1.0 INTRODUCTION

Welspun Energy Madhya Pradesh Limited (WEMPL) proposes to setup a Greenfield Thermal Power Plant (TPP) of 1980 MW (3x660 MW) capacity at Bujbuja village, Barhi tehsil, Katni district, Madhya Pradesh. Memorandum of Understanding (MOU) signed with Government of Madhya Pradesh on 24th November 2009, to develop 2000 MW (± 20%) TPP in Madhya Pradesh.

The present EIA Report addresses the environmental impacts of the proposed power plant and proposes the mitigation measures for the same.

1.1 Screening Category

The proposed thermal power plant project falls under 'Category A' with project or activity type number '1(d)', as per Environment Impact Assessment (EIA) Notification dated 14th September 2006 which requires preparation of EIA Report to get Environmental Clearance (EC) from the Ministry of Environment and Forests (MoEF), New Delhi.

1.2 Objective Of the Report

The present EIA report has been prepared based on the Terms of Reference (TOR) approved by MoEF, Vide letter no. J-13012/98/2010-IA. II (T), dated 1st September 2010 and based on primary data collected during 1st October – 31st December 2010 representing post-monsoon season 2010.

1.3 Environmental Setting

The study area map of 10-km radius around the proposed site is given in **Figure-1**. The environmental setting of the proposed plant site is as follows:

- The proposed project site is covered in toposheet no Toposheet No. 64A/13;
- The project site is located at an elevation of 360 m above Mean Sea Level (MSL);
- The geographical co-ordinates of the proposed power plant range between 23°53'44.30" N to 23°55'16.63" N latitudes and 80°45'00.93"E to 80°46'44.83"E longitudes;
- Ash pond will be located within the plant complex between 23°53'52" N to 23°54'23" N Latitude and 80°45'03"E to 80°46'45"E Longitude;
- Present land use at the proposed plant site is mostly barren and single crop agricultural land;
- The State Highways, SH-10 and SH-11 run at a distance of 0.6 km, S and 0.9 km, N respectively from the proposed plant boundary;
- The Katni Singrauli link of Central Railways (CR) runs at a distance of 2.2 km, S from the proposed plant boundary and the nearest railway link is located at Khanna Banjari at a distance of 4.5 km, E from the site;
- The nearest airport to the project site is located in Jabalpur at a distance of about 118 km from the proposed plant site;
- The district head-quarter of Katni is located at a distance of about 38 km from the proposed plant site;

- The Mahanadi river is flowing at a distance of 6.0 km, N from the project site;
- There are eleven forest blocks in 11 km radius;
- Buffer zone of Bandhvagarh Tiger Reserve is located at a distance of 10.6 km, SE, where as the Core Zone of Bandhavgarh Tiger Reserve (Panpatha Sanctuary) is located at a distance of 16.2 km, ESE from the proposed plant boundary; and
- The project area falls under Seismic Zone-III as per Indian Standards, IS:1893 (Part-1) 2002.

1.4 Project Details

The proposed Thermal Power Plant at Bujbuja village, Katni district will include the following:

- 1980 MW (3x660 MW) capacity in three implementation stages of 660 MW capacity each;
- Area required for project facilities including power plant, corridor for railway siding and colony will be developed in a area of 1200 acres (485.6 ha)
- Coal requirement of 11.1 MTPA will be met from SECL/NCL through dedicated railway siding
- Total Water requirement of 5816 m^3/hr will be met from Bansagar dam;
- Estimated project cost will be about Rs. 7360 Crores.

1.5 Environmental Impact assessment

With a view to assess the environmental impacts arising due to the proposed project, M/s. Welspun Energy Madhya Pradesh Limited (WEMPL) have retained the services of **M/s. Vimta Labs Limited, Hyderabad** – a QCI/ NABET accredited consultancy organization and NABL accredited & MoEF recognised laboratory to prepare EIA Report for various environmental components including air, noise, water, land and biological components along with parameters of human interest which may be affected and to suggest mitigation measures for the adverse impacts.

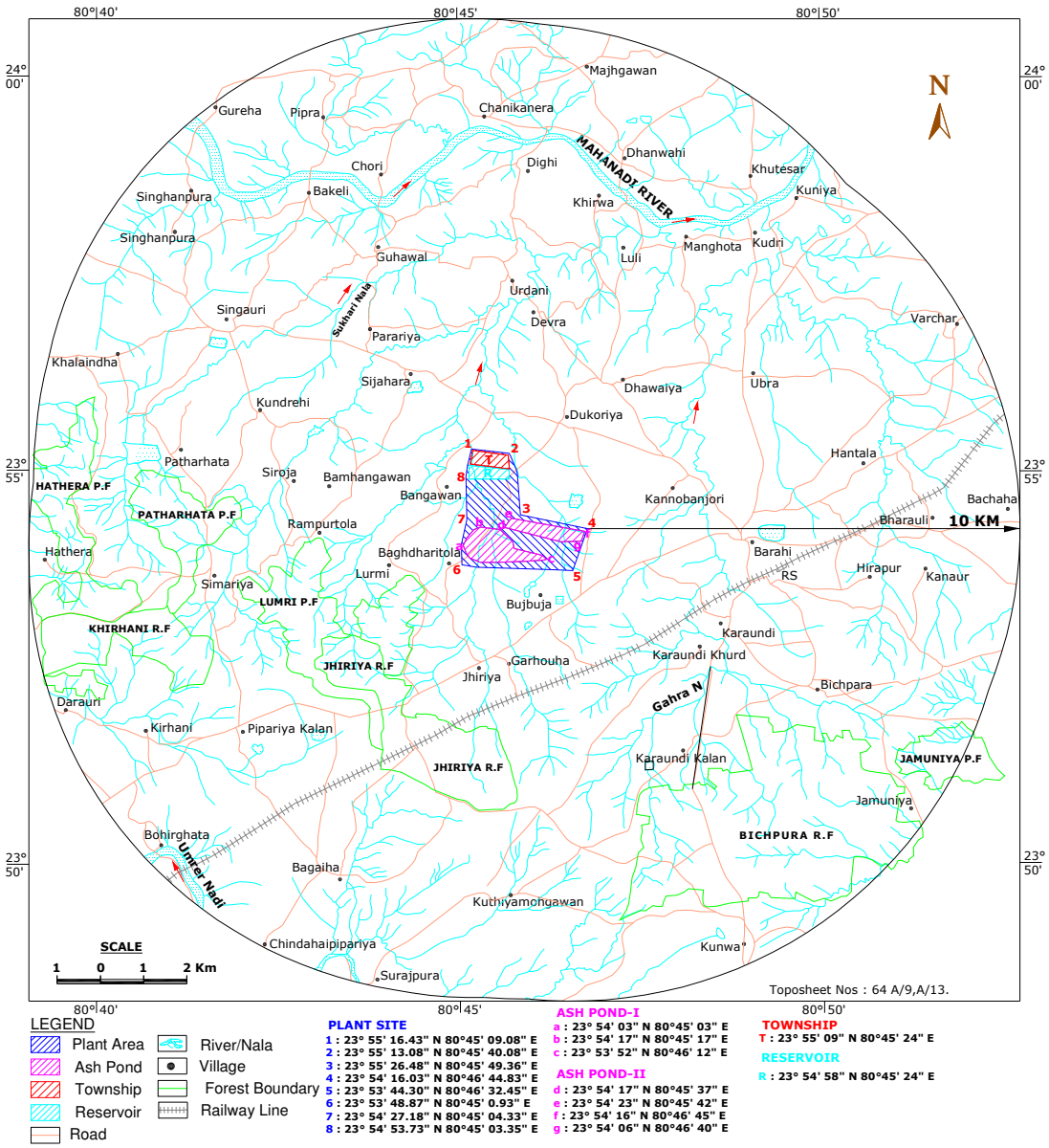

FIGURE-1
STUDY AREA MAP OF THE PROJECT (10 KM RADIUS)

2.0 Details of Process

2.1 Process Description

The proposed 1980 MW power plant will have a configuration of 3x660 MW with super-critical technology.

The power plant would be provided with main plant equipment and plant auxiliary systems comprising external and internal coal handling systems, raw water pre-treatment and post treatment systems, condenser cooling water system, auxiliary cooling water system, plant effluent treatment, ash handling and dumping systems, fuel oil system, service and instrument compressed air systems, air-conditioning and ventilation systems, fire protection system, hydrogen generation system, workshop, chemical laboratory, plant electrical system and plant instrument and control systems. It also includes the transmission lines from switchyard at power plant upto nearest 400 kV sub-station.

2.2 Resource Requirement

2.2.1 Raw Material Requirement

The coal requirement for the proposed power plant is 11.1 MTPA for the proposed power plant capacity of 1980 MW at a Plant Load Factor (PLF) of 90%. The required coal will be sourced from proposed SECL / NCL through railway line. Long term coal linkage has been applied for.

2.2.2 Land Requirement

The total land requirement for the proposed project has been optimized to about 1200 acres (485.6 ha). This includes the proposed power plant, ash pond, railway siding and colony.

The boiler will be designed for cold start-up and initial warm-up using Light Diesel Oil (LDO) and coal flame stabilization with Heavy Fuel Oil (HFO). HFO and LDO will be received to the proposed plant by means of the road tankers.

2.2.3 Power Requirement and Supply

The power from the proposed power plant would be evacuated at 400 KV grid at nearest PGCIL/MPSEB grid substation.

2.2.4 Water Requirement and Supply

The total water requirement for the proposed power project is 5816 m^3/hr. The water demand for the proposed plant will be met from Bansagar dam through a suitable water intake system. Water Resources Department of GoMP vide letter dated 2nd August, 2010 has confirmed the allocation of 60 cusecs of water from Bansagar dam for the project.

2.2.5 Manpower Requirement

The total direct manpower requirement of the project during operation period is estimated to be about 500 persons. Further, more than 1000 personnel will be indirectly employed.

3.0 BASELINE ENVIRONMENTAL STATUS

Baseline environmental studies have been carried during Post-Monsoon 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.

3.1 Meteorological Data Generated at Site

The meteorological parameters were recorded on hourly basis during the study period near proposed plant site and comprises of parameters like wind speed, wind direction (from 0 to 360 degrees), temperature, relative humidity, atmospheric pressure, rainfall and cloud cover.

- Temperature — Min: 8.5°C and Max: 39.4°C
- Relative Humidity — Min: 30 % and Max: 65 %
- Predominant Wind Direction — W, WSW
- Rainfall Recorded — 2.3 mm

3.2 Ambient air quality

Predominant winds from W, WSW and SW directions were observed during study period. To establish the baseline status of the ambient air quality in the study area, the air quality was monitored at 16 locations during the study period. The PM10 and PM2.5 are observed to vary from 16.4 to 33.7 µg/m^3 and 5.0 to 11.8 µg/m^3 respectively. The SO_2 and NOx are observed to vary from 5.0 to 10.0 µg/m^3 and 6.5 to 11.2 µg/m^3 respectively.

The results of the monitored data indicate that the ambient air quality of the region in general is in conformity with respect to norms of the National Ambient Air Quality (NAAQ) Standards of Central Pollution Control Board (CPCB), with present level of activities and also it infers that the air quality levels in the study area are of fairly good quality.

3.3 Water Quality

The baseline groundwater quality status in the region is established by analyzing 4 samples. The pH and conductivity varies from 7.1 – 7.9 and 460 - 971 micromhos/cm. Sodium and Potassium content is found to be in the range of 13.6 -40.6 mg/l and 0.4 – 2.8 mg/l. Calcium and Magnesium content varies between 43.2 – 76.8 mg/l and 22.8 – 48.6 mg/l respectively. Total hardness and alkalinity expressed as $CaCO_3$ ranges between 202 - 392 mg/l and 188- 360 mg/l respectively. The physico-chemical and

biological analysis revealed that most of the parameters of groundwater are within the permissible limits as per IS: 10500.

3.4 Soil Characteristics

The soil samples were tested at 8 locations covering various land uses. It was observed that the soil in the study area is predominantly of sandy clay type. The pH of the soil samples ranged from 7.4 to 7.5. The Electrical Conductance of the soil samples varied from 82 to 155 µmhos/cm. The phosphorus values ranged between 50.1 to 83.3 kg/ha. The nitrogen values ranged between 58.9 – 94.0 kg/ha. The potassium values ranged between 283.4 – 435.7 mg/kg.

3.5 Noise Level Survey

The noise monitoring has been conducted at 8 locations in the study area. The Day time and Night time Noise Levels in the study area ranged between 44.2 dB (A) to 65.3 dB (A) and 38.5 dB (A) to 58.4 dB (A) respectively. The noise levels in general found mostly within the acceptable levels as per standards for various zones as prescribed by Central Pollution Control Board (CPCB).

3.6 Flora and fauna studies

Detailed ecological studies were conducted during study to identify the floristic composition in and around proposed block and surrounding villages. Predominance of phanerophytes and therophytes could be observed during study period. 240 plant species and 88 animals observed/recorded through primary survey or with interaction local elderly people and forest officials of the area. 62 birds species, 6 species butterflies, 5 species of Amphibians and 14 species of mammals are recorded, out of which 5 species belongs to Schedule-II, 5 species belongs to Schedule-III rest belongs to Schedule- IV and V of Wildlife (Protection) Act,1972.

3.7 Socio-Economics Details

The information on socio-economic aspects of the study area has been compiled from secondary sources, which mainly include census data of 2001. As per the 2001 census, the study area consists of a total population of 62079 persons residing in 12102 households. The configuration of male and female indicates that the males constitute about 51.03% and females 89.96 % of the total population. About 9.14 % of the population in the study area belongs to Scheduled Castes (SC) and 20.85 % to Scheduled Tribes (ST). The study area experiences a literacy rate of 99% and has 29.5% of the total population as working population.

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 Air Environment

- Air pollution modeling, carried out for proposed power plant shows that resultant concentrations of SO_2, NO_x and PM due to the proposed project for the study period will remain well within the National Ambient Air Quality Standards;

- Limiting of pollutant discharge and minimizing its effect on air quality, within prescribed standards, will be achieved, consequent to plant design for boilers and installation of stacks of adequate height that provides better dispersion of pollutants; and

- 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 Air Dispersion Modeling

In the present case, **Industrial Source Complex [ISC3]** dispersion model based on steady state Gaussian plume dispersion, designed for multiple point sources for short term and developed by United States Environmental Protection Agency [USEPA] has been used for simulations from point sources.

Modeling studies reveal that the maximum incremental short term 24 hourly ground level concentrations for Particulates, SO_2 and NO_x likely to be encountered during study period are 0.9, 57.8 and 11.8 µg/m^3 occurring at a distance of about 1.0 km in the E direction**.** The resultant concentrations are predicted to be well within the standards specified by CPCB.

4.3 Water Environment

The total water requirement for the proposed power project is 5816 m^3/hr, which will be met from Bansagar dam through a suitable water intake system. The project will not extract groundwater and hence there will be no impact on ground water.

The total waste water generation will be 1242 m^3/hr. Out of this, about 933 m^3/hr of domestic/sanitary/service wastewater will be suitably treated in STP/CETP and utilized for greenbelt development, ash handling, dust suppression, service etc. The remaining 309 m^3/hr of treated wastewater will be discharged to the nearest water body. The quality of treated effluent from the plant will conform to CPCB standards. The sludge generated in the raw water treatment plant will be used as manure in the greenbelt development.

4.4 Solid Waste Generation

A long-term ash management agenda has been drawn to ensure compliance with the Ash Management Rules and meet CREP (Corporate Responsibility for Environment Protection) requirements. Entire production of fly ash is proposed for consumption in cement and brick manufacturing at the existing and proposed cement plants in the vicinity.

4.5 Noise Environment

The main noise generating sources are blowers from boilers and turbines. The impact of noise emission from boilers will be minimized by acoustic enclosures and the noise levels will be limited to 85 dB(A).

4.6 Greenbelt Development

A 100 m wide greenbelt, consisting of at least 3 tiers around plant boundary will be developed as greenbelt and green cover as per CPCB/MoEF, New Delhi guidelines. The plant density of 2500 trees per hectare with local native species will be implemented.

4.7 Socio- Economics

The major economic impacts, which will accrue to the region, during the construction phase and operation of the proposed power plant, will be an increased availability of direct and indirect employment. Local people will be benefited after commissioning of the proposed project in terms of petty to major contractual jobs and associated business establishments.

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/MPPCB. Following attributes will be covered in the post project environmental monitoring in and around the project site:

- Ambient air quality monitoring on bi-weekly, 24 hours basis in the plant area and in the surrounding villages with respect to PM10, PM2.5, SO_2, NO_x and Hg;
- Source emissions will be monitored on monthly basis. Automatic continuous online monitoring system shall be installed in the stacks;
- Water quality monitoring at intake point, surface water bodies and ground water in the surrounding villages. Further, the wells around the ash pond area will be identified and monitored on the monthly basis;
- Treated wastewater before routing to clarifier will be analyzed on fortnightly basis. The pH, temperature, electric conductivity, TDS and flow will be monitored regularly;
- The noise levels will be recorded in and around plant. The noise levels at boundary of the plant will be recorded on monthly basis;
- The soil quality around ash pond area will be monitored on six monthly basis for the fertility of the soil;

- All the results will be compiled and thoroughly analyzed to assess the performance of the power plant; and

- The results will be reported on regular basis to the MPPCB and Regional Office of MoEF.

5.1 Cost Provision for Environmental Measures

It is proposed to invest about . 325 Crores on pollution control, treatment and monitoring systems for proposed power plant. In addition to this, . 2.12 will be spent on greenbelt development in and around the proposed power plant.

6.0 Additional Studies

6.1 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.

6.2 Project Benefits

The proposed project by WEMPL would enable to meet part of the growing power demand in the State 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.

6.3 CSR Activities

WEMPL will implement a Community Development Plan in phased manner through a dedicated cell, starting from the construction phase onwards. It is proposed to invest an estimated amount of ₹ 86.9 Crores for various community development activities in the region. Concept proposals for community development plan prepared on the basis of primary socio-economic survey in the region are already under active consideration. WEMPL will implement the same with the help of NGOs/Government Organizations in the region.

7.0 Environment Management Plan

During operation phase, the impacts on the various environmental attributes should be mitigated using appropriate pollution control equipment. The Environment Management Plan prepared for the proposed project aims at minimizing the pollution at source.

7.1 Air Pollution Management

Fugitive and stack emissions from the power plant will contribute to increase in concentrations of particulate matter and gaseous pollutants, viz., SO_2 and NO_x. The mitigative measures proposed in the plant are:

- Installation of ESPs of >99.99% efficiency to limit the SPM concentrations below 50 mg/Nm^3;
- Provision of 275 m high stack for wider dispersion of gaseous emissions;
- Providing low NO_x burners to reduce the NO_x emissions;
- Dust extraction system will be provided at transfer points;
- Provision of water sprinkling system at material handling and storage yard;
- Asphalting of the roads within the plant area; and
- Development of Greenbelt around the plant to arrest the fugitive emissions.

7.2 Water Pollution Management

The effluents generated from the power plant during operations will be collected stream-wise for various treatments as envisaged in the wastewater treatment scheme. The wastewater recovery, as practiced, will considerably reduce the impact on the surface water quality. The recovered wastewaters collected in a central monitoring basin will be reused with in plant premises and greenbelt/irrigation.

The measures proposed to minimise the impacts are:

- Provision of sewage treatment plant to treat domestic sewage from plant and township;
- Utilization of treated domestic wastewater for greenbelt development;
- HDPE liners will be provided to the ash pond in order to arrest any seepage of ash pond water into groundwater;
- Provision of separate storm water system to collect and store run-off water during rainy season and utilization of the same in the process to reduce the water requirement;
- Suitable rainwater harvesting structures to be constructed.

7.3 Noise Pollution Management

In the process, various equipments like pumps, cooling tower, compressors etc generate noise. The proposed means to mitigate higher noise levels are:

- Equipment will conform to noise levels prescribed by regulatory authorities;
- Provision of acoustic enclosures to noise generating equipments like pumps;
- Provision of thick greenbelt to attenuate the noise levels; and

- Provision of earplugs to the workers working in high noise level area.

7.4 Solid Waste Management

The main solid waste from the proposed power plant will be ash (fly ash and bottom ash). Considering the expected coal quality, of about 4.44 MTPA of ash will be generated from the proposed power plant. Out of this, the bottom ash will be about 20% of the total ash generated i.e. 0.89 MTPA and the fly ash will be remaining 80% of the total ash generated i.e. about 3.55 MTPA.

It is proposed to utilize 100% of the fly ash generated from the project for cement and brick manufacturing at existing and proposed cement plants in the vicinity. During emergency the ash will be disposed off safely in ash pond area to avoid environmental hazards. All efforts will be made to utilize bottom ash for various purposes. Unused bottom ash will be disposed off in the ash pond proposed within the plant complex. To control fugitive dust emission from the ash pond area water sprinkling would be done. After the ash pond is abandoned, its area will be reclaimed through tree plantation. HDPE liners will be provided in the ash pond in order to arrest any seepage of ash pond water into groundwater.

8.0 Conclusion

The proposed power plant has certain level of marginal impacts on the local environment. However, with the implementation of the proposed pollution control and environment management measures, even the minor impacts anticipated due to construction and operation of the proposed power plant will be mitigated. Further, 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.

Thus, in view of considerable benefits from the project without any adverse environmental impact, the proposed project is most advantageous to the region as well as to the nation.