



1.0 INTRODUCTION

1.1 Purpose of the Report

PPN Power Generating Company Pvt. Ltd. (PPN) based at Chennai, owns and operates a mixed fuel fired Combined Cycle Power Station of 330 MW capacity at Pillaiperumalnallur and Manikyapangu villages of Tharangambadi Taluk of Nagapattinam District, Tamil Nadu. PPN is now planning to expand the power plant capacity from 330 MW to 1410 MW by installing three additional units of similar technology of 360 MW each in existing plant premises for which the land is already under possession of the company.

As per the EIA Notification dated 14th September 2006, the proposed expansion of power plant project falls under '**Category A**' with project activity type '1(d)', which require Environmental Clearance (EC) from the Ministry of Environment and Forests (MoEF), New Delhi. The present EIA report is prepared, based on the Terms of Reference (ToR) conditions issued by MoEF vide letter no. J-13012/38-/2010-IA.II(T) dated May 24th 2010 and addresses the environmental impacts of the proposed power plant expansion and proposes the mitigation measures.

1.2 Identification of Project and Project Proponent

1.2.1 Identification of Project

The existing power plant with a nominal capacity of 330 MW is a dual fuel combined cycle power plant using F class turbine technology was commissioned on April 26, 2001. The gas turbine is operating in mixed fuel mode with combination of naphtha and natural gas. Naphtha is delivered by ocean going 20,000 dwt tankers and off loaded through a single point mooring system. The natural gas is transferred through a dedicated pipeline to the site by GAIL from nearby py-01 offshore gas fields.

PPN is planning to expand the existing dual fuel based power plant capacity from 330 MW to 1410 MW by installing three 360 MW modules.


1.3 Brief Description of the Project

1.3.1 Nature of the Project

The expansion of dual fuel (natural gas and naphtha) power project falls under Category A as per the EIA Notification. The natural gas will be sourced from KG basin through Kakinada-Nellore-Chennai and Chennai-Tuticorin trunk lines or additional gas from the existing PY-01 gas block.

1.3.2 Size of the Project

The proposed expansion of power plant will have three identical units of 360 MW with a total power generation capacity of 1080 MW and will be developed in an area of 23.7-ha. The estimated cost of the project is about Rs. 4073.0 Crores which includes environmental protection measures expenditure of Rs. 100 Crores.

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1.3.3 Location of the Project

The expansion power plant units and facilities will be located within the existing plant premises, which is located in the coastal region towards south-eastern side of Tamil Nadu, falling in Pillaiperumalnallur and Manikapangu villages of Tharangambadi taluk in Nagapattinam district. The Nagapattinam town and Chennai city are located at a distance of about 35 km, S and 280-km, N respectively to the existing plant. The details of environmental setting are given in **Table-1**. The index map of the project and study area map are shown in **Figure-1** and **Figure-2**.

TABLE-1
ENVIRONMENTAL SETTING AROUND 10-KM RADIUS OF PROJECT SITE

Sr. No.	Particulars	Details
1	Project Location	Pillaiperumalnallur and Manikapangu villages of Tharangambadi Taluk, Nagapattinam District
2	Plant site elevation above MSL	+3.5 M
3	Present land use at the site	Industrial land use
4	Villages in 1-km radius area	Pillaiperumalnallur, Manikyapangu and Anakoil
5	Nearest highway	NH-45A Extension (2.5-km, W)
6	Nearest railway station	Mayiladuturai (22.0-km NW)
7	Nearest airport	Trichy (150-km, SW)
8	Nearest town/City	Tharangambadi (6.5-km, S) Thirukadayur (2.5-km,W)
9	Hills/valleys	None in 10-km radius
10	Topography	Plain
11	Archaeologically important places	Tharangambadi fort and Melayur temples
12	Protected areas as per Wildlife Protection act,1972(Biospheres, Tiger reserves, Elephant reserves, National Parks / Wildlife Sanctuaries, Conservation reserves and Community reserves)	None within 10-km radius
13	Reserved / Protected Forest	None within 10-km radius
14	Seismicity	Seismic Zone-II according to IS:1893-2002
15	Surface water bodies	Bay of Bengal –2.0 km, E Virasolanar River – 7.3 km, SSW Nadalur River – 6.8 km, SSE Uppanar River – 3.5 km, SSW Ambanar River – 1.4 km. N River Cauvery – 7.2 km – N
16	Defence Installations	None within 10-km radius
17	Nearest seaport	Karaikal (25-km,S)



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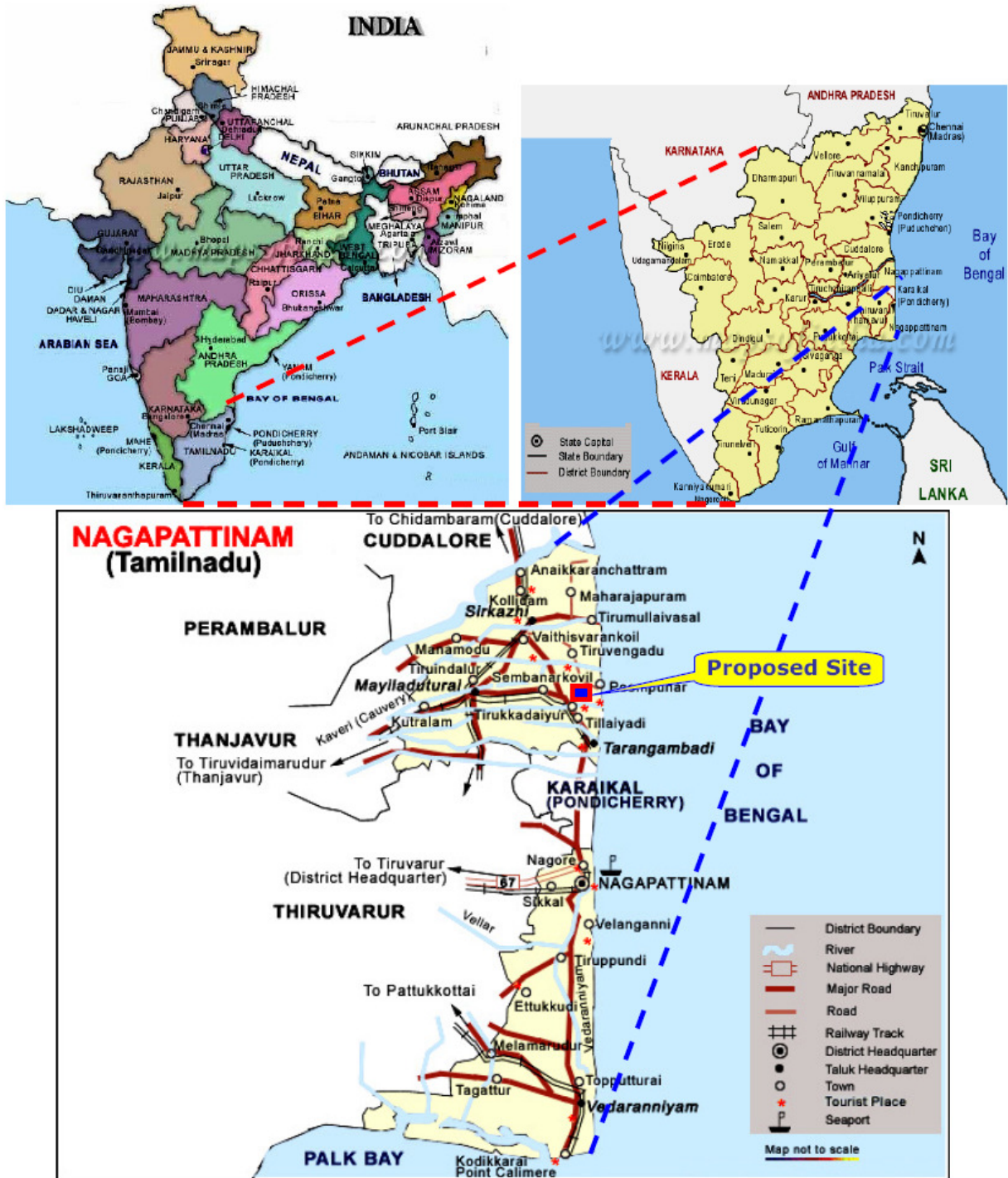
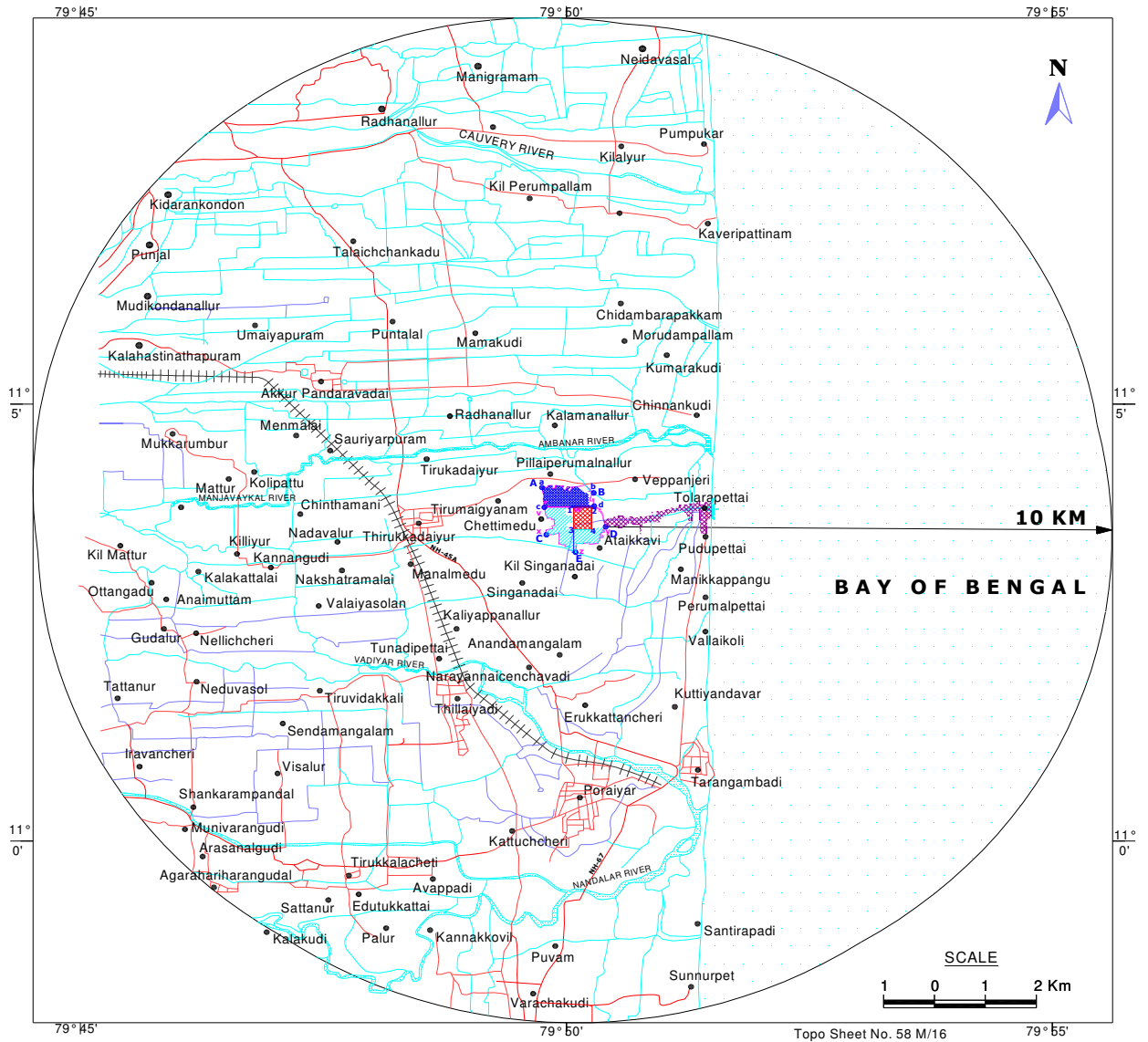


FIGURE-1
INDEX MAP SHOWING THE PROJECT SITE




Environmental Impact Assessment for the Proposed Capacity Expansion from 330 MW to 1410 MW Dual Fuel Fired Combined Cycle Power Project at Pillaiperumalnallur and Manickapangu villages, Tarangambadi Taluk, Nagapattinam District, Tamil Nadu

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**FIGURE-2
STUDY AREA MAP OF THE PROJECT (10 KM RADIUS)**

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2.0 PROJECT DESCRIPTION

The existing power plant with a capacity of 330.5 MW was commissioned on 26.4.2001. The proposed capacity expansion is from 330 MW to 1410 MW by installing 3x360 MW units. The Required Gas for this expansion project is will be sourced from KG basin and or additional gas from py-01 gas block.

The Gas will be fed into Gas turbine with required pressure which will drive the generator connected rigidly to it. The power output from the generator through appropriate electrical system will be fed to the grid for distribution to consumers. Exhaust Gas from the turbine will be sent to HRSG to produce the steam which will feed into the steam turbine which will drive the generator connected rigidly to it. The power output from the generator through appropriate electrical system will be fed into the grid for distribution to consumers. Exhaust steam from the turbine cooled in the sea water cooled surface condenser and the condensate water will be recycled in the power cycle involving boiler, turbine and condenser as mentioned. Water for cooling purposes is required in the condenser, heat exchanger of auxiliary systems of boiler, turbine and generator etc. In addition, water is required for fire fighting systems, drinking (in plant and colony), make up for the power cycle etc. Hot water outlet of condenser and other heat exchangers will be cooled in suitable cooling tower and reused in the system. Similarly, water used in other systems mentioned above will be recycled to the extent possible after suitable treatment. However, make-up will be required to be added for replenishing the loss due to evaporation, blow down and other consumptive use. To minimize the makeup, effluent water from different process in the power station will be chemically treated so as to make it suitable for use in the development of green belt, sanitation, etc.

After taking all these measures about 6000 m³/ hr of makeup water will be required for 3x360 MW unit planned at the location And the existing cooling water intake and discharge arrangements will be utilised for the same.

2.1 Resource and Utility Requirement

2.1.1 Details of Land Requirement

The project area is already in industrial category in extent of area of 176.80-ha(436 acres) and expansion project will be developed in 26.74-ha of land. Hence, no additional land is required or to be acquired for the development of expansion units.

2.1.2 Fuel Requirement and Source

The fuel that has been envisaged for the proposed project will be natural gas and naphtha. Natural gas will be supplied by GAIL/RIL from gas wells of PY 01 and KG Basin. The naphtha will be supplied by IOC. The naphtha is supplied by 20,000 tonne ocean going ships and offloaded through a single point mooring system to the existing power plant and same has been proposed for the expansion project. Existing Naphtha & HSD storage facilities in the plant will also be utilised for expansion power plant.



Based on natural gas analysis, the annual requirement of fuel for 1080 MW gross capacity and 85% plant load factor is estimated to be around 1530 Million SCM. The design net calorific value, which has been considered for estimating the fuel gas consumption, is 8500 kcal/Sm³ and Density 0.72 kg/Sm³.

Daily estimated natural gas and naphtha consumption for base load operation at site design ambient condition are about 4.89 MMSCM and 4680 Tonne respectively, which has been estimated based on the power plant configurations, The maximum natural gas requirement at ISO ambient condition would be about 5.26 MMSCMD (for 3 GTs), which should be considered for feeder gas pipeline design.

2.1.3 Water Requirement

Seawater requirement for expansion is estimated as 6000m³/hr. Closed recirculation type Cooling water system with Mechanical draft cooling towers using Seawater as liquid media is envisaged for the proposed project.

2.1.4 Infrastructure

The existing project site has good road as well as railway network connectivity. Karaikal major port is about 25 Kms from the site and would be used for receiving the equipments transported by sea. Other equipments may be transported by road or railway route to the plant.

2.1.5 Power Evacuation

The Power generated from the proposed power plant is proposed to be evacuated through 400 kV line from the 400 kV switch yard to the TNEB grid / Southern grid.

2.1.6 Manpower


The expansion power plant will require skilled and semi-skilled personnel during operation, maintenance and administration and semi and unskilled labour will be sourced from local youth. The total manpower estimated to be about 3000 people will be deployed during peak construction phase and about 70 personnel will be employed either directly or indirectly during the operation phase. People from neighbouring villages, if found suitable, will be employed during constructional and operational phases.

2.1.7 Township

The existing colony has 63 dwelling with state of art of facilities and will be expanded suitably..

2.2 **Schedules of project**

The project is proposed to achieve Commercial Operation Date (COD) within a period of 27 and 30 months from the date of financial closure.

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2.3 Sources of Pollution and Mitigation Measures

Power plant is the major source of gaseous emissions. In addition, wastewater will also be generated. The quantities and the composition of the gaseous and liquid waste that are generated in the plant will be managed and treated such that their final disposal into the environment meets all the statutory requirements and the environmental impacts are minimized.

2.3.1 Stack Emissions

The major pollutant emitting from the proposed gas based power plant will be NO_x. About 60 m height stack will be provided to disperse the emissions over a wide area with proper control measures to minimize the stack emissions within the stipulated/permissible limits prescribed by NAAQS. In order to keep NO_x level within the stipulated limit DLN burner system or by injection of steam/water depending on the suitability is envisaged.

2.3.2 Wastewater Generation

The wastewater emanates from the cooling tower blow down, raw water treatment plant, DM plant regeneration waste, Boiler blow down, power house area, fuel oil storage and handling area will be the main sources of the wastewater. Sanitary wastewater will be treated in STP. Besides this, domestic waste from canteen and toilets will be generated in the plant.


Reuse and recycling of wastewaters to the possible extent will be considered. The central monitoring basin (Neutralizing pit) has been contemplated to act as an equalization basin for those wastewaters are suitable for recycling in to the plants raw water system. The treated wastewater will be utilized for greenbelt development within the plant complex. However, the entire wastewater will not be utilized and thus the remaining quantum of 4557 m³/hr will be routed to marine outfall.

2.3.3 Solid Waste Generation

As gas will be used as fuel for the proposed CCPP, there will be no generation of solid waste from process. However, nominal quantity of sludge from water and wastewater treatment will be generated, which will be dried and utilized as manure within plant complex. Solid waste from colony is being vermicomposted and use as manure in greenbelt and same will be practiced for expansion project. The Biomass generated from the plant (grass cutting, trees trimming and leaves shedding) is manured by vermin composting. The organic manure generated is used in the green belt.

2.3.4 Noise Pollution

Acoustic enclosures will be provided wherever required to control the noise level below 85 dB (A). Anywhere not possible technically to meet the required noise levels, personal protection equipment will be provided to the workers. The wide

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greenbelt around the plant will attenuate the noise level dissemination outside the plant boundary.

3.0 BASELINE ENVIRONMENTAL STATUS

Baseline environmental studies have been carried during summer season-2010. Studies have been carried out in 10-km radius from project as centre for Soil quality, Ambient air quality, Water quality, Noise level monitoring studies, flora and fauna studies and demography. The scope of the present study is in line with the Terms of References as recommended by MoEF vide their letter no. J-13012/38/2010-IA.II (T), dated May 24th 2010.

3.1 Meteorology and Ambient Air quality

The recorded temperature at site during study period ranges between 23.2 and 37.6°C and relative humidity ranges in between 79% and 84%. No rainfall was recorded during period. Predominant winds from SE, SSE directions were observed during study period.

Ambient Air Quality Monitoring (AAQM) stations were set up at seven locations in study area covering upwind, downwind and crosswind directions. The methodology of sampling and analysis as per Central Pollution Control Board norms. The observations on AAQM for pre-monsoon season are summarized below:

Particulate Matter (PM_{2.5})

The minimum and maximum concentrations for PM_{2.5} were recorded as 6.2 µg/m³ and 10.3 µg/m³ and respectively. The minimum concentration was recorded at Project site (AAQ1) maximum concentration was recorded at Thirukkadaiyur (AAQ5).

Particulate Matter (PM₁₀)

The minimum and maximum concentrations for PM₁₀ were recorded as 9.2 µg/m³ and 17.1µg/m³ and respectively. The minimum concentration was recorded at Thillaiyadi village (AAQ6) and the maximum concentration was recorded at Pillaiperumalnallur (AAQ7).

Sulphur Dioxide

The minimum and maximum SO₂ concentrations were recorded as 9.3 µg/m³ and 16.7 µg/m³. The maximum concentration was recorded at Pillaiperumalnallur (AAQ7) and the minimum concentration was recorded at Poraiyur (AAQ4).

Nitrogen Oxide

The minimum of 11.0 µg/m³ observed at Poraiyur (AAQ4) and maximum concentration of 16.8 µg/m³ for NO_x was recorded at Pillaiperumalnallur (AAQ7).



Carbon Monoxide and Ozone

The minimum and maximum carbon monoxide concentrations were recorded as 185 $\mu\text{g}/\text{m}^3$ and 238 $\mu\text{g}/\text{m}^3$. The ozone concentration in study area varies between 5.6 to 10.8 $\mu\text{g}/\text{m}^3$ during study period.

3.2 Noise environment

Seven locations were monitored for assessing the existing noise levels in and around the project location. The analysis results reveal that the monitored noise levels are well within the limits as per statutory norms prescribed by Ministry of environment and forests.

3.3 Water Quality

Eight surface water and **six ground** water sources covering 10-km radial distance were examined for physico-chemical, heavy metals and bacteriological parameters in order to assess the effect of industrial and other activities on surface and ground water. The samples were analyzed as per the procedures specified in 'Standard Methods for the Examination of Water and Wastewater' published by American Public Health Association (APHA).

3.3.1 Surface Water Quality

- The analysis results indicate that the pH values in the range of 7.5 to 8.4, which is well within the specified standard of 6.5 to 8.5.
- The TDS was observed in the range of 400 mg/l to 38200 mg/l. DO was observed to be in the range of 5.2 to 6.0 mg/l.
- The chlorides and sulphates were found to be in the range of 110 to 15881 mg/l and 12.9 to 1708 mg/l respectively.

3.3.2 Ground Water Quality

- The analysis results indicate that the pH ranges in between 7.2 to 7.6, which is well within the specified standard of 6.5 to 8.5.
- Total hardness was observed to be ranging from 180 to 529.3 mg/l. Chlorides were found to be in the range of 115 mg/l to 574.3 mg/l.
- Sulphates were found to be in the range of 19.3 mg/l to 75.4 mg/l.

3.4 Soil quality

Eight locations within 10-km radius of the project site were selected for soil sampling. At each location, soil samples were collected in line with IS: 2720 and Methods of Soil Analysis, Part-1, 2nd edition, 1986 of (American Society for Agronomy and Soil Science Society of America). The samples have been analyzed as per the established scientific methods for physico-chemical parameters. The



heavy metals have been analyzed by using Atomic Absorption Spectrophotometer and Inductive Coupled Plasma Analyzer.

- It has been observed that the pH of the soil in the study area ranged from 7.0 to 7.6. The electrical conductivity was observed to be in the range of 103 $\mu\text{mhos/cm}$ to 1744 $\mu\text{mhos/cm}$.
- The nitrogen values range between 58.5-99.0 kg/ha. The nitrogen content in the study area falls in very less to less category.
- The phosphorus values range between 48.2 to 62.9 kg/ha, indicating that the phosphorus content in the study area falls in medium to average sufficient category.
- The potassium values range between 157.3 – 406.8 kg/ha. The potassium content in the study area falls in less to more than sufficient category.
- The chlorides were found to be in the range of 159.5 – 269.8 mg/kg of soil.

3.5 Flora and fauna studies

Detailed ecological studies were conducted during study period to identify the floristic composition in and around proposed block and surrounding villages, 255 plant species were identified which are belong to 58 families. 93 wild animals observed /recorded through primary survey or with interaction local elderly people and forest officials of the area. 63 birds species, 9 species of reptiles, 9 species butterflies, 2 species of Amphibians and 10 species of mammals are recorded, out of which 2 species belongs to Schedule-II, 1 species belongs to Schedule-III rest belongs to Schedule- IV and V of Wildlife (Protection) Act,1972. As per records of forest department and MoEF, New Delhi reveals that there are no wildlife sanctuaries or national parks, Tiger reserves and Elephant reserves in study area.

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 Identification of Impacts

The environmental impacts are categorized as either primary or secondary impacts. Primary impacts are those, which are attributed directly to the project and secondary impacts are those, which are indirectly induced and typically include the associated investment and changed pattern of social and economic activities by the proposed action. The impacts have been assessed for the power plant assuming that the pollution due to the existing activities has already been covered under baseline environmental monitoring and details are incorporated in report.

4.2 Operation Phase

4.2.1 Air Environment

Industrial Source Complex [ISC3] dispersion model has been used for simulations from point sources to assess the dispersion of pollutants.



Air pollution modeling, carried out for proposed expansion power plant shows that maximum incremental short term 24 hourly ground level concentrations for SO_x and NO_x likely to be encountered during summer season are 3.6 µg/m³ and 9.3 µg/m³ respectively occurring at a distance of about 1.8 km in the NW direction.

The maximum incremental Ground Level Concentrations (GLCs) due to the proposed project for SO₂ and NO_x are superimposed on the maximum baseline SO₂ and NO_x concentrations recorded during the study period in the downwind direction to arrive at the likely resultant concentrations during the same period after implementation of the proposed project. The predictions indicate that the SO₂, NO_x concentrations are likely to be well within the prescribed limit for residential and rural zone as per National ambient air quality monitoring standards prescribed by Central Pollution Control Board, New Delhi.

- Limiting of pollutant discharge and minimizing its effect on air quality, within prescribed standards, will be achieved, by installing tall stacks, for better dispersion of particulates and gaseous pollutants.
- Consequently the proposal is unlikely to have any major impacts on local or regional air quality or to adversely affect human health or status of pollution-sensitive vegetation, either locally or on nearby terrain.

4.2.2 Water Environment

Total 4557 m³/hr of wastewater will be generated during operation phase, out of which 3906 will be cooling water blow down and the rest for filter back wash and RO reject etc., The entire wastewater will be sent to sea along with existing project waste through existing marine discharge point. 40 m³ of sewage will be generated after expansion of power plant operations. The existing sewage treatment plant will be replaced with new sewage treatment plant.

4.2.3 Noise Environment

The main noise generating sources from the power plant will be pumps, compressors along with cooling tower and boilers. The noise levels at the source for these units will be in the range of 80-90 dB(A). There will not be any adverse impact on the nearby villages as the local residents will be exposed to a noise level of not more than 30 dB(A). The noise dispersion from the plant units has been computed based on the mathematical model.

The predicted ambient noise levels is less than 40 dB(A) are observed in 400 m radius from the source of the plant and falls within the plant boundary. There will not be any adverse impact due to the noise generation on the habitations falling on the boundary of the proposed project. It is seen from the simulation results that the noise levels are well within the CPCB standards.

4.2.4 Greenbelt Development

In the existing power plant about 70,000 nos plants have been planted in colony, open areas and plant boundary. In addition to that, existing greenbelt will be



strengthened by in rows of plants and or gap to be filled to make belt round the project site. As a part of expansion plan, it is decided to develop greenbelt or plantations along the boundary of project area which includes the alignment route of the water and gas lines. As corporate responsibility, it is decided to develop a plantations in open areas, school premises, waste lands and along the roads

5.0 ENVIRONMENTAL MONITORING PROGRAMME

Post project environmental monitoring is important in terms of evaluating the performance of pollution control equipments installed in the project. The sampling and analysis of the environmental attributes will be as per the guidelines of CPCB/CECB.

For environmental protection measures, PPN has allocated about Rs. 100 crores as capital investment and Rs.2.1 crores as recurring expenditure during operation of project.

6.0 ENVIRONMENT MANAGEMENT PLAN

6.1 Management during Constructional Stage

6.1.1 Site Preparation

During dry weather conditions, dust may be generated by activities like excavation and transportation through un-bituminized roads. The dust suppression would be arrested by using water sprinklers.

As soon as construction is finished, the surplus earth shall be utilized to fill up low lying areas, the rubbish shall be cleared and all un-built surfaces reinstated. Appropriate vegetation shall be planted and all such areas shall be landscaped. Hazardous materials [e.g. acids, paints, etc.] shall be stored in proper and designated areas.


6.1.2 Water Quality

In order to reduce the impact on water quality, temporary sedimentation tanks shall be constructed for the settlement of the suspended matter.

6.1.3 Air Quality

Adequate measures for the dust suppression are as follows:

1. Provision of adequate water for sprinkling on the roads used for transportation of materials;
2. Use of sprinklers at the construction site;
3. Removal of debris and unutilized construction material and earth from the construction site at a safe location to avoid generation of fugitive emissions; and
4. Proper maintenance of the vehicles carrying the construction materials.

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6.1.4 Noise

The following recommendations shall be implemented for noise reduction:

- Provision for insulating caps and aids at the exit of noise source on the machinery;
- The use of damping materials such as thin rubber/lead sheet for shielding the work places like compressors, generator sheets;
- Adoption of Shock absorbing techniques to reduce impact;
- Provision of Inlet and outlet mufflers which are easy to design; and
- Provision of Earmuffs to the workers and enforcement of its use by the workers.

6.1.5 Ecological Aspects

A comprehensive greenbelt programme is proposed for the improvement of ecological conditions of the region.

6.2 Management during Operational Stage

Environment management at design stage includes all the steps undertaken at the design stage by the project proponents to meet the statutory requirements and towards minimizing environmental impacts.

6.2.1 Air Quality Management

The following methods of abatement and measurements will be employed for the air pollution control and monitoring:

- Emission of NO_x should be controlled through proper design/technology to maintain the emission to 50 ppm. The NO_x emission should be controlled by providing either DL NO_x burners or by injection of steam/water depending on the suitability;
- DM plant should be sized to meet the water requirement for NO_x control;
- All the internal roads shall be concreted / asphalted to reduce the fugitive dust due to vehicular movement;
- Water spraying will be practiced frequently on unpaved area;
- Green belt (50 m wide) around the plant area will be strengthened;
- Continuous online stack gas analyzers for SPM, SO₂, NO_x, CO and HC. Sampling ports should be provided in the stacks according to CPCB guidelines for manual Stack Monitoring;
- The concentration of PM, SO₂ and NO_x in the ambient air outside the project boundaries and in the adjoining villages shall be monitored as per the direction



- of the State Pollution Control Board; and
- The dry bulb temperature, wet bulb temperature, wind speed, wind direction, cloud cover, rainfall and solar radiation shall be monitored and recorded daily.

6.2.2 Water and Wastewater Management

The total water requirement for the proposed plant will be drawn from sea (Bay of Bengal). The total sea water requirement for the proposed project is about 5928 m³/hr. Out of this, about 4435 m³/hr (primarily cooling tower blow down and RO plant reject water) would be discharged back to the sea and about 1173 m³/hr would be lost through evaporation in the cooling towers. About 285 m³/hr of desalinated water would be produced by the RO plant and used for meeting the various fresh water requirements of the plant.

Water Conservation Measures

The treated wastewater will be used for greenbelt development. The stage II RO reject water will be recycled.

Effluent Treatment and Disposal

The liquid effluent treatment system of the proposed plant is designed to treat all liquid effluent generated so as to meet the standards as mentioned in The Gazette of India Extraordinary, Ministry of Environment and Forests Notification, 1993. All effluent will be taken to the guard pond and part of treated water will be used for greenbelt development.

Final Disposal of the Liquid Waste

Part of the treated effluent will be used for horticulture and greenbelt development. Remaining treated wastewater along with RO reject water will be discharged into sea at about 2.5 km from the plant boundary.

- Quantity of effluents will be minimized through reuse to the maximum extent feasible;
- The treatment schemes proposed would be finalized before the commissioning of the plant; and
- Sludge would be removed regularly and sufficient time would be given for proper settling of solids.

6.2.3 Noise Level Management

The specifications for procuring major noise generating machines/equipment shall include built in design requirements to have minimum noise levels meeting Occupational Safety and Health Association (OSHA) requirement. Appropriate noise barriers/shields, silencers etc. shall be provided in the equipment, wherever feasible. Noise emanating from noisy equipment shall be adequately attenuated by enclosure, insulation etc.



- Recommendations for Noise Level Management
 - The use of damping materials such as thin rubber/lead sheet for wrapping the work places like turbine halls, compressor rooms etc.;
 - Shock absorbing techniques shall be adopted to reduce impact;
 - Efficient flow techniques for noise associated with high fluid velocities and turbulence shall be used (like reduction in noise generated by control levels in both gas and liquid systems achieved by reducing system pressure to as low as possible);
 - All the openings like covers, partitions shall be acoustically sealed;
 - Inlet and outlet mufflers shall be provided which are easy to design and construct;
 - Ear plugs shall be provided to workmen working near high noise generating sources;
 - Noise levels shall be reduced by the use of absorbing material on roof walls and floors;
 - Provision of separate cabins for workers/operators; and
 - The plant compound shall be thickly vegetated with species of rich canopy.

7.0 RISK ASSESSMENT AND DISASTER MANAGEMENT STUDIES

Hazard analysis involves the identification and quantification of the various hazards (unsafe conditions) that exist in the proposed power plant. On the other hand, risk analysis deals with the recognition and computation of risks, the equipment in the plant and personnel are prone to, due to accidents resulting from the hazards present in the plant.

Risk analysis follows an extensive hazard analysis. It involves the identification and assessment of risks the neighboring populations are exposed to as a result of hazards present. This requires a thorough knowledge of failure probability, credible accident scenario, vulnerability of population etc. Much of this information is difficult to get or generate. Consequently, the risk analysis is often confined to maximum credible accident studies and these details discussed in details in EIA report.

8.0 MARINE ENVIRONMENTAL IMPACT ASSESSMENT STUDIES

Baseline data namely water quality, biological studies were conducted in and around intake and marine out falls area. Impact assessment and mathematic modeling studies have been carried and details are incorporated in MEIA report

9.0 COASTAL REGULATION ZONE STUDIES

Demarcation of High tide line and Low tide line studies have been carried in relation with pipeline facilities and details are presented in EIA report.

10.0 PROJECT BENEFITS

The existing project by PPN would enable to meet part of the growing power demand in the Tamilnadu due to rapid industrialization and also due to large scale



use of electricity for irrigation, domestic and commercial purposes. Further, the proposed power plant will result in improvement of infrastructure as well upliftment of social structure in the area. It is anticipated that the proposed power plant will provide benefits for the locals in two phases i.e. during construction phase as well as during operational stage.

Employment

The construction phase of power plant is expected to span over 30 months. Approximately 3000 persons would be required for the construction work in peak period.

During the operational phase, about 70 people shall be employed. Considering that most of the skilled personnel proposed to be employed for the expansion project would be from outside the study area and unskilled/ semiskilled personnel shall be from within the study area, the proposed project would add to the population in the study area which results in better scope for indirect employment opportunities.

Community Services

PPN will employ local people to the extent possible in order to reduce the need for additional infrastructure. In addition, PPN will develop necessary infrastructure like accommodation, water supply, sewerage, medical facility etc. for catering to the needs of the project personnel and their families. The local people will be indirectly benefited by these developments.

Education

Unskilled people and limited skilled people (depending on availability) shall be hired from local population. In addition, some secondary developments like opening of new schools, shops may take place in view of the increased family population due to the proposed employment. These factors will be beneficial to locals residing in the study area.

Corporate Social Responsibility

As a part of corporate social responsibility of project proponents have conducted following activities in and around project site and in Nagapattinam District.

- The company has employed sixty personnel for the operation and maintenance of the power plant. In addition job has been provided to about 250 skilled and unskilled workers (which includes 20 women) through contracting for maintenance activities, security services, fire crew, housekeeping, gardening, medical services etc.
- The Company voluntarily took up the matter of upgrading the education facilities at Thirukkadaiyur from primary school to secondary and senior secondary and has spent Rs. 250 Lakhs till date to provide various facilities to



the Government Senior Secondary High School. Constructed a separate Building for Noon Meal Scheme.

- All the Class Rooms were fully furnished for Rs.12 Lakhs and maintained from 2004
- Computer Lab was Equipped for Rs. 3 Lakhs in 2005 Library was Established with Books and Furniture for Rs. 4 Lakhs in 2005 Extended the School Building in 2006 and got upgraded to Plus 2 level. Provided Stainless Steel Plates and Two Sets of Uniform to all the students
- Solar powered RO Treatment Plant to produce drinking water was provided for Rs. 5 Lakhs Cash awards are being given to students in Nagapattinam District who has obtained first three ranks at the public examinations in 10th and 12th standards.
- Adopted the Thirukkadaiyur Primary Health Centre near the plant site and spent Rs. 4 Lakhs for building renovation, procurement of hospital equipments & furniture in 2004. It is catering to the requirement of nearby 8 villages.
- Provided Reverse Osmosis Drinking Water Treatment Plant to the Office of Superintend of Police, Nagapattinam in 2006 for Rs. 1 Lakh.
- Re-laid the Thirukkadaiyur to Pillaiperumalnallur Road in 2004 for Rs. 40 Lakhs
- Nagapattinam District was the worst affected district during the Tsunami in December 2004. The company has extensively used its infrastructure for the relief activities like rescue, funeral, medical, food, clothing, resettlement etc.
- Provided Emergency Relief Corpus Fund of Rs. 1 Lakh for the use during any emergency.
- Conducted free Gynaecological camp and Eye camp through PPN-Apollo Medical Centre for the nearby villagers.
- In addition to that, as a part of expansion project Rs.15.0Crores will be spent on development of new state of art of hospital, fisheries endowment fund, common green fund, construction of community hall/cyclone shelter, relaying of the existing village road to the power plant with concrete road, construction of toilets in Thirukkadaiyur etc.,

11.0 Conclusion

The expansion power plant has certain level of marginal impacts on the local environment. However, development of this project has certain beneficial impact/effects in terms of bridging the electrical power demand and supply gap and providing employment opportunities that will be created during the course of its setting up and as well as during the operational phase of the project.