Executive Summary

1.0 Introduction

The State of Gujarat is poised for rapid industrial development and large-scale use of electricity for industrial purposes, for which the demand for electrical power is continuously increasing. The present demand for electrical power is greatly in excess of the generating capacity. The power generation scenario in the state reveals that the demand for power will continue to out-strip the available and planned generation capacity.

In view of this, there is a need for addition of power generation capacity in Gujarat to stabilize the economy and foster the industrial economy and growth, Gujarat Industries Power Company Limited (GIPCL) has decided to increase generating capacity by adding 2x300 Station-III at village Nani Naroli, Taluka Mangrol, Dist Surat near existing Surat lignite power plant. The Mangrol-Valia lignite mine covering leased area of 2080 hectares in Mangrol and Valia taluka of Surat and Bharuch districts respectively is 14-15 km from the proposed 2x300 MW, Station-III with a reserve of 199 million tonnes will be used as a fuel source for the proposed project. The requirement of lignite has been estimated to be 3.75 MTPA.

The proposed plant site is adjacent to the existing power plant. The latitude and longitude of the site is A point : 21^{O}24'31.903"N and 73^{O}06'43.754"E, B point : 21^{O}24'14.550"N and 73^{O}07'19.025"E, C point : 21^{O}24'08.653"N and 73^{O}07'16.302"E, D point : 21^{O}24'12.439"N and 73^{O}06'37.834"E respectively.

The site is accessible by road from Mumbai-Ahmedabad National highway through state highway from Kim and Kosama. The site is located at a distance of 30 km from Kosamba. Nearest railway station is Kosamba and Surat which are at a distance of 30 km and 50 km respectively from the project site. Nearest Airport is Surat which is at a distance of 70 km from the project site.

Various possible power plant site locations (six) have been evaluated considering various aspects like:

- Lignite transportation
- Site approach,
- Land terrain
- Land strata / type of soil,
- Natural and other building/structural obstructions

- Presence of human habitation near the proposed plant site
- Power evacuation /access for the power lines
- Distance from Tapi river which is the source of water for the proposed Station -III.

Following site locations were studied for locating the proposed Station -III:

Site - A	At village Nani Naroli North – East Side of the existing power plant along the Tadkeswar – Mosali State highway.
Site - B	North side of the Mosali – Jankavav State highway between Mosali Chokdi and Gadkach Village.
Site ALT-B	Village : Kargara/Khareda -4 Km inside from state Highway Mosali-Jhankhvav
Site – C	East size of Bhaga and Rajgadh village (Eastern side of mines block D) on “Valia – Desad – Sodgam – Wadi State highway”.
Site –D	North end of the mining lease area in Vagad-Khol village before the State Reserve police camp on the Ankleshwar-Valia-Netrang State Highway
Site –E	North end of the mining lease area in Vagad-Khol village near State Reserve police camp on the Ankleshwar-Valia-Netrang State highway.

Based on the criteria for selection of site and feasibility of the site location, site A was selected for the proposed plant.

The advantage of this site is that, this site is adjacent to the existing plant and on available land. The land terrain is plain with farse vegetation. It is away from the dense habitat area.

Land for the proposed power plant is already available with GIPCL. The total land required for the power plant area is estimated to be around 150 ha, for installation of two units of capacity 300 MW each including space for raw water reservoir, cooling towers, Lignite and lime stone handling system with 10 days coal stockpile, Fuel Oil unloading and storage facility, 400 kV switchyard have been considered etc.

The ash generated from the proposed units will be 100 % utilized in dry form by way of supply of ash to ash based products manufactures. However, in case any excess quantity left out, the same would be disposed after mixing with over burden into captive lignite mines for voids filling. Hence, no additional area for ash disposal is required.

The source of raw water is river Tapi which has perennial flow throughout the year. The total raw water requirement for the proposed power plant units is 50016 m^3/d (11 MGD).

In Principle Clearance for drawal of water from river Tapi is already available and proposed to install additional pumps in existing intake well for drawal of water at the village Patna. Studies for drawal of water from river Tapi and proposed routing of raw water pipelines to the proposed power plant area is under process. Thus adequate and reliable quantity of water is available for the proposed power plant.

2.0 Baseline Environmental Status and Assessment of Impacts

2.1 Air Environment

$PM_{2.5}$, PM_{10}, SO_2 & NOx were monitored on 24 hourly basis including grab samples of HCs, VOCs and CO_2. In all 14 ambient air quality monitoring stations were selected within the study area during winter season (2011-2012).

The ambient air quality status observed during winter seasons in core zone area (5 Km radius) and buffer zone area (10 km radius). The average concentrations of PM_{10} at each site varied from 52-71$\mu g/m^3$.

The average $PM_{2.5}$ concentrations were observed to be in the range of 27-37 $\mu g/m^3$.

The average concentrations of SO_2 at all stations were in the range of 17-28 $\mu g/m^3$ and the average concentrations of NOx were in the range of 8-25 $\mu g/m^3$. The concentration levels of PM_{10}, $PM_{2.5}$, SO_2 and NOx are well below the stipulated standard of CPCB.

For estimating the atmospheric emissions from the proposed expansion for each 2x300 MW unit, the given lignite consumption rate of 3.75 million tonnes/annum is considered alongwith the coal characteristics like the ash content of 10% (wt.) and sulphur content 1.2 %.

The predicted maximum concentrations are 2.6 $\mu g/m^3$, 3.6 $\mu g/m^3$ and 11.8 $\mu g/m^3$ respectively for SO_2, NOx and PM_{10} respectively at a distance of 4.9 Km in NW direction for SO_2 and NOx and at 0.5 Km in W direction for SPM. The maximum GCLs occurring at larger distance due to proposed stacks because of higher stack height of 275 m of proposed unit.

The ground level impact of all pollutants exclusively from proposed power project would be very insignificant (SO_2 and NOx < 4 $\mu g/m^3$ and PM_{10} < 12 $\mu g/m^3$). The cumulative impact (including the existing and under construction units of SLPP) would also be very less during winter season at the given emissions rates. The post project air quality status, i.e. after implementation of proposed Units (2x300 MW) power project, would be well within the

prescribed NAAQS for residential, rural and mix areas, while the SPM levels may remain exceeding the standards, as indicated by the baseline status itself, mainly due to local natural sources. However, the impact (contribution) from the proposed stack emissions would be negligible.

2.2 Noise Environment

The noise levels in the residential zone have been monitored. The Noise levels ranged between 41-69 dBA during day time and 38-56 dBA during night time in core and buffer zone. At the commercial zone the noise level ranged between 70.7-73.0 dBA during day time and 59.6-64.0 dBA at night time. The noise levels for sensitive area varied from 52.0-62.9 dBA during day time and 46.0-54.2 dBA during night time.

Increase in traffic due to proposed power plant will be 135 heavy vehicular trips, 163 medium and 245 light. Cumulative noise level due to traffic will be around 78 dBA, 2 dBA more than the existing level and will not have significant impact on the villages located surrounding the proposed plant.

2.3 Water Environment

The baseline water quality (physico-chemical and biological) of the region was monitored by identifying 11 sampling locations. Samples collected include various sources viz. 2 from surface waters, 8 from Hand Pumps, 1 from bore well from the study area.

The physico-chemical characteristics of Canal water showed pH: 7.7-8.1, TDS: 242-246 mg/l and TSS : 2-14 mg/l. Alkalinity was found to be 152-164 mg/l. The nutrient load in the form of nitrate was observed 3.55-5.13 mg/l and phosphate in the range of 0.42-0.73 mg/l.

The organic load in terms of COD (Chemical Oxygen Demand) was found to be 6.2-8.0 mg/l. Heavy metals were found within the permissible limits of drinking water.

The physico-chemical characteristics of groundwater indicate pH in the range of 7.0-8.1; turbidity <1-3 NTU, TDS: 495-1200 mg/l. Total suspended solids (TSS) concentration was in the range of 1-2 mg/l. The inorganic parameters viz. alkalinity was in the range of 92-346 mg/l; total hardness 292-498 mg/l; chlorides 58-350 mg/l; sulphates 31-212 mg/l.

Demand Parameter COD was in the range of <3 mg/l. Nitrates and phosphates were 9.42-39.22 mg/l and 0.1-0.75 mg/l respectively. Heavy metals were found to be within the permissible limits of drinking water.

The total colifoms and faecal coliforms are not found in bore well samples collected, whereas in canal water samples the total coliforms are found in the range of 45-110 CFU/100 ml.

The phytoplankton count as number of organism per ml of water sample of Surface water varied between 480-624. Baseillariaphyceae was found to be the dominant group. Shannon Weaver Diversity (SWD) Index varies between 2.93-3.28 indicating healthy water body.

The zooplankton count as number of organisms per m^3 of water sample varied between 769-1308. Copepoda the dominant group followed by Cladocera and Echinodermata. The SWD index varies between 2.44 to 2.14, which indicates moderate productivity.

Water Requirement and Wastewater Generation for Proposed 2x300 MW Unit

The source of raw water is river Tapi, which has perennial flows throughout the year. The total raw water requirement for the proposed power plant units is 50016 m^3/day (11 MGD). The wastewater generation for the proposed power plant would be 7074 m^3/day. All effluents are proposed to be collected in guard pond for effluent treatment. The collected water in guard pond would be utilized for plant washing, gardening purposes and fire water storage. The effluents generated from washing of houses of lignite handling system are proposed to be collected in lignite run-off pond and will be treated in clarifier.

The generated wastewater from blow down is quite suitable for Bamboo, Jatropha plantation and green belt development.

2.4 Land Environment

Agriculture is the main source of occupation and more than 51 percent land is under agriculture. Main Kharif crops are cotton, jowar, maize tur and mug. The small area is covered with vegetables. The majority of the agricultural field is clay in texture. The 10 km radius area is divided into two parts 1) core area, 2) within 10 km radius area.

Agriculture is a major activities in the core area from the proposed site and it is found that more than 78 percent land come under unirrigated agricultural land. The irrigated agricultural land cover only 10 percent crops. About 7 percent land is covered with culturable waste land including gaucher and groves and 5.88 percent land is beloged to area not available for cultivation.

Total seven composite soil samples were collected from the study area within 10 km radial distance including core area and within 10 km radial distance along with one

composite soil samples from the GIPCL green belt site respectively.

The texture of the soil is clay. Clay content in the soil of the study area varies from 44.2-54.60 %.

The bulk density of the soil in the study area is in the range of 1.22 to 1.38 g/cm^3 whereas the porosity and water holding capacity are in the range of 50.22-59.78 % and 52.71-61.38 % respectively. The pH of the soil in the study area is neutral to slightly alkaline in reaction having pH in the range of 7.8 to 8.3. The EC for the soil samples are in the range of 0.23 to 1.17 dS/m. The chemical analysis shows that the soils are normal.

The most important cations present in soluble state in the soil are calcium and magnesium. It was observed that calcium and magnesium are in the range of 0.44 to 0.827 meq/l and 0.12 to 0.24 meq/l respectively. Sodium and potassium in the soils are varies from 0.31 to 0.98 meq/l and 0.01 to 0.3 meq/l respectively.

In general, the soil in the region has very high adsorption capacity as evident from the cation exchange capacity which was found to be in the range of 33.49-41.06 cmol (P^+) Kg^{-1} soil. Amongst the different exchangeable cations, calcium is prominent followed by magnesium. The concentrations of calcium and magnesium vary from 18.62-23.64 cmol(P^+) kg^{-1} and 10.52-13.06 cmol(P^+) kg^{-1} of soil respectively. Sodium and potassium are in the range of 1.40-1.61 cmol(P^+) kg^{-1} and 1.62-1.81 cmol(P^+) kg^{-1} of soil respectively.

Exchangeable sodium percentage (ESP) was found to vary from 3.8 to 4.3. ESP between 4-10 can be considered as satisfactory. Soils from all the villages are normal with respect to alkalinity as exchangeable sodium percentage of soil is below 15. The soils of all the villages have very high adsorptive capacity and also have high productivity.

Organic matter present in the soil influences the soils physical and chemical properties. Organic matter commonly accounts as one third or more of the cation exchange capacity of surface soils. It is also responsible for stability of soil aggregates.

Organic carbon and available nitrogen, phosphorous and potassium are found to be in the range of 0.27-0.60 % and 122.9-341.2, 0.179-6.182 and 43.41-101.50 kg/ha respectively. Soil samples are poor to medium level content in organic carbon. Data indicates that soil are poor to medium fertile.

Lignite based power plants use huge quantities of lignite which result in ash production. Thus the ash handling system plays an important role in environmental management.

The estimated bed ash generation quantity for 2x300 MW units based on an ash content of 20 % in the worst lignite would be about 2x70 TPH (Including Gypsum & unreacted CaO).

Both bed ash and fly ash will be collected in ash silos through dense phase pneumatic system to facilitate dry ash collection. Bed ash & Fly Ash would be disposed off in dry form for utilization.

2.5 Biological Environment

The study area is covered with natural vegetation. However no forest land comes under study area. The Umarpara Forest is 50 km away from the study area. Agricultural activities are also undertaken in the nearby villages*. Prosopis juliflora* (Jangali Babul) is observed to be dominant in the study area

The nature of vegetation cover in core and buffer is mixed. Most of the human population is dependent on agriculture for their livelihood. The grazing on uninhabited wasteland by livestock is a common practice because of more number of cattle and openly available land for grazing. Few medicinal plants were recorded, amongst which *Azadirachta indica, Cassia fistula, Ficus benghalensis* are common one. In and around the villages, the other trees observed are *Azadirachta indica (*Neem*), Cassia fistula* (Bahava), *Casuarina equisetifolia* (Suru), *Eucalyptus* sp. (Nilgiri), *Ficus benghalensis* (Bad)*, Ficus religiosa* (Pipal)*, Mangifera indica* (Aam), *Phoenix sylvestris* (Khajur)*, Ricinus communis* (Castor)*, Tamarindus indica* (Imli)*,* etc. were observed.

A total of 11 sites in core and buffer zone were visited by NEERI team during the month of January 2012.

A total of 36 birds were observed in the study area during the visit. Most dominant varieties of birds were observed to be house crow and Indian myna in majority of the sampling sites. About 66 species of common birds were found to be available in the study area as recorded by the Forest Department Office.

The core zone area do not support any habitat for any group of wild animal except few animals such as squirrel, lizards and bird species those well adapted to urban areas. They live in the agricultural field, open scrub land. Other wildlife fauna commonly available in the study area.

2.6 Socio-economic Environment

Most of the villages have basic infrastructural facilities like drinking water supply, medical, power supply, P & T and communication. Electricity for lighting is available on 24 hrs basis in all the villages under Jyoti Gram Yojana Scheme of Government of Gujarat.

The salient observations recorded during survey in the study area are:

- Agriculture is the main occupation. The main crop is sugarcane the surveyed area while few respondents are having job in private sector or either government sector.
- Education facilities are available up to primary school. For middle , secondary and higher studies people avail the facility from the nearest block and district
- Mainly wood is used as fuel since availability of Kerosene and LPG in the villages
- Most of the area are having electricity facility both for agricultural and domestic purpose
- Literacy level among the respondents is good. This is mainly because of better educational facilities
- Communication and transportation facilities are good in most of the villages. Maximum villages having bus service facility
- Many respondents expect job opportunities in construction as well as operational phase

Awareness regarding the proposed project is good in the region but the awareness regarding the existing GIPCL project is very high. The land is already available with GIPCL for the proposed Power Project.

The average QoL index value for the study area is leaning satisfactory level due to employment facilities and also availability of basic needs, viz. food, clothing, and housing.

3.0 Environment Management Plan

3.1 Air Environment

The impacts during the construction phase would be of transient nature and prevail for a shorter duration. However, the control of pollution during construction phase is of

considerable importance. Following control measures are recommended to mitigate the probable adverse impacts :

- Sites for construction and workers camp should be clearly demarcated to prevent occupational hazards. Ensure provision for necessary basic needs and infrastructure facilities such as water supply, sanitary facilities, housing, domestic fuel etc.
- Preparation of site will involve excavation and transport of substantial quantities of earthen material and generation of large quantities of waste material. Site grading operations will also involve stockpiling of backfill materials. Due care needs to be taken to avoid water pollution problems during rainy season due to washout of waste material from dump sites
- Blasting operations, if involved for deeper foundations, these should be conducted with due care as per prevailing safety regulations
- Where, gases or fumes are likely to be present in trenches/foundations, sufficient mechanical/artificial ventilation to protect the health and safety of persons working there, shall be provided. If necessary, the personnel working there shall be provided with respiratory protective equipment when work in such unhealthy conditions is to be carried out
- At the site of construction, where petroleum powered equipments are used and temporary storage of petroleum products (Highly inflammable) is done, these may cause fire hazard, if safety norms are not strictly followed. Care should, therefore, be taken to avoid all sources of ignition at such places
- During dry weather conditions, it is necessary to control the dust emissions arising out of the excavation, leveling, transportation and stockpiling activities by water sprinkling
- It should be ensured that diesel powered vehicles are properly maintained to minimize the exhaust emissions as well as noise generation
- Though the effect of noise on the nearby inhabitants due to construction activity will be negligible, noise prone activities should be restricted to the extent possible during daytime in order to have minimum noise impact during night time.
- Onsite workers should strictly use noise protection devices like earmuffs. The construction machinery should be maintained to minimize the noise levels generated

- Accidental spillages of oil from construction equipment and storage sites should be prevented
- Combustible wastes should be burnt in a controlled manner and other category of wastes should be disposed off at identified dump site
- Hazardous materials such as petrol, diesel, lubricating oil, compressed gases, paint and varnishes as also explosives for blasting operations required at the site during construction phase should be stored properly as per the safety regulations
- Tree plantation (large size species) should be undertaken at the time of preparation of the site so that they would grow to considerable size by the time of commissioning of the proposed project
- Construction workers should be provided with domestic fuel so as to prevent cutting of trees for fire wood
- As soon as construction is over, surplus quantity of excavated soil should be utilized to fill up low-lying areas, rubbish need be cleared and all unbuilt surfaces be reinstated

The proposed plant unit would add to the industrial base in the region. In order to mitigate the adverse environmental impacts due to operation of proposed 2x300 MW power plant, following measures have been delineated for implementation by GIPCL.

Because of the selection of CFBC technology in the Thermal Power Plant &addition of limestone in boiler combustor to ensure capture of sulphur more than 90% on bed and Combustor temperature in the range of 850-860 Deg C, therefore SOx/NOx emission from the boiler stack will be well within prescribed statutory limits. Further, state-of-the art electrostatic precipitators with -higher efficiency and hence PM_{10} emission from the boiler stack will be well within prescribed statutory limits.

Lignite Handling System

Crushed Lignite (-) 250/300 mm will be transported from lignite stockpile in the mine area by trucks/dumpers up to the plant lignite handling system through dedicated road and through closed conveyors. At Plant end, Lignite handling system , lignite will be conveyed through belt conveyors to the screens in the primary crusher house (PCH). The primary screen will separate (-) 50 mm size lignite and the oversize will be fed to the double roll crusher (DRC) downstream of the primary screen and located in the PCH. The DRC will crush lignite from 250/300 mm to 50 mm size. This lignite along with the undersize (-) 50 mm from the primary screen will be conveyed to the stockpile through stacker cum reclaimers. The

reclaimed lignite from the stockpile is fed to the secondary crushers (hammer mill type) located in the secondary crusher house. The crushed lignite of (-) 10 mm size from the crushers will be conveyed to the boiler bunkers. The total annual lignite consumption would be about 3.75 million metric tones.

Lime Stone Handling System

Limestone from Tadkeshwar captive Mines will be transported to limestone stockyard in planted through tractor dozer, it will be dumped to reclaim hopper. The limestone hopper conveying through conveyor belt to limestone crusher house and thereafter it will go to limestone bunker (near ball mill). From limestone bunker it will go to lime stone crushing mills (ball mills) and stocked in limestone bunker in power plant. Annual limestone consumption will be 0.38 million MT at full load.

Control Measures Lignite Handling System

Dust emission is mostly of fugitive type and necessitates installation of close conveyor system along with suitable dust traping/control facility at various transfer points. At lignite yard, to prevent dust emission due to wind erosion, frequent spraying of water is recommended. This also prevents spot fires. Dry fog system shall be installed at all transfer points/junction towers to prevent dust emission in the lignite handling system.

Lignite Transportation system :

Special precaution for Road Transport :

(i) Green belt development along the corridor.

(ii) Covered dumpers/trucks will be used for lignite transportation

(iii) Water sprinkling on the Road

(iv) Use of mobile dust sweeping machine and use of mobile industrial vacuum cleaner.

Special precaution for Lignite Transport through conveyor :

(i) Closed conveyor Gallery
(ii) dust suppression system and drg fog system
(iii) Spraying of water at lignite storage yard

Coal Crusher and Bunkers

For fine dust control, bag filters have been successfully tried in such operations. Better efficiency dry collection system shall prove to be long term cost effective because of

possibility of lignite recovery in the process.

3.2 Noise Environment

- Manufacturers and suppliers of major noise generating machines/ equipments like compressors, turbines, generators should be asked to take required measures for minimizing the noise levels generated by the machines i.e. using noise absorbing material for enclosures or using appropriate design/technology for fabricating/assembling machines
- The operator's cabins (control rooms) should be properly acoustically insulated with special doors and observation windows
- The operators working in the high-noise areas, i.e. compressor houses, blowers, generators, feed pumps, steam generation plant, turbo-generator area should be strictly instructed to use ear-muffs/ear-plugs
- Plantation of tall as well as short trees will be carried out around the plant area to protect the outside environment from any noise and dust nuisance
- It is possible to reduce the noise levels by 3-5 dB(A) per 50 m width of the green belt. The maximum noise level of about 90 dB(A) would be produced in the power plant. The present noise levels at the site are very low

3.3 Water Environment

Effluent from Water Treatment (WT) Plant

There are no specific Indian standards available. Sulphuric acid and caustic soda would be used as regenerants in the water treatment plant. The acid and alkali effluents generated during the regeneration process of the ion exchangers would be drained into an underground neutralisation pit. The treated effluent would be neutralised by the addition of either acid or alkali to achieve the required pH of 7. The treated effluent would be led to the guard pond.

Steam Generator Blowdown

The salient characteristics of the blowdown water from the point of view of pollution are the pH and temperature of water since suspended solids are negligible. The pH would be in the range of 9.5 to 10.3 and the temperature of the blowdown water would be about 100°C since it is first flashed in an atmospheric flash tank. The quantity of blowdown from the 2x300 MW unit would be approximately 10 m^3/hr.

Cooling Water Blowdown

The blowdown from the cooling tower of CW system would be completely used for lignite handling system, Ash dust conditioning and gardening/plantation.

- ***Demineralisation (DM) Plant Effluent***

During treatment, acidic and alkaline effluent will be generated periodically. The effluents need be collected in a neutralizing pit where the acidic and alkaline effluents will be neutralized with each other. This will be pumped and mixed with other effluents in the Guard pond after filtration

- ***Boiler Blowdown***

This effluent is recommended to be either reused as plant service water or sent to Guard pond for mixing with other effluents after adequate treatment.

- ***Effluent from Oil Handling Areas***

The effluent carrying oil spillage etc. should be taken to oil/water separation. The decanted oil (containing small amount of water) should be taken to a slop oil tank for further separation. The decanted oil may be stored in a tank for reuse. The supernatant water need be sent to the Guard pond.

- ***Lignite Yard Drainage***

During monsoon season, the problem of lignite yard drainage becomes critical due to lignite particles and dust in the yard. To take care of this problem, the entire lignite storage yard should be provided with separate drains, which will be led to a lignite run-off pond. The settleable solids will settle in the run-off pond and the water will be treated through clarifier & clear water will be used for washing purpose.

- ***Power House and Boiler Area Effluents (Containing Oil)***

The power house and boiler area effluents are likely to contain oil/grease in small quantity. These will be taken to the oil/water separators, slop oil tank and treated in the same way as the oil handling area effluent.

- ***Sanitary Waste***

Sanitary waste from the plant premises should be treated in a sewage treatment plant to be provided within the plant boundary area. For this, low cost treatment methods such as oxidation ponds or aerated lagoon can be adopted since these are easy to operate

and maintain. Sock pit and septic tank shall be provided for separate toilet block of plant premises.

General Recommendations for Wastewater Management

- The measures recommended for ETP should be planned, completed and commissioned alongwith the commissioning of the 2x300 MW power plant
- Evaluation of the effluent treatment plant for its performance after its commissioning should be undertaken at regular intervals to keep a check on the treated effluent quality
- Trained personnel should be engaged for operating the effluent treatment plant
- In-plant control measures should be implemented to minimize the quantities of wastewater generation
- In addition to the above, to keep control on biological treatment, regular monitoring of effluent quality is also recommended
- The clarifier unit of the clariflocculator tank should be cleaned regularly inorder to avoid clogging. Sludge should be removed regularly and sufficient time should be given for proper settling of solids
- It is recommended that treated effluents from all streams should be stored in a Guard pond with 5-6 days detention capacity
- Wherever possible, treated effluent should be recycled and reused for plantation in order to conserve fresh water
- The oily sludges from oil separator should be disposed of at identified location as per GPCB requirements
- Treated wastewater will be reused for dust suppression or plantation

Conservation of Water – Rain Water Harvesting

- Objectives of rain water harvesting at this project are to reinstate the runoffs and to supplement ground water recharge. Rain water harvesting structures depend on topography. Therefore, the following investigations will be carried out
- Demarcation of micro water-shed
- Preparation of drainage map after civil construction
- Draw contour plan at 1.0 m intervals

- Physiography after construction
- Construction of suitable structure
- Initial investigations have shown the following :
    - Slope of the area is 4%

  Area indicates conducive geological and hydrological conditions
- The proponent will carry out the following:
    - Engage an expert agency for above
    - Divert storm water drains to the respective existing drains
    - Carry out pilot experiments during the construction phase
    - Make a suitable budgetary provision

3.4 Land Environment

With a view to attenuate air pollutants, to absorb noise and to uptake of water pollutants, it is recommended to develop a greenbelt all round the boundary and at several locations within the power plant premises.

Ash, the main solid waste generated from the Thermal Power Plant, will be 100% utilized in suitable manner. To avoid the adverse impact on the vegetation as a result of fly ash and dust deposition and on groundwater due to contamination caused by the leachates, attempts should be made to maximize the use of fly ash for bricks manufacture and other ash based product as is being practiced. It is proposed to use 100% fly ash utilization.

Disposal of Waste Oil / Spent Oil

- The waste oil/ spent oil likely to be generated from the proposed power plant units is required to be carefully handled and stored in an environment friendly manner. Such oil needs be finally disposed off by way of sale to the processing units registered with the Ministry of Environment & Forest, Govt. of India for its further processing and reuse.
- It needs to be seen that the provisions under the Hazardous wastes (Management & Handling) Rules, 1989 as amended in the year 2000 are implemented by GIPCL. GIPCL will also have to seek authorization from the Gujarat Pollution Control Board under the provisions of above rules.

3.5 Biological Environment

- To protect the water resources, the discharge of liquid wastes into water bodies and particulate matter into the atmosphere must be controlled at the levels within the stipulated standards so that the animals and plants are not affected adversely
- Land clearing activities in the areas should be minimized. The removal of native vegetation has profound effect on natural community structure, physical environment and animal life. Therefore, rich and diverse vegetation in the study area should be protected and maintained by adopting adequate measures
- Destruction of natural habitats of animals should be minimized. Nesting, mating and other behavioral patterns of wildlife should be protected.

3.6 Socio-economic Environment

The proposed project is expected to contribute towards upliftment of local people quality of life & it shall generate inputs for industrial/economic development in the region.

- GIPCL should take adequate steps to get local people into confidence so as to avoid any misconceptions amongst the local people in future. The following measures are suggested for minimizing the adverse impacts on socio-economics & parameters & human interest
- Communication with the local community should be institutionalized & done on regular basis by the project authorities to provide as opportunity for mutual discussion
- Project authorities should organize regular environmental awareness programmes to bring & environmental management measures being undertaken for improving their quality of life
- For social welfare activities to be undertaken by the project authorities collaboration may be sought with local administration gram panchayat block development office etc for better co-ordination
- Based on baseline status of the study area & the likely adverse impacts of the project, following measures are suggested for desirable achievement of goals from the project
- To minimize the strain on existing infrastructure, adequate provisions of basic amenities viz. education health transport etc. should be made considering the migrating population & the work force in the area

- Awareness programmes to help & educate the local people about potential hazards & the disaster management as well as environmental management plan being undertaken at project site. This can be done in collaboration with local administration
- As regards aesthetic environment development of social forestry & road side plantations shall be encouraged through tree plantation derives in the project region
- It is envisaged that upon implementation of community development programmes/welfare measures as recommended in environmental management plan would lead to increase in subjective quality of life index. QoL(s), which ultimately result in increase of cumulative quality of life QoC (C) in the project area
- Co- operative and open working relations should be established and maintained throughout the life of the project
- Preference shall be given to local people for employment during construction phase considering their skills and abilities
- Welfare activities such as organizing medical check-up camps and extending facilities to local population must also be undertaken
- Preventive measures should be taken for controlling the pollution, which may arise from the project
- Unsanitary conditions causes number of health problems and sanitary facilities are inadequate in rural area so project authority must arrange different programs for enhancing cleanliness and reducing unsanitary conditions
- Timely valued different awareness programs must be arranged by the project proponent based on the common health problems caused in the region that may help to reduce the lower health status of the region
- Gujarat Industries Power Company Limited (GIPCL) has promoted a trust namely “Development Efforts For Rural Economy And People” (DEEP) exclusively to undertake its Corporate Social Responsibility’s (CSR) activities, which is basically aimed at INFRASTRUCTURE & COMMUNITY DEVELOPMENT program in its area of operation.
- The company through its trust DEEP (Development Efforts For Rural Economy) with the help of the locals and prepare a financial budget as a corporate social responsibility for the Upliftment of the local people. However, for this purpose sectorwise CSR activities like drinking water supply scheme, health, sewages and

sanitation, roads, education, agriculture & animal husbandry and village infrastructure development proposed by company.

General

- Adequate provisional should be made by GIPCL to undertake various measures outlined in EMP such as pollution control, greenbelt development, social welfare measure etc.
- Post-project environmental quality monitoring should be undertaken on regular basis by GIPCL. This will help taking-up corrective measures in time, in case of non-compliance of some of the requirements of SPCB.

4.0 Risk Assessment & Management

- Workable Disaster Management Plan (DMP) should be formulated based on the guidelines described (Manual on Emergency Preparedness for Chemical Hazards - MoEF, 1992) for the various hazardous scenarios presented in chapter 6 for the proposed 2x300 MW power plants. Workers/ employees should be made aware of all such hazards arising within the facility. The plan should be upgraded from the various mock drills carried out from time to time. Reports of individual mock drill performed will help a long way in strengthing DMP for the power station
- Fire and toxic gas release are major hazards of the facility, hence fire and toxic gas release prevention is one of the major areas of responsibility. The power plant should be equipped with all fire fighting and safety equipments.
- An offsite emergency preparedness plan involving Government Departments like public health, fire services, police, civil defense and other voluntary organizations should be prepared to mitigate serious damages to the people, livestock and property in the area. Offsite emergency preparedness plan should be prepared for a maximum distance of 1.5 km from the power station. The local population around the power plant should be made aware of their responsibilities during such an eventuality