CHAPTER – 10

ENVIRONMENTAL MANAGEMENT PLAN

10.1  INTRODUCTION
Industrial development is associated with a few positive and negative impacts on the environment. The negative impacts should not hinder industrial development but they should be properly mitigated.

An environmental management plan (EMP) has been prepared for the proposed plant, M/s. Numaligarh Refinery Limited to minimize negative impacts and is formed on the basis of prevailing environmental conditions and likely impacts of this project on various environmental parameters. This plan will also facilitate monitoring of environmental parameters.

Preparation of Environmental Management plan is required for the formulation, implementation and monitoring of environmental protection measure. EMP includes schemes for proper and scientific treatment and disposal mechanism for air, liquid and solid hazardous pollutants. Apart from this, green belt development, safety aspect of the workers, noise control, fire protection etc. are also included in it. The various components of the EMP are outlined in subsequent sections.

10.2  PURPOSE OF ENVIRONMENTAL MANAGEMENT PLAN
Various purposes of the environmental management plan are:

- To treat and dispose off all the pollutants viz. liquid, gaseous and solid waste so as to meet statutory requirements (Relevant Pollution Control Acts) with appropriate technology.
- To support and implement work to achieve environmental standards and to improve the methods of environmental management.
- To promote green-belt development.
- To encourage good working conditions for employees.
- To reduce fire and accident hazards.
- Budgeting and allocation of funds for environment management system.
- To adopt cleaner production technology and waste minimization program.

10.3  DETAILS OF ENVIRONMENTAL MANAGEMENT PLAN

10.3.1  DURING CONSTRUCTION PHASE

10.3.1.1  AIR ENVIRONMENT
Construction phase will be for a short period and hence the impacts will also be for a short and temporary period. During construction activities, mainly emission of dust and gases from movement of vehicles and construction activity is expected. However, following measures will be taken to reduce/contain such emissions:

- Preparation of paved internal movement roads will be taken up at the initial stage of civil construction work.
- Water will be sprinkled on loose top soil to prevent re-suspension of dust into ambient air due to movement of vehicles etc.
- Separate civil construction material storage yard will be created within the site and it will be enclosed.
- Possibility of raising green belt along with construction activity will also be explored.
- Transport vehicles and construction equipments / machineries will be properly maintained to reduce air emissions.
- Vehicles and equipments will be periodically checked for pollutant emissions against stipulated norms.
- Idle running of vehicles will be minimized during material loading / unloading operations.
- Exhaust vent of D.G. set will be kept at proper height to ensure quick dispersal of gaseous emissions.
- All construction workers will be provided appropriate PPEs like dust mask, ear plug, helmet, safety belt etc. and made to wear them during working hours.
10.3.1.2 WATER ENVIRONMENT
Water quantity being small, no major impact on existing water resources of the study area is envisaged. Further, there will be no housing facilities at site for construction workers and hence a major source of impact on water environment will be avoided. Proper and sufficient sanitary facilities will be provided to construction workers to maintain all hygienic conditions at site. Storm water drain compatible with the local hydrological pattern of the area, will be provided to carry – off, any run - off or storm water from the premises. Care should be taken during construction work & will nor create any obstruction/dips in the topography which can lead to accumulation of water within premises leading to undesirable consequences like health and hygiene problems etc.

10.3.1.3 SOLID WASTE
Main solid waste generation during construction phase will be construction debris like rubble, brick bats, debris, steel scrap, wooden scrap, sand, gravel etc. However, these materials are inert in nature and will not result into leaching of any substance or constituent. These materials will be properly sorted and will be used within premises for filling of low lying areas. Wooden scrap, steel scrap will be given to scrap dealers. On completion of civil work, all debris etc. will be completely removed from site to avoid any incompatibility with future use.

10.3.1.4 NOISE ENVIRONMENT
Following measures are proposed during construction period to mitigate adverse impacts:
- Construction machinery and vehicles will undergo periodic maintenance to keep them in good working condition.
- All machineries to be used for construction purpose will be of highest standard of reputed make and compliance of noise pollution control norms by these equipments will be emphasized by company.
- Feasibility of putting up acoustic enclosure / temporary barrier around areas with high noise levels will also be explored.
- All construction workers working in high noise areas will be provided appropriate PPE,s like ear muffs and made to wear them during working hours.
- Possibility of raising green belt along with construction activity will also be explored so as to serve as a noise barrier.

10.3.1.5 LAND ENVIRONMENT
Following steps are proposed to take care of impact of construction activity on project land area:
- On completion of civil works, all debris etc. will be completely removed from site to avoid any incompatibility with future use.
- Other materials like paints; diesel etc. will be properly stored and handled to prevent any spillage on land.
- All the wastes will be stored at a designated site within the premises to prevent scattered discharge on land.

10.3.1.6 ECOLOGY
As the Project site is having few shrubs and no major cutting exercise will be there and hence no major impact on ecology is anticipated. However, possibility of rising of green - belt along with construction activity will be explored so that greening of area can be started at the beginning of project.

10.3.1.7 SOCIO-ECONOMIC
As there will be no temporary housing colony for construction workers, neither socio - economic impact due to the same is envisaged. Overall socio - economic effect of construction phase will be positive due to direct and indirect employment opportunity for the local livings. Local people from nearby villages of the surroundings of the site will be employed for construction work to the maximum extent possible.
10.3.2 DURING OPERATION PHASE
Operation phase of any industry being longer in duration and because of its potential to create continuous impacts is quite important from the impact point of view. Comprehensive and effective EMP has to be prepared and implemented to safe-guard environmental concerns during operation phase of any unit.

10.3.2.1 AIR ENVIRONMENT
The air pollutants in the plant may be classified broadly into particulate matter like dust, fumes etc. and gases like Sulphur dioxide, carbon mono oxide, nitrogen oxide etc. The measure to control the air pollution will ensure the ambient air quality standards as laid down by Central Pollution Control Board for industrial areas.

The system proposed for air pollution control will provide acceptable environment condition in the working areas and abate air pollution in the surrounding area of the plant. The technological equipment and processes have been selected with the above objectives. Depending on quality of emission from different sources, suitable air pollution control system will be provided. The chimney height will be as per CPCB norms to ensure ground level concentration of different pollutants within permissible limit.

Dust collection equipment such as fabric filter/Electro Static Precipitator, etc. will be adopted to remove particulate matter from gas streams.

Following measures are proposed to mitigate negative impact of operation phase of the project on the surrounding air environment:

- Height of the stacks will be as per statutory requirement. Stack will have stack monitoring facility (SMF) consisting of sampling port-hole, platform and access ladder.
- Apart from above continuous online monitoring system (24x7 monitoring device) will be installed to stack attached to CHP plant.
- Adequate spares of critical components of dust collection systems will be kept to ensure trouble-free operations and continuous compliance to emission norms.
- Transport vehicles will be properly maintained to reduce air emissions.
- Vehicles will be periodically checked for pollutant emissions against stipulated norms.
- Idle running of vehicles will be minimized during material loading / unloading operations.

10.3.2.2 CONTROL AND MONITORING OF SECONDARY FUGITIVE EMISSIONS
Fugitive emissions from the proposed bamboo based distillery plant would be evaporation of wastewater, volatization of Ethanol from process & storage tanks, dust from stock piles, Spills and material handling and open vessel, dust caused by vehicular traffic.

For effective prevention and control of fugitive emissions, company shall implement the followings:

- All the equipment and tanks in the acidic part of the process are closed and connected to a vent gas collection system.
- Leaks are eliminated by maintaining a slight vacuum inside the equipment and tanks.
- The vent vapors are collected, condensed and washed with a scrubber (e.g. a packed-bed scrubber/absorber). The condensed water and acids are returned to the process.
- Fugitive from during fermentation and ethanol separation will be control as above without condensing the vapours.
- Storage area shall be clearly earmarked.
- Enclosure shall be provided for all the loading & unloading operations, if possible.
- All transfer points shall be fully enclosed.
- Airborne dust shall be control by sprinkling of water.
- All roads shall be paved on which movement of raw materials or products will take place.
- Preventive measures shall be employed to minimize dust build up on road.
- Maintenance of air pollution control equipment shall be done regularly.
- Green belt will be developed around the plant to arrest the fugitive emissions.
- Regular training shall be given to the personnel operating and maintaining fugitive emissions control systems.

The fugitive emission will be monitored at following locations within plant area as per CPCB/SPCB guidelines, details of such locations is given in table-10.1.
TABLE - 10.1 LOCATION OF FUGITIVE MONITORING

<table>
<thead>
<tr>
<th>SR.NO.</th>
<th>MONITORING LOCATION/AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Raw material handling</td>
</tr>
<tr>
<td>2.</td>
<td>Processing area</td>
</tr>
<tr>
<td>3.</td>
<td>Near fly ash storage area</td>
</tr>
</tbody>
</table>

10.3.2.3 WATER ENVIRONMENT

Total water requirement for the proposed project would be 2,224 KLPD which will be sourced from existing source i.e. Dhansiri river.

- Water conservation measures shall be taken to optimize the fresh water requirement. Moreover, record of water consumption shall be maintained.
- Spent wash holding tank of 6,500 m³ shall be provided considering 5 day retention time with HDPE lining as per CPCB guidelines.
- Two piezometer well are proposed for Regular monitoring of ground water around spent wash holding tank.
- Proper and sufficient sanitary facility will be provided to construction workers to maintain hygienic conditions at site. The sewage will be disposed off through septic tank followed by soak pit/well.
- Philosophy of maximum recycling and reuse of treated waste water within the plant will be adopted to minimize consumptive water requirements and to achieve “zero” effluent discharge from the plant.
- Adequate spares for effluent collection, handling, treatment and disposal system shall be maintained.
- Records of analysis results of treated and untreated wastewater should also be maintained.
- Record of the wastewater generation and recycle shall be maintained on printed logbook/computer.
- Proper housekeeping shall be adopted to prevent spillages and contaminated surface runoff going to storm water drains.

RAIN WATER HARVESTING SCHEME:

Rain Water Harvesting is a way to capture the rain water when it rains, store that water above ground or charge the underground and use it later. There are a number of types of systems to harvest rainwater ranging from very simple to the complex industrial systems. Generally, rainwater is either harvested from the ground or from a roof. The rate at which water can be collected from either system is dependent on the plan area of the system, its efficiency, and the intensity of rainfall.

To improve ground water table, it is proposed to recharge the water through rain water harvesting system.

**Storm Water Drainage Line:** Channels will be installed wherever required to collect and transport rain water to the storage tank. Drainage will be semi-circular and will be made using Galvanized Iron sheet folded to required shapes. Drainages will be fixed using Iron Brackets.

**Conduits:** Pipes will be used to carry rain water from catchment to the recharge pit, passing through filter. A valve will be put at the end of wall for first flushing.

**Filter:** Sand Filter will be used to remove suspended pollutants from the rainwater.

**Recharge:** After filtration, water will be recharged using percolation pit, filled with pebbles or brick and river sand and covered with perforated concrete slabs. Depth of recharge pit will be designed according to Water table of the area.
10.3.2.4 SOLID WASTE
Solid wastes shall be generated in the form bamboo based distillery would be on Ash from the boiler. Following steps shall be taken to manage fly ash;
- Ash will be stored in ash pond area of about 1,070 sq.m.
- Ash will be utilized as manure or sold to the cement or brick manufacturer.
- Record of solid waste generation and disposal shall be maintained on printed logbook.
- All Necessary precaution shall be taken during handling, loading and unloading of solid waste.
There will be no major generation of hazardous waste from the project. A small quantity of used lubricating oil will also be generated which will be properly stored and sold to authorized recyclers/re-processors.

10.3.2.5 NOISE ENVIRONMENT
Following precautionary measures will be adopted to control the noise level:
- Noise generating sources and their platforms will be maintained properly to minimize noise vibrations generated by them
- Personnel working near the noisy machines in different plant locations, will be provided with well designed ear muffs / plugs (effective noise reduction 10-15 dBA)
- Green belt will be developed to act as a noise barrier.
- Noise barriers/ shields in the form of walls, beams will be provided around the units wherever found feasible
- Training to personnel will be imparted to generate awareness about effects of noise and importance of using PPEs.
- Regular monitoring of noise levels will be carried out and record will be maintained.

10.3.2.6 LAND ENVIRONMENT
There will be no major generation of hazardous waste from the project except Ash and a small quantity of used lubricating oil. Ash will be utilized as manure or sold to the cement or brick manufacturer and spent/used oil sold to authorized recyclers/re-processors. There will be no disposal of industrial effluent on land as small quantity of treated industrial effluent will be re-used.

10.3.2.7 BIOLOGICAL ENVIRONMENT
10.3.2.7.1 GREEN BELT DEVELOPMENT
Green belt with properly selected plant species can serve as a useful buffer to contain the menace of pollution from the different sources. As a control measure of atmospheric pollution, as a barriers noise generated in the plant premises and to utilize the wastewater generated as treated effluent, it is recommended to develop vast green belt around the periphery of the plant, along the road side and other area available for the plantation. Total 34,700 sq. m. of land are earmarked in the layout plan for the development of green belt.

Guidelines for plantation
The plant species identified for greenbelt development shall be planted using pitting technique. The pit size will be either 45 cm x 45 cm x 45 cm or 60 cm x 60 cm x 60 cm. bigger pit size will be considered at marginal and poor quality soil. Soil used for filling the pit should be mixed with well decomposed farm yard manure or sewage sludge at the rate of 2.5 kg (on dry weight basis) and 3.6 kg (on dry weight basis) for 45cm x 45 cm x 45 cm and 60 cm x 60 cm x 60 cm size pits respectively. The filling of soil should be completed at least 5-10 days before actual plantation. Healthy sapling of identified species should be planted in each pit with the commencement of monsoon. Provision for regular and liberal watering during the summer period during the commissioning stage of the plant will be arranged from the local available resources. The authorities responsible for plantation will also make adequate measures for the protection of the saplings.
While making choices of plant species for cultivation in green belts, weightage has been given to the natural native species, bio climatic condition, plants which can be grown as per normal horticultural practices.
10.3.2.7.2 RECOMMENDED PLANTS FOR GREEN BELT DEVELOPMENT
Greenbelt is an effective mode of control of air pollution, where green plants form a surface capable of absorbing air pollutants and forming a sink of pollutants. Leaves with their vast area in a tree crown, sorbs pollutants on their surface, thus effectively reduce pollutant concentration in the ambient air. Often the adsorbed pollutants are incorporated in the metabolic pathway and the air is purified. Plants grown to function as pollution sink are collectively referred as greenbelts.

An important aspect of a greenbelt is that the plants are living organism with their varied tolerance limit towards the air pollutants. A green belt is effective as a pollutant sink only within the tolerance limit of constituent plants. Planting few, known pollutant sensitive species along with the tolerant species within a green belt however, do carry out an important function of indicator species.

Apart from function as pollution sink, greenbelt would provide other benefit like aesthetic improvement of the area and providing suitable habitats for birds and animals.

10.3.2.7.3 SELECTION OF PLANTS FOR GREEN BELTS
The main limitation for plants to function as scavenger of pollutants are, plant’s interaction to air pollutants, sensitivity to pollutants, climatic conditions and soil characteristics. While making choice of plants species for cultivation in green belts, due consideration has to be given to the natural factor of bio-climate. Xerophytes plants are not necessarily good for greenbelts; they with their sunken stomata can withstand pollution by avoidance but are poor absorber of pollutants.

Character of plants mainly considered for affecting absorption of pollutant gases and removal of dust particle are as follows.

For Absorption of Gases:
- Tolerance towards pollutants in question, at concentration, that are not too high to be instantaneously lethal
- Longer duration of foliage
- Freely exposed foliage
- Adequate height of crown
- Openness of foliage in canopy
- Big leaves (long and broad laminar surface)
- Large number of stomatal apertures

For Removal of Suspended Particulate Matter
- Height and spread of crown.
- Leaves supported on firm petiole
- Abundance of surface on bark and foliage
- Roughness of bark
- Abundance of axillary hairs
- Hairs or scales on laminar surface
- Protected Stomata

10.3.2.7.4 PLANTATION ALONG ROAD SIDES
Automobiles are the source of pollution of gaseous and particulate pollutants. Component of green belt on road side hence should be with both absorbers of gases as well as of dust particles. The choice of plants for road side should include shrubs of height 1 to 1.5 meter and trees of 3-5 meter height. Medium sized trees, alternating with shrubs are ideal for sorption of particulates and gases, as the company is doing the same in existing plant. The budgetary plan is given in the table-10.2.
TABLE-10.2  BUDGETARY OUTLETS OF GREENBELT DEVELOPMENT FOR FIVE YEARS

<table>
<thead>
<tr>
<th>No.</th>
<th>YEAR</th>
<th>NO. OF PLANTS</th>
<th>BUDGET (IN INR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1st Year</td>
<td>6,000</td>
<td>1,50,00,000</td>
</tr>
<tr>
<td>2.</td>
<td>2nd Year</td>
<td>4,000</td>
<td>1,00,00,000</td>
</tr>
<tr>
<td>3.</td>
<td>3rd Year</td>
<td>3,000</td>
<td>75,00,000</td>
</tr>
<tr>
<td>4.</td>
<td>4th Year</td>
<td>2,000</td>
<td>50,00,000</td>
</tr>
<tr>
<td>5.</td>
<td>5th Year</td>
<td>1,000</td>
<td>25,00,000</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>16,000</td>
<td>4,00,00,000</td>
</tr>
</tbody>
</table>

10.3.2.8  SOCIO - ECONOMIC ENVIRONMENT

A comprehensive plan for Socio - economic uplift of the area has been prepared by M/s. Numaligarh Refinery Limited and presented in chapter-7.

10.3.2.9  OCCUPATIONAL HEALTH SURVEILLANCE PROGRAMME

Health hazards associated with the occupation are called occupational hazards. In chemical industry, due to handling of toxic and hazardous chemicals there are possibilities of developing occupational diseases. Company shall carry out the following checks to curb the problem:

i) Pre - employment medical checkup at the time of employment.

ii) Annual medical checkup shall be done for all employees.

<table>
<thead>
<tr>
<th>Nature of Laboratory examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Blood</td>
</tr>
<tr>
<td>ii) Urine</td>
</tr>
<tr>
<td>iii) Stool</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Radiological (X-Ray)</th>
</tr>
</thead>
</table>

| Audiometric                     |

<table>
<thead>
<tr>
<th>Occupational diseases suspected</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Occupational diseases detected</th>
</tr>
</thead>
</table>

| No. of workers declared unfit for further work |
|                                               |

| Others (clinical exam)                    |

10.3.2.10  TRAFFIC MANAGEMENT FOR RAW MATERIAL AND PRODUCT HANDLING

In the proposed project 49 thousand tonnes per annum Ethanol will be manufactured using around 3 lac tonnes per annum Bamboo. As proposed Bamboo will be procured from the Assam, Nagaland, Arunachal Pradesh and Meghalaya through road. On the other part, Ethanol produce will also be distributed in the region through existing setup. This will increase traffic on the existing transportation route as well as at the plant area. To manage traffic following measures are proposed.

- Access to proposed Bio-refinery will be provided through existing refinery complex at NRL to minimize impact in the vicinity.
- Possibility of transporting raw-material through rail route will be explored.
- Major product, i.e. ethanol will be consumed internally at NRL for MS production Hence requirement of external MS blend component will come down drastically. This will reduce truck/tanker movement
- Existing rail gantry at NRL will be used for dispatch of by-products.
- Exiting truck parking area will be adequate for by-products trucks transporting by-products.

10.3.2.11  GENERAL CONSIDERATIONS

For good housekeeping of the proposed project, following measures will be planned:

- Maintaining cleanliness of roads to prevent accumulation of dust and waste material.
- Inculcating positive attitude among employees for good house-keeping.
- Maintaining hygienic conditions in canteens, near drinking water source and toilets.
10.3.2.12 CONCEPT OF WASTE-MINIMISATION, RECYCLE/REUSE/RECOVER TECHNIQUES, ENERGY CONSERVATION, AND NATURAL RESOURCE CONSERVATION

**Waste-minimization:** Process optimization by using latest technology equipment.

**Recycle/reuse/recover:** Wastewater generated from the process and other sources shall be reutilized in the process and or shall be used for Cooling tower make up, green belt development, dust suppression and fire water makeup after giving suitable treatment.
Biocoal and Stillages generated from the process shall be use as a fuel in the CHP plant to generate steam and power. Boiler ash utilized as manure or sold to the cement or brick manufacturer and spent/used oil sold to authorized recyclers/re-processors.

**Energy Conservation Measures:** Latest Technology has been selected for distillation process consuming optimal energy. In order to conserve Energy, the following measures have been taken right at the time of selection of Equipments and Technology:
- To go for highly energy efficient Electrostatic Precipitator and Bag Filters
- To go for automatic system for plant functioning
- False leakages in the plant will be arrested by carrying out regular checks.

**Natural Resource Conservation:** Biocoal and Stillages generated from the process shall be use as a fuel as a replacement of coal in the CHP plant to generate steam and power.
To conserve water rain water harvesting will be carried out to store rain water for future use and also to recharge ground water. Recycling of process water shall be done up to the extent possible to reduce the fresh water demand.

### 10.4 ENVIRONMENTAL MANAGEMENT CELL

In addition to preparing an EMP, it is also necessary to have a permanent organizational set up to ensure its effective implementation. Hence, proposed project will create a team consisting of officers from various departments to co-ordinate the activities concerned with management and implementation of the environmental control measures as per existing refinery project. This team will undertake the activity of monitoring the stack emissions, ambient air quality, noise level etc. either departmentally or by appointing external agencies wherever necessary. Regular monitoring of environmental parameters will be carried out to find out any deterioration in environmental quality and also to take corrective steps, if required, through respective internal departments.

The Environmental Management Cell will also collect data about health of workers, green belt development etc. Organogram of the Environmental Management Cell is presented in figure-10.1.

#### FIGURE - 10.1 AN ORGANOGRAM OF ENVIRONMENT MANAGEMENT CELL

![Organogram](image-url)
The cell will also be responsible for monitoring of the plant safety and safety related systems which include:

- Checking of safety related operating conditions.
- Visual inspection of safety equipments.
- Preparation of a maintenance plan and documentation of maintenance work specifying different maintenance intervals and the type of work to be performed.

Other responsibilities of the cell will include:

- Conduct and submit annual Environmental Audit. A SPCB registered agency will be retained to generate the data in respect of air, water, noise, soil and meteorological data and prepare the Environmental Audit report. Timely renewal of Consolidated Consents & Authorization (CC & A) will also be taken care of.
- Submitting environmental monitoring report to SPCB. Data monitored by the cell will be submitted to the Board regularly and as per the requirement of SPCB. The cell will also take mitigative or corrective measures as required or suggested by the Board.
- Preparing and submitting six monthly Compliance report on conditions stipulated environmental clearances as per EIA notification, in hard and soft copy on 1st December and 1st June of every calendar year to the monitoring agencies.
- Keeping the management updated on regular basis about the conclusions / results of monitoring activities and proposes measures to improve environment preservation and protection.
- Conducting regular safety drills and training programs to educate employees on safety practices. A qualified and experienced safety officer will be responsible for the identification of the hazardous conditions and unsafe acts of workers and advise on corrective actions, organize training programs and provide professional expert advice on various issues related to occupational safety and health.
- Conducting safety and health audits to ensure that recommended safety and health measures are followed.

10.5 ENVIRONMENTAL POLICY

Numaligarh Refinery Limited operating petroleum refinery unit at adjacent to proposed project location, and it has well laid health, Safety and Environment (HSE) Policy. This HSE policy is present in following figure-10.2, which will be followed in the proposed Bamboo based distillery unit.

10.6 REPORTING SYSTEM TO THE DIRECTORS

A fully functional, dedicated environment management cell manned by qualified engineers/officers and headed by a Deputy General Manager (Technical) reporting to General Manager (Technical) has been continuously working for constant improvement, monitoring, safe guarding and reporting of environmental activities of the refinery. Also, a multidisciplinary Apex-level Committee on Environment which includes senior level officers from various departments as members under the chairmanship of Director (Technical) constantly guides the Environment Cell regarding all the environmental issues in the refinery. The Apex Committee that convenes quarterly discusses the unresolved issues if any, regarding the environment and monitors the regular environmental activities.

10.7 BUDGETARY PROVISIONS FOR EMP

Adequate budgetary provisions have been made by management for execution of environmental management plans. The details of capital and recurring (per annum) budget earmarked for pollution control / monitoring equipment; operation and maintenance of pollution control facilities, for greenbelt development and maintenance will be as given in table-10.3 and 10.4 respectively.

**TABLE - 10.3 CAPITAL COST OF ENVIRONMENTAL PROTECTION MEASURES**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Particulars</th>
<th>Capital Cost (Rs. In Crore)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Air Pollution Control (A)</td>
<td>3.5</td>
</tr>
<tr>
<td>1.1</td>
<td>Electro static precipitator</td>
<td>2.0</td>
</tr>
<tr>
<td>1.2</td>
<td>Low NOX burners</td>
<td>0.5</td>
</tr>
</tbody>
</table>
### TABLE - 10.4 RECURRING COST OF ENVIRONMENTAL PROTECTION MEASURES

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Particulars</th>
<th>Recurring Cost (Rs. In Lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Air Monitoring Activities</td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>Stack Emissions</td>
<td>40.0</td>
</tr>
<tr>
<td>1.2</td>
<td>Ambient Air Monitoring</td>
<td>20.0</td>
</tr>
<tr>
<td>1.3</td>
<td>VOC monitoring</td>
<td>30.0</td>
</tr>
<tr>
<td>1.4</td>
<td>Other recurring cost (consents)</td>
<td>30.0</td>
</tr>
<tr>
<td>1.5</td>
<td>AMC for Pollution Control Analyzers</td>
<td>40.0</td>
</tr>
<tr>
<td></td>
<td><strong>Total (A)</strong></td>
<td><strong>160.0</strong></td>
</tr>
<tr>
<td>2</td>
<td>Water Monitoring Activities</td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Water Quality Monitoring</td>
<td>20.0</td>
</tr>
<tr>
<td>2.2</td>
<td>RO DM O&amp;M</td>
<td>70.0</td>
</tr>
<tr>
<td>2.3</td>
<td>Raw Water Treatment O&amp;M</td>
<td>80.0</td>
</tr>
<tr>
<td>2.4</td>
<td>Effluent Treatment O&amp;M</td>
<td>70.0</td>
</tr>
<tr>
<td>2.5</td>
<td>Other recurring cost (cess, Consents)</td>
<td>30.0</td>
</tr>
<tr>
<td>2.6</td>
<td>Rain water harvesting</td>
<td>30.0</td>
</tr>
<tr>
<td>2.7</td>
<td>Membranes, Carbon Media Replacement</td>
<td>70.0</td>
</tr>
<tr>
<td></td>
<td><strong>Total (B)</strong></td>
<td><strong>370.0</strong></td>
</tr>
<tr>
<td>3</td>
<td>Noise Monitoring Activities</td>
<td></td>
</tr>
<tr>
<td>3.1</td>
<td>Ear Plugs, Ear Muff, Soft Sponge</td>
<td>10.0</td>
</tr>
<tr>
<td>3.2</td>
<td>OHC staff for noise monitoring</td>
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<td></td>
<td><strong>Total (C)</strong></td>
<td><strong>30.0</strong></td>
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<td>4</td>
<td>OHC Monitoring Activities</td>
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<td>4.1</td>
<td>OHC staff &amp; officers</td>
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<tr>
<td>4.2</td>
<td>ARC for OHC lab tests</td>
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<td><strong>Total (D)</strong></td>
<td><strong>30.0</strong></td>
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<td>5</td>
<td>Land Monitoring Activities</td>
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<td>5.1</td>
<td>Soil testing</td>
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<td>5.2</td>
<td>Ground Water Quality</td>
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<td>5.3</td>
<td>Sludge management</td>
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<td>5.4</td>
<td>Tree Plantation-Green belt</td>
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<td></td>
<td><strong>Total (E)</strong></td>
<td><strong>125.0</strong></td>
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<td></td>
<td><strong>Grand Total (A+B+C+D+E)</strong></td>
<td><strong>715.0</strong></td>
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NUMALIGARH REFINERY LIMITED

HEALTH, SAFETY AND ENVIRONMENT POLICY

Commitment

Together, we have the highest concern and commitment for protecting the Health and Safety of all employees, contractors, contractor’s employees, customers and the communities in which we operate and for conservation of the Environment. We will comply with all Statutory Regulations and may even go beyond these for the benefit of our environment. We consider Health, Safety and Environmental aspects are an integral part of our business planning and operation process.

Policy

Based on these guiding principles, we shall:

Demonstrate our commitment by.....

- Providing and maintaining safe facilities and working conditions.
- Recognising that all employees have responsibility for their own safety and actions which could affect the safety of others.
- Adoption of appropriate technologies to minimise the impact of our activities on the Environment.

Establish clear objectives and targets to.....

- Improve continuously for prevention of accidents & occupational illnesses and minimising any impact of our activities on the environment.
- Promote learning through training and sharing of experiences and best practices; including with contractors, customers and the public, wherever required.
- Including values and attitudes conducive to achieve excellence in Health, Safety and Environmental performance.

Provide means to achieve our mission by.....

- Assigning clear roles and responsibilities at all levels and periodically reviewing and recognising contribution to HSE objectives.
- Allocating adequate resources.
- Fostering a spirit of participation by all employees in Health, Safety and Environmental conservation efforts.
- Creating appropriate forums for deliberations on Health, Safety and Environmental issues.

Monitor performance by....

- Periodically auditing work processes, systems & practices and promptly correcting deficiencies.
- Incorporating HSE performance as a parameter for assessing the overall performance of Employees, Business Units, Contractors Contractor’s Employee and Business Associates.

> The above shall be applicable in all the installation of NRL.

Sona Tam Medhi
Director (Technical)