



NIRMA LTD.

**EXECUTIVE SUMMARY
OF
ENVIRONMENTAL IMPACT ASSESSMENT AND
ENVIRONMENTAL MANAGEMENT PLAN
FOR
THE PROPOSED CEMENT PLANT (CEMENT 1.91
MTPA, CLINKER 1.5 MTPA), CAPTIVE POWER
PLANT (50 MW) AND COKE OVEN PLANT
(1.5 LAKH TPA)
AT
VILLAGE PADHIARKA,
TALUKA MAHUVA, DISTRICT BHAVNAGAR,
GUJARAT**

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approved company

**EXECUTIVE SUMMARY
OF
EIA/EMP FOR
CEMENT PLANT, CAPTIVE POWER PLANT AND COKE OVEN
PLANT OF NIRMA LTD.
AT
VILLAGE PADHIARKA, MAHUVA TALUKA
BHAVNAGAR DISTRICT, GUJARAT**

1.0 INTRODUCTION

1.1 General background

Nirma Ltd. is a part of the Nirma Group, engaged in the business of consumer products like Soap, Detergent and Industrial products like Sulphuric acid, Oleum, Distilled Fatty acids, Linear Alkyl Benzene, Soda ash (Light & Dense), Salt etc.

This Group came in existence in the year 1980 and since then continuously expanding its wings for increase in production capacities and diversification. It has about 14,000 employee-base and annual turnover of around Rs. 3500 Crores.

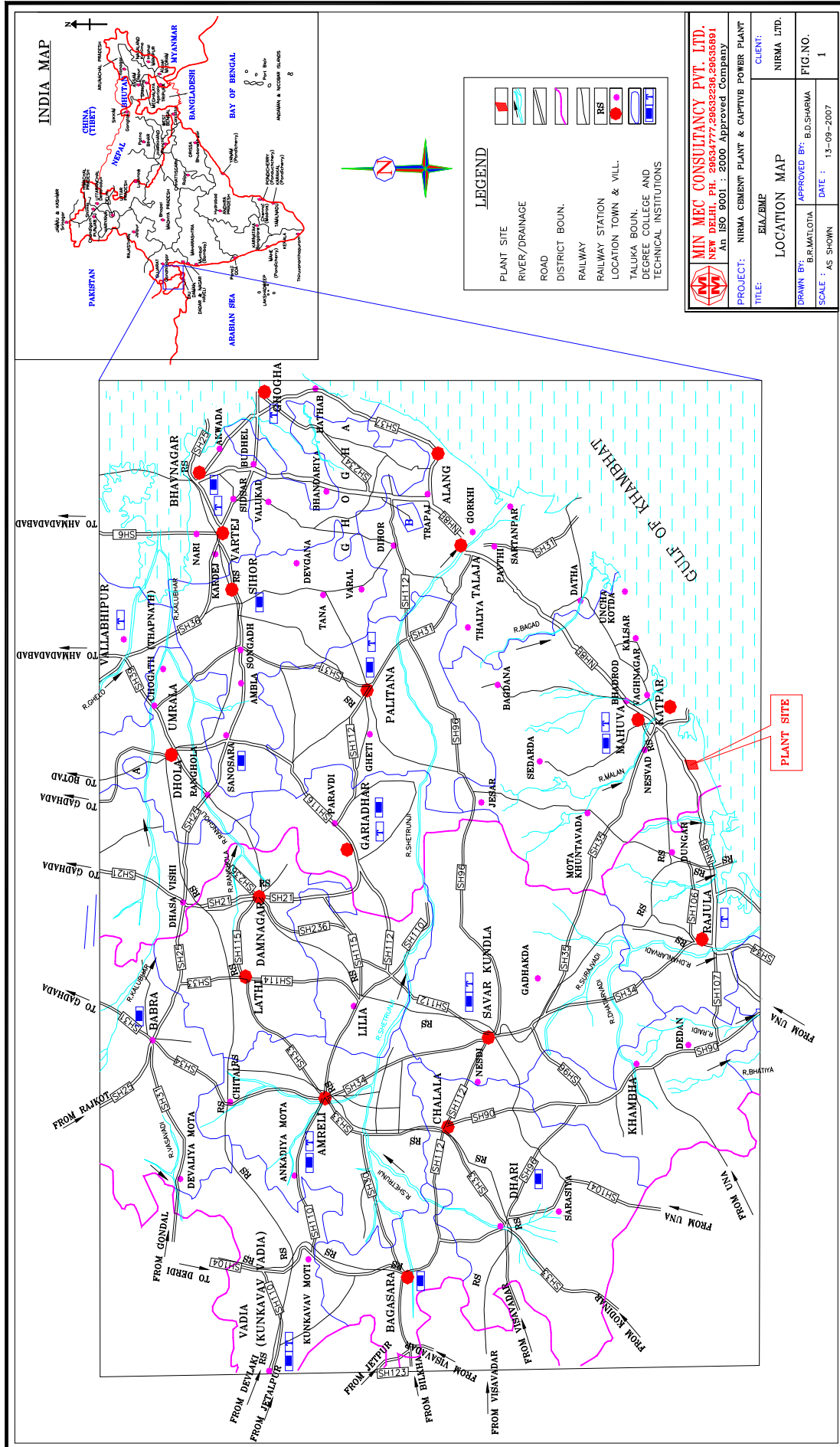
1.2 Location and communication

The plant site is located in 280 ha. near village Padhiarka, Taluka Mahuva, District Bhavnagar, Gujarat. The location of plant and study area can be seen in Survey of India Topo sheet No. 41. The location plan is shown in **Fig 1**. The plant site is located between Latitude 21° 01' N and Longitude 71° 40' E.

The site is accessible through road by national highway NH-8E (coastal highway), which is at a distance of 1.0 km from the proposed site. The nearest railway station is Mahuva which is at a distance of 15 km in north east from the site and nearest airport is at Bhavnagar about 100 km from the site in north east direction.

2.0 PROJECT DESCRIPTION

Nirma Limited (NL) proposes to set up a cement plant (cement 1.91 MTPA, 1.5 MTPA clinker), coke oven plant (capacity 1.5 Lakh TPA) and a captive power plant (capacity 50 MW) at village Padhiarka, 15 km from Taluka headquarters Mahuva in district Bhavnagar of Gujarat.



Salient features of the project are given below:

Sl. No.	Particulars	Details
1	Company Name	Nirma Ltd.
2	Location	Village Padhiarka, Taluka Mahuva, District Bhavnagar, Gujarat
3.	Plot Area	280 ha.
4	Product	Cement & clinker, coke
5	Raw materials	Limestone (high grade, cement grade, marly), sand, clay, fly ash, lithomargic clay, gypsum, Coal
6	Process Water consumption	8500 m ³ /day
7	Seawater consumption	20000 m ³ /hr
8	Source of water	Sea water/ Narmada Pipeline
9	Net Power consumption	44 MW
10	Source of power	Proposed 50 MW Coal based Captive Power Plant and/or 66 kV grid substation of Gujarat State Electricity Board (GSEB). DG Set –5 MW (in case of emergency)
11	Proposed Project Cost	Rs. 893.52 Crores

2.1 Process description

2.1.1 Cement Manufacturing Process:

The different steps involved in manufacture of cement from limestone, clay, laterite, gypsum and coal/lignite are as follows:

- a) Limestone crushing
- b) Raw material grinding
- c) Kiln feed and pre-heaters
- d) Pre-heating system
- e) Clinker storage and transport
- f) Cement grinding
- g) Cement Transport, Storage and packing
- h) Coal mill & fuel unloading, storage and crushing

The main raw material, limestone, is obtained from the captive mines located nearby the plant. In these captive mines, cement grade limestone is available and a very little quantity of additive is to be obtained from outside.

The proposed manufacturing process, based on dry process technology consists of essentially two steps:

- a. A finely ground mixture (raw mix) of limestone, laterite and clay materials with a small amount of fluxing material is heated to a high temperature to form clinker.
- b. The clinker is finely ground along with gypsum, with or without pozzolonic materials to produce cement of different grades.

2.1.2 Coke Oven process:

For the production of the Coke, process adopted will be Energy recovery / Non recovery type coke making. In this process volatiles evolved during coal carbonization are not recovered as by-products but are combusted completely in presence of controlled quantity of air and the heat of the volatiles of evolving gases is utilized for coking the coal mass into coke and thus no external heating is required. The balance heat in waste flue gas gainfully utilized for energy generation. Process produces high quality low ash metallurgical coke for a given coal blend.

3.0 PRESENT ENVIRONMENTAL SCENARIO

3.1 Topography and drainage

The topography of the study area is generally plain with minor undulations. The land acquired for the project is barren and low lying land, which will be changed to industrial area. The core zone elevation is ranging between 8-10 m above MSL and in buffer zone elevation is ranging 0-55m MSL.

Malan River is present at North east part of the study area at a distance of 9.5 km (aerially). Narmada water pipeline is present approximately 10 km from the proposed plant. The distance of Arabian Sea is 3.5 km in the south of the study area. Since the project area is a low-lying area, a suitable drainage system will need to be constructed to avoid flooding. The rainfall is very scanty with the average annual rainfall being 618.2 mm.

3.2 Climate

The climate of the district is arid with large annual variations in rainfall and moderate humidity. The area experiences extreme climate conditions. January is the coldest month, with the temperature falling below 4°C. May is the hottest month of the year, when the maximum ambient temperature exceeds 40°C. As per the climatological table for Bhavnagar Meteorological station, the average annual rainfall (1993 to 2004) in the area is 618.2 mm. The period from June to September accounts for more than 95% of total annual rainfall.

3.3 Micro-meteorological survey

Micro-meteorological survey was undertaken for monitoring wind speed, wind direction, ambient air temperature and relative humidity for the summer season during 1st March, 2007 to May 31st, 2007 in the study area. The summary of monitoring is given below:

Particulars	Maximum	Minimum	Average
Temperature (°C)	40.90	23.70	33.25
Relative humidity (%)	94.00	24.60	55.78
Wind speed (km/hr)	29.40	0.00	3.48
Predominant wind direction	Predominant wind direction is from SW (78.99%)		

3.4 Ambient air quality

Ambient air quality study was carried out from 01.03.2007 to 31.05.2007 (summer season) at five sampling stations within the study area using a Respirable Dust Sampler. The locations were the core zone, Padhiarka, Vangar, Samadiyala, and Dudhala. The concentration of RPM was found between 31 to 67 $\mu\text{g}/\text{m}^3$, SPM between 76 to 166 $\mu\text{g}/\text{m}^3$, SO_2 is found to be between 5.1 to 10.4 $\mu\text{g}/\text{m}^3$, NO_x between 6.5 to 13.8 $\mu\text{g}/\text{m}^3$ and CO less than 1000 $\mu\text{g}/\text{m}^3$.

3.5 Water environment

3.5.1 Ground water and hydrogeology

The area is underlain by the aeolian deposit of recent age micritic limestone. The thickness of windblown sand varies between 2-10m. The sand dunes are present in isolated patches. The soil cover having thickness of 0.5 to 5m constituting black cotton soil is invariably present overlying the limestone.

The geomorphology is the main controlling factor for occurrence and movement of ground water. The water table lies between 10-15 m below the ground. The ground water storage in the area gets charged through rainfall alone. The non-monsoon rainfall is much lower than potential evapotranspiration rate. Therefore, it may not contribute any recharge to ground water storage. Probable recharge to groundwater storage would be around 15.4MCM. The ground water flows towards the sea in the south. The entire recharge to ground water is ultimately lost to sea.

3.5.2 Surface water and hydrology

The study area is devoid of any drainage. Malan River is present at North east part of the study area at a distance of 9.5 km (aerially). Narmada water pipeline is present approximately 10 km from the proposed plant. The nalas and river hold some water only during monsoon season and remain dry during the remaining months of the year.

3.5.3 Water quality

Water samples from 10 locations were collected and analysed in the laboratory of Consulting Group. The result shows that parameters like colour, odour, taste and turbidity, calcium, copper, manganese, sulphate, nitrate, fluoride and zinc are within desirable limits and unobjectionable. pH value varies between 6.41 to 6.76 for the collected samples. Chloride exceeds the desirable limit in 1 surface water sample. Total hardness exceeds prescribed limits in 4 samples of ground water, dissolved solids exceed the desirable limit in 1 surface water sample and 5 ground water samples. Cadmium, selenium, arsenic, mercury, lead, hexavalent chromium, aluminium, boron and nickel are below the detectable limits and Alkalinity exceeds prescribed limits in 3 sample of ground water.

3.6 Noise level

Ambient noise levels were measured at 10 locations in and around the site using a sound level meter along with filter. The noise level was found to be between 45.10 dB(A) to 53.10 dB(A) during day time and 37.70 dB(A) to 42.20 dB(A) during night. Based on the observations made during the studies, it is concluded that the noise levels observed at all the locations are within the limits specified for residential and rural area category.

3.7 Traffic density

Traffic density monitoring was performed on the NH-8E Mahuva to Una Road, on 18-19/04/2007. HVM counts were 815 out of 2057 vehicles. The traffic density with respect to two/three wheelers is generally higher during daytime. The movement of heavy motor vehicles are almost uniform through out the 24-hour period. The movement of light motor vehicles is low during the night hours.

3.8 Land environment

Core zone: Total 280 ha. land is required for the cement project. Of this 170 ha. is proposed to be used for the cement plant, captive plant and remaining 110 ha. shall be used for coke oven plant. However 33% of the total area (i.e.92.6 ha.) will be used for Green belt/canal development. Most of the land is barren without any use.

Buffer zone: Land use pattern of the study area has been assessed on the basis of 2001 Census data. It is found that about 41.83 % of the total area is occupied by unirrigated agricultural land while irrigated agricultural land is only 8.28 %. Out of the total area, 1.02 % area is under Reserved/ Protected/ Revenue forests. The area not available for cultivation is 42.69 % and culturable wasteland 6.19 %.

3.9 Soil quality

Top soil samples were collected from three villages in the study area. The results of the soil quality analysis show that the pH of soils is normal to saline while the electrical conductivity varies from 102 to 118 $\mu\text{mhos/cm}$. The soils have a bulk density of 1.02 to 1.13 g/cm^3 indicating soft soils and the organic matter content varies from 1.49 to 1.74 %.

3.10 Socio-economic conditions

There are 38 villages in study area. Total population is 134069 with 68358 males & 65711 females. 53.12% of total population is literate. The composition of SC and ST in the study area is 4.61% and 0.24% respectively. The average family size is more than to 6 persons/family. 63.89% of the total populations are non-workers while main workers are 28.46% and marginal workers are 7.65%.

3.11 Ecology

The floral species found in the whole of core zone. Trees are like Harmo, Desi-babool, Gorad, Limdo, Pipli. Shrubs are Akdo, Awal, Dhaturo, Kantaro thor, Arand. Herbs are Chirchitta, Dudhi bel, Piludi. Grasses and Bamboo are Rosha ghans, Gandharu, Dhro, Babsaliu, Nakkatoka-gaddi *etc.*

The floral species found in the whole of study area. Trees species like Harmo, Desi-babool, Limdo, Pipli. Shrubs are Akdo, Awal, Dhaturo, Jakhmi, Kanerek *etc.* Shrubs are Ratanjot, Mehndi, Harsingar, Peela kaner, Mehndi, Kharsani thor. Herbs are Chirchitta, chaulii, Dudhi bel, Tulsi, Piludi. Grasses and Bamboo are Bhamgoru, Lapduu, Kanti vans, Rosha ghas, Gandharu, Dhro, Motha, Manvel, Babsaliu and Nakkatoka-gaddi. Awes, Mammals, raptiles found in the core zone.

4.0 ENVIRONMENTAL IMPACT ASSESSMENT & MITIGATION MEASURES

4.1 Impact on topography, climate and drainage

The topography will change only due to construction of buildings, which will be constructed for the purpose of cement plant, captive power plant and coke oven plant and related facilities. It is a low lying area with an average fill of 1.5 m. Any change in topography due to digging and earth work will be of temporary nature and the drainage will be managed by storm water drainage. There will be no change in topography or drainage during the operation phase. Green belt development and landscaping will contribute to the aesthetics of the topography.

4.2 Impact on air quality

Major source of air pollution, during the construction phase are vehicle exhausts for transport of materials, dust generation due to excavation work, shifting of construction materials (cement, sand and gravel), vehicle

movement on unpaved roads and concrete preparation plant, exhaust from construction equipment like compressors, DG sets, heavy earth moving machinery etc. Appropriate pollution control equipments with adequate capacity are proposed to be installed to avoid degradation of air environment.

To control the dispersion of fugitive dust, all crushers and transfer points will be provided with dust extraction system. To control particulates, the gas is passed through high efficiency bag filters before discharge through stack of appropriate height. Electrostatic precipitators will be used for cleaning the vent gases from the captive power plant and the clinker cooler.

4.3 Impact on water quality

Surface water: - The effluent from proposed desalination plant will be discharged into the deep sea through a diffuser to avoid concentration at a single point. There will be no other effluent discharge from the proposed plant to any surface water channel. So there is no impact envisaged on the surface water resources due to the proposed plant.

Ground water: - There is no withdrawal of ground water for utilisation in plant or colony. So there will not be any impact on the ground water table. Also there will not be any effluent discharge that will contaminate the ground water resources. The treated effluent will be used for plantation and will not cause any pollution of the ground water.

Though no/ less liquid effluent will be generated from the Cement/ CPP/ Coke oven plants. The Once through return cooling seawater will be discharge in Gulf of Khambhat as per recommendation of NIO. In case of Narmada water, the cooling water will be recycled. There is only domestic effluent from the sanitation facilities in the plant as well as from the worker colony. The domestic wastewater will be treated in the sewage treatment plant. The treated wastewater will be utilized for green belt and plantation in the plant as well as in the colony.

4.4 Impact on land environment

The land chosen for the proposed plant is 280 ha. The existing land is barren land and only shrubs/bushes present on the land. About 33% of the area has been envisaged to be covered with green belt/canal development. Since the plant species will be capable of checking soil erosion, the soil will be fully stabilised without any adverse change in erosion potential of the area.

4.5 Impact due to noise & vibration

In the power plant there is noise pollution from turbine, fans, centrifugal pumps, electric motors, safety valves, start up vents, steam jet ejectors of condenser etc. In the coke oven plant there is noise generation from turbine, generator, valves, steam pipe and boiler.

The noise level will be maintained by erecting noise dampening enclosures, by maintaining the machines and greasing them regularly, providing and maintaining green belt, noise generating machinery including transportation vehicles, reducing the exposure time of workers to the higher noise levels.

4.6 Impact on traffic density

The raw material required for the cement plant, power plant and coke oven plant will be transported by road/rail and sea linkage. The lignite will be brought from Kutchch lignite mine about 450 kms from the proposed plant. The limestone and silica sand will be procured from the captive mines near Padhiarka and will be mainly transported by conveyors. Thus, increase in the traffic density is envisaged for receipt of raw material.

Adequate road infrastructure is available for transportation of raw material. The trucks will be properly covered with tarpaulin and overloading will not be allowed to avoid spillage of loose material on roads. Regular maintenance and washing of vehicles will be done and the emissions from the vehicles will be kept as per norms by conducting regular PUC checks.

4.7 Impact on ecology

No impact on flora or fauna is expected since the land is barren, the impact zone is part of landscape involving rural areas. There is scarce growth of vegetation and meagre presence of fauna. Impacts on biological environment will be negligible during the operational phase. On the contrary, with progressive growth of greenery, terrestrial eco-system will improve in course of time.

The number of trees to be planted as a part of the plantation programme is taken as 1000 trees per hectare for green belt as well as along roads/canals.

4.8 Solid waste

During operation phase land environment is affected by solid and liquid waste and also through change in land use pattern. Depending on the type of the industry, the problem of handling waste varies accordingly. However, the solid waste treatment and disposal are not applicable to the plant as all solid wastes generated will be recycled in the process.

The kiln will be designed to function as an incinerator so that high calorific hazardous waste can be utilised in the kiln as fuel. This will minimise the expenditure on fuel and also on incineration of municipal and hazardous waste. All the fly ash generated from the captive power plant will be consumed in the cement manufacturing process.

4.9 Risk Assessment and Disaster Management Plan

All types of industries face certain types of hazards which can disrupt normal activities abruptly and lead to disaster like fires, inundation, failure of machinery, explosion to name a few.

In order to prevent disaster due to fire, explosion, electrocution and other accidents following preventive measures shall be adopted.

- i) Design, manufacture and construction of all plant and machineries building will be as per national and international codes as applicable in specific cases and laid down by statutory authorities.
- ii) Provision of adequate access way for movement of equipment and personnel shall be kept.
- iii) Minimum two gates for escape during disaster shall be provided.
- iv) System of fire hydrants comprising electrical motor division and diesel engine drivers fire pumps with electrical motor driver jokey pump for keeping the fire hydrant system properly pressurized for all important suspected places.

Emergency preparedness shall be ensured by regular drills, caution boards, communication systems, emergency team formulation, etc.

5.0 ANALYSIS OF ALTERNATIVES

The limestone mines are situated in nearby villages like Padhiarka, Doliya Madhiya, Gujarda, Dudheri, Dudhala, Vangar, hence, it is natural to establish a pit head cement plant to which mines shall be captive. These will give assured availability of limestone throughout the plant life. The other advantages are:

- Availability of adequate land for captive power plant in same premises of cement plant.
- Proximity to National highway no. NH-8 E.
- Absence of any irrigation canal or drainage channel within the selected area.
- The area chosen is not having habitation of any kind.
- No ecologically sensitive places within 10 km radius.
- Availability of sea port located at a distance of 25 km SW of the site for finished product transportation and receipt of raw material.
- Availability of workers in nearby villages.

The land required for the plant is 280 Hectares, which is a barren and low lying land not suitable for agriculture.

6.0 ENVIRONMENTAL CONTROL AND MONITORING ORGANISATION

To evaluate the effectiveness of environmental management programme, regular monitoring of the important environmental parameters will be taken up. In view of the importance of monitoring results in the implementation

and continual improvement of the environmental management programme, an organizational chart has been functioning under the Environment Department Head.

The total investment on environmental improvement works is envisaged to be around Rs. 4284.98 lakhs and recurring expenditure during the operations is around Rs. 468.32 lakhs per annum.

7.0 BENEFITS OF THE PROJECT

The upcoming project will generate direct and indirect employment opportunities for the local people. The plant and mine will create employment for about 418 (operational phase) and 133 (implementation phase) skilled as well as semi-skilled staff directly.

The company will also provide the helping hand in the development of the nearby villages by following ways:

- There will not be any displacement of people from the proposed site.
- Employment opportunities / alternative arrangement of livelihood for the land losers is considered.
- Development of facilities within the villages like roads, etc.
- Arranging regular free of cost of medical check up camp for the employees, which will be also extended for the villagers.
- Supply of drinking water in the period of scarcity to the nearby villages.
- Canals will be developed (3 big canals) within plant premises as per the direction of the State Government so that sweet water during rainy season for farmers can be collected.
- Upgradation of primary school in nearby villages.
- The company will also provide funds for the various development activities of the neighbouring villages as and when required