FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

FOR

Proposed 2X660 MW Super Critical Coal Based Thermal Power Plant

At

VILLAGE DADRI KHURD,

TEHSIL - MIRZAPUR SADAR,

MIRZAPUR DISTRICT, UTTAR PRADESH

PROJECT PROPONENT

M/s Welspun Energy UP Pvt. Ltd.

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Sansad Marg, New Delhi - 110 001
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List of Abbreviation

S. No.	ABBREVIATION	EXPANDED FORM
1.	WEUPPL	Welspun Energy UP Private Limited
2	°C	Degree Centigrade
3	AAQ	Ambient Air Quality
4	AAQM	Ambient Air Quality Monitoring
5	AAS	Atomic Absorption Spectroscopy
6	AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
7	AHP	
8	APHA	American Public Health Association
9	BOD	Biological Oxygen Demand
10	CCL	Central Coalfields Limited
11	CDM	Clean Development Mechanism
12	*CEA*	*Central Electricity Authority*
13	CER	Certified Emission Reduction
14	CMB	Central Monitoring Basin
15	COC	Cycle Of Concentration
16	CPCB	Central Pollution Control Board
17	CSR	Corporate Social Responsibilities
18	CST	Concentrated Solar Thermal Systems
19	CW SYSTEM	Cooling Water System
20	dB	Decible
21	DE/DS System	Dust Extraction And Dust Supression
22	DGMS	Director General of Mines Safety
23	DM Plant	Demineralisation Plant
24	DMP	Disaster Management Plan
25	DNI	Direct Normal Irradiation
26	DO	Dissolved Oxygen
27	EAC	Expert Appraisal Committee
28	EC	Environmental Clearance
29	ECC	Emergency Control Center
30	ECO	Emergency coordinating officer
31	EIA	Environmental Impact Assessment
32	EMC	Environmental Monitoring Cell
33	EMP	Environmental Management Plan
34	ENE	East of North East
35	EPO	Emergency planning officer
36	*EPS*	*Electric Power Survey*

37	ESPs	Electrostatic Precipitators
38	ETP	Effluent Treatment Plant
39	FCC	False Color Composite
40	FE&TI	Fire-Explosion and Toxicity Index
41	FGD	flue gas desulphurization
42	GC	Gas Chromatography
43	GCP	Ground Control Points
44	GCV	Gross Calorific Value
45	GHG	Green House Gas
46	GLC	Ground Level Concentration
47	GOI	Government of India
48	ha	Hactare
49	HFL	High Flood Level
50	HFO	Heavy Fuel Oil
51	Hg	Mercury
52	HVAC	Heating, Ventilation and Air Conditioning
53	HVWS	high velocity water sprays system
54	Hz	Hertz
55	IIP	Indian Institute of Petroleum
56	IMD	India Meteorological Department
57	*IS*	Indian Standards
58	kcal	Kilo Calorie
59	kg	Kilo Gram
60	KL/annum	Kilo Litre PerAnnum
61	km	Kilometer
62	KWh	Kilo Watt Hour
63	kWh	Kilo Watt Hour
64	LCV	Light Carriage Vehicles
65	LDO	Light Diesel Oil
66	LPG	Liquified Petroleum Gas
67	m^3/hr	Cubic meter per hour
68	MCAA	Maximum Credible Accident Analysis
69	MCH	Maternal and Child Health
70	MCM	Million Cubic Meter
71	MoEF	Ministry of Environment and Forests
72	mS/cm	Milli Siemens per Centimeter
73	MSL	Mean Sea Level
74	MTPA	Million Tonnes per Annum
75	MVWS	Medium Velocity Water Spray system

76	MW	Megawatt
77	N	North
78	NCL	Northern Coalfields Limited
79	NCR	North Central Railways
80	NDIR	Non Depressive Infrared Spectroscopy
81	NFPA	National Fire Prevention Association
82	NFPA	National Fire Prevention Association
83	NH	National highway
84	NIHL	Noise Induced Hearing Loss
85	NNE	North of North East
86	NR	Northern Railways
87	NW	NorthWest
88	O&M	Operation and Maintenance
89	OSE	On Site Emergency
90	OSHA	Occupational Safety and Health Administration
91	PAF	Proposed Land Acquisition For Families
92	PAH	Polycyclic Aromatic Hydrocarbons
93	PCN	Concept Note
94	PDD	Project Design Document
95	PGCIL	Power Grid Corporation of India Limited
96	PIN	Project Idea Note
97	PLF	Plant Load Factor
98	PM_{10}	Particulate Matter less than 10 µg
99	$PM_{2.5}$	Particulate Matter less than 2.5 µg
100	PPC	Portland Pozzolana Cement
101	R&R	Rehabilitation and Resettlement
102	R.S	Railway Station
103	RF	Reserved Forest
104	ROW	Right of Way
105	SC	Scheduled Castes
106	SECL	South Eastern Coalfields Limited
107	SH	State highway
108	SHGs	Self help Groups
109	SOI	Survey of India
110	SPL	Sound Pressure Level
111	SPM	Suspended Particulate Matter
112	SPV	Special purpose Vehicle
113	SPV	Solar Photo Voltaic
114	SS	Suspended Solids

115	ST	Scheduled Tribes
116	STP	Sewage Treatment Plant
117	SW	South -West
118	TAC	Tariff Advisory Committee
119	TAC	Tariff Advisory Committee
120	TDS	Total Dissolved Solids
121	ToR	Terms of Reference
122	UNFCCC	United Nations Framework Convention for Climate Change
123	UPPCB	Uttar Pradesh Pollution Control Board
124	USEPA	United States Environmental Protection Agency

List of Abbreviation

S. No.	ABBREVIATION	EXPANDED FORM
1.	WEUPPL	Welspun Energy UP Private Limited
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4	EC	Environmental Clearance
5	MoEF	Ministry of Environment and Forests
6	ToR	Terms of Reference
7	NCL	Northern Coalfields Limited
8	CCL	Central Coalfields Limited
9	SECL	South Eastern Coalfields Limited
10	PGCIL	Power Grid Corporation of India Limited
11	SPV	Special purpose Vehicle
12	SH	State highway
13	NH	National highway
14	km	Kilometer
15	SW	South -West
16	N	North
17	R.S	Railway Station
18	ENE	East of North East
19	SOI	Survey of India
20	NW	NorthWest
21	MSL	Mean Sea Level
22	NNE	North of North East
23	NR	Northern Railways
24	RF	Reserved Forest
25	*IS*	Indian Standards
26	*EPS*	*Electric Power Survey*
27	*CEA*	*Central Electricity Authority*
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29	GOI	Government of India
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31	IMD	India Meteorological Department
32	ESPs	Electrostatic Precipitators
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34	MTPA	Million Tonnes per Annum
35	kcal	Kilo Calorie
36	kWh	Kilo Watt Hour
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38	m^3/hr	Cubic meter per hour
39	R&R	Rehabilitation and Resettlement
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74	NDIR	Non Depressive Infrared Spectroscopy
75	AAS	Atomic Absorption Spectroscopy
76	GC	Gas Chromatography
77	APHA	American Public Health Association
78	dB	Decible
79	Hz	Hertz
80	NIHL	Noise Induced Hearing Loss
81	SPL	Sound Pressure Level
82	SC	Scheduled Castes
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122	MCH	Maternal and Child Health
123	CSR	Corporate Social Responsibilities
124	SHGs	Self help Groups

J-13012/12/2011 - IA. II (T)
Government of India
Ministry of Environment & Forests

`Paryavaran Bhavan, C.G.O. Complex,
Lodi Road, New Delhi -110003.
Dated: June 15, 2011.

To

M/s Welspun Energy UP Private Ltd.
Welspun House, 7th Floor, Kamla City,
Senapati Bapat Marg, Lower Parel,
Mumbai-400 013.

Sub: ***2x660 MW Super Critical Coal Based Thermal Power Plant of at villages Dadri Khurd, in Mirzapur Sadar Taluk, in Mirzapur Distt., in Uttar Pradesh - reg. TOR.***

Sir,

The undersigned is directed to refer to your letter dated 31.12.2010 on the above mentioned subject.

2. It is to inform that the proposal was considered by the Expert Appraisal Committee during its 24th Meeting held during May 2-3, 2011, for determination of the Terms of Reference (TOR) for undertaking detailed EIA study in accordance with the provisions of the EIA notification dated **September 14, 2006.**

3. Based on the information provided by you with regard to the above mentioned project proposal, the Committee has prescribed the following Terms of Reference (TORs) for preparation of the Environmental Impact Assessment (EIA) Report and Environment Management Plan (EMP), in respect of your above mentioned project.

i) Vision document specifying prospective long term plan of the site shall be formulated and submitted.

ii) Executive summary of the project indicating relevant details along with photograph of site shall be provided and responses to the issues raised in public hearing and written representations (if any) along with action plan to address the same shall be provided in tabular form including requisite allocation of funds.

iii) Possibility for harnessing solar power within the premises of the plant (particularly at available roof tops) shall be examined and details submitted.

iv) The coordinates of the proposed site including location of ash pond shall be submitted along with topo sheet and confirmed GPS readings of plant boundary, ash pond site etc. Level at Ash Pond site with respect to HFL of nallah/river shall be specified.

v) Layout plan indicating break-up of plant, green belt, infrastructure, roads etc. shall be provided.

vi) Land and requirement for the project shall be optimized as per latest CEA norms. Item wise break up of land requirement and revised layout shall be provided.

vii) Present land use as per revenue records of the proposed site shall be furnished. Information on land to be acquired, if any, for coal transportation system as well as for lying of pipeline including ROW shall be specifically stated. It may clearly be confirmed whether the land including ROW is free of all encumbrances. The issues relating to land acquisition and R&R should be clearly discussed in the EIA report.

viii) Satellite imagery or authenticated map indicating drainage, cropping pattern, water bodies (rivers, nallahs, ponds etc.), location of nearest villages, creeks, mangroves, rivers, reservoirs, national parks, wildlife sanctuaries, tiger reserves, biosphere reserves, heritage sites etc in the study area shall be provided.

ix) Location of any National Park, Sanctuary, Elephant/Tiger Reserve (existing as well as proposed), migratory routes, if any, within 10 km of the project site shall be specified and marked on the map duly authenticated by the Chief Wildlife Warden.

x) Topography of the area (elevation) shall be clearly indicated and specific information whether the site requires any filling shall be provided. If in case so, details of filling, quantity of fill material required, its source, transportation etc. shall be given.

xi) A detailed study on land use in the study area shall be carried out which shall include identification of common property resources available for conversion into productive land. Accordingly action plan for abatement and compensation for damage to agricultural land/ common property land (if any) due to proposed project (as applicable) shall be prepared.

xii) A mineralogical map of the proposed site and confirmed information that the site is not located on economically feasible mineable mineral deposit shall be submitted.

xiii) Details of 100% fly ash utilization plan from day one of operation of the plant along with firm agreements / MoU with contracting parties shall be submitted. The plan shall also include disposal method / mechanism of bottom ash.

xiv) Water requirement shall be optimized as per latest CEA norms and revised requirement shall be submitted along with water balance diagram. Details of water balance calculated shall take into account reuse and re-circulation of effluents which shall be explicitly specified.

xv) Water body/nallah (if any) passing across the site shall not be touched. It shall also be ensured that atleast 100 m distance is kept away from the HFL of the nallah (if any) passing in and around the proposed site. In case any nallah / drain are to be diverted it shall be ensured that natural drainage pattern of the area is not disturbed and details shall be provided.

xvi) Degenerated water bodies in and around the site within a 3.0 Km radius shall be regenerated and action plan shall be formulated.

xvii) Hydro-geological study of the area shall be conducted from an institute/ organisation of repute to assess impact on ground and surface water regime due to proposed project. Specific mitigation measures shall be spelt out and action plan for implementation of the same shall be provided.

xviii) Study on the impact on river/marine ecology (as may be applicable) due to the proposed withdrawal of water / discharge of treated wastewater into the river/creek/ sea etc shall be carried out and submitted alongwith the EIA Report.

xix) Source of water and its availability and sustainability shall be studied. Commitment regarding availability of requisite quantity of water from the Competent Authority shall be provided along with letter / document stating firm allocation of water. Details on allocation of water of other competing sources downstream of the project shall be provided.

xx) Detail plan for carrying out rainwater harvesting and proposed utilisation in the plant shall be provided.

xxi) Feasibility of zero discharge shall be examined and detailed justification shall be submitted if in case the same is not possible. Proposed discharge (if any), its quantity, quality and point of discharge, users downstream etc. shall be provided.

xxii) Quantity of water requirement for the project should be optimized. Optimization of COC for water conservation shall be specified. Other water conservation measures proposed in the project should also be given.

xxiii) Detailed plan for conducting monitoring of water quality regularly and mechanism for maintenance of records shall be formulated. Detail of methodology and identification of monitoring points (between the plant and drainage in the direction of flow of surface / ground water) shall be submitted. It shall be ensured that parameter to be monitored also include heavy metals.

xxiv) Detailed socio-economic study shall be carried out for the study area comprising of 10 km from the plant site.

xxv) Action plan for identification of local employable youth for training in skills relevant to the project for eventual employment in the project itself shall be formulated.

xxvi) A detailed R&R and CSR plan along with activities wise break up of financial commitment shall be prepared. CSR component shall be identified considering need based assessment study. Sustainable income generating measures which can help in upliftment of poor section of society which is consistent with the

traditional skills of the people shall be identified. The programme can include activities such as development of fodder farm, fruit bearing orchards, vocational training etc. Separate budget for community development activities and income generating programmes shall be specified.

xxvii) R&R action plan shall specify the details of land / homestead oustees and compensation and welfare measures formulated.

xxviii) While formulating R&R and CSR schemes it shall be ensured that an in-built monitoring mechanism for the schemes identified are in place and mechanism for conducting annual social audit from the nearest government institute of repute in the region shall be prepared. The project proponent shall also provide action plan for the status of implementation of the scheme from time to time.

xxix) Special schemes for upliftment of tribals in the area (if any) and measures for sustainable livelihood for tribal population shall be formulated and financial budget shall be specified.

xxx) One complete season AAQ and meteorological data (except monsoon) shall be collected and the dates of monitoring mentioned. The parameters to be covered for AAQ shall include RSPM (PM10, PM2.5), SO_2, NO_x, Hg and O_3 (ground level). The location of the monitoring stations should be so decided so as to take into consideration the pre-dominant downwind direction, population zone and sensitive receptors including reserved forests. There should be at least one monitoring station each in the upwind and in the pre dominant downwind direction at a location where maximum ground level concentration is likely to occur.

xxxi) Cumulative impact of other sources of emission including the proposed project on the AAQ of the area shall be assessed. Details of the model used and the input data used for modelling shall also be provided. The air quality contours may be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any. The wind roses should also be shown on this map.

xxxii) Fuel analysis shall be provided. Details of auxillary fuel, if any including its quantity, quality, storage etc should also be given.

xxxiii) Quantity of fuel required its source and characteristics and document to substantiate confirmed fuel linkage shall be provided.

xxxiv) Details of transportation of fuel from the source to the proposed plant shall be submitted. If transportation is over a long distance it shall be ensured that rail transportation to the site shall be first examined and details in this regard provided.

xxxv) Details regarding infrastructure facilities such as sanitation, fuel, restroom, medical facilities, safety during construction phase etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase.

xxxvi) EMP to mitigate the adverse impacts due to the project along with item wise cost of its implementation shall be specified.

xxxvii) A Disaster Management Plan along with risk assessment study including fire and explosion issues due to storage and use of fuel should be carried out. It should take into account the maximum inventory of storage at site at any point in time. The risk contours should be plotted on the plant layout map clearly showing which of the proposed activities would be affected in case of an accident taking place. Based on the same, proposed safeguard measures should be provided. Measures to guard against fire hazards should also be provided.

xxxviii) Detailed plan for raising Green belt of 100 m width and consisting of at least 3 tiers around plant boundary (except in areas not possible) with tree density not less than 2500 trees per ha and survival rate atleast 80% shall be submitted. In case 100 m width is not feasible atleast 50 m width green belt shall be raised and detail justification provided.

xxxix) Details of litigation pending or otherwise with respect to project in any courts, tribunal etc. shall be provided.

4. Besides the above, the following general points will be followed:

a. All documents to be properly referenced with index, page numbers and continuous page numbering.

b. Where data is presented in the report especially in table, the period in which the data was collected and the source should invariably be indicated.
c. Where the documents provided are in a language other than English, an English translation should be provided.
d. The Questionnaire for environmental appraisal of thermal power projects as devised earlier by the Ministry shall also be filled and submitted.
e. The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India (QCI) / National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA/ EMP reports prepared by them and data provided by other organization / Laboratories including their status of approvals etc. In this regard circular no. F.No. J-11013/77/2004-IA-II (I) dated 2nd December, 2009 is posted on the Ministry's website http://www.moef.nic.in may be referred.

In addition to the above, information on the following may also be incorporated in the EIA report.

1. Is the project intended to have CDM-intent?

(i) If not, then why?
(ii) If yes, then

a. Has PIN (Project Idea Note) {or PCN (Project Concept Note)} submitted to the ?NCA? (National CDM Authority) in the MoEF?
b. If not, then by when is that expected?
c. Has PDD (Project Design Document) been prepared?
d. What is the Carbon intensity? from your electricity generation projected (i.e. CO_2 Tons/MWH or Kg/KWH)
e. Amount of CO_2 in Tons/year expected to be reduced from the baseline data available on the CEA?s web-site (www.cea.nic.in)

2. Notwithstanding 1(i) above, data on (d) & (e) above shall be worked out and reported.

5. **The Environmental clearance shall be applied only after firm fuel and water linkages are obtained.**

6. After preparing the Draft EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned issues, the same shall be submitted to the SPCB for conducting the public hearing as per procedure of EIA notification 2006. The issues emerged during public hearing shall be further incorporated in the Draft EIA/EMP report. The final EIA/EMP report along with public hearing report and the requisite documents (*including written objections, if any*) shall be submitted to the Ministry for appraisal by the Expert Appraisal Committee for consideration of awarding environmental clearance under the provisions of Environmental Impact Assessment notification dated September 14, 2006.

7. The TORs prescribed shall be valid for a period of two years for submission of EIA/ EMP reports, after public consultation.

Yours faithfully,

P. Ahujarai

(Dr. P.L. Ahujarai)
Director

Copy to:

1. The Secretary, Department of Environment, Govt. of Uttar Pradesh.

2. The Chairman, Uttar Pradesh Pollution Control Board, IIIrd Floor, PICUP Bhawan, Vibhuti Khand, Gomti Nagar, Lucknow – 226 010
3. The Chief Conservator of Forests, Ministry of Environment & Forests, Regional Office (CZ), Kendriya Bhawan, 5th Floor, Sector-H, Aliganj, Lucknow – 226020.
4. Guard File.

(Dr. P.L. Ahujarai)
Director

PROPOSED 2 X 660 MW SUPER CRITICAL COAL BASED THERMAL POWER PLANT AT VILLAGE: DADRI KHURDH, TEHSIL: MIRZAPUR SADAR, DISTRICT: MIRZAPUR (U.P.) BY M/S WELSPUN ENERGY UP PVT. LTD.

MoEF F. No. J-13012/ 12/ 2011-IA. II (T) dated 15th June, 2011

S. No.	ToR Points	ToR Reply
I.	Vision document specifying prospective long term plan of the site shall be formulated and submitted.	**Chapter 1 of the Final EIA/ EMP Report under section 1.2 on page no 1-2**
II.	Executive summary of the project indicating relevant details along with photograph of site shall be provided and issues raised in public hearing along with action plan to address the same shall be provided in tabular form including requisite allocation of funds.	Executive Summary is appended with Final EIA/EMP Report. Photographs have been incorporated in **Chapter 2 of the Final EIA/ EMP Report under section 2.4 and Figure No. 2.1 on page no 20.** The details of Public hearing are incorporated in section 7.1 and replies of the issues raised in Public Hearing are incorporated under Sub section 7.1.5 in **Chapter VII of Final EIA/ EMP Report, page no. 191 to 194.**
III.	Possibility for harnessing solar power within the premises of the plant (particularly at available roof tops) shall be examined and details submitted.	**Chapter 7 of the Final EIA/ EMP Report under section 7.7 on page no 256 to 258.**
IV.	The coordinates of the proposed site including location of ash pond shall be submitted along with topo sheet and confirmed GPS readings of plant boundary, ash pond site etc. Level at Ash	**Chapter 1 of the Final EIA/ EMP Report under section 1.3.4, Table no. 1.1 on page no 4-6. Coordinated of ash pond are marked on the toposheet and the figure is incorporated in Chapter 2, Section 2.4.2 and figure no 2.3 and page no. 23of the Final EIA/EMP Report.**

	Pond site with respect to HFL of nallah/river shall be specified	
V.	Layout plan indicating break-up of plant, green belt, infrastructure, roads etc. shall be provided	**Chapter 2 of the Final EIA/ EMP Report under section 2.4 and Figure no. 2.2 on page no. 21**
VI.	Land and requirement for the project shall be optimized as per latest CEA norms. Item wise break up of land requirement and revised layout shall be provided	**Chapter 2 of the Final EIA/ EMP Report under section 2.5.1 on page no 26-27.** **Chapter 2 of the Final EIA/ EMP Report under section 2.4 on page no 18.**
VII.	Present land use as per revenue records of the proposed site shall be furnished. Information on land to be acquired, if any, for coal transportation system as well as for lying of pipeline including ROW shall be specifically stated. It may clearly be confirmed whether the land including ROW is free of all encumbrances. The issues relating to land acquisition and R&R should be clearly discussed in the EIA report.	**Chapter 2 of the Final EIA/ EMP Report under section 2.5.1 and 2.5.1.2 on page no 26-27** **The Issue relating to land acquisition and R&R are incorporated under Section 7.8 of Chapter VII of Final EIA/EMP Report, page no. 258-262.**
VIII.	Satellite imagery or authenticated map indicating drainage, cropping pattern, water bodies (rivers, nallahs, ponds etc.), location of nearest	**Chapter 3 of the Final EIA/ EMP Report under section 3.3 on page no 56 to 61.**

	villages, creeks, mangroves, rivers, reservoirs, national parks, wildlife sanctuaries, tiger reserves, biosphere reserves, heritage sites etc in the study area shall be provided	
IX.	Location of any National Park, Sanctuary, Elephant/Tiger Reserve (existing as well as proposed), migratory routes, if any, within 10 km of the project site shall be specified and marked on the map duly authenticated by the Chief Wildlife Warden.	**Chapter 1 section 1.3.4, Figure no. 1.2 of the Final EIA/ EMP Report on page no 8.**
X.	Topography of the area (elevation) shall be clearly indicated and specific information whether the site requires any filling shall be provided. If in case so, details of filling, quantity of fill material required, its source, transportation etc. shall be given	**Chapter 4 of the Final EIA/EMP Report under section 4.2.1 on page no 124 & Section 4.3.1 on Pg no 129.**
XI.	A detailed study on land use in the study area shall be carried out which shall include identification of common property resources available for conversion into productive land. Accordingly action plan for abatement and compensation for	**No common property resources were identified. Chapter 3 – Section 3.3 of Final EIA/EMP Report, page no. 56 to 61.**

	damage to agricultural land/ common property land (if any) due to proposed project (as applicable) shall be prepared	
XII.	A mineralogical map of the proposed site and confirmed information that the site is not located on economically feasible mineable mineral deposit shall be submitted	**Mineralogical Map is enclosed in Chapter III, Section 3.5.2.1, figure 3.6, page no. 74 with Final EIA/EMP Report.**
XIII.	Details of 100% fly ash utilization plan from day one of operation of the plant along with firm agreements / MoU with contracting parties shall be submitted. The plan shall also include disposal method / mechanism of bottom ash	**Chapter 4 of the Final EIA/ EMP Report under section 4.6.4.1 on page no 156 to 159.**
XIV.	Water requirement shall be optimized as per latest CEA norms and revised requirement shall be submitted along with water balance diagram. Details of water balance calculated shall take into account reuse and re-circulation of effluents which shall be explicitly specified.	**Chapter 2 of the Final EIA/ EMP Report under section 2.5.2 on page no 27 to 32.**
XV.	Water body/nallah (if any) passing across the site shall not be touched. It shall also be ensured that atleast 100 m	**Chapter 4 of Final EIA/EMP Report under section 4.2.4 on Page no. 125**

	distance is kept away from the HFL of the nallah (if any) passing in and around the proposed site. In case any nallah / drain are to be diverted it shall be ensured that natural drainage pattern of the area is not disturbed and details shall be provided.	
XVI.	Degenerated water bodies in and around the site within a 3.0 Km radius shall be regenerated and action plan shall be formulated.	**No degenerated water bodies are present within 3.0 Km radius from project site. However, Rainwater Harvesting shall be practiced within the plant premises and ground water recharge activities shall be arranged in the near by villages under CSR programs.**
XVII.	Hydro-geological study of the area shall be conducted from an institute/ organization of repute to assess impact on ground and surface water regime due to proposed project. Specific mitigation measures shall be spelt out and action plan for implementation of the same shall be provided.	**Chapter 7 of Final EIA/EMP Report, section7.6, page No: 252 to 255.**
XVIII.	Study on the impact on river/marine ecology (as may be applicable) due to the proposed withdrawal of water / discharge of treated wastewater into the river/creek/ sea etc shall be carried out and submitted along	**Chapter 4 of Final EIA/EMP Report, section 4.2.4, Page No. 125 & Section 4.3.7on Page no. 141 to 143.**

	with the EIA Report	
XIX.	Source of water and its availability and sustainability shall be studied. Commitment regarding availability of requisite quantity of water from the Competent Authority shall be provided along with letter / document stating firm allocation of water. Details on allocation of water of other competing sources downstream of the project shall be provided	In principle Water allocation from Irrigation Department, Lucknow and from Central Water Commission, Irrigation Planning (North) Dept. Vide letter no. 7/2/18/UP/2008/IP (N)/804 dated 12.10.2011. **Annexure 1 of the Final EIA/ EMP Report.**
XX.	Detail plan for carrying out rainwater harvesting and proposed utilization in the plant shall be provided	**Chapter 7 of the Final EIA/ EMP Report under section 7.6.2 on page no 254 to 255.**
XXI.	Feasibility of zero discharge shall be examined and detailed justification shall be submitted if in case the same is not possible. Proposed discharge (if any), its quantity, quality and point of discharge, users downstream etc. shall be provided	**Chapter 4 of Final EIA/EMP Report, Section 4.3.7.1, Page no. 141 to 142.**
XXII.	Quantity of water requirement for the project should be optimized. Optimization of COC for water conservation shall be specified. Other water conservation measures	**Chapter 2 of the Final EIA/ EMP Report under section 2.5.2 on page no 27 to32.** The details of the water management & Rain water harvesting have been incorporated in **Chapter 4 and Chapter 7 of the Final EIA/EMP Report under section 4.6.2 & Section 7.6.2 on page no 152 to 154**

	proposed in the project should also be given	**and 254-255 respectively.**
XXIII.	Detailed plan for conducting monitoring of water quality regularly and mechanism for maintenance of records shall be formulated. Detail of methodology and identification of monitoring points (between the plant and drainage in the direction of flow of surface / ground water) shall be submitted. It shall be ensured that parameters to be monitored also include heavy metals.	**Chapter 5 of the Final EIA/EMP Report under section 5.2 and under table 5.2 on Page nos. 161 to 163.**
XXIV.	Detailed socio-economic study shall be carried out for the study area comprising of 10 km from the plant site	**Chapter 3 of final EIA/EMP Report, section 3.11– page no. 116 to 122.**
XXV.	Action plan for identification of local employable youth for training in skills relevant to the project for eventual employment in the project itself shall be formulated	**Chapter 8 of the Final EIA/ EMP Report under section 8.3 & 8.4.2 on page no 265 to 267 & 268 to 279 respectively.**
XXVI.	A detailed R&R and CSR plan along with activities wise break up of financial commitment shall be prepared. CSR component shall be identified considering need based assessment study.	**Chapter 8 of the Final EIA/ EMP Report under section 8.3 & 8.4.2 on page no 265 to 267 & 268 to 279 respectively.** **Details R&R plan in incorporated under section 7.8, Chapter 7 of Final EIA/EMP Report, page no. 258 to**

	Sustainable income generating measures which can help in upliftment of poor section of society which is consistent with the traditional skills of the people shall be identified. The programme can include activities such as development of fodder farm, fruit bearing orchards, vocational training etc. Separate budget for community development activities and income generating programmes shall be specified.	**262.**
XXVII.	R&R action plan shall specify the details of land / homestead oustees and compensation and welfare measures formulated.	**Details R&R plan in incorporated under section 7.8, Chapter 7 of Final EIA/EMP Report, page no. 258 to 262.**
XXVIII.	While formulating R&R and CSR schemes it shall be ensured that an in-built monitoring mechanism for the schemes identified are in place and mechanism for conducting annual social audit from the nearest government institute of repute in the region shall be prepared. The project proponent shall also provide action plan for the status of implementation of the scheme from time to time	**Chapter 7 & Chapter 8 of Final EIA/EMP Report– section 7.8.1 & Section 8.3 page No. 259 & Page no 265 to 267 Respectively.**

XXIX.	Special schemes for upliftment of tribals in the area (if any) and measures for sustainable livelihood for tribal population shall be formulated and financial budget shall be specified	**Chapter 7 of Final EIA/EMP Report – section 7.8.1 – page No; 259**
XXX.	One complete season AAQ and meteorological data (except monsoon) shall be collected and the dates of monitoring mentioned. The parameters to be covered for AAQ shall include RSPM (PM10, PM2.5), SO2, NOx, Hg and O3 (ground level). The location of the monitoring stations should be so decided so as to take into consideration the pre-dominant downwind direction, population zone and sensitive receptors including reserved forests. There should be at least one monitoring station each in the upwind and in the pre dominant downwind direction at a location where maximum ground level concentration is likely to occur	**Chapter 3 of the Final EIA/EMP Report under section 3.7 on page no. 84 to 90.**
XXXI.	Cumulative impact of other sources of emission including the proposed project on the AAQ of the area shall be assessed. Details of the model used and	**Chapter 4 of the Final EIA/ EMP Report under section 4.3.4 on page no 130 to 140.**

	the input data used for modelling shall also be provided. The air quality contours may be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any. The wind roses should also be shown on this map	
XXXII.	Fuel analysis shall be provided. Details of auxiliary fuel, if any including its quantity, quality, storage etc should also be given	**Chapter 2 of the Final EIA/EMP Report under section 2.5.3 on page no 33 to 34.**
XXXIII.	Quantity of fuel required its source and characteristics and document to substantiate confirmed fuel linkage shall be provided.	**Chapter 2 of the Final EIA/ EMP Report under section 2.5.3 on page no 33 to 34.** Application for Coal linkage vide letter no. WEUPPL/SLC-LT/10-11/DEC/ 2910 dated December 29, 2010 have been enclosed as **Annexure 2 of the Final EIA/ EMP Report.**
XXXIV.	Details of transportation of fuel from the source to the proposed plant shall be submitted. If transportation is over a long distance it shall be ensured that rail transportation to the site shall be first examined and details in this regard provided	**Chapter 2 & Chapter 4 of the Final EIA/EMP Report under section 2.5.3.2 and 4.3.5 on page no. 34 and page no. 140 to 141 respectively.**
XXXV.	Details regarding infrastructure facilities such as sanitation, fuel, restroom, medical facilities, safety during construction phase	**Chapter 8 of the Final EIA/EMP Report under section 8.1.2 on page no 263.**

	etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase.	
XXXVI.	EMP to mitigate the adverse impacts due to the project along with item wise cost of its implementation shall be specified	**Chapter 5 of the Final EIA/ EMP Report on page no. 160 to 171.** The item wise allocation of the EMP has been specified under **section 5.8, table no. 5.6 of Chapter 5 of the Final EIA/ EMP Report on page no 170.**
XXXVII.	A Disaster Management Plan along with risk assessment study including fire and explosion issues due to storage and use of fuel should be carried out. It should take into account the maximum inventory of storage at site at any point in time. The risk contours should be plotted on the plant layout map clearly showing which of the proposed activities would be affected in case of an accident taking place. Based on the same, proposed safeguard measures should be provided. Measures to guard against fire hazards should also be provided.	**Chapter 7 of the Final EIA/ EMP Report under section 7.2, 7.3 and 7.4 on page no. 194 to 222, 222 to 224 and 224 to 247 respectively.**
XXXVIII	Detailed plan for raising Green belt of 100 m width and consisting of at least 3 tiers	**Chapter 5 of the Final EIA/EMP Report under section 5.6 on page no 165 to 168.**

	around plant boundary (except in areas not possible) with tree density not less than 2500 trees per ha and survival rate at least 80% shall be submitted. In case 100 m width is not feasible at least 50 m width green belt shall be raised and detail justification provided	
XXXIX.	Details of litigation pending or otherwise with respect to project in any courts, tribunal etc. shall be provided	**There is no litigation pending against the proposed project.**
Besides all the above, the following general points will be followed:-		
XL.	All documents to be properly referenced with index, page numbers and continuous page numbering	All documents have been properly referenced with index, page numbers and continuous page numbering.
XLI.	Where data is presented in the report especially in table, the period in which the data was collected and the source should invariably be indicated	The same has been done in the entire Final EIA/ EMP Report.
XLII.	Where the documents provided are in a language other than English, an English translation should be provided.	The same has been done.
XLIII.	The Questionnaire for environmental appraisal of thermal power projects as devised	The same shall be submitted along with the Final EIA/ EMP Report.

	earlier by the Ministry shall also be filled and submitted. In addition, information on the following may also be incorporated in the EIA report	
XLIV.	1. Is the project intended to have CDM-intent? i) If not, then reasons thereof? ii) If yes, then details under mentioned to be provided: a) Has PIN (Project Idea Note) {or PCN (Project Concept Note)} been submitted to the NCA? (National CDM Authority) in the MoEF? b) If not, then by when is that expected? c) Has PDD (Project Design Document) been prepared? d) What is the Carbon intensity from your electricity generation projected (i.e 019. CO_2 Tons/MWH or Kg/KWH) e) Amount of CO_2 in Tons/year expected to be reduced from the baseline data available on the CEA?s web-site (www.cea.nic.in)	Yes, the project is intended to have CDM-intent. **Chapter 5 of the Final EIA/ EMP Report under section 5.7 on page no 169 to 170.**

1.0 INTRODUCTION

1.1 PURPOSE OF THE REPORT

Welspun Energy UP Private Limited (WEUPPL) proposes to setup a Greenfield Coal based Thermal Power Plant (TPP) of 1320 MW (2x660 MW) capacity at Dadri Khurd village, Mirzapur Sadar tehsil, Mirzapur district, Uttar Pradesh.

As per the Environmental Impact Assessment (EIA) Notification dated 14th September 2006 as well as its amendment thereafter on 1st December 2009, the proposed thermal power plant project falls under '**Category A**' with project or activity type number '1(d)', which requires preparation of EIA Report to get Environmental Clearance (EC) from the Ministry of Environment and Forests (MoEF), New Delhi.

The present EIA Report addresses the anticipated environmental impacts of the proposed coal based power plant and the mitigation measures to be incorporated to minimize the adverse impacts, if any. This Final EIA report is prepared is as per the Terms of Reference (ToR) issued by MoEF, vide letter no. J-13012/12/2011-IA. II (T), dated 15th June, 2011.

1.2 INTRODUCTION OF PROJECT PROPONENT

Welspun Energy UP Private Limited (WEUPPL) is a Special purpose Vehicle (SPV) of Welspun Energy limited for developing the proposed 2x660 MW Coal Based Thermal Power Plant (TPP) based on supercritical technology.

VISION OF WEUPPL

"Looking at the growing energy needs of Uttar Pradesh, Welspun Energy Limited envisages initiating a 2 x 660 MW thermal power plant in Mirzapur district. This will help the state of Uttar Pradesh to minimize its energy deficit and contribute towards making India energy independent. Environment safety and community interest are paramount to us in this endeavor. We are using super critical technology, which will minimize adverse impact to the environment. We are committed to improving the lives of the local people by generating direct/

indirect employment in this region and would be investing in their health & education. We endeavor to provide the community a sustainable and secure future."

Welspun Energy, an integral part of the Welspun Group, established to setup over 5,000 MW commercial thermal power plants over the next three years in various states of India. It would also fulfill its commitment towards a green and clean energy setting up solar, hydro, biomass and wind energy power generating facilities.

Welspun Group ranks amongst India's fastest emerging conglomerates with an enterprise value of ` 15,000 Crores. Welspun Stahl Rohren, the flagship company of the group is the world's 2nd largest pipe producer. With proven capabilities in steel, steel pipes, power generation and home textiles, Welspun have global presence in over 50 countries. The group enjoys strong relationship with marquee clients including most of the Fortune 100 Companies.

The company started its activity in 1995 with Hsaw pipe manufacturing facility of 30,000 TPA at Dahej, Gujarat. The company also manufactures steel plates cum coil at its recently commissioned facility at Anjar, Gujarat. Welspun is accredited with over 50 oil and gas majors of the world and among one of the few preferred vendors across the globe.

1.3 BRIEF DESCRIPTION OF THE PROJECT

The proposed coal based power plant is of 1320 MW capacity will comprise of two units of 660 MW capacity each, based on super-critical technology.

The project utilizes domestic coal from NCL/SECL /CCL as primary fuel. The plant will be designed for base load operation with a plant design life of about 25 years.

The proposed power plant will have two units with a total power generation capacity of 1320 MW. The land requirement for the project is 875 acres including power plant, ash pond and other auxiliaries and the estimated cost of the project is about Rs 7500 Crores.

1.3.1 Location of the Project

The proposed plant site is located at Dadri Khurd village in Mirzapur Sadar tehsil, Mirzapur district in Uttar Pradesh. Varanasi town is located at a distance of about 50 km from the proposed plant site, whereas the district head-quarter of Mirzapur is located at a distance of about 18 km from the proposed plant site. The details of environmental setting are given in **Table-1.1**. The index map of the project site is shown in **Figure-1.1**. The geographical co-ordinates of the proposed plant site on Survey of India (SOI) toposheet No. 63K/12 & 63 L/9 falls between 24°58'41.6"to 25°0'16.8" N Latitudes and 82°39'50.4"E to 82°41'03.7"E longitudes.

1.3.2 Access to the Site

The State Highways, SH-5 and NH-7 run at a distance of 1.5 km, SW and 10 km, N respectively from the proposed plant boundary. The nearest railway link is located at Sakteshgarh Railway Station & Sarsongram Railway Station at a distance of 15.5 km, ENE & 15.5 km, E respectively from the project site. The nearest airport to the project site is located in Varanasi.

1.3.3 Project Area Coordinates

The study area map, showing 10 km radius from the proposed project boundary is shown in **Figure-1.2**

1.3.4 Environmental Setting of the Project Site

The Upper Khajuri Dam is at a distance of 5.5 km, NW and Ganga River is flowing at a distance of 17.0 km, N from the project site. However, the project area is devoid of any major stream meeting these water bodies. There are no protected areas as per Wild Life Protection Act 1972 like biospheres, tiger reserves, wild life sanctuaries, natural parks in the 10 km radius study area. The project area falls under Seismic Zone-III as per Indian Standards, IS: 1893-2000.

TABLE-1.1

ENVIRONMENTAL SETTING AROUND 10-KM RADIUS OF PROJECT SITE

Sr. No	Particular	Details		
1	Location	Dadri Khurd Village, Mirzapur Sadar Tehsil, Mirzapur District, Uttar Pradesh		
2	**Coordinate Range**	**Sr. No.**	**Latitude**	**Longitude**
A	Plant Boundary	1	25° 00' 16.887"N,	82° 40 29.204"E
		2	24° 59' 45.117"N,	82° 41 03.728"E
		3	24° 58' 41.858"N,	82° 40 23.802"E
		4	24° 58' 41.645"N,	82° 39 50.425"E
		5	24° 59' 08.278"N,	82° 40 00.404"E
		6	24° 59' 44.581"N,	82° 40 00.552"E
B	Ash Dyke Area (within plant boundary)	A	25° 0' 14.5"N	82° 40' 27.5"E
		B	24° 59' 57.1"N	82° 40' 57.8"E
		C	24° 59' 54.8"N	82° 40' 43.5"E
		D	24° 59' 46.8"N	82° 40' 8.2"E
		E	25° 0' 7.5"N	82° 40' 13.7"E
C	Chimney	C	24°59'35.08"N	82°40'26.15" E
3	Toposheet No.	63 K/12 & 63 L/9		
4	Site elevation	180 m above Mean Sea Level (MSL)		
5	Topography	Slightly undulating		
6	Climatic Conditions : IMD, Varanasi, Pre-Monsoon season	Mean Minimum Temperature: 12.1°C Mean Maximum Temperature: 37.6°C Predominant Wind Direction: W Relative Humidity: At 8:30 hrs: 31 % to 61% and at 17:30 hrs: 14 % to 45 % Rainfall: 47.5 mm		
7	Climatic conditions at site (monitored during Pre Monsoon season, 2011)	Mean Minimum Temperature:11.6°C Mean Maximum Temperature: 42.0°C Predominant Wind Direction: W Relative Humidity: At 8:30 hrs: 32 % to 62 % and at 17:30 hrs: 16 % to 48 % Rainfall: 0 mm		
8	Nearest Habitations	Dadri Khurd (Population : 09)		

Sr. No	Particular	Details
	(Population as per Census-2001 Data)	Dadri Gahira (Population : 48)
9	Present land use at the site	Mostly barren
10	Nearest Major Roads/ Highway	State Highway, SH-5 (1.5 km, SW) National Highway, NH-7 (10.0 km, NNE)
11	Nearest Railway Line	Broad Gauge Railway line of Northern Railways (NR)
12	Nearest Railway Station	Sakteshgarh R.S. (15.5 km, ENE) Sarsongram R.S. (15.5 km, E)
13	Nearest Airport	Varanasi (50 km, NNE)
14	Nearest Seaport	Haldia
15	Nearest Town	Mirzapur –District Headquarters (18 km, NW)
16	Nearest water bodies	Jamtlhwa Nadi (2.0 km, N) Jogiadar Nadi (2 kms, NE) Pahiti Nadi (3.75 kms, NE) Upper Khajuri Dam (5.5 km, W) Ganga River (17 km, NE)
17	Eco sensitive Zone (National Part, Wildlife Sanctuary, Biosphere reserve wildlife corridors etc.) Within 10 km radius of the project site.	No Eco sensitive Zone viz. National Park, Wildlife Sanctuary, Biosphere reserve, Wildlife corridors and Protected Forest falling with the 10 km radius of the project site.
18	Reserved/Protected forests	Danti RF (on northern side of project site) Mirzapur RF (on southern side of project site) Bahati RF(6.0 km in SW) Karaunda RF (5 km, SW) Patehra RF(5.0 km in SW) Malua RF (8.5 km in SW) Chandlewa Khurd RF (6.0 km in NNE) Nanauti RF (7 km in E) Golhanpur RF (6.5 km in E) Sarson RF (5.5 km in SE)

Sr. No	Particular	Details
19	Areas susceptible to natural hazards (earthquakes, erosion, flooding or extreme or adverse climatic conditions)	None within 10 km radius study area
20	Archaeologically important places as per Archeological Survey of India Records	None within 10 km radius study area
21	Existing Industries	None within 10 km radius study area
22	Seismic Zone	Zone-III as per IS:1893-2000

Note: All distances mentioned above in parenthesis are aerial distances

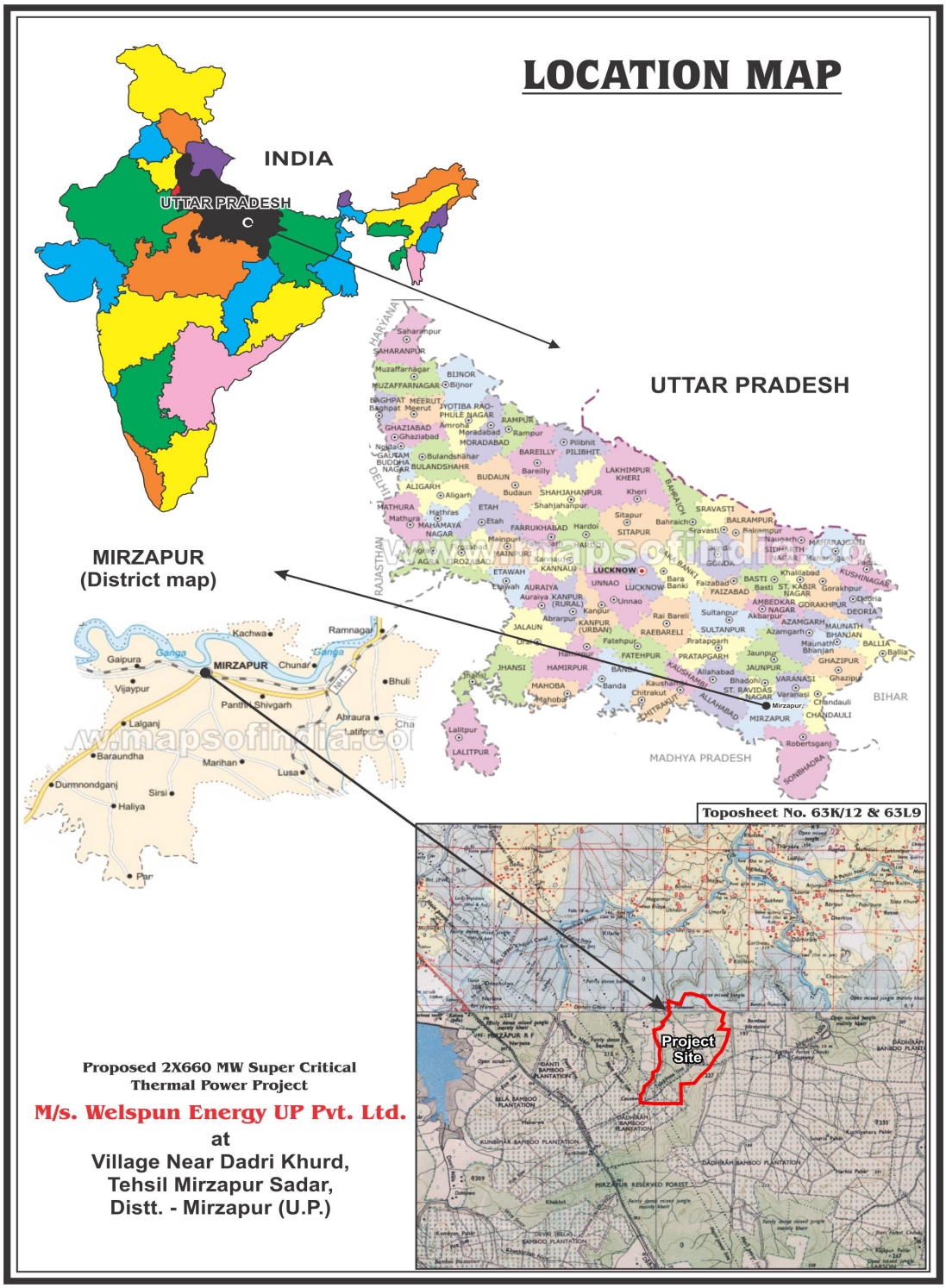


FIGURE-1.1

INDEX MAP SHOWING THE PROJECT

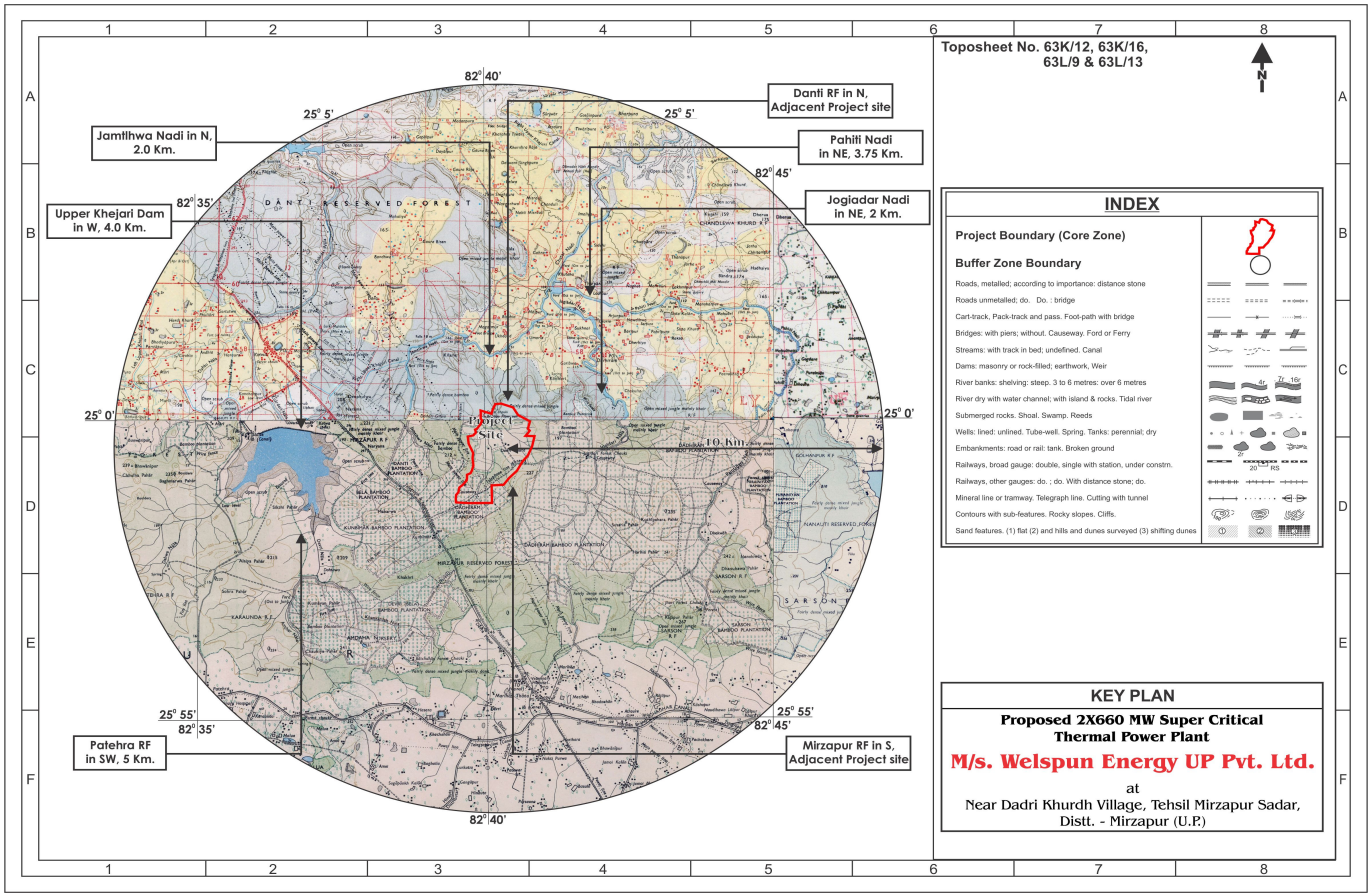


FIGURE-1.2

STUDY AREA MAP OF THE PROJECT (10 KM RADIUS)

1.4 IMPORTANCE OF THE PROJECT

Though there has been substantial growth in power sector infrastructure in India, the power supply position is still characterized by shortages, both in terms of demand met during peak periods and the overall energy supply. Many parts of the country continue to reel under severe power shortages.

The all India region-wise forecast for electrical energy requirement and peak demand scenario fare presented in **Table-1.2**.

TABLE-1.2

LONG TERM FORECAST OF POWER DEMAND

Sr. No	Region	Electrical Energy Requirement (TWh)			Peak Electric Load (GW)		
		2011-12	2016-17	2021-22	2011-12	2016-17	2021-22
1	Northern	294.8	411.5	556.8	48.1	66.6	89.9
2	Western	294.9	409.8	550.0	47.1	64.3	84.8
3	Southern	253.4	380.1	511.7	40.4	60.4	80.5
4	Eastern	111.8	168.9	258.2	19.1	28.4	42.7
5	North-Eastern	13.3	21.1	37.0	2.5	3.8	6.2
6	**All India**	968.7	1392.1	1914.5	152.7	218.2	298.3

Source: "Long Term Forecast at Power Station Bus Bars", 17th Electric Power Survey (EPS) of India, Central Electricity Authority (CEA)

The economic growth of any country depends upon the availability and consumption of energy. The level of development of a country is measured in terms of per capita energy consumption. Presently India's per capita energy consumption at 717 KWh/year (during 2007-08), which is less than that of other developing countries like China (1891) and Malaysia (1000). The per capita energy consumption of the developed countries are very much higher like United States of America (13338), Sweden (16665) and Canada (18117).

World average per capita energy consumption is 2500 kwh/year. The present installed capacity in India is around 1,99,627 MW as on 31st March, 2012 and requires significantly more generating capacity to match the pace of development taking place in the country as well to bridge the gap between demand and supply. Government is aiming to increase the present installed capacity to 2,76,000 MW by 2017 and aiming per capita energy consumption of 1000 kwh/year. The investment from public and private sector for capacity addition shall help the nation to achieve the energy availability.

All the three sectors namely Central, State and Private contribute to the availability of power in the country. State owns a share of about 52%, central own a share of about 33% of installed capacity and the rest 15% by private sector. Major contribution of energy came from thermal (64%) followed by Hydropower energy (25%).

Ministry of Power has estimated that by the year 2012, India's peak demand would be 152,746 MW with energy requirement of 975 Billion Unit (BU).

- **Power Development Scenario-11th Plan Period**

As per the "5th National Power Plan (2002-2012)" prepared by CEA, a need based installed capacity of the order of 2,12,000 MW is required by the end of 11th plan based on demand projections of 17th Electric Power Survey (EPS). The primary resources for electric power generation are water, fossil fuel (coal, lignite, oil and natural gas) and nuclear energy. These would continue to serve as major sources of power generation in the long run, though various forms of renewable sources viz, wind, bio-mass, tides, etc., will also contribute to meeting the demand.

As per Central Electricity Authority's (CEA) projection for the 11th Plan (2007-2012), the capacity addition requirement is 78,578 MW comprising 16,627 MW of hydro, 58,571 MW of thermal and 3,380 MW of Nuclear. Out of the total thermal capacity of 58,571 MW, the coal/lignite based capacity shall be 53,930 MW. This implies that the capacity addition has to be about 10,786 MW per annum through coal / lignite alone.

- **Power Development Scenario-Beyond 11th Plan**

The Indian Power System requirement had been assessed to need a hydro power and thermal/nuclear power mix in the ratio of 40:60 for flexibility in system operation depending on typical load pattern. The motion to achieve this mix and to accelerate the hydro electric power generation of 50,000 MW has already been initiated by Government of India (GOI).

CEA has identified new hydro schemes aggregating to a capacity of 30,000 MW for yielding benefits during the 12th Plan period (2012-2017). These schemes have been identified based on their present status as available with the CEA. Nuclear Power Corporation has planned to add nuclear power projects aggregating to 12,000 MW to be commissioned in year 2012-2017.

A capacity addition of 21180 MW has been achieved during 10th plan and 78578 MW is assessed as required during the 11th plan. However, it may be noted that the proposed capacity addition in the 11th Plan is three and a half times of that achieved in the 10th Plan, which is rather very ambitious.

As per CEA/Planning Commission, a tentative capacity addition of 82,200 MW has been envisaged for the 12th Plan. This comprises of 30,000 MW hydro, 40200 MW thermal and 12000 MW of Nuclear power plants Considering the slippages in the past, and keeping in view the huge power generation capacity requirement to be added during the 11th and 12th Plan periods, an urgent need is felt for a large scale thermal power development programme in an environment friendly manner.

All the three sectors namely Central, State and Private contribute to the availability of power. On the consumption side, industrial sector is the principal consumer of electricity followed by agricultural and domestic sector. The domestic sector shows the highest growth rate in electricity consumption in the recent past and electricity consumption in the agricultural sector has been rising at the rate of 7 to 8 percent due to government's policy of supplying heavily subsidized power to the farmers and massive rural electrification.

The rapid pace of all round developments of the states in the region due to globalization of economy has seen the states in the region to be a few of the highest power consuming states in the country. The power demand and availability figures of the state exhibit a wide uncovered margin calling attentions of the SEB's to accelerate the pace of growth in this core sector. With the present trend of growth rate ranging around 7-9% for the past two decades, the concern of State Government in the region can be gauged from the urgency with which they are exploring all possible means of augmenting the generating capacity.

The power scenario in the region during 10th and 11th Five Year Plans has been discussed in detail and need for the proposed station is studied in the backdrop of past and future power demands, viz, present and future generation capacities planned for bridging the gap.

- **Justification of Project**

The actual growth in industrial, agricultural and domestic demand will establish that there is a considerable shortfall in the installed capacity, demand and energy availability as on date. This shortfall will continue even after the commissioning of the proposed power plants in various parts of the State. As Uttar Pradesh is the most preferred State for industrialization, the industrial demand for power will be ever increasing.

In order to narrow down the bridging gap between supply and demand, the proposed capacity addition by 2x660 MW TPP which will yield benefits in the 12th Plan gets justified due to projected deficit in the Northern Region.

With open access of the transmission lines now available and power trading possible, the merchant power plants can sell electricity to registered power traders, who will in turn identify buyers for the power. Under such a favorable condition, putting up of a thermal power plant by WEUPPL is justified.

1.5 SCOPE OF THE STUDY

With a view to assess the environmental impacts arising due to the proposed power plant project, WEUPPL has retained the services of **M/s J.M. EnviroNet Private Limited, Gurgaon** to prepare the EIA Report and suggest an Environmental Management Plan (EMP) for mitigating the adverse impacts of the proposed project.

Environmental baseline monitoring has been carried out during March 2011 to May 2011 representing pre monsoon season. Various modeling exercises have been carried out to predict and evaluate the impacts due to the proposed project. The scope of the present study is in line with the ToR as recommended by MoEF.

1.5.1 Study Area Details

The study area for the present EIA study is the area covered within the 10 km radius from the proposed plant boundary. The topographical features of the study area within 10 km stretch from the proposed plant boundary are shown in **Figure-1.2**. The environmental setting within the study area of 10 km radius from the proposed plant boundary has been given in **Table-1.1**.

1.5.2 Details of the Study

The scope of study broadly includes:

Reconnaissance survey was conducted by the consultants and sampling locations were identified on the basis of:

- Predominant wind directions in the study area as recorded by India Meteorological Department (IMD) at Varanasi;
- Existing topography, drainage pattern and location of surface water bodies like ponds, canals, rivers and sea;
- Location of villages/towns/sensitive areas;
- Areas which represent baseline conditions; and

- Collection, collation and analysis of baseline data for various environmental attributes;
- Estimate the likely impacts through appropriate models;
- Identify extent of the adverse impacts;
- Prescribe mitigation measures;
- Draw an EMP and post project monitoring requirements.

Field studies have been conducted to determine existing conditions of various environmental attributes as outlined in **Table-1.3**.

TABLE-1.3

ENVIRONMENTAL ATTRIBUTES AND FREQUENCY OF MONITORING

Sr. No.	Environmental Component	Sampling Locations	Sampling Parameters	Total Sampling Period	Sampling Frequency
1	Meteorology	One central location	Temperature, Wind Speed, Wind Direction, Relative Humidity, Cloud Cover, Rainfall	3 months	continuous hourly recording
2	Ambient Air Quality	11 Locations	PM10, PM2.5, SO_2, NO_x, CO, HC and O_3	Twice a week for 3 months	24 hourly samples for SPM, PM10, PM2.5, SO_2 and NO_x; three 8 hourly samples per day for CO, HC and O_3
3	Ground Water Quality	9 Locations	All major surface water quality parameters	Grab sampling	Once during study period

Sr. No.	Environmental Component	Sampling Locations	Sampling Parameters	Total Sampling Period	Sampling Frequency
	Surface Water Quality	5 Locations	All major ground water quality parameters	Grab sampling	Once during study period
4	Noise Monitoring	11Locations	Sound Pressure Levels	continuously for 24 hours	Once during study period
5	Soil analysis	9 Locations	Soil profile, Chemical constituents	Grab sample	Once during study period
6	Ecology	existing ecological resources within study area	Flora and fauna	Field observations and secondary sources	Once in study period
7	Demography and Socio-economic aspects	10 km radius study area	Demographic profile	Based on Census of India Records (2001)	
8	Land Use	10 km radius study area	Landuse pattern	Based on Census of India Records (2001) and Remote sensing data	
9	Geology	-	Geological history	Data collected from secondary sources	
10	Hydrology	-	Drainage area and pattern, nature of streams, aquifer characteristics, recharge and discharge rates	Based on data collected from secondary sources	

Sr. No.	Environmental Component	Sampling Locations	Sampling Parameters	Total Sampling Period	Sampling Frequency
11	Traffic Studies	1 Location	Counting of vehicle category wise traffic movement on major roads near to the project site	Continuous for 24 hours	Once during study period

***Source**: EIA Report*

The applicable environmental standards & Methodology adopted for the monitoring and analysis for the project are given in Chapter 3 along with the baseline results.

2.0 PROJECT DESCRIPTION

2.1 Introduction

The chapter highlights the features of the proposed 1320 MW power plant, its layout, details of the process, fuel requirement utilities and services, infrastructural facilities and sources of waste generation, their quantity and pollution control measures.

2.2 Type of the Project

WEUPPL proposes to establish a power station of 1320 MW capacity, which will be fired on domestic coal from NCL/SECL/CCL. Circulating condenser cooling system with mechanical draft cooling tower for each unit and dedicated railway siding for coal transportation will be installed.

2.3 Salient Features of the Project

The configuration of the proposed power plant is 2 x 660 MW. Installation of associated mechanical and electrical equipment auxiliary units like coal and ash handling plants, water treatment plant cooling water system, Electrostatic Precipitators (ESPs), low NOx burners, online stack monitoring system etc. will form part of the total installation. The salient features of the proposed power plant project are given in Table-2.1.

TABLE-2.1

SALIENT FEATURES OF PROPOSED POWER PLANT PROJECT

Sr. No.	Features	Details
1.	Capacity	1320 MW [2 x 660 MW)
2.	Estimated Project Cost	7500 Crores
3.	Total Project Area	875 acres (354.11 ha)
4.	Ash pond Area	140 acress (within plant area)
5.	Power evacuation	Power will be evacuated at 400 kV grid at nearest PGCIL substation
6.	Coal Requirement and Transportation	i) 6.74 MTPA domestic coal from NCL/SECL/CCL through Indian railway Network. Documents for the Coal linkage is enclosed as ***Annexure-2***
	a) Station heat Rate	i) 2268 kcal/kWh

	b) Gross Calorific Value	i) 3500 kcal/kg
	c) Sulphur Content in Coal	0.5% (max)
	d) Ash Generation	2.7 MTPA (40% ash content)
7.	ESP Efficiency	99.9%
8.	Stack details	One twin-flue stack of 275 m height
9.	Water Requirement	4002 m^3/hr In principle Water allocation of 36 MCM from Irrigation Department, Lucknow which has further been approved by GoI, Central Water Commission, Irrigation Planning (North) Dept. Vide letter no. 7/2/18/UP/2008/IP(N)/804 dated 12.10.2011. ***(Annexure-1)***
10.	Source of water	Upper Khajuri Dam being fed by Ganga River

2.4 Project Location and Layout

The proposed power plant will be located at Dadri Khurd village, Mirzapur Sadar tehsil, Mirzapur district Uttar Pradesh. Topography of the proposed site is slightly undulating in the project area. The present land usage at the proposed plant site is mostly barren land. There are no major existing structures in the proposed site area. There is no forest land within the plant site. The project location falls in Seismic Zone-III as per IS 1893:2000 and is suitable to locate major heavy structures, buildings and foundations. The photographs depicting vicinity of the proposed plant area are shown in Figure-2.1. The proposed plant layout drawing is shown as Figure-2.2.

2.4.1 Site Selection Criteria

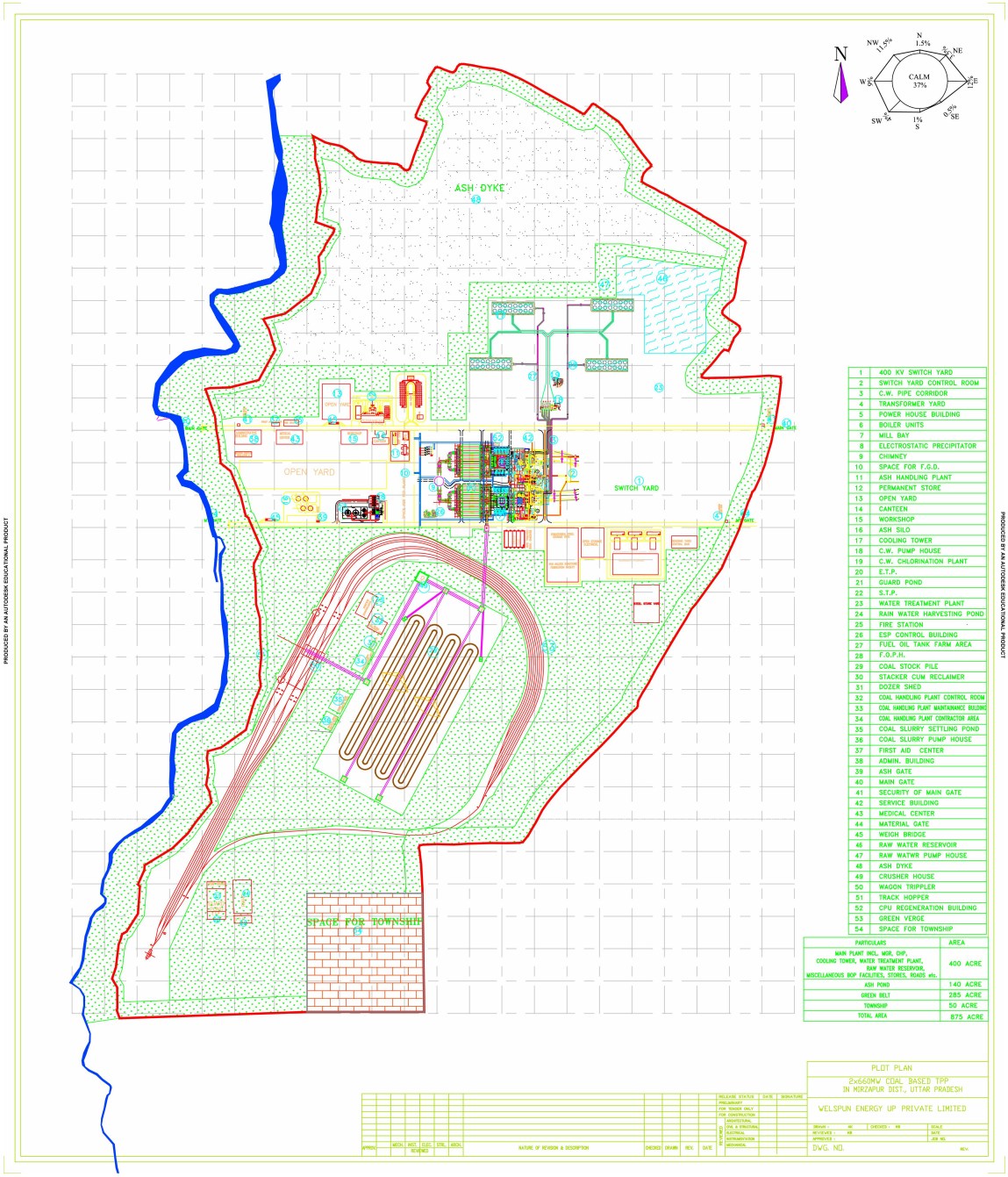
Area requirement for the proposed power plant has been optimized considering the space requirements of all the equipment, systems, buildings and structures, coal storage area, ash silos, raw water storage area, water treatment plant cooling water pump house and chemical storage area etc for the proposed power plant. Necessary plant drainage system would be provided at the proposed power plant site. All facilities of the plant area laid out in close proximity to each other to the extent practicable so as to minimize the extent of land required. The layout also facilitates movement of men and materials between various facilities both during construction and also during subsequent operation and maintenance.

The following factors which influence the site selection have been favourable to select the proposed site:

- Availability of adequate uncultivable and unused land for erecting power plant structures;
- Vicinity to the railway line for laying railway siding for coal transportation;
- Adequate land being available for coal storage yard;
- Suitability of land from topography, geological aspects;
- Proximity to Highways for transport of heavy equipments;
- Facility for interconnection with transmission system for evacuation of power;
- Environmentally suitable, absence of sensitive areas and major settlements;
- And availability of infrastructure facilities.

FIGURE-2.1

PHOTOGRAPHS SHOWING PROJECT SITE VICINITY



1	400 KV SWITCH YARD
2	SWITCH YARD CONTROL ROOM
3	C.W. PIPE CORRIDOR
4	TRANSFORMER YARD
5	POWER HOUSE BUILDING
6	BOILER UNITS
7	MILL BAY
8	ELECTROSTATIC PRECIPITATOR
9	CHIMNEY
10	SPACE FOR F.G.D.
11	ASH HANDLING PLANT
12	PERMANENT STORE
13	OPEN YARD
14	CANTEEN
15	WORKSHOP
16	ASH SILO
17	COOLING TOWER
18	C.W. PUMP HOUSE
19	C.W. CHLORINATION PLANT
20	E.T.P.
21	GUARD POND
22	S.T.P.
23	WATER TREATMENT PLANT
24	RAIN WATER HARVESTING POND
25	FIRE STATION
26	ESP CONTROL BUILDING
27	FUEL OIL TANK FARM AREA
28	F.O.P.H.
29	COAL STOCK PILE
30	STACKER CUM RECLAIMER
31	DOZER SHED
32	COAL HANDLING PLANT CONTROL ROOM
33	COAL HANDLING PLANT MAINTAINANCE BUILDING
34	COAL HANDLING PLANT CONTRACTOR AREA
35	COAL SLURRY SETTLING POND
36	COAL SLURRY PUMP HOUSE
37	FIRST AID CENTER
38	ADMIN. BUILDING
39	ASH GATE
40	MAIN GATE
41	SECURITY OF MAIN GATE
42	SERVICE BUILDING
43	MEDICAL CENTER
44	MATERIAL GATE
45	WEIGH BRIDGE
46	RAW WATER RESERVOIR
47	RAW WATWR PUMP HOUSE
48	ASH DYKE
49	CRUSHER HOUSE
50	WAGON TRIPPLER
51	TRACK HOPPER
52	CPU REGENERATION BUILDING
53	GREEN VERGE
54	SPACE FOR TOWNSHIP

PARTICULARS	AREA
MAIN PLANT INCL. MGR, CHP, COOLING TOWER, WATER TREATMENT PLANT, RAW WATER RESERVOIR, MISCELLANEOUS BOP FACILITIES, STORES, ROADS etc.	400 ACRE
ASH POND	140 ACRE
GREEN BELT	285 ACRE
TOWNSHIP	50 ACRE
TOTAL AREA	875 ACRE

PLOT PLAN
2x660MW COAL BASED TPP
IN MIRZAPUR DIST., UTTAR PRADESH
WELSPUN ENERGY UP PRIVATE LIMITED

FIGURE-2.2
PROPOSED POWER PLANT LAYOUT

2.4.1.1 Conformation to the Guidelines for Site Selection

The State Highway, SH-5 runs at a distance of 1.5 km, SW from the proposed plant boundary. The Chunar-Chopan link of North Central Railways (NCR) runs at a distance of 20Km, E from the proposed plant boundary. There are no major fresh water bodies in vicinity to the proposed plant area. However, Ganga River flows at a distance of 17 km, NE from the proposed plant boundary. The study area map, showing highways, railway lines and water bodies in the vicinity to the project site is also shown in Figure-1.2 of Chapter-1. The proposed project site conforms with the prescribed guidelines.

2.4.2 Location of Ash Pond Area

Long-term storage of ash within the plant area has not been envisaged. An area of 140 acres has been assigned within the proposed plant premises for ash pond. Ash Pond sizing and Design will be in line with MOEF guidelines and latest notification pertaining to Ash Utilization. Arrangements for utilization of Ash in various ways like Using in cement manufacturing, Brick manufacturing, Embankments etc shall be done. Beyond 4th year of commissioning 100% ash will be utilized.

The ash pond area will be located towards north side of the plant. The location of ash pond is shown on the proposed plant layout in Figure-2.2.

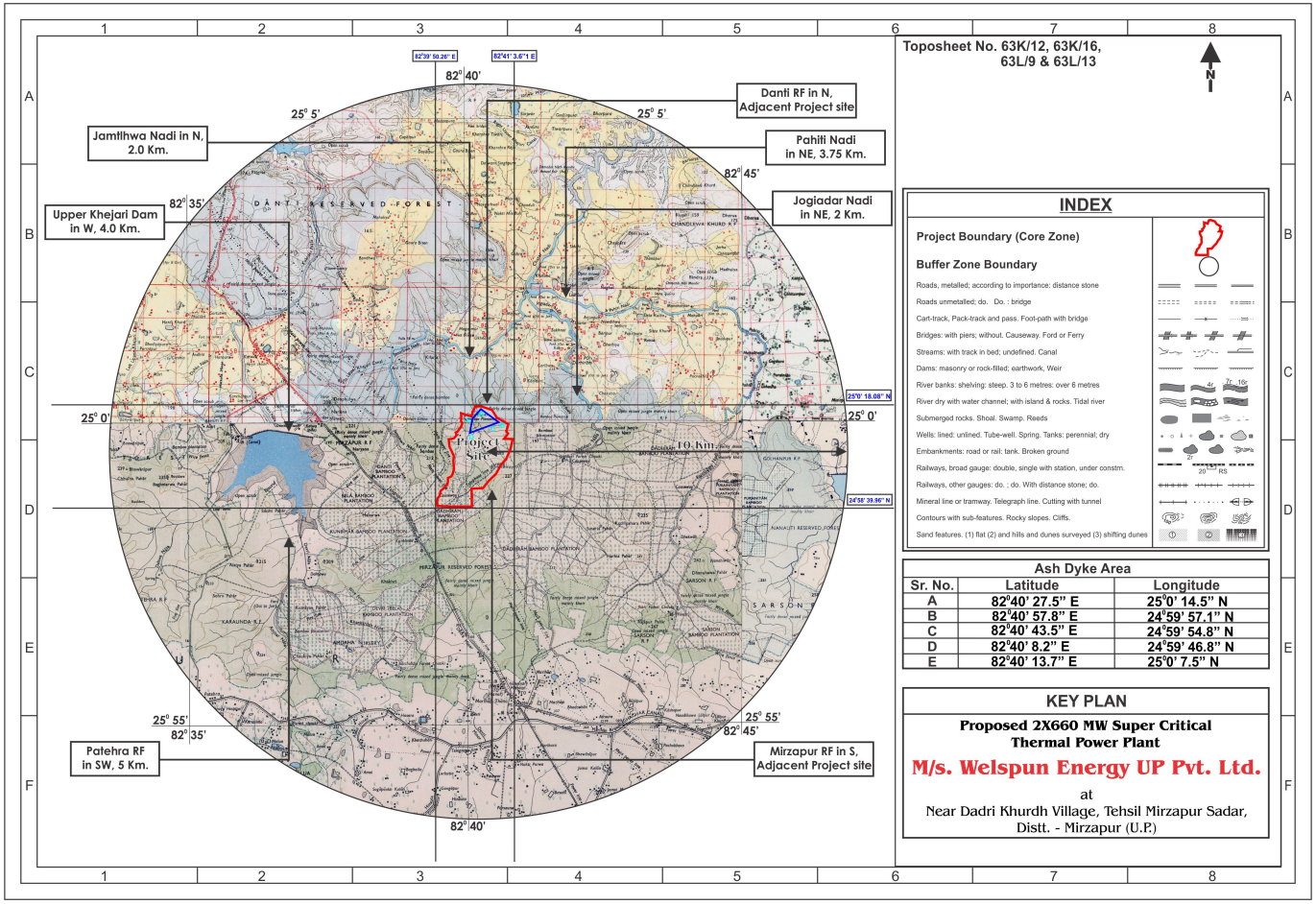


Figure 2.3

Map showing location of Ash pond superimposed on the Key Plan

2.4.3 Location of Intake Water Point

The fresh water for the proposed power plant will be drawn from the Ganga River flowing at a distance of 17 Km (aerial distance). Intake point at river Ganga is at 25° 9' 26.08"N, 82° 31' 32.77" E.

Water from Ganga River shall be pumped to the Upper Khajuri dam located at a distance of about 5.5 km (aerial distance) from the project site. Water shall then be pumped to project site from the Upper Khajuri dam. A reservoir at site with capacity of 4 days storage will be made within the plant complex.

The details of alignment of right of way of water intake are shown on the proposed plant layout in Figure-2.3.

TABLE-2.2
PROPOSED PIPELINE FROM INTAKE POINT TO SITE

Sr. No.	Features	Ganga to Upper Khajuri	Upper Khajuri to Site
1.	Length	24 Km	7.0 Km
2.	Accessibility	Along a nallah and SH-5	Along SH-5

As presented in above Table, the route is along the motorable road. The same is shown in Figure 2.3.

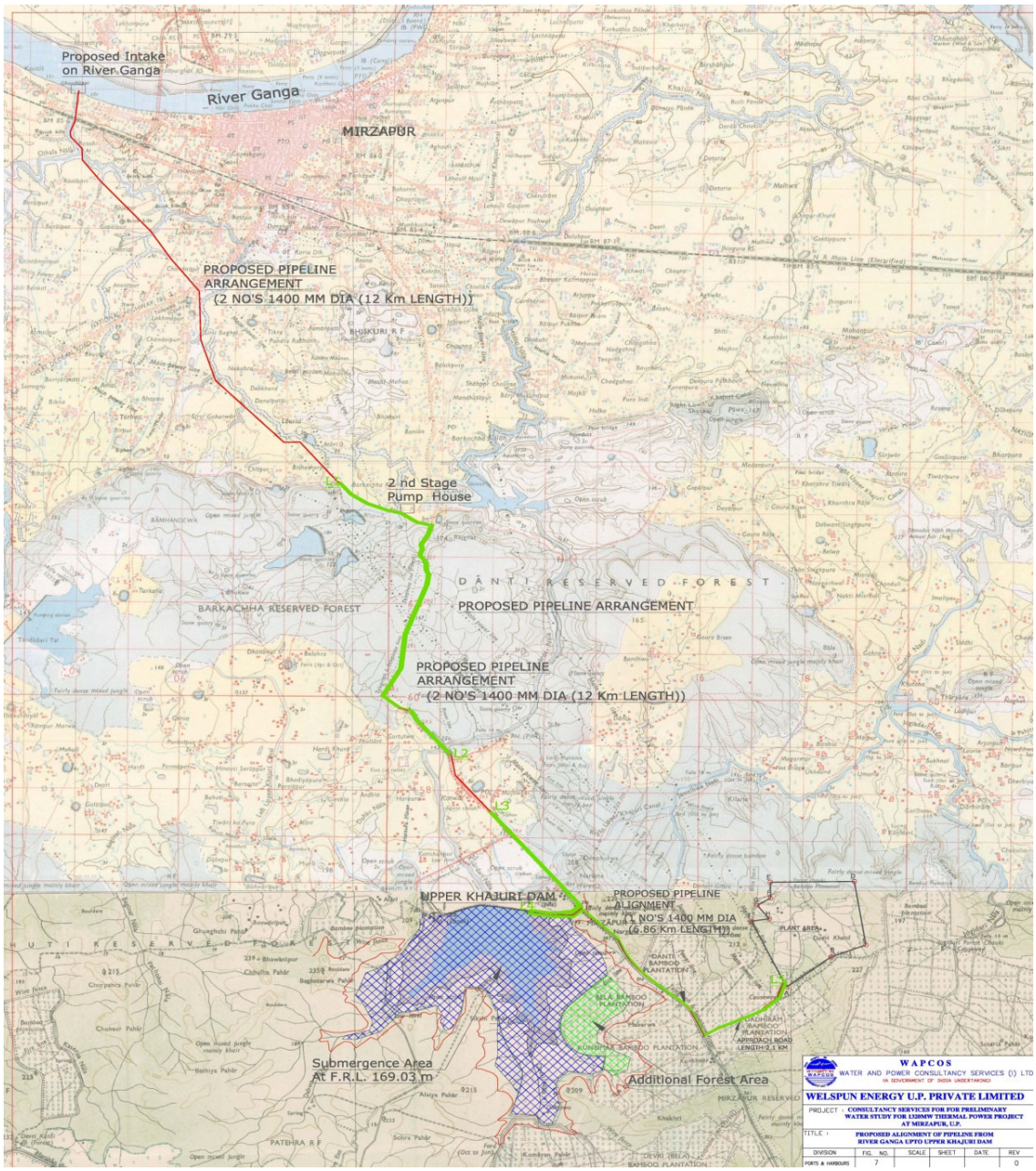


FIGURE-2.4

PROPOSED PIPELINE CORRIDOR

2.5 INFRASTRUCTURE AND RESOURCES REQUIREMENT

2.5.1 Land Requirement

The total land requirement for the proposed project has been optimized to about 875 acres (354.11 ha). This includes the proposed power plant, ash pond, railway siding, colony and other plant facilities. The break-up of land requirement including is given in Table-2.3.

TABLE-2.3
BREAKUP OF PROPOSED LANDUSE

Sr. No.	Description	Land Required(acres)	Percentage (%)
1.	Main Plant including MGR, CHP, cooling tower, water treatment plant, Raw water reservoir, Misc BOP facilities, stores, roads etc	400	45
2.	Ash Pond Area	140	16
3.	Colony	50	6
4.	Greenbelt	285	33
Total Plant Area		**875**	**100**

Further, the project area is free of all encumbrances. The survey of Corridor area required outside the plant area, such as river water intake/outfall piping, water intake pump house, Railway siding from Sarsongram Railway station to site etc is under progress.

2.5.1.1 Optimization of Land Requirement

Considering the best possible plant layout design, the area requirement for the proposed 1320 MW power plant has been optimized to 875 acres. The proposed land area is adequate to meet the plant requirements, including green belt development and meets the recommendations as per the CEA guidelines for similar capacity of power projects. The proposed plant layout is shown in Figure-2.2.

2.5.1.2 Land Availability Details

The private land area for the plant and for facilities required outside the plant area is being acquired through the respective land owners as per the prevailing norms of Uttar Pradesh Government. The details of current land usage are given in Table-2.4.

TABLE-2.4

DETAILS OF PRESENT LAND USAGE AT THE PROPOSED PROIECT SITE

(As per the revenue records)

Sr. No.	Land Usage	Area (acres)	Percentage (%)
1	Single crop Agricultural Land	15.631	1.78
2	Barren Land	853.743	97.58
3	Water Body	5.436	0.62
4	Human Settlement	0.190	0.02
	Total	**875**	**100**

Out of the total proposed project area 875 acres includes 97.13 acres (11.1 %) of government land and 777.88 acres (88.9%) of private land. There are no major existing structures in the proposed site area.

S. No.	Land Type	Area (Acres)	Status
1	Govt. Land	97.13	Application of transfer of Government land applied with GoUP
2	Private Land	777.88	Direct Purchase from farmers on negotiation basis

2.5.1.3Details of Cutting and Filling

The proposed plant is having variation in ground level 165 to 190 m. Plant layout has been finalized considering the HFL of the area. Levels shall be finalized in such a way that there is balance in cutting and filling quantities of earth and minimum borrowed earth / disposal of earth to be required.

2.5.2 Water Requirement Details

2.5.2.1General

a) In a thermal power project, major quantum of water is required for Condensing low Pressure steam in Condenser which is the heat sink of thermodynamic cycle. In addition cooling water is also required for cooling of various coolers of auxiliaries of Steam turbine and Steam Generators. Cooling water requirement for two units of 2x 660 MW shall be of the order 4002 cum. /hr.

b) Further losses due to draining /intermittent blow down and /or venting in feed water circuit and /or Steam pipes and occasional loss of DM cooling water shall be made up by supplying demineralised water.

c) Apart from these two major requirements, water to be supplied for other miscellaneous requirements such as are service water, water for dust suppression system of coal handling plant, makeup to evaporative ventilation system, makeup to AC system, supply of potable water in the plant and colony, makeup to the ash handling plant.

2.5.2.2 CW System

As per MoEF regulation, new power plants (other than projects using sea water) commissioned after June 1991 should install cooling towers for circulating water system. Accordingly it is proposed to adopt closed re-circulating type CW System with Cooling Towers. Water loss occurs in cooling towers due to evaporation of water. To limit the dissolved solids in circulating water, portion of water under circulation is bled. Fresh water shall be added as makeup to account for the evaporation and the "Blow Down" loss.

2.5.2.3 Water Balance System

As described major quantum of water is required for supplying makeup water to the Circulating water system. Based on preliminary data water balance diagram of the project is prepared and shown in Fig 2.4.

2.5.2.4 Water Requirement

The total water requirement for the proposed power project is 4002 m^3/hr at the plant reservoir end. The break-up of water requirement for the proposed power plant is given in Table-2.5.

TABLE-2.5

WATER REQUIREMENT DETAILS

Sr. No.	Units	Water Requirement (m3/hr)
1	Make-up water for Circulating Water System	3358
2	Potable water for plant and Township	35
3	Feed to DM plant	86
4	HVAC makeup	120
5	Makeup to account for Clarifier Sludge	153
6	Makeup to Service Water System	250
Total Fresh Water Requirement		**4002**

HVAC: Heating, Ventilation and Air Conditioning; DM Plant: Demineralisation Plant Total plant water requirement of the project is estimated to be 4002 cum/hr exclusive of evaporation loss in the water storage reservoirs.

The water balance of the power plant is shown in Figure-2.3. From the above it is seen that project water requirements is 3.05 cum/hr /MW Water Resources Department of Govt. of UP vide letter dated 9th September, 2011 has confirmed the allocation of 36 MCM of water from Upper Khajuri dam, which has further been approved by GoI, Central Water Commission, Irrigation Planning (North) Dept. Vide letter no. 7/2/18/UP/2008/IP(N)/804 dated 12.10.2011. Copies of the water allocation and Linkage letters are enclosed in **Annexure-1.** Considering the quantum of allocated water, intake water quality and general design practice adopted in typical thermal power projects, Circulating water system has been designed to operate at design cycle of Concentration of 5.

2.5.2.5Waste water Generation, Treatment and Disposal

The waste water treatment system envisaged will cover all the plant and colony waste water which are to be disposed. The objective of the treatment is to treat the waste water suitably either for horticultural purposes or for disposal as per the guidelines of the Uttar Pradesh Pollution Control Board (UPPCB)/ Central Pollution Control Board (CPCB) and other statutory authorities. All the waste water after treatment will be fed to the Central Monitoring Basin (CMB) to ensure that the effluent meets the UPPCB/CPCB stipulations.

The water balance giving details of water requirement and wastewater generation is given in Table-2.6.

Table-2.6

DETAILS OF WASTE WATER GENERATION

Sr. No.	System	Makeup Water Quantity		Loss	Waste Water		
		From fresh water	From waste water		Generated	Used/ Recycled	Discharged
1.	CW System	3358	-----	2766**	592	592	0
2.	DM System	86	-----	58**	28	0	28
3.	HVAC System	120	-----	120**	-----	-----	-----
4.	Potable water system	35	-----	20**	15	15	-----
5.	To makeup Clarifier Sludge	153	-----	-----	153	153	-----
6.	Ash Handling Plant Makeup	-----	690	690	-----	-----	-----
7.	Fly Ash handling	-----	55	55	-----	-----	-----
8.	Service Water,	250	0	150**	100	100	-----
9.	Coal Handling Plant.	-----	100	100	-----	-----	-----
	Total	4002	845	3114 (**)	888	860	28

Note: 1) All the quantities are in cum/hr

2) Consumptive water (3114 cum/hr) shows loss out of fresh water makeup only (**)

3) Waste Water Generated = Makeup – Loss {i.e. 4002 – 3114 = 888 cum/hr}

4) Waste water discharged = Generated Qty- Recycled {888 – 860} = 28 cum/hr

The total waste water generation will be 888 m^3/hr which includes sanitary waste of 15 cum/hr. Balance water shall be utilised for ash handling, dust suppression, plant service water, fly ash handling etc.

Excess waste water from CW blow down, service water, Coal handling plant, drains from condensate & steam, regeneration water from DM plant etc shall be collected, treated and disposed off. During normal plant operation a quantum of 28 cum/hr of treated waste water will be discharged to the nearest nallah. This waste water quantity which is proposed to be disposed off works out to be about 0.7% of the intake water quantity drawn for the project.

However during rainy season overflow water from various pits collecting the waste water may get filled up with rain water and clear rain water shall overflow from the CMB and waster water collection system like coal settling ponds, oil water separators etc to the nearest plant drainage . No traces of oil or coal particles are expected to be present in the waste water let out of the system.

All the waste water after treatment will be fed to the Central Monitoring Basin (CMB) to ensure that the occasional effluent shall meet the UPPCB/CPCB stipulations before disposal. Parameters and quantity of waste water collected in the CMB shall be monitored.

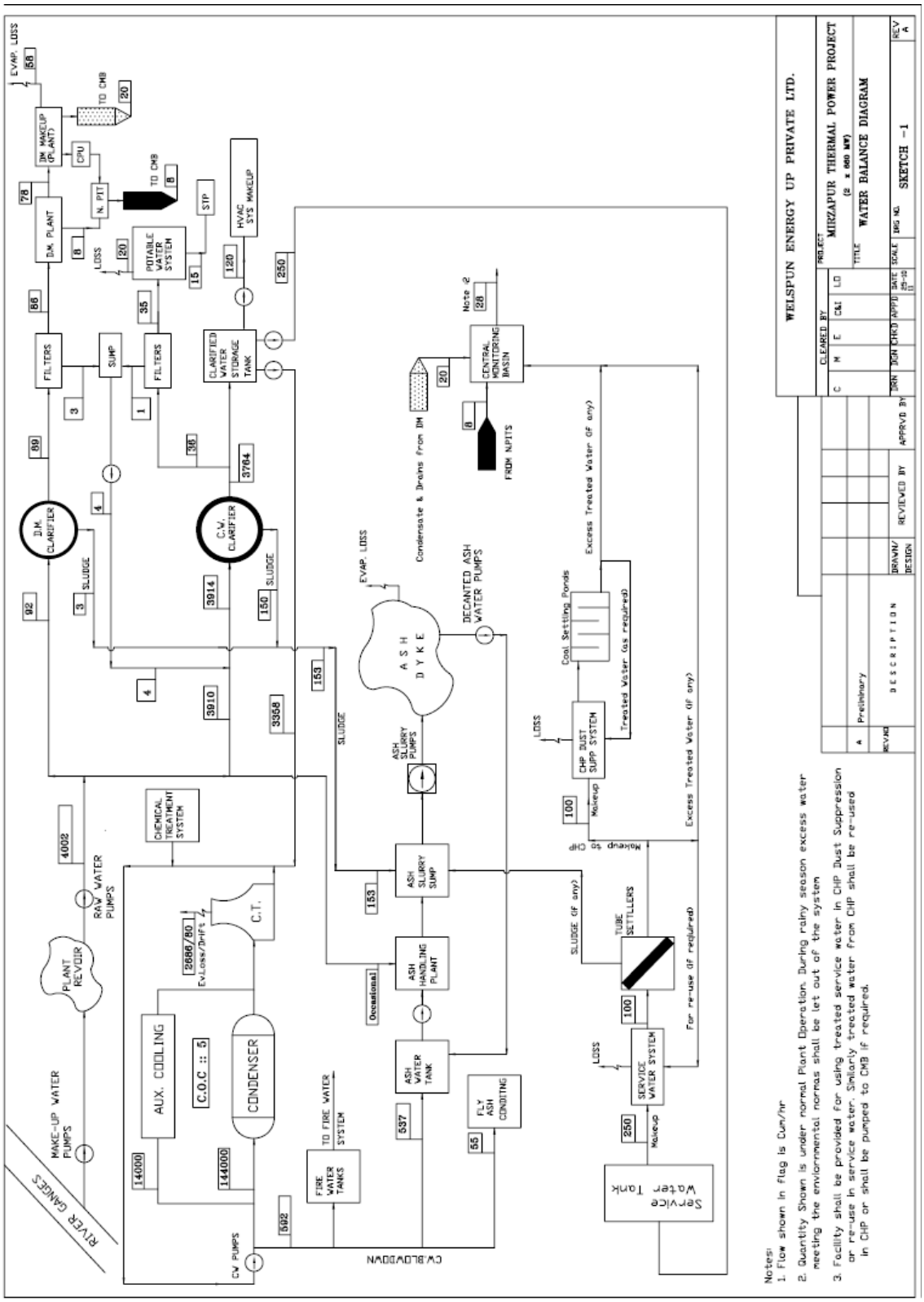


FIGURE 2.5
WATER BALANCE DIAGRAM

2.5.3 Fuel Requirement

2.5.3.1 Coal

The coal requirement is approx 6.74 MTPA for the proposed power plant capacity of 1320 MW at a Plant Load Factor (PLF) of 90%. The required coal will be sourced from proposed nearby coal mines such as NCL / SECL / CCL as per the availability through railway line. Long term coal linkage has been applied.

The expected coal analysis is given in Table-2.7.

TABLE - 2.7
Coal analysis

	Indigenous Coal
PROXIMATE ANALYSIS- As Received Basis (% by wt)	
Total Moisture	13.00
Ash	40.00
Volatile Matter	21.00
Fixed Carbon	26.00
ULTIMATE ANALYSIS-As Received Basis (% by wt)	
Carbon	35.06
Hydrogen	3.00
Nitrogen	0.04
Oxygen	8.50
Sulphur (max.)	0.5
GCV (Kcal/Kg)	**3500**
HGI	**50**
Silica (SiO_2) (%)	61.85
Alumina (Al_2O_3) (%)	27.36
Iron Oxide (Fe_2O_3) (%)	5.18
Titanium oxide (TiO_2) (%)	1.84
Phosphoric Anhydride (P_2O_5) (%)	0.54
Lime (CaO) (%)	1.47
Magnesia (MgO) (%)	1.00
Sulphuric Anhydride (SO_3) (%)	0.05
Sodium oxide (Na_2O) Max (%)	0.08
Potassium Oxide (K_2O) (%)	0.63

ASH FUSION RANGE (Under reducing atmosphere)	
	Indigenous Coal
Initial Deformation Temp. (IDT) deg.C	1100
Hemispherical Temp. (HT) deg.C	1300
Flow Temperature deg. C	1400

2.5.3.2 Coal Transport Facilities

Private Rail Siding will be built for transportation of heavy equipment/ bulk material during construction and for transportation of coal during operation of the plant. The nearest railway station is at Sarsongram on North Central Railway line. WEUPPL will enter into an agreement with Indian Railways for transporting coal from the mines to the project site by extending the railway tracks to the coal mines. A 20 km long spur is envisaged from Sarsongram railway station.

2.5.3.3 Start-up Fuel

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. The annual requirement of secondary fuel by way of LDO and HFO used for start-up and coal flame stabilization is estimated to be around 18,870 KL/annum. The typical characteristics of HFO and LDO are given in Table-2.8.

TARLE-2.8

TYPICAL CHARACTERISTICS OF HFO AND LDO

Component	Unit	HFO	LDO
Density at 37°C	Kg/m3	960	800
Kinematic Viscosity at 37°C	CSt	180-3 70	2.0-7.0
Sulphur	% by Weight	4.5	1.0
Water	% by Weight	1.0	0.05
Ash Content	% by Weight	0.1	0.02
Sediment	% by Weight	0.25	1.00
Lower Calorific Value	kCal/kg	10465	10900

2.5.4 Power Evacuation

Evacuation of power from the proposed power plant will be done at 400 kV level. The generation voltage is envisaged as 21 kV or will be as per the standard design of manufacturer. For evacuation of power, two (2) nos. single phases 270

MVA, 21 / 400/√3 generator transformers are envisaged for each unit One 400 kV switchyard will be constructed in the proposed power plant. For evacuation of power, two number of 400 kV transmission lines from the power plant switchyard to the nearby 400 kV PGCIL grid sub-station have been envisaged.

2.5.5 Manpower

The proposed power plant will require skilled and semi-skilled personnel during construction and operational phase. Many people in and around neighbouring villages will get opportunity for employment during construction and operational phase based on suitability. The total direct manpower requirement for Operation and Maintenance (O&M) of the power plant during operation period is estimated to be about 300 persons. Further, more than 1000 personnel will be indirectly employed.

2.5.6 Township

A township for power plant has been planned in an area of 50 acres towards south of the plant complex within the plant boundary which will be self contained and equipped with all the amenities. About 300 employees will be accommodated in the township.

2.5.7 Health and Sanitation

To ensure optimum hygienic conditions in the plant area, proper drainage network will be provided to avoid water logging and outflow. Adequate health related measures and a well equipped safety and environment department will be provided to ensure clean and healthy environment

2.5.8 Drainage

The proposed project area drains towards west direction. There are no major water bodies or streams within the plant site. In the proposed project no diversion of any water course is envisaged. A well planned internal sewer system will be developed in the plant area Suitable storm water drainage system and Rainwater Harvesting System will be constructed. The natural drainage pattern of the plant site will be maintained. The proposed project will not cause any disturbance to natural drainage pattern of the study area.

The rain water and dust suppression water run-off from the coal storage area will be clarified in settling tank and the clear water will be routed to storm water drain. The separated coal dust will be recycled to coal storage area

2.5.9 Internal Roads

All internal roads within the proposed plant area will be flexible/rigid pavements as per functional requirement. Roads will be single or double lane, depending upon the functional requirement.

2.5.10 Lightening Protection System

Adequate lightning protection facilities shall be provided as per the applicable Indian codes of practice.

2.5.11 Fire Protection System

For protection of the plant against fire, all yards and plant will be protected by any one or a combination of the following system:

a) Hydrant system;

b) Automatic high velocity and medium velocity sprinkler system;

c) Water spray (emulsifier system);

d) Automatic fixed foam system; and

e) Portable and mobile chemical extinguisher.

The system will be designed as per the recommendation of Tariff Advisory Committee

(TAC) of Insurance Association of India. Applicable codes and standards of National Fire Prevention Association (NFPA), USA would also be followed.

2.6 PROPOSED SCHEDULE FOR APPROVAL AND IMPLEMENTATION

The first unit of 660 MW capacities would be put into commercial operation in 42 months after obtaining all the necessary statutory approvals and consents. The second unit of 660 MW capacity would be put into commercial operation in a gap of 4 months thereafter.

2.7 TECHNOLOGY AND PROCESS DESCRIPTION

The proposed 1320 MW power plant will have a configuration of 2x660 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 pretreatment 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.

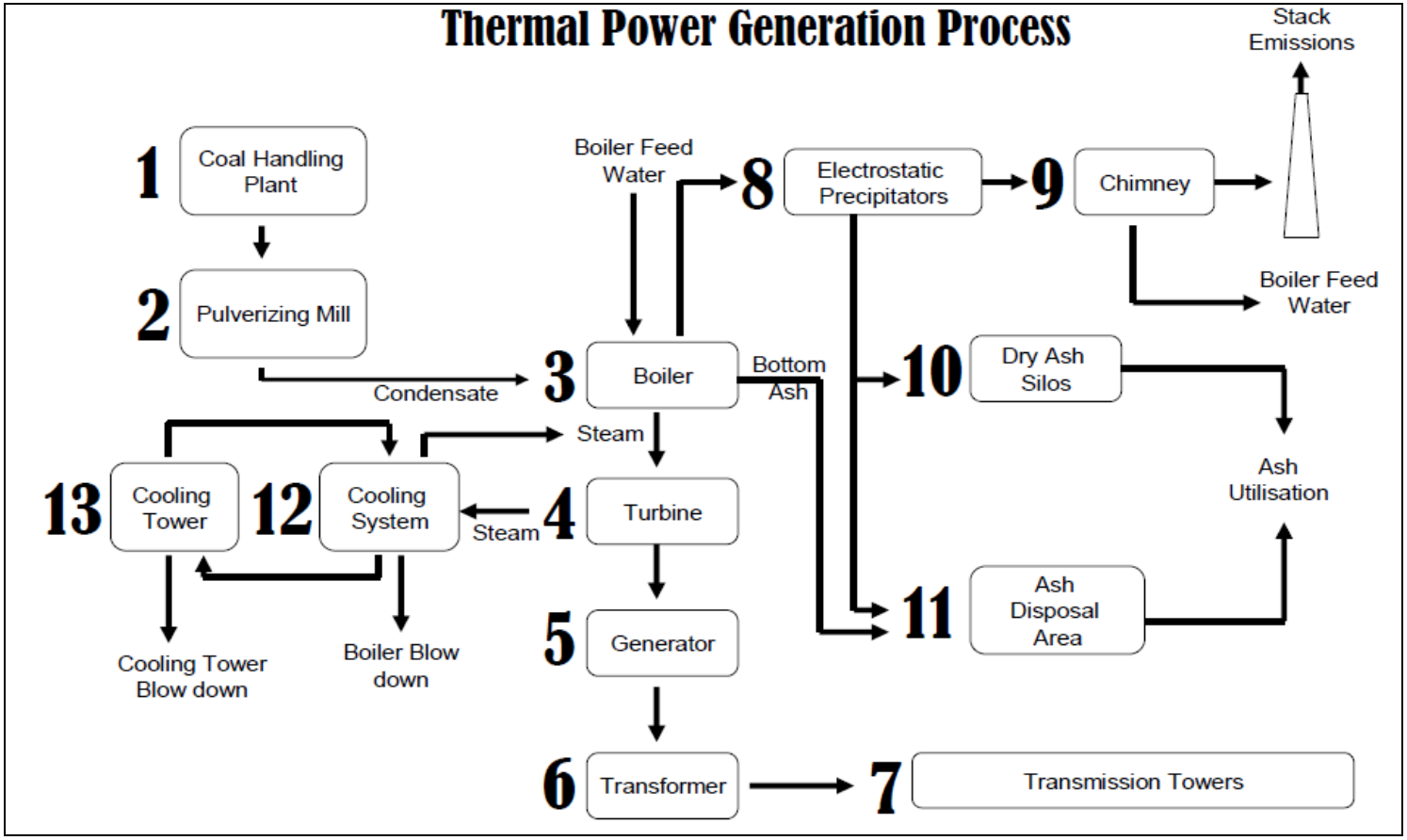


Figure 2.6
Thermal Power Generation Process

2.7.1 Main Plant Equipment

The parameters of the main plant for the project capacity of 2x660 MW has been reviewed considering the international trend during the past few years, feedback from operating plants, commercial competitiveness etc. Based on the above, steam parameters in the following range have been considered:

- Main steam pressure at turbine inlet: 247 kg/cm2
- Main steam temperature: 566-600 °C
- Hot Reheat steam temperature: 566-600 °C

The electrostatic precipitator will be designed to limit the particulate matters in flue gas to a maximum of 50 mg/Nm^3. The chimney height for all the units of the proposed power plant would be 275 m above finished grade level of main plant area for effective dispersion of the gaseous pollutants as per the MoEF/CPCB guidelines. The chimney would be twin-flue RCC structure with refractory brick lining. The chimney will be provided with the aviation lamps and lightning conductors. Online monitoring systems as per MoEF/CPCB requirements will be provided to monitor the gaseous pollutants from chimney. Based on the Sulphur content, the sulphur dioxide concentration level for this power plant will be low. However, provision will be made in the plant layout for installing the flue gas desulphurization (FGD) plant if required in future.

2.7.2 Coal Handling System

The coal for the proposed power plant would be received through dedicated railway siding. Coal handling facility will comprise of unloading by wagon tipplers with online crushing and stacking by stacker - cum - reclaimer in the coal yard and finally feeding the bunker level conveyors. In-plant total stockpiles capacity has been considered for 30 days; to take care of any contingencies in receipt of coal. Suitable stacking and reclaiming arrangement will be provided to transport and handle the coal from the in-plant stockpile. The coal handling plant will be provided with the facility for recording the quantity and analysis of the raw coal received in the station and fed to the bunkers. In-line magnetic separators, bunker level indicators, flap gates in bifurcating chutes, chute vibrators, sump pumps (for underground areas) will be provided, where-ever necessary, to make the system efficient and trouble free.

Suitable pollution control measures like dust extraction and dust suppression systems shall be provided at different transfer points and crusher houses and ventilation system to supply fresh air in underground tunnels will be provided. In addition, roof extraction fans will be provided in essential areas like crusher house and boiler bunker floors. Air conditioning for control room and pressurized ventilation with unitary air filter unit for MCC buildings of coal handling plant will be provided. Stockpile areas shall be provided with automatic garden type sprinklers for dust suppression as well as to reduce spontaneous ignition of the coal stockpiles. Plant effluent is used in ash handling system for equipment sealing and cooling and the same will be reused for coal dust suppression system. Necessary water distribution network for drinking and service water with pumps, piping, tanks, valves etc. will be provided for distributing water at all transfer points, crusher house, control rooms etc.

A centralised control room with microprocessor based control system (PLC) has been envisaged for operation of the coal handling plant. Except locally controlled equipment like travelling tripper, dust extraction/ dust suppression / ventilation equipment, sump pumps, water distribution system etc., all other in-line equipment will be controlled from the centralised coal handling control room but will have provision for local control as well. All necessary interlocks, control panels, MCC's, mimic diagrams etc. will be provided for safe and reliable operation of the coal.

2.7.2.1 Coal Storage Stockyard

A complete, fully operational and safe working coal storage stockyard with all associated equipment and environmental controls shall be provided. The facilities of the coal storage stockyard shall include:

- Fully automatic stacking and reclaiming facilities;
- Emergency reclaim hopper and associated mobile plant; and
- Dust suppression system.

2.7.3 Ash Handling System

Considering the coal quality with hourly coal firing rate of 428 tph/boiler at MCR condition, a maximum of about 2.7 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. 0.54 MTPA and the fly ash will be remaining 80% of the total ash generated i.e. about 2.16 MTPA.

Appropriate design of ash handling system will be ensured. For each unit Bottom ash will be collected in wet form; while fly ash will be collected in dry form to facilitate utilization and the un-utilized fly ash and bottom ash will be disposed in form to the ash pond. Ash extraction system is unitised basis and ash disposal system will be common for all units.

The fly ash system will have provision to dispose the dry ash for ash utilization as well as dispose to ash pond area through Slurry system. The ash management system will be designed as per the latest fly ash notification. The fly ash will be collected in the dry form and transported to silos for discharging to the cement and brick manufacturing industries. Bottom ash shall be conveyed to Ash pond through slurry system.

2.7.4 Plant Auxiliary Systems

2.7.4.1 Plant Water System

i) Intake Water System

In principle Water allocation of 36 MCM from Irrigation Department, Lucknow which has further been approved by GoI, Central Water Commission, Irrigation Planning (North) Dept. Vide letter no. 7/2/18/UP/2008/IP(N)/804 dated 12.10.2011.

From river Ganga water will be pumped and stored in Upper Khejuri Dam and from upper Khehuri Dam water will be further pumped to Plant raw water reservoir by means of Intake water pumps. River Ganga is located approx 24 Km (length of pipeline) upstream of Upper Khejuri Dam which is at approx 7 Km (length of pipeline) from the plant.

The River water pumps shall pump total annual water requirement during the monsoon period of 5-6 months whereas Intake water pumps shall pump on continuously.

Detailed scheme, location of pump houses, number of pumps, pipelines etc shall be decided later.

ii) Water Treatment Plant

Water Treatment Plant comprises of Pre-treatment and Demineralisation plant. In the Water Pre-treatment plant, suspended solids shall be removed by Clarifiers to the extent required to produce clarified water. Major portion of clarified water shall be supplied to makeup to CW system and HVAC makeup. Portion of clarified water shall be filtered to prod plant as feed water.

In the DM plant, filtered water shall be treated through ion exchanger process to produce Demineralised water. Filtered water shall be supplied to potable water system and to DM water which shall be supplied to Steam cycle makeup up, Hydrogen generation plant and to compensate losses if any in DM water cooling system.

Open re-circulating CW system using Induced Type Cooling Towers is proposed to implement in this project. Water Loss due to drift & evaporation from cooling towers and CW blow down shall be made up by adding fresh clarified CW makeup to the system as stated above.

iii) Circulating and Auxiliary Cooling Water System

a) System Description:

It is proposed to install a closed re-circulating cooling water system using mechanical draft cooling towers. Temperature rise across the condenser shall be in the range of 10-11 deg C. Circulating water system shall be designed to operate at design Cycle of Concentration (COC) of about 5.

The plant CW system will include the CW and auxiliary CW pumping system, mechanical draft cooling towers. It is proposed to provide one common circulating water pumping station for 2 units in the plant. The pumping station will have Five (5) numbers of circulating water pumps, two (2) working pumps for each unit and one (1) common standby. For carrying circulating water from CW pump house to TG area and from TG area to cooling tower, steel pipe or steel lined concrete pipe shall be used.. For interconnecting CW duct with CW pump, condenser and cooling towers, steel pipes would be used. Hot water from the Condenser shall be led to the Cooling Tower through hot water ducts.

Cold water from cooling tower basin shall flow by gravity to the pump sumps of CW pump house through the cold-water channel. It is proposed to draw CW system blow-down water from the discharge duct of each unit of CW pumps.

Closed circuit cooling water system would be adopted for steam generator and turbine generator and common auxiliaries like air compressors, ash handling plant equipment etc. DM water would be used in the primary circuit, which in turn will be cooled by circulating water in plate type heat exchangers. For the secondary side cooling water would be tapped from CW duct at the upstream of condenser and after cooling the primary water, hot water shall be discharged into the discharge duct downstream of the condenser. For each unit 2x100% or 3 x 50% capacity auxiliary cooling water pumps will be provided to supply cooling water to plate type heat exchangers.

For preliminary design purpose of plant water system, total circulation water requirement is considered to be about 144000 cum/hr. Estimated loss in the form evaporation and drift shall be about 2686 cum/hr and 80 cum/hr respectively considering temperature rise of 10 deg C across condenser. These parameters shall undergo little change during detailed engineering stage based on vendor data.

b) COC of CW System

Evaporation of pure water from CW system in cooling tower results build-up of dissolved solids in circulating water. To keep the water chemistry within control, portion of circulating water need to be bled down and fresh water is to be supplied as makeup. Thus makeup water is required to compensate for the evaporation & drift loss and water bled (CW blow down) from the system. Amount of CW blow down depends on acceptable limit of chemical parameters of circulating water. This is measured by "cycle of concentration". Lower cycle of concentration (COC) results higher CW Blow down which results more plant water requirement. Adopting higher COC results lower Blow down and less makeup water. However the relationship is not linear.

However COC cannot be increased beyond a certain practical limit as water chemistry would be difficult to manage/control. Moreover beyond a COC of 5, water quantity does not reduce substantially.

As per general design standards, constituents such as Calcium, Alkalinity, micro organism etc need to be limited to certain design values for trouble free operation of CW system equipments such as cooling towers, condensers, pumps etc. Hence Chemical treatment programme shall be adopted to facilitate operation of CW system at COC of 3 and above.

With due consideration of the various issues, it is proposed to adopt a optimum COC of 5.0 for this project so that:

1. CW system chemistry can be controlled with the aid of suitable Chemical Treatment programme during operation stage.
2. Water requirement of the project is minimal
3. Blow down from CW system is minimal so that effluent from the plant can be least.

2.7.4.2 Electrostatic Precipitator

The steam generating units will be provided with three parallel gas path Electrostatic Precipitator (ESP) for collecting fine dust from the boiler convective system. ESP will be selected for obtaining a dust concentration to below 50 mg/Nm3 in the flue gas at the outlet of the ESP. The efficiency of the ESP shall be above 99.9%. The ESP would have adequate number of ash hoppers provided with electric heaters. The control of ESP would be based on microprocessor using semi-pulse device. The ESP unit will be complete with casing, Hoppers, gas distribution system, heating elements for hoppers and insulators, transformers, rectifiers and controls.

2.7.4.3Chimney

The two units of 660 MW capacity will be provided with a common RCC chimney of 275 m with twin-flue arrangement connected to the two boilers. The top-most inner diameter of each flue will be 7.0 m.

2.7.4.4DM Plant

DM water would be used as heat cycle make-up and primary coolant in heat exchangers for the auxiliary cooling systems of boiler, Turbo-Generator (TG) auxiliaries and other auxiliaries.
Besides meeting heat cycle make-up, DM plant will also supply the make up water requirement to primary water circuit of stator cooling system, hydrogen generation plant and regeneration requirement of condensate polishing unit to be located in the power house building.

2.7.4.5Air Conditioning System

It is proposed to air-condition the units control room, computer room, UPS room, battery charger room, SWAS room (dry panel area only) service building, administrative building, Shift In-charge Engineer's room, Maintenance Engineer's room, printer room, UPS room, analyser room, static excitation cubicle room, relay room, ESP control rooms, I&C lab switchyard control room etc. A centralized chilled water system for the main control room comprising compressor, condenser, direct expansion/flooded type evaporator, condenser cooling water circulating pumps, cooling towers, chilled water circulating pumps, cooling water piping with valves, accessories, fittings etc. has been envisaged. The chilled water produced will be circulated through the coils of air handling units located near respective control rooms.

2.7.4.6Ventilation System

Ventilation system shall be designed to supply fresh outdoor air and shall be selected for maintaining interiors of those areas which do not require close control of temperature, but nevertheless have a stipulated maximum temperature. The areas proposed to be ventilated are turbine building, ESP control building, ash slurry pump house, air compressor/DG rooms, AC plant room, DM plant building, Battery and battery charger room, Miscellaneous rooms in power house stations like cable spreader room, switch gear room, pump rooms, oil room, stores, toilet elevator m/c room etc.

2.7.5 Pollution Control Systems

Special precaution will be taken for pollution control in different transfer points and stockpile areas to suppress dust under adverse wind condition. Each and every transfer point and storage will have adequate ventilation and dust extraction and suppression [DE/DS] system. Environmental controls on the coal storage stockyard shall comprise of dust suppression sprays, good housekeeping techniques including compaction to prevent spontaneous combustion and surface water run- off treatment and recirculation.

2.7.6 Infrastructure Facilities for Labour Force

During construction of the project work force of about 3000 workers need to be deployed, which consists of skilled and un-skilled workers. Most of the unskilled workers will be sourced from local. Rest skilled workers will be housed in labour colony, which will be located near the project site. The colony which will be temporary in nature will have the following amenities:

- Drinking water facility -drinking water will be supplied through water tankers;
- Community kitchen will be provided for the workers;
- Sanitation facilities will be constructed which will include adequate number of separate toilets for men and women. Make shift treatment plant will be installed and treated wastewater will be utilized in greenbelt development;
- Bins will be installed to collect municipal waste from the colony;
- Small play ground and child care centres will be developed in the colony; and
- Fuel (kerosene/LPG) will be supplied to the labours for cooking to prevent tree felling.
- During operation phase, following facilities will be provided to the marginal workers/casual workers and truck drivers.
- Canteen will be provided and food will be made available on chargeable basis;
- Rest rooms with proper sanitary facilities and drinking water will be provided; and

- Medical facilities in the plant will be extended to the marginal workers and drivers.

2.8 MITIGATION MEASURES PROPOSED

The various types of pollution from the proposed power plant are categorized under the following types:

- Air pollution;
- Water pollution;
- Noise pollution; and
- Solid waste

The major types of emissions from the power plant are gaseous emissions. In addition, wastewater and solid waste will also be generated. The quantities and the composition of the gaseous, liquid and solid waste that are likely to be generated in the plant will be managed and treated such that their final disposal into the environment meets all the statutory requirements and thus the environmental impacts are minimized to the extent possible.

2.8.1 Air Pollution Management

Fugitive and stack emissions from the power plant will contribute to increase in concentrations of dust SO_2 and NOx pollutants. The mitigative measures recommended in the plant are:

a) Installation of ESPs of over 99.9% efficiency to limit the SPM concentrations below 50 mg/Nm3

b) Provision of 275 m high tn-flue stack for wider dispersion of gaseous emissions;

c) Provision of Low NO_X burners;

d) Dust extraction/ suppression system at transfer points of conveyor system;

e) Enclosed Conveyor belt;

f) Water sprinkling at material handling and storage yard;

g) Block topped / concrete roads within the plant area; and

h) Development of greenbelt around the plants to arrest the localised fugitive emissions.

2.8.2 Water Pollution Management

Quantum of fresh water makeup, loss and waste water are shown in the Table: 2.6 in previous paragraphs. Wastewater is generated in the following systems and an effluent management scheme will be implemented to reduce intake water requirement as well as effluent discharge.

i) Water Pre-treatment System

The suspended solids in raw water get precipitated in the form of sludge in clarifiers of Pre –treatment plant. This sludge laden waste water is collected in a pit and pumped to the bottom ash sump for disposal to ash dyke. Estimated quantity of waste water under this category is 153 cum/hr and this waste water is completely re-used in the plant.

Filters in water PT plant needs regular back washing and this produces filter back wash waste water. This waste water consists of a lot of suspended solids. This waste water is estimated to be 4 cum/hr (maximum) and after collection, the same shall be pumped to the clarifiers for re-use/recycle.

ii) CW System :

Description of CW system , need of providing CW blow down, selection of COC of CW system are mentioned in Clause 2.7.4.1 (iii) above . As can be seen above the CW blow down water is generated as a waste from this system and quantum of 592 cum/hr is expected to be generated. This blow down water is recycled / reused to the extent possible to the following:-

- Makeup to Fire Water Storage Tanks as and when required
- Dust suppression system of Coal Handling plant including stockyard.
- Makeup to Ash handling Plant.

iii) DM Plant

In DM plant ion exchange resins are periodically regenerated with acid / alkali. This produces waste water and the same is collected in a pit. This waste water is required to be neutralised by adding acid/alkali and neutralised effluent shall be discharged to Central monitoring basin for disposal into nearest nallah/water body.

iv) Drains from Steam Cycle:

In supercritical unit no continuous blow down from steam cycle is expected once the plant is stabilised unlike that of sub-critical units, However occasional drains from condensate / steam circuit may occur. Quality of this is pure water, whereas its temperature is expected to be high. These drain if any shall be led into Central monitoring basin and temperature gets reduced due to dilution by other effluents. This shall be for reused in Ash handling plant

v) Drains from Service Water/CHP Areas:

The plant is provided with service water network. The service water is used for cleaning of various areas, floors and equipments periodically. Wash water waste from various areas shall be laden with oil particles, suspended solids, traces of chemical, as dust particles etc depending on the area in which washing is carried out.

This wash water is collected locally at various locations in sumps/pits. On the basis of quality of waste water collected, they are grouped together and treated.

Service water laden with oily waste shall be treated through oily water separators, and oil free water shall be re-used back in service water system Excess water if any during rainy season shall be discharged to CMB.

In areas where ash particles and other dust particles are expected, waste service water shall be treated by using tube settlers or lamella type clarifiers. The treated water free from dust particles/ suspended matter shall be re-used back in service water system. Excess water if any during rainy season shall be pumped back to CMB. Sludge from the settlers/clarifiers shall be collected and shall be disposed off to ash dyke.

The run off water from the coal yard & Coal conveyors shall be led to a set of Coal settling pond(s) for settlement of coal particles. The pond shall be designed for design rain fall condition. The supernatant water shall be re-used for dust suppression system. Excess water shall be pumped back to CMB. The settled coal particles shall be periodically removed, dried and re-used or disposed.

vi) Thus water pollution management will essentially involve collection, treatment and recirculation/ disposal of various effluents. The wastewater generation, collection, recycle treatment, and disposal details are given in Table-2.9.

Table-2.9

DETAILS OF WASTE WATER GENERATION, TREATMENT, RECYCLE AND DISPOSAL

Sr. No.	System	Waste Water (m^3/hr)			
		Generated	Used/ Recycled	Dis-charged	Reamrks
1.	CW System	592	592	--	Utilisation of 592 cum/hr : 537 -for AHP 55 - Fly ash conditioning ,
2.	DM System	28	0	28	
3.	Potable water system	15	15	--	Used for horticulture / gardening
4.	To makeup Clarifier Sludge	153	153	----	Used for AHP
5.	Service Water System	100	100	----	Used for Coal Handling Plant.
	Total	888	860	28	

The total waste water generation will be 888 m^3/hr. Out of this, 860 m^3/hr of domestic/sanitary/service wastewater will be suitably treated and utilized for greenbelt development, ash handling, dust suppression, service etc. The remaining 28 m^3/hr of treated wastewater will be discharged to nearest nallah/water body during normal plant operation. The quality of treated effluent discharged from the plant will confirm to CPCB standards.

Treated Effluent

The quality of treated effluent from the plant will conform to CPCB standards and given in Table-2.10.

TABLE-2.10

EXPECTED QUALITY OF TREATED EFFLUENT

Parameters	Unit	Quality of Treated Effluent
pH	-	6.5-8.5
Temperature	°C	Not more than 5°C higher than ambient
Total suspended solids	mg/l	<100.0
Oil and Grease	mg/l	<10.0
BOD	mg/l	<30.0
Free chlorine	mg/l	<0.5
Copper	mg/l	<1.0
Iron	mg/l	<1.0
Zinc	mg/l	<1.0
Phosphate	mg/l	<5.0

2.8.3 Storm Water Management

Storm water management will be done by installing intercepting drains in the plant area and led to rainwater collection tanks, which will help in conserving the fresh water. The surplus overflow will however be discharged into the nearby water body. The storm water drainage will take into account the topography of the plant area, intensity of hourly rainfall and existing drainage pattern of the area.

The storm water drainage system will consist of a network of open drains. The run-off from plant area, open areas, buildings and installation shall be carried through the network of open drains running all along the road system

2.8.4 Noise Pollution Management

In the Plant, various equipments like pumps, cooling tower compressors etc generate the noise. Equipment will be designed to conform to noise levels prescribed by regulatory authorities. The noise level ranges expected from various noise generating sources in the proposed plant are given in Table-2.11.

TABLE-2.11

SOURCE NOISE LEVELS IN THE PROPOSED PLANT

Sr. No.	Unit	(Expected Noise Level dBA) [1m away]
1.	Turbine unit	80-85
2.	Cooling tower	65-70
3.	Air compressors	80-85
4.	Transformer	70-75
5.	Boilers	80-85

Provision of acoustic enclosures to noise generating equipment like pumps will conform to noise levels prescribed by regulatory authorities. In Places where it is difficult to meet the prescribed noise levels, personal protection equipment will be provided to the workers. The wide greenbelt around the plant will attenuate the noise level dissemination outside the plant boundary.

2.8.5 Solid Waste Management

The main solid waste from the proposed power plant will be ash (fly ash and bottom ash. Considering coal quality with 40% ash content, a maximum of about 2.7 MTPA of ash will be generated from the proposed power plant.

The fly ash has high pozzolonic properties and form cementaceous material when mixed with lime and water and itis suitable forthe following commercial uses:

- Cement Industries
- Brick Industries
- Light weight aggregates
- Road sub-base
- Grouting Material
- Roads / paving used as filler in asphalt mix for roads
- Road widening
- Land filling material

It is proposed to utilize 100% of the fly ash generated from the project for cement and brick manufacturing. 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 high 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. Liners of permeability of less than 1 micron will be provided will be provided in the ash pond in order to arrest any seepage of ash pond water into groundwater.

2.8.6 Implementation Schedule

The implementation schedule with activities in detail and tentative completion dates of the proposed project is given in Table- 2.12.

Table-2.12

PROPOSED IMPLEMENTATION SCHEDULE

Sr. No.	Activity	Completion Date
1	Land Acquisition Completion	March 2012
2	Coal & Water Approval	March 2012
3	EC from MoEF	May 2012
4	Financial Closure	May 2012
5	Unit Synchronization	March 2015
6	COD of Unit-1	June 2015
7	COD of Unit — 2	September 2015

3.0 DESCRIPTION OF THE ENVIRONMENT

3.1 Introduction

This chapter illustrates the description of the existing environmental status of the study area with reference to the prominent environmental attributes. The study area covers the area falling within 10 km radius around the proposed project site.

The existing environmental setting is considered to adjudge the baseline environmental conditions, which are described with respect to climate, hydro-geological aspects, atmospheric conditions, water quality, soil quality, vegetation pattern, ecology, socio-economic profiles of people, land use. The objective of this section is to define the present environmental status which would help in assessing the environmental impacts due to the proposed project.

To achieve these objectives, our team monitored the environmental parameters within the core zone and buffer zone (10 km. radial distance) of the project site in accordance with the Guidelines for EIA issued by the Ministry of Environment & Forests, Govt. of India.

This report incorporates the baseline data generated through primary surveys for three months during Summer Season, 2011 representing pre-monsoon season.

3.2 SEISMICITY OF AREA

Many parts of the Indian subcontinent have historically high Seismicity. Seven catastrophic earthquakes of magnitude greater than 8 (Richter scale) have occurred in the western, northern and eastern parts of India and adjacent countries in the past 100 years.

By contrast, peninsular India is relatively seismic, having suffered only infrequent earthquakes of moderate. The main seismogenic belts are associated with the collision plate boundary between the Indian and Eurasian plates.

The hazard map shows contours joining locations of equal expected peak accelerations in rock expressed in percentage. The study area lies in the seismic zone III under area of moderate seismic risk by national standards (as per IS 1893:2000).

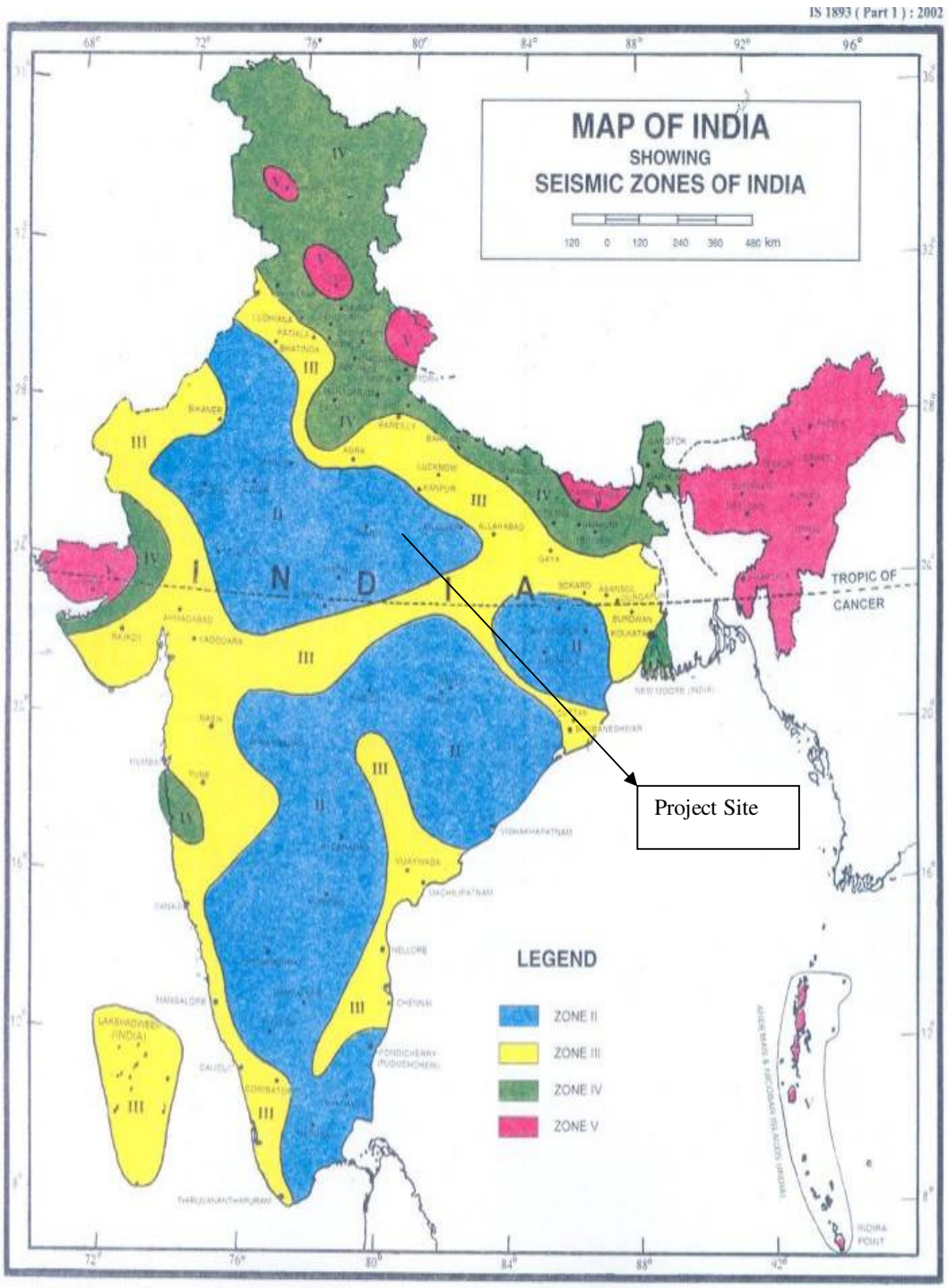


FIGURE 3.1

SEISMIC ZONES OF INDIA

3.3 LAND USE STUDIES

Studies on land use aspects of eco-system play an important role in identifying sensitive issues and to take appropriate action by maintaining 'Ecological Homeostatics' in the past and present development of the region. The objective of this section is to define the present environmental status and evaluate changes that have occurred during the last decade due to industrialization in the region.

3.3.1 Objectives

The objectives of land use studies are:

- To determine the present land use pattern;
- To analyze the impacts on land use due to proposed project activities in the study area; and
- To give recommendations for optimizing the future land use pattern.

3.3.2 Methodology

DATA USED

Indian Remote Sensing satellite IRS P6 LISS IV MX digital FCC (False Color Composite) of current vintage data at 5m. spatial resolution has been used for preparation of Land use/ Land cover thematic map of present study area. Survey of India toposheet as a reference map on 1:50,000 scale has been used for preparation of base layer map like road, rail network, contour, drainage, village and rectification of satellite data.

METHODOLOGY

The methodology used for the study area consists of following components.

(i) GEOREFERENCING OF SATELLITE IMAGE

Survey of India Toposheet has registered in Geographic lat/long. Satellite image has been georeferenced by using registered SOI toposheet as a reference map taking suitable Ground Control Points (GCP) points like intersection point of railway, Road network, landmarks and permanent feature. Finally Images have re-projected in UTM projection and their respective zone.

(ii) BASE MAP LAYER CREATION

Base map has been prepared using Survey of India Toposheet as a reference map on 1:50000 scale. In base layer linear and point feature like road, rail, canal,

village location and plant site have been created in vector data format. Base map layer information has been used for analysis of surrounding feature like road, rail, village location near Plant site activity through superimposed on thematic map for data integration.

(iii) INTERPRETATION OF SATELLITE IMAGE

Hybrid technique has been used i.e. visual interpretation and digital image processing for identification of different land use and vegetation cover classes based on spectral signature of geographic feature. Spectral signature represents various land use class. Image interpretation keys are developed based on image characteristics like color, tone, size, shape, texture, pattern, shadow, association etc, which enables interpretation of satellite images for ground feature.

(iv) GROUND TRUTH DATA COLLECTION

Ground data on geo-environmental components of the study area were collected for verification of information of the different features of the study areas, which are responsible for the occurrence of specific spectral reflectance behavioural patterns. The ground truth detailed information on agricultural practices; wastelands, mining, industrial area etc. were collected along with other land features. Ground truth has been carried out for verification of the ground features (esp. one in doubt) interpretation accuracy and reliability of remotely sensed data, which cannot be interpreted directly on satellite imagery.

RESULTS

In the present study, both digital image processing and visual interpretation technique were applied to generate output of Land use / Land cover map of study area on 1: 50,000 scale. A standard False Colour Composite (FCC) image has also been generated on the same scale. The study area has been divided into the following major classes of land use for the purpose of computing the area.

Land use/Land Cover Classification System

The present land use / land cover maps were prepared based on the classification system of National standards. For explanation for each of the land use category the details as given in Table-3.1 were considered.

TABLE -3.1

LAND USE/LAND COVER CLASSIFICATION SYSTEM

Sr. No.	Level-1	Level-2
1	Built-up Land	Town/cities
		Villages
		Institution/Industry/Godown etc
		Plotted Area/Layout
2	Agriculture Land	Crop Land
		Plantations
		Fallow
3	Forest	Evergreen/Semi evergreen
		Deciduous
		Forest Plantation
4	Wastelands	Rocky/Stony Waste
		Land with /without scrubs
		Saline/sandy & Marshy/swampy
5	Water Bodies	River/Stream
		Lake/Reservoir/Tanks
6	Others	Orchard/Other Plantation
		Shifting cultivation
		Salt Pans, Snow covered/Glacial
		Barren/Vacant Land

3.3.3 Land use of the Buffer Zone

The land use pattern for 10 km radius study area around the project area is shown in the table below:

Table No. 3. 2

LAND USE /LAND COVER DISTRIBUTION IN THE BUFFER ZONE

S. No.	Land use pattern	Area (ha.)	(%)
1.	Water Bodies	489.40	1.20
2.	Crop Land	3837.21	9.43
3.	Fallow Land	11577.99	28.47
4.	Plantation/ Vegetation	854.67	2.10
5.	Human Settlement	353.18	0.87
6.	Scrub Land	6653.74	16.36
7.	Open Waste Land	2543.05	6.25
8.	Degraded Forest	9327.58	22.93
9.	Dense Forest	5037.32	12.39
Total		**40674.14**	**100**

Source: Land Use/Land Cover Map of the Buffer Zone

Above table depicts that the buffer zone is dominated by the Fallow land which is 28.47% of thetotal land area. 22.93% of the total area is dominated by the degraded forests. Scrub Land covers 16.36% ofthetotal land area. Both Fallow Land and Scrub are neither productive in terms of their use nor appears to be of very much significance to thenearby villagers.

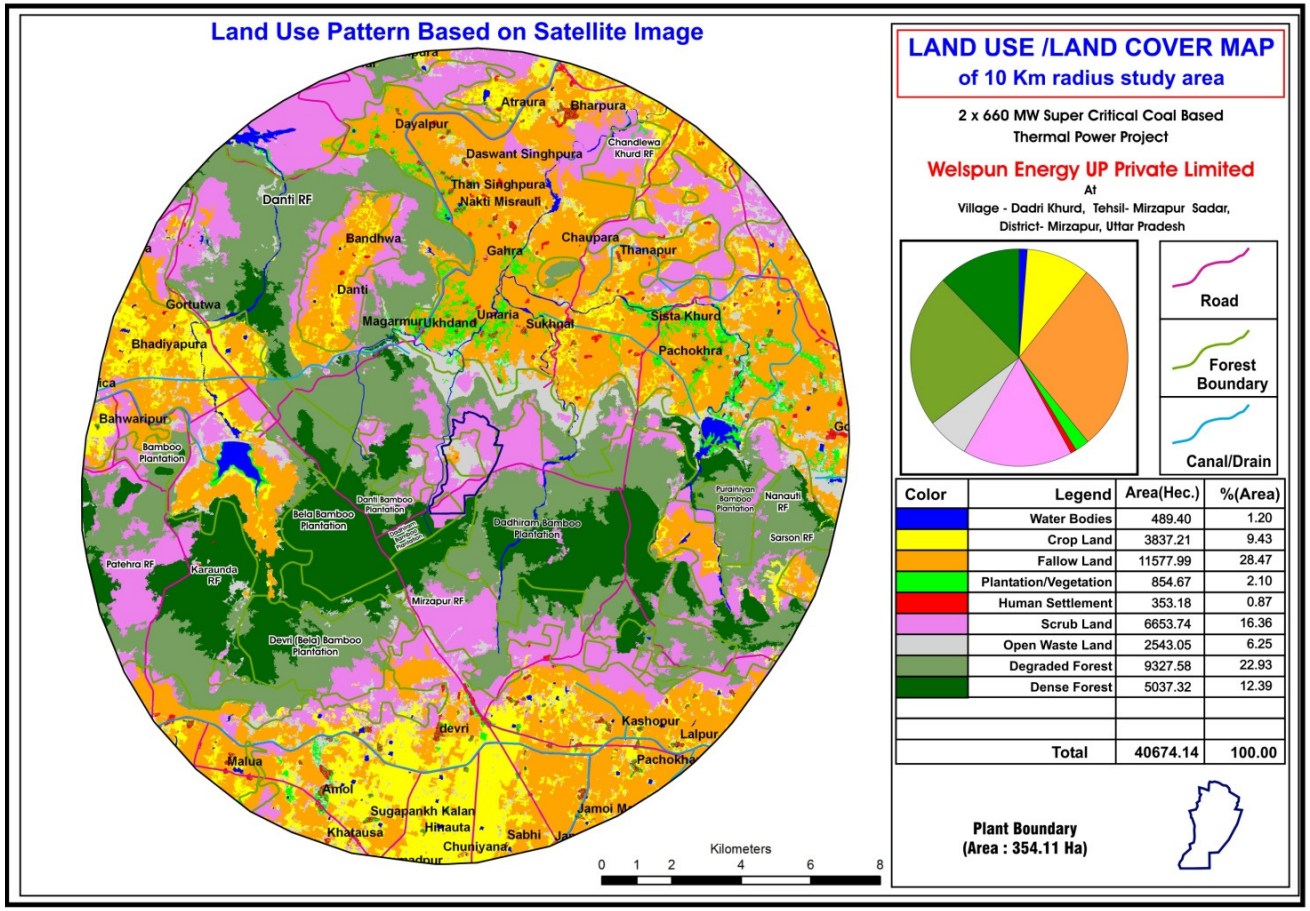


FIGURE 3.2

LAND USE LAND COVER MAP OF THE PROJECT STUDY AREA

3.3.4 Forest Land

Forest Land occupies about 35.32% (including both degraded and dense forest) of the study area covering about 14364.9 ha. There is **no forest land** within plant boundary.

3.4 SOIL CHARACTERISTICS

It is essential to determine the potential of soil in the area and identify the impacts of urbanization and industrialization on soil quality. Accordingly, a study of assessment of the soil quality has been carried out.

Agriculture is the main occupation of people in the study area, hence it is essential to determine the soil quality in the area and identify the impact of urbanization and industrialization on the soil quality.

The information on soil has been collected from various secondary sources and also through primary soil sampling, analysis of which is described in this section.

3.4.1 Data Generation

For studying soil profile of the region, sampling locations were selected to assess the existing soil conditions in and around the plant area representing various land use conditions. The physical, chemical and heavy metal concentrations were determined. The samples were collected by ramming a core-cutter into the soil upto a depth of 90 cm. Simultaneously, in-situ infiltration test using double ring infiltrometer was carried out at all locations to determine the permeability.

The present study on the soil profile establishes the baseline characteristics and identifies the incremental concentrations if any, due to the proposed project. The sampling locations have been identified with the following objectives:

- To determine the baseline soil characteristics of the study area;
- To determine the impact of industrialization on soil characteristics; and
- To determine the impact on soils more importantly from agricultural productivity point of view.

Nine locations within 10 km radius of the project site were selected for soil sampling. The list of sampling locations is depicted in **Table-3.4** and is shown in **Figure-3.3.** The analyis of Soil at various sampling locations is depicted in **Table-3. 5.** At each location, soil samples were collected during the study period from three different depths viz. 30 cm, 60 cm and 90 cm below the surface and homogenized. The homogenized samples were analyzed for physical and chemical characteristics.

3.4.2 Baseline Soil Status

Quality of the soil in the area shows a marked diversity in nature depending upon the parent rock and climatic conditions prevailing in different parts of the district. The soil in the area has a property of swelling to some extent when wetted and foaming cracks, when it dries up subsequently.

It has been observed that the texture of soil is mostly silty loam in the study area with moderate water holding capacity. It has been observed that the pH of the soil quality ranged from 6.76 – 7.87 indicating that the soil is neutral to slightly alkaline in nature. The bulk density of soil ranges between 1.17 and 1.38 gm/cc.

The Electrical Conductivity was observed to be in the range of 0.19 – 0.23 mS/cm, with the maximum (0.23) observed in the village Shikathi (SS3) &

Madihan (SS6) and with the minimum (0.19) observed in the village Kotwa Pandey (SS9) during the pre- monsoon season. Organic matter in the soil varies between 0.21-0.62 indicating that the soil in the area has less to on an average sufficient in Organic matter.

The Nitrogen values ranged between 131.79–256.50 kg/ha. The values observed at all the sampling locations indicate that the soil has 'good' to 'better' quantity of Nitrogen. The Phosphorus values range between 11.56 – 32.98 kg/ha. The maximum value (32.98 kg/ha) was found in Project site Near By Ash Pond Area (SS2) indicating that the soil has more quantity of Phosphorus. The Potassium values range between 99.02-142.19 kg/ ha indicating that the soils in the area have less quantity of Potassium.

TABLE-3.3

SOIL SAMPLING LOCATIONS

S. No.	Sampling Locations	Direction from the project boundary	Aerial Distance (Km) from the project boundary
1.	Project Site	--	--
2.	Near Project Site Ash Pond	--	--
3.	Village Shikathi	SW	5.0
4.	Village Rajapur	SE	8.0
5.	Village Dekhwah	ESE	5.5
6.	Village Madihan	SE	6.0
7.	Village Dadiram	NE	2.5
8.	Village Vindampal	NW	5.0
9.	Village Kotwa Pandey	NW	5.5

Source: Toposheet & Field Visit

TABLE-3.4
SOIL ANALYSIS RESULTS
(Summer Season, 2011)

S. No.	Parameters	Project Site	Near Project Ash Pond	Village shikathi	Village Rajapur	Village Dekhwah	Village Madihan	Village Dadiram	Village Vindampal	Village Kotwa Pandey
01.	pH (at 25 ^{0}C)	6.92	6.76	6.96	7.28	6.94	6.98	7.67	7.02	7.87
02.	Conductivity (mS/cm)	0.22	0.19	0.23	0.21	0.21	0.23	0.22	0.21	0.19
03.	Soil Texture	Silty Loam	Silty Loam	Silty Loam	Silty Loam	Silty Loam	Silty Loam	Silty Loam	Silty Loam	Silty Loam
04.	Colour	Blackish Brown	Raddish Brown	Blackish Brown	Yellowish Brown	Blackish Brown	Blackish Brown	Yellowish Brown	Blackish Brown	Blackish Brown
05.	Water holding capacity (%)	22.10	26.76	22.10	27.10	27.70	16.70	26.90	28.40	28.10
06.	Bulk density (gm/cc)	1.38	1.32	1.30	1.36	1.20	1.20	1.17	1.29	1.24
07.	Chloride (mg/100gm)	23.08	20.50	23.17	14.05	24.64	27.10	17.91	20.70	28.37
08.	Calcium as Ca (mg/100gm)	25.39	22.45	24.60	13.49	18.25	13.09	16.27	11.51	16.27
09	Sodium (mg/100gm)	3.90	3.56	6.96	9.00	3.91	6.90	9.00	7.81	5.40
10.	Potassium (kg. /hec.)	120.08	125.56	122.47	123.20	142.19	121.38	123.08	131.25	99.02

11.	Organic Matter (%)	0.54	0.60	0.21	0.55	0.29	0.36	0.62	0.50	0.39
12.	Magnesium as Mg (mg/100gm)	8.19	5.83	9.63	11.32	10.11	10.83	8.19	10.83	10.11
13.	Available Nitrogen as N (kg. /hec.)	235.39	256.50	210.78	189.65	143.50	131.79	178.40	212.15	192.86
14.	Available Phosphorus (kg. /hec.)	18.43	32.98	17.13	21.80	11.56	21.20	18.97	23.54	15.80
15.	Zinc (mg/100gm)	1.62	1.59	1.90	2.11	1.95	2.15	3.54	8.90	4.16
16.	Manganese (mg/100gm)	19.36	18.45	15.15	12.11	15.72	30.39	25.09	27.87	18.37
17.	Chromium (mg/100gm)	2.17	2.08	1.96	3.11	3.52	3.34	3.87	2.90	2.71
18.	Lead (mg/100gm)	4.15	3.89	3.38	3.17	2.49	3.24	3.08	3.28	8.28
19.	Cadmium (mg/100gm)	0.19	0.18	0.21	0.13	0.28	0.22	0.18	0.22	0.56
20.	Copper as Cu (mg/100gm)	0.79	0.87	1.24	1.28	1.32	1.06	1.70	1.81	1.97

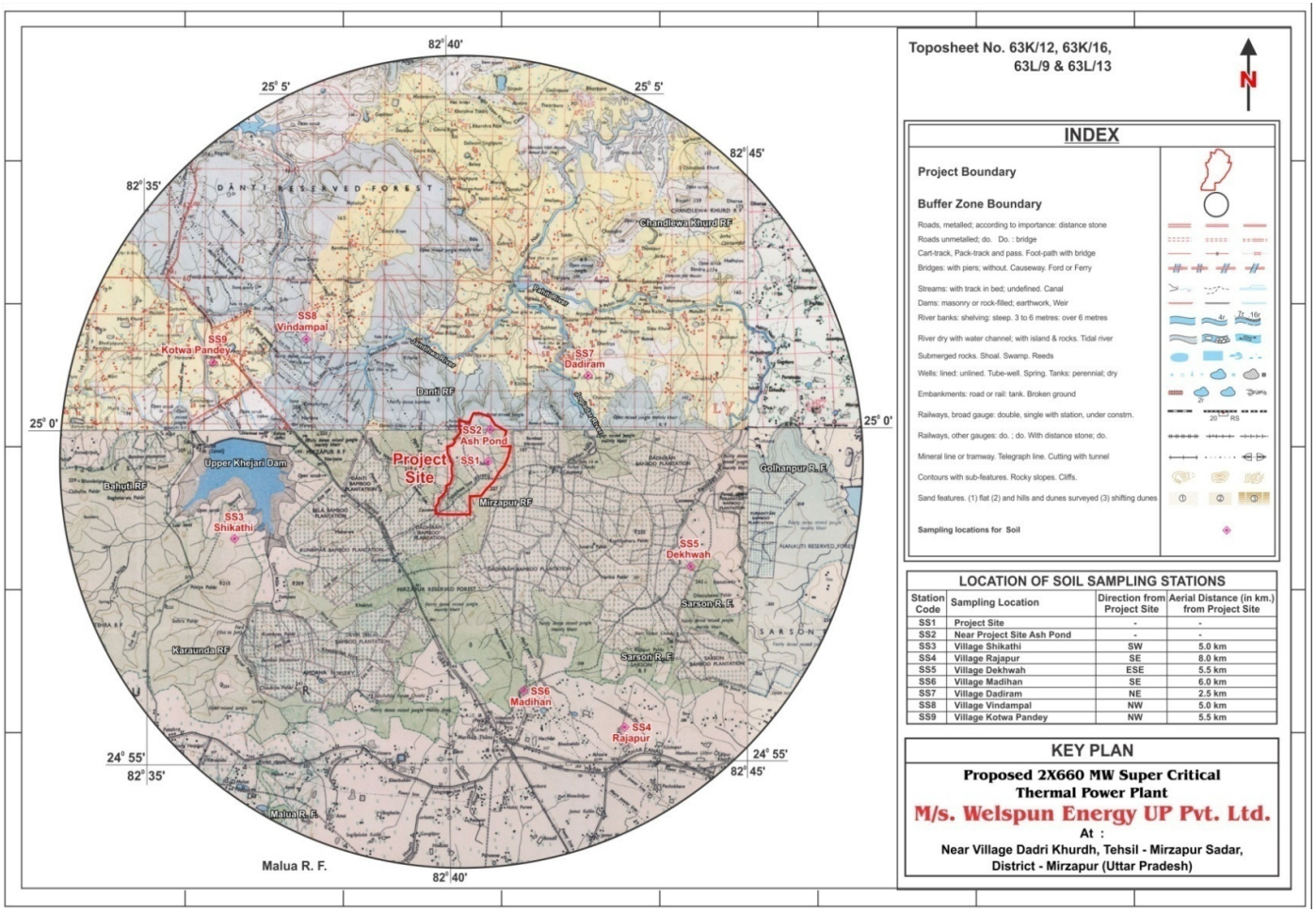


FIGURE-3.3

SOIL SAMPLING LOCATIONS

TABLE- 3.5

STANDARD SOIL CLASSIFICATION

Sr. No.	Soil Test	Classification
1	pH	<4.5 Extremely acidic 4.51- 5.00 Very strongly acidic 5.51-6.0 moderately acidic 6.01-6.50 slightly acidic 6.51-7.30 Neutral 7.31-7.80 slightly alkaline 7.81-8.50 moderately alkaline 8.51-9.0 strongly alkaline 9.01 very strongly alkaline
2	Salinity Electrical Conductivity (µmhos/cm) (1µmho/cm = 640 ppm)	Upto 1.00 Average 1.01-2.00 harmful to germination 2.01-3.00 harmful to crops (sensitive to salts)
3	Organic Carbon	Upto 0.2: very less 0.21-0.4: less 0.41-0.5 medium, 0.51-0.8: on an average sufficient 0.81-1.00: sufficient >1.0 more than sufficient
4	Nitrogen (Kg/ha)	Upto 50 very less 51-100 less 101-150 good 151-300 Better >300 sufficient
5	Phosphorus (Kg/ha)	Upto 15 very less 16-30 less 31-50 medium, 51-65 on an average sufficient 66-80 sufficient >80 more than sufficient
6	Potash (Kg/ha)	0 -120 very less 120-180 less 181-240 medium 241-300 average 301-360 better >360 more than sufficient

***Source**: Indian Council of Agriculture Research, New Delhi*

3.5 GEOLOGICAL AND HYDROGEOLOGICAL ASPECTS

GEOLOGICAL SETTINGS OF THE STUDY AREA

Geomorphology of the study area says that the Northern part of the lower Son valley is composed of the finer alluvium deposits derived from the river Ganges which is sloping towards North-West, North and North-East directions. All the tributaries of Ganges flow towards north in the central region. In the eastern part of the lower Son valley, the rivers Son and Punpun flow almost parallel which was mainly ravaged by the river Son and hence this portion has many depressions. A deep forest belt is located here, which lies on sandstone plateau of the Kaimur range with good porosity and permeability.

The drainage patterns indicate that porosity of the soil is good with low permeability. Recent studies suggest that the area under study is mostly of fluviatile origin and is formed by the involvement of traction, saltation and suspension processes. However, the presence of inland dunes may also be indicated.

Findings of the Geology of the study area depict that the project site is located in the Vindhyan basin in Central India is an Intra-Cratonic sedimentary basin with sandstone-shale-limestone sequences. It covers a very long period of 1600-400 Ma during Meso-Neo Proterozoic eras and exposed over 1,04,000 sq. km in the states of Bihar, Uttar Pradesh, Madhya Pradesh and Rajasthan having a total thickness of 4000-5000 m. Geology of the Vindhyan Basin is shown in Fig below. The Vindhyan Supergroup of rocks are mainly divided in to Semri, Kaimur, Rewa and Bhander Groups both in the Son valley in the east and Rajasthan in the west on the basis of lithological similarities. The stratigraphy of the Vindhyan Supergroup rocks in the Son valley regions is given in the following **Table3.7**

Table3.6

Stratigraphic Sequence of the Study Area

Series	Stage/ Formation	Lithology
	Kaimur Formation	Sandstone and Shale
	~~~~~~~~~~ Unconformity ~~~~~~~~~~	
	Rohtas Formation	Limestone and Shale
		Glauconitic Sandstone
	Kheinjua Formation	Fawn Limestone
Semri Group (Lower Vindhyan)		Olive Shale
	Porcellanite Formation	Porcellanite
	Basal Formation	Kajrahat Limestone
		Basal Conglomerate
	~~~~~~~~~~ Unconformity ~~~~~~~~~~	
	Bijawar Formation	Phyllite

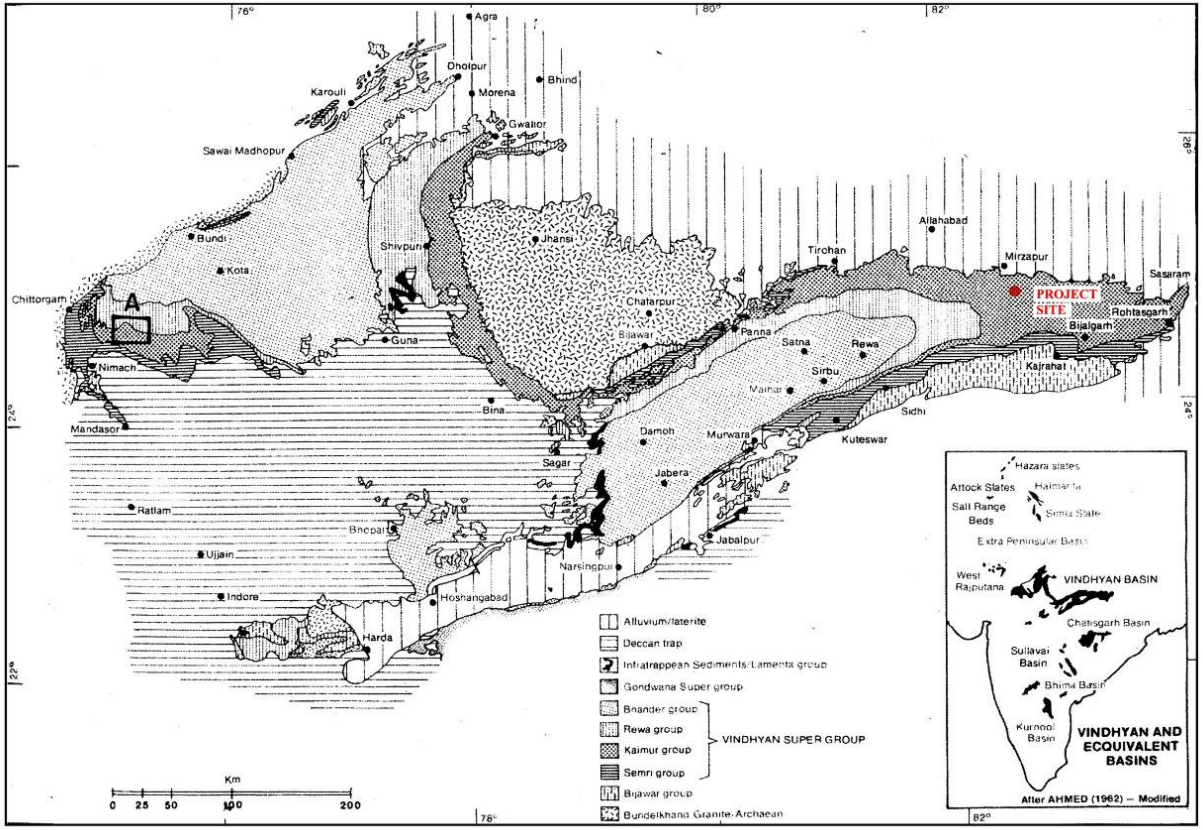


FIGURE 3.4

GEOLOGICAL MAP OF VINDHYAN BASIN AND ITS SURROUNDING AREAS SHOWING LOCATION OF PROJECT SITE

Hydrogeological study of the plant area is being carried out by M/s MINMEC Consultancy Pvt. Ltd., a highly reputed and experienced agency. Also, Rain water harvesting has been envisaged for the project to supplement the water requirement of the plant. The same shall be implemented during execution of the project.

3.5.1 Topography

The proposed power plant will be located at Dadri Khurd in Mirzapur District of Uttar Pradesh. The study area is covered by Survey of India Toposheet No 63K/12 and 63L/9.

The study area form a part of Ganga basin flowing eastward and located about 10 km north of the study area. The area represents hilly and slightly undulating topography with regional slope towards north. The maximum observed land elevation is 241 mRL in Karund RF forest area north of Karaunda village. The lowest recorded land elevation is 100 m in extreme north. The average land slope works out as 7 m/km. Following geomorphic units are present over the study area.

1. Residual hill & table land.
2. Marginal alluvial plain.

The local variation in magnitude and direction of land slope is observed over the central parts of study area. A well defined escarp is present along the northern part of the project area which runs roughly in WNW – ESE direction Local variation in direction depends on orientation of hill range present. The hill range present in the area is northward extension of Kaimur hills.

The study area is drained by the streams named as Kuradari (Khajuri) & Chatar/Belwa Nadi which are 5-8 Km from the site . These nadis maintain perennial flow and overflood their bank some times during rainy season. Finally these stream debouch in river Ganga along the right bank. Formation character and land slope controls the flow direction and morphometric behaviours of the drainage in the area. The drainage pattern of the area is dendrite type. The surface water potential of the area has been partially harvested through Khajuri dam which is located about 5.5 km west of project site.

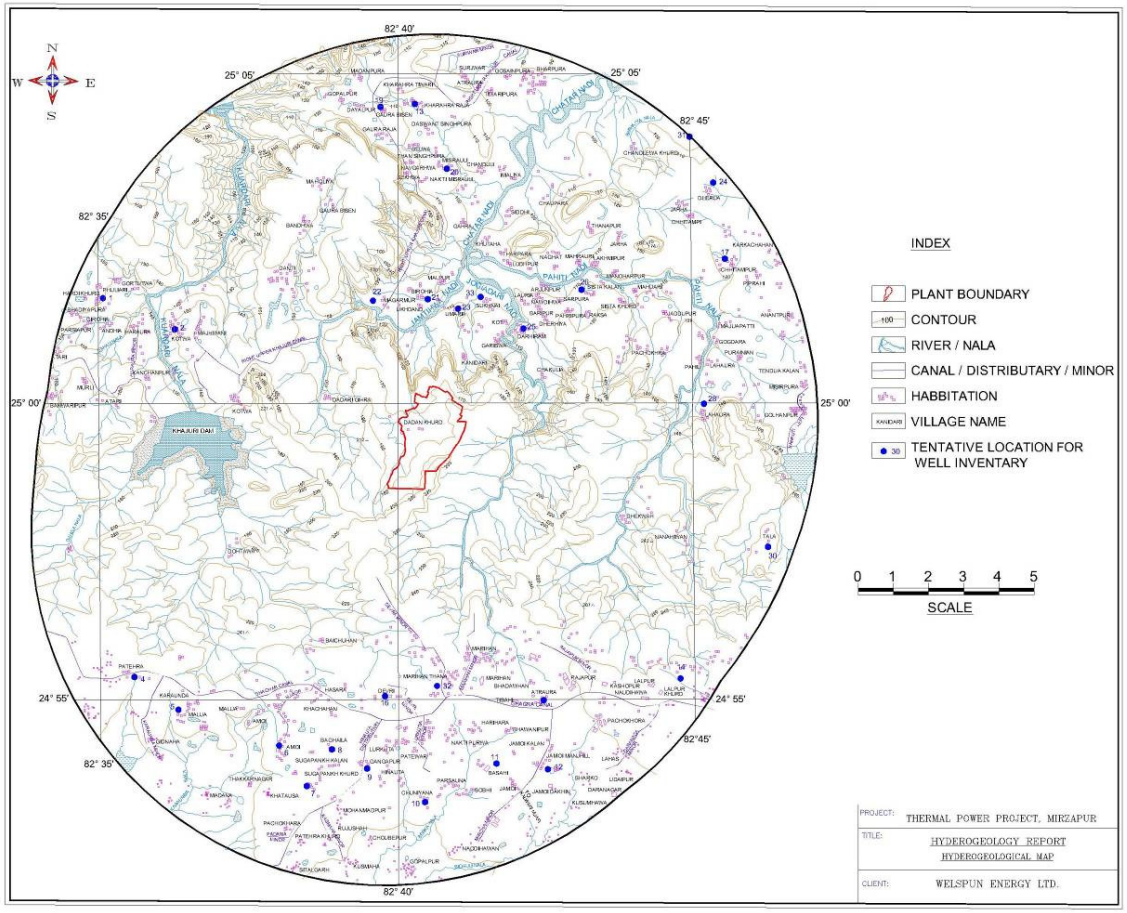


FIGURE 3.5

DRAINAGE MAP OF THE AREA

3.5.2 Geology of the Buffer Zone

The project site is belonging to the Kheinjua formation of Semri group in Lower Vindhayn Supergroup. The lower Vindhyan units are collectively designated the Semri Group. The Semri Group in the Son Valley overlies the Bijawar series of sediments and lavas, which contains volcanic rocks. The Semri Group consists of five formations and is typically alternating shale and limestone carbonate units, with areas of sandstone and volcaniclastic units. The Semri Group is separated from the Upper Vindhyan by a basin wide unconformity between the Rohtas limestone and the overlaying Kaimur Group. The Kaimur consists of a lower shale unit overlain by quartz rich sandstone including a volcaniclastic deposit.

The Semri Group comprises a thick sequence (more than 1000 m) of unmetamorphosed and mildly deformed sandstone, shale, and limestone. Samples generlly consist of quartz, with coarse crystals of orthoclase, albite, microcline and minor amounts of K-feldspar and fine matrix of quartz sericite.

3.5.2.1 Mineralogical Map of the Proposed Site

District lies in the south of Uttar Pradesh , bounded by Sant Ravidas Nagar (Bhadohi) and Varanansi in the North , Chandauli in the East , Allahabad in the west and sonebhadra in the south .Major minerals of the district are Sand, Sand Stone (Building Stone), Red Morrum , Granite (Building Stone). The mineralogical Map of Mirzapur indicates that the project site does not fall in any economic viable zone as per regional GSI map.

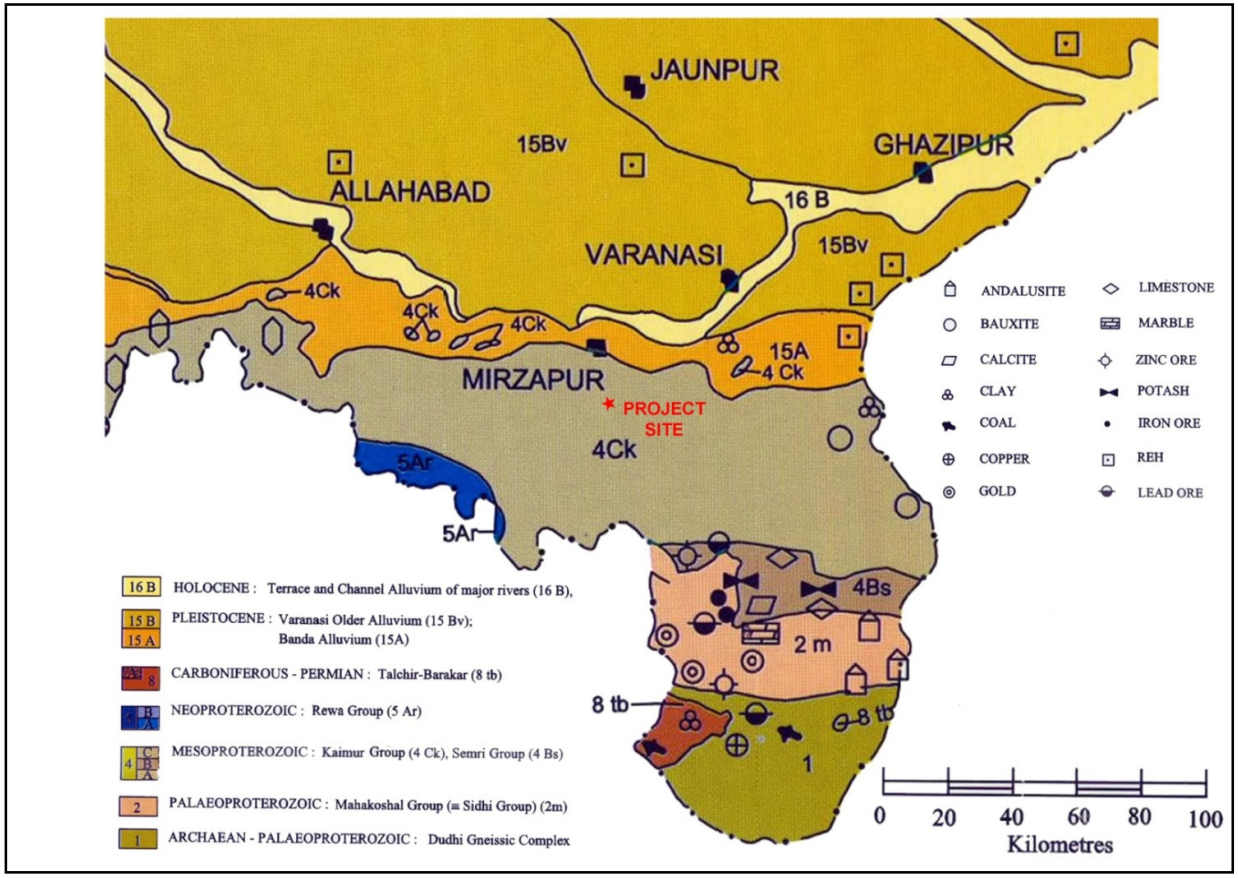


FIGURE 3.6

REGIONAL GEOLOGY AND MINERAL MAP OF DISTRICT MIRZAPUR (MODIFIED AFTER GSI).

3.5.3 Hydrology of Project Site (Core Zone)

The proposed project area drains out the storm water into the main stream Jamathwa. The catchment of the watershed of this streamlet partly passing through project area. The maximum elevation of this watershed is above 220 mRL in the south and lowest elevation towards north is 120 mRL. The average land slope is 27.8 m/km . The volume of probable storm water generation over the year indifferent month has been worked out using rational method.

Q = C x A x P

Where

Q - is runoff (MCM)

C - is constant

A - Area in km^2

P - Rainfall (m)

The value of constant C depends upon nature of terrain, slope, vegetation and characteristic of formation. Based on physical observations the value of C for the watershed is taken as 60%.

3.5.4 Hydrogeology

Hydro-geologically the formation present in the area may be grouped as (A) Unconsolidated formation & (B) Consolidated formation.

(A) Unconsolidated formation

The unconsolidated formation present over the area is Quarternary alluvium which has limited thickness and as such does not form potential aquifer in the area. The alluvium occurs as isolated patches only. The groundwater in these occur in unconfined state with in he primary porosity of the loose sediments. The occurrence & movement of groundwater in these formation is controlled basically by topography.

(B) Consolidated formation

The consolidated formation presenting the area main represented by upper vindhyan group (Dhandraul Quartzite).

Quartzites & Sandstones

These formations cover larger part of the district to the south of the Ganga. These are massive and compact and the ground water occurs along the weak planes. Generally the ground water occurs under unconfined conditions and the depth to water table has large variation metres below ground. The studies have revealed that these formations occasionally forms good aquifer in the district. Their exact potential and geometry is yet to be determined precisely. The presence of confined condition and auto flow conditions has been reported near Vindhyachal & Mirzapur close to river Ganga by C.G.W.B. The piezometre head of the confined water occurring below black shale of Bijaigarh group at Lonhdi Kalan was about 1.5 metres above ground. The well yield was 18 litres/sec. for a megre drawdown of 0.3 metres. Similar artesian condition has been noted in another tubewell at Vindhyachal on the southern bank of the Ganga.

3.5.4.1 Depth to water table

To evaluate the status of groundwater storage over the study area detail field investigation has been carried out. The well inventory data is presented in following table.

HYDROLOGICAL DATA OF WELL INVENTORY FOR MIRZAPUR

Name of village	Location	Well No.	R. L. of Ground Level (mamsl)	Dia (m)	Total Depth (m)	M. P.(m)	Water Level (mbmp)	Water Level (mbgl)
Phuliari	Primary school	1	150 m	5.50	3.70	0.50	1.90	1.40
Kotwa	State homeopathic hospital	2	150 m	3.90	10.30	1.40	3.90	2.50
Bindam Fall	Before Bindam Fall entry gate(LHS) on Kotwa to Bindam road	3	140 m	4.60	7.20	0.60	4.75	4.15
Patehra	Primary school	4	245 m	3.50	7.30	0.60	3.20	2.60
Malua	Infront of house of Mr. Gati	5	245 m	4.00	7.00	1.40	3.40	2.00
Amoi	Infront of house of Mr. Hiksha	6	246 m	3.50	7.10	0.30	3.40	3.10
Sugapankh Khurd	Primary school	7	248 m	2.20	6.30	0.50	3.50	3.00
Baghaila	Infront of house of Mr. Bachan Singh	8	255 m	2.40	5.10	0.90	4.00	3.10
Gangapur	Infront of house of Mr. Lalta Singh	9	260 m	2.0	13.00	0.20	11.00	10.80
Basahi	RHS on Marihan-Jamui Rd after more	11	250 m	2.2	9.30	0.40	2.80	2.40
Jamoi Kalan	RHS in begining of village	12	250 m	2.5	8.85	1.00	1.95	0.95

Nakti Misrauli	LHS on Birohia road before village	20	103 m	2.40	9.10	0.20	2.65	2.45
Birohia	In middle of village Infront of house of Mr. Vishram Pal Birohia	21	113 m	3.30	15.40	0.20	2.35	2.15
Magarmor	Infront of house of Mr. Jaganath	22	117 m	2.00	4.85	0.20	3.80	3.60
Umaria	In mango garden on LHS on main road	23	110 m	2.10	13.75	0.60	11.00	10.40
Kharahra Tiwari	Before entering the village in open land	13	108 m	3.40	4.10	gl	0.50	0.50
Lalpur Khurd	Opposite Mandir	14	270 m	1.60	9.30	0.40	3.85	3.45
Tisahi	LHS entry to the village	15	255 m	1.70	14.00	0.20	6.20	6.00
Devri	Opposite Sarsawati Niwas	16	250 m	2.20	11.50	0.40	2.70	2.30
Chhitampur	After village in agricultural land	17	122 m	3.70	7.20	0.10	4.30	4.20
Khajuri	Near Sakti Peeth at turning point to Lower Khajuri Bandh	18		1.10	10.20	0.30	8.30	8.00
Gaura Bisen	Just before entring to village in agricultural land	19	110 m	2.30	7.40	0.20	1.30	1.10
Dherua	In the village public well	24	123 m	2.80	10.40	0.80	6.30	5.50
Darhiram	Infront of mandir near peepal tree	25	112 m	2.00	5.75	1.00	2.50	1.50
Sista kalan	After crossing the village RHS on road leading to Misipura	26	112 m	2.10	7.50	0.10	0.80	0.70
Pachpokhra	Middle school	27	127 m	2.10	8.90	0.60	2.10	1.50
Lahaura	LHS on Lauhra-Misirpura road	28	130 m	4.10	11.50	0.80	5.50	4.70
Misirpura	RHS on road leading to Dagmagpur in open land	29	135 m	4.80	14.80	0.90	2.80	1.90
Talar	Mauli Devi High School	30	205 m	3.20	25.50	0.30	21.10	20.80
Lalpokhora	In open field before entry of village	31	100 m	2.30	11.50	0.50	6.40	5.90
Marihan	Opposite Kamla Niwas	32	250 m	4.10	13.00	1.10	9.30	8.20
Sukhnai	Infront of house of Mr. Shyamapati Tiwari	33	110 m	2.00	13.50	0.30	8.05	7.75
Average								**4.33**

From the above table it is evident that the depth to water table over the study area has a large variation ranging between 0.5 to 21.1m below the ground during August.

Following salient points features concerning status of water table emerges:

- Over the larger parts of the study area the depth of water level is more than 5 m below ground.
- The depth to water table over the proposed plant & surrounding is observed over 5 m below ground.
- The geomorphology of the area has a strong bearing on the depth to water table.

- Based on well inventory data it is evident that no possibility of drying of aquifer exists. But the well yield is moderate to low with high drawdown.
- No degenerated water bodies are present within 3.0 km radius during primary survey.

3.5.4.2 Ground water flow regime

It is observed that the groundwater flow direction on regional scale is towards north and NE, that is toward river Ganga. The configuration of water table elevation contours clearly suggest that topography of the area has got a strong bearing on ground water flow regime. Flatter water table slope is observed in plain while steeper where land slope in steep. The ground water flow regime is highly variable over the study area. The

ground water flow over the northern portion of the study area is towards NW while over southern sector the groundwater flows towards north. The water table slope over the study area is highly variable. The average water table elevation over the project site and surrounding is 130 mRL and regional slope of the water table varies between 4.2 m/km to 20 m/km.

3.5.4.3 Water table fluctuation

To evaluate the seasonal change in ground water storage on account of recharge/groundwater use the historical water level data of Marihan, which falls in the study area has been collected from Central Ground Water Board. The review of the data and the corresponding trend it is observed that there is a gradual rise in post-monsoon water table over the area and surrounding and gradual decline in pre-monsoon water level.

3.6 METEOROLOGY

The meteorological data recorded during the study period is very useful for proper interpretation of the baseline information as well as for input prediction models for air quality dispersion. Historical data on meteorological parameters will also play an important role in identifying the general meteorological regime of the region. The year may broadly be divided into four seasons:

- Winter season : December to February
- Pre-monsoon season : March to May

- Monsoon season : June to September
- Post-monsoon season : October to November

Since meteorological factors show wide fluctuations with time, meaningful interpretation can be drawn only from long-term reliable data. Such source of data is the Indian Meteorological Department (IMD), which maintains a network of meteorological stations at several important locations. The nearest IMD station to the study area is located at Varanasi, U.P. The Meteorological parameters obtained for Summer Season, 2011 from this station is temperature, humidity, rainfall, wind speed, and wind direction, recorded at two synoptic hours i.e. 8:30 and 17:30 hours.

3.6.1 Meteorological Data Generated at Site

The Meteorological parameters obtained for Summer Season, 2011 from this station located at project site, is temperature, humidity, rainfall, wind speed, and wind direction, recorded hourly for the entire study periodThe meteorological data summary ius given below:

Table No. 3.7

Micro-Meteorology at Site

Month	Temperature (°C)		Relative Humidity (%)		WIND SPEED (m/s)	
	Min.	Max.	At 8:30	At 17:30	At 8:30	At 17:30
March-2011	11.6	36.2	32-50	18-26	0.8-2.3	1.0-2.9
April-2011	17.0	38.5	42-62	16.36	1.5-3.1	1.6-3.1
May-2011	20.7	39.0	32-59	17-48	1.6-3.2	1.2-3.6
June-2011	27.0	42.0	47-54	43-47	1.9-3.5	2.1- 3.5

Source: Meteorological Station at Site

1. **Temperature**

   During the study period it was observed that the temperature ranged from 11.6°C in March month to 42.0°C in May Month. The maximum and minimum values of temperatures are presented in **Table-3.7**.

2. **Relative Humidity**

During the period of observation the relative humidity recorded at 8:30 hrs ranged from 32% to 62% and at 17:30 hrs ranged from 16 % to 48%. The maximum and minimum values of temperatures are presented in **Table-3.7**

3. Wind Speed/Direction

The predominant winds along with wind speeds during the study period are represented as windrose (**Figure-3.7**) and are discussed below. A review of the wind rose diagram shows that predominant winds are from W direction which constitutes 15 % of the total time. Calm recorded - 40.83% times.

4. Rainfall

Rainfall was measured using Rain Gauge envirotech model during the study period. The rainfall found during the study period was 0 mm.

The above mentioned climatological data was collected during study period of summer season. The study was started from 15th of March 2011and completed at first week of the June, 2011.

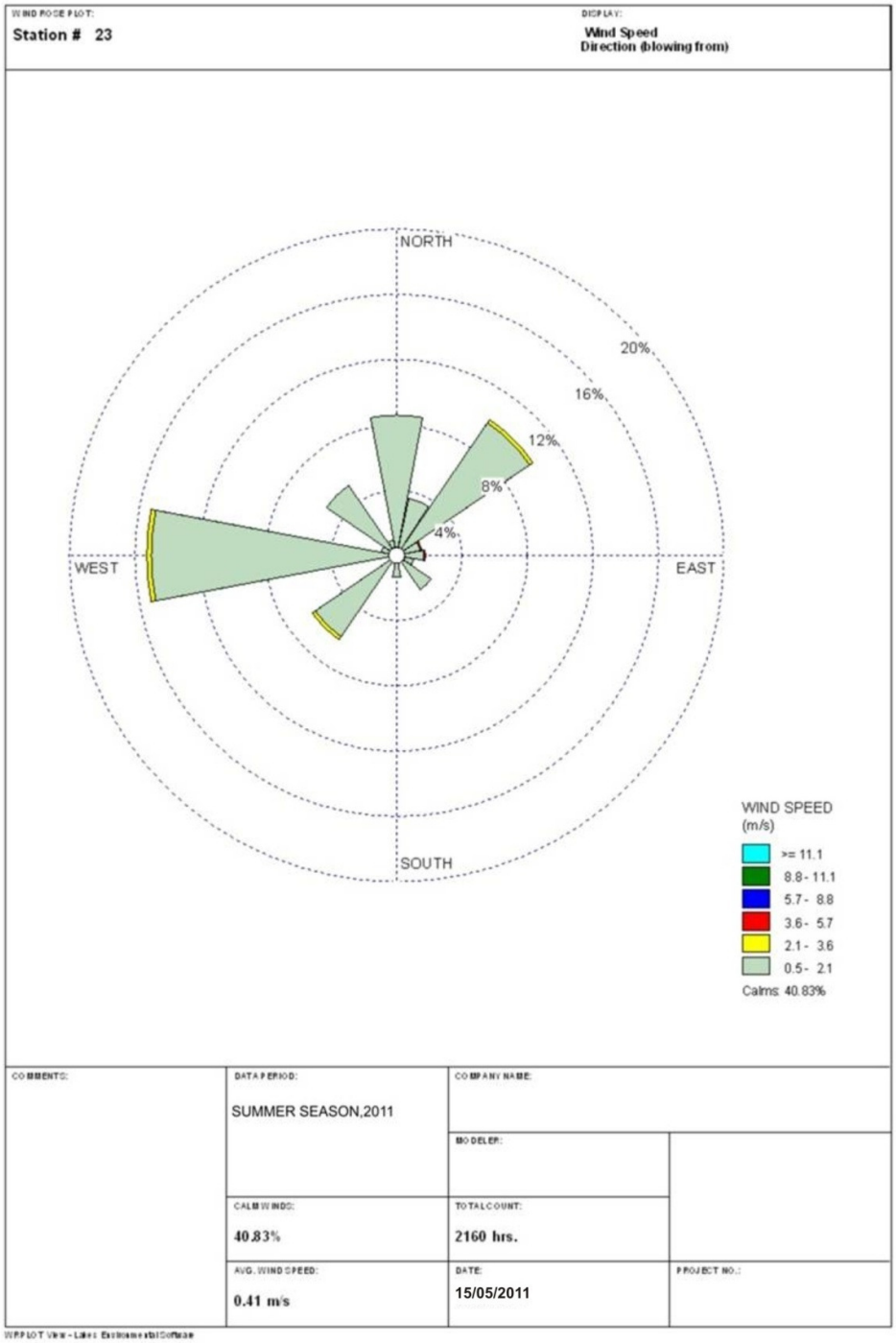


FIGURE-3.7
SITE SPECIFIC WINDROSE – SUMMER SEASON

3.6.2 Secondary Data Collected from IMD- Varanasi

Secondary data from IMD- Varanasi has been collected for atmospheric pressure, temperature, relative humidity, rainfall, wind speed and direction. The data at IMD is usually monitored daily. The IMD staion at Varanasi (Station code VAR) is about 45 km from the project site in the NE direction. The seasonal wind rose are enclosed as ***Annexure- 6***

The climate that the region of Mirzapur experiences is sub tropical, and the basic seasons are those of summer, winter and monsoon. The summer season in Mirzapur is very dry, and temperatures escalate during this time. Winters in Mirzapur are very dry and very cold. The monsoon season in Mirzapur brings along heavy rainfall.

Summers of Mirzapur are during the months of March, April, May and June. These four months will experience a maximum temperature of around forty two degrees (42°C) and a minimum temperature of around twenty two degrees (22°C).

Winters of Mirzapur are during the months of October, November, December, January and February. These months will experience a maximum temperature of around twenty seven degrees (27°C) and a minimum temperature of around seven degrees (7°C).

The months of July, August, and September are the monsoon months in Mirzapur. The temperatures during this time come down by a significant level and rainfall during this time is quite heavy.

The monthly maximum, minimum and average values are collected for all the parameters.

Mean Minimum Temperature: 12.1°C

Mean Maximum Temperature: 37.6°C

Relative Humidity: At 8:30 hrs: 31 % to 61% and at 17:30 hrs: 14 % to 48 %

Rainfall

The average annual rainfall of the area recorded in last five years is 1043 mm in Mirzapur district. The recorded rainfall during last five years has been 45, 26,

36, 67 and 49% to the normal average rainfall. Thus the situation is alarming. The monsoon generally sets in during the first week of June. The rainfall gradually decreases after August. The maximum numbers of rainy days are observed in the month of July.

The meteorological data recorded at the site has been compared with the data recorded by IMD Varanasi station and found that the data generated at the Proposed Project site is broadly compatible with the regional meteorology recorded by IMD station, Varanasi.

3.6.3 Mixing Height & Inversion Height

Mixing height is as given below, & Inversion height has been taken as 450 m in the night. There is a seasonal variation of mixing height. During summer daylight hours, maximum mixing depth (MMD) can be a few thousand meters, where it can be a few hundred meters in winter. It also varies during the course of a day. It is lowest at night and increases as the day progresses. With a measure of both MMD and wind speed with respect to height, we get a good idea of the amount of pollutant dispersion.

The mixing height shows increasing trend during the day with the increase of surface air temperature, achieving maxima around the time of maximum surface temperature and later in the afternoon over rural / open areas in fair weather situation. However, it is more likely to remain persistent to heights of roughly a hundred meters or so over urban areas owing to slower cooling than rural / open areas.

Table No. – 3.8
MIXING HEIGHT FOR THE PROJECT SITE
STUDY PERIOD (Summer Season, 2011)

Time (Hours)	Mixing Height (m)
700	50
800	125
900	320
1000	500
1100	750
1200	975

1300	1050
1400	1100
1500	1280
1600	1010
1700	830
1800	590
1900	380

Source: *CPCB publication, "Spatial Distribution Of Hourly Mixing Depth Over Indian Region", PROBES/88/2002-03*

3.7 AMBIENT AIR QUALITY

The ambient air quality with respect to the study zone of 10 km radius around the project site forms the baseline information. The prime objective of the baseline air quality study was to assess the existing air quality of the area. This will also be useful for assessing the conformity to standards of the ambient air quality during the operation of the proposed expansion of the plant. The study area represents mostly rural environment.

This section describes the selection of sampling locations, methodology adopted for sampling, analytical techniques and frequency of sampling. The detail table of the Ambient Air Quality carried out for pre monsoon season, during Summer Season, 2011 is enclosed as ***Annexure 4.***

3.7.1 Methodology adopted for Air Quality Survey

3.7.1.1 Selection of Sampling Locations

The baseline status of the ambient air quality has been assessed through a scientifically designed ambient air quality-monitoring network. The design of monitoring network in the air quality surveillance program has been based on the following considerations:

- Meteorological conditions on synoptic scale;
- Topography of the study area;
- Representatives of regional background air quality for obtaining baseline status;
- Representatives of likely impact areas.

Ambient Air Quality Monitoring (AAQM) stations were set up at eleven (11) locations with due consideration to the above mentioned points. **Table-3.9** gives the details of environmental setting around each monitoring station and their distances with reference to the project site.

TABLE-3.9

DETAILS OF AMBIENT AIR QUALITY MONITORING LOCATIONS

S. No.	Sampling Locations	Direction from the project boundary	Aerial Distance (Km) from the project boundary
1.	Project Site	--	--
2.	Village Shikathi	SW	5.0
3.	Village Rajapur	SE	8.0
4.	Village Dekhwah	ESE	5.5
5.	Village Madihan	SE	6.0
6.	Village Dadiram	NE	2.5
7.	Village Vindampal	NW	5.0
8.	Village Kotwa Pandey	NW	5.5
9.	Village Dadri Gahira	W	1.8
10.	Village Chakulia	E	2.3
11.	Near by Danti RF	N	1.5

3.7.1.2 Frequency and Parameters for Sampling

Ambient air quality monitoring has been carried out with a frequency of 2 days per week at eleven locations. The baseline data of air environment is generated for the following parameters:

- Particulate Matter less than 10 µg (PM_{10});
- Particulate Matter less than 2.5 µg ($PM_{2.5}$);
- Sulphur dioxide (SO_2);
- Oxides of Nitrogen (NO_x);
- PAH;
- Ozone (O_3); and
- Mercury (Hg)

The air samples are analyzed as per standard methods specified by Central Pollution Control Board (CPCB), IS: 5182.

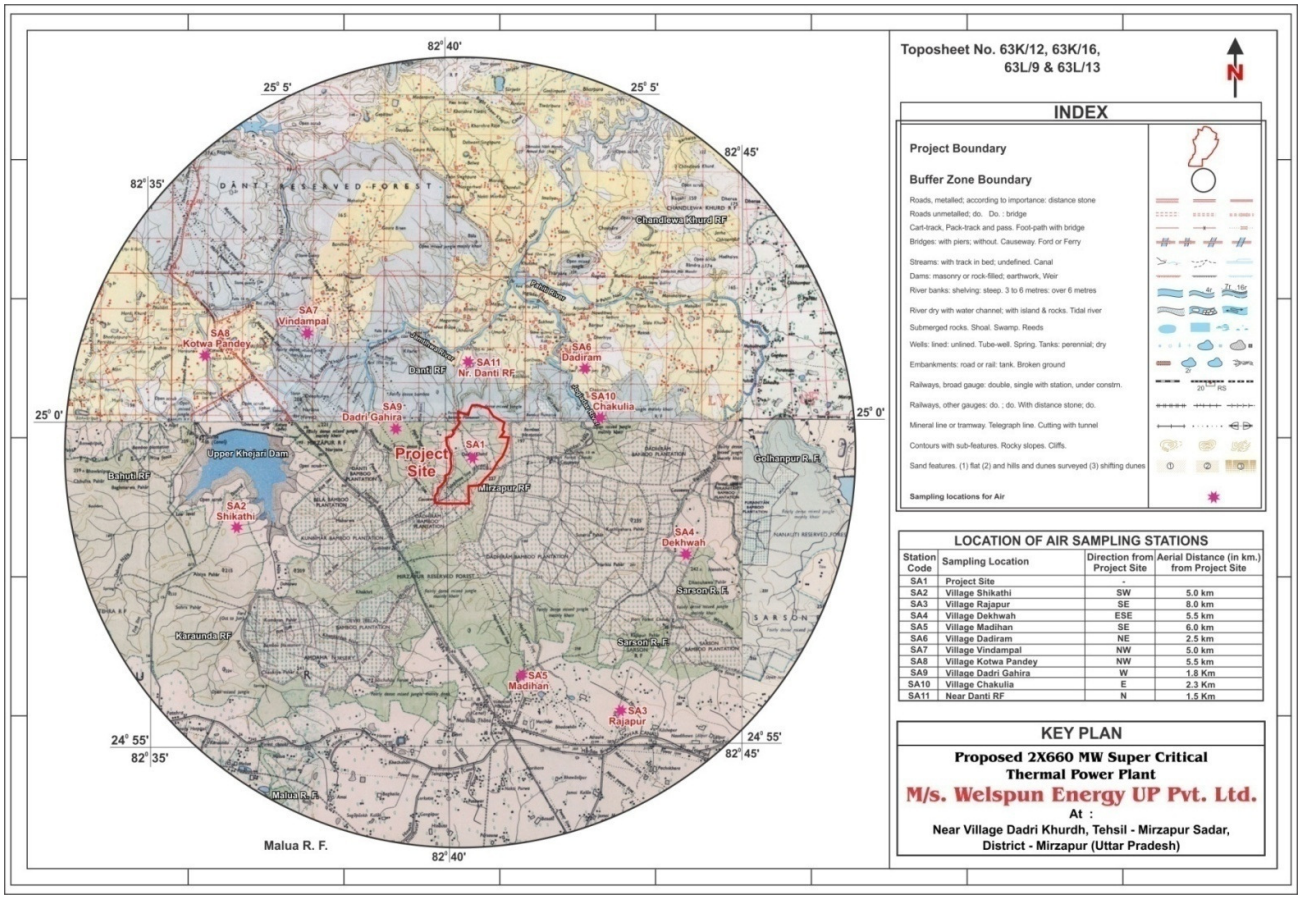


FIGURE-3.8

AMBIENT AIR QUALITY SAMPLING LOCATIONS

3.7.2 Presentation of Primary Data

Various statistical parameters like 98th percentile, average, maximum and minimum values have been computed from the observed raw data for all the AAQ monitoring stations. The summary of these results for all the locations is presented in **Table-3.10** These are compared with the standards prescribed by Central Pollution Control Board (CPCB) for Industrial Residential, Rural and Other Areas.

3.7.2.1 Observations based on Primary Data

The minimum and maximum concentrations of PM_{10} were recorded as 45.10 µg/m^3 and 71.35 µg/m^{3}respectively. The maximum concentration was recorded at village Madihan (SA5) and the minimum concentration was recorded at near Danti RF (SA11).

The minimum and maximum concentrations for $PM_{2.5}$ were recorded as 13.22 µg/m^3 and 28.15 µg/m^3 respectively. The maximum concentration was recorded at Dadiram village and the minimum concentration was recorded at near Danti RF.

The minimum and maximum SO_2 concentrations were recorded as 5.78 µg/m^3 and 9.65 µg/m^3 respectively. The maximum concentration was recorded at Madihan village and the minimum concentration was recorded at Vindampal village. The minimum concentration of 12.67 µg/m^3 for NOx was recorded at near Danti RF and maximum of 21.39 µg/m^3 observed at Dadiram village. The minimum and maximum concentration of Ozone values ranged between 2.00 µg/m^3 to 4.90 µg/m^3. The values for Hg were observed below 0.50 µg/m^3 at all the sampling locations.

The concentrations of $PM_{2.5}$, PM_{10}, SO_2, NO_X, Hg and O_3 are observed to be well within the standards prescribed by Central Pollution Control Board (CPCB).

TABLE-3.10

SUMMARY OF AMBIENT AIR QUALITY RESULTS- SUMMER SEASON 2011

(Unit in µg/m^3)

Station	Sampling Location	PM10			PM2.5			SO2			NO2			PAH	Hg	O3
		Max.	Min.	98%	Max	Min	98%	Max	Min	98%	Max.	Min	98%			
SA1	Project Site	59.73	46.60	59.64	23.60	14.50	23.60	9.12	7.60	9.12	18.60	13.21	18.60	BDL	<0.50	2.62
SA2	Village shikathi	65.81	52.10	65.81	24.63	15.00	24.63	8.28	7.56	8.28	19.55	13.67	19.53	BDL	<0.50	4.25
SA3	Village Rajapur	69.52	55.10	69.52	27.13	16.50	27.13	9.52	8.12	9.52	20.00	14.80	20.00	BDL	<0.50	3.11
SA4	Village Dekhwah	64.75	53.20	64.75	24.75	14.60	24.75	8.9	7.34	8.9	18.42	13.32	18.42	BDL	<0.50	3.60
SA5	Village Madihan	71.35	58.40	71.35	28.15	18.00	28.14	9.65	8.10	9.63	21.06	15.60	21.06	BDL	<0.50	4.74
SA6	Village Dadiram	69.48	56.40	69.48	26.62	17.50	26.62	9.20	8.00	9.20	21.39	15.20	21.39	BDL	<0.50	2.62
SA7	Village Vindampal	63.53	48.70	63.53	22.61	15.00	22.61	8.32	5.78	8.31	17.72	12.80	17.70	BDL	<0.50	2.94
SA8	Village Kotwa Pandey	66.36	54.20	66.36	25.59	16.50	25.59	8.34	6.45	6.45	19.61	14.20	19.61	BDL	<0.50	4.90
SA9	Village Dadri Gahira	66.10	56.20	66.10	26.20	18.00	25.89	8.80	7.20	8.78	18.40	14.60	18.31	BDL	<0.50	3.50
SA10	Village Chakulia	70.30	56.10	69.80	27.10	17.70	26.83	8.90	8.00	8.84	20.66	14.90	20.35	BDL	<0.50	2.10
SA11	Near by Danti RF	57.22	45.10	56.79	22.12	13.22	22.01	8.10	7.00	8.07	17.56	12.56	17.33	BDL	<0.50	2.00
STANDARD		**NAAQS for Industrial, Residential and Other Rural Areas**														

***Source**: Ambient Air Quality Monitoring Results*

TABLE No. : 3.11

NATIONAL AMBIENT AIR QUALITY STANDARDS (Revised)

Pollutant	Time Weighted Average	Concentration in Ambient Air		Method of Measurement
		Industrial, Residential Rural & Other Areas	Ecologically Sensitive Area	
Sulphur Dioxide (SO_2), µg/m^3	Annual* 24 hours **	50 80	20 80	-Improved West and Gaeke method. -Ultraviolet fluorescence.
Oxides of Nitrogen as NO_2, µg/m^3	Annual* 24 hours **	40 80	30 80	-Jacob & Hochheiser (Na-Arsenite). -Chemiluminescence
Particulate Matter (Size less than 10 µm)or PM_{10} µg/m^3	Annual* 24 hours **	60 100	60 100	-Gravimetric -TOEM -Beta attenuation
Particulate Matter (Size less than 2.5 µm)or $PM_{2.5}$ µg/m^3	Annual* 24 hours **	40 60	40 60	-Gravimetric -TOEM -Beta attenuation
Ozone (O_3), µg/m^3	8 hours** 1 hour**	100 180	100 180	- UV photometric - Chemiluminescence - Chemical Method

Lead (Pb), µg/m^3	Annual* 24 hours **	0.50 1.0	0.50 1.0	- AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper. - ED-XRF using Teflon filter
Carbon Monoxide (CO), mg/m^3	8 Hours** 1 Hours	02 04	02 04	-Non Depressive Infrared Spectroscopy (NDIR)

Source: *NAAQS*

* *Annual Arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform intervals.*

** *24 hourly or 8 hourly or 01 hourly monitored values, as applicable, should be complied with 98% of the time in a year. However 2% of the time, it may exceed but not on two consecutive days of monitoring.*

3.8 WATER QUALITY

Selected water quality parameters of ground water and surface water resources within 10 km radius of the study area has been studied for assessing the water environment and evaluate anticipated impact of the proposed project. Understanding the water quality is essential in preparation of Environmental Impact Assessment and to identify critical issues with a view to suggest appropriate mitigation measures for implementation.

The purpose of this study is to:

- Assess the water quality characteristics for critical parameters;
- Evaluate the impacts on agricultural productivity, habitat conditions, recreational resources and aesthetics in the vicinity; and
- Prediction of impact on water quality by this project and related activities.

3.8.1 Methodology

Reconnaissance survey was undertaken and monitoring locations were finalized based on:

- Drainage pattern;
- Location of residential areas representing different activities/likely impact areas; and
- Likely areas, which can represent baseline conditions.

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 ground water. The samples were collected and analyzed as per the procedures specified in 'Standard Methods for the Examination of Water and wastewater' published by American Public Health Association (APHA).

3.8.2 Water Sampling Locations

Water samples were collected from 14 sampling locations – 5 Surface water sample and 9 Ground water Samples. The grab samples were analyzed for various parameters to compare with the standards for drinking water as per IS: 10500. The water sampling locations are listed below in **Table-3.12** and **Table-3.14.** Sampling location for Ground water & Surface Water in **Figure no. 3.10 & 3.11** respectively.

3.8.3 Presentation of Results

3.8.3.1 Ground Water Quality

Most of the villages in the study area have borewell facilities, and the residents of these villages make use of this water for drinking and other domestic uses. Therefore, borewell samples have been considered for sampling. The list of ground water sampling locations is depicted in **Table-3.12.** In total 9 ground water samples collected from different sources around the projects area within the 10 km radius. The summary of the results of the water quality monitored during study period representing pre monsoon season are given in **Table-3.13** and are compared with standards for drinking water as per IS:10500-1983 "Specifications for Drinking Water".

As seen from the **Table-3.13** the pH varies from 7.14 to 7.84. Calcium and Magnesium content varies between 21.05 to 64.77 mg/l and 5.89 to 23.02 mg/l respectively. Total hardness and alkalinity expressed as $CaCO_3$ ranges between 76.76 to 218.16 mg/l and 66.33 to 402.52 mg/l respectively. Chlorides and Sulphates are found to be in the range of 13.31mg/l to 81.77 mg/l and 3.80 mg/l 19.79 mg/l respectively. Nitrates and Fluorides are found to be in the range of 2.33 mg/l to 4.26 mg/l and 0.23 mg/l to 0.69 mg/l respectively. The heavy metal contents are found to be well within the limit.The physico-chemical and biological analysis revealed that all the parameters are well within the prescribed limits of IS: 10500.

TABLE-3.12

DETAILS OF GROUND WATER SAMPLING LOCATIONS

S. No.	Location	Direction from the project boundary	Distance (km) from the project boundary (approx.)
GW1	Project Site	--	--
GW2	Project Site Near Ash Pond	--	--
GW3	Village Shikathi	SW	5.0
GW4	Village Rajapur	SE	8.0
GW5	Village Dekhwah	ESE	5.5
GW6	Village Madihan	SE	6.0
GW7	Village Dadiram	NE	2.5
GW8	Village Vindampal	NW	5.0
GW9	Village Kotwa Pandey	NW	5.5

Source: Toposheet & Field Visit

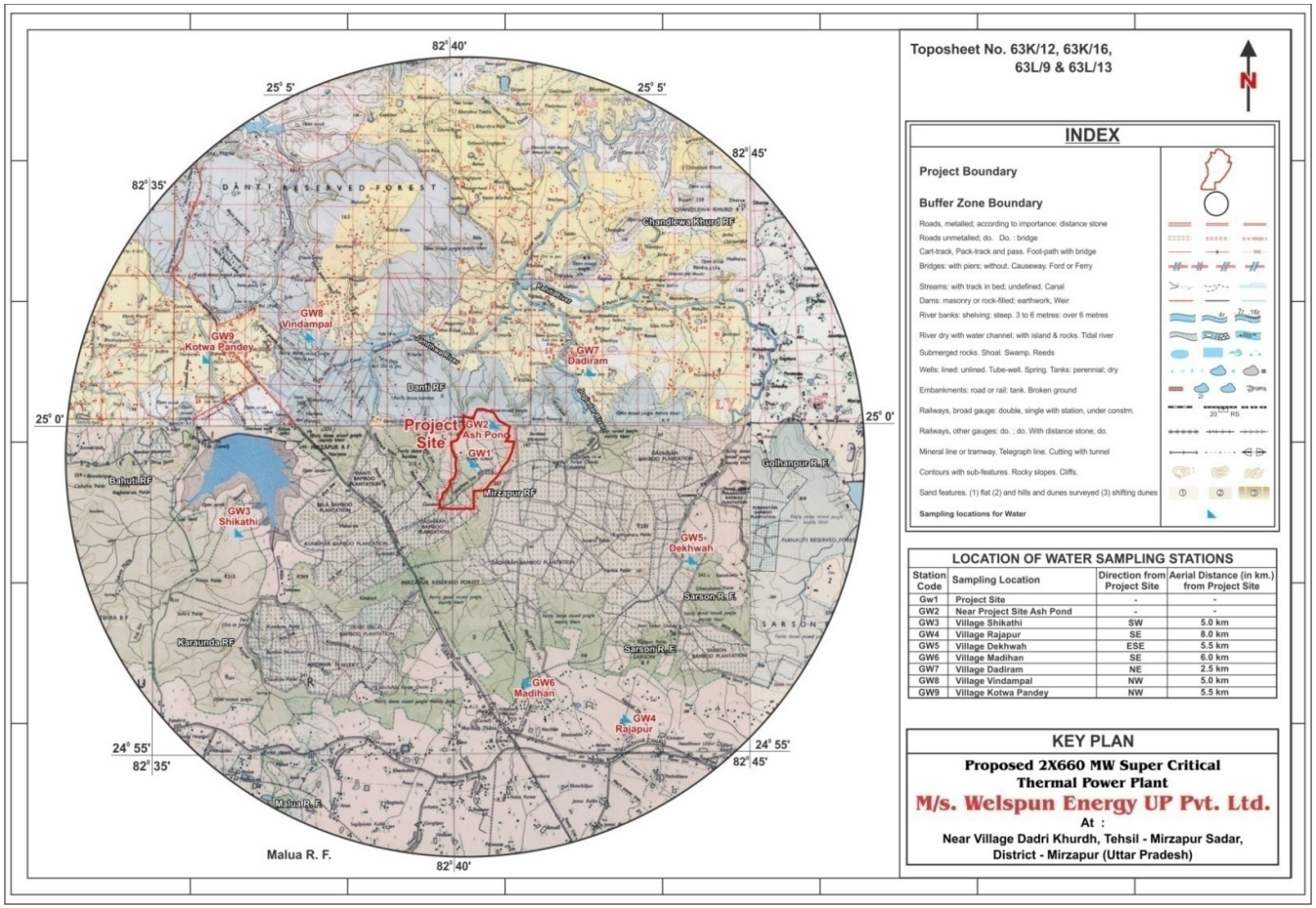


FIGURE-3.9

GROUND WATER SAMPLING LOCATIONS

TABLE-3.13

GROUND WATER QUALITY – SUMMER SEASON

S. No.	Parameters	Project Site	Project Site Near Ash Pond	Village Shikathi	Village Rajapur	Village Dekhwah	Village Madihan	Village Dadiram	Village Vindampal	Village Kotwa Pandey	Standards as per IS: 10500 (Desirable)
1.	pH (at 25^0C)	7.70	7.14	7.49	7.67	7.63	7.61	7.84	7.52	7.78	6.5-8.5
2.	Colour (Hazen Unit)	<5	<5	<5	<5	<5	<5	<5	<5	<5	5
3.	Turbidity (NTU)	<1	<1	<1	<1	<1	<1	<1	<1	<1	5
4.	Odour	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjecti-onable
5.	Taste	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
6.	Total Hardness as $CaCO_3$ (mg/1)	208.08	126.00	189.88	169.68	109.08	76.76	210.08	145.44	218.16	300
7.	Calcium as Ca (mg/1)	44.96	31.26	64.77	55.05	27.53	21.05	46.96	35.62	61.53	75
8.	Alkalinity as $CaCO_3$, (mg/1)	238.30	124.80	202.60	154.09	235.25	66.33	402.52	195.29	73.75	200
9.	Chloride as Cl (mg/1)	80.77	16.97	15.21	13.31	34.23	13.31	81.77	38.03	15.21	250
10.	Residual free Chlorine (mg/1)	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2
11.	Cyanide as CN (mg/1)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05
12.	Magnesium as Mg (mg/1)	23.02	11.67	6.87	7.86	9.82	5.89	22.58	13.75	15.71	30
13.	Total Dissolved solids (mg/1)	342.00	166.00	324.00	288.00	321.00	169.00	517.00	327.00	241.00	500
14.	Sulphate as SO_4 (mg/1)	17.79	3.80	17.01	18.06	11.11	15.97	19.79	16.32	8.51	200
15.	Fluoride as F (mg/l)	0.50	0.29	0.35	0.23	0.24	0.24	0.69	0.47	0.31	1.0
16.	Nitrate as NO_3 (mg/l)	4.03	0.74	3.61	4.26	3.23	2.37	4.23	4.05	2.33	45
17.	Iron as Fe (mg/l)	0.05	0.24	0.09	0.03	0.05	0.10	0.06	0.04	0.14	0.3
18.	Aluminium as Al (mg/l)	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.03

19.	Boron (mg/l)	0.60	<0.50	0.68	0.52	0.52	0.84	0.82	<0.50	0.82	1
20.	Phenolic Compounds (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
21.	Anionic Detergents as MBAS (mg/l)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02
22.	Hexa Chromium as Cr+6 (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
23.	Zinc as Zn (mg/l)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	5
24.	Chromium as Cr (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
25.	Copper as Cu (mg/l)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05
26.	Manganese as Mn (mg/l)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.1
27.	Cadmium as Cd (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
28.	Lead as Pb (mg/l)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
29.	Selenium as Se (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
30.	Arsenic as As (mg/l)	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
31.	Mercury as Hg (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
32.	Total Coliform (MPN/100 ml)	<2	<2.00	<2	<2	<2	<2	<2	<2	<2	-
33.	E-Coli	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	-

***Source**: Ground Water Quality Monitoring results*

3.8.3.2 Surface Water Quality

Five surface water sample has been collected around the projects area within the periphery of 10 km. The list of surface water sampling locations is depicted in **Table-3.14.** The results for the parameters analyzed for surface water samples are presented in **Table–3**.15

As seen from the **Table-3.15** the pH ranges between 7.25 to 7.82. The COD was found between 11.20 mg/l to 19.92 mg/l. BOD was found between 3.60 mg/l to 7.50 mg/l. Total dissolved solids ranges between 122.00 mg/l to 209.00 mg/l.

Sulphates and Nitrates were observed between 1.87 mg/l to 19.44 mg/l and 0.68 mg/l to 1.73 mg/l. The heavy metal contents are found to be well within the limit. Total coliforms was found to be <2 MPN/100 ml. The physico-chemical and biological analysis revealed that all the parameters are well within the prescribed limits. The surface water meets suface water quality norms notified by IS: 10500 & CPCB.

TABLE-3.14

DETAILS OF SURFACE WATER SAMPLING LOCATIONS

S. No.	Location	Direction from the project boundary	Distance (km) from the project boundary
SW1	Upper Khajuri Dam	W	4.0
SW2	Jamitihwa nadi	N	1.3
SW3	Confluence Point	N	4.0
SW4	60 M. US Jogidari Nallah	E	1.0
SW5	60 M. DS Jogidari Nallah	SE	1.0

Source: Toposheet & Field Visit

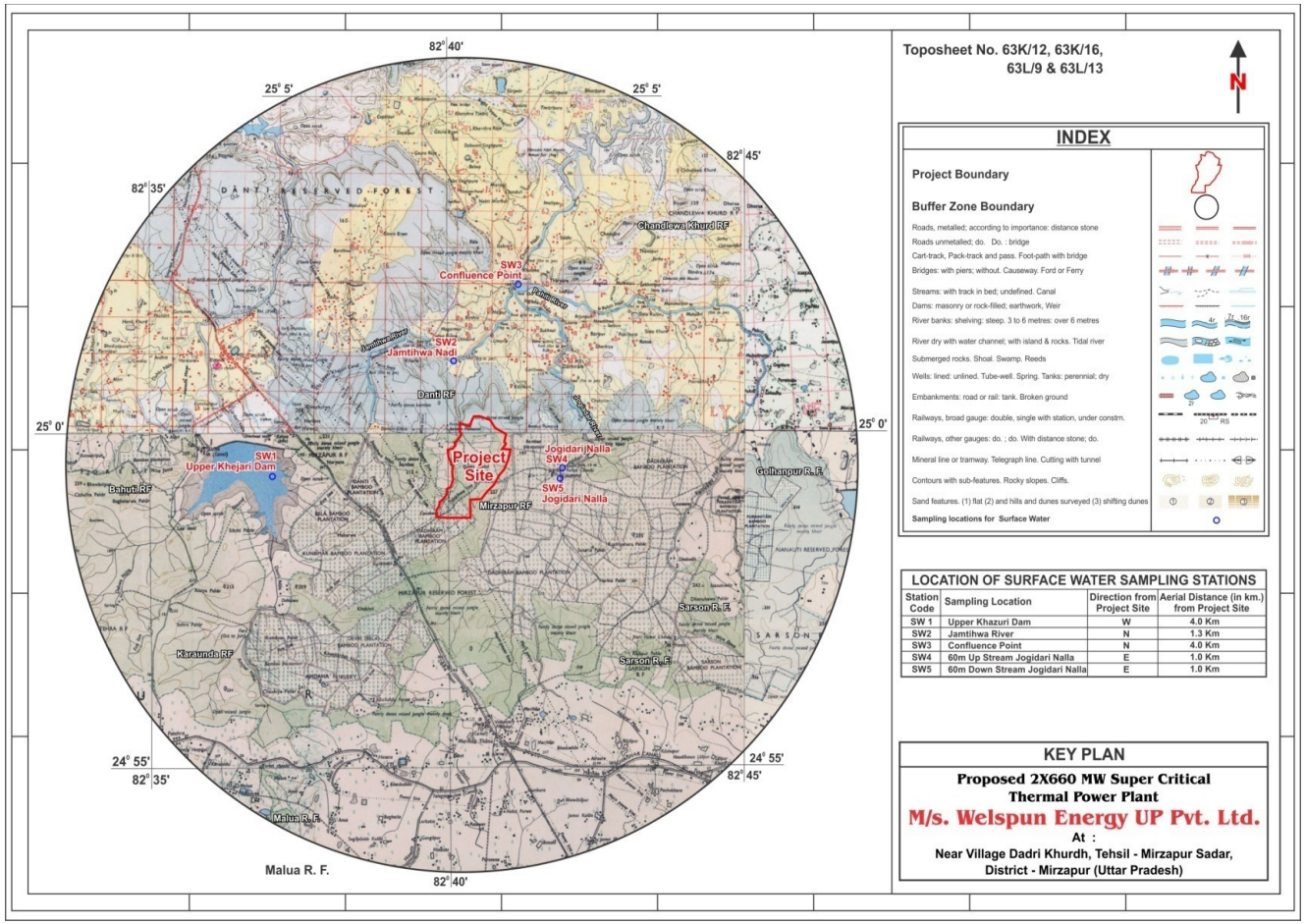


FIGURE-3.10

SURFACE WATER SAMPLING LOCATIONS

TABLE-3.15
SURFACE WATER QUALITY (SUMMER SEASON-2011)

S. No.	Parameters	Upper Khajuri Dam	Jamitihwa River	Confluence Point	Jogidari Nallah		Drinking water Standard (Limits of IS:10500-1991.Reaffirmed-2009)		Discharge of Efluent (Standards of CPCB)
					US	DS	Desirable Limit	Permissible limit in absenceof alternatesource	Inland Surface Water
1	pH (at 25^0C)	7.82	7.25	7.69	7.75	7.78	6.5 to8.5	(No Relaxation)	5.5 to 9.0
2	Colour (Hazen Unit)	<5	<5	<5	<5	<5	5	25	All efforts should be made to remove colour and unpleasant odour as far as practicable
3	Turbidity (NTU)	<1	2	1	<1	<1	5	10	--
4	Odour	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	unobjectionable	-	--
5	Taste	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	-	--
6	Total Hardness as $CaCO_3$ (mg/L)	60.6	132.21	120.58	66.5	68.8	300	600	--
7	Calcium as Ca (mg/ L)	6.48	36.19	31.2	14	14.8	75	200	--
8	Alkalinity as $CaCO_3$, (mg/ L)	45.32	156.47	166.4	82.22	83.97	200	600	--
9	Chloride as Cl (mg/ L)	19.02	20.44	18.85	16.24	17.6	250	1000	750
10	Residual free Chlorine (mg/ L)	<0.2	<0.20	<0.20	<0.20	<0.20	0.2	-	1
11	Cyanide as CN (mg/ L)	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	No Relaxation	0.2
12	Magnesium	10.8	10.19	10.38	7.67	7.75	30	100	--

	as Mg (mg/ L)								
13	Total Dissolved solids (mg/ L)	132	197	209	122	134	500	2000	--
14	Sulphate as SO_4 (mg/ L)	19.44	1.87	2.4	3.04	3.69	200	400	750
15	Fluoride as F (mg/ L)	0.12	0.42	0.59	0.57	0.59	1	1.5	2
16	Nitrate as NO_3 (mg/ L)	1.73	0.97	0.68	0.88	0.93	45	No Relaxation	10
17	Iron as Fe (mg/ L)	0.16	0.33	0.18	0.42	0.44	0.3	1	3
18	Aluminium as Al (mg/ L)	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	0.2	5
19	Boron (mg/ L)	0.77	0.64	<0.50	<0.50	<0.50	1	5	0.75
20	Phenolic Compounds (mg/ L)	<0.001	<0.001	<0.001	<0.001	<0.001	0.0001	0.002	1
21	Anionic Detergents as MBAS (mg/ L)	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	1	--
22	Hexa Chromium as Cr+6 (mg/ L)	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	No Relaxatio	0.1
23	Zinc as Zn (mg/ L)	<0.10	<0.10	<0.10	<0.10	<0.10	5	15	5
24	Chromium as Cr (mg/ L)	<0.01	<0.01	<0.01	<0.01	<0.01		--	2
25	Copper as Cu (mg/ L)	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	1.5	3
26	Manganese as Mn (mg/	<0.10	<0.10	<0.10	<0.10	<0.10	0.1	0.3	2

	L)								
27	Cadmium as Cd (mg/ L)	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	No Relaxation	2
28	Lead as Pb (mg/ L)	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	No Relaxation	0.1
29	Selenium as Se (mg/ L)	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	No Relaxation	0.05
30	Arsenic as As (mg/ L)	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	No Relaxation	0.2
31	Mercury as Hg (mg/ L)	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	No Relaxation	0.01
32	Total Coliform (MPN/100 ml)	<2	<2	<2	<2	<2	--	10	Less than 400
33	E-Coli	Absent	Absent	Absent	Absent	Absent	--		Less than 200
34	Chemical Oxygen Demand (mg/ L)	11.43	19.92	14.5	11.2	12.5	--	--	250
35	Biochemical Oxygen Demand (mg/ L)	3.6	7.5	5.98	4.1	4.8	--	--	30
36	Total suspended solid (mg/ L)	9	8	6	5	5.4	--	--	35

3.9 NOISE LEVEL SURVEY

The physical description of sound concerns its loudness as a function of frequency. Noise in general is sound, which is composed of many frequency components of various loudness, distributed over the audible frequency range. Various noise scales have been introduced to describe, in a single number, the response of an average human to a complex sound made up of various frequencies at different loudness levels. The most common and universally accepted scale is the A weighted Scale which is measured as dB (A). This is more suitable for audible range of 20 to 20,000 Hz. The scale has been designed to weigh various components of noise according to the response of a human ear. The impact of noise sources on surrounding community depends on:

- Characteristics of noise sources (instantaneous, intermittent or continuous in nature). It can be observed that steady noise is not as annoying as one, which is continuously varying in loudness;
- The time of day at which noise occurs, for example high noise levels at night in residential areas are not acceptable because of sleep disturbance; and
- The location of the noise source, with respect to noise sensitive landuse, which determines the loudness and period of exposure.

The environmental impact of noise can have several effects varying from Noise Induced Hearing Loss (NIHL) to annoyance depending on loudness of noise. The environmental impact assessment of noise from construction activity, vehicular traffic can be undertaken by taking into consideration various factors like potential damage to hearing, physiological responses, and annoyance and general community responses.

The main objective of noise monitoring in the study area is to establish the baseline noise levels and assess the impact of the total noise generated by the operation of the proposed project activities around it.

3.9.1 Identification of Sampling Locations

A preliminary reconnaissance survey has been undertaken to identify the major noise generating sources in the study area. Noise at different noise generating

sources have been identified based on the activities in the village area, ambient noise due to commercial activities, traffic and noise at sensitive areas like hospitals and schools.

The noise monitoring has been conducted for determination of noise levels at 11 locations in the study area. The noise levels at each location were recorded for 24 hours. The environment setting of each noise monitoring location is given in Table**-3.16** and depicted in **Figure-3.11.**

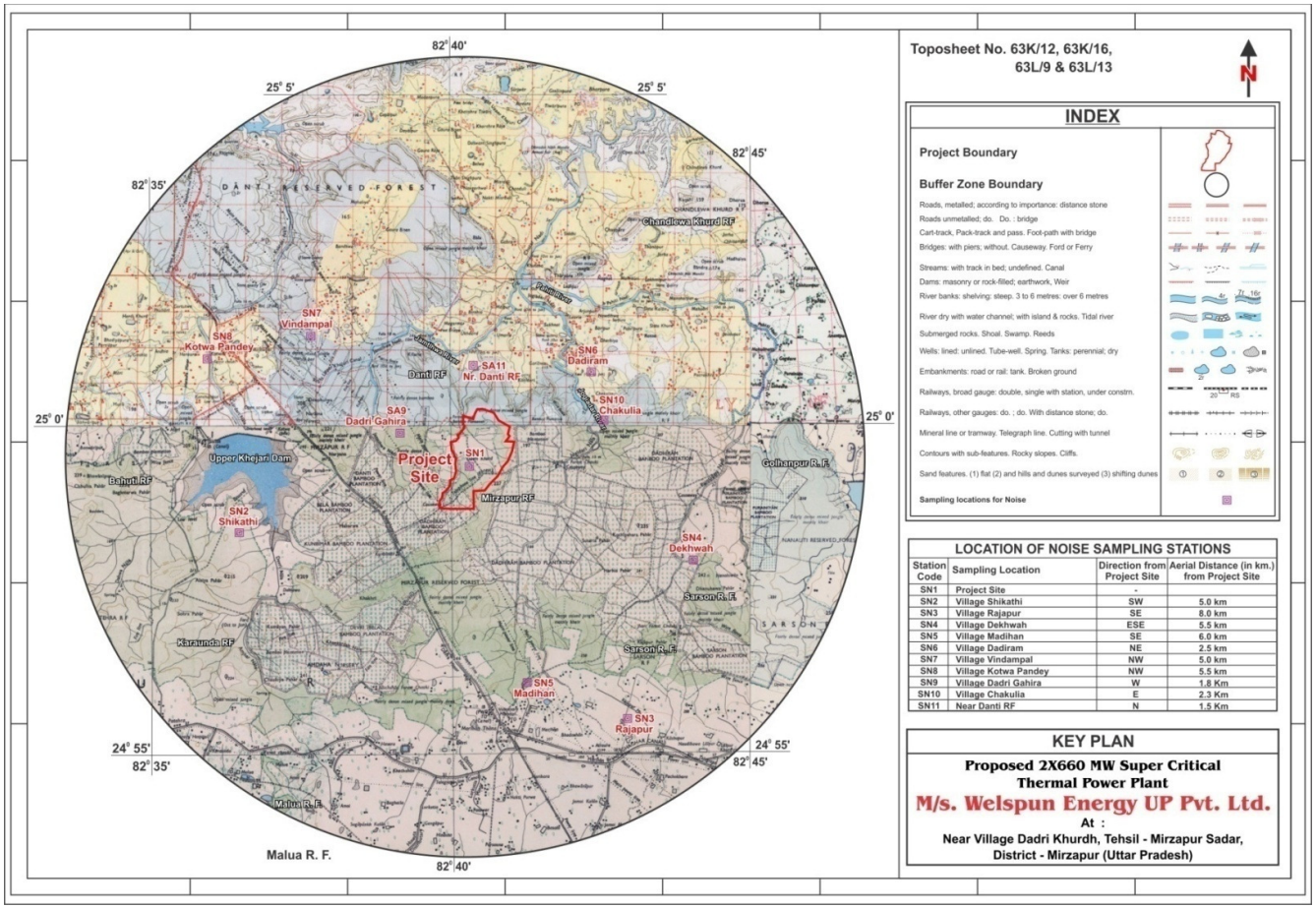


FIGURE-3.11

NOISE MONITORING LOCATIONS

3.9.2 Method of Monitoring

Sound Pressure Level (SPL) measurements were measured at all locations, recording for 10 minute at each hour was taken for 24 hours continuously. The day noise levels have been monitored during 6 am to 10 pm and night levels during 10 pm to 6 am at all the locations covered in 10 km radius of the study area.

TABLE- 3.16
DETAILS OF NOISE MONITORING LOCATIONS

S. No.	Sampling Locations	Direction	Aerial Distance (Km) with respect to plant	Zone
1.	Project Site	--	--	Residential
2.	Village Shikathi	SW	5.0	Residential
3.	Village Rajapur	SE	8.0	Residential
4.	Village Dekhwah	ESE	5.5	Residential
5.	Village Madihan	SE	6.0	Residential
6.	Village Dadiram	NE	2.5	Residential
7.	Village Vindampal	NW	5.0	Residential
8.	Village Kotwa Pandey	NW	5.5	Residential
9.	Village Dadri Gahira	W	1.8	Residential
10.	Village Chakulia	E	2.3	Residential
11.	Near Danti RF	N	1.5	Commercial

Source: Toposheet & Field Visit

3.9.3 Parameters Measured During Monitoring

For Noise levels measured over a given period of time interval, it is possible to describe important features of noise using statistical quantities. This is calculated using the percent of the time certain noise levels are exceeding the time interval. The notation for the statistical quantities of noise levels are described below:

L_{10} is the noise level exceeded 10 per cent of the time

L_{50} is the noise level exceeded 50 per cent of the time and

L_{90} is the noise level exceeded 90 per cent of the time

Equivalent Sound Pressure Level (L_{eq}):

The Leq is the equivalent continuous sound level, which is equivalent to the same sound energy as the actual fluctuating sound measured in the same period. This is necessary because sound from noise source often fluctuates widely during a given period of time.

This is calculated from the following equation:

$$Leq = L_{50} + \frac{(L_{10} - L_{90})^2}{60}$$

L_{day} is defined as the equivalent noise level measured over a period of time during day (6 am to 10 pm).

L_{night} is defined as the equivalent noise level measured over a period of time during night (10 pm to 6 am).

A noise rating developed by **EPA** for specification of community noise from all the sources is the Day-Night Sound Level, (L_{dn}).

Day-Night Sound Level (L_{dn}):

The noise rating developed for community noise from all sources is the Day-Night Sound Level (L_{dn}). It is similar to a 24 hr equivalent sound level except that during night time period (10 pm to 6 am) a 10 dB (A) weighting penalty is added to the instantaneous sound level before computing the 24 hr average.

This night time penalty is added to account for the fact that noise during night when people usually sleep is judged as more annoying than the same noise during the daytime.

The L_{dn} for a given location in a community may be calculated from the hourly L_{eq}'s, by the following equation.

$$L_{dn} = 10 \log\{\frac{1}{24}[16(10^{Ld/10}) + 8(10^{(Ln+10)/10})]\}$$

Where L_d is the equivalent sound level during the daytime (6 am to 10 pm) and L_n is the equivalent sound level during the nighttime (10 pm to 6 am).

3.9.4 Presentation of Results

The statistical analysis is done for the measured noise levels at **eleven** locations**.** The parameters are analyzed for L_{eq}, L_{day}, L_{night}, and L_{dn}. These results are tabulated in **Table-3.17.**

TABLE-3.17
NOISE LEVELS IN THE STUDY AREA [dB(A)]

S. No	Locations	Noise Level dB (A)	
		L_{eq} Day	Leq Night
NS1	Project Site	47.32	41.60
NS2	Village Shikathi	41.60	37.60
NS3	Village Rajapur	44.12	37.39
NS4	Village Dekhwah	43.80	39.41
NS5	Village Madihan	52.66	43.31
NS6	Village Dadiram	42.16	37.91
NS7	Village Vindampal	42.18	37.43
NS8	Village Kotwa Pandey	43.50	38.30
NS9	Village Dadri Gahira	45.44	41.00
NS10	Village Chakulia	48.20	42.00
NS11	Near Danti RF	51.40	42.00

Source: Toposheet & Field Visit

3.9.5 Observations

a) Day Time Noise Levels [(L_{day})]

The day time noise levels at all the residential locations were observed to be within the prescribed limit of 55 dB (A) for Residential Zone. The noise levels ranged between 41.60 dB (A) to 52.66 dB (A).

b) Night Time Noise Levels (L_{night})

The night time noise levels at all the residential locations were observed to be slightly on a higher side as compared to prescribed limit of 45 dB (A). The noise levels ranged between 37.39 dB (A) to 43.31 dB (A).

3.10 BIOLOGICAL SURVEY

3.10.1 Introduction

Anthropogenic activities tend to bring instability in the species composition and functioning of ecosystem. The first component to be affected directly as well as indirectly and in a short, medium and long time span would be the biotic component of the area. This sets a cyclic process, which may aggravate the situation unless corrective measures are adopted.

Generation of base-line data and knowing the types and extents of pollutants would be the first step of the environmental study report. The biological assessment is trustworthy and acceptable method to understand the impact of surroundings. This leads to suggesting remedial measures for minimizing impact. The aim of environment management plan is to manage the ecosystems with least alterations because only this can make ecosystem stable.

Biological studies are one of the important aspects of Environmental Impact Assessment with a view to conserve environmental quality and biodiversity. Ecological systems show complex inter-relationships between biotic and abiotic components including dependence, competition and mutualism. Biotic components comprise of both plant and animal communities, which interact not only within and between themselves but also with the abiotic components viz. physical and chemical components of the environment.

Generally, biological communities are good indicators of climatic and edaphic factors. Studies on biological aspects of ecosystems are important in Environmental Impact Assessment for safety of natural flora and fauna. The biological environment includes terrestrial and aquatic ecosystems.

The animal and plant communities co-exist in a well-organized manner. Their natural settings can get disturbed by any externally induced anthropological activities or by naturally occurring calamities or disaster. So, once this setting is disturbed, it sometimes is either practically impossible or may take a longer time to come back to its original state. Hence changes in the status of flora and fauna are an elementary requirement of Environmental Impact Assessment studies, in view of the need for conservation of environmental quality and biodiversity. Information on flora and fauna was collected within the study area.

An ecological survey of the study area was conducted particularly with reference listing of the existing biological resources.

Biological environment of the area have been studied during the study period. No endangered species have been sighted in the area. No Wildlife Sanctuary, National Park, Biosphere Reserves, Wildlife Corridors falls within 10 km radius from project site area. No migratory routes of birds & no endangered species have been found. The Reserve Forest/Protected Forest found within 10 km radius from project site area as under:

TABLE: 3.18

RESERVE FORESTS FALLING WITHIN 10 KM RADIUS OF THE PROJECT SITE

S. No.	Name of R.F.	Distance from Project boundary	Direction from Project Boundary
1	Danti RF	Adjacent to the project site	N
2	Barkachha RF	8.5 km	NW
4	Mirzapur RF	Adjacent	S
5	Sarson RF	5.5 km	SE
6	Malua RF	8.5 km	SW
7	Karaunda RF	5 km	SW
8	Patehra RF	5 km	SW
9	Bahuti RF	6.5 km	W
10	Newaria RF	10km	SW
11	Nanuti RF	7 km	E
12	Golhanpur RF	6.5 km	E

Source: Toposheet & Field Visit

3.10.2 Terrestrial Ecological Studies

3.10.2.1Objectives of Ecological study

The objectives of the present study are intended to

- Generate and establish the baseline ecological status and the impact of the proposed power project;
- To accomplish the above objectives, a general ecological survey covering an area of detailed study area of 10-km from the plant.
- Reconnaissance survey for selection of sampling sites in and around proposed project site on the basis of meteorological conditions;

- Generation of primary data to understand baseline ecological status, important floristic elements; and
- Generation of primary data to understand baseline fauna structure; and
- Collection of secondary data from Forest Working Plan and Gazetteers.

3.10.2.2 Criteria adopted for Biological survey

Reconnaissance survey was conducted by Green Future Foundation ,Udaipur to identify the phyto-sociological sampling location on the basis of following criteria:

- Proximity to the existing and proposed project;
- Downwind direction of the existing and proposed project site; and
- Upwind direction of the existing and proposed project.

3.10.2.3 *Flora and Fauna Found in Study area*

A primary survey was conducted in proposed project site and surroundings. During the survey it was noted that most of the forest was mixed forest with Acacia catechu and Butea monosperma dominant among tree species and at place dominated by Bambusa arundinacea (bamboo). The shrub layer was dominated by the straggling Zizyphus oenoplia and Acacia sinuta.

All parts of the main project site (core zone) that includes rian fed agriculture patches and surrounding agriculture fallow, scrub and open waste land and forest on the southern and south eastern part of the project site were surveyed.

Similarly, in the buffer zone some of the reserved forest (Danti RF in the north, Mirzapur RF in the south and Karaunda RF) and one of the Wetlands. Upper Khejer dam from where water is to be taken for the project were surveyed

Detailed list of flora s presented in **Table 3.19.**

The project site (core zone) and the buffer zone were surveyed in the mornings and evenings mainly to recognize the different land use / habitat types. Further list of common floral species and some major faunal species encountered were listed and are given in the tables (**Table. 3.20).**

Table no. 3.19
Floral Species listed during the Primary survey of the Study Area

S.No	**Family, Scientific & Name**	**Habitat**
1	**Amaranthaceae**	
1	*Achyranthes aspera*	Ag
2	**Anacardiaceae**	
2	*Lannea coromandelica*	F
3	*Mangifera indica*	Ag
3	**Apocynaceae**	
4	*Carissa spinarum*	SL/F
5	*Holarrhena pubscens*	F
6	*Wrightia tinctoria*	F
4	**Asclepiadaceae**	
7	*Calotropis gigantea*	Ag/SL
5	**Asteraceae**	
8	*Ageratum conyzoids*	SL/Ag
9	*Parthenium hysterophorus*	SL/Ag
10	*Pulicaria crispa*	SL
11	*Tridax procumbens*	SL
6	**Bombacaceae**	
12	*Bombax ceiba*	F
7	**Boraginaceae**	
13	*Cordia dichotoma*	F
8	**Burseraceae**	
14	*Boswellia serrata*	F
9	**Caesalpiniaceae**	
15	*Bauhinia racemosa*	F
16	*Cassia fistula*	F
17	*Cassia tora*	SL/F/Ag
18	*Tamarindus indica*	SL/Ag
10	**Capparaceae**	
19	*Capparis sepiaria*	F
11	**Caricaceae**	
20	Carica papaya	Ag
12	**Celastraceae**	
21	*Maytenus senegalensis*	F
13	**Combretaceae**	
22	*Anogeissus pendula*	F
23	*Terminalia bellrica*	F
14	**Cyperaceae**	

S.No	**Family, Scientific & Name**	**Habitat**
24	*Cyperus Sp*	Wb
15	**Ebenaceae**	
25	*Diospyros melanoxylon*	F/SL
16	**Euphorbiaceae**	
26	*Euphorbia hirta*	SL
27	*Jatropha curcas*	SL
28	*Phyllanthus emblica*	F
29	*Securinega leucopyrus*	F
17	**Fabaceae**	
30	*Butea monosperma*	F/SL
31	*Dalbergia sisoo*	F
32	*Pongamia pinnata*	F
18	**Flacourtiaceae**	
33	*Flacourtia indica*	F/SL
19	**Lamiaceae**	
34	*Leucas aspera*	SL/Ag
35	*Ocimum canum*	SL/Ag
36	*Ocimum gratissium*	SL/F
20	**Loranthaceae**	
37	*Dendrophthoe falcata*	F
21	**Lythraceae**	
38	*Lagerstroemia parviflora*	F
22	**Malvaceae**	
39	*Sida acuta*	SL/F
40	*Sida cordifolia*	SL
23	**Meliaceae**	
41	*Azadirachta indica*	F/Ag
24	**Mimosaceae**	
42	*Acacia catechu*	F/SL
43	*Acacia sinuta*	F/SL
44	*Prosopis juliflora*	SL/Ag
25	**Moraceae**	
45	*Atrocarpus heterophyllus*	Ag
46	*Ficus benghalensis*	F
47	*Ficus racemosa*	F
48	*Ficus religiosa*	F/Ag
49	*Ficus aritiona*	F
26	**Myrtaceae**	
50	*Syzygium cumini*	F
27	**Nyctaginaceae**	
51	*Boerhavia diffusa*	SL/Ag

S.No	**Family, Scientific & Name**	**Habitat**
28	**Periplocaceae**	
52	*Hemidesmus indicus* var. *indicus*	F
29	**Papaveraceae**	
53	*Argemone maxicana*	SL
30	**Poaceae**	
54	*Apludu mutica*	F
55	*Aristida setacea*	F/SL
56	*Bambusa arundinacea*	F/SL
57	*Cynodon dactylon*	Wb/Ag/Sl/F
58	*Desmostachya bipinnata*	SL
59	*Saccharum munja*	Ag
31	**Rhamnaceae**	
60	*Ventilago denticulata*	F
61	*Zizyphus mauritiana*	F/SL/Ag
62	*Zizyphus nummularia*	SL
63	*Zizyphus oenoplia*	F/SL
64	*Zizyphus xylopyrus*	F/SL
31	**Rubiaceae**	
65	*Mitragyna parvifolia*	F
66	*Xeromphis spinosa*	SL
32	**Rutaceae**	
67	*Aegle marmelos*	F/SL/Ag
33	**Sapotaceae**	
68	*Madhuca indica*	Ag
34	**Solanaceae**	
69	*Solanum nigrum*	SL/Ag
70	*Triumfetta rhomboidea*	Sl/F
35	**Ulmaceae**	
71	*Holoptelea integrifolia*	F
36	**Verbenaceae**	
72	*Lantana camara*	F/SL
73	*Tectona grandis*	F

Source: Field Visit

(Ag-Agriculture lands including orchards groves and trees along the agriculture fields, Wb-Water body, SL-Scrubland including open waste land, F –Degraded & Dense forest).

Table3.20:
Birds of different Foraging Guilds recorded during the Primary survey of the Study Area

Foraging Guild	**Common Names**	**Habitats**

Foraging Guild	Common Names	Habitats
Aquatic	Red-wattled Lapwing	Ag/Wb
	Indian Pond Heron	Wb
	Wood Sandpiper	Wb
	Cattle Egret	Ag/SL
	Little Egret	Wb
	Intermediate Egret	Wb
	Large Egret	Wb
	Indian Cormorant	Wb
	Little Cormorant	Wb
	Asian Spoonbill	Wb
	Painted Stork	Wb
Carnivores	Common Kestrel	SL
	Oriental Honey Buzzard	Ag
Frugivores	Plum-headed Parakeet	F
	Coppersmith Barbet	F
Granivores	Grey Francolin	SL/F
	Spotted Dove	SL/F
	Laughing Dove	SL/F
	Eurasian-collared Dove	SL/F
	Red-turtled Dove	SL/F
	Chestnut-bellied Sandgrouse	SL
	Singing Bushlark	SL
	Ashy-crowned Finch Lark	SL
	House Sparrow	SL/F
	Baya Weaver	F
	Chestnut-shouldered Petronia	F
	Indian Silverbill	SL/F
	Paddyfield Pipit	SL
Insectivores	Red-rumped Swallow	WB/Ag
	Indian Robin	Sl/F
	Rufous Treepie	F
	Oriental White-eye	F
	Marshall's Iora	F
	Common Woodshrike	F
	Long-tailed Shrike	SL

Foraging Guild	Common Names	Habitats
	Small Minivet	F/SL
	Indian Roller	F
	Green Bee-eater	SL/F/Ag
	Common Hoopoe	SL
	Black Redstart	SL
	Black Drongo	SL/F
	Yellow-eyed Babbler	SL/F
	Jungle Prinia	F
	Grey-breasted Prinia	F
	Plain Prinia	SL
	Rufous-fronted Prinia	SL
	Common Tailorbird	F/SL
Nectarivores	Purple Sunbird	SL/F
Omnivores	Common Crow	Ag/F
	Common Myna	F/SL
	Rosy Starling	SL
	Brahimany Myna	SL/F
	Red-vented Bulbul	SL/F
	Greater Coucal	F
	Jungle Babbler	F
	Common Babbler	SL
	Large-grey Babbler	SL
	Indian Peafowl	SL/F
Piscivores	White-throated Kingfisher	Wb

Source: Field Visit

(Ag-Agriculture lands including orchards groves and trees along the agriculture fields, Wb-Water body, SL-Scrubland including open waste land, F –Degraded & Dense forest)

Table 3.20 (A):
Mammals of different groups recorded during the Primary survey of the Study Area

Groups	Common Names	Habitats Recorded
Herbivore	Common Langur	F
	Nilgai	F/SL
	Indian Hare	SL/F

Carnivore	Jungle Cat	SL
	Indian Fox	SL
Omnivore	Jackal	SL/F
	Wild pig	SL/F
Frugivore	Five striped palm squirrel	F/Ag
Granivore	Indian Gerbil	SL/Ag
	Lesser Bandicoot-rat	SL/Ag
Scavenger	Striped Hyena	SL/F

Source: Field Visit

Ag-Agriculture lands including orchards groves and trees along the agriculture fields, SL-Scrubland including open waste land, F –Degraded & Dense forest.

3.10.2.4 Aquatic Fauna of Upper khajuri dam

Water for the proposed 2×660 MW Thermal Power Plant is souced from Upper Khajuri Dam , fed by Ganga River, which is 5.5 Km , in West direction from the PreojectSite.The total area of the dam is 700 Ha. The average water area is 470 ha. Water is present throughout the year in the reservoir.The present aquatic fauna includes the following:

Table: 3.20 (B)

Aquatic Fauna of Upper Khajuri Dam

S. No.	Common Name	Scientific Name
1	Catla-catla	Cyprinus catla, Gibelion catla
2	Rohu	Labeo rohita
3	Nain	Cirhinus mrigala
4	Karonch	--
5	Tengna	*Mystus bleekeri*
6	Sounk	
7	Moa	*Amblypharingodon mola* (Ham.-Buch.)
8	Pabda	Ompok pabda
9	Papta	Ompok pabo
10	Daho	
11	Fulia	
12	Bata	Labeo bata

Source: *Field Visit*

3.10.3 Cropping Pattern

Major crops of the study area are cultivated during monsoon period (Kharif crop) & in winter months (Rabi crop). Details are as follows:-

Rabi - Wheat, Gram, Pea, Arhar, Barley, Lentil, Mustard, etc.

Kharif - Paddy, Gingelly, Arhar, Minor millet, Rapseed, Black gram, Millet, Smaller millet, Green gram, Ground nut

3.11 DEMOGRAPHY AND SOCIO-ECONOMIC PROFILE

3.11.1 Methodology adopted for the Study

The methodology adopted for the study is based on the review of secondary data, which mainly comprises 2001 Census records, as these are more comprehensive and authentic. The sociological aspects studied include human settlements, demographic and other socio-economic aspects and the infrastructural facilities available in the study area. The economic aspects include agriculture, industry and occupational structure of workers.

3.11.2 Review of Demographic and Socio-Economic Profiles – 2001

The information on socio-economic aspects of the study area has been compiled from secondary sources, which mainly include census data of 2001. The sociological aspects of this study include human settlements, demographic and other socio-economic aspects and infrastructure facilities available in the study area. The economic aspects include agriculture and occupational structure of workers.

The salient features of the demographic and socio-economic details are described in the following sections.

3.11.3 Settlement Pattern and Demography

The socio-economic condition was studied over an area falling within 10 km radius from the centre of the project area. As per the 2001 census, details of the around 88-90% of the villages falling in the study area have been found which have been tabulated below:

Distribution of Population

As per 2001 census, the study area consists of a total population of 241710 persons residing in 38736 households. This indicates an average household size of

06 persons per household. The distribution of population in the study area is summarized in **Table-3.21**

TABLE-3.21
DISTRIBUTION OF POPULATION

Particulars	0-3 km	3-7 km	7-10 km	0-10 km
No. of Households	567	3422	34747	38736
Male Population	2056	12342	112120	126518
Female Population	1841	11315	102036	115192
Total Population	3897	23657	214156	241710
% of males to the total population	52.76	52.17	52.35	52.34
% of females to the total population	47.24	47.83	47.64	47.66
Sex Ratio (no of females per 1000 males)	859	916	910	910

***Source**: District Census Hand Books*

The configuration of male and female indicates that the males constitute slightly higher ratio in the total population. The study area on an average has 910 females per 1000 males as per 2001 census.

3.11.3.1 Social Structure

As per 2001 census, 45.67 % of the population in the study area belongs to Scheduled Castes (SC) and there is no Scheduled Tribes (ST). The distribution of population by social structure is shown in **Table-3.22**

TABLE-3.22
DISTRIBUTION OF POPULATION BY SOCIAL STRUCTURE

Particulars	0-3 km	3-7 km	7-10 km	0-10 km
Schedule caste	1645	8526	100225	110396
% To the total population	42.21	36.04	46.80	45.67
Schedule Tribes	0	0	0	0
% To the total population	0	0	0	0
Total SC and ST population	1645	8526	100225	110396
% To total population	42.21	36.04	46.80	45.67

***Source**: District Census Hand Books*

3.11.3.2 Literacy Levels

The analysis of the literacy levels is done in the study area. The 10 km radius study area demonstrates a literacy rate of 34.34 % as per 2001 Census. The male literacy rate, i.e., the percentage of literate males in the study area works out to be 45.52 %. Whereas, the female literacy rate, which is an important indicator for social change, is observed to be 22.06 % in the study area as per 2001 census. This indicates that there is a need for sociological development in the region. The distribution of literates and literacy rates in the study area is given in **Table-3.23**

TABLE-3.23
DISTRIBUTION OF LITERATE AND LITERACY RATES

Particulars	0-3 km	3-7 km	7-10 km	0-10 km
Male Population	2056	12342	112120	126518
Female Population	1841	11315	102036	115192
Total Population	**3897**	**23657**	**214156**	**241710**
Male literates	726	5885	50982	57593
Female literates	225	2213	22975	25413
Total literates	**951**	**8098**	**73957**	**83006**
Male literacy rate (%)	35.31	47.68	45.47	45.52
Female literacy rate (%)	12.22	19.56	22.52	22.06
Total Literacy rate (%)	**24.40**	**34.23**	**34.53**	**34.34**

Note: Literacy Rate is calculated as percentage of no of literates to the population of more than 6 years of age

***Source**: District Census Hand Books*

3.11.3.3Occupational Structure

The occupational structure of residents in the study area is studied with reference to work category. The population is divided occupation wise into three categories, viz., main workers, marginal workers and non-workers. The workers include cultivators, agricultural laborers, those engaged in household industry and other services.

The marginal workers are those workers engaged in some work for a period of less than six months during the reference year prior to the census survey. The non-workers include those engaged in unpaid household duties, students, retired persons, dependents, beggars, vagrants etc. besides institutional inmates or all other non-workers who do not fall under the above categories.

As per the 2001 census records, altogether the main workers work out to be 26.98 % of the total population. The marginal workers constitute 13.21 % of the total population. The non-workers constitute 59.76 % of the total population. The occupational structure of the study area is shown in **Table-3.24.**

TABLE-3.24
OCCUPATIONAL STRUCTURE

Particulars	0-3 km	3-7 km	7-10 km	0-10 km
Total Population	3897	23657	214156	241710
Total main workers	1074	5692	58438	65204
% of main workers to total population	27.56	24.06	27.28	26.98
Marginal workers	459	3138	28340	31937
% of marginal workers to total population	11.78	13.26	13.23	13.21
Non-workers	2364	14714	127378	144456
% of non-workers to total population	60.66	62.20	59.47	59.76

***Source**: District Census Hand Book*

3.12 TRAFFIC DENSITY

The traffic studies have been conducted to know the prevailing traffic volumes on the existing roads. It is essential to consider these details for assessing the anticipated future traffic volumes as a part of overall impacts assessment for the project.

The variations of traffic densities depend upon the working days and time and also vary in day and night times. In order to assess the prevailing traffic volumes on the roads, the survey was conducted during normal working days of the week by avoiding local holidays or abnormal situations to reflect the true picture of the traffic densities. The traffic study was conducted at SH-5 (Mirzapur-Osra Road) locations for 24 hours for 9 days.

3.12.1 Methodology

3.12.1.1 Vehicle Count

The vehicles passing through the road (in both ways) were counted separately for 24 hours at one locations from 0600 hrs to 0600 hrs next day continuously.

Category-wise vehicle counting has been done continuously and recorded in the traffic volume count on hourly basis under respective categories.

3.12.1.2 Categorization of Traffic

The engine driven vehicles were categorized into various heads viz. Trucks/Bus, Light Carriage Vehicles (LCV), Car/Jeep, Multi Axle Vehicles, Two/Three Wheelers and Cycles/others.

3.12.2 Sampling Locations

The details of traffic locations are represented in **Table-3.25.** The traffic density was collected from the approach road i.e Kulabiya Marg near SH no. 5, which is 2 km away from the Project site in SW direction.

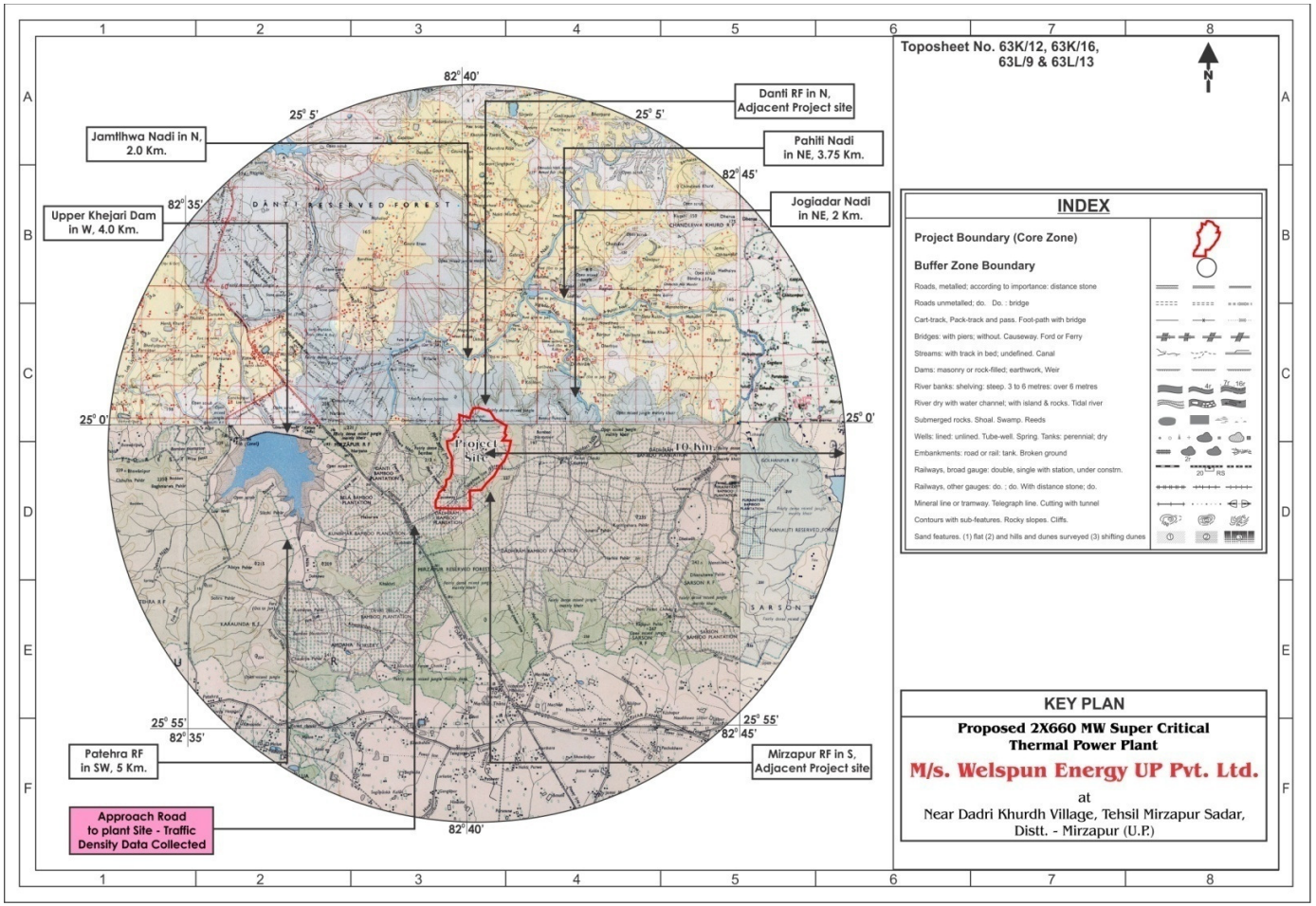


FIGURE 3.12
KEY PLAN SHOWING THE LOCATION FOR TRAFFIC DENSITY COLLECTION

TABLE-3.25
DETAILS OF TRAFFIC MONITORING
(COLLECTED DURING 16.05.2011 TO 24.05.2011)

Date of Monitoring	TWO-WHEELER	FOUR-WHEELER	HEAVY TRAFFIC (Buses/ Truck)
16.05.2011	1914	1974	2315
17.05.2011	1827	1797	2421
18.05.2011	2007	1867	2215
19.05.2011	1805	1957	2305
20.05.2011	2106	1797	2116
21.05.2011	1718	1865	2257
22.05.2011	1156	1900	2185
23.05.2011	2187	1968	2314
24.05.2011	1892	1687	2453

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 Identification of Impacts

This chapter presents identification and appraisal of various impacts from the proposed power plant. 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 continue to remain same till the operation of the project. The construction and operational phase of the proposed project comprises various activities, each of which may have an impact on some or all environmental parameters. Various impacts during the construction and operation phase on the environment have been studied listed along with mitigating measures in the subsequent sections.

4.2 Impacts during Construction Phase

During construction phase the activities related to land de-weeding, leveling of site and construction of related structures and installation of related equipment.

The environmental matrix points out each activity and its impact on specific environmental parameters.

Table 4.1

ENVIRONMENT IMPACT MATRIX FOR CONSTRUCTION PHASE

Environment Parameters / Activities	Topography	Land-use	Water Quality	Hydrology	Air Quality	Noise & Odor	Flora/Fauna	Soil	Employment	Housing	Health	Infrastructure
Civil Construction Work	●	●	●	●	●	●	●	●	●	●	●	●
Material Storage & Handling					●	●		●	●		●	
Water Supply				●								
Mechanical & Electrical Erection					●	●			●			●
Transport					●	●			●		●	●
Accommodation of Labour		●	●							●	●	

4.2.1 Impact on Topography and Land Use

Topography of the proposed site is slightly undulating and drains towards west of the project area. The existing site elevation is about 180 m above Mean Sea Level (MSL). Some level of cutting and filling will need to be done to maintain an even topography within the plant area. No major change in topography of the site is envisaged due to proposed plant erection.

The present land use of the proposed plant site is mostly barren and unused land which would be converted to industrial after the project execution. There are no major human settlements in the project area. Apart from the change in land use pattern and temporary change in soil profile within the project site there will not be any adverse impact on the surrounding land use during the construction period.

4.2.2 Impact on Soil

The soil is silty and has rocky out crop. It does not support vegetation except scanty bushes. However the construction activities do result in loss of some vegetation cover and topsoil to some extent in the plant area. It is proposed to construct line drains for storm water to minimize the soil erosion and collect the

soil through series of check dams. Apart from localized construction impacts at the plant site, no adverse impacts on soil in the surrounding area are anticipated.

4.2.3 Impact on Air Quality

The main sources of emission during the construction period are the movement of equipment at site and dust emitted during the leveling grading, earthwork and foundation works. Exhaust emissions from vehicles and equipment deployed during the construction phase is also likely to result in marginal increase in the levels of SO_2, NOx, SPM and CO. The impact will be for short duration. This will be confined within the project boundary and is expected to be negligible outside the plant boundaries. The impact will, however, be reversible, marginal and temporary in nature. Proper maintenance of vehicles and construction equipment will help in controlling the gaseous emissions. Water sprinkling on roads and construction site will prevent fugitive dust.

4.2.4 Impact on Water Resources and Water Quality

A Seasonal nallah exists outside the boundary of the proposed project on the west side. Due to undulating nature of the project site there is small tertiary drain on northern side of the proposed project site. No major water bodies exist in the project site as well as no degenerated water bodies are present within 3.0 km radius during study area. No diversion of stream or any other water body is envisaged Hence, no significant impact is envisaged on water resources of the area. No groundwater is proposed to be utilized for the project. Hence, no impact is envisaged on the ground water resources. The possibility of soil erosion and carryover of top soil to surface water resources is likely due to non- point discharges in any project construction site. This will be taken care with a network of well designed storm water drains with check dams. The contamination due to sewage generated from the construction work force stationed at the site in labor colony will be eliminated by providing a septic tank with soak pit facility. The overall impact on water environment during construction phase due to proposed project is likely to be short term and insignificant.

4.2.5 Impact on Noise Levels

Heavy construction traffic for loading and unloading of fabrication and material handling of equipment/ materials is likely to cause an increase in the ambient noise levels. The vehicles used for movement will be taken for preventive maintenance to reduce noise generation at source. The little noise generation during construction phase of the project will be temporary and will be restricted to site. D.G. Sets during construction activities will have acoustic enclosures around the equipments as per CPCB norms to control noise level.

4.2.6 Impact on Terrestrial Ecology

The initial construction works at the project site involves land clearance. During construction activities vegetation may be disturbed which can be considered insignificant as the site do not support quality vegetation. The proposed land is mainly barren and very less single crop land exists, in the proposed plant area. Greenbelt will be developed to improve the aesthetic value in the area and to reduce the fugitive dust. However, such impacts will be confined to the project site and will be minimized through paving and water sprinkling. There are very few mature trees in the site, which will be protected while finalizing the layout or replanted through transplantation. The other minor vegetation will be removed during construction causing insignificant impact on the ecology.

4.2.7 Impact on Socio-economics

The proposed project area does not disturb any habitation except a few hutments located in an area of 0.2 acre. The land has been acquired from the dweleers on willing seller willing buyer method. So as such no R&R is applicable in this case. However land sellers are being considered for providing job during construction and operation based on eligibility and qualifications. . Most of the site is uncultivable barren land owned by few individuals and government land. There are no tribal populations getting affected due to this project. . The project will have positive impact on socioeconomics of the area due to employment generation by around 3400 jobs during construction and operation together and indirectly employing more than 1000 personnel. The requirement of unskilled manpower for construction will be met from nearby villages. The project will

also help in generation of indirect employment in the form of entrepreneurship to set up dairy, poultry, household needs, horticulture etc. apart from direct employment during this period. This will be a positive socio-economic development for the region.

4.3 IMPACTS DURING OPERATIONAL PHASE

The proposed plant operation will involve 1320 MW of power generation. The following activities related to the operational phase will have varying impacts on the environment and are considered for impact assessment:

- Land use;
- Soil quality;
- Topography and climate;
- Air quality;
- Water resources and quality;
- Solid waste;
- Noise levels;
- Terrestrial and aquatic ecology;
- Demography and socio-economics; and
- Infrastructural facilities.

The environmental Impact matrix during operation phase is provided in **Table 4.2**.

TABLE 4.2

ENVIRONMENT IMPACT MATRIX FOR OPERATION PHASE

Environment Parameters →											
Activities ↓	**Topography**	**Land-use**	**Water Quality**	**Hydrology**	**Air Quality**	**Noise & Odor**	**Flora / Fauna**	**Soil**	**Employment**	**Health**	**Infrastructure**
Water Withdrawal			●	●			●	●	●	□	●
Handling & Transportation of Coal		●	□	□	●	●	□	□	□	●	
Coal Combustion					●	●	●	□	□	●	□
Plant Operation		●	□	□	□	●	□	□	●	●	
Ash Handling		●	●	□	□	□	□	●	□		
CSR Work									●	●	●

4.3.1 Impact on Land Use

The pre project land use of site which is barren will change to industrial use. The land use in the study area is degraded forest; scrub land and fallow land mostly and don't support agriculture per se. The power project will not have any significant adverse impact in this land use. In contrary it may give impetus to change land use from barren to cultivable. Certain areas may change the land use to commercial etc.

However the long term impacts of project on land use can be as under:

- New habitation areas may come up.
- New infrastructure might be constructed.
- New markets may be formed, which will improve the overall social attributes of the surrounding area.

4.3.2 Impact on Soil

Most of the impacts of power project on soils are restricted to the construction phase, which will get stabilized during operational phase. The impact on the topsoil will be confined to the proposed main plant area. There could be chances that air borne fugitive dust from the plant may likely get deposited in the immediate vicinity. However, the fugitive emissions will be controlled by an effective dust extraction and suppression system and source emission by installing highly efficient electrostatic precipitators/ other pollution control facilities at suitable locations.

4.3.3 Topography and Climate

The area of the plant site is slightly undulated, which will be leveled and maintained even in the post-project scenario. There will not be any topographical changes during operation of the project in the study area.

Heat loss through stack will be 6 to 7% of the total heat input. The quantum of heat so lost to the atmosphere is minimized through selection of super critical technology, which will have better efficiency thereby reduce this heat loss to some extent. The impact on climate is likely insignificant.

4.3.4 Impact on Air Quality

The impact on air quality is assessed based on combined emissions of the proposed power plant along with the present baseline data. Particulate Matter (PM), Sulphur dioxide (SO_2) and Oxides of Nitrogen (NO) are important pollutants emitted by thermal power plants.

4.3.4.1 Details of Mathematical Modeling

Prediction of impacts on air environment has been carried out employing mathematical model based on a steady state Gaussian plume dispersion model designed for multiple point sources. In the present case, AERMOD (American Meteorological Society/Environmental Protection Agency Regulatory Model) version 6.4 dispersion model based on steady state gaussian plume dispersion, designed for multiple point sources and developed by United States Environmental Protection Agency [USEPA] has been used for simulations from Industrial sources.

The model options used for short-term computations are:

- The plume rise is estimated by Briggs formulae,
- Stack tip downwash is not considered;
- Buoyancy induced dispersion is used to describe the increasing plume dispersion during the ascension phase;
- Calms processing routine is used by default;
- Wind profile exponents are used by default 'Irwin;
- Flat terrain is used for computations;
- It is assumed that the pollutants do not undergo any physico-chemical transformations and that there is no pollutant removal by dry deposition;
- Pollutant washout by rain is not considered; and
- Cartesian co-ordinate system has been used for computations.

4.3.4.2 Emission Details

The emission sources identified is the stack of Thermal Power Plant. For the modeling purpose pollutants like, Sulphur dioxide, Oxides of Nitrogen and Particulate Matter 10 are considered. The details of stack emissions envisaged from the project as well as the emission rates have been given in the table below:

TABLE-4.3

STACK EMISSION DETAILS

Parameters	**UOM**	**For Each Unit**
		Domestic Coal
Stack height	m	275
Total number of flues in stack	No.	2 (one for each unit)
Top-most flue diameter	m	7.0
Flue gas exit velocity	m/s	25
Flue gas temperature	^{0}K	413
Volumetric flow rate	Nm^3/s	692.7
Coal Consumption Rate	TPH	428
Sulphur Content (Max)	%	0.5
Emission Rates		
Particulate Matter$_{10}$ (based on 50 mg/Nm^3)	g/s	34
Sulphur dioxide (based on 0.5% Sulphur)	g/s	1129
Oxides of Nitrogen (based on design limit of 750 mg/Nm^3)	g/s	519

Model has been run considering the worst case for domestic coal. If the imported coal is used instead, the impact will be less.

- **Meteorological Data**

Data recorded at the site on wind speed, direction, solar radiation and temperature at one hour interval for the summer was used as meteorological input. The hourly meteorological data recorded at site is converted to the mean meteorological hourly data as specified by CPCB and the same has been used in the model. Model simulations have been carried using the hourly Joint Frequency data viz, stability, wind speed, mixing height and temperature.

- **Mixing Height**

Hourly values of mixing heights estimated by Mr. RN. Gupta (Spatial Distribution of Hourly mixing depth over Indian Region) have been considered for modeling to establish the worst case scenario.

Table: 4.4

MIXING HEIGHT FOR THE PROJECT SITE

STUDY PERIOD (Summer Season, 2011)

Time (Hours)	Mixing Height (m)
700	50
800	125
900	320
1000	500
1100	750
1200	975
1300	1050
1400	1100
1500	1280
1600	1010
1700	830
1800	590
1900	380

Source: CPCB publication, "Spatial Distribution Of Hourly Mixing Depth Over Indian Region", PROBES/88/2002-03

4.3.4.3Presentation & comments on the predicted Results

In the present case, model simulations have been carried out for the summer season. Modeling studies reveal that the maximum incremental short term ground level concentrations for Particulate Matter$_{10}$ (PM_{10}) likely to be encountered during study period are 0.508 µg/m^3 at a distance of about 2.0 km from project site on eastern direction.

The maximum incremental short term ground level concentrations for SO_2 and NOx are 40.96 and 18.85 µg/m^3 respectively occurring at a distance of about 2.0 km from project site in the E direction. The resultant concentrations on super imposing the predicted values on the worst baseline data recorded is found to be well within the ambient AAQ standards. The incremental ground level concentrations for PM_{10}, SO_2 and NO_2 are given in Table-4.2.

TABLE-4.5

PREDICTED 24-HOURLY SHORT TERM INCREMENTAL CONCENTRATIONS

Pollutant	Incremental Concentration_(µg/m3)	Distance (m)	Direction
PM_{10}	0.508	2000	E
SO_2	40.962	2000	E
NO_2	18.849	2000	E

Source: *Air Quality Modeling (AERMOD)*

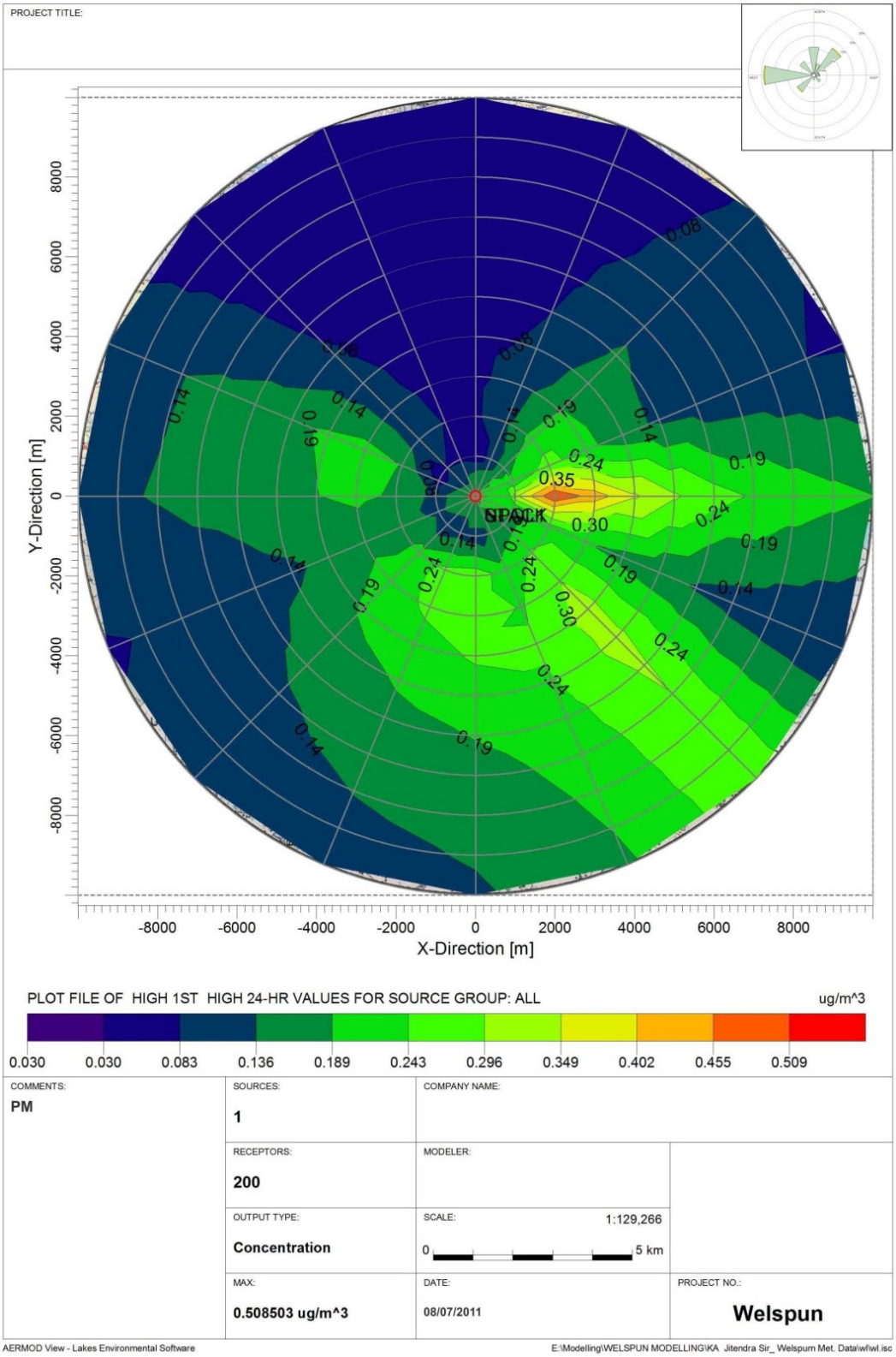


FIGURE-4.1

ISOPLETH SHOWING MAXIMUM PREDICTED GLC OF PM_{10}

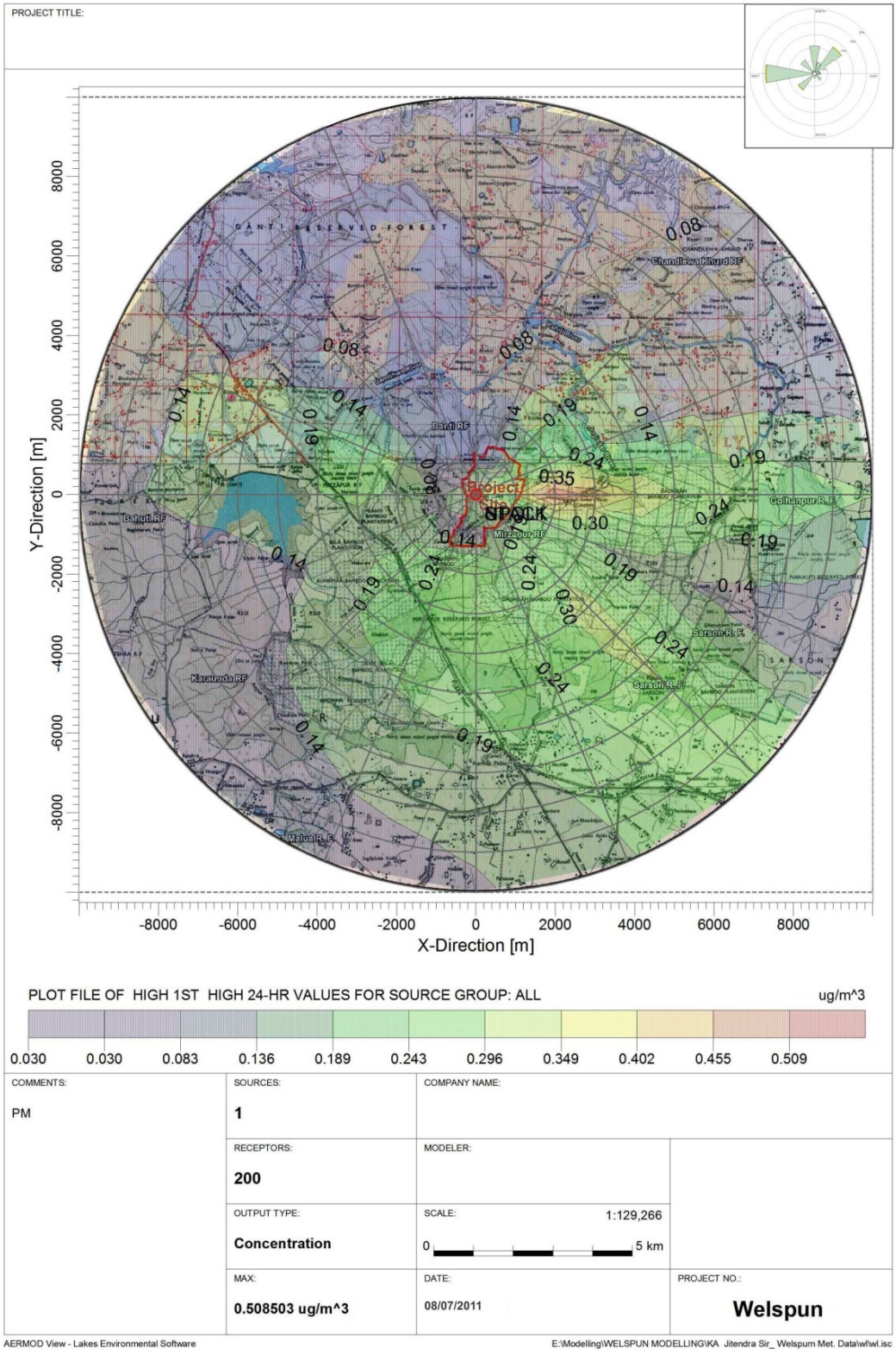


FIGURE-4.1 A

ISOPLETH (PM_{10}) SUPERIMPOSED ON KEY PLAN

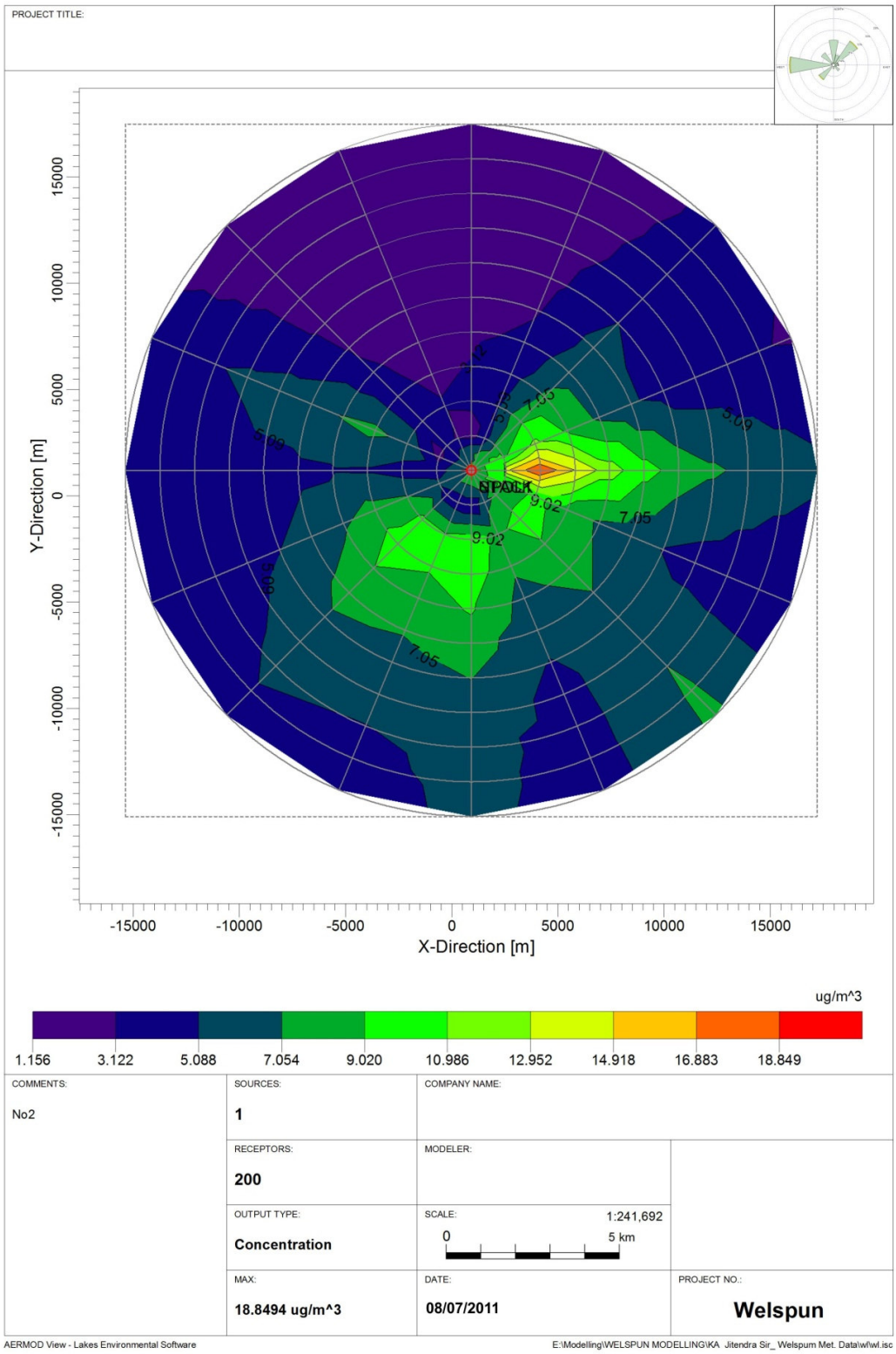


FIGURE-4.2

ISOPLETH SHOWING MAXIMUM PREDICTED GLC OF NO_2

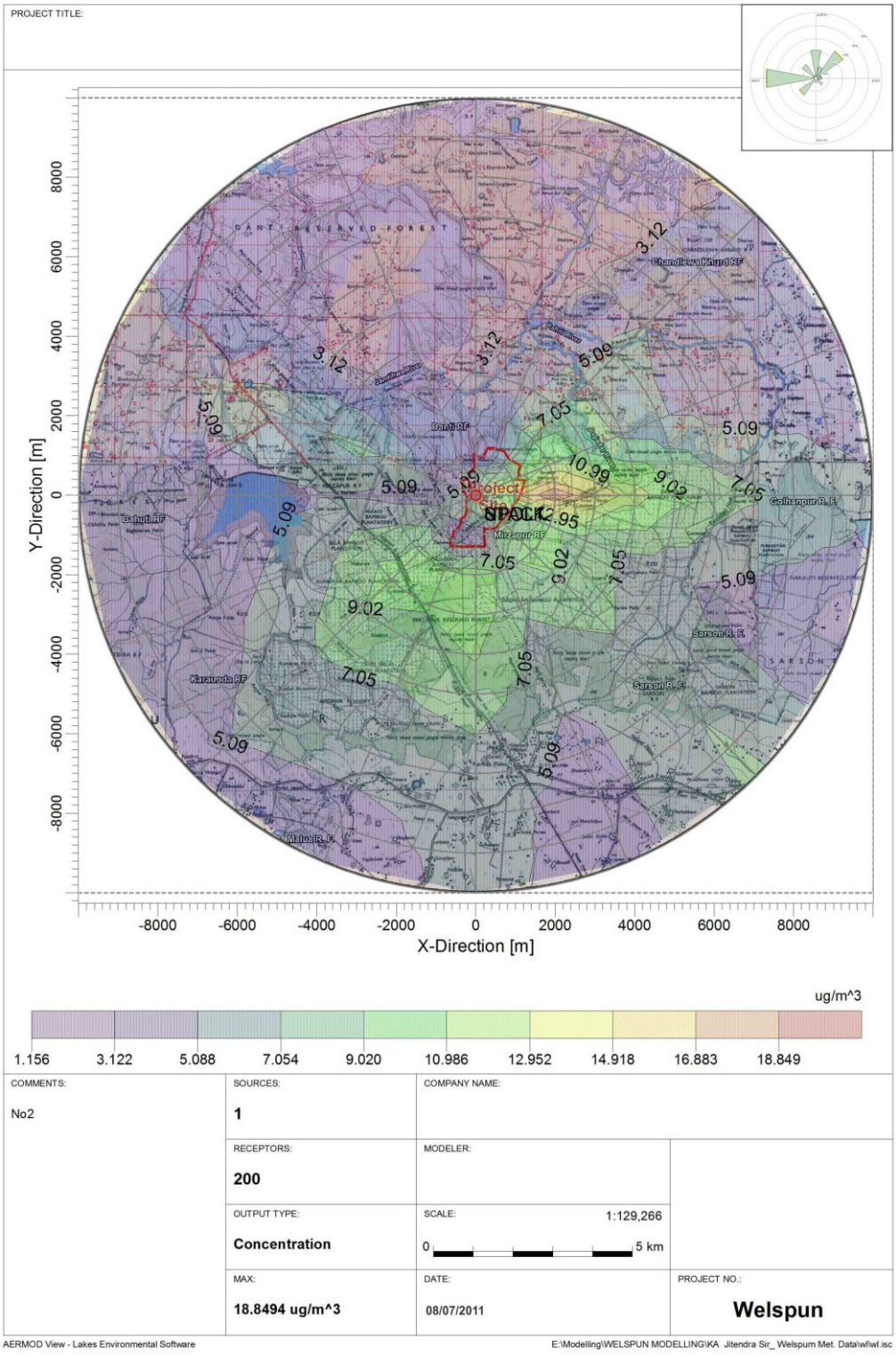


FIGURE-4.2 A

ISOPLETH (NO_2) SUPERIMPOSED ON KEY PLAN

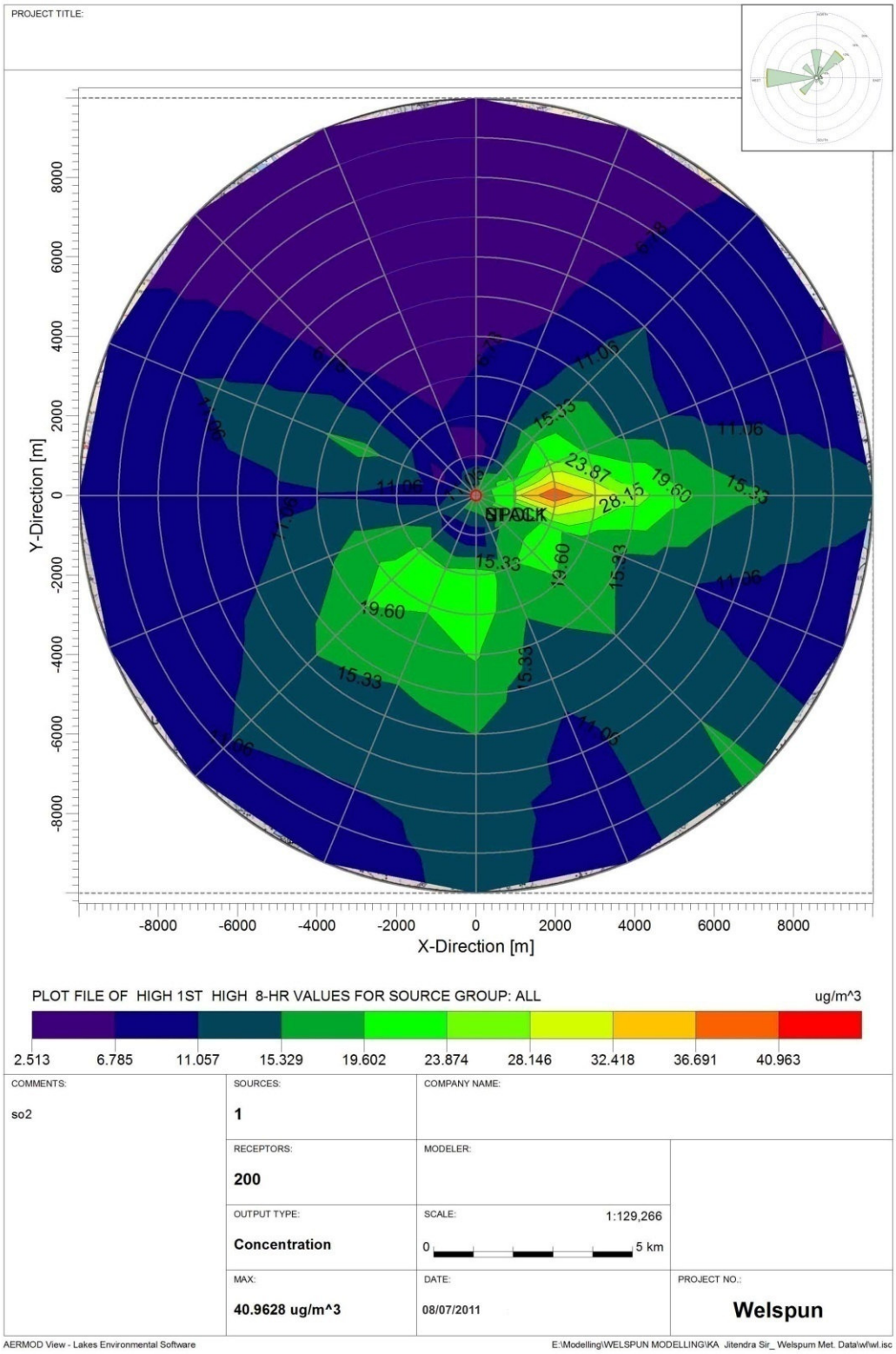


FIGURE-4.3

ISOPLETH SHOWING MAXIMUM PREDICTED GLC OF SO_2

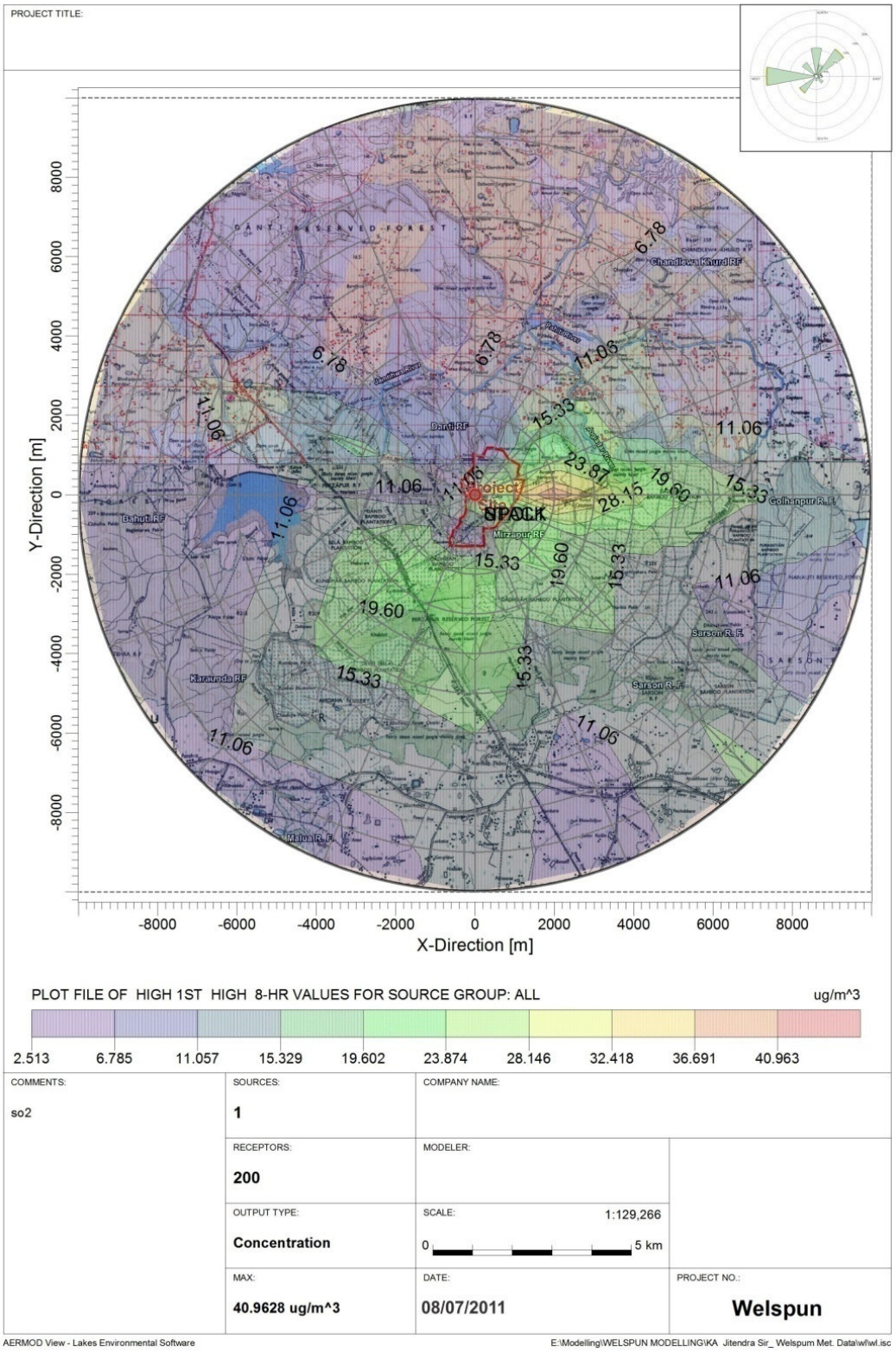


FIGURE-4.3 A

ISOPLETH (SO_2) SUPERIMPOSED ON KEY PLAN

Resultant Concentrations after Implementation of the Project

The maximum incremental Ground Level Concentrations (GLCs) due to the proposed project for PM, SO_2 and NOx are superimposed on the maximum baseline PM_{10}, SO_2 and NOx 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 cumulative concentrations (baseline+ incremental) after implementation of the project are tabulated below in Table-4.3.

TABLE-4.6

RESULTANT CONCENTRATIONS DUE TO INCREMENTAL GLCs

S. No.	24 Hrs. Concentrations	PM_{10} ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)
1.	Maximum Baseline Concentrations in the study area (24 Hrs.)	71.35	9.65	21.39
2.	Predicted Max. GLC (24 Hrs.)	0.508	40.962	18.849
3.	Total Concentration	71.858	50.612	40.239
4.	NAAQS – Industrial & Residential area Limits	100	80	80
5.	NAAQS – Ecologically Sensitive Area Limits	100	80	80

The predictions indicate that the PM_{10}, SO_2, NOx concentrations are likely to be well within the prescribed Limits.

- **Impacts of Air Emissions on Sensitive Areas and Habitations**

The incremental concentrations when superimposed over the existing maximum baseline concentration in the study area, the resultant concentrations are found to be within the permissible levels. The total concentration is also below than the standards specified for the Ecologically Sensitive Area, hence no significant impact is envisaged in the study area for these receptors too.

4.3.5 Impact of Traffic on Air Quality

Captive Rail Siding will be built for transportation of coal during operation of the plant. The nearest railway station is at Sarsongram on North Central Railway

line. WEUPPL is entering into an agreement with Indian Railways for transporting coal. A 20 km long spur is envisaged from Sarsongram railway station. No significant adverse impact is envisaged on the road network because of coal transport is by rail. However, fuel oil required for the project will be transported using road network and there by additional traffic on road network is envisaged.

4.3.6 Adequacy of Existing & Road Network in Study Area

About 75 number of trucks per month would be required for transportation of fuel oil required The traffic contribution from proposed plant to the outside road network will thus be to and fro movement of 75 vehicles per month, which is equivalent to 225 PCU per month (taking a PCU factor of 3 per vehicle). This is not going to make any adverse impact on the road network as recommendations of IRC on traffic capacity are presented in the table below:

TABLE-4.7

RECOMMENDATIONS ON TRAFFIC CAPACITY – IRC

Sr. No.	Category of Road	Maximum Carrying Capacity (PCU/day)
1	Two lane roads (7-m) with earthen shoulders	15,000
2	4-lane highway with earthen shoulders	35,000

4.3.7 Impact on Water Resources and Water Quality

No ground water source will be used for meeting the water requirements during operation of power plant. The entire water requirement of the project will be met from Ganga River through Upper Khajuri dam. Hence, no adverse impact on ground water sources is envisaged.

4.3.7.1 Impact on Surface and Ground Water Quality

The water balance and wastewater generation details have been discussed in Chapter-2. The cooling tower blow down is utilized for ash sluicing. As can be seen the waste water generated will be 28 M3/hr which is less than 1% of fresh water drawn. All efforts and arrngemnet will be made to achieve or recycling of waste water to attain Zero discharge. In inescapable scenerion this quantity will be drained to nearest nallah after meeting the MoEF stipulated standards. This

water will find utility for irrigation in downstream since it will meet MoEF norms in terms of pH, TSS and Oil & grease. The wastewater recovery, as envisaged will considerably reduce the impact on the surface water quality. The recovered wastewater collected in a central monitoring basin will be reused with in plant premises and greenbelt/irrigation. Hence, no impact is envisaged on surface river water quality. The storm water in the project area will be collected through storm water drains and collected in the storm water tank. The stored storm water will be utilized in the plant operation or for service water resulting in conservation of fresh water.

There will not be any significant impact on the surface water quality as no major discharge is envisaged. The ash pond will be suitably lined with an impervious lining to avoid any leaching, there by finding its way into Ground water. So no impact on GW quality is anticipated.

4.3.7.2 Impact on River Ecology

There shall be no impact on the river ecology due to the proposed withdrawal of water as the water shall be withdrawn from River Ganga during monsoon only when high water level prevail and shall be pumped to store in the Upper Khajuri dam for use. Water will be pumped from Ganges during June to December only (covers Monsoon season as per the permission from Ganges . The required approvals from Irrigation department and CWC was already obtained.

The water shall not be withdrawn during the lean period i.e. from 1st January to 31st May, as per the Ganges Policy.

4.3.7.3 Impact on Drainage of the Area

The project area drains towards west into the existing nallah. Detailed Area Drainage study for the proposed project is being undertaken by M/s Minmec to study the impacts of the proposed project on hydrogeology and drainage. The proposed rain water harvesting in the project area will conserve the maximum quantity of rainwater run-off.

The rain and dust suppression water run-off from the coal storage area will be clarified in settling tank and the clear water will be routed to equalization tank. The separated coal dust will be recycled to coal storage area. Considering the above scenario, two different aspects for draining of the plant area and the surrounding agriculture land to the drainage has been considered:

- External drainage system taking care of the run-off being contributed from the agriculture land using garland drainage channel around project site area; and
- Internal drainage system for taking care of excessive rainfall within the plant site during the operational phase. Different techno-economically viable alternatives will be studied/ analyzed with respect to the plant layout so as to achieve best solution during the detailed engineering stage.
- Diversion drains on Eastern side and Southern side will be made to intercept surface run off from outside areas and diverted to nearest natural drains to maintain its existing natural drainage pattern.

4.3.8 Impact of Solid Wastes

Considering the expected coal quality, maximum 2.7 MTPA of ash will be generated from the proposed power plant while firing domestic coal. The details of the solid waste generation in the plant are given in Table-4.5.

TABLE-4.8

EXPECTED SOLID WASTE FROM POWER PLANT

Type of Solid Waste	Maximum Quantity	Mode of Disposal
Fly Ash	2.16 MTPA	Sent to cement industries in dry form. Unutilized ash will be disposed into lined ash pond
Bottom Ash	0.54 MTPA	
Clarifier sludge	0.6 MTPA	It will be disposed along with bottom ash.
Used Oil	70 KLPA	Will be supplied to authorized recyclers.

Canteen waste will be composted and used as manure for greenbelt maintenance.

With the implementation of the above precautionary measures, the impacts on the environment due to solid waste disposal are insignificant.

The ash management system will be designed as per the latest Fly Ash Notification 2009. The ash generated in the plant will be utilized to the maximum extent possible and balance will be stored in the ash pond.

4.3.9 Impact on Noise Levels

The main noise generating sources from the power plant will be steam turbine, pumps, compressors, cooling tower and boilers. The noise levels at the source for these units will be in the range of 80-90 dB(A). The major noise generating sources from the proposed plant are Boiler-Turbine-Generator, ID Fans. The noise levels at the boundary due to various plant activities will not exceed the norms. There will not be any adverse impact due to the noise generation on the habitations falling on the boundary of the proposed project.

4.3.9.1Impact on Occupational Health

The damage risk criteria as enforced by Occupational Safety and Health Administration (OSHA) to reduce hearing loss, stipulates that the noise levels up to 90 dB (A) are acceptable for 8-hour working per shift per day. There are no high noise equipments in the proposed power plant, except boilers. However, impacts on the working personnel are not expected to be significant on account of the high Level of automation of the plant which means that workers will be exposed for short duration only that too intermittently. Equipments will be provided with silencers. Workers will be provided with necessary protection devices eg. Ear plugs, ear muffs etc.

TABLE-4.9
MAJOR NOISE GENERATING SOURCES

Sr. No.	Sources	Noise Level in dB(A) [1-m away]	Nature of Noise
1	Turbine units	85	Continuous
2	Cooling tower	75	Continuous
3	Air compressors	85	Continuous
4	Boilers	85	Continuous

4.3.9.2Impact on Work Zone

Boilers and cooling towers are the high noise generating equipments in the proposed power plant However, impacts on the working personnel are not expected to be significant on account of the high Level of automation of the plant, which means that workers will be exposed for short duration only and that too intermittently. In addition all workers at the high noise environments will be provided with ear plugs/muffs to minimize any such exposure.

Hence, the impact on occupational health of workers would be insignificant.

4.3.9.3Impact on Community

As per the location of power plant the adequate distance will be kept between major noise sources and the outer periphery of the project site in the layout.

4.3.10 Prediction of Impacts on Socio-Economics

The requirement of unskilled manpower will be met from nearby villages during construction and operation phase. The proposed activities would generate more than 1000 direct and indirect employment in the region. The project will also contribute and improve physical infrastructure including transport facilities etc. This will be a positive socio-economic development for the region. There will be a general upliftment of standard of living in the region

Through a systematic well conceived CSR action plan will contribute for the development of education, environmental awareness, and empowerment of villagers.

4.3.11 Impact on Public Health and Safety

The discharge of waste (stack emission, wastewater and solid wastes) from process operations may not have potential impact on public safety and health as none are considered toxic. The adverse impacts on ambient air and soil quality are predicted to be low.

4.4 SUMMARY OF ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION

The summary of anticipated adverse environmental impacts and mitigation measures are given in Table-4.7.

TABLE-4.10
ANTICIPATED ADVERSE ENVIRONMENTAL IMPACTS AND MITIGATION

Discipline	Likely Negative Impacts	Probable Source	Mitigative Measures	Remarks
Constructional Impact				
Water Quality	Increase in suspended solids due to soil run-off during heavy precipitation	Loose soil at construction site	During monsoon season run off from construction site will be routed through a series of check dams for arresting the suspended solids.	
Air Quality	Increase in dust and NOx concentration	Leveling activity and Heavy vehicular movement	Sprinkling of water in the construction area and on unpaved roads. Proper maintenance of vehicles will be done. Use of vehicles meeting PUC norms	The impact will be low, as the main roads will be tarred.
Noise	Increase in noise	Construction Equipment	Equipment will be kept in good condition to keep the noise level within 90 dB(A).	Workers will be provided necessary protective equipments e.g. ear plug, earmuffs.
Terrestrial Ecology	Clearing of Vegetation	Soil enabling activities	Landscaping and extensive plantation will be done.	Stacking of top soil and utilizing it for Plantation
Socio-economics	Land oustees	Land Acquisition	Appropriate R&R Action Plan will be implemented	Land is being acquired on mutual basis after paying adequate compensation.

Operational Impact				
Water Quality	Deterioration of surface water quality	Discharge from various plant units	Most of the waste water generated is reused and recycled. Only <1% of input water is discharged to environment only after adequate treatment to conform to the UPPCB/ MoEF standards.	All treated effluents will be brought to the CMB equalization and will be used for horticulture and greenbelt development and any excess wastewater will be discharged into nearest nallah, which is dry most part of the time.
Air Quality	Increase in PM, SO_2 and NOx levels	Stack emissions and coal stockyards and CHP.	99.9% efficient ESPs will be installed to control Particulates. Stack of 275 m will be provided for the proper dispersion of pollutants. Motorable roads in the plant area will be paved to reduce dust emission. Afforestation programs will be undertaken around the plant area. Dust suppression measures will be implemented in the Coal Handling Plant and stockyards	The resultant air quality will conform to the stipulated Standards. Particulate emission from stack will be kept below 50 mg/Nm3.
Solid waste	Fly ash and bottom ash	From the ESPs	Fly ash will be supplied to cement industries and brick manufacturing units and excess will be disposed in ash pond.	Dust generation in ash pond will be controlled by maintaining water level
Ecology				
a. Terrestrial	Impact on plant species	Emissions from stack	Emission will be controlled as well as dispersed through appropriate design. Green belt being developed will be with	AAQ at the identified locations will be monitored and corrective steps if needed will be taken.

			local species and effort will be made to protect identified threatened species in collaboration with forest department	
b. Aquatic	Impact on water bodies	Treated waste water from plant	The wastewater will be provided with adequate treatment and used for green belt after equalization in CMB and the balance, if any will be disposed into nearest nallah which is dry most of the time.	No impact on aquatic ecology is anticipated as no direct discharge to aquatic bodies is envisaged.
Noise	Increase in noise levels in the plant area	Equipment in main plant and auxiliaries	Equipment will be designed to conform to occupational noise levels prescribed by regulatory agencies. Provision of green belt and plantation would further help in attenuating noise.	Employees working in high noise areas would be provided earplugs/earmuffs as protective device.
Demography and Socio-economics	Strain on existing amenities like housing, water sources and sanitation, medical and Infrastructure facilities.	Influx people proposed power plant employees as well as Contractor's employees/ labor.	Local population will be given preference in awarding work No significant impact is envisaged. An extensive CSR activity will be undertaken to increase the education & awareness levels, sanitation, etc. Additional facilities will be developed by the project proponents.	Overall socio-economic status of the area is expected to improve.

4.5 PROPOSED MITIGATION MEASURES DURING CONSTRUCTION

The impacts during the construction phase on the environment would be basically of transient nature and are expected to reduce gradually on completion of the construction activities.

4.5.1 Site Preparation

The project site terrain is slightly undulated and therefore dozing or leveling may only be to some extent Vegetation on topsoil will be removed prior to commencement of bulk earth work. During dry weather conditions, dust may be generated by activities like excavation and transportation through flexible/ rigid pavements as per functional requirement roads. The dust suppression would be arrested by using water sprinklers.

Appropriate vegetation shall be planted and all such areas shall be landscaped. Hazardous materials shall be stored in proper and designated areas.

4.5.2 Water Quality

During construction period, the water quality is likely to be affected due to the construction work and loosening of topsoil. In order to reduce the impact on water quality, series of check dams shall he constructed for the arresting of the suspended matter. There is no likely hood of ground water contamination as there will not be any process effluents during construction.

4.5.3 Air Quality

During construction period, there is likely hood of generation of dust and NOx emissions. . The transport vehicles using petrol or diesel shall be properly maintained to minimize smoke in the exhaust Water sprinkling is proposed to address this issue. Since there is likelihood of fugitive dust from the construction activity, material handling and from the truck movement in the premises of the proposed plant the power plant shall go for tree plantation program along the boundaries of the proposed plant site.

4.5.4 Noise

The noise impact on the surrounding population during the construction phase will be within the acceptable limits. High noise generating equipment, if used,

shall not be operated during the night to eliminate any possible discomfort to the nearby residents. Community noise levels are not likely to be affected because of the vegetation and likely attenuation due to the physical barriers. The following recommendations shall be implemented:

- 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.

4.5.5 Ecological Aspects

During construction period, there could be clearing of vegetation in order to prepare the site for construction. However, this will be mitigated by proper landscaping and extensive plantation as per green belt development Plan along with the construction of the plant. Similarly, aquatic life observed in the nearby streams is common in nature and these do not harbor any endangered species. A scientific green belt program will improve the ecology of the region.

4.5.6 Migrant Laborers

Safe and secure camping area shall be provided for the migrant laborers during the construction period. Contractors shall be directed to provide adequate arrangements for water supply, sanitation and cooking fuels.

The construction site shall be provided with sufficient and suitable toilet facilities for workers to allow proper standards of hygiene. These facilities would be connected to a septic tank and maintained to ensure minimum environmental impact.

4.6 PROPOSED MITIGATION DURING OPERATIONAL STAGE

The design basis for all process units will lay special emphasis on measures to minimize effluent generation and emission control at source. The specific control measures related to gaseous emissions, liquid effluent discharges, noise generation, solid waste disposal etc. are described below:

4.6.1 Air Quality

4. 6.1.1Reduction of Emission at Source

Major pollutants envisaged from the proposed power plant are Particulate Matter, Sulphur dioxide, Oxides of Nitrogen and Fugitive dust The baseline ambient air quality levels in the project area are within the permissible limits as specified by regulating agency. The following methods of abatement will be employed for the air pollution control.

- Particulate matter shall be controlled below 50 mg/Nm3 by providing efficient Electrostatic Precipitators (ESPs);
- Further, a stack of 275 m height shall be provided for adequate dispersion of sulphur dioxide;
- Emission of NOx will be controlled by designing low NOx burners;
- Adequate dry fog dust suppression system and water sprinkling system shall be installed in the material handling system transfer points;
- Green belt shall be developed scientifically. Plantation along the internal roads in the plant premises will also be done.
- All the internal roads shall be paved as per functional requirement to reduce the fugitive dust due to vehicular movement; and
- Water spraying will be practiced frequently at coal stockyard.
- Ash pond will be maintained wet always by maintaining a water layer on top.
- Speed control and regular vehicle maintenance will be made mandatory with the plant
- Fly ash movement if any will be through closed bulkers
- Dry ash silos will be provides with bag filters

4.6.1.2Stack Monitoring

The emissions from the stack will be continuously monitored for exit concentration of Sulphur dioxide, Oxides of Nitrogen and Particulate Matter. Sampling ports shall be provided in the stacks according to CPCB guidelines. A stack of 275 m height shall be provided for adequate dispersion of pollutants.

4.6.1.3Ambient Air Quality Monitoring

The concentration of PM, SO_2 and NOx in the ambient air outside the project boundaries and in the adjoining villages shall be monitored in up wind and down wind direction , consulted with the State Pollution Control Board. The data shall be statistically analyzed and compared against the pre-project baseline data.

4.6.1.4Meteorological Observations

The dry bulb temperature, wet bulb temperature, wind speed, wind direction, cloud cover, rainfall and solar radiation shall be monitored and recorded daily.

4.6.2 Water and Wastewater Management

The water requirement for the proposed plant will be drawn from Upper Khajuri dam. Out of the total waste water generation at source will be of 888 m^3/hr, , 860 m^3/hr of domestic, sanitary and service waste water will be suitably treated and utilized for greenbelt development, ash handling dust suppression, service etc. The remaining 28 m^3/hr of treated wastewater will be discharged to the nearest nalah/water body, in case of emergency. The quality of treated effluent from the plant will conform to UPPCB/ MoEF standards.

4 .6.2.1Water Conservation Measures

The treated wastewater will be used for dust suppression in CHP, service water Ash handling plant dust suppression in ash dumps and for greenbelt development .Continuous efforts shall be made to reduce the fresh water consumption and through improving recycling practices at source . Flow meter shall be installed at all major water consumption points and the flow rates shall be continuously monitored. Periodic water audits shall be conducted to explore the possibilities for minimization of water consumption.

4.6.2.2Effluent 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, MoEF Notification, 1993.

Either gravity or mechanical Oil-water separators will be provided if needed to separate the oil from oil-water sewers from transformer area, , fuel oil tank dyke

area, etc. The clear water will be taken to CMB. The separated oil will be disposed-off to as per MoEF norms. The clarifier sludge from the water pre-treatment plant will be pumped to Ash handling plant and disposed to ash dyke.

The runoff water from the coal yard & Coal conveyors shall be led to a set of settling pits for settling of coal particles. The supernatant water shall be re-used for dust suppression system. Excess water shall be pumped back to CMB. The settled coal particles shall be periodically removed, dried and re-used or disposed.

The proposed waste management schemes are given in **Table-4.8**

TABLE-4.11

WASTE MANAGEMENT AT PROPOSED TPP

Type of Waste	Significant Parameters	Treatment Proposed
Condenser Cooling water	Temperature	The waste will be collected in CMB and subsequently diluted and temperature will be brought down
Demineralization Plant Waste	pH (4to 10) TDS (5000 mg/fl	pH Neutralization and equalize with other effluents in CMB
Service Water System	Oil and Grease Suspended Solids	The waste containing oil and grease will be treated in oil separator and the treated water will be routed to CMB
Sanitary Effluents	BOD(200-250 mg/I) TSS (300-450 mg/fl	The waste will be treated in septic tank followed by soak pit

Effluent monitoring instruments like pH meter, flow meter etc., to be provided in the effluent discharge line. Flow integrators to be provided both at the plant intake and discharge point at central effluent holding pond. Apart from the proposed treatment schemes, some additional measures are given hereunder:

The quality of treated effluent from the plant at CMB will conform to UPPCB/MoEF standards as given in table-4.9.

TABLE-4.12
EXPECTED OUALITY OF TREATED EFFLUENT

Parameters	**Unit**	**Quality of Treated Effluent**
pH	-	**6.5-8.5**
Temperature	**°C**	Not more than 5°C higher than ambient
Total suspended solids	mg/l	<100.0
Oil and Grease	mg/l	<10.0
BOD	mg/l	<30.0
Available chlorine	mg/l	<0.5
copper	mg/l	<1.0
Iron	mg/l	<1.0
Zinc	mg/l	<1.0
Phosphate	mg/l	<5.0

4.6.3 Noise Impact & Mitigation

The resultant noise levels due to the proposed power plant will be less than 50 dB (A) near the plant boundaries in all the directions.

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**

- 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. The silencers and mufflers of the individual machines shall be regularly checked.
- 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.
- Proper precaution will be taken to keep noise level within prescribed limits.
- The enclosure of STG and other major equipments in plant area will be designed for noise attenuation to reduce noise level to 85 dB (A) at 1 m distance.
- The ambient noise level at 120 metres from any part of the plant boundary shall not exceed 63 dB (A).
- Machines shall be housed in building & provided with acoustic enclosures as required to maintain noise levels within limits.
- The operator's cabins (control rooms) shall be properly insulated with special doors and observation windows.

4.6.4 Solid Waste

The main solid waste from the proposed power plant will be ash (fly ash and bottom ash). Considering worst coal quality with 40% ash content, a maximum of about 2.70 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. 0.54 MTPA and the fly ash will be remaining 80% of the total ash generated i.e. about 2.16 MTPA.

It is proposed to utilize the entire fly ash generated from the project for cement and brick manufacturing. 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. Lining of permeability of less than 10^{-6} will be provided in the ash pond in order to arrest any seepage of ash pond water into groundwater.

4.6.4. 1Perspective Ash Utilization Plan

The ash generated from the proposed power plant shall be managed in the following ways:

- Most of Fly ash generated is proposed to be extracted and disposed in dry form by setup of silos.
- Bottom ash would be disposed in slurry mode.
- Fly ash would be used in making value added products as in cement production, bricks manufacturing, , low lying area filling, for road construction and other usages. M/s Prism Cements and M/s Chunar Cement Factory have shown inclination to lift to max of 2.0 and 1.0 MMTPA fly ash respectively to their grinding unit.
- The rest of the ash will be utilized for brick making and low lying area filling.
- Unused fly ash, if any shall be disposed in slurry mode to the ash pond with provision of recovery of ash water.
- Ash pond of adequate area which can hold ash for designated period has been planned
- A blanket of water shall be maintained over the ash pond to control fugitive dust emission.
- Action Plan for 100 % Fly Ash utilization has been proposed as per the MoEF notification in the table below:

TABLE-4.13
100% FLY ASH UTILIZATION PLAN

Year	Fly Ash generation (MTPA)	Target for Ash utilization (MTPA)	Area-wise utilization (MTPA)					Total Ash Utilization in MTPA	% Utili-zation
			Cement/ Concrete	Road / low lying area	Agriculture / Wasteland Develop. /horticulture@	Brick/ block, etc	Mine-fill		
1st	2.16	1.08	0.98	0.0	0.0	0.1	0.0	1.08	50
2nd	2.16	1.51	1.41	0.0	0.0	0.1	0.0	1.51	70
3rd	2.16	1.94	1.54	0.1	0.1	0.2	0.0	1.94	90
4th	2.16	2.16	1.56	0.2	0.1	0.3	0.0	2.16	100

@ on experimental basis

TABLE-4.14
Bottom Ash Utilization Plan

Year	Bottom Ash generation (MTPA)	Target for Ash utilization (MTPA)	Area-wise utilization (MTPA)					Total Ash Utilization in MTPA	% Utili-zation
			Cement/ Concrete	Road	Filling low lying area	Brick/ blocks, etc	Mine-fill		
1st	0.54	0.27	0.00	0.25	0.02	0.00	0.00	0.27	50
2nd	0.54	0.378	0.00	0.30	0.078	0.00	0.00	0.378	70
3rd	0.54	0.486	0.00	0.32	0.166	0.00	0.00	0.486	90
4th	0.54	0.54	0.00	0.40	0.04	0.00	0.00	0.54	100

The following initiatives may be undertaken from the construction stage of power plant of WEUPPL:

- Constitute a separate group at WEUPPL (2-3 experts having knowledge in chemistry of fly ash) for handling, collection, storage, management and utilization of fly ash.
- Fly Ash from nearby operating power projects (about 300 km from WEUPPL project site) may be used for all the project construction activities, namely, brick/ block making and as a part substitute of cementitious material in all the cement concrete works based on mix design.
- Set-up an in-house fly ash brick manufacturing unit in WEUPPL premises. The decision regarding the size/ type of plant may be taken as per requirement.

The above activities will create confidence building amongst the decision makers, officers and staff of WEUPPL and other stakeholder agencies regarding use of fly ash in various areas.

WEUPPL may also take following initiatives for bulk use of fly ash in various areas after the start of generation of fly ash:

i) Brick manufacturing:

Close interaction with fly ash & clay brick manufacturers, district administration in the region may be made and proper guideline/ technology may be provided along with some subsidy in transportation costs. Technical support, if required, may be taken from the technology institutes, namely, CBRI-Roorkee, IMMT-Bhubaneshwar, AMPRI-Bhopal, NIIST-Trivandrum and FTMA-Noida.

ii) Road embankment:

To interact with agencies, i.e. PWD, Irrigation Dept. and Rural Engg. Services (RES) and hold meetings for creating awareness regarding MoEF notification for use of fly ash in all the construction activities in place of soil in line with the manual/ guidelines issued by Indian Road Congress.

iii) Cement & concrete:

Set-up grinding units at site or close proximity for production of PPC which can consume at least 1 million tonne per year dry fly ash by tie up with the cement plants. MoUs have been made with Cement Manufacturing Industries for Utilization of Ash (Fly+ Bottom) in cement manufacturing Process. Documents are enclosed as ***Annexure- 6-A, 6-B.***

- WEUPPL may install silos (2000 tonne capacity each),to facilitate dry ash collection & handling to supply to brick manufacturers and cement companies.
- WEUPPL may explore to set-up small units for value added products based on the technologies developed/ available.
- WEUPPL may consider incentivize the lifting/ transportation of fly ash by private fly ash brick manufacturing units and for agricultural applications.
- Establish a Dispute Settlement Committee headed by the GM of the power plant with members from Brick Manufacturer Association, construction agency etc.

5.0 ENVIRONMENT MANAGEMENT PLAN

The environmental management plan consists of the set of management, monitoring and institutional systems to be observed during implementation and operation of the project activity to minimize the adverse environmental impacts to acceptable levels. The environmental management plan addresses, the components of environmental affected during construction of the plant and by the different activities in implementation of the Coal based Thermal Power Plant. Based on the evaluation of impacts and baseline conditions, an Environmental Management Plan (EMP) has been delineated to mitigate the adverse impacts on environment of the area due to the Proposed 2 X 660 MW Super Critical Coal Based Thermal Power Plant at Village: Dadri Khurd, Tehsil: Mirzapur Sadar, District: Mirzapur (U.P.).

5.1 IMPLEMENTATION OF MITIGATION MEASURES

The mitigation measures suggested in Chapter-4 shall be implemented so as to reduce the impact on environment due to the operations of the proposed power project. The implementation of construction activities mitigation measures will have to be started from day one and continue till the activity completes. In order to facilitate easy implementation of mitigation measures, the phased priority of implementation is given in **Table-5.1**.

TABLE-5.1
IMPLEMENTATION SCHEDULE

Sr. No.	Recommendations	Time Requirement	Schedule
1	Air pollution control measures	Before commissioning of respective units	Immediate
2	Water pollution control measures	Before commissioning of the plant	Immediate
3	Noise pollution control measures	Along with the commissioning of the Plant	Immediate
4	Ecological conservation & improvement	Stage wise implementation	Progressive
5	Socio Economic improvement	Phased implementation	progressive

5.2 ENVIRONMENTAL MONITORING

The environmental monitoring for the proposed plant operations shall be conducted as follows, during construction and as applicable, during operation:

- Air quality;
- Water and wastewater quality;
- Noise levels;
- Soil Quality and
- Greenbelt Development.

5.2.1 Post Project Monitoring During Construction Stage

During construction period, the monitoring shall be done as per the conditions stipulated by UPPCB in the Consent to Establish & the detailed monitoring schedule for the sampling location, monitoring frequency, duration of sampling for all the important parameter shall be made accordingly.

5.2.2 Post Project Monitoring During Operation Stage

The monitoring schedule during operation phase shall be as per the conditions stipulated in the Environmental Clearance & Consent to Operate. However, following is the tentative schedule for monitoring proposed:

TABLE-5.2
POST PROJECT MONITORING SCHEDULE FOR ENVIRONMENTAL PARAMETERS
(After the project is commissioned)

Sr. No.	Particulars		Monitoring Frequency	Duration of Sampling	Important Monitoring Parameters
1	**Air Pollution and Meteorology**				
	A	Ambient Air Quality Monitoring			
	1	Six Locations specified by UPPCB	Twice in a week	24 hr continuously	PM_{10}, $PM_{2.5}$ SO_2, NOx and Hg
	2	Source emission	Monthly	Grab sampling	PM, SO_2, NOx, CO, temperature, exit velocity etc.

Sr. No.	Particulars		Monitoring Frequency	Duration of Sampling	Important Monitoring Parameters
			On-line	Continuous	SPM, SO_2 and NOx concentration
	B	Meteorology			
	1	Meteorological data to be monitored at the proposed plant site.	Daily	Continuous	Wind speed, direction, temperature, relative humidity, Rainfall
2	**Water and Wastewater Quality**				
	A	Wastewater			
	1	Effluent discharge/outlet	Once in a week	Grab sampling	pH, Temperature, EC, Free chlorine, SS, TDS, O&G, Cu, Fe, Zn, Cr, Phosphate
	2	outlet of Sewage discharge point	Once in a week	Grab sampling	pH, SS, BOD, COD, DO, O&G
	B	Water Quality in the Study Area			
	1	Surface Water – Jamutwa river and Upper Khajuri Dam	Once in a quarter	Grab	pH, DO, BOD, TDS, hardness, Cl, SO_4, NO_3, Ca, Mg, Na, K, Cu, Cr, Cd, CN, , Pb, Zn, O&G, Total coliforms
	2	Ground Water- Four Locations	Once in a quarter	Grab	As per the parameters specified under IS:10500; Ground water levels
3	**Noise Levels**				
	A	Industrial Noise Levels			
	1	GT House, Cooling Tower, Plant gate, administration building	weekly	24 hr continuous with 1 hr interval	Noise level in dB(A)
	B	Ambient Noise Levels			
	1	Three Locations in the nearby villages /	Quarterly	24 hr continuous	Noise levels in dB(A)

Sr. No.	Particulars		Monitoring Frequency	Duration of Sampling	Important Monitoring Parameters
		or as specified by UPPCB		with one hr interval	
4	**Soil**				
	1.	samples in nearby villages on need basis	Pre-Monsoon and Post-Monsoon (Six monthly)	One Grab sample	Colour, pH, Electrical Conductivity, Bulk Density, Organic matter SAR, , Zn, Cd, N, P, K, Infilteration Rate.
5	**Green Belt & Ecology**				
		Monitoring of progress	Yearly post monsoon	NA	Survival percentage, health & growth of specific species, observation on ecological health

5.3 ENVIRONMENT MANAGEMENT RECORDS

The power plant shall establish and maintain a system of records to demonstrate compliance with the environmental management systems and the extent of achievement of the environmental objectives and targets. In addition to the other records (legislative, audit and review reports), management records shall address the following:

- Details of compliance and corrective action in case of any shortfall;
- Grievance redress mechanism and follow-up action;
- Inspection and maintenance reports by regulators, consultants, third party;
- Monitoring data;
- Environmental training action plans & records.
- Management Information system and MOM

5.4 ENVIRONMENTAL MONITORING LABORATORY

A well-equipped laboratory with consumable items will be provided for monitoring of basic environmental parameters. Specialized monitoring will be outsourced to a recognized laboratory.

Following equipment and consumable items will be procured by the project proponent to implement the monitoring programme as given in **Table-5.3**.

TABLE-5.3

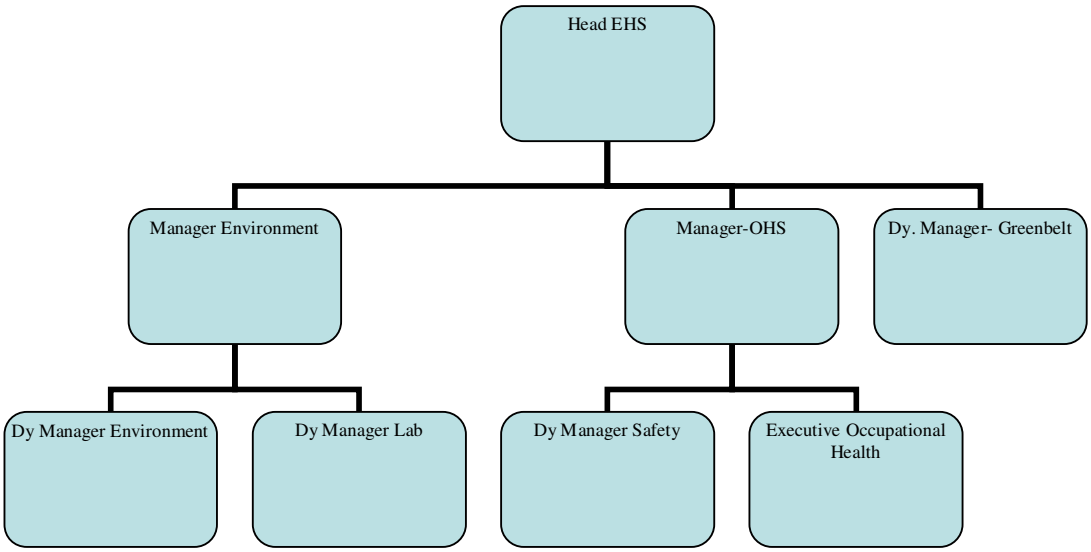
EQUIPMENT FOR ENVIRONMENTAL LABORATORY

Name of Equipment	Number
Fine Particulate Sampler / Respirable dust samplers	Six units
Stack monitor	One unit
On-line flue gas analyser	One unit
Automatic Weather monitoring station	One unit
Sound level meter	Two units
UV – Spectrophotometer	One unit
Atomic Absorption Spectrophotometer	One unit
Mercury Analyser	One
Micro-balance	One unit
BOD Incubator	One
COD reflux set up	One
Refrigerator	One
Oven	One
Dry & wet bulb Thermometer	One
pH & Conductivity ,DO meter	One
Distilled water plant	One
Glass ware & Consumables	As per requirement

5.5 ENVIRONMENTAL MONITORING CELL

A centralized environmental monitoring cell will be established for monitoring of important and crucial environmental parameters and manage the EMP implementation. The cell will have qualified environmental scientists and

engineers reporting to the head of the power plant. The EMC also will have horticulture expert to take care of green belt & ecological aspects. The suggested organizational structure for the EMC will be as below:



5.6 GREENBELT DEVELOPMENT

The main objective of the green belt is to provide a barrier between the plant and the surrounding areas. The green belt helps to capture the fugitive emissions and to attenuate the noise generated in the plant apart from improving the aesthetics of the plant site. In order to control the industrial pollutants, scientific tree plantations are necessary.

5.6.1 Design of Green Belt

A 50 -100 m wide greenbelt, consisting of at least 3 tiers around plant boundary will be developed as greenbelt and green cover as per CPCB, New Delhi guidelines. The plant density of 2,500 trees per hectare with local native species will be implemented. The expenditure on development and maintenance of green belt is of revenue nature and sufficient fund shall be provided to meet the requirement. The plantation schedule will be completed within five years from the construction period of the project. The plantation schedule is given in Table-5.4. The plant layout showing Green Belt Development is placed in **figure no. 5.4**

TABLE-5.4
GREENBELT DEVELOPMENT PLAN

Sr. No.	Year	Area (ha)	No. of saplings
1	1st	16	40000
2	2nd	20	50000
3	3rd	24	60000
4	4th	27	67500
5	5th	28.3	70750
Total		**115.3**	288,250

- **Plant Species for Greenbelt**

While selecting the plant species for the proposed green belt the following points shall be taken into consideration:

- Should be a fast growing type;
- Should have a thick canopy cover;
- Should be perennially green;
- Should be preferably of native origin; and
- Should have a large leaf area index.

- **Criteria for Selection of Species**

Species to be selected should fulfill the following specific requirements of the areas:

- Availability of seed material;
- Tolerance to specific conditions or alternatively wide adaptability to eco-physiological conditions;
- Rapid growth;
- Capacity to endure water stress and climatic extremes after initial establishment;
- Differences in height growth habits and shapes;
- Pleasing appearance;
- Capacity to selectively concentrate some materials from the surroundings;
- Providing shades;

- Large bio-mass and leaves number to provide fodder and fuel;
- Ability of fixing atmospheric Nitrogen; and
- Improving waste lands.

The pits should be watered prior to plantation of seedlings.

➢ **Recommended Species for Plantation**

The recommended plants for greenbelt are presented in Table-5.5

TABLE-5.5
RECOMMENDED PLANTS FOR GREENBELT

S. No.	Types of Plants	Common Name	Botanical Name
1.	Large Size Trees	Australian Babul	*Acacia auriculaeformis*
2.	Large Size Trees	Amaltas	*Cassia fistula*
3.	Large Size Trees	Neem	*Azadirachta indica*
4.	Large Size Trees	Pipal	*Ficus religiosa*
5.	Large Size Trees	Sagon	*Tectona grandis*
6.	Large Size Trees	Khair	*Acacia cathechu*
7.	Large Size Trees	Babul	*Acacia nilotica*
8.	Large Size Trees	Semal	*Bombax ceiba*
9.	Large Size Trees	Sandan	*Cassia siamea*
10.	Large Size Trees	Shishu	*Dalbergia sisoo*
11.	Medium Size Trees	Van tulsi	*Eranthemum purpurascens*
12.	Medium Size Trees	Aam	*Magnifera indica*
13.	Medium Size Trees	Mahua	*Madhuca indica*
14.	Medium Size Trees	Ber	*Ziziphus xylopyra*
15.	Large Size Trees	Imli	*Tamarindus indica*
16.	Large Size Trees	Arjun	*Terminalia arjuna*
17.	Large Size Trees	Ashok	*Polyathia longifolia*
18.	Medium Size Trees	Karanj	*Pongamia pinnata*
19.	Large Size Trees	Paraspipal	*Ficus arnottiana*
20.	Large Size Trees	Bargad	*Ficus bengalensis*
21.	Large Size Trees	Gular	*Ficus racemosa*
22.	Large Size Trees	Bel	*Aegle marmelos*
23.	Medium Size Trees	Kusum	*Scleichara oleosa*
24.	Large Size Trees	Jamun	*Syzygium cumini*
25.	Large Size Trees	Kadamba	*Anthocephalus cadamba*
26.	Large Size Trees	Gulmohar	*Delonix regia*
27.	Shrubs	Tulsi	*Ocimum sanctum*
28.	Medium Size Trees	Champa	*Plumeria rubra*

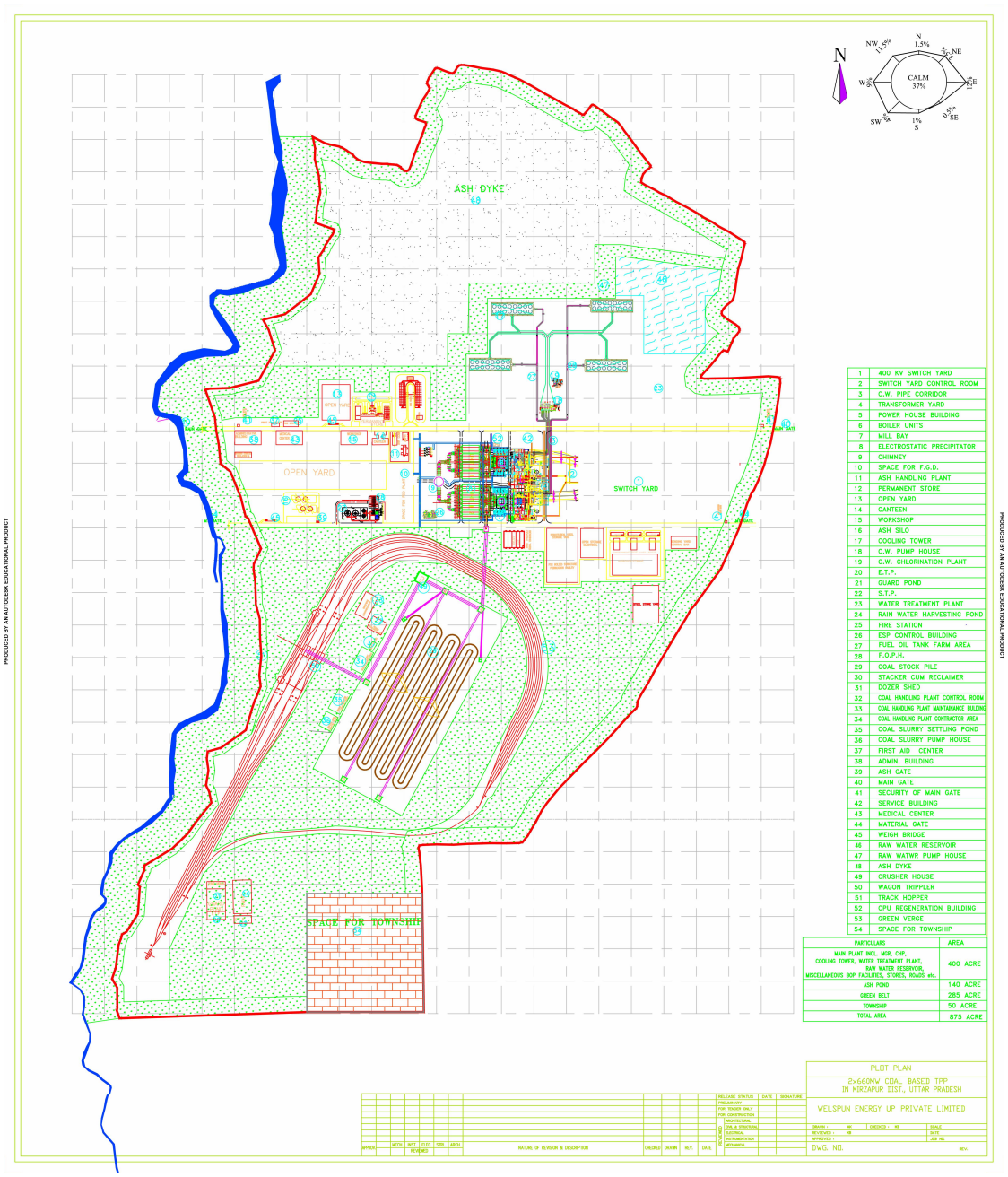


FIGURE-5.1

GREENBELT DEVELOPMENT PLAN

5.7 CLEAN DEVELOPMENT MECHANISM (CDM)

The proposed 2 x 660 MW power plant will be operated on super-critical technology. The expected heat rate of the power plant will be about 2268 Kcal/KWh (domestic coal).

GHG reduction measures for the project are being explored. However, energy conservation measures will be considered, which may reduce generation of Green House Gases (GHG). It has conceptualized the project to go for CDM registration with the United Nations Framework Convention on Climate Change (UNFCCC) to avail Certified Emission Reductions (CERs). Since it is more efficient way of generating power through coal they are eligible for CDM activity. The project activity is expected to generate approximately 800,000 CERs annually.

5.7.1 Clean Development Mechanism (CDM) for the proposed project

The plant and facilities will be installed to minimize the green gas emissions, by adopting advanced combustion technologies. Reduction in emission of carbon dioxide into the environment will be achieved by adopting advanced coal preparation and firing systems along with appropriate design of furnace to achieve good combustion regime resulting in reduction of CO/CO2/NOx to sustainable development. Global warming can be reduced with by adopting advanced super critical technologies.

5.7.2 Abatement of Green House Gas (GHG) emissions

Welspun proposes to implement the project activity in a way so as to ensure maximum global and local benefits in relation to certain environmental issues.

The project uses supercritical technology which by improving the generation efficiency will generate more power for the same quantity of coal fired. As steam is generated under supercritical conditions, the efficiency of steam generation will be significantly higher than that of the conventional technology (sub-critical technology). Higher steam generation efficiency and hence higher efficiency of the overall power generation cycle that in lower specific coal (i.e. fossil fuel) consumption, thereby fulfilling the projects commitment to environmental well being.

The project fulfils the following objectives:

- Reduction in fossil fuel (coal) consumption through higher efficiency
- Conservation of depleting non renewable natural resources like coal
- Reduction in GHG emissions associated with power generation
- Bridging the demand-supply gap of electricity in India by enhancing installed capacity base of the regional and/or national grid

This in turn will also help the company in generating CERs. The Project Idea Note (PIN), Project Concept Note (PCN) and Project Design Document (PDD) is under preparation.

5.8 BUDGETARY ALLOCATION FOR ENVIRONMENTAL MANAGEMENT

An investment of about Rs. 466.0 Crores on pollution control, treatment, monitoring systems and green belt development as well as other pollution control activates.

A detailed budgetary allocation for Environment Protection is presented in **Table-5.6**.3

TABLE-5.6

PROPOSED COST PROVISION FOR ENVIRONMENTAL MEASURES

Sr. No.	Description of Item	Capital Cost	Recurring Cost
		Rs. In Cr.	Rs. In Cr.
1	ESP	180.00	4.50
2	Stacks	60.00	0.60
3	Ash dyke/pond	55.00	1.50
4	Effluent treatment facility	7.00	0.20
5	Dust suppression system	2.00	0.05
6	Control of Fire and Explosion hazards	27.00	0.65
7	Noise Abetment		0.00
8	Env. Lab equipment and on line monitoring system	6.00	0.06
9	Green belt	3.50	0.03
10	STP	2.00	0.02
11	WTP effluent management facility	0.20	0.10
12	Rain water Harvesting pond	2.70	0.07
13	Chlorine leakage detection system	0.60	0.01
14	Cooling tower	70.00	0.70
15	Dry fly ash collection facility	50.00	1.50
		466.00	**9.90**

5.9 CONCLUSION

Based on the above referred Environment Management Plan, it can be concluded that the project is not likely to cause any significant adverse impact on the ecology of the area, as adequate preventive measures will be adopted to keep the various pollutants within permissible limits. Green belt development around the area would also be taken up as an effective pollution mitigation technique, as well as to control the pollutants released from the premises of WEUPPL.

6.0 ANALYSIS OF ALTERNATIVES

Introduction

The alternatives for establishing the power project and its design looking at economic, environmental considerations. Various alternatives like;

- alternative sites
- Alternate technologies
- Alternate fuel

have been considered in this case.

6.1 Alternate Sites

WEUPPL has identified three sites in Mirzapur & Sonbhadra districts of Uttar Pradesh for setting up of the proposed 2x660 MW Super Critical TPP.

These project locations were considered and examined on the following grounds:

1. Environmental Setting criteria issued by MoEF,
2. Proximity to Fuel supply and water,
3. Minimum displacement of human population,

Based on the analysis on above criteria, the selected site at Dadri Khurd, Mirzapur was found most suitable. This was presented to MoEF and accordingly on 15th June 2011, EAC (Thermal) has recommended and approved the site for issue of ToR.

6.2 Alternate Fuels

Alternate fuels for thermal power generation considered include liquid fuel, natural gas/LNG, lignite & Coal. These are discussed in brief as follows:-

- **Liquid Fuel**

The environmentally use of HFO is not acceptable due to its high sulfur content and there by necessitating FGD to meet norms. The other Liquid fuels like LDO,

LSHS are scarce in availability in quantities for a power plant of this size and for base load operations like this plant. The cost of all these is also is not competitive. The price is volatile and dependent on international markets which may bleed foreign exchange.

- **Natural Gas/LNG**

Though Natural gas is a clean fuel, presently the domestic natural gas availability is limited and is already committed. The chosen location of power project has no logistics for bringing natural gas. No pipeline exists nearby. Special pipeline need to be laid which makes the project unviable.

- **Lignite**

Lignite resources in country are limited to Rajasthan and Tamil Nadu. Transportation of this fuel from those places will be no advantage environmentally & economically. Therefore use of Lignite for power generation is unviable in this case.

- **Coal**

Use of coal is considered due to its Long term availability nearer to the proposed site and its low sulfur content as well as acceptable calorific values within its limitation. The availability of coal reserves with in 100 Kms from the site and enabling dedicated railway line will ensure the uninterrupted supply of fuel. The required coal linkage has already been applied and awaiting allocation for the 12th Plan power projects. . As an interim arrangement, WEUPPL is also in process to undertake feasibility for supply of Imported Coal from various sources, though it may have certain level of economic impact on the project.

Also, since long term availability scenario of coal seems to be better, the present study considers use of coal from indigenous sources.

6.3 Alternate Technology

The boilers based on super critical technology has been opted for this project over the conventional sub critical technology due to the following environmental benefits

- The specific coal consumption of super critical boilers is less than the conventional boilers
- The reduction of GHG gases and other pollutants due to fuel combustion
- Higher efficiency of the super critical over sub critical
- Heat rejection to condensers and cooling tower will be less. Hence less thermal pollution.

In view of the above the plant of 2X660 MW capacity with super critical technology was adopted in this case.

6.4 No project alternative

The economic growth of any country depends upon the availability and consumption of energy. The level of development of a country is measured in terms of per capita energy consumption. Presently India's per capita energy consumption at 717 KWh/year (during 2007-08), which is less than that of other developing countries like China (1891) and Malaysia (1000) leave aside the developed countries like USA, Sweden etc.

The present installed capacity in India is around 1,49,111 MW as on 31st May, 2009 and requires significantly more generating capacity to match the pace of development taking place in the country as well to bridge the gap between demand and supply. Government is aiming to increase the present installed capacity to 200,000 MW by 2012 and aiming per capita energy consumption of 1000 kwh/year. The investment from public and private sector for capacity addition shall help the nation to achieve the energy availability.

Table: 6.1

LONG TERM FORECAST OF POWER DEMAND

Sr. No	Region	Electrical Energy Requirement (TWh)			Peak Electric Load (GW)		
		2011-12	2016-17	2021-22	2011-12	2016-17	2021-22
1	Northern	294.8	411.5	556.8	48.1	66.6	89.9
2	Western	294.9	409.8	550.0	47.1	64.3	84.8
3	Southern	253.4	380.1	511.7	40.4	60.4	80.5
4	Eastern	111.8	168.9	258.2	19.1	28.4	42.7
5	North-Eastern	13.3	21.1	37.0	2.5	3.8	6.2
6	**All India**	968.7	1392.1	1914.5	152.7	218.2	298.3

***Source**: "Long Term Forecast at Power Station Bus Bars", 17th Electric Power Survey (EPS) of India, Central Electricity Authority (CEA)*

As can be seen from above the demand in northern region is the highest and In order to narrow down the bridging of gap between supply and demand, the proposed capacity addition by 2x660 MW TPP, which will yield benefits in the 12th Plan gets justified, due to projected deficit in the Northern Region. In the absence of the project the demand supply gap continue to exist and there by hampering the progress and economic activity of the region.

The power sector is capital intensive and needs support from private sector too in achieving the power generation target to bridge the gap. With open access of the transmission lines now available and power trading possible, the merchant power plants can sell electricity to registered power traders, who will in turn identify buyers for the power. The no project scenario will add to furthering the deficit, which is undesirable.

7.0 ADDITIONAL STUDIES

This chapter describes the social impacts, Risk Assessment and Disaster Management Plan and Socio-economic development activities and other additional studies carried out.

The following Additional Studies has to be done in reference to the additional Terms of References; details have been mentioned in the relevant paragraphs mentioned below:

A) Public Hearing Consultation

B) Risk Assessment

C) Disaster Management Plan

D) Emergency Action Plan

E) Hydro geological Study & Rain Water Harvesting Plan

F) Harvesting Solar Power

G) Need based assessment studies

H) Resettlement Plan

7.1 PUBLIC HEARING CONSULTATION

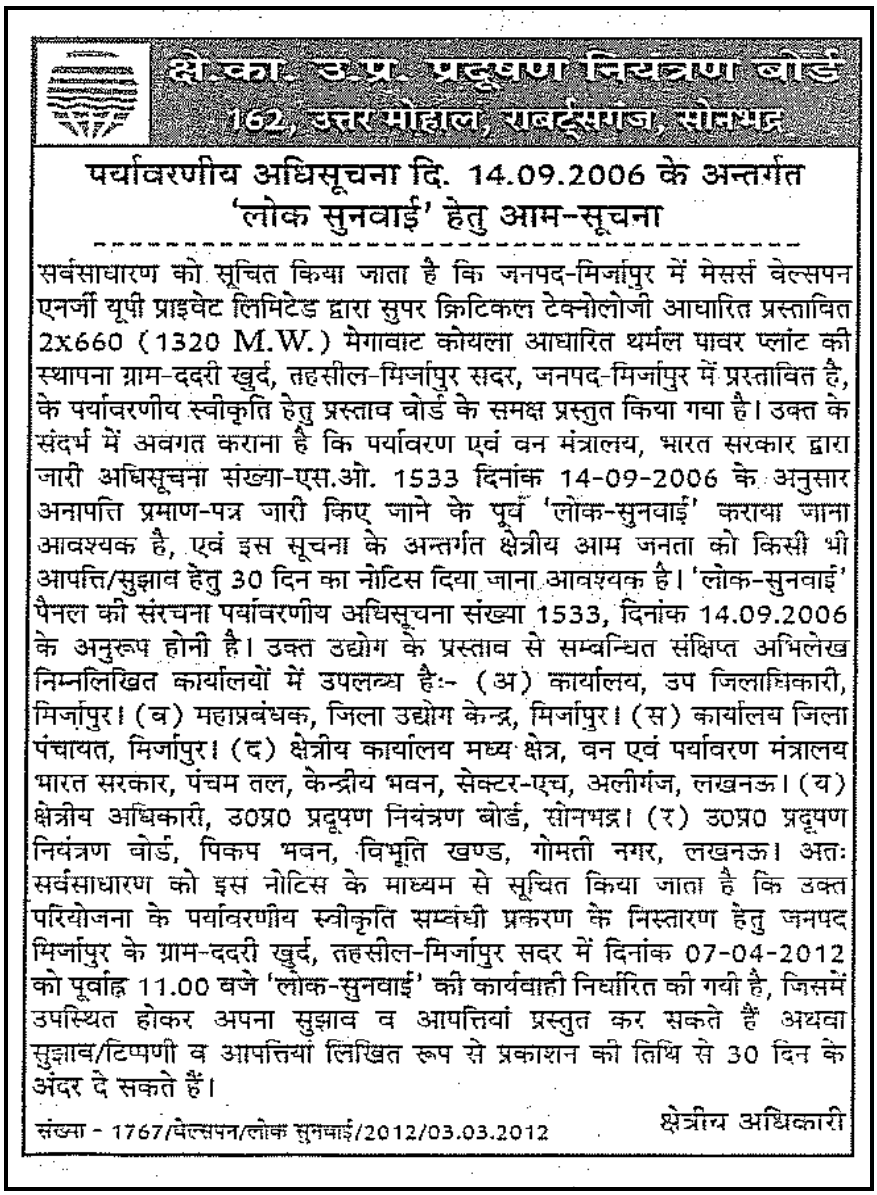
As per the new EIA Notification dated 14th September 2006, Public hearing for this project has been conducted in accordance with the procedure to obtain the Environmental Clearance.

As per the new EIA notification dated 14.09.2006, the first technical presentation i.e. the ToR presentation has been done on 02.05.2011 subsequently, MoEF has prescribed the additional ToRs and after the preparation of Draft EIA in accordance of ToR letter the Public Hearing for this project of "1320 MW (2×660 MW) Coal Based Thermal Power Plant based on Super Critical Technology" at village Dadri Khurd, Block Sadar, District Mirzapur, Uttar Pradesh has been conducted on 07th April, 2012 at the Project Site at village Dadri Khurd.

A copy of Public Hearing proceeding received from Uttar Pradesh Pollution Control Board (UPPCB) is separately with this Final EIA/EMP report. A copy of covering letter received along with public hearing proceeding from the Uttar Pradesh Pollution Control Board and copies of public hearing advertisements published in the National News Paper and local news paper are shown below:

Copy of the public hearing Advertisement in displayed below.

7.1.1 Public Hearing Advertisement Copy



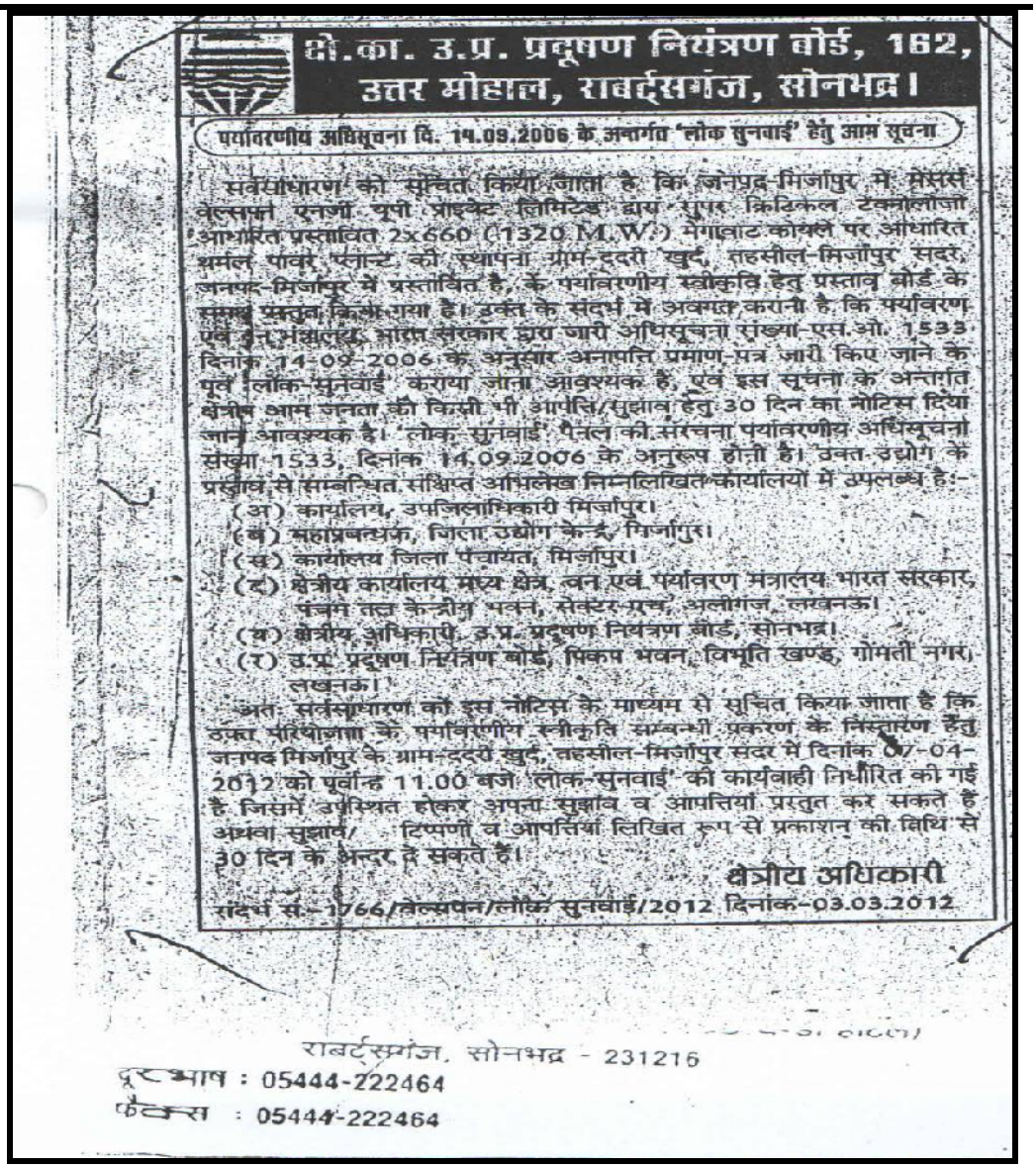
क्षे.का. उ.प्र. प्रदूषण नियंत्रण बोर्ड
162, उत्तर मोहाल, राबर्ट्सगंज, सोनभद्र

पर्यावरणीय अधिसूचना दि. 14.09.2006 के अन्तर्गत 'लोक सुनवाई' हेतु आम-सूचना

सर्वसाधारण को सूचित किया जाता है कि जनपद-मिर्जापुर में मेसर्स वेल्सपन एनर्जी यूपी प्राइवेट लिमिटेड द्वारा सुपर क्रिटिकल टेक्नोलोजी आधारित प्रस्तावित 2x660 (1320 M.W.) मेगावाट कोयला आधारित थर्मल पावर प्लांट की स्थापना ग्राम-ददरी खुर्द, तहसील-मिर्जापुर सदर, जनपद-मिर्जापुर में प्रस्तावित है, के पर्यावरणीय स्वीकृति हेतु प्रस्ताव बोर्ड के समक्ष प्रस्तुत किया गया है। उक्त के संदर्भ में अवगत कराना है कि पर्यावरण एवं वन मंत्रालय, भारत सरकार द्वारा जारी अधिसूचना संख्या-एस.ओ. 1533 दिनांक 14-09-2006 के अनुसार अनापत्ति प्रमाण-पत्र जारी किए जाने के पूर्व 'लोक-सुनवाई' कराया जाना आवश्यक है, एवं इस सूचना के अन्तर्गत क्षेत्रीय आम जनता को किसी भी आपत्ति/सुझाव हेतु 30 दिन का नोटिस दिया जाना आवश्यक है। 'लोक-सुनवाई' पैनल की संरचना पर्यावरणीय अधिसूचना संख्या 1533, दिनांक 14.09.2006 के अनुरूप होनी है। उक्त उद्योग के प्रस्ताव से सम्बन्धित संक्षिप्त अभिलेख निम्नलिखित कार्यालयों में उपलब्ध है:- (अ) कार्यालय, उप जिलाधिकारी, मिर्जापुर। (ब) महाप्रबंधक, जिला उद्योग केन्द्र, मिर्जापुर। (स) कार्यालय जिला पंचायत, मिर्जापुर। (द) क्षेत्रीय कार्यालय मध्य क्षेत्र, वन एवं पर्यावरण मंत्रालय भारत सरकार, पंचम तल, केन्द्रीय भवन, सेक्टर-एच, अलीगंज, लखनऊ। (य) क्षेत्रीय अधिकारी, उ0प्र0 प्रदूषण नियंत्रण बोर्ड, सोनभद्र। (र) उ0प्र0 प्रदूषण नियंत्रण बोर्ड, पिकप भवन, विभूति खण्ड, गोमती नगर, लखनऊ। अतः सर्वसाधारण को इस नोटिस के माध्यम से सूचित किया जाता है कि उक्त परियोजना के पर्यावरणीय स्वीकृति सम्बंधी प्रकरण के निस्तारण हेतु जनपद मिर्जापुर के ग्राम-ददरी खुर्द, तहसील-मिर्जापुर सदर में दिनांक 07-04-2012 को पूर्वाह्न 11.00 बजे 'लोक-सुनवाई' की कार्यवाही निर्धारित की गयी है, जिसमें उपस्थित होकर अपना सुझाव व आपत्तियां प्रस्तुत कर सकते हैं अथवा सुझाव/टिप्पणी व आपत्तियां लिखित रूप से प्रकाशन की तिथि से 30 दिन के अंदर दे सकते हैं।

संख्या - 1767/वेल्सपन/लोक सुनवाई/2012/03.03.2012

क्षेत्रीय अधिकारी



क्षे.का. उ.प्र. प्रदूषण नियंत्रण बोर्ड, 162, उत्तर मोहाल, रावर्ट्सगंज, सोनभद्र।

पर्यावरणीय अधिसूचना दि. 14.09.2006 के अन्तर्गत 'लोक सुनवाई' हेतु आम सूचना

सर्वसाधारण को सूचित किया जाता है कि जनपद मिर्जापुर में मेसर्स वेलस्पन एनर्जी यूपी प्राइवेट लिमिटेड द्वारा सुपर क्रिटिकल टेक्नालॉजी आधारित प्रस्तावित 2x660 (1320 M.W.) मेगावाट कोयले पर आधारित थर्मल पावर प्लान्ट की स्थापना ग्राम-ददरी खुर्द, तहसील-मिर्जापुर सदर, जनपद-मिर्जापुर में प्रस्तावित है, के पर्यावरणीय स्वीकृति हेतु प्रस्ताव बोर्ड के समक्ष प्रस्तुत किया गया है। इस्तें के संदर्भ में अवगत कराना है कि पर्यावरण एवं वन मन्त्रालय, भारत सरकार द्वारा जारी अधिसूचना संख्या एस.ओ. 1533 दिनांक 14-09-2006 के अनुसार अनापत्ति प्रमाण-पत्र जारी किए जाने के पूर्व 'लोक-सुनवाई' कराया जाना आवश्यक है, एवं इस सूचना के अन्तर्गत क्षेत्रीय आम जनता की किसी भी आपत्ति/सुझाव हेतु 30 दिन का नोटिस दिया जाना आवश्यक है। 'लोक-सुनवाई' पैनल की संरचना पर्यावरणीय अधिसूचना संख्या 1533, दिनांक 14.09.2006 के अनुरूप होती है। उक्त उद्योग के प्रस्ताव से सम्बन्धित संक्षिप्त अभिलेख निम्नलिखित कार्यालयों में उपलब्ध है:-

(अ) कार्यालय, उपजिलाधिकारी मिर्जापुर।
(ब) महाप्रबन्धक, जिला उद्योग केन्द्र, मिर्जापुर।
(स) कार्यालय जिला पंचायत, मिर्जापुर।
(द) क्षेत्रीय कार्यालय मध्य क्षेत्र, वन एवं पर्यावरण मंत्रालय भारत सरकार, पंचम तल के-त्रीय भवन, सेक्टर-एच, अलीगंज, लखनऊ।
(य) क्षेत्रीय अधिकारी, उ.प्र. प्रदूषण नियंत्रण बोर्ड, सोनभद्र।
(र) उ.प्र. प्रदूषण नियंत्रण बोर्ड, पिकप भवन, विभूति खण्ड, गोमती नगर, लखनऊ।

अतः सर्वसाधारण को इस नोटिस के माध्यम से सूचित किया जाता है कि उक्त परियोजना के पर्यावरणीय स्वीकृति सम्बन्धी प्रकरण के निस्तारण हेतु जनपद मिर्जापुर के ग्राम-ददरी खुर्द, तहसील-मिर्जापुर सदर में दिनांक 07-04-2012 को पूर्वाह्न 11.00 बजे 'लोक-सुनवाई' की कार्यवाही निर्धारित की गई है जिसमें उपस्थित होकर अपना सुझाव व आपत्तियां प्रस्तुत कर सकते हैं अथवा सुझाव/ टिप्पणी व आपत्तियां लिखित रूप से प्रकाशन की तिथि से 30 दिन के अन्दर दे सकते हैं।

क्षेत्रीय अधिकारी

संदर्भ सं.- 1766/वेलस्पन/लोक सुनवाई/2012 दिनांक-03.03.2012

रावर्ट्सगंज, सोनभद्र - 231216
दूरभाष : 05444-222464
फैक्स : 05444-222464

7.1.2 Photographs Showing Public Hearing

Hona'ble Head of the Public Hearing

7.1.3 Minutes of the Public Hearing in Hindi

मे0 वेल्स्पन एनर्जी यूपी. प्राइवेट लिमिटेड के 2x660 (1320) मेगावाट ग्रीन फील्ड सुपर क्रिटिकल थर्मल पावर प्रोजेक्ट, मिर्जापुर कोयले पर आधारित तापीय विद्युत परियोजना के स्थापनार्थ दिनांक 07–04–2012 को ग्राम–ददरी खुर्द, तहसील सदर, जिला मिर्जापुर, उत्तर प्रदेश का "लोक सुनवाई" का कार्यवाही विवरण।

सदस्य–सचिव, उ0प्र0 प्रदूषण नियंत्रण बोर्ड, लखनऊ के पत्र संख्या–एफ 95860/सी–9/एन0ओ0सी0/सोनभद्र/106/2011 दिनांक 09.12.2011 के अनुपालन में उपरोक्त उद्योग द्वारा प्रस्तावित ग्रीन फील्ड 2x660 मेगावाट कोयले पर आधारित विद्युत परियोजना के स्थापनार्थ दिनांक 07–04–2012 को पूर्वान्ह 11:00 बजे ग्राम ददरी खुर्द, तहसील सदर, जिला मिर्जापुर, उत्तर प्रदेश में "लोक सुनवाई" आयोजित की गई।

"लोक सुनवाई" की आम सूचना दैनिक समाचार पत्र अमर उजाला, मीरजापुर में दिनांक 04.03.2012 को तथा हिन्दुस्तान टाइम्स नई दिल्ली में दिनांक 04.03.2012 को प्रकाशित की गई थी, जिनकी प्रतियॉ संलग्न है (संलग्नक–1)।

"लोक सुनवाई" की अध्यक्षता श्री श्रीश चन्द्र श्रीवास्तव, अपर जिलाधिकारी (वि/रा0), मीरजापुर एवं श्री कालिका सिंह क्षेत्रीय अधिकारी, उ0प्र0 प्रदूषण नियंत्रण बोर्ड, सोनभद्र द्वारा की गई। "लोक सुनवाई" में श्री दयाशंकर पाण्डेय उपजिलाधिकारी (सदर, मीरजापुर) भी उपस्थित थे। वेल्स्पन एनर्जी यूपी. प्राइवेट लिमिटेड की तरफ से श्री कुक्कू टेक्कर उपाध्यक्ष (परियोजना), श्री जी. उदय भास्कर उपाध्यक्ष (पर्यावरण), श्रीमती जया अब्राहम उपाध्यक्ष (सी.एस.आर.), श्री रविकान्त वर्मा वरिष्ठ महाप्रबन्धक, श्री वीरेन्द्र पाण्डेय क्षेत्रीय महाप्रबन्धक, श्री सुरंजन सरकार उपमहाप्रबन्धक (पर्यावरण), एवं श्री एच. एस. सोनी वरिष्ठ प्रबन्धक (पर्यावरण), उपस्थित थे। उ0प्र0 प्रदूषण नियंत्रण बोर्ड, सोनभद्र की तरफ से सहायक वैज्ञानिक अधिकारी, उ0प्र0 प्रदूषण नियंत्रण बोर्ड, सोनभद्र श्री प्रदीप कुमार विश्वकर्मा एवं अन्य अधिकारी उपस्थित थे।

जनप्रतिनिधियों में प्रमुख रूप से श्री कृपाशंकर मिश्रा पूर्व अध्यक्ष डिस्ट्रिक्ट बार एसोसिएशन, मिर्जापुर एवं जिलाध्यक्ष जिला कांग्रेस कमेटी मीरजापुर, श्री हरिशंकर सिंह, किसान संरक्षण संघ एवं पूर्व जिला पंचायत सदस्य, लाल बहादुर सिंह पूर्व जिलाध्यक्ष भा0ज0पा0, मीरजापुर, श्रीमती निर्मला राय, भा0ज0पा0 नेता, मिर्जापुर, श्री अनिल सिंह सर्व सेवा समिति संस्थान मिर्जापुर, श्री शिवशंकर पाण्डेय जिलाध्यक्ष राष्ट्रीय लोकदल, रोहित शुक्ला उर्फ लल्लू, मिर्जापुर, छात्र नेता बिन्नानी कालेज आदि मुख्य रूप से उपस्थित थे (उपस्थिति का विवरण संलग्नक–2, में संलग्न है)।

"लोक सुनवाई" प्रारम्भ करते हुए क्षेत्रीय अधिकारी, उ0प्र0 नियंत्रण बोर्ड, सोनभद्र द्वारा सभी उपस्थित व्यक्तियों का स्वागत करते हुए अवगत कराया गया कि वेलस्पन एनर्जी यूपी प्राइवेट लिमिटेड मीरजापुर द्वारा ग्राम ददरी खुर्द, तहसील सदर, जिला मीरजापुर में प्रस्तावित 2x660 मेगावाट थर्मल पावर परियोजना का प्रस्ताव पर्यावरणीय स्वीकृति हेतु प्रेषित किया गया है। उन्होंने परियोजना के सम्बन्ध में विस्तृत जानकारी परियोजना प्रस्तावकों द्वारा प्रस्तुत करने हेतु अनुरोध किया।

क्रमशः 2/पर.....

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श्री विरेन्द्र पाण्डेय क्षेत्रीय महाप्रबन्धक ने परियोजना के सम्बन्ध में विस्तृत जानकारी दी है तथा यह बताया कि प्रदेश में भारी विद्युत की कमी को दृष्टिगत रखते हुए 2x660 मेगावाट की कोयले पर आधारित परियोजना के स्थापित होने से मॉग और आपूर्ति के बीच का अन्तर कम किया जा सकेगा तथा प्रस्तावित परियोजना के आने से स्थानीय लोगों को प्रत्यक्ष एवं अप्रत्यक्ष रोजगार के अवसर उपलब्ध होंगे। साथ ही परियोजना में प्रयोग किये जाने वाले संसाधनों की विस्तृत जानकारी दी जैसा कि–परियोजना हेतु 6.74 एम.टी.पी.ए. कोयले की आपूर्ति घरेलू कोयले के रूप में एन.सी.एल./एस.ई.सी.एल./सी.सी.एल. से की जायेगी तथा घरेलू कोयला न उपलब्ध होने की स्थिति में आयातित कोयले का इस्तेमाल किया जायेगा एवं 36 एम.सी.एम. पानी गंगा नदी से अपर खजूरी बॉध में वर्षा ऋतु में पम्प किया जायेगा, वहॉ से पाइप लाइन द्वारा परियोजना स्थल पर लाया जायेगा, जिसके लिये उत्तर प्रदेश सरकार और केन्द्रीय जल आयोग द्वारा स्वीकृति प्राप्त की जा चुकी हैं। परियोजना के लिए 875 एकड़ भूमि की आवश्यकता है, जिसमें से 180 एकड़ भूमि का उपयोग ऐश पॉन्ड के रूप में होगा।

इसके उपरान्त पर्यावरणीय के सभी आधारभूत घटकों के बारे में तथा इनमें पड़ने वाले प्रभाव तथा पर्यावरण प्रबन्धन की विस्तृत जानकारी दी गयी इनमें क्रमशः 1–परवेशीय वायु गुणवत्ता, 2–ध्वनि गुणवत्ता, 3–जल गुणवत्ता, 4–मृदा गुणवत्ता, 5–वनस्पति एवं जीव जन्तुओं और सामाजिक एवं आर्थिक सर्वेक्षण के आकड़े प्रस्तुत किये। इसके उपरान्त चिमनी से निकले वाले धुएं के उत्सर्जन को नियंत्रित करने हेतु 99.9 प्रतिशत दक्षता वाले इ0एस0पी0 के साथ 275 मीटर ऊँची चिमनी का निर्माण किया जायेगा, तथा परियोजना से निकलने वाले जल को शुद्धिकरण के पश्चात् पुनः प्रयोग में लाया जायेगा। प्लान्ट के चारों तरफ 50 से 100 मीटर चौड़ी तीन स्तरीय हरित पट्टिका (ग्रीन बेल्ट) का विकास किया जाएगा जिसमें स्थानिय प्रजाती के पौधों का इस्तेमाल होगा, यह यू0पी0पी0सी0बी0, सी0पी0सी0बी0 एवं एम0ओ0इ0एफ0 के दिशा–निर्देशों के अनुसार होगा।

अन्त में स्थानीय लोगों के सामुदायिक विकास के बारे में विस्तृत जानकारी दी गयी मुख्यतः योजना निर्माण जैसेः– शिक्षा के स्तर में सुधार के लिए शिक्षण प्रशिक्षण, पुस्तकालय जैसी बुनयादी सुविधाओं की स्थापना, और छात्रवृति, जल आपूर्ति और वर्षा जल संचयन संरचनाएँ, साफ–सफाई, शौचालय निर्माण के लिए समर्थन, युवाओं और महिलाओं के लिए कौशल विकास कार्यक्रम, स्थानीय हस्तकला उद्योग का प्रोत्साहन, मंदिरो और अन्य पूजा स्थलों का सुधार, स्वास्थ्य शिविरों और टीकाकरण शिविरों का आयोजन आदि की व्यवस्था की जायेगी।

तत्पश्चात् क्षेत्रीय अधिकारी, उ0प्र0 प्रदूषण नियंत्रण बोर्ड, सोनभद्र द्वारा उपस्थित जन समूह से प्रस्तावित विद्युत परियोजना के बारे में पर्यावरण संरक्षण से सम्बन्धित अपने सुझाव/टिप्पणी एवं आपत्तियॉ प्रकट करने हेतु अनुरोध किया गया, प्राप्त सुझाव/टिप्पणी निम्नवत् हैः–

1. श्री हाशमी जी, इमामबाड़ा, मिर्जापुर :– द्वारा कहा गया कि हमें खुशी है कि मिर्जापुर जिलें में हमारे यहां परियोजना लग रही है इसके आने से हमारी कई आवश्यकताओं की पूर्ति होगी जैसे सभी को रोजगार मिलेगा एवं इसके साथ हमें छोटे बड़े काम करके अपने जीवन स्तर सुधारने का मौका मिलेगा। हमें बहुत खुशी है कि कम्पनी द्वारा किसानों द्वारा मॉगी गयी कीमत पर जमीन ली गयी। लेकिन हमें लगता है कि कुछ पाने के लिए कुछ खोना पड़ता हैं। अगर प्रदूषण की बात करें तो इस परियोजना से होने

क्रमशः 3/पर.....

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वाले प्रदूषण से ज्यादा चुनार में प्रदूषण ईंट–भट्टे से होता है जिसे हम आसानी से सहते हैं। इस परियोजना के आने से दूध के व्यापार, सब्जी के व्यापार एवं अन्य तरह के व्यापार के लिए अब बाजार खोजने की जरूरत नहीं होगी। हम आसानी से अपने घर में ही रहकर अपना जीवन–यापन अच्छे से कर सकते हैं।

2. श्री हरिशंकर सिंह, किसान संरक्षण संघ :– ने कहा कि मैं वेलस्पन का अभिनन्दन करना चाहता हूँ कि यह प्लान्ट पहले गाजीपुर लगना था लेकिन वेलस्पन के द्वारा हमारे क्षेत्र को चूना गया। हमारे यहां बेरोजगारी है जिसका स्थानीय स्तर पर कोई विकल्प नहीं है। यह कम्पनी हमारे लिए एक विकल्प की तरह है, जिससे हमारी बेरोजारी कम होगी। इसलिए हमें इसका सहयोग करना चाहिए। इसके साथ ही हमारे क्षेत्र में टमाटर एवं मूँगफली की खेती बड़े स्तर पर की जाती है। कम्पनी से अनुरोध है कि इनसे सम्बन्धित उद्योग लगाने का कार्य करें।

3. श्री मदन तिवारी, ग्राम भोड़सर :– मैं एक छोटा कास्तकार हूँ मैने अपनी खुशी से कम्पनी को जमीन दिया। साथ ही शासन से अपील करता हूँ कि कम्पनी की मद्द करें ताकि हम बेरोजगारों को आसानी से रोजगार उपलब्ध हो सके।

4. श्री अजय बहादुर सिंह, ग्राम ददरी खुर्द :–द्वारा कहा गया कि मैंने स्वेच्छा से कम्पनी को जमीन दी है और मैं कम्पनी का समर्थन करता हूँ।

5. श्री रोहित शुक्ला उर्फ लल्लू, मिर्जापुर, छात्र नेता बिनानी कालेज :– कम्पनी के आने से युवा बेरोजगारों को काम मिलेगा। परियोजना के लिए गंगा नदी से अपर खजुरी बाँध में पानी आयेगा जिससे सिंचाई के लिए हम सभी लोगों को पानी मिलेगा।

6. श्री शकील अहमद, मिर्जापुर :– द्वारा कहा गया कि मैने अपनी जमीन परियोजना के लिए स्वेच्छा से दी हैं।

7. मोहम्मद चाँद बाबू, मिर्जापुर :– द्वारा कहा गया कि कम्पनी हमारे सहयोग के लिए प्लान्ट लायी है इससे अप्रत्यक्ष रूप से 20000 नहीं लाखों लोगों को रोजगार मिलेगा, और हमें अपने क्षेत्र से बाहर नहीं जाना पड़ेगा।

8. श्रीमती निर्मला राय, बी.जे.पी. जिलाध्यक्ष, मिर्जापुर :– द्वारा कहा गया कि हमें पेपर के माध्यम से पता चला कि जन सुनवाई का आयोजन किया जा रहा हैं। हम यहां आये हैं कि जान सके कि परियोजना से क्या फायदा होगा। हमें खुशी है कि मिर्जापुर के विकास के लिए कोई आया है। हमारा कम्पनी से अनुरोध है कि कम्पनी महिलाओं के स्वालम्बन के लिए योजना बद्ध तरीके से काम करें।

9. श्री राजीव चौबे, ग्राम–भरपूरा, मिर्जापुर :– ने कहॉ कि हमे बहुत खुशी है कि परियोजना के लिए कम्पनी ने ददरी खुर्द को चुना। हमारे यहां कोई स्कूल, हास्पिटल नहीं है। परियोजना के आने से अच्छी स्वास्थ्य सेवायें मिलेगी साथ ही शिक्षा के स्तर में सुधार होगा।

क्रमशः 4/र....

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10. श्री शिवशंकर पाण्डेय, जिलाध्यक्ष लोकदल, मिर्जापुर :– द्वारा कहा गया कि कम्पनी के आने से हमारे पूरे क्षेत्र का विकास होगा साथ ही हमारे यहां से लोग दूसरे जिले के कम्पनियों में काम करने जाते है लेकिन इस कम्पनी के आने से अब हमें बाहर जाने की जरूरत नहीं है क्योकि हमें घर में ही रोजगार प्राप्त होगा। प्लान्ट के लगने से मिर्जापुर का नाम पूरे देश में जाना जायेगा।

11. श्री अनिल सिंह, सर्व सेवा समिति संस्थान, ग्राम–शाहपुर :– द्वारा कहा गया कि कम्पनी मिर्जापुर को नई पहचान देगी। हम आपका सहयोग करते है लेकिन आप भी सहयोगी भूमिका निभाये। कम्पनी किसी एक पिछड़े गॉव को गोद लेकर एक आदर्श गॉव बनाने का कार्य करे।

12. श्री लालबहादुर सिंह, ग्राम लहौराइ(पूर्व जिलाध्यक्ष एवं सदस्य प्रदेश कार्य समिति भा0ज0पा0):–ने कहा कि कम्पनी द्वारा इस निर्जन पठारी भूमि को खरीद लेने से एक तरह से यहां के कास्तकारों को इस जमीन से मुक्ति मिली है। कम्पनी द्वारा प्रदूषण को रोकने के लिए जो हरितपट्टी के विकास की बात की जा रही है उसमें लम्बी उम्र के वृक्ष जैसे–बरगद, नीम, गुलर, पीपल, आम, जामुन, महुआ इत्यादि कम्पनी द्वारा लगाये जायॅ।

13. श्री विरेन्द्र कुमार तिवारी, ग्राम–ददरी खुर्द, मिर्जापुर :– द्वारा कहा गया कि परियोजना में प्रदूषण रोकने के लिए प्रदूषण नियंत्रक यंत्र लगाये जायेंगे, तथा मैं कम्पनी का समर्थन करता हूँ।

14. श्री उमेश पाण्डेय, ग्राम पड़री:– द्वारा कहा गया कि मैं कम्पनी का स्वागत करता हूँ।

15. श्री शिव प्रकाश पाण्डेय, मिर्जापुर :– द्वारा कहा गया कि परियोजना के लिए पानी गंगा नदी से खजुरी बॉध में लाया जायेगा उससे आस–पास के कम से कम 20 हजार बीघा जमीन की सिंचाई होगी। इस तरह से भी अप्रत्यक्ष रूप से लोगों की आर्थिक स्थिति में सुधार होगा।

16. श्री संजय सिंह, ग्राम पहाड़ी :–द्वारा कहा गया कि हम कम्पनी का स्वागत करते हैं और हम आशा करते है कि कम्पनी के द्वारा शिक्षा के स्तर में सुधार किया जायेगा।

17. श्री रविन्द्र शुक्ला :–इन्होंने कहा कि कम्पनी से प्रदेश का विकास होगा, साथ ही हमे इस परियोजना के सकारात्मक पहलूओं पर ज्यादा जोर देने की जरूरत है ताकि हमें ज्यादा से ज्यादा लाभ प्राप्त हो सके।

18. श्री विकास दूबे मिर्जापुर :–द्वारा कहा गया कि यदि बेरोजगार युवाओं को इस कम्पनी के द्वारा रोजगार के अवसर प्राप्त होंगे, तो बेरोजगार युवाओं के लिए इससे अच्छा कुछ नहीं हो सकता। वह अपने क्षेत्र में नौकरी कर सकेंगे, हमारा अनुरोध है कि स्थानीय लोगों को प्राथमिकता दी जाए।

क्रमशः 5 / पर.....

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19. श्री गब्बर सिंह :–हमने अपनी जमीन कम्पनी को स्वेच्छा से दी है, और कम्पनी का स्वागत करते हैं।

20. श्री आलोक पाठक:–द्वारा कहा गया कि कम्पनी की स्थापना पर्यावरण को ध्यान में रख कर किया जाय एवं स्थानीय स्तर पर रोजगार उपलब्ध करवाकर पलायन को रोका जाय।

21. श्री शिवशंकर सिंह, विन्ध्याचल :– इन्होंने कहा कि अगर प्लान्ट क्षेत्र में रहने वाले मूल निवासियों में कोई कोल एवं भील जाति के लोग हों तो उनके विकास एवं रोजगार के अवसर उपलब्ध कराये जाए एवं पलायन के प्रतिशत को कम करने का प्रयास किया जाय। इसके साथ ही साथ वन्य जीव जन्तुओं के संरक्षण के लिए भी उपाय किये जायं।

22. श्री अमरीश मिश्रा, (पत्रकार–द टाइम्स आफ इण्डिया):–इन्होंने कहा कि कम्पनी के द्वारा जो तकनीकी जानकारी दी गई है हम आशा करते हैं कि परियोजना उसी के अनुरूप कार्य करेगी। हरित पट्टिका में परंपरागत एवं लाभकारी पेड़ पौधे लगाये जाएंगें। साथ ही परियोजना के 1/5 हिस्से में राख कुण्ड बनाया जाएगा जिससे प्रदूषण होने की संभावना कम हो जाएगी।

23. श्री रामगोपाल सिंह विंध्यांचल – हमें समाचार पत्र से इस जन–सुनवाई के बारे में पता चला साथ ही हम कम्पनी से आशा करते है कि जमीन देने वाले गरीब एवं बेरोजगार परिवारों को प्राथमिकता देकर कार्य किया जाय।

24. श्री सुशील कुमार मिश्रा मिर्जापुर – हम आशा करते हैं कि परियोजना के आने से आसपास के गांव ही नही वरन पूरे जनपद का विकास होगा ।

25. श्री जय सिंह पाल मिर्जापुर – इन्होने कहा कि कम्पनी ने मिर्जापुर में बिजली उत्पादन की परियोजना लगाकर बहुत बड़ा योगदान दिया है एवं इससे हमें रोजगार मिलेगा साथ ही घरेलू उद्योगों को प्रोत्साहन मिलेगा लेकिन हम कम्पनी को बताना चाहेंगें कि जन सुनवाई के लिये यहां पर इतनी पुलिस और सुरक्षा की जरूरत नही थी सभी आपका सहयोग करेंगें। हमें खेद इस बात का है कि आसपास की जनता इतने कम संख्या में उपस्थित है।

26. श्री कृपाशंकर मिश्रा (पूर्व अध्यक्ष डिस्ट्रिक्ट बार एसोसिएशन मिर्जापुर)– इन्होने कहा कि लोगों ने जमीन अपने मन से दिया है क्यों कि अभी तक रजिस्ट्री में किसी भी तरह कि कोई भी रुकावट नही हुई है एवं सारा काम लोगों की सहमती से किया जा रहा है, पर्यावरण के सम्बन्ध में जो भी सुझाव आये हैं हम आशा करते है कि कम्पनी के द्वारा उन सुझावों को मानते हुए कार्य किया जाएगा । हमारा कम्पनी से अनुरोध है कि जब सरकार के द्वारा बिजली क्रय करने का एग्रीमेंट किया जाय तो उसमें मिर्जापुर को प्राथमिकता दिया जाय।

क्रमशः 6/पर... ...

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अन्त में वेल्स्पन एनर्जी यूपी. प्राइवेट लिमिटेड की तरफ से श्री वीरेन्द्र पाण्डेय, क्षेत्रीय महाप्रबन्धक ने 'लोक–सुनवाई' में आये सभी विषयों पर विस्तार से प्रकाश डालते हुए कहा कि रोजगार से संबंधित जो प्रश्न आयें है उसमें मै बताना चाहूंगा कि कम्पनी के द्वारा सबसे पहले जिनकी जमीन ली गई है उनको रोजगार दिया जाएगा फिर मिर्जापुर जिले को योग्यता के आधार पर वरीयता दी जाएगी अगर कम्पनी के मांग के आधार पर स्थानीय स्तर पर योग्य लोगों की उपलब्धता नहीं होगी तब बाहर से योग्य व्यक्तियों को बुलाया जाएगा।

तत्पश्चात वीरेन्द्र पाण्डेय जी ने कहा कि महिलाओं से संबंधित जो प्रश्न आये हैं उस संबंध में मै बताना चाहूंगा कि हमारे कम्पनी में कार्यरत महिला कर्मचारियों द्वारा महिलाओं के कौशल विकास हेतु विभिन्न कार्यक्रम चलाए जाते हैं एवं घर–घर जाकर उन्हे जागरूक किया जाता है। हम आपको विश्वास दिलाते हैं कि इसी तरह के कार्यक्रम यहां भी नियमित रूप से किये जाएंगें।

पर्यावरण से संबंधित जो प्रश्न किया गया है उसमें मै बताना चाहूंगा कि यह परियोजना सुपर क्रिटिकल तकनीक पर आधारित है जिसमें पानी एवं कोयला की खपत अपेक्षाकृत कम है साथ ही प्रदूषण नियंत्रण के लिये ई.एस.पी. एवं ड्स्ट सप्रेशन सिस्टम लगाये जाएंगें। हरित पट्टी से संबंधित दिये गये सुझावों को मानते हुए मै विश्वास दिलाता हूं कि आपके कहे अनुसार कम्पनी वन विभाग के सहयोग एवं समन्वय के द्वारा हरित पट्टिका में बड़े वृक्षों का रोपण किया जाएगा।

अंत में श्री वीरेन्द्र पाण्डेय जी ने बताया कि हम इन कार्यो के अतिरिक्त शिक्षा एवं स्वास्थ्य पर भी विशेष रूप से कार्यक्रम आयोजित करेंगें ।

लोक सुनवाई की अध्यक्षीय सम्बोधन में श्रीश चंद्र श्रीवास्तव अपर जिलाधिकारी (वि0/रा0), मिर्जापुर ने कहा कि स्थानीय एवं मिर्जापुर की जनता बहुत खुश है। मै यहां की जनता एवं वेल्स्पन कम्पनी को बधाई देता हूँ। इस कम्पनी के आने से जनपद को ही लाभ होगा। साथ ही जन–सुनवाई की सूचना न होने के जवाब में कहा कि स्थानीय एवं राष्ट्रीय दैनिक समाचार पत्रों में एक माह पूर्व ही जन–सुनवाई की सूचना विज्ञापन के माध्यम से दी जा चुकी है। क्षेत्रीय अधिकारी, उत्तर प्रदेश प्रदूषण नियंत्रण बोर्ड, सोनभद्र ने कहा कि इस जन–सुनवाई में जो भी सुझाव एवं आपत्तियां आपके द्वारा प्रस्तुत की गई हैं उन्हे ई.आई.ए. अधिसूचना 2006 के अनुसार यथावत् पर्यावरण एवं वन मंत्रालय, नई दिल्ली को प्रेषित कर दिया जाएगा।

उपरोक्त विचारों, सुझावों, टिप्पणीयों एवं आपत्तियों के अतिरिक्त और कोई मुद्दा "लोक सुनवाई" के दौरान नहीं उठाया गया। उपस्थित जनसमूह ने सर्वसम्मति से इस परियोजना के स्थापना हेतु अपनी सहमति जताई एवं इसके जल्द से जल्द क्रियान्वयन का आग्रह किया। अन्त में क्षेत्रीय अधिकारी, उ0प्र0 प्रदूषण नियंत्रण बोर्ड द्वारा पर्यावरणीय 'लोक–सुनवाई' में उपस्थित गणमान्य नागरिकों/अधिकारियों आदि द्वारा दिए गए सुझाव के प्रति आभार प्रकट किया गया।

क्रमशः 7/पर.....

(7)

उपरोक्त मन्तब्य के साथ पर्यावरणीय दृष्टिकोण से मेसर्स वेल्स्पन एनर्जी यूपी. प्राइवेट लिमिटेड, मिर्जापुर के प्रस्तावित परियोजना 2x660(1320 M.W.) मेगावाट के स्थापना हेतु 'सशर्त' अनापत्ति प्रमाण–पत्र निर्गमन हेतु आख्या प्रेषित है।

कालिका सिंह
क्षेत्रीय अधिकारी,
उ0प्र0 प्रदूषण नियंत्रण बोर्ड,
सोनभद्र

श्रीश चन्द्र श्रीवास्तव
अपर जिलाधिकारी (वि0/रा0),
मिर्जापुर

वेल्स्पन एनर्जी यूपी. प्राइवेट लिमिटेड, मिर्जापुर द्वारा प्रस्तावित 2x660 मेगावाट तापीय विद्युत परियोजना की ई0आई0ए0 नोटिफिकेशन संख्या–1533 दिनांक 14–09–2006 के अन्तर्गत प्राविधानित 'लोक–सुनवाई' के कार्यवाही का विवरण आपके अवलोकनार्थ सादर प्रेषित।

कालिका सिंह
क्षेत्रीय अधिकारी,
उ0प्र0 प्रदूषण नियंत्रण बोर्ड,
सोनभद्र

जिलाधिकारी, मिर्जापुर

7.1.4 Attendance Sheet of the Public Hearing

मेसर्स वेल्सपन एनर्जी यूपी प्राइवेट लिमिटेड, ग्राम–ददरी खुर्द, तहसील–मिर्जापुर सदर, जनपद–मिर्जापुर(उ0प्र0) द्वारा सुपर क्रिटिकल टेक्नोलोजी आधारित प्रस्तावित **2x660 (1320 M.W.)** मेगावाट कोयला आधारित थर्मल पावर प्लान्ट की स्थापना से पूर्व जनपद–मिर्जापुर के ग्राम–ददरी खुर्द, तहसील मिर्जापुर सदर में दिनांक **07–04–2012** को पूर्वाह्न **11:00** बजे "लोक सुनवाई" के दौरान उपस्थित अधिकारिया, पत्रकार वन्धु एवं गणमान्य नागरिक।

क्रमांक	नाम	पदनाम एवं विभाग	हस्ताक्षर
1.	श्री शचि श्रीवास्तव	A-DM MZP	
2.	कालिकाप्रसाद	R.O. U.P. PCB. Sonbhadra.	
3.	[illegible] पाण्डेय	SDM SADAR MZP	
4.	[illegible]	SP City	
5.	[illegible]	[illegible]	
6.	Rakhu Tailor	Project Head	
7.	[illegible]	[illegible] UPPCB	
8.	[illegible]	[illegible]	
9.	Chandra Shekhar	Junior Engineer UPPCB	
10.	Rajesh Singh	Scientific Assistant	
11.	Rajiv Kumar	monitoring Asst UPPCB	
12.	Suneel Kumar Yadav	T/e	
13.	B. Chaubey	DEO UPPCB, Sonbhadra	
14.	Vijay [illegible]	UPPCB.	
15.	Pawan Kumar Verma	J.M. Environet. Pvt. Ltd. Gurgaon	
16.	J. KUMAR	[illegible]	
17.	Virendra Pandey	Reg. Gen. Manager Welspun	
18.	Sanjan Sinha	Dy GM - EHS	
19.	H. S. Soni	Sr. Manager	
20.	Shobhit Aggarwal	Engg Environment	
21.	Anurag Chaturvedi	Asst. P. Affairs	

क्रमशः 2/पेज....

(2)

क्रमांक	नाम	पदनाम एवं विभाग	हस्ताक्षर
22.	निर्मला राय	[illegible]	निर्मला राय
23.	सरोज मिश्रा	[illegible]	सरोज मिश्रा
24.	रेखा मिश्रा	[illegible]	रेखा मिश्रा
25.	कीर्ति केशरी	गृहिणी	Kirti Kesharwani
26.	बिन्दु देवी	गृहिणी	बिन्दु
27.	किरन गुप्ता	[illegible]	Kiran
28.	सुनीता सोनी	[illegible]	सुनीता
29.	सुनीता सोनी	[illegible]	सुनीता सोनी
30.	शोभा केशरवानी	[illegible]	Shobha
31.	राजेश तिवारी	[illegible]	राजेश तिवारी
32.	[illegible]	[illegible]	[illegible]
33.	[illegible]	[illegible]	
34.	[illegible] सिंह	[illegible]	S. K. S.
35.	उपेन्द्र सिंह	[illegible]	[illegible]
36.	अनिल कुमार [illegible]	[illegible]	अनिल कुमार [illegible]
37.	आनन्द कुमार सिंह	[illegible]	आनन्द सिंह
38.	अजय बहादुर सिंह	रेनुकूट सोनभद्र	A. B. Singh
39.	अमित मिश्रा	[illegible]	Amit
40.	ओम प्रकाश सिंह	[illegible]	[illegible]
41.	[illegible]	[illegible]	[illegible]
42.	AKach Yadav	[illegible]	AKash Yadav
43.	अशोक कुमार पाण्डेय	[illegible]	[illegible]
44.	विजय शंकर पाठक	[illegible] मिर्जापुर	विजय शंकर पाठक
45.	काशीनाथ पाण्डेय	[illegible]	काशीनाथ पाण्डेय
46.	उपेन्द्र कुमार [illegible]	[illegible]	उपेन्द्र

क्रमशः 3/पर....

Complete attendance sheets are enclosed as ***Annexure- IV*** in Public Hearing documents with Final EIA/EMP Report.

7.1.5 Minutes of the Public Hearing in English, Issues Raised, Replies from the clients and Action plan for CSR Activities

S. No.	Name	Issues Raised	Response/action plan by PP.
	Issues Related to Employment		
1.	Mr. Hashmi, Imammbada	He stated that we are happy to know that the upcoming project is located in Mirzapur district. This project will meet many of our demands like, Employment opportunities, which will improve our standard of living. We are happy that company has provided the compensation, as per demands of farmers. But we feel that one has to lose something to gain something. As per the pollution concerned for the project activity, much more pollution is caused by the Brick manufacturing industries in Chunar, which we are bearing easily. With the upcoming project there will be no need to search market for milk, vegetables etc. We can easily earn our living, staying in our area only.	Company will give preference to those who have given their land to the company while providing jobs. Only after that job will be provided to the locals as per their Qualification and eligibility. People from outside will be employed only when eligible locals are not available.
2.	Mr. Madan Tiwari, Village, Bhodsar	I am a small farmer and I have given my land to the company with my full consent. I request the authorities to support the project, so that unemployed can get employment.	Company will give preference to those who have given their land to the company while providing jobs. Only after that job will be provided to the locals as per their Qualification and eligibility. People from outside will be employed only when eligible locals are not available.
3	Vikash Dubey	He said that, nothing can be better for unemployed youth if they will be employed by this company. They will be able to work at their native place; we request to prefer locals for the jobs.	Local are given preference for employment and People from outside will be employed only when eligible locals are not available. Welsp

			training to youth so that they become capable to take up the jobs.
4	Shiv Shankar Singh, vindhyanchal	He said that, if kol and bheel caste people are present in the local community then opportunities for their development and employment should be made available to stop percentage of migration. Required measures should be adopted for wild life conservation.	. Welspun will set up a separate CSR team for development activities in the area. Activities such as Health care facilities, setting up and refurnishing of schools and general improvement of infrastructure will be done. Other than this there will generation of lots of indirect employment for which Welspun will provide training to youth so that they become capable to take up the jobs. Other activities will also be taken up as per the needs of the area from time to time. These measures will help to stop migration. Welspun has already deputed a consultants for conducting wildlife conservation study and the recommendations of the study will be implemented.
5	Ram Gopal Singh, Vindhyanchal	He stated that we came to know by the News paper for Public hearing. We hope that project will commence with preference in jobs for poor and unemployed land losers.	Employment preference to local is proposed.. People from outside the district will be employed only when eligible locals are not available.
	Issues Related to Women Empowerment		
6	Mrs. Nirmala Rai, BJP District President, Mirzapur.	She stated that we came to know about the project from the daily newspapers and we have participated here to know how the project will be beneficial for the area. We are happy to know that someone has taken the initiative for the upliftment of the Mirzapur.	The company believes in women empowerment and it is one of the thrust program in company CSR. Various programs on skill development for the women are proposed once the proje

		We request the company to plan for the women empowerment.	
	Issues Related to Pollution Control Equipments		
7	Veerendra Kumar Tiwari, Villa Dadri khurd, Mirzapur	He said that, to minimize the pollution, pollution control Instruments should be installed and I support the company.	The project is based on Super Critical Technology to conserve coal and water.the pollution control facility installed will be the best technology equipments eg ESP, bag filters and dust suppression system etc.. Other pollution control measures like Green belt development proper consultation with forest department will be done to select the appropriate local species.
8	Alok Pathak	He said that, establishment of the project should be done considering the environmental aspects and local should be preferred for the Jobs to stop migration.	To take care of Environmental aspect a EIA studies has conducted and the recommendations of the study will be implemented to mitigate adverse impact . Employment preference to local is proposed. People from outside the district will be employed only when eligible locals are not available.
9	Shri Amrish Mishra, (Reporter-The Times of India)	He said that, we hope that all technical measures as explained by the company will be adopted in the project activity. Conventional and beneficial plant should be planted for green belt development. It is good that 1/5 part of the land will be used for Ash disposal so chances of pollution will be less.	The project is based on Super Critical Technology to conserve coal and water is. In addition to this for pollution control ESP and dust suppression system will be installed. As far as Green belt development is concerned company will take inputs from local forest department and follow various suggestions given by the locals as well as by forest department

	Issues Related to Education & Medical Facilities		
10	Sanjay Singh, Vill. Pahadi.	He said that, we welcome the company and we hope that education level will improve by the company.	The company will undertake various programmes related with health and education. Moreover The health & education facilities will be provided free of cost to the project affected families. People from neighboring villages may also avail the service at a nominal cost.
11	Mr. Rajeev Chaube	He stated that we are happy to know that company has selected village Dadri Khurd for setting up their proposed Project. Our area lacks the facility of schools and hospitals. We hope that with the setting up of upcoming project we will be getting good medical Facilities and the level of Education in our area will also improve.	The company will undertake various programmes related with health and education. Moreover The health & education facilities will be provided free of cost to the project affected families. People from neighboring villages may also avail the service at a nominal cost.

7.2 RISK ASSESSMENT

Risk assessment often requires the synthesis of risk profiles, which represent the probability distribution of total annual loss due to a certain set of events or activities. These assessments usually involve estimation of losses for several sub-classifications of the overall process and synthesis of the results into an aggregate risk profile. Hazard analysis involves the identification and quantification of the various hazards (unsafe conditions) that exist in the plant. On the other hand, risk analysis deals with the identification and quantification of risks, the plant equipment and personnel are exposed to, due to accidents resulting from the hazards present in the plant. 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.

In the sections below, the identification of various hazards, probable risks in the Power plant after de-bottlenecking project, maximum credible accident analysis, consequence analysis are addressed which give a broad identification of risks involved in the plant. Based on the risk estimation for fuel and chemical storage, Disaster Management Plan (DMP) has been prepared.

There is always possibility of occurrence of incidents in an industry which requires proper risk assessment and proper safety preparedness. Activities requiring assessment of risk due to occurrence of most probable instances of hazard and accident are both on-n site and off-site.

On-site

- Exposure to fugitive dust, noise, and other emissions
- House keeping practices requiring contact with solid and liquid wastes
- Emission/spillage etc. from storage & handling

Off-site

- Exposure to pollutants released from offsite/ storage/related activities
- Contamination due to accidental releases or normal release in combination with natural hazard
- Deposition of toxic pollutants in vegetation / other sinks and possible sudden releases due to accidental occurrences

7.2.1 Approaches to the Study

The Consequence Analysis has been done for selected scenarios. This has been done for weather conditions having wind speed 3.0 m/s. In Consequence Analysis, geographical location of the source of potential release plays an important role. Consideration of a large number of scenarios in the same geographical location serves little purpose if the dominant scenario has been identified and duly considered. Risk involves occurrence or potential occurrence of some accidents due to an event or sequence of events. The risk assessment study covers the following:

- Identification of potential hazard areas;
- Identification of representative failure cases;
- Visualization of the resulting scenarios in terms of fire (thermal radiation) and explosion;
- Assess the overall damage potential of the identified hazardous events and the impact zones from the accidental scenarios;
- Assess the overall suitability of the site from hazard minimization and disaster mitigation points of view;
- Furnish specific recommendations on the minimization of the worst accident possibilities;
- Preparation of broad Disaster Management Plan (DMP), On-site and Off-site; Emergency Plan, which includes Occupational and Health Safety Plan.

7.2.2 Hazard Identification

Identification of hazards in the proposed power plant covers analysis, quantification and cost effective control of accidents involving chemicals and process. A classical definition of hazard states that hazard is in fact the characteristics of system/plant/process that presents potential for an accident. Hence, relevant components of a system/plant/process need to be examined to assess their potential for initiating or propagating an unplanned event/sequence of events, which can be termed as an accident.

Hazard identification has been carried out considering the following:

- Hazardous Waste (Management, Handling & Transboundary Movement) Rules 2008.
- Identification of major hazardous units based on Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 of Government of India (GOI Rules, 1989); and
- Identification of hazardous units and segments of plants and storage units based on relative ranking technique, viz. Fire-Explosion and Toxicity Index (FE&TI).

7.2.3 Classification of Major Hazards

Hazardous substances may be classified into three main classes namely Flammable substances, Unstable substances and Toxic substances

Flammable Category

The Flammable Substances used in power plant are Heavy Furnace Oil (HFO) and Light Diesel Oil (LDO), which are primarily used in flame stabilization. These are stored in main storage tanks.

Unstable Substances Category

There are no unstable substances or chemicals used or formed in the plant operation and hence risk category not applicable.

Toxic Substances Category

There are some substances & Chemicals, which are commonly used in various industries, which come under Toxic category. These are Ammonia, Hydrogen, Chlorine, Hydrochloric Acid, and Sodium Hydroxide.

Procedure Followed for Risk Assessment

For Risk Assessment arising from Flammable Category (Storages of HFO & LDO) hazard assessment and evaluation has been carried out employing Maximum Credible Accident Analysis (MCAA) with ALOHA model.

The ratings for a large number of chemicals based on flammability, reactivity and toxicity have been listed under NFPA Codes 49 and 345 M. Potential risk areas of power plant have been summarized in the Table- 7.1(A). The major hazardous materials to be stored, transported, handled and utilized within the facility have been summarized in the Table-7.1 (B). The fuel storage details are given in Table-7.1(C).

7.2.4 Identification of Major Hazard Installations Based on GOI Rules, 1989

Following accidents in the Thermal Power Plant in India over a few decades, a specific legislation covering major hazard activities has been enforced by Govt. of India in 1989 in conjunction with Environment Protection Act, 1986. This is referred here as GOI rules 1989. For the purpose of ident

installations the rules employ certain criteria based on toxic, flammable and explosive properties of chemicals.

Table No. - 7.1 (A)

POTENTIAL RISK AREAS OF PROPOSED EXPANSION PROJECT

S. No.	Blocks/Areas	Hazards Identified
1.	Coal storage Yard	Fire, Spontaneous Combustion
2.	Coal Handling Plant including Bunker area	Fire, Spontaneous Combustion
3.	Boilers	Fire (mainly near oil burners), steam; Explosions, Fuel Explosions
4.	Turbo-Generator Building	Fires in - a) Lube Oil systems including oil tank b) Cable galleries c) Short circuits in i) Control Rooms ii) Switchgears Explosion due to leakage of Hydrogen and fire following it.
5.	Power Transformers	Explosion and fire
6.	Switch-yard Control Room	Fire in cable galleries and Switchgear/Control Room.
7.	Hydrogen Plant: Hydrogen Cylinders in	R.C.C. building
8.	Tank Farms H.F.O L.D.O.	Fire
9.	Chlorination plants	Chlorine leakage
10.	Hydrochloric Acid (HCl) Sodium Hydroxide (NaOH) for DM plant	Corrosive
11.	Steam turbine	Hydrogen and lube oil leak leading to fire /smoke

TABLE-7.1(B)

HAZARDOUS MATERIALS STORED, TRANSPORTED AND HANDLED

Materials	Hazardous Properties
LDO	UN 1203. Dangerous Goods class 3 – Flammable Liquid
HFO	Dangerous Goods class 3 - Flammable Liquid

TABLE-7.1 (C)

CLASSIFICATION OF FUEL (HFO/ LDO)

Sr. No.	Material	No. of Tanks	Storage quantity (Tonne)	Classification
1	HFO	Two	1500	Non-dangerous Petroleum
2	LDO	One or two	800 or 400	Non-dangerous Petroleum

A systematic analysis of the fuels/chemicals and their quantities of storage has been carried out, to determine threshold quantities as notified by GOI Rules, 1989 and the applicable rules are identified. Applicability of storage rules are summarized in Table-7.1 (D).

TABLE-7.1 (D)

APPLICABILITY OF GOI RULES TO FUEL/CHEMICAL STORAGE

Sr. No.	Chemical/ Fuel	Listed in Schedule	Storage quantity (Tonne)
1	HFO	1	1500
2	LDO	2	800 or 400

7.2.5 Hazard Assessment and Evaluation

An assessment is conducted for the purpose of identifying and examining hazards related to feed stock materials, major process components, utility and support system, environmental factors, proposed operations, facilities, and safeguards.

A preliminary hazards analysis is carried out initially to identify the major hazards associated with storages. This is followed by consequence analysis to quantify these hazards. Finally, the vulnerable zones are plotted for which risk reducing measures are deduced and implemented. Preliminary hazard analysis for fuel storage area is given in following Tables:

Table No. - 7.2 (A)

Preliminary Hazard Analysis for Storage Areas

Unit	Hazard Identified
LDO	Fire/Explosion
HFO	Fire/Explosion

Table No. – 7.2 (B)

Preliminary Hazard Analysis (PHA) for the Power Plant

PHA Category	Description of Plausible Hazard	Recommendation Provision	Provision
Environmental factors	If any leakage and eventuality of source of ignition.	-	All electrical fittings and cables will be provided as per the specified standards. All motor starters will be flame proof.
Environmental factors	Inflammable nature of the Fuel may cause fire hazard in the storage facility.	A well designed fire protection including protein foam, dry powder, CO_2 extinguishers should be provided.	Fire extinguishers of small size and big size will be provided at all potential fire hazard places. In addition to the above, fire hydrant network is also provided.

7.2.5.1 Maximum Credible Accident Analysis (MCAA)

Hazardous substances may be released as a result of failures or catastrophes, causing possible damage to the surrounding area. This section deals with the question of how the consequences of the release of such substances and the likely damage to the surrounding area can be determined by means of models. Major hazard posed by flammable storage can be identified taking recourse to MCA analysis. MCA analysis covers techniques to identify the hazards and calculate the consequent effects in terms of damage distances of heat radiation, toxic releases, vapor cloud explosion, etc. A host of probable or potential accidents of the major units in the complex arising due to use, storage and handling of the hazardous materials are examined to establish the credibility. Depending upon the effective hazardous attributes and their impact on the event, the maximum effect on the surrounding environment and the respective damage caused can be assessed. The reasons and purpose of consequence analysis are many folds like:

- Part of Risk Assessment;
- Plant Layout/Code Requirements;
- Protection of other plants;
- Protection of the public;
- Emergency Planning; and
- Design Criteria (e.g. loading on Control Room).

The results of consequence analysis are useful for getting information about all known and unknown effects that are of importance when some failure scenario occurs in the plant and also to get information as how to deal with the possible catastrophic events.

It also gives the workers in the plant and people living in the vicinity of the area, an understanding of the situation.

Selected Failure Cases

The failure cases that are selected for study are indicated in Table-7.3(A) The purpose of this listing is to examine consequences of such failure individually or in combination. The failure cases related to storage of LDO and HFO have been identified.

Table No.-7.3 (A)

Scenarios Considered for MCA Analysis

S. No.	Fuel	Scenarios Considered
1.	Failure of LDO tank	Pool Fire
2.	Failure of HFO tank	Pool Fire

Damage Criteria

The fuel storage and unloading at the storage facility may lead to fire and explosion hazards. The damage criteria due to an accidental release of any hydrocarbon arise from fire and explosion. The vapors of these fuels are not toxic and hence no effects of toxicity are expected.

Tank fire would occur if the radiation intensity is high on the peripheral surface of the tank leading to increase in internal tank pressure. Pool fire would occur when fuel collected in the dyke due to leakage gets ignited.

Fire Damage

A flammable liquid in a pool will burn with a large turbulent diffusion flame. This releases heat due tocombustion and the burning rate of the fuel. A part of the heat is radiated while the rest is convicted away by rising hot air and combustion products. The radiations can heat the contents of a nearby storage or process unit to above its ignition temperature and thus result in a spread of fire.

The radiations can also cause severe burns or fatalities of workers or fire fighters located within a certain distance. Hence, it will be important to know beforehand the damage potential of a flammable liquid

created due to leakage or failure of a storage or process vessel. This will help to decide the location of other storage/process vessels, decide the type of protective clothing the workers/fire fighters need, the duration of time for which they can be in the zone, the fire extinguishing measures needed and the protection methods needed for the nearby storage/process vessels. Table-7.3 (B) tabulate the damage effect on equipment and on workers due to thermal radiation intensity.

TABLE NO. - 7.3 (B)

DAMAGE DUE TO INCIDENT RADIATION INTENSITIES

S. No.	Incident Radiation (kW/m^2)	Type of Damage Intensity	
		Damage to Equipment	**Damage to Workers**
1.	37.5	Damage to Process equipment	100% lethality in 1 min. 1% Lethality in 10 sec
2.	25.0	Minimum energy required to ignite wood at indefinitely long exposure without a flame	50% Lethality in 1 min. Significant injury in 10 sec.
3.	19.0	Maximum thermal radiation intensity allowed on thermally unprotected adjoining equipment	----
4.	12.5	Minimum energy to ignite with a flame; melts plastic tubing	1% lethality in 1 min.
5.	4.5	----	Causes pain if duration is longer than 20 sec, however blistering is un-likely (First degree burns)
6.	1.6	---	Causes no discomfort on long exposures

***Source**: Techniques for Assessing Industrial Hazards by World Bank.*

7.2.5.1.1 Scenarios Considered for MCA Analysis

Fuel Storage

The details of storages are given Table. In case of fuel released, in the area catches fire, a steady state fire will ensue. Failures in pipeline may occur due to corrosion and mechanical defects. Failure of pipeline due to external interference is not considered as the area will be closely supervised by trained personnel.

Modeling Scenarios

Based on the storage and consumption of various fuels the following failure scenarios for the proposed power plant have been identified for MCA analysis and the scenarios are discussed in Tables. The fuel properties considered for modeling are presented in Table-7.4 (A).

Worst case possible threats from HFO & LDO storage in the plant premises have been analyzed here, with storage tank details as below:

Table 7.4 (A)

Details of the Fuel used for the Model

S. No	Name of Chemicals Or Fuel	Chemical state [Liquid or Gas]	Storage Conditions		Type of storage tank [Vertical or Horizontal]	Density at 37 deg C (kg/m^3)	Tank dimensions		
			Temperature (Degree Celsius)	Pressure (atm)			Diameter (m)	Length (m)	Volume (m^3)
1.	HFO	Liquid	50 degree Celcius	Atmospheric	Vertical	960	14	10.8	1500 x 2
2.	LDO	Liquid	Atmospheric	Atmospheric	Vertical	800	7.5	9.0	400 x 2 Or 800 x 1

7.2.5.1.2ALOHA (Areal Locations Of Hazardous Atmospheres)- Software Used For Calculations

Aloha is a computer program designed especially for use by people responding to chemical accidents, as well as for emergency planning and training. ALOHA can predict the rates at which chemical vapors may escape into the atmosphere from broken gas pipes, leaking tanks, and evaporating puddles. It can then predict how a hazardous gas cloud might disperse in the atmosphere after an accidental chemical release.

ALOHA is an air dispersion model, which we can use as a tool for predicting the movement and dispersion of gases. It predicts pollutant concentrations downwind from the source of a spill, taking into consideration the physical characteristics of the spilled material. ALOHA also accounts for some of the physical characteristics of the release site, weather conditions, and the circumstances of the release.

ALOHA provides output as amount of chemical discharged from the source as well as its concentration in air it takes in to account different levels of concentrations for a specified chemical. For this a Line of Concentration (LOC) is fixed, LOC is a threshold concentration of the chemical—usually the concentration above which a hazard is believed to exist. Here in this case we have fixed the hazard into 3 concentrations and accordingly the LOC are predicted.

Worst case scenarios have been predicted considering the leakage via a hole in the storage tank un-noticed for about 60 minutes and without any mitigation measures & hindrances to proposed hazards. Safety & Management Plan should therefore include the instant identification with alarm systems installed appropriately to avoid even the slightest impact.

Flammable Threat Zone ALOHA® 5.4.1.2

```
Time: November 21, 2011  1729 hours ST (using computer's clock)

Chemical Name: FUEL OIL

Wind: 3 meters/second from W at 7 meters

THREAT ZONE:
  Threat Modeled: Flammable Area of Vapor Cloud
  Model Run: Gaussian
  Red    : 647 meters --- (0.36 ppm = 60% LEL = Flame Pockets)
  Orange: 1.2 kilometers --- (0.13 ppm)
  Yellow: 2.0 kilometers --- (0.06 ppm = 10% LEL)
```

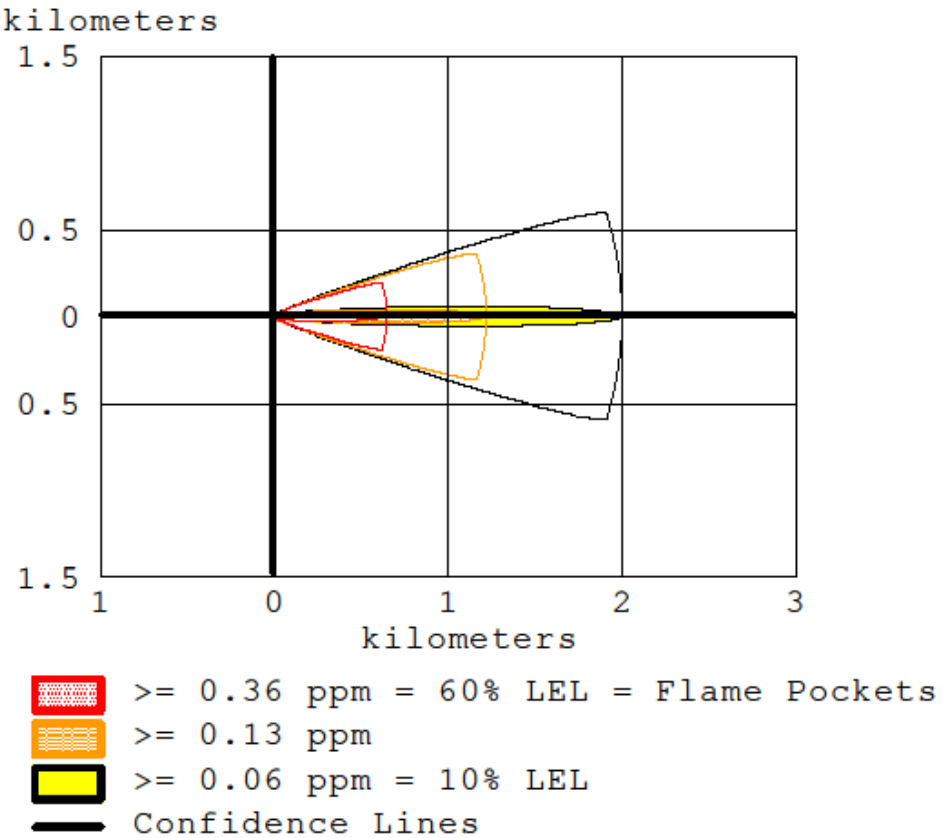

FIGURE 7.1

FLAMMABLE THREAT ZONE _ HFO

Interpretation: The predictions of impact of leakage of the HFO storage Tank & threat for increase flammability of the surrounding shows that the flame pockets shall be around 600 m on the downwind direction (here East). This impact is the LEL i.e. Lower Explosive Limit (LEL) which is the minimum concentration of fuel in the air needed for a fire or an explosion to occur if an ignition source is present. The impact lowers beyond this region and has been found till 2 km though this concentration is much lower to cause any significant harm to the environment even in the calm conditions.

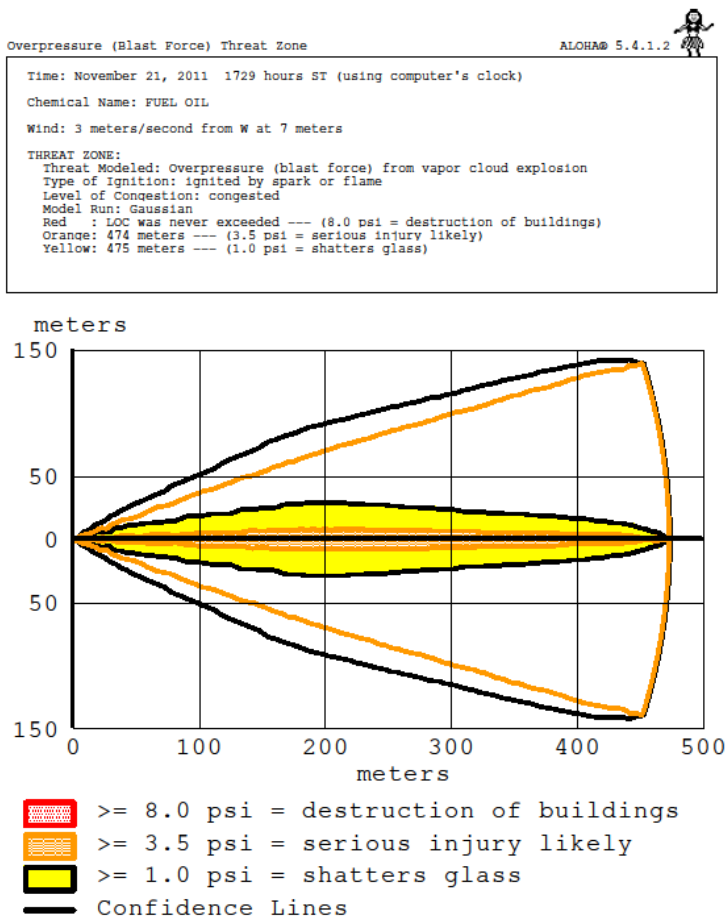

FIGURE7.2

OVERPRESSURE (BLAST FORCE) THREAT ZONE HFO

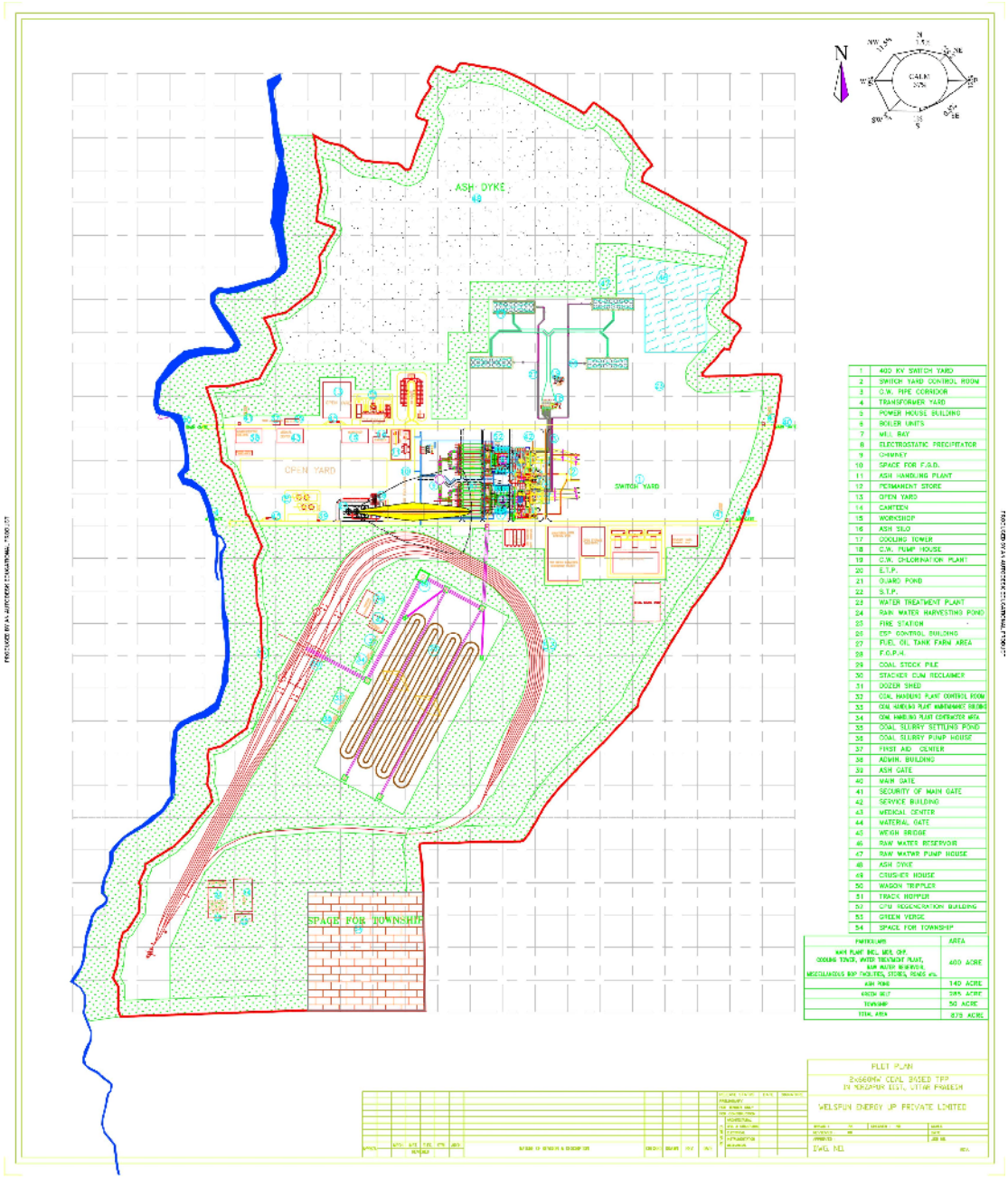

FIGURE7.3

OVERPRESSURE (BLAST FORCE) THREAT ZONE_HFO, SUPER IMPOSED ON KEY PLAN)

Interpretation: The predictions of impact of leakage of the HFO storage Tank & threat for overpressure (blast force) in the surrounding shows that there is no threat of the maximum impact which hereby relates to the destruction of buildings. Threat of serious injury is likely to happen within 500 m distance from the source. This scenario has been developed considering the worst case scenario of having very congested layout nearby, though considering the scenario of proper spacing the threat the LOC was never exceeded. The impact will within the plant area and no any impact will be caused by the exploration on nearby residential area.

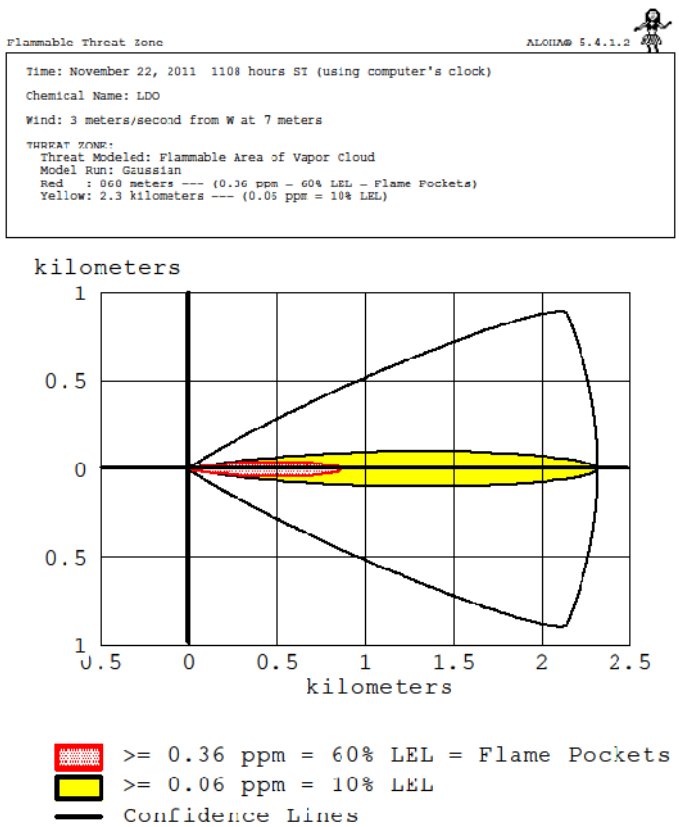

FIGURE 7.4

FLAMMABLE THREAT ZONE _ LDO

Interpretation: The predictions of impact of leakage of the LDO storage Tank & threat for increase flammability of the surrounding shows that the flame pockets shall be limited below 1 km in the downwind direction (here East). This impact is the LEL i.e. Lower Explosive Limit (LEL) which is the minimum concentration of fuel in the air needed for a fire or an explosion to occur if an ignition source is present. The impact lowers beyond this region and has been found till 2.25 km though this concentration is much lower to cause any significant harm to the environment even in the calm conditions.

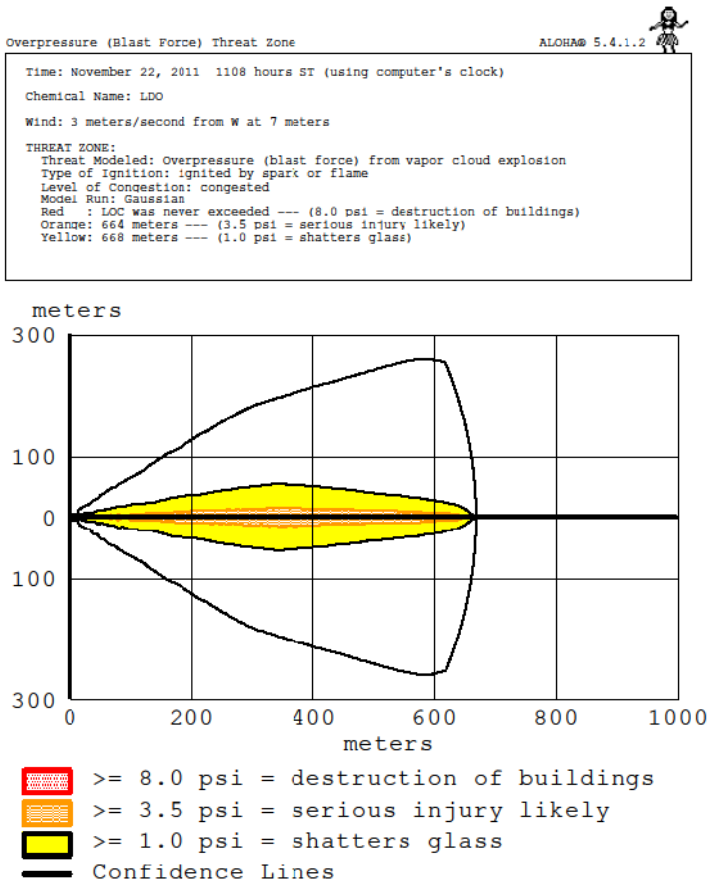

FIGURE 7.5

OVERPRESSURE (BLAST FORCE) THREAT ZONE LDO

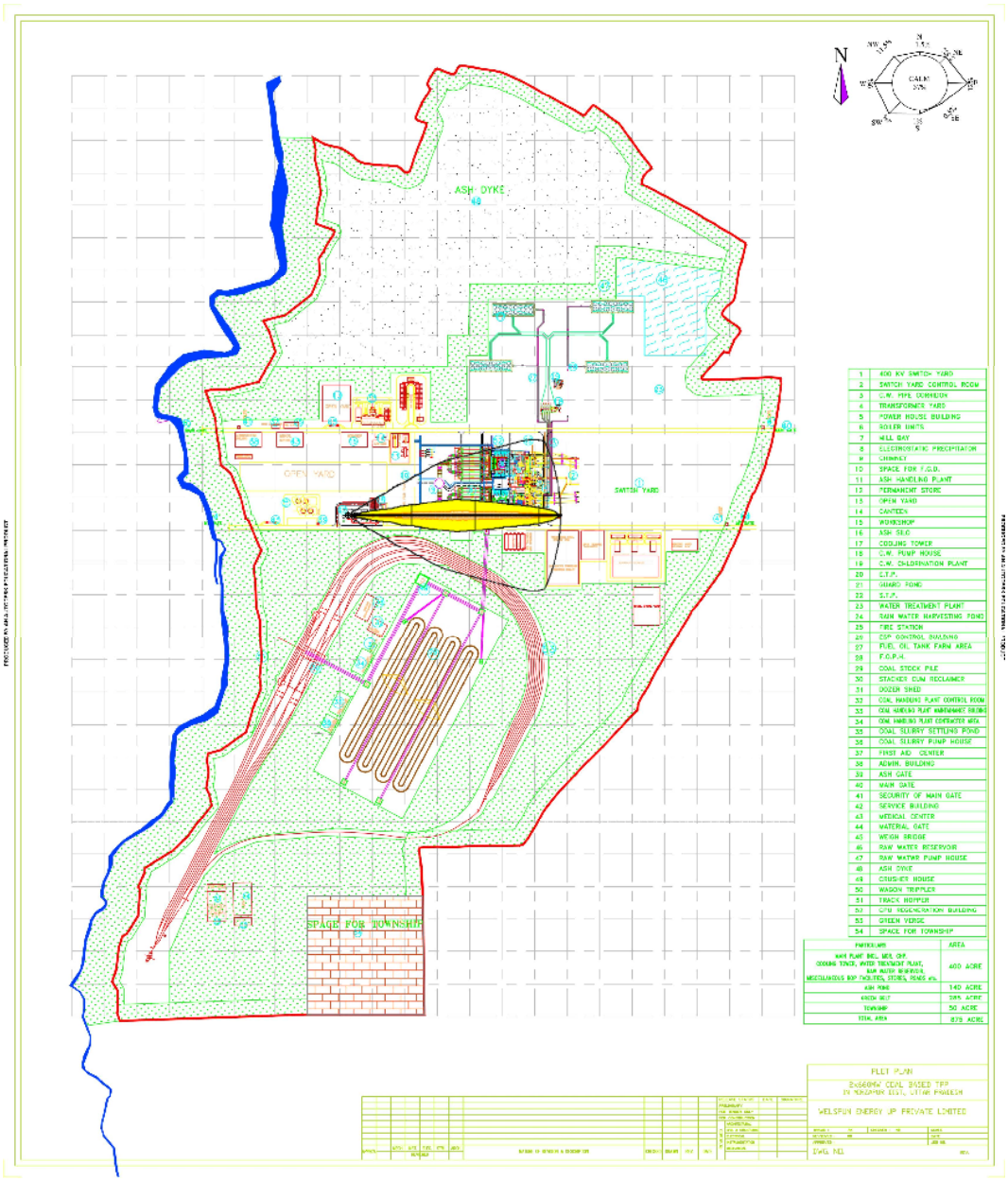

FIGURE 7.6:

OVERPRESSURE (BLAST FORCE) THREAT ZONE LDO (SUPER IMPOSED ON KEY PLAN)

Interpretation: The predictions of impact of leakage of the LDO storage Tank & threat for overpressure (blast force) in the surrounding shows that there is no threat of the maximum impact which hereby relates to the destruction of buildings. Threat of serious injury is likely to happen around 600 m distance from the source. This scenario has been developed considering the worst case scenario of having very congested layout nearby, though considering the scenario of proper spacing the threat the LOC was never exceeded. The impact will within the plant area and no any impact will be caused by the exploration on nearby residential area.

Proposed safety measures:

Fuel tank should have water spray and foam spray system. The tank should be surrounded by dyke. The dyke area should have sufficient volume to hold 100% capacity of both the tanks. Building/ township should be more than 500 m away from the storage area. Unloading at fuel stations should be done carefully to avoid any spark.

7.2.5.2 Chlorine Risk Analysis

7.2.5.2.1 Chlorine Leakage Hazards

To prevent growth of organic matter and micro organisms, which tend to foul condenser tubes etc, chlorine is the most common biocide use. The system is based on conventional gas chlorination using evaporator – chlorinators proposed to be housed in building close to the cooling tower and CW pumps.

7.2.5.2.1.1 Leakage of Chlorine Tank

Consequences of any of the following failure modes results in a chlorine leak. The scenarios of consequence depend upon:

- Quantity of chlorine leaked
- Location of leakage
- Atmospheric conditions such a wind velocity, temperature etc.

The consequences of chlorine release are, escape of chlorine in the work area (if the leakage is in the chlorinator) and moving beyond work area. If the le

area, the leaked gas can drift in the direction of wind and diffuse over a distance. Chlorine being heavier than air, slumps down in its movement. This may result in various degrees of concentration of the chlorine at different distances are presented below. In computing the distance, worst conditions are considered with stability category of D, which may usually occur in nights with overcast sky and minimum temperature.

Chlorine Tonner System

- Total four chlorine tonners are envisaged at the project site
- Two chlorine tonners will be connected online and remaining two will be on standby.

Table 7.5

Details of Chlorine Tower

S.No	Technical Particulars	Design Parameters
1	Each Cl_2 tonner (Cylinder) capacity	940 kg
2	Temperature	Ambient
3	Dimensions: Internal Diameter x Length	760 mm x 2085 mm
4	Circular Opening Diameter	2 mm

Source: Detailed Project report

Table 7.6

Atmospheric Data

S.No	Parameter	Data used for Modeling
1	Wind Speed	1.3 m/s
2	Air Temperature	22.2° C
3	Relative Humidity	65%

Source: Detailed project Report

Table 7.7

Threat Zone

S.No	Scenario	Source Rate (kg/s)	Conc (ppm)	Damage distance (m)
Open Storage				
1	2 mm leak in Chlorine Cylinder	0.115	10.0	136
			2.0	315
2	10 mm leak in Chlorine Cylinder	1.112	10.0	687
			2.0	1500

Source: Detailed Project report

Interpretation: The predictions of impact of leakage of the Chlorine storage Tank & threat for overpressure (blast force) in the surrounding shows that there is no threat of the maximum impact which hereby relates to the destruction of buildings. Threat of serious injury is likely to happen within 500 m distance from the source. This scenario has been developed considering the worst case scenario of having very congested layout nearby, though considering the scenario of proper spacing the threat the LOC was never exceeded. The impact will within the plant area and no any impact will be caused by the exploration on nearby residential area.

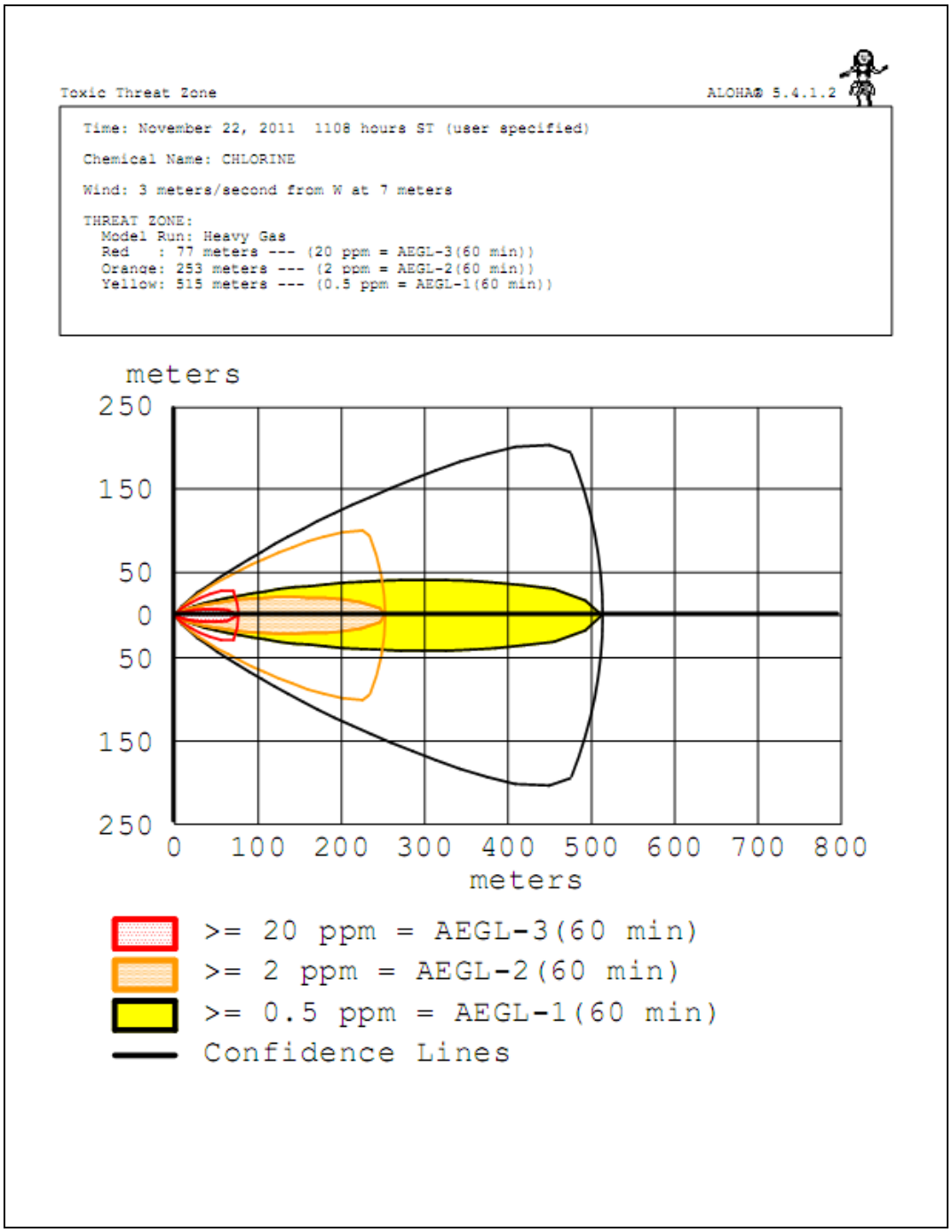

Fig. 7.7

OVERPRESSURE (BLAST FORCE) THREAT ZONE_CHLORINE

7.2.5.3 Effect of Chlorine on Human Beings

The effects of various levels of chlorine inhalation vary with the individuals involved. The following list, taken from the Chlorine Institute's Pamphlet 90, Molecular Chlorine: Health and Environmental Effects, is a compilation of chlorine exposure thresholds and reported responses in humans.

Table 7.8
Type of Damage

S.No	Parts of Chlorine	Type of Damage
1	0.2-0.4	Threshold of odor perception with considerable variation among subjects (a decrease in odor perception occurs over time);
2	1-3	Mild, mucous membrane irritation, tolerated for up to one hour;
3	5-15	Moderate irritation of the respiratory tract;
4	30	Immediate chest pain, vomiting, dyspnea, and cough;
5	40-60	Toxic Pneumonitis and pulmonary edema;
6	430	Lethal over 30 minutes;
7	1000	Fatal within a few minutes.

7.2.5.4 Consequence Analysis

The total employees at power plant would be about 300 permanent and 200 contractual. The power plant would run in three shifts. Thus at any point of time, the maximum strength of all cadres including contractual workers of power plant in general shift would be about 170.

The nearest settlement is located at a distance of 1.8 km from the Chlorine handling place. In the present scenario the dispersion is likely to extend upto a distance of maximum 1.5 km. The IDLH value is for the worst case scenario, whereas the probability of such meteorological conditions coinciding with the failure of the cylinder is remote.

7.5.3.5 Mitigation Measures-Chlorine Tonners

For chlorine tonners following control/containment measures are recommended.

- Chlorine from pressure relief devices should go to an expansion tank or to gas absorption system
- To prevent the large release of chlorine to atmosphere, monitoring and feedback facilities for early detection leaks and emergency shutdown shall be provided
- There should be facilities in the form of water curtain for absorption of chlorine released during an emergency as chlorine is highly soluble in water
- Flow control valves at key points should be installed to prevent excess Cl2 flow from the tonner with multiple level safety per line
- Immediate actions needs to be taken for evacuation of all personnel in case of accidental release of chlorine
- Eye wash stations and emergency shower stations should be provided at appropriate locations especially in the vicinity of chlorine storage and dosing facilities
- The stand by Cl2 tonners shall be kept / stored at isolated covered warehouse at safe distance. It shall be provided with sufficient high (about 6 m) roof ventilation, Cl2 detection and water spray system inside storage facility
- Conduct awareness programmes on regular basis in order to educate villagers around the project about the consequences of possible health hazards and their precautionary measures during accidental conditions.

7.2.6 Coal Handling Plant - Dust Explosion

Coal dust when dispersed in air and ignited would explode. Crusher house and conveyor systems are most susceptible to this hazard. To be explosive, the dust mixture should have:

- Particles dispersed in the air with minimum size (typical figure is 400 microns);
- Dust concentrations must be reasonably uniform; and

- Minimum explosive concentration for coal dust (33% volatiles) is 50 g/m^3.

Failure of dust extraction and suppression systems may lead to abnormal conditions and may increase the concentration of coal dust to the explosive limits. Sources of ignition present are incandescent bulbs with the glasses of bulkhead fittings missing, electric equipment and cables, friction, spontaneous combustion in accumulated dust. Dust explosions may occur without any warnings with Maximum Explosion Pressure upto 6.4 bar. Another dangerous characteristic of dust explosions is that it sets off secondary explosions after the occurrence of the initial dust explosion. Many a times the secondary explosions are more damaging than primary ones. The dust explosions are powerful enough to destroy structures, kill or injure people and set dangerous fires likely to damage a large portion of the Coal Handling Plant including collapse of its steel structure which may cripple the life line of the power plant.

Stockpile areas shall be provided with automatic garden type sprinklers for dust suppression as well as to reduce spontaneous ignition of the coal stockpiles. Necessary water distribution network for drinking and service water with pumps, piping, tanks, valves etc will be provided for distributing water at all transfer points, crusher house, control rooms etc. A centralized control room with microprocessor based control system (PLC) has been envisaged for operation of the coal handling plant. Except for locally controlled equipment like traveling tripper, dust extraction/ dust suppression / ventilation equipment, sump pumps, water distribution system etc., all other in-line equipment will be controlled from the central control room but will have provision for local control as well. All necessary interlocks, control panels, MCC's, mimic diagrams etc. will be provided for safe and reliable operation of the coal handling plant.

7.2.6.1 Control Measures for Coal Yards

The total quantity of coal will be stored in separate stack piles, with proper drains around to collect washouts during monsoon season.

Water sprinkling system will be installed on stocks of coal in required scales to prevent spontaneous combustion and consequent fire l

geometry will be adopted to maintain minimum exposure of stock pile areas towards predominant wind direction.

7.2.7 Identification of Hazards

The various hazards associated, with the plant process apart from fuel storage have been identified and are outlined in **Table-7.9**

TABLE-7.9

HAZARD ANALYSIS FOR PROCESS IN POWER PLANT

Sr. No.	Blocks/Areas	Hazards Identified
1	Coal storage in open yard	Fire, Spontaneous Combustion
2	Coal Handling Plant including Bunker area	Fire and/or Dust Explosions
3	Boilers	Fire (mainly near oil burners), Steam Explosions, Fuel Explosions
4	Steam Turbine Generator Buildings	Fires in – a) Lube oil system b) Cable galleries c) Short circuits in i) Control rooms ii) Switch-gears Explosion due to leakage of Hydrogen and fire following it.
5	Switch-yard Control Room	Fire in cable galleries and Switch-gear/Control Room
6	LDO Tank Farms HFO Tank Farm	Fire

7.2.8 Hazardous Events with Greatest Contribution to Fatality Risk

The hazardous event scenarios likely to make the greatest contribution to the risk of potential fatalities are summarized in **Table-7.10** 'Onsite facility' refers to the operating site, whereas 'offsite facility' refers to transport and handling systems, which are away from the operating site.

TABLE-7.10

HAZARDOUS EVENTS CONTRIBUTING TO ON-SITE FACILITY RISK

Hazardous Event	Risk Rank	Consequences of Interest
Onsite vehicle impact on personnel	3	Potential for single fatalities, onsite impact only
Entrapment/struck by Machinery	3	Potential for single fatalities, onsite impact only
Fall from heights	3	Potential for single fatalities, onsite impact only
Electrocution	3	Potential for single fatalities, onsite impact only
Storage tank rupture	3	Potential for single fatalities, onsite impact only

7.2.9 Risk Assessment Summary

The preliminary risk assessment has been completed for the proposed power plant and associated facilities and the broad conclusions are as follows:

- There will be no significant community impacts or environmental damage consequences; and
- The hazardous event scenarios and risks in general at this facility can be adequately managed to acceptable levels by performing the recommended safety studies as part of detailed design, applying recommended control strategies and implementing a Safety Management System.

7.2.10 Risk Reduction Opportunities

The following precautionary measures shall be considered as a potential means of reducing identified risks during the detailed design phase:

- Building and plant structures shall be designed for high floods and seismic events to prevent structural collapse and weather (water) proofing for storage tanks
- Provision of adequate water supply for fire protection systems;
- Easy isolation of workers form accidental area;
- Provision safe access way and fall protection systems to facilitate access to fire fighting equipment and control valves;
- Provision of process tanks, waste holding tanks and bunded areas as per relevant standards;
- Containment of Hazardous materials;
- Security arrangement to prevent unauthorized access to plant. And
- Development of emergency response management system commensurate with site specific hazards and risks.

7.3 DISASTER MANAGEMENT PLAN

Disasters

A disaster is a catastrophic situation in which suddenly, people are plunged into helplessness and suffering, as a result, need protection, clothing, shelter, medical and social care and other necessities of life.

Disasters can be divided into two main groups. In the first, disasters resulting from natural phenomena like earthquakes, volcanic eruptions, storm surges, cyclones, tropical storms, floods, avalanches, landslides, forest fires etc. The second group includes disastrous events occasioned by man, or man's impact upon the environment. Examples are armed conflict, industrial accidents, radiation accidents, factory fires, explosions and escape of toxic gases or chemical substances, river pollution, mining or other structural collapses, air, sea, rail and road transport accidents and can reach catastrophic dimensions in terms of human loss.

There can be no set criteria for assessing the gravity of a disaster in the abstract since this depends to a large extent on the physical, economic and social environment in which it occurs. What would be considered a major disaster in a developing country, ill equipped to cope with the problems involved, may not mean more than a temporary emergency elsewhere. However, all disaster brings in their wake similar consequences that call for immediate action, whether at the local, national or international level, for the rescue and relief of the victims. This includes the search for the dead and injured and removal of debris and social care, the provision of temporary shelter to the homeless, food, clothing and medical supplies, and the rapid re-establishment of essential services.

Objectives of Disaster Management Plan (DMP)

The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities. For effective implementation of the Disaster Management Plan, it will be widely circulated and personnel training given through rehearsals/drills.

The Disaster Management Plan would reflect the probable, consequential severalties of the undesired event due to deteriorating conditions or through 'Knock on effects. Further the management should be able to demonstrate that their assessment of the consequences uses good supporting evidence and is based on currently available and reliable information, incident data from internal and external sources and if necessary the reports of outside agencies.

To tackle the consequences of a major emergency inside the factory or immediate vicinity of the factory, a Disaster Management Plan has to be formulated and this planned emergency document is called "Disaster Management Plan".

The objective of the Industrial Disaster Management Plan is to make use of the combine resources of the plant and the outside services to achieve the following:

- Effect the rescue and medical treatment of casualties;

- Safeguard other people;
- Minimize damage to property and the environment;
- Initially contain and ultimately bring the incident under control;
- Identify any dead;
- Provide for needs of relatives;
- Provide authoritative information to the news media;
- Secure the safe rehabilitation of affected area; and
- Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the Emergency.

In effect, it is to optimize operational efficiency to rescue, rehabilitation and render medical help and to restore normalcy.

7.4 EMERGENCY ACTION PLAN

7.4.1 General, Industrial, Emergencies

The emergencies that could be envisaged in the plant and tank farm are as follows:

- Fires at Tank farm unloading platform;
- Fire at the Hydrogen plant;
- Fire at the tank farm of all storages;
- Slow isolated fires;
- Fast spreading fires;
- Structural failures;
- Contamination of food/water;
- Sabotage/Social disorder and

7.4.2 Specific Emergencies Anticipated

Fire and Explosion

Fire consequences can be disastrous, since they involve quantities of fuel either stored or in dynamic inventory in pipelines or in nearby areas. Toxic releases can affect persons working around. Preliminary hazard analysis has provided a basis for consequences estimation. Estimation can be made by using various pool fire, tank fire consequence calculations.

During the study of Risk Assessment, the nature of damages are worked out and probability of occurrence of such hazards is also drawn up. Therefore, the risk assessment report is to be essentially studied in conjunction with disaster management plan.

For protection of the plant against fire, all yards and plant will be protected by any one or a combination of the following systems:-

a. Hydrant system

b. Automatic high velocity and medium velocity sprinkler system

- Automatic high velocity water sprays (HVWS) system and foam system for fuel oil tanks.
- Automatic Medium Velocity Water Spray (MVWS) system and foam system for fuel oil tanks.
- Automatic MVWS system for coal conveyors, cable galleries, etc.
- Automatic sprinkler systems for certain selected areas.

c. Water spray (Emulsifier system)

d. Foam system

e. Portable and mobile chemical extinguishers

f. Auto modular inert gas flooding system

The system will be designed as per the recommendation of Tariff Advisory Committee (TAC) of the insurance Association of India. Applicable Codes and Standards of National Fire Prevention Association (NFPA), USA, would also be followed.

A. Fire detection & Alarm system complete would be provided for efficient, safe and trouble free operation of plant. Areas for fire alarm detection will include Main Control Room, Local Control Rooms, Control Equipment Room, Electrical Equipment Rooms, Cable Cellar Room, oil tank areas, coal conveyors and coal stockpiles.**Fire Hydrant System.**

Fire Hydrant system shall be designed per TAC guidelines considering 'Ordinary' hazard classification.

B. Water Spray System

HVWS system for transformers, emergency DC & Lube oil tank will be designed for a water density of 10.2 litres/min./m2 of projected surface area in accordance with TAC's 'Rules for Water Spray Systems'. A minimum pressure of 3.5 bars & maximum pressure of 5 bars will be maintained at the nozzle.

MVWS system for cable galleries will be designed for a water density of 12.2 litre/min/m2 of the exposed area of the cable racks as per TAC's "Rules for Water Spray Systems". A minimum pressure of 2.8 bars will be maintained at the remotest nozzle.

Fuel oil storage tank cooling system will be designed for water density of 3 litre/ min/ m^2 as per OISD recommendations.

C. Mobile Fire Extinguisher

The selection and number of portable extinguishers (water, foam, dry chemical powder, CO2) will be as per Tariff Advisory Committee (TAC) recommendations.

D. Foam Injection

Bladder Pressure Proportioning Foam Injection system will be provided for Fuel oil (HFO+LDO) storage tanks. Foam system for fuel oil tanks is designed as per NFPA41.

E. Inert Gas Flooding

Inert gas flooding will be as per NFPA 2001. The area to be covered under flooding system will be divided in to different zones and system will be designed

for the highest risk. Accordingly, common standby cylinder banks (100% reserve) will be provided based on the largest risk zone.

F. Fire Detection & Alarm System

The plant will be provided with microprocessor based analogue addressable fire alarm and detection system, which will include detectors, manual call points, panels, etc.

The Fire Alarm and detection system shall be designed as per IS 2189/TAC/NFPA guidelines/recommendations. For the type of Fire Protection & Detection System(s) envisaged at different plant areas, refer table below.

G. HVAC Fire Provisions

The HVAC system of an area will be isolated by tripping of fire dampers and running plant equipment (wherever applicable) in the event of fire.

H. Fire Water Storage

The raw water storage reservoir will be sized taking into account the exclusive fire water requirement of two(2) hours of hydrant pump capacity (in line with TAC's recommendations for ordinary hazard areas) and 40 minutes of spray pump capacity (in line with TAC's recommendations for spray system). Raw water reservoir will have reserve storage for Fire Protection System.

I. Pumps

Following pumps are envisaged for the system:

- Hydrant Pumps

The hydrant pump capacity will be determined based on number of hydrants as per TAC recommendations for ordinary hazard area.

- Spray Pumps

Spray pump capacity will be selected based on the water requirement for single largest risk.

- Jockey Pumps

As per the recommendations of TAC, the jockey pumps capacity will be selected between 3-5% of installed fire water pumping capacity.

Piping, Valves, Fittings and Specialties:

Piping, valves, fittings, hangers, anchors, supports, guides etc. would be provided as required. All high pressure, medium pressure and low pressure lines will be of proven quality and suitable for conditions of operation encountered at the specific points. Pipelines running outside the power house will be routed over trestles as far as practicable in order to avoid maintenance and other problems encountered with trench piping and buried piping. However, large diameter water pipes will be buried with proper coating and waterproofing. Steam piping will be as per IBR regulation.

7.4.3 Emergency Organization

It is recommended to setup an Emergency Organization. A senior executive who has control over the affairs of the plant would be heading the Emergency Organization. He would be designated as Site Controller. As per the General Organization chart, would be designated as the Incident Controller. In the case of stores, utilities, open areas, which are not under the control of the Production Heads, Senior Executive responsible for maintenance of utilities would be designated as Incident Controller. All the Incident Controllers would be reporting to the Site Controller.

Each Incident Controller, for himself organizes a team responsible for controlling the incidence with the personnel under his control. Shift In-charge would be the reporting officer, who would bring the incidence to the notice of the Incidence Controller and Site Controller.

Emergency Coordinators would be appointed who would undertake the responsibilities like fire fighting, rescue, rehabilitation, transport and provide essential and support services. For this purposes, Security In-charge, Personnel Department, Essential services personnel would be engaged. All these personnel would be designated as Key personnel.

In each shift, electrical supervisor, electrical fitters, pump house In-charge, and other maintenance staff would be drafted for emergency operations. In the event of power or communication system failure, some of the staff members in the office/plant offices would be drafted and their services would be utilized as messengers for quick passing of communications. All these personnel would be declared as essential personnel.

7.4.3.1 Emergency Communication

Whoever notices an emergency situation such as fire, growth of fire, leakage etc. would inform his immediate superior and Emergency Control Center. The person on duty in the Emergency Control Centre would appraise the Site Controller. Site Controller verifies the situation from the Incident Controller of that area or the Shift In-charge and takes a decision about an impending On Site Emergency. This would be communicated to all the Incident Controllers, Emergency Coordinators. Simultaneously, the emergency warning system would be activated on the instructions of the Site Controller.

Emergency Responsibilities

The responsibilities of the key personnel are appended below:

A. Site Controller

On receiving information about emergency he would rush to Emergency Control Center and take charge of ECC and the situation.

- Assesses the magnitude of the situation on the advice of incident Controller and decides;
  - Whether the affected area needs to be evacuated;
  - Whether personnel who are at assembly points need to be evacuated; declares emergency and orders for operation of emergency siren;
- Organizes announcement by public address system about location of emergency;

- Assesses which areas are likely to be affected, or need to be evacuated or are to be alerted;
- Maintains a continuous review of possible development and assesses the situation in consultation with Incident Controller and other Key Personnel as to whether shutting down the plant or any section of the plant is required and if evacuation of persons is needed;
- Directs personnel for Rescue, rehabilitation, transport, fire, brigade, medical and other designated mutual support systems locally available, for meeting emergencies;
- Controls evacuation of affected areas, if the situation is likely to go out of control or effects are likely to go beyond the premises of the factory, informs to District Emergency Authority, Police, Hospital and seeks their intervention and help;
- Informs Inspector of Factories, Deputy Chief Inspector of Factories, PCB and other statutory authorities;
- Gives a public statement in necessary;
- Keeps record of chronological events and prepares an investigation report and preserves evidence; and
- On completion of on Site Emergency and restoration of normalcy, declares all clear and orders for all clear warning.

B. Incident Controller

- Assembles the incident control team;
- Directs operations within the affected areas with the priorities for safety to personnel, minimize damage to the plant, property and environment and minimize the loss of materials;
- Directs the shutting down and evacuation of plant and areas likely to be adversely affected by the emergency;

- Ensures that all key personnel help is sought;
- Provides advice and information to the Fire and Security Officer and the Local Fire Services as and when they arrive;
- Ensures that all non-essential workers/staff of the affected areas evacuated to the appropriate assembly points, and the areas are searched for causalities;
- Has regard to the need for preservation of evidence so as to facilitate any inquiry into the causes and circumstances, which caused or escalated the emergency;
- Co-ordinates with emergency services at the site;
- Provides tools and safety equipment to the team members;
- Keeps in touch with the team and advise them regarding the method of control to be used; and
- Keeps the Site Controller of Emergency informed of the progress being made

C. Emergency Coordinator - Rescue, Fire Fighting

- On knowing about emergency, rushes to ECC;
- Helps the incident Controller in containment of the emergency;
- Ensures fire pumps in operating conditions and instructs pump house operator to ready for any emergency with standby arrangement;
- Guides the fire fighting crew i.e. firemen, trained plant personnel and security staff;
- Organizes shifting the fire fighting facilities to the emergency site, if required;
- Takes guidance of the Incident Controller for fire fighting as well as

assesses the requirements of outside help;

- Arranges to control the traffic at the gate and the incident area;
- Directs the security staff to the incident site to take part in the emergency operations under his guidance and supervision;
- Evacuates the people in the plant or in the nearby areas as advised by Site Controller;
- Searches for casualties and arranges proper aid for them;
- Assembles search and evacuation team;
- Arranges for safety equipment for the members of this team;
- Decides which paths the evacuated workers should follow; and
- Maintains law and order in the area, and if necessary seeks the help of police.

D. Emergency Coordinator-Medical, Mutual Aid, Rehabilitation, Transport and Communication

- In the event of failure of electric supply and thereby internal telephone, sets up communication point and establishes contact with the Emergency Control Center (ECC);
- Organizes medical treatment to the injured and if necessary will shift the injured to nearby hospitals;
- Mobilizes extra medical help from outside, if necessary;
- Keeps a list of qualified first aiders of the factory and seek their assistance;
- Maintains first aid and medical emergency requirements;
- Makes sure that all safety equipment are made available to the emergency team;
- Assists Site Controller with necessary data a

emergency activities;

- Assists Site Controller in updating emergency plan, organizing mock drills verification of inventory of emergency facilities and furnishing report to the Site Controller;
- Maintains liaison with civil Administration;
- Ensure availability of canteen facilities and maintenance of rehabilitation center;
- He will be in liaison with Site Controller/Incident Controller;
- Ensure transportation facility;
- Ensures availability of necessary cash for rescue/rehabilitation and emergency expenditure;
- Controls rehabilitation of affected areas on discontinuation of emergency; and
- Makes available diesel/petrol for transport vehicles engaged in emergency operation.

E. Emergency Coordinator - Essential Services

- He would assist Site controller and Incident Controller;
- Maintains essential services like Diesel Generator, Water, Fire Water, Compressed Air/Instrument Air, power supply for lighting;
- He would plan alternate facilities in the event of power failure, to maintain essential services such as lighting, refrigeration plant etc;
- He would organize separate electrical connections for all utilities and emergency services so that in the event of emergency or fires, essential services and utilities are not affected;
- Gives necessary instructions regarding emergency electrical supply, isolation of certain sections etc. to shift In-charge and electricians; and

- Ensures availability of adequate quantities of protective equipment and other emergency materials, spares etc.

General Responsibilities of Employees during an Emergency

During an emergency, especially it becomes more enhanced and pronounced when an emergency warning is raised, the workers if they are In-charge of process equipment should adopt safe and emergency shut down and attend any prescribed duty as essential employee. If no such responsibilities assigned, he should adopt a safe course to assembly point and await instructions. He should not resort to spread panic. On the other hand, he must assist emergency personnel towards objectives of DMP.

7.4.4 Emergency Facilities

7.4.4.1 Emergency Control Center (ECC)

For the time being Office Block is identified as Emergency Control Center. It would have external Telephone, Fax, Telex facility. All the Site Controller/Incident Controller Officers, Senior Personnel would be located here. Also, it would be an elevated place. Various other materials that are to be maintained in the Emergency Control Center are:

The following information and equipment are to be provided at the Emergency Control Center (ECC).

- Intercom, telephone P & T telephone
- Self contained breathing apparatus
- Fire suit/gas tight goggles/gloves/helmets
- Hand tools, wind direction/velocities indications
- Public address megaphone, hand bell, telephone directories
- (internal, P&T) factory layout, site plan
- Emergency lamp/torch light/batteries

- Plan indicating locations of hazard inventories, plant control room, sources of safety equipment, work road plan, assembly points, rescue location vulnerable zones, escape routes.
- Hazard chart
- Emergency shut-down procedures
- Nominal roll of employees
- List of key personnel, list of essential employees, list of Emergency Co-ordinators
- Duties of key personnel
- Address with telephone numbers and key personnel, emergency coordinator, essential employees.
- Important address and telephone numbers including Government agencies, neighboring industries and sources of help, out side experts, chemical fact sheets, population details around the factory.

7.4.4.2 Assembly Point

Number of assembly points, depending upon the plant location would be identified wherein employees who are not directly connected with the disaster management would be assembled for safety and rescue. Emergency breathing apparatus, minimum facilities like water etc. would be organized.

In view of the size of plant, different locations would be ear marked as assembly points. Depending upon the location of hazard, the assembly points are to be used.

7.4.4.3 Emergency Power Supply

Plant facilities would be connected to Diesel Generator and would be placed in auto mode. Thus water pumps, plants lighting and emergency control center, administrative building and other auxiliary services are connected to

emergency power supply. In all the blocks flame proof type emergency lamps would be provided.

7.4.4.4 Fire Fighting Facilities

Firefighting equipment suitable for emergency should be maintained in each and at Bulk Storage of LDO and HFO. This would be as per statutory requirements as well as per TAC Regulations. However, fire hydrant line covering major areas would be laid. It would be maintained as 6 kg/sq. cm pressure. Fire alarms would be located in the bulk storage areas.

7.4.4.5 Location of Wind Sock

On the top of the Administration block, top of each production blocks, wind socks would be installed to indicate direction of wind for emergency escape.

7.4.4.6 Emergency Medical Facilities

Stretchers, gas masks and general first aid materials for dealing with chemical burns, and inhalations, fire burns etc. would be maintained in the medical center as well as in the emergency control room. Private medical practitioners help would be sought. Government hospital would be approached for emergency help.

Apart from plant first aid facilities, external facilities would be augmented. Names of Medical Personnel. Medical facilities in the surrounding area and near towns would be prepared and updated. Necessary specific medicines and antidotes for emergency treatment of Burns Patients and for those affected by toxicity would be maintained.

Breathing apparatus and other emergency medical equipment would be provided and maintained. The help of nearby industrial management in this regard would take on mutual support basis.

7.4.4.7 Ambulance

An ambulance with driver availability in all the shifts, emergency shift vehicle would be ensured and maintained to transport the injured or

Number of persons would be trained in first aid so that, in every shift first aid personnel would be available.

7.4.5 Emergency Actions

7.4.5.1 Emergency Warning

Communication of emergency would be made familiar to the personnel inside the plant and people outside. An emergency warning system would be established.

7.4.5.2 Emergency Shutdown

There are number of actions which are to be initiated to help deal with hazardous conditions, when a tank is on fire. The suggested actions are:

- Stop feed;
- Dilute contents;
- Remove heat;
- Deluge with water; and
- Transfer contents

Whether a given method is appropriate depends on the particular case. Cessation of agitation may be the best action in some instances but not in others. Stopping of the feed may require the provision of by-pass arrangements.

Methods of removing additional heat include removal through the normal cooling arrangements or use of an emergency cooling system. Cooling facilities which use vapouring liquid may be particularly effective, since a large increase in vaporization can be obtained by dropping pressure.

7.4.5.3 Evacuation of Personnel

There could be more number of persons in the storage area and other areas in the vicinity. The area would have adequate number of exits, stair cases. In the event of an emergency, unconnected personnel have to escape to assembly point. Operators have to take emergency shutdown procedure and escape. Time Office

maintains a copy of deployment of employees in each shift, at ECC. If necessary, persons can be evacuated by rescue teams.

7.4.5.4 All Clear Signal

Also, at the end of an emergency, after discussing with Incident Controllers and Emergency Co-ordinators, the Site Controller orders an all clear signal. When it becomes essential the Site Controller communicates to the District Emergency Authority, Police, and Fire Service personnel regarding help required or development of the situation into an Off-Site Emergency.

7.4.6 General

7.4.6.1 Employee Information

During an emergency, employees would be warned by raising siren in specific pattern. Employees would be given training of escape routes, taking shelter, protecting from harmful effects. Employees would be provided with information related to fire hazards, antidotes and first aid measures. Those who would designate as key personnel and essential employees should be given training to emergency response.

7.4.6.2 Public Information and Warning

The industrial disaster effects related to this plant may mostly be confined to the plant area. The detailed risk analysis has indicated that the pool fire effects would not be felt outside. However, as an abundant precaution, the information related to chemicals in use would be furnished to District Emergency Authority for necessary dissemination to general public and for any use during an off-site emergency.

7.4.6.3 Coordination with Local Authorities

Keeping in view of the nature of emergency, two levels of coordination are proposed. In the case of an On Site Emergency (OSE), resources within the organization would be mobilized and in the event extreme emergency local authorities help should be sought.

In the event of an emergency developing into an off-site emergency, local authority and District Emergency Authority (normally the Collector) would be appraised and under his supervision, the Off Site Disaster Management Plant would be exercised. For this purpose, the facilities that are available locally, i.e. medical, transport, personnel, temporary accommodation, voluntary organizations etc. would be kept on record. Necessary training and rehearsals in the form of mock drills would be organized.

7.4.6.4 Mutual Aid

Mutual aid in the form of technical personnel, runners, helpers special protective equipment, transport vehicles, communication facility etc. should be sought from the neighboring industrial management.

7.4.6.5 Mock Drills

Emergency preparedness is an important on that of planning in Industrial Disaster Management. Personnel would be trained suitably and prepared mentally and physically in emergency response through carefully planned, simulated procedures. Similarly, the key personnel and essential personnel should be trained in the operations.

7.4.6.6 Important Information

Once the Plant starts manufacturing products, important information such as names and addresses of key personnel, essential employees, medical personnel outside the plant, transporter's address, address of those connected with Off Site Emergency such as Police, Local Authorities, Fire Services, District Emergency Authority should be prepared and maintained. The on-site emergency organization chart for various emergencies is shown in figure 7.2

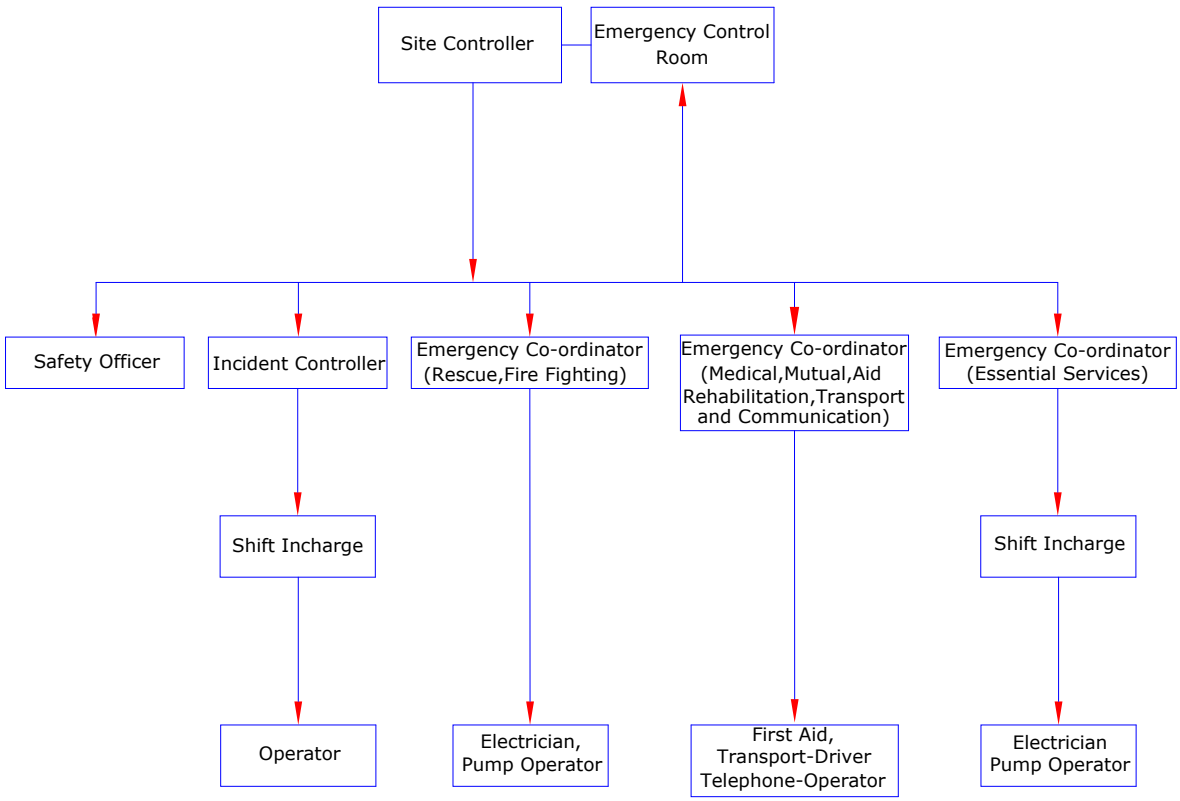

FIGURE 7.8

ONSITE EMERGENCY ORGANISATION CHART

7.4.7 Off-Site Emergency Preparedness Plan

The task of preparing the Off-Site Emergency Plan lies with the district collector, however the off-site plan will be prepared with the help of the local district authorities. The proposed plan will be based on the following guidelines.

7.4.7.1 Introduction

Off-site emergency plan follows the on-site emergency plan. When the consequences of an emergency situation go beyond the plant boundaries, it becomes an off-site emergency. Off-site emergency is essentially the responsibility of the public administration. However, the factory management will provide the public administration with the technical information relating to the nature, quantum and probable consequences on the neighboring population.

The off-site plan in detail will be based on those events which are most likely to occur, but other less likely events which have severe consequence will also be considered. Incidents which have very severe consequences yet have a small probability of occurrence will also be considered during the preparation of the plan. However the key feature of a good off-site emergency plan is flexibility in its application to emergencies other than those specifically included in the formation of the plan.

The roles of the various parties who will be involved in the implementation of an off-site plan are described below Depending on local arrangements, the responsibility for the off-site plan will be either rest with the works management or, with the local authority. Either way, the plan will identify an emergency co-ordinating officer, who would take the overall command of the off-site activities. As with the on- site plan, an emergency control center will be setup within which the emergency co-ordinating officer can operate.

An early decision will be required in many cases on the advice to be given to people living "within range" of the accident - in particular whether they should be evacuated or told to go indoors. In the latter case, the decision can regularly be reviewed in the event of an escalation of the incident. Consideration of evacuation may include the following factors.

- In the case of a major fire but without explosion risk (e.g an oil storage tank), only houses close to the fire are likely to need evacuation, although a severe smoke hazard may require this to be reviewed periodically;
- If a fire is escalating and in turn threatening a store of hazardous material, it might be necessary to evacuate people nearby, but only if there is time; if insufficient time exists, people should be advised to stay indoors and shield themselves from the fire.

7.4.7.2 Aspects to be considered in the Off-Site Emergency Plan

The main aspects, which will be included in the emergency plan, are:

Organization

Details of command structure warning systems, implementation procedures, emergency control centers.

Names and appointments of incident controller, site main controller, their deputies and other key personnel.

Communications

Identification of personnel involved, communication center, call signs, network, lists of telephone numbers.

Specialized Knowledge

Details of specialist bodies, firms and people upon whom it may be necessary to call i.e. those with specialized chemical knowledge, laboratories.

Voluntary Organizations

Details of organizers, telephone numbers, resources etc

Chemical Information

Details of the hazardous substances stored or procedure on each site and a summary of the risk associated with them.

Meteorological Information

Arrangements for obtaining details of weather conditions prevailing at the time and weather forecasts.

Humanitarian Arrangements

Transport, evacuation centers, emergency feeding, treatment of injured, first aid, ambulances, temporary mortuaries.

Public Information

Arrangements for dealing with the media press office; informing relatives, etc.

Assessment for Emergency Plan

Arrangements for: (a) collecting information on the causes of the emergency; (b) reviewing the efficiency and effectiveness of all aspects of the emergency plan.

7.4.7.3 Role of the Emergency Co-ordinating Officer

The various emergency services will be co-ordinated by an emergency coordinating officer (ECO), who will be designated by the District Collector. The ECO will liaison closely with the site main controller. Again depending on local arrangements, for very severe incidents with major or prolonged off-site consequences, the external control will be passed to a senior local authority administrator or even an administrator appointed by the central or state government. The ECO will be equipped with address and phone numbers of important agencies.

7.4.7.4 Role of the Local Authority

The duty to prepare the off-site plan lies with the local authorities. The emergency planning officer (EPO) appointed will carry out his duty in preparing for a whole range of different emergencies within the local authority area. The EPO will liaison with the workers, to obtain the information to provide the basis for the plan. This liaison will ensure that the plan is continually kept up-to-date.

It will be the responsibility of the EPO to ensure that all those organizations which will be involved off site in handling the emergency, know of their role and are able to accept it by having for example, sufficient staff and appropriate equipment to cover their particular responsibilities. Rehearsals for off-site plans will be organized by the EPO.

7.4.7.5 Role of Police

Formal duties of the police during an emergency include protecting life and property and controlling traffic movements.

Their functions will include controlling bystanders evacuating the public, identifying the dead and dealing with casualties, and informing relatives of death or injury.

7.4.7.6 Role of Fire Authorities

The control of a fire will be normally the responsibility of the senior fire brigade officer who would take over the handling of the fire from the site incident controller on arrival at the site. The senior fire brigade officer will also have a similar responsibility for other events, such as explosions. Fire authorities in the region will be apprised about the location of all stores of flammable materials, water and foam supply points, and fire-fighting equipment. They will be involved in on-site emergency rehearsals both as participants and on occasions, as observes of exercises involving only site personnel.

7.4.7.7 Role of Health Authorities

Health authorities, including doctors, surgeons, hospitals, ambulances, and so on, will have a vital part to play following a major accident, and they will form an integral part of the emergency plan.

For major fires, injuries will be the result of the effects of thermal radiation to a varying degree, and the knowledge and experience to handle this in all but extreme cases may be generally available in most hospitals.

Major off-site incidents are likely to require medical equipment and facilities additional to those available locally, and a medical "mutual aid "scheme should exist to enable the assistance of neighboring authorities to be obtained in the event of an emergency.

7.4.7.8 Role of Government Safety Authority

Factory Inspectors of the region may like to satisfy themselves that the organization responsible for producing the off-site plan has made adequate arrangements for handling emergencies of all types including major emergencies. They may wish to see well documented producers and evidence of exercise undertaken to test the plan.

In the event of an accident, local arrangements regarding the role of the factory inspector will apply. These may vary from keeping a watching brief to a close involvement in advising on operations.

The action plan suggested for control of the off-site emergencies is given in Table-7.11.

TABLE-7.11

OFF-SITE ACTION PLAN

Sr. No.	Action required to be taken to mitigate disaster by aid giving agency	Responsible agencies for taking action	Equipments/material facilities required at site to mitigate emergency
A1	Arrangements for evacuation/rescue of persons from zone of influence to predetermined camps	Police Department	Self Breathing apparatus with spare cylinder Chemical gas mask with spare canister
2	Caution to public by announcement		Vehicle with PA system
3	Traffic and Mob control by cordoning of the area		Transportation for evacuation of people
4	Law & order		
5	Request to railway authority for keeping the nearest by railway gate open & to stop		

Sr. No.	Action required to be taken to mitigate disaster by aid giving agency	Responsible agencies for taking action	Equipments/material facilities required at site to mitigate emergency
	the up & down trains at the nearest railway station		
B1	Control of fire	District Fire Brigade	Self breathing apparatus with spare cylinders Foam/water fire tenders Gas mask with spare canisters Lime water Neck to toe complete asbestos suit, PVC hand gloves, gumboots, safety goggles Mobile scrubbing system along with suction arrangement.
1	Scrubbing of the flashed off gas cloud with water curtain		
2	To rescue trapped persons		
3	If fire is big, keep surrounding area cool by spraying water		
4	Communication to TNEB to continue or cut off electric supply		
5	Communication to water supply department for supplying water		
C1	Medical facilities for affected persons (first aid and treatment)	Hospital and public health	Ambulance with onboard resuscitation unit, first aid, stretchers
D1	Identification of concentration of gas in zone of influence	Pollution control board	Gas detector
E1	Removal of debris and damaged structures	Municipal corporation	Provide bulldozers Provide cranes
F1	Monitor the incoming and out going transports	Transport department	Provide traffic police at site Provide emergency shifting vehicles at site Provide stock of fuel for vehicles
2	Arrange emergency shifting of affected persons and non affected person to specified area		
3	Arrange diesel/petrol for needed vehicles		

Sr. No.	Action required to be taken to mitigate disaster by aid giving agency	Responsible agencies for taking action	Equipments/material facilities required at site to mitigate emergency
G1	Give all information related to meteorological aspects for safe handling of affected area for living beings	Meteorological Department	Provide wind direction and velocity instruments with temperature measure Mobile van for meteorological parameter measurements
2	Forecast if any important weather change		
H1	Representatives of all departments are in the local crisis group; therefore they are expected to render services available with them. Since it is a group of experts with authority, the mitigating measures can be implemented speedily. The representatives from locals are also there so that communication with local people is easy and quick.	Local Crises Group	Must have all resources at hand, specially disaster management plan and its implementation method. All relevant information related to hazardous industry are generally available with crisis group News paper editor is a part of the group so that right and timely media release can be done
2	The district emergency or disaster control officer is the president and he is used to mock drill etc. so action can be taken in right direction in time		
I1	Collector is the President of District Crisis Group therefore all district infrastructure facilities are diverted to affected zone	District Crisis group	All necessary facilities available at district can be made available at affected zone
2	All other functions as mentioned for local crisis group		Control of law and order situation

7.5 OCCUPATIONAL HEALTH AND SAFETY

For large industries, where multifarious activities are involved during construction, erection, testing, commissioning, operation and maintenance, the men, materials and machines are the basic inputs. Along with the boons, industrialization generally brings several problems like occupational health and safety.

The industrial planner, therefore, has to properly plan and take steps to minimize the impacts of industrialization and to ensure appropriate occupational health and safety including fire plans. All these activities again may be classified under construction and erection, and operation and maintenance.

7.5.1 Occupational Health

Occupational health needs attention both during construction and erection and operation and maintenance phases. However, the problem varies both in magnitude and variety in the above phases.

- **Construction and Erection**

The occupational health problems envisaged at this stage can mainly be due to constructional accident and noise. To overcome these hazards, in addition to arrangements to reduce it within TLV's, necessary protective equipments shall also be supplied to workers.

- **Operation and Maintenance**

The problem of occupational health, in the operation and maintenance phase is primarily due to noise which could affect hearing. The necessary personal protective equipments will be given to all the workers. The working personnel shall be given the following appropriate personnel protective equipments.

- Industrial Safety Helmet;
- Crash Helmets;
- Face shield with replacement acrylic vision;
- Zero power plain goggles with cut type filters on both end

- Zero power goggles with cut type filters on both sides and blue color glasses;
- Welders equipment for eye and face protection;
- Cylindrical type earplug;
- Ear muffs;
- Canister Gas mask;
- Self contained breathing apparatus;
- Leather apron;
- Aluminized fiber glass fix proximity suit with hood and gloves;
- Boiler suit;
- Safety belt/line man's safety belt;
- Leather hand gloves;
- Asbestos hand gloves;
- Acid/Alkali proof rubberized hand gloves;
- Canvas cum leather hand gloves with leather palm;
- Lead hand glove;
- Electrically tested electrical resistance hand gloves; and
- Industrial safety shoes with steel toe.

Full-fledged hospital facilities will be available round the clock for attending emergency arising out of accidents, if any. All working personnel will be medically examined at least once in every year and at the end of his term of employment. This is in addition to the pre-employment medical examination.

7.5.2 Safety Plan

Safety of both men and materials during construction and operation phases is of concern. Safety plan shall be prepared and implemented in the proposed power plant. The preparedness of an industry for the occurrence of

known as emergency plan. The disaster in the plant is possible due to collapse of structures and fire/explosion etc.

Keeping in view the safety requirement during construction, operation and maintenance phases, the power plant would formulate safety policy with the following regulations:

- To allocate sufficient resources to maintain safe and healthy conditions of work;
- To take steps to ensure that all known safety factors are taken into account in the design, construction, operation and maintenance of plants, machinery and equipment;
- To ensure that adequate safety instructions are given to all employees;
- To provide wherever necessary protective equipment, safety appliances and clothing and to ensure their proper use;
- To inform employees about materials, equipment or processes used in their work which are known to be potentially hazardous to health or safety;
- To keep all operations and methods of work under regular review for making necessary changes from the point of view of safety in the light of experience and upto date knowledge;
- To provide appropriate facilities for first aid and prompt treatment of injuries and illness at work;
- To provide appropriate instruction, training, retraining and supervision to employees in health and safety, first aid and to ensure that adequate publicity is given to these matters;
- To ensure proper implementation of fire prevention methods and an appropriate fire fighting service together with training facilities for personnel involved in this service;
- To organize collection, analysis and presentation of data on accident, sickness and incident involving people injury or injury to health with a view to taking corrective, remedial and preventive action;

- To promote through the established machinery, joint consultation in health and safety matters to ensure effective participation by all employees;
- To publish/notify regulations, instructions and notices in the common language of employees;
- To prepare separate safety rules for each type of occupation/processes involved in a plant; and
- To ensure regular safety inspection by a competent person at suitable intervals of all buildings, equipments, work places and operations.

7.5.3 Safety Organization

- ***Construction and Erection Phase***

A qualified and experienced safety officer shall be appointed. The responsibilities of the safety officer include identification of the hazardous conditions and unsafe acts of workers and advise on corrective actions, conduct safety audit, organize training programs and provide professional expert advice on various issues related to occupational safety and health. He is also responsible to ensure compliance of Safety Rules/ Statutory Provisions. In addition to employment of safety officer by WEUPPL, every contractor, who employs more than 250 workers, shall also employ one safety officer to ensure safety of the worker, in accordance with the conditions of contract.

- ***Operation and Maintenance Phase***

When the construction is completed the posting of safety officers shall be in accordance with the requirement of Factories Act and their duties and responsibilities shall be as defined thereof.

7.5.4 Safety Circle

In order to fully develop the capabilities of the employees in identification of hazardous processes and improving safety and health, safety circles would be constituted in each area of work. The circle would consist of 5-6 employees from that area. The circle normally shall meet for about an hour ever

7.5.5 Safety Training

A full-fledged training center shall be set up at the plant. Safety training shall be provided by the Safety Officers with the assistance of faculty members called from Professional Safety Institutions and Universities. In addition to regular employees, limited contractor labors shall also be provided safety training. To create safety awareness safety films shall be shown to workers and leaflets shall be distributed. Some precautions and remedial measures proposed to be adopted to prevent fires are:

- Compartmentation of cable galleries, use of proper sealing techniques of cable passages and crevices in all directions would help in localizing and identifying the area of occurrence of fire as well as ensure effective automatic and manual fire fighting operations;
- Spread of fire in horizontal direction would be checked by providing fire stops for cable shafts;
- Reliable and dependable type of fire detection system with proper zoning and interlocks for alarms are effective protection methods for conveyor galleries;
- Housekeeping of high standard helps in eliminating the causes of fire and regular fire watching system strengthens fire prevention and fire fighting; and
- Proper fire watching by all concerned would be ensured.

7.5.6 Health and Safety Monitoring Plan

The health of all employees shall be monitored once in a year for early detection of any ailment due to exposure to heat and noise.

7.6 HYDROGEOLOGICAL STUDY & RAIN WATER HARVESTING PLAN

Geomorphology of the study area says that the Northern part of the lower Son valley is composed of the finer alluvium deposits derived from the river Ganges which is sloping towards North-West, North and North-East directions. All the tributaries of Ganges flow towards north in the central region. In the eastern part of the lower Son valley, the rivers Son and Punpun flow al

was mainly ravaged by the river Son and hence this portion has many depressions. A deep forest belt is located here, which lies on sandstone plateau of the Kaimur range with good porosity and permeability. The drainage patterns indicate that porosity of the soil is good with low permeability.

The study area is drained by the streams named as Kuradari (Khajuri) & Chatar/Belwa Rivers which are 5-8 Km from the site. These Rivers maintain perennial flow and over flood their bank some times during rainy season. Finally these streams debouch in river Ganga along the right bank. Formation character and land slope controls the flow direction and morphometric behaviors of the drainage in the area. The surface water potential of the area has been partially harvested through Khajuri dam which is located about 7.0 km west of project site. Details

7.6.1 Hydrology of Project Site (Core Zone)

The proposed project area drains out the storm water into the main stream Jamathwa. The catchment of the watershed of this streamlet partly passing through project area. The maximum elevation of this watershed is above 220 mRL in the south and lowest elevation towards north is 120 mRL. The average land slope is 27.8 m/km.

The Unconsolidated Formation present over area is Quaternary alluvium which has limited thickness and as such does not form potential aquifer in the area. The Ground Water of this area is unconfined state within the primary porosity of the loose sediments. The consolidated formation presenting the area main represented by upper vindhyan group (Dhandraul Quartzite). The depth of the water table was identified in 10.20 meter.

The flow of ground water on regional scale is towards north and NE that is towards River Ganga. The ground water flow over the northern portion of the study area is towards NW while over southern sector the groundwater flows towards north. The average water table elevation over the project site and surrounding is 130 mRL and regional slope of the water table varies between 4.2 m/km to 20 m/km.

Detailed Hydro-geological Study Report is prepared by M/S MINMEC Consultancy Pvt. Ltd.

7.6.2 Rain Water Harvesting

7.6.2.1 Groundwater Recharge with Rain Water Harvesting

There will be generation of surface run-off from the proposed plant facility during monsoon season. The run-off from the paved surfaces of the proposed facility will be routed through a carefully designed storm water drainage network and collected in storm water collection sump and excess rainwater will be discharged into bore wells constructed on these internal drains.

For augmenting the ground water resources in the proposed plant a number of rainwater harvesting bore wells will be connected to the internal drains and excess rain water flowing in the drains will be diverted to these bore wells. These structures will facilitate percolation of water into the ground, thus augmenting the groundwater sources. This will result in increase in groundwater tables.

To facilitate water harvesting, collection and storage of rainwater and also reduction in water consumption, the following measures will be adopted:

- The storm water treatment facility will be located at an appropriate location on the site keeping in view the slope contours and collection point;
- The storm water from paved areas will be treated for the removal of oil & grease and sediments and routed to the water harvesting structures to recharge the ground water table;
- The storm water from the previous area will also be routed to the rainwater harvesting structures;
- The storm water in rainy season will be stored to the maximum extent and utilized in fire fighting facility and balance will be routed to Rain Water Harvesting structure after treatment.

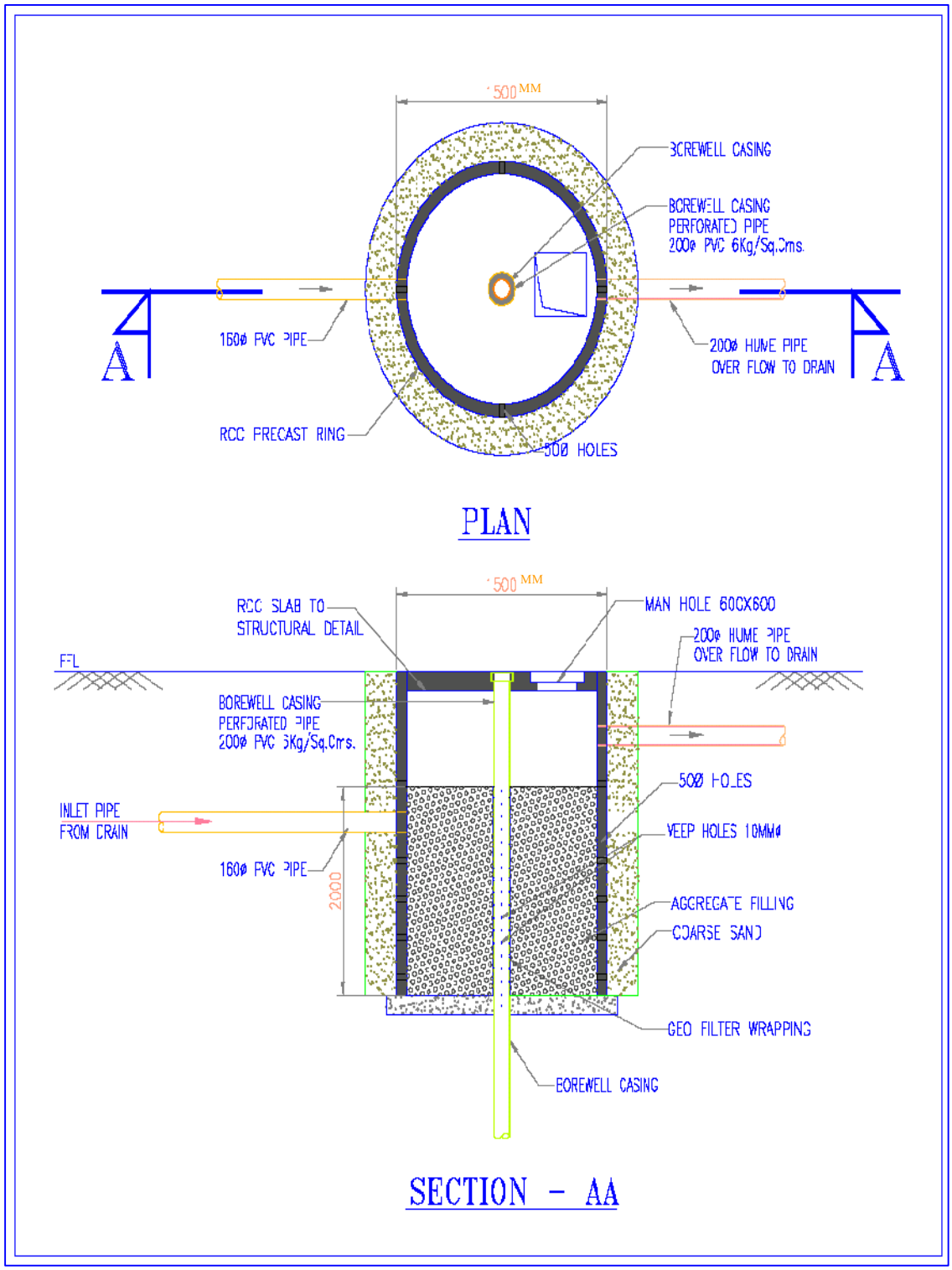

FIGURE-7.9

TYPICAL PLAN AND SECTION OF DEEP WELL RECHARGE PITS

7.7 HARVESTING SOLAR POWER

The total solar radiation available at any point is quantified as Global Solar Radiation. Global Solar Radiation is essentially the sum of Direct Irradiation and Diffused Irradiation. Concentrated Solar Thermal (CST) systems depend on the conversion of normalized direct irradiation, termed Direct Normal Irradiation (DNI), to electrical energy. Solar Photo Voltaic (SPV) technology depends on the conversion of global radiation to electrical energy. All radiations are measured in kWh/m2/day and annual averages considered to account for changes in weather.

There are few key factors should be check before taking decision for setting up solar power plants:

- Solar concentrator technology works only Direct Normal Irradiation (DNI) and Solar Photovoltaic (PV) technology works on Global Solar Radiation
- Minimum solar radiation 1900 - 2000 kWh/m^2/year is required
- No Shadow due to surrounding objects (tree, electric pole, high rise building etc)
- Solar radiation mapping for site identification
- Land slope (< 5%)
- Legal issues – Land Acquisition and Power Selling
- Water (3 – 6 m^3/MWh) for solar thermal and minimum water requirement for PV module cleaning in solar PV
- Transmission Network Proximity
- Technology – Type, Reliability, Efficiency, Vendors, Local Fabricators, EPC Contractors etc.
- Financial viability

Welspun Energy has done solar resource study for setting up solar power plant in Uttar Pradesh.

Detailed solar radiation data of Uttar Pradesh Major Districts has been done and tabulated in Table 7.12

Table 7.12

Global Horizontal Solar Radiation in Uttar Pradesh

S. No.	Districts	Global Solar Radiation at Horizontal Surface ($kWh/m^2/d$)
1.	Pillbhit	5.5
2.	Bijnor	5.5
3.	Bahraich	5.5
4.	Balrampur	5.5
5.	Shravasti	5.5
6.	Rampur	5.4
7.	Bareilly	5.4
8.	Budaun	5.4
9.	Gonda	5.3
10.	Deoria	5.3
11.	Gorakhpur	5.2
12.	Khalilabad	5.2
13.	Maharajganj	5.3
14.	Azamgarh	5.1
15.	Akbarpur	5.2
16.	Allahabad	5.1
17.	Jhansi	5.2
18.	Navadia, Dist. Mirzapur	5.0
19.	Manda, dist. mirzapur	5.1
20.	Kasurva	5.0
21.	Mirzapur	5.1
22.	Dadri Khurd	5.1

Table 7.10 clearly indicate that Mirzapur and Dadri Khurd has lower solar radiation in U.P. Proposed site in Dadri Khurd (Mirzapur) also surrounded by forest and trees, which is also obstacle for receiving solar radiation on solar surface (either PV Module or Solar Concentrators).

Welspun Energy hesitates to develop solar power plant in the proposed site of thermal power plant due to inferior solar resource and shadow by surrounding trees.

7.8 REHABILITATION & RESETTLEMENT AND NEED BASED ASSESSMENT STUDY

The proposed project site i.e. core zone is slightly undulating and barren with negligible settlement. It is been carved out from part of Dadri Khurd village. The total land requirement for the proposed project has been optimized to about 875 acres (354.11 ha). It includes 97.13 acres Govt. land and rest 777.88 acres private land. The land mainly barren land with patches rain fed agriculture practice occasionally.

As a proactive measure land acquisition and other involuntary settlement is avoided in while selecting the location of project. The entire land has been procured from the willing sellers through direct negotiations on the willing buyer and willing seller concept. The price paid is determined through mutual negotiation on mutually acceptable terms and conditions. The procured land has 221 title holders in 63 Khatas from Dadri Khurd village, whose land is located in the area identified for the project. There are 4 small structures located in the identified land. There are no cultural properties and common property resources in the identified land. There are no non title holders in the land being procured as defined in NRRP 2007. There are also no scheduled tribes land sellers from the land being procured. The Uttar Pradesh state government R&R policy as well as present national R&R policy is silent and do not insist on specific R&R provisions to such procurement of land through a private mutual negotiation process. Most of land owners have left Mirzapur and settled at different locations faraway places and are willing to dispose the land. Only 51 of land owners are residing in villages around the project site like Sukhnai, Juruhliya, Umariya etc and Mirzapur city. Xavier Institute of Development Action and Studies. Jabalpur has been commissioned to look into the aspect of Need assessment Study and resettlement needs in such scenario and a separate report has been prepared by them. As a good corporate citizenship it is proposed to adopt certain measure to the land deprived persons for their lively hood from the land sellers community

The national Rehabilitation & Resettlement policy 2007 is applicable where 400 families are affected due to land acquisition in plains and 200 families in hilly terrains for public purposes.

7.8.1 Economic Rehabilitation of land seller

For the economic rehabilitation of the sellers family a nominated member from their family would be provided with employment as per eligibility criteria, in the proposed project on the basis of the extent of land loss and the extent of land that would be still left out with the family after land acquisition.

7.8.1.1 Compensation for the lands

Every seller is entitled to the monetary compensation as per the loss of assets, he/ she had lost, which is described below.

- Compensation for Land and Houses
- Compensation for other Structures
- Compensation for trees

7.8.2 Need based Benefits for Villagers of Project affected Area

The company is committed to developing its business towards ecological, social and economic sustainability. Community development and upliftment of the marginalized section have been identified as the focus areas. The company will work extensively with the communities on broad range of issues, including health, education, strengthening of community based organization and village panchayat system through training of members on issues related to governance, development etc.

A need assessment study has been carried out by Xavier Institute of Development Action and Studies. Jabalpur to understand the baseline socio economic status of the surrounding villages and the infrastructure. Based on this study WEUPPL will evolve an action plan for taking up activities in regard to corporate social responsibility. The study observations as below:

This plan is in participation with the community with long-term perspective. The highlights of the plan include:

- The company will focus on putting up the long-term and sustainable livelihood measures for the project affected families working with Self-help-group, farmers group, youth group on the social mobilization and empowerment approach.
- The company will support to set up micro-enterprises like dairy, poultry, goat rearing, fishery, petty shops, transport business etc.
- Vocational training will be provided to the youths to enhance their employability skills.
- Health is an important factor in the pursuit of livelihood. The company will focus on primary health both preventive and curative, at the village level. Under this project Maternal and Child Health (MCH) will be an important focus. Health of adolescent girls and boys will be another important area. In addition regular and periodic health camps will be conducted with follow-ups. All programs will be in collaboration with the government.
- Education; the focus of the education programme will be to increase enrolment in the formal school systems, enhance learning and arrest dropouts. Innovative programmes like mobile village level libraries and computer literacy on wheels will be implemented to increase the interest of children in academics.
- Natural Resource Management; the focus of the programme will be to preserve and regenerate water resource and also preserve the soil conditions in the area. The activities undertaken in this will be deepening of wells, de-silting, creating water harvesting structures, organic farming through vermi composting, fodder development and promoting kitchen gardens.
- Livestock development and veterinary facilities; healthy livestock is an asset to the farmers and can be a good source of income for families. The

activities under this will include bettering the quality of livestock, preventing diseases in animals. Regular animal health camps will be conducted along with follow ups.

- Other activities; Village infrastructure related works will be executed as per the needs of the community from time to time. Recreational and sports activities as needed will be organized in the village.
- A well planned CSR for 10 years of time is proposed to implement at the site.

S. No.	Corporate Initiatives	Rs in Crores				
		1st Year	3rd Year	5th Year	10th Year	Total
A	**EDUCATION**					
A.1	School infrastructure improvement	0.15	0.20	0.25	0.25	0.35
A.2	Existing Teachers training	0.10	0.10	0.20	0.10	0.50
A.3	Satellite school teachers training	0.05	0.05	0.15	0.15	0.40
A.4	Development of local resources	0.10	0.10	0.20	0.20	0.60
A.5	Setting up resource center	0.10	0.15	0.20	0.20	0.60
A.6	Setting up multi level community EU	0.10	0.10	0.20	0.25	0.65
A.8	Coaching classes for the ongoing improvement	0.10	0.15	0.20	0.20	0.65
A.9	Scholarship/ Reward	0.15	0.15	0.15	0.15	0.60
A.10	Welspun Energy School	1.00	1.50	1.75	2.05	5.65
SUB-TOTAL (A)		**1.85**	**2.50**	**3.30**	**3.55**	**10.00**
B	**HEALTH AND ENVIRONMENT**					
B.1	Awareness	0.15	0.15	0.15	0.10	0.55
B.2	Regular camps	0.15	0.20	0.20	0.15	0.70
B.3	Special medical camps	0.10	0.10	0.10	0.10	0.40
B.4	Medical center in PAP affected village	0.15	0.30	0.30	0.25	1.00
B.5	Mobile medical centers for villagers in and around PAP affected areas.	0.15	0.30	0.30	0.30	0.80
B.6	Ambulance service	0.10	0.15	0.20	0.20	0.65
B.9	Nutrition centers	0.10	0.15	0.1[illegible]		

B.10	Plantations	0.10	0.10	0.10	0.10	0.40
B.11	Local prodructs	0.10	0.10	0.10	0.10	0.40
B.12	Educational Institutions: Environment champions program	0.05	0.05	0.05	0.05	0.20
B.13	Water shed management	0.20	0.40	0.40	0.40	1.40
B.14	Animal Husbandry health initiatives	0.10	0.10	0.10	0.10	0.40
	SUB-TOTAL (B)	**1.45**	**2.10**	**2.15**	**2.00**	**7.70**
C	**SANITATION / WATER INFRASTRUCTURE**					
C.1	Sanitation	0.25	0.30	0.40	0.40	0.35
C.2	Permanent Water infrastructure in PAP villages.	0.45	0.50	0.55	0.45	1.95
C.3	Education in schools and colleges	0.10	0.10	0.10	0.10	0.40
	SUB-TOTAL (C)	**0.55**	**0.90**	**1.05**	**0.95**	**3.45**
D	**EMPOWERMENT**					
D.1	Stitching and Tailoring Classes	0.15	0.25	0.30	0.30	0.85
D.2	Livelihood Production Unit	0.25	0.25	0.30	0.35	1.15
D. 3	Candles, Agarbatti Production Unit	0.00	0.05	0.10	0.05	0.20
D.4	Festive time specific products manufacturing	0.00	0.05	0.10	0.05	0.20
D.5	Village Youth Champions Training	0.10	0.10	0.10	0.10	0.40
D.6	Coordinators for various activities	0.20	0.22	0.30	0.33	1.05
D.7	Technical Semi -Skill Enhancement Training	1.00	1.40	1.70	1.90	6.00
SUB-TOTAL (D)		**1.70**	**2.32**	**2.90**	**3.08**	**10.00**
TOTAL (T)= (A+B+C+D)		**5.55**	**7.82**	**9.40**	**9.58**	**31.15**

8.0 PROJECT BENEFITS

The proposed developmental activities in this region will result in improvement of infrastructure as well as upliftment of social structure in the area. The people residing in the nearby areas will be benefited indirectly. 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.

Detailed socio-economic study of villages around the project site has been undertaken and an action plan for community development has been proposed by WEUPPL. The summary of the benefits due to the proposed project and proposed action plan of WEUPPL has been discussed in following sections.

8.1 Construction Phase

8.1.1 Employment

The major benefit due to the proposed project will be in the sphere of generating temporary employment for substantial number of personnel. The construction phase of proposed merchant power plant will take place in two phases. Approximately 3000 persons would be required for the construction work, most of whom would be unskilled workers, although the power plant construction needs a large number of skilled personnel as well. These construction workers shall be taken from the study area to the extent possible. Hence, the proposed project will benefit locals to some extent.

8.1.2 Community Services

WEUPPL shall employee local people to the extent possible in order to reduce the need for additional infrastructure. In addition, WEUPPL shall develop necessary infrastructure like accommodation, water supply, sewerage, medical facility, etc. for catering to the needs of the project personnel and their families. It is proposed to develop township for employees near the plant site. The local people will be indirectly benefited by these developments.

8.2 OPERATIONAL PHASE

8.2.1 Population

During the operational phase, about 400 people shall be employed. Considering an average family size of 4 persons, there is a likelihood of increase of about 1600 persons in the study area. Considering that most of the skilled personnel proposed to be employed for the proposed 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 etc.

8.2.2 Education

Unskilled people and limited skilled people (depending on availability) shall be hired from local population. People expected to come to the study area from outside are expected to be educated and especially skilled. 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.

8.2.3 Employment

The man power requirements for the operational phase of the power project shall be about 400 persons. Many of these persons however shall be skilled people and possibly shall come from outside the study area. Need of unskilled people shall be satisfied from local population.

In addition to the direct employment mentioned above, there will be indirect employment of local people by utilizing their expertise in different areas like horticulture, site clearing, etc. Also, due to secondary development in the study area, employment opportunities will be generated. About 1000 people are expected to get indirect employment.

8.3 CSR PHILOSOPHY OF WELSPUN GROUP

Welspun is committed to conduct business in a socially responsible and ethical manner. Sustaining mutually accountable and responsible synergies, we serve with passion to our Customers, Shareholders, and Employees & Society at large. To meet our commitment we seek to respect the rule of law, adopt appropriate international standards and strictly follow our 3 Guiding Principles (The 3 'E's): EDUCATION, EMPOWERMENT and Health and ENVIRONMENT.

In addition to our guiding principles, at Welspun, Ethical Business Conduct is strictly followed and we practice the principles of accountability, honesty and integrity in all aspects of our business. Besides this, we strictly comply with all the laws that regulate and apply to the company, its systems and the conduct of its business.

Welspun works with governments and agencies (including the Universal Declaration of Human Rights by the UN) to support and respect Human Rights within our sphere of influence. Welspun promotes universal respect for observance of human rights and fundamental freedom - particularly those of our employees, the communities within which we operate and parties with whom we do business, without distinction as to ethnicity, origin, religion, gender, language or disability.

To reach out to the larger society Welspun has established Welspun Foundation for Health and Knowledge. The foundation is instrumental in creating impact wherever Welspun has business presence.

To improve and enhance the quality of education system Welspun has collaborated with government and non for profit organizations and has positively impacted 3000 tribal, rural and urban children.

Welspun's health centres are providing health facilities for underprivileged population from the neighboring villages, particularly on general health, mother and child health care and also by sponsoring major health expenditure.

Volunteerism is one of the crucial elements in all the CSR initiatives at all its project locations. Their employee volunteers participate enthusiastically and consistently. Their participation is strategically planned that helps to get different set of skills.

Charitable Donations:

- Partnered with 'Save the Children India' to support victims of Cloud burst in Ladakh;
- Donation of desks and benches to Government run primary school, Korlai village in Alibaug benefiting around 350 students; and
- Supported orphanage in Korlai village in Alibaug, benefitting about 30 children.

FIGURE-8.1

CSR ACTIVITIES BY WELSPUN GROUP

The CSR activities carried out by Welspun Group at its various project locations are shown in **Figure-8.1.**

8.4 PROPOSED LIVELIHOOD INTERVENTION PLAN FOR VILLAGES IN THE PROJECT VICINITY

A macro-plan for community development has been prepared on the basis of primary socio-economic survey in the region. WEUPPL will implement the same with the help of NGOs/Government Organizations in the region.

8.4.1 Overview of Existing Socio-Economic Profile of the Region

Mirzapur is a city in the heart of North India. It forms a portion of the Vindhyachal Division. On the north and north-east it is bounded by the Varanasi district and on the south by district Sonbhadra. Mirzapur city is the administrative headquarters of Mirzapur District of Uttar Pradesh. The population of Mirzapur district 2,494,533 persons of which male and female were 1,312,822 and 1,181,711 respectively. Mirzapur district has an average literacy rate of 62%, higher than the national average of 59.5%. Male literacy is 69%, and female literacy is 54%. In Mirzapur, 14% of the population is under 6 years of age. However the study area records only 34.34 % overall literacy indicate the need for increased education levels.

About 79% of the population of U.P. lives in villages. They are socially and economically backward. Country or state can progress, when its people are socially as well as economically developed. There is a need to make them a part of developmental process and make the life of rural people better. To convert the above vision in reality, rural people must be facilitated with rural infrastructure development, hygenic living, better housing, better health services & family welfare, social securities, land reforms, and employment etc. Welspun Group has carried many CSR activities in various parts of India and has been focusing on the key issues of the area.

8.4.2 Improvements in the Social Infrastructure

WEUPPL will initiate action for social upliftment in the area. Financial support will also be extended to strengthen education infrastructure in the region.

FOCUS AREA OF THE WEUPPL WILL BE:-

- Education
- Health and Sanitation
- Women's Empowerment

CSR Activities carried out at WEUPPL will be as follows:

CSR activities carried out focusing the sustainable development of the local community. Identified activities as under:

- Education
- Health & Environment
- Sanitation & Water Supply
- Youth Skill Development
- Women Empowerment

8.4.2.1 Education

The overall literacy levels of the study area indicate a deep intervention in improving the needs for education locally. Education programme will be focused on quality education in the government schools of the project area villages. Programme on awareness to be conducted in the said schools regarding increasing awareness on issues related to health, safety and other relevant issues important to the society. Awareness in the schools to be carried out through organizing essay and drawing competition, Video shows, etc.

Setup of Multi Level Community Educational units: Multiple Educational Units will be set by combining the syllabus of primary, higher primary & secondary levels. Entry level into each of these units will not be restricted by age. For example: A 14-year old student who has never attended school will begin at the lowest level & will go through the same syllabus as a 4 year old student.

Identification of Teaching volunteers within the areas & community: Build up a team of teaching volunteers who will facilitate the Community Educational units.

Enrolment of children in Schools

Teachers Training:

- Gram Panchayat Teachers at primary, middle, high and higher secondary level could be trained in the following areas of skill development:
  - Skills to create classroom atmosphere.
  - Enhance teachers' skills to use learning with fun method.
  - Facilitate required skills for teachers to organize and conduct parents/ guardians meetings.
- Resource Center at the block level to be set-up and run by us.
  - Books

- Tools and equipment for use
- Art, craft and science center
- On-going training of the teachers for skill enhancement.

- Anganwadi supervisors training
  - Activity based learning methodology

School Infrastructure enhancement:

Anganwadis;

To adopt the same in the project villages and enhance the infrastructure facilities:

- Provision of Dharis for the children to sit on.
- Availability of drinking water.
- Chair for the workers.
- Vessels for the mid-day meals.
- Toys.
- Books
- Provision of toilet infrastructure.

Primary Schools:

To adopt the same in the project villages and enhance the infrastructure facilities.

To create 2 model schools by enhancing teachers skills, enhancing the students classroom and surrounding conditions as well as collaborating with the community for their engagement.

Teachers work as agents of change, in the community to encourage the parents to send the kids to the schools.

Middle Schools:

To focus on investing:

- In the infrastructure improvement of the school as well as for to provide facilities for children for other activities in the school premises.
- Computers installation, training and knowledge impartation of the same.

8.4.2.2 Health & Environment

- Mobile Ambulance will be made available for the villagers use.
- Medi care center to be set-up in the local village for the regular visit of doctors for villagers treatment and like.
- Daycare is a place where we may get engaged in assisting the growth of children who are suffering from malnutrition.
- Veterinarian services to be made available on a weekly basis for the treatment of the animal husbandry.
- Village level workers to be trained as ANM and Midwives.
- Regular bi-monthly medical camps to be organized for the benefit of the villagers.
- Community Health Management:
- Village health committees comprised of elected men and women monitor health status in the villages on a periodic basis, with special focus on sanitation and timely intervention during the outbreak of diseases. Periodic growth monitoring of children to arrest malnutrition is also carried out. Kitchen gardens with banana, papaya and drumstick are promoted to improve the nutrition status of village communities, especially children.
- Health camps, catering to clusters of villages are organized to promote awareness of common diseases and preventive measures. Government health officials were actively involved in these camps. To ensure that basic care is readily available at the village level, regular training of village health

workers and traditional birth attendants are organized. The health workers are responsible for running drug distribution centres in the villages, while birth attendants play a crucial role in ensuring safe deliveries and post natal care.

- To look at working with the teenagers in the area- by educating them through moral and ethics.

8.4.2.3 Sanitation & Protected Water Supply

The intervention in sanitation and protected water supply is one of the core activities in community health. Over 80% of instances of morbidity and mortality in rural areas can be traced to water borne diseases. A program in which each family in the village surrounding the energy park builds their own toilet and bathing room, with piped water supply from a common water tower to which water is lifted by pumping from open wells or deep bore wells or from perennial springs through gravity flow water supply. The sanitation and water supply systems ensure access to protected piped water to all families all through the year.

- The intervention in sanitation and protected water supply is one of the core activities in community health.
- We will implement a program in which each family in the surrounding villages builds their own toilet and bathing room, with piped water supply from a common water tower to which water is lifted by pumping from open wells or deep bore wells or from perennial springs through gravity flow water supply.
- The sanitation and water supply systems ensure access to protected piped water to all families all through the year.
- These conditions will spur processes of collective work and collaboration within the villages.
- Work for establishing water supply systems is undertaken only after completion of construction of toilets and bathing rooms by all families.

- We will provide all technical support in establishing the water supply systems.
- Villagers arrange for electricity and are responsible for operations and maintenance of the system.
- They are trained by us for undertaking minor repairs and maintenance and as we find in villages where have set up these systems, the local people are able to take complete responsibility and manage the systems.
- Together with toilets and bathing rooms, drainage systems are developed to ensure that wastewater does not accumulate.
- In the villages banana and papaya to be planted around the soak pits to help to leach excess water and keep the pits dry.
- Cleanliness drives to be carried out in all villages to motivate villagers to ensure that the surroundings are unpolluted and clean.
- Children are also encouraged to partake in maintaining village cleanliness.

8.4.2.4 Youth Skill Development Program

Semi skilled training Programs to equip the Youth with skills such as Electrical, Masonry, Plumbing, Carpentry, Welding etc.

- Training of village youth as YOUTH CHAMPIONS.
- Training of village youth for rural marketing of products.

8.4.2.5 Empowerment

Training in Carpet making, local crafts, tailoring, embroidery, health care workers, formation of self help groups, kitchen gardening, smokeless Chula, animal husbandry, drinking water facility.

Women:

Stitching and tailoring class:

- The training school concept is much accepted in the village set-up.

- Branding of the institute as under Usha Sewing School.
- The courses could be for 6 months of 5 days for 3 hours duration.
- The trained women could be organized into a village society group.
- They could be encouraged to produce items that could be made available for sale on a regular basis.
- Village youth trained in sales could as field sales men and not only sell these products but also earn remuneration for doing the same on a consistent basis.

Gram Kiosks:

- Enabling the women to set-up village level kiosks that becomes an outlet through which the groceries and like can be made available.
- A central unit can be maintained for the gram kiosks to come and purchase for replenishing the stocks in their outlets.
- The income generated on a daily basis becomes her contribution to the family.

Training programs in Carpet making, local crafts, embroidery, health care workers, formation of self-help groups, kitchen gardening, smokeless Chula, animal husbandry etc.

Others:

- **To establish a school as long term plan** – English Medium of instruction.
  - To begin as bi-lingual school.
  - By year 3 to shift into a single medium of instruction.
  - To train local teachers who have a heart for children's development as the resource for these centers.

Water:

- **Bore well** – drinking water to be made available.
- **Talau** in the local areas - to clean up and make it usable.
- To look at constructing a **Water tank** for the area.

Local places of worship to be renovated- painting and like. To work on the exteriors as well as the interiors of these buildings of worship.

- To package with 10 lessons in Hindi for the students.
- Propose to do Master trainers – training of trainers – so that cascading of the training becomes feasible to a large number of audience.
- look at **working with the teenagers** in the area- by educating them through moral and ethics.
    - For the same I have identified a Ambedkar Gram Vikas Yojana.

Objectives

About 79% of the population of U.P. lives in villages. They are socially and economically backward. Country or state can progress, when its people are socially as well as economically developed. There is a need to make them a part of developmental process and make the life of rural people better. To convert the above vision in reality, rural people must be facilitated with rural infrastructure development, hygenic living, better housing, better health services & family welfare, social securities, land reforms, and employment etc. To achieve the above target, government launches different developmental schemes. Dr. Ambedkar Gram Sabha Vikas Vibhag, documents/monitors the progress of developmental schemes and coordinates with the various department for effective implementation of schemes.

Keeping the above facts in mind and providing the developmental facilities to all rural peoples, following development schemes for multidimensional, integrated and uniform development of rural areas have been launched-

1. Dr Ambedkar Gram Vikas Yojana.

2. Dr. Ambedkar Grameen Samgra Vikas Yojana.

3. Dr. Ambedkar Gram Sabha Vikas Yojana

4. Samgra Gramya Vikas Yojana.

5. Naxal affected Gramya Vikas Yojana.

AMBEDKAR GRAM VIKAS YOJANA

S. No.	Scheme	Implementing Department
1.	Drinking Water	Rural Development
2.	Indira Avas	Rural Development
3.	S.G.S.Y.	Rural Development
4.	Sanitary Laterine	Panchayati Raj
5.	Nali/Kharanja	Panchayati Raj
6.	Primary School Establishment/Building Construction	Basic Education
7.	Link Road Construction	P.W.D.
8.	Free Boring	Minor Irrigation
9.	Old Age Pension	Social Welfare
10.	Widow Pension	Women's Welfare
11.	Rural Electrification	Energy

8.4.2.6 Others

Availability of infrastructural facilities is essential for successful implementation of the project in a tight time frame. For the proposed project along with the existing facilities, few additional infrastructure has been proposed to be brought up during early stage of construction are: -

Access roads: Arterial roads will be laid to facilitate the movement of materials and equipment during construction/erection and operation of the units. However, temporary roads would be built on the basis of plant layout during construction period, which will be subsequently converted to permanent roads.

Construction Building: About 2000 m2 of construction office space and 6000 m2 of covered storage are proposed to be built. In addition, construction of canteen, car shed, yard toilets, etc. are also proposed. Separate housing facility

for owner's constructor staff is envisaged near site. However, space provision will also be kept for putting up temporary barracks/ housing within the plant area or nearby the plant area for the Contractors' workmen during the period of construction work.

Start of Public Transport: There will also be small increase in the vehicular traffic due to passenger transport. This increase in traffic will not have any consequence to warrant special mention. The increased passenger load in the sector may prompt the state government to start new and frequent public transport services to this area, bringing upliftment to the whole locality.

WEUPPL will develop medical facilities for catering to the needs of the project personnel.

- **Estimated Budget for Proposed CSR Plan**

It is proposed to invest an estimated amount of Rs 31.15 Crores for various community development activities in the region as discussed in previous sections. Detailed breakup of the budget is given as under in **Table-8.1.**

TABLE-8.1

ESTIMATED BUDGET FOR LIVELIHOOD INTERVENTION AND COMMUNITY DEVELOPMENT IN THE REGION

S. No.	Corporate Initiatives	Rs in Crores				
		1st Year	3rd Year	5th Year	10th Year	Total
A	**EDUCATION**					
A.1	School infrastructure improvement	0.15	0.20	0.25	0.25	0.35
A.2	Existing Teachers training	0.10	0.10	0.20	0.10	0.50
A.3	Satellite school teachers training	0.05	0.05	0.15	0.15	0.40
A.4	Development of local resources	0.10	0.10	0.20	0.20	0.60
A.5	Setting up resource center	0.10	0.15	0.20	0.20	0.60
A.6	Setting up multi level community EU	0.10	0.10	0.20	0.25	0.65
A.8	Coaching classes for the	0.10	0.15	0.20	0.20	0.65

	ongoing improvement					
A.9	Scholarship/ Reward	0.15	0.15	0.15	0.15	0.60
A.10	Welspun Energy School	1.00	1.50	1.75	2.05	5.65
SUB-TOTAL (A)		**1.85**	**2.50**	**3.30**	**3.55**	**10.00**
B	**HEALTH AND ENVIRONMENT**					
B.1	Awareness	0.15	0.15	0.15	0.10	0.55
B.2	Regular camps	0.15	0.20	0.20	0.15	0.70
B.3	Special medical camps	0.10	0.10	0.10	0.10	0.40
B.4	Medical center in PAP affected village	0.15	0.30	0.30	0.25	1.00
B.5	Mobile medical centers for villagers in and around PAP affected areas.	0.15	0.30	0.30	0.30	0.80
B.6	Ambulance service	0.10	0.15	0.20	0.20	0.65
B.9	Nutrition centers	0.10	0.15	0.15	0.15	0.55
B.10	Plantations	0.10	0.10	0.10	0.10	0.40
B.11	Local produrcts	0.10	0.10	0.10	0.10	0.40
B.12	Educational Institutions: Environment champions program	0.05	0.05	0.05	0.05	0.20
B.13	Water shed management	0.20	0.40	0.40	0.40	1.40
B.14	Animal Husbandry health initiatives	0.10	0.10	0.10	0.10	0.40
	SUB-TOTAL (B)	**1.45**	**2.10**	**2.15**	**2.00**	**7.70**
C	**SANITATION / WATER INFRASTRUCTURE**					
C.1	Sanitation	0.25	0.30	0.40	0.40	0.35
C.2	Permanent Water infrastructure in PAP villages.	0.45	0.50	0.55	0.45	1.95
C.3	Education in schools and colleges	0.10	0.10	0.10	0.10	0.40
	SUB-TOTAL (C)	**0.55**	**0.90**	**1.05**	**0.95**	**3.45**
D	**EMPOWERMENT**					
D.1	Stiching and Tailoring Classes	0.15	0.25	0.30	0.30	0.85
D.2	Livelihood Production Unit	0.25	0.25	0.30	0.35	1.15
D. 3	Candles, Agarbatti Production Unit	0.00	0.05	0.10	0.05	0.20
D.4	Festive time specific products manufacturing	0.00	0.05	0.10	0.05	0.20
D.5	Village Youth Champions Training	0.10	0.10	0.10	0.10	0.40
D.6	Coordinators for various activities	0.20	0.22	0.30	0.33	1.05
D.7	Technical Semi -Skill Enhancement Training	1.00	1.40	1.70	1.90	6.00
SUB-TOTAL (D)		**1.70**	**2.32**	**2.90**	**3.08**	**10.00**
TOTAL (T)= (A+B+C+D)		**5.55**	**7.82**	**9.40**	**9.58**	**31.15**

***Source**: Action Plan for CSR, M/s WEUPPL*

WEUPPL will implement a Community Development Plan in phased manner through a dedicated cell, starting from the construction phase onwards. Concept proposals for community development plan are already under active consideration.

9.0 SUMMARY AND CONCLUSIONS

9.1 INTRODUCTION

Welspun Energy UP Private Limited (WEUPPL) proposes to setup a Greenfield Coal based Thermal Power Plant (TPP) of 1320 MW (2x660 MW) capacity at Dadri Khurd village, Mirzapur Sadar tehsil, Mirzapur district, Uttar Pradesh.

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

9.2 PROJECT DESCRIPTION

The proposed coal based power plant will be implemented in two stages of 660 MW capacity each. Each unit will have a turbine generator set fed by steam from pulverized coal fired boiler operating at super critical range. The estimated cost of the project is about 7500 Crores.

The primary fuel for the proposed power plant will be coal from NCL/SECL/CCL as per availability through railway line. Power will be evacuated at through two outgoing feeders at 400 kV to nearest substation of Power Grid Corporation of India Limited (PGCIL).

The proposed project will provide direct employment to a large number of personnel. This project will also generate indirect employment to a considerable number of families, who will render their services for the project.

9.2.1 Infrastructure and Other Requirements

9.2.1.1Land Requirement

The proposed project facilities including power plant, corridor for railway siding and colony will be developed in an area of 875 acres (354.11 ha).

The project area includes 97.13 acres of Government land and 777.88 acres of private land. There are no major existing structures in the proposed site area. Detailed R&R studies are in progress and the private land area for the plant and for facilities required outside the plant area is being acquired through the respective land owners as per the prevailing norms of Uttar Pradesh Government. Further, allotment of Government land for the project has also been applied for and is under active consideration.

9.2.1.2 Water Requirement

The total water requirement for the proposed power project is 4002m^3/hr. The water demand for the proposed plant will be met from Upper Khajuri Dam fed by Ganga River through a suitable water intake system. Water Resources Department of Govt. of UP vide letter dated 9th September, 2011 has confirmed the allocation of 36 MCM of water from Ganga river for the project, which has further been approved by GoI, Central Water Commission, Irrigation Planning (North) Dept. Vide letter no. 7/2/18/UP/2008/IP(N)/804 dated 12.10.2011.

9.2.1.3 Coal Requirement

The Coal requirement for the proposed power plant is 6.74 MTPAfor the proposed power plant capacity of 1320 MW at a Plant Load Factor (PLF) of 90%. The required coal will be sourced from proposed NCL/SECL/CCL through railway line. Long term coal linkage has been applied for.

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.

9.2.1.4 Power Evacuation

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

9.2.1.5 Manpower

The proposed power plant will require skilled and semi-skilled personnel during construction and operational phase. Many people in and around neighbouring villages will get opportunity for employment during construction and operational phase based on suitability. The total direct manpower requirement of the project during operation period is estimated to be about 300 persons & 3000 persons during construction. Further, more than 1000 personnel will be indirectly employed.

9.3 Description of the Environment

9.3.1 Location and Description of the Site

The proposed plant site is located at Dadri Khurd village in Mirzapur Sadar tehsil, Mirzapur district in Uttar Pradesh. The environmental setting of the proposed plant site is discussed as under:

- The proposed project site is covered in toposheet no Toposheet No. 63 K/12, 63 L/9;
- The project site is located at an elevation of 180 m above Mean Sea Level (MSL);
- The project area covers mostly barren and single crop agricultural land;
- Present land use at the proposed plant site is largely barren and rain fed single crop agricultural land.
- The State Highways, SH-5 and NH-7 run at a distance of 1.5 km, SW and 10 km, NNE respectively from the proposed plant boundary;
- Railway siding from Sarsongram railway station on North Central Railway Line is 20 Km from the project Site.
- The nearest airport to the project site is located in Varanasi at a distance of about 50 km from the proposed plant site;
- The district head-quarter of Mirzapur is located at a distance of about 18 km from the proposed plant site;
- The Ganga river is flowing at a distance of 17.0 km, N from the project site;
- There is no Eco sensitive zone viz. National Park, Wild life sanctuary, Biosphere Reserve, Wild Life corridors within 10 km radius of the project site;
- There is no Historical and Archeological site within 10 Km.
- The project area falls under Seismic Zone-III as per Indian Standards, IS:1893 -2000

9.3.2 Baseline Environmental Monitoring Study

Baseline environmental monitoring studies have been carried out for three months during Summer Season, 2011 representing pre monsoon season.

9.3.2.1Ambient Air Quality

Predominant winds from W direction were observed during the study period. To establish the baseline status of the ambient air quality in the study area, the air quality was monitored at 11 locations during the study period.

The minimum and maximum concentrations of PM_{10} were recorded as 46.60 µg/m^3 and 71.35 µg/m^{3}respectively. The maximum concentration was recorded at village Rajapur (SA3) and the minimum concentration was recorded at project site (SA1).

The minimum and maximum concentrations for $PM_{2.5}$ were recorded as 14.50 µg/m^3 and 42.38µg/m^3 respectively. The maximum concentration was recorded at Chakulia village and the minimum concentration was recorded at project site.

The minimum and maximum SO_2 concentrations were recorded as 5.78 µg/m^3 and 9.65 µg/m^3 respectively. The maximum concentration was recorded at Madihan village and the minimum concentration was recorded at Vindampal village. The minimum concentration of 12.80 µg/m^3 for NOx was recorded at Vindampal village and maximum of 21.39 µg/m^3 observed at Dadiram village. The minimum and maximum concentration of Ozone values ranged between 1.43 µg/m^3 to 4.90 µg/m^3. The values for Hg were observed below 0.50 µg/m^3 at all the sampling locations.

The concentrations of $PM_{2.5}$, PM_{10}, SO_2, NO_X, Hg and O_3 are observed to be well within the standards prescribed by Central Pollution Control Board (CPCB).

9.3.2.2 Water Quality

The baseline groundwater quality status in the region is established by analyzing 8 ground water samples and 1 surface water sample.

In ground water samples, the pH varies from 7.49 – 7.84 and. Calcium and Magnesium content varies between 21.05 to 64.77 mg/l and 5.89 – 23.02 mg/l respectively. Total hardness and alkalinity expressed as $CaCO_3$ ranges between 76.76-218.16 mg/l and 66.33 – 402.52 mg/l respectively. Chlorides and Sulphates are found to be in the range of 13.31mg/l to 81.77 mg/l and 8.51 mg/l to 19.79 mg/l respectively. Nitrates and Fluorides are found to be in the range of 2.33 mg/l to 4.26 mg/l and 0.23 mg/l to 0.69 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.

One surface water sample was taken for analysis.

pH ranges between 7.25 to 7.82. The COD was found between 11.20 mg/l to 19.92 mg/l. BOD was found between 3.60 mg/l to 7.50 mg/l. Total dissolved solids ranges between 122.00 mg/l to 209.00 mg/l.

Sulphates and Nitrates was observed between 1.87 mg/l to 19.44 mg/l and 0.68 mg/l to 1.73 mg/l. The heavy metal contents are found to be well within the limit. Total coliforms was found to be <2 MPN/100 ml. The physico-chemical and biological analysis revealed that all the parameters are well within the prescribed limits. The surface water meets suface water quality norms notified by IS: 10500 & CPCB

9.3.2.3 Soil Characteristics

It has been observed that the texture of soil in the study area is mostly with moderate water holding capacity as per the Preliminary soil Investigation done at site.. It has been observed that the pH of the soil quality ranged from 6.76 – 7.87 indicating that the soil is usually slightly alkaline in nature. The Conductivity of the soil samples varied from 0.19 to 0.23 mS/cm. The phosphorus values ranged between 11.56 to 32.98 kg/ha. The nitrogen values ranged between 131.79 – 256.50 kg/ha. The potassium values ranged between 99.02 – 142.19 kg/ha.

9.3.2.4 Noise Level Survey

The noise monitoring has been conducted at 11 locations in the study area. The Day time and Night time Noise Levels in the study area ranged between 41.60 dB (A) to 52.66 dB (A) and 37.39 dB (A) to 43.31 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).

9.3.2.5 Flora and Fauna Studies

Detailed ecological studies were conducted during study to identify the floristic composition in and around proposed block and surrounding villages. Plant species and animals observed/recorded through primary survey or with interaction local elderly people and forest officials of the area.

9.3.2.6Socio-Economic 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 241710 persons residing in 38736 households. The configuration of male and female indicates that the males constitute about 52.34 % and females 47.66 % of the total population. About 45.67 % of the population in the study area belongs to Scheduled Castes (SC). The overall literacy rate is of 34.34%, of which male literacy is 45.52 % and the female literacy is 22.06 %. The total main working population is 26.98 %.

9.4 Anticipated Environmental Impacts and Mitigation Measures

9.4.1 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.

9.4.1.1Air Dispersion Modeling

In the present case, AERMOD (American Meteorological Society/Environmental Protection Agency Regulatory Model) version 6.4 dispersion model based on steady state gaussian plume dispersion, designed for multiple point sources and developed by United States Environmental Protection Agency [USEPA] has been used for simulations from Industrial sources. Modeling studies reveal that the maximum incremental ground level concentrations for Particulate Matter10 (PM10) likely to be encountered during study period are 0.51 µg/m3 at a distance of about 2 km in both x and y coordinate.

The maximum incremental short term ground level concentrations for SO2 and NOx are 40.96 and 18.85 µg/m3 respectively occurring at a distance of about 2 km(in both x and y coordinate) in the E direction. The resultant concentrations are predicted to be well within the standards. The resultant concentrations on superimposing the results over the baseline data collected indicate that the AAQ to be well within the standards specified by CPCB.

9.4.2 Water Environment

The total water requirement for the proposed power project is 4002 m^3/hr, which will be met from Upper Khajuri dam which will be fed from Ganga River 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 888 m^3/hr which includes sanitary waste of 15 cum/hr. This 15 m^3/hr of domestic/sanitary wastewater will be suitably treated and shall be utilized for greenbelt development. Balance water shall be utilised for ash handling, dust suppression, plant service water, fly ash handling etc. The waste water discharge at nearby nallah will be 28 m^3/hr. 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.

9.4.3 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 proposed grinding / cement plants in the vicinity.

9.4.4 Noise Environment

The main noise generating sources are blowers from boilers and turbines. The impact of noise emission from TG set will be minimized by acoustic enclosures and the ambient noise levels will be limited to 55 dB (A).

9.4.5 Greenbelt Development

A 50-100 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.

9.4.6 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.

9.5 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 PM_{10}, $PM_{2.5}$, 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 UPPCB and Regional Office of MoEF.

9.5.1 Cost Provision for Environmental Measures

It is proposed to invest about Rs 466.00 Crores on pollution control, treatment and monitoring systems for proposed power plant. In addition to this, Rs 3.50 Crores will be spent on greenbelt development in and around the proposed power plant.

9.6 Additional Studies

9.6.1 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 have been discussed in details in EIA report.

9.6.2 Rehabilitation & Resettlement

The total land requirement for the proposed project has been optimized to about 875 acres (354.11 ha). It includes 97.13 acres Govt. land and rest 777.88 acres private land. The land mainly barren land with patches rain fed agriculture practice occasionally.

As a proactive measure land acquisition and other involuntary settlement is avoided in while selecting the location of project. The entire land has been procured from the willing sellers through direct negotiations on the willing buyer and willing seller concept. The price paid is determined through mutual negotiation on mutually acceptable terms and conditions. The procured land has 221 title holders in 63 Khatas from Dadri Khurd village, whose land is located in the area identified for the project. There are 4 small structures located in the identified land. There are no cultural properties and common property resources in the identified land. There are no non title holders in the land being procured as defined in NRRP 2007. There are also no scheduled tribes land sellers from the land being procured. The Uttar Pradesh state government R&R policy as well as present national R&R policy is silent and do not insist on specific R&R provisions to such procurement of land through a private mutual negotiation process. Most of land owners have left Mirzapur and settled at different locations faraway places and are willing to dispose the land. Only 51 of land owners do stay in and around the project site like Sukhnai, Juruhliya, Umariya etc and Mirzapur city. Xavier Institute of Development Action and Studies. Jabalpur has been commissioned to look into the aspect of Need assessment Study and resettlement needs in such scenario and a separate report has been prepared by them. As a good corporate citizenship it is proposed to adopt certain measure to the land deprived persons for their lively hood from the land sellers community.

The national Rehabilitation & Resettlement policy 2007 is applicable where 400 families are affected due to land acquisition in plains and 200 families in hilly terrains for public purposes.

Every PAP is entitled to the monetary compensation as per the loss of assets, he/she has lost, which is described below.

- Compensation and Rehabilitation as per provisions of Uttar Pradesh State Government R&R Policy
- Compensation for Lands and Houses
- Compensation for Structures

- Compensation for trees, if any
- Integration of PAF with income generation schemes

Systems & Procedures to monitor the RAP

9.7 PROJECT BENEFITS

The proposed project by WEUPPL 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.

9.7.1 CSR Activities

WEUPPL 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 Rs 31.15 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. WEUPPL will implement the same with the help of NGOs/Government Organizations in the region.

9.8 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.

9.8.1 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;
- Pavement of the roads within the plant area; and
- Development of Greenbelt around the plant to arrest the fugitive emissions.

9.8.2 Water Pollution Management

The effluents generated from the power plant during operations will be collected and treated 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 and shall be reused to the extent possible 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;
- Suitable 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.

9.8.3 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.

9.8.4 Solid Waste Management

The main solid waste from the proposed power plant will be ash (fly ash and bottom ash). Considering the expected domestic coal quality, the total ash generations from Power plant will 2.7 MTPA of which 2.16 will be fly ash and rest is bottom ash. 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 from 4th year onwards. The Tables for fly ash and bottom ash utilization are given below. 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. Lining of permeability of less than 10^{-6} will be provided in the ash pond in order to arrest any seepage of ash pond water into groundwater.

9.9 CONCLUSION

The proposed power plant may have certain level of marginal adverse impacts on the local environment; it can be controlled, with the implementation of the proposed pollution control and environment management measures. Further, development of this project will have certain beneficial impact in terms of bridging the electrical power deficit in northern region but also provide direct and indirect employment opportunities during the course of its implementation. M/s WEUPPL with its sound CSR policy will develop the local area by providing education to the needy, increase employability, health and women empowerment in collaboration with state government. Thus, in view of considerable benefits from the project which may accrue without much of adverse environmental impact, the proposed project is good for the overall development of the region as well as to the nation.

10.0 DISCLOSURE OF CONSULTANTS

J.M. EnviroNet Pvt. Ltd. (JMEPL) was established in the year 1993. 'JM' in the name of the Company is derived from the name of 'Lord Shiva' - the Temple of 'Jharkhand Mahadev' (JM). The Temple is located at Queens Road, Vaishali Nagar, Jaipur.

The Registered office of JMEPL is at 7-CH-10, Jawahar Nagar, Jaipur. Its Delhi-NCR Corporate office is at SCO-16, Sector 10A, Gurgaon (Haryana).

J.M. EnviroNet Pvt. Ltd. is accredited with ISO-9001: 2000 for EIA Division. EIA Division is also approved by National Accreditation Board for Education & Training (NABET) formerly NRBPT (Quality Council of India) with Registration No. EIA 81 004. The Company has its own Environmental Laboratory at Gurgaon (Haryana) approved under EPA (Environment Protection Act) From the Ministry of Environment & Forests, Govt. of India, New Delhi vide notification No.865E dated 11.04.2008 published in the Gazette of India dated 11.04.2008 & approved by the National Accreditation Board for Testing and Calibration Laboratories, Govt. of India (NABL) (Registration No.NABL-T-1327), as also ISO-17025: 2005.

The Company's work is spread over 20 States viz.:- Andhra Pradesh, Kerala, Gujarat, Maharashtra, Orissa, Tamil Nadu, Goa, Jammu & Kashmir, Himachal Pradesh, Punjab, Haryana, Delhi, Rajasthan, Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Assam, West Bengal. Karnataka Jharkhand, Bihar & Uttarakhand.

JMEPL is offering Environmental Consultancy Services in various sectors viz Industrial Projects / Chemical Industries / Cement Plants / Thermal Power Plants / Mining Projects / Coal Washery Project/ Real Estate Projects / Distilleries / Steel Plants etc.

In the Mining sector, JMEPL is covering mines of minerals viz. Limestone, Bauxite, Chromite, Coal, Zinc, Copper, Gypsum, Soapstone, Iron & Manganese ore, Clay, Silica Sand, Feldspar, Quartz etc.

Besides this, its MoEF and NABL approved Environmental Laboratory at Gurgaon is also providing Analytical Laboratory Services of various elements and environmental parameters.

Annual monitoring as per MoEF / CPCB / SPCB guidelines, Risk Assessment and Disaster Management Plan, consultancy for Rain Water Harvesting Plan, detailed Hydro-geological Study for major mining projects, preparation of Environmental Statement Reports (Environmental Clearance Compliance Conditions), etc. are amongst the various other consultancy services offered by the Company.

JMEPL has a highly qualified team of Subject Experts. As Faculty Heads of the EIA Division we have Ex-chairman State Pollution Board, Retd. General Managers of the Reputed Cement Companies, Ex-Head EIA Division of big Business Group, STP & ETP designing experts, Retd. Mining and Geology Experts with vast experience in their respective fields.

JMEPL has been accredited with National Accreditation Board for Education & Training vide their certificate no NABET/EIA/1013/002 valid upto 16th May' 2013.

DETAILS OF PERSONNEL INVOLVED IN THE PRESENT EIA STUDIES

Sr. No.	Name	Qualification	Position	Contribution
1	Mr. J Kumar	B.E. (Chemical)	EIA Coordinator & Functional Area Expert	As an EIA Coordinator & FAE of Risk Assessment & Hazardous waste management & Solid Waste & Hazardous waste management
2	Dr. Jitendra Yadav	Ph.D.	Functional Area Expert	As an FAE of Meteorology, Air Quality Modeling & Prediction
3	Mr. Amarjit Singh	BE (Mechanical)	Functional Area Expert	As an FAE of Noise & Vibration & Air Pollution Prevention, Monitoring & Control
4	Mr. Rajveer Singh	M. Sc. (Remote Sensing)	Functional Area Expert	As an FAE of Land Use
5	Mr. Jayant Reddy	M.A. (Industrial Sociology)	Functional Area Expert	As an FAE of Socio Economy
6	Mr. Rohit Mainkar	BE (Chemical)	Functional Area Expert	As an FAE of Water Pollution, Prevention, Control & Prediction of Impacts

7	Mr. Pawan Gupta	M.Sc. (Geology), M.Sc. (Tech), Applied Geology	Functional Area Expert	As an FAE of Ground water & Geology & Soil
8	Dr. B Lal	Ph.D. Botany	Functional Area Expert	As an FAE of Ecology & Biodiversity

LIST OF ANNEXURES

ANNEXURE NO.	DETAILS
I	IN PRINCIPLE WATER ALLOCATION OF 36 MCM FROM IRRIGATION DEPARTMENT, LUCKNOW & LETTER FROM GOI, CENTRAL WATER COMMISSION, IRRIGATION PLANNING (NORTH) DEPT. VIDE LETTER NO. 7/2/18/UP/2008/IP (N)/804 DATED 12.10.2011.
II	APPLICATION FOR COAL LINKAGE HAS ALREADY BEEN MADE IN THE MINISTRY OF COAL VIDE LETTER NO. WEUPPL/SLC-LT/10-11/DEC/ 2910 DATED DECEMBER 29, 2010
III	DETAIL TABLE OF THE AMBIENT AIR QUALITY
IV	COMPLETE PUBLIC HEARING DOCUMENT
V	SEASONAL WIND ROSE DIAGRAMS
VI-A & VI-B	MOU WITH ASH UTILIZATION BODIES
VII	HOURLY MICRO-METEOROLOGY TABLE

7/2/18/UP/2008/IP (N)/ 804
Government of India
Central Water Commission
Irrigation Planning (North) Dte.

204 (S), Sewa Bhavan
R.K. Puram, New Delhi-66
Dated: 12.10.2011

To

The Special Secretary
Government of Uttar Pradesh
U. P. Sachivalaya
Lucknow - 226001

Sub: Clearance for Withdrawal of 36 MCM water from River Ganga during non-restrictive period for proposed 1320 MW Thermal Power Project to M/s Welspun Energy U.P. Pvt. Ltd. at Mirzapur, Uttar Pradesh – reg.

Ref: Govt. of UP Lr. no. no. 3763/11-27-Sin-4-174(W)/11 dated 16.09.2011.

Sir,

Please refer to Government of Uttar Pradesh letter under reference above vide which request for clearance for Water Allocation from River Ganga to M/s. Welspun Energy U.P. Pvt. Ltd. for 1320 MW Thermal Power Project at Mirzapur, Uttar Pradesh has been made. The proposal envisages storing water in Upper Khajuri Dam by pumping water from River Ganga to fulfil the requirement of proposed Thermal Power Plant.

The proposal has been examined and I am directed to convey the 'No Objection' of MoWR for allocation of 36 MCM of water for this project, to be withdrawn from River Ganga to M/s Welspun Energy U.P. Pvt. Ltd. at Mirzapur, Uttar Pradesh subject to the following conditions:

1. At present, except for Sone basin and some project - specific agreement, there is no agreement for sharing of Ganga water between co-basin States. Hence in future, if any agreement is reached for sharing of water of River Ganga, the consumptive use for this project would be counted against the share of U.P.

2. The Government of Uttar Pradesh shall ensure that there is no withdrawal of water from Ganga River during the lean season (1st January to 31st May) and there is sufficient storage available in Upper Khajuri Dam for the monsoon water to be stored for utilization during the lean season by proposed Thermal Power Project at Mirzapur.

3. Government of U.P shall ensure that during the lean season, the releases downstream of the existing dam remain unaffected.

Yours faithfully,

12/10

Director, IP (N)

Copy to:

1. Sr. Jt. Commissioner – I (Ganga), Ministry of Water Resources, Block No-11, 8th Floor, CGO Complex, Lodhi Road, New Delhi-110003 w.r.t MoWR letter no. 7/24/2010-Ganga/3821-23 dated 03.10.2011.

2. Shri M.S. Puri, Chief Engineer, TP&I Divn., Central Electricity Authority, 9th floor, Sewa Bhawan, R.K. Puram, New Delhi.

3. Welspun Energy U.P. Pvt. Ltd. 3rd Floor, PTI Building, 4, Parliament Street, New Delhi – 110001.

WELSPUN

Dare to Commit

O/c

WELSPUN ENERGY UP PRIVATE LIMITED

WEUPPL/SLC-LT/10-11/DEC/2910

December 29, 2010

To,
Additional Secretary & Chairman, SLC (LT)
Govt. of India, Ministry of Coal
Shastri Bhawan,
New Delhi - 110001

Sub: Application for Long term Coal Linkage for IPP being developed in the State of Uttar Pradesh

Dear Sir,

Welspun Energy Ltd. is part of the renowned Welspun Group, which ranks amongst India's fastest emerging conglomerates with an **enterprise value of USD 4 Billion**. Welspun Corp Limited, the flagship company of the group is the **world's largest pipe producer in the world**. With proven capabilities in steel, steel pipes, power generation and home textiles, Welspun has global presence in over 50 countries with international clients including behemoths like **British Petroleum, Chevron, Exxon Mobil, El Paso, Wal-Mart, Bechtel, Target and J.C. Penny** all of whom have selected Welspun as preferred supplier.

Welspun Energy, an integral part of the Welspun group has been established to setup over **6,000 MW commercial thermal power plants** over the next 3 years in various states. It would also fulfill its commitment towards a Greener Environment by setting up Solar, Hydro, Biomass and Wind energy power generating facilities.

Welspun Energy, through its SPV Welspun Energy UP Pvt. Limited is developing 2x660 MW coal based Thermal Power plant based on environment friendly supercritical technology.

We are hereby submitting our application in triplicate for long term coal linkage for 2x660 MW coal based Thermal Power plant being developed in the State of Uttar Pradesh.

Corporate Office:
3rd Floor,
Press Trust of India Building,
4, Parliament Street,
New Delhi - 110 001. INDIA

Tel: +91-11-66034600
Fax: +91-11-66273090 / 91
E-mail: welspun@bom2.vsnl.net.in
URL: www.welspun.com

Cont…2

Registered Office / Works: Welspun City, Village Versamedi, Tal. Anjar, Dist. Kutch, Gujarat - 370 110, INDIA. Tel: +91-2836-661111, 279041-44 Fax: +91-2836-279060

The demand draft number "**783808" dated 15th December, 2010** for an amount of Rs. 5.0 Lakhs drawn in favour of '**Pay & Accounts officer, Ministry of Coal**' is enclosed herewith.

We request you to kindly consider our proposal and grant us the coal linkage.

For, **Welspun Energy UP Pvt. Limited**

29/12/10

for Ravi Verma
General Manager – Corporate Affairs

Corporate Office:
3rd Floor,
Press Trust of India Building,
4, Parliament Street,
New Delhi - 110 001. INDIA

Tel: +91-11-66034600
Fax: +91-11-66273090 / 91
E-mail: welspun@bom2.vsnl.net.in
URL: www.welspun.com

Registered Office / Works: Welspun City, Village Versamedi, Tal. Anjar, Dist. Kutch, Gujarat - 370 110, INDIA. Tel: +91-2836-661111, 279041-44 Fax: +91-2836-279060

अदाता के खाते में
A/C Payee

IDBI BANK
इंडस्ट्रियल डेवलपमेंट बैंक ऑफ इंडिया लिमिटेड
Industrial Development Bank of India Limited

शाखा कूट
Branch Code
187 Sr.No.:783808

जारी करने की तारीख से छः माह के भीतर वैध
VALID FOR SIX MONTHS FROM THE DATE OF ISSUE

दिनांक
DATE 15-12-2010

LOWER PAREL (W)
जारीकर्ता शाखा/Issuing Branch

मांगने पर/ON DEMAND PAY PAY & ACCOUNTS OFFICER,
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अदा करें. / FOR VALUE RECEIVED.
For Industrial Development Bank Of India Ltd.

****** Not Over INR. 5,00,000.00 ******
K G MARG NEW DELHI(011)
(अदाकर्ता शाखा/ Drawee Branch)

C

प्राधिकृत हस्ताक्षरकर्ता/Authorised Signatory
क्रम सं./Sr. No

प्राधिकृत हस्ताक्षरकर्ता/Authorised Signatory
क्रम सं./Sr. No

एह OT
दह TT
एला OL

1 2 3 4 6 7 8 9 0

12060 - D. S. SAVANT & SONS MUMBAI 400 030.

APPLICATION FOR LONG TERM COAL LINKAGE TO POWER PLANTS

S. No	Item	Details
1.	Name of the power Project	**(2X660 MW) 1320 MW Welspun Energy UP Thermal Power Project**
2.	Proposed Location (Place/District/State)	Village Katya and Sabash, District Gazipur, Uttar Pradesh
3.	Name of the Project Developer	**Welspun Energy UP Private Limited.** 3rd Floor, PTI Building, 4, Parliament Street New Delhi - 110 001, Delhi, India Phone: +91-11 66034600 / Fax: +91-11-66273090 Email :- ravi_verma@welspun.com
4.	Type of Power Project	
(i)	Whether Utility/IPP/CPP	Independent Power Producer (IPP)
(ii)	Whether Co-generation, if yes furnish Process & Power steam consumption	No
(iii)	Pithead/Load Centre/Coastal/Nearest Railway station	Load Center
5.	Unit-wise/ Set-wise capacity (MW) & commissioning schedule (in month and year) **(with details of Boiler & Generator)**	**Capacity** Unit I - 660 MW Unit II - 660 MW Total – 1320 MW **Commissioning Schedule** **Phase 1** Unit I - December 2014 Unit II - April 2015 **Details of Boiler & Generator** Supercritical equipment (BTG) will be sourced from reputed suppliers / manufacturers

6.	Details regarding Category of power project	
(i)	Project being executed by the **Central Sector / State Sector PSUs / Private sector**	**IPP being developed by Private Sector**
(ii)	Expansion of existing projects of **Central Sector / State Sector PSUs / Private sector**	No
(iii)	IPP projects which have been allowed tariff approval by the appropriate Regulatory Commission under Section 62 of Electricity Act, 2003	No
(iv)	Projects being developed through tariff based competitive bidding by the distribution utilities	No
(v)	Expansion of existing IPPs already supplying power to the grid	No
(vi)	Captive Power Projects supplying at least 25% capacity to the grid	No
(vii)	Other Captive Power Projects	No
(viii)	Any other category not covered by S.No. (i) to (vii)	Not Applicable
7.	Station Heat Rate, Plant Load Factor(PLF) & Specific coal consumption	Station Heat Rate: 2400 Kcal/unit Plant Load Factor: 92% Specific Coal consumption: Tones per hour - 841 Tones per day - 20184 Per year - 7.37 MTPA (GCV = 3500 Kcal/kg)
8.	Details of Power Purchase agreement	100% Power generated shall be supplied to Discoms of Uttar Pradesh
9.	Brief status of power project	Attached as Annexure 'A'
(i)	Land Acquisition	Approx. 900 acres of land for the project have been identified and process for land acquisition has been initiated

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Cont...3

(ii)	Water availability	Water will be taken from Ganga River or nearby Canal based on Water Feasibility study to be conducted.
iii)	Environment Clearance	Application for MoEF clearance (TOR) being filed with MoEF and will be submitted once TOR received from MoEF
(iv)	State Pollution Control Board Clearance	Will be obtained after getting clearance from MoEF
(v)	Main Plant Package/EPC contract	Discussions with key suppliers of Supercritical technology is in process
(vi)	**Other Statutory clearances including state/central registrations**	Under process
10.	Status of End use project in case of CPP's	Not Applicable
11.	Preferred source of Coal Linkage & Grade of Coal **(with range of UHV/GCV)**	Source: MCL/NCL/BCCL/SECL Grade: E-F Range of GCV: 4200 - 3500 Kcal/Kg
12.	Mode of transportation of Coal **(Rail, Road, Rail-cum-sea, MGR, Belt etc)**	Rail
13.	**Clearance/Agreement with transporter.**	Will be obtained in due course

For, **Welspun Energy UP Private Limited**

29/12/10

for Ravi Verma
General Manager

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Annexure A

PROJECT AT A GLANCE

Welspun Energy UP Pvt. Ltd is implementing a Coal based Supercritical Thermal Power Project of 1320 MW capacity, in Uttar Pradesh. The present status of the power project is as follows:

1.	Plant Capacity	: 1320 MW (2 x 660 MW)
2.	Location	: Vill. Katya & Sabash, Dist. Gazipur, Uttar Pradesh
3.	Site	: i. a) Distance from Varanasi - 35 km b) Distance from Gazipur - 45 km ii. Distance from National Highway 29 – 12 km iii. Distance from State Highway 36 – 6 km
4.	Nearest Railway Station	: Sadat and Mahpur Railway Station - 6 km
5.	Nearest Airport	: Varanasi Airport - 46 km
6.	Land Requirement	: Total area requirement for Power Plant = 900 acres for 1320 MW
7.	Topographical features	: Plain area nearly flat topography
8.	Source of Water	: Water will be taken from Ganga River or nearby Canal based on Water Feasibility study to be conducted.
9.	Cooling System	: Closed cycle cooling system with Natural Draft Cooling Towers
10.	Primary Fuel & Source	: Coal from NCL/MCL/BCCL/SECL coal fields
11.	Coal Requirement	: 7.37 million tones per annum of E – F Grade Coal
12.	Coal Transportation	: By Rail
13.	Commissioning Schedule	: Unit I – December 14, Unit II – March 15

For, **Welspun Energy UP Pvt. Limited**

29/12/10

for Ravi Verma
General Manager – Corporate Affairs

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Annexure III

AMBIENT AIR QUALITY

LOCATION: SA1 PROJECT SITE **(Unit µg/m³)**

DATE OF MONITORING	CLOCK HOURS							
	00 – 08		08 – 16		16 – 24		24 HOURS PM_{10}	24HOURS $PM_{2.5}$
	SO_2	NO_x	SO_2	NO_x	SO_2	NO_x		
15.03.2011	7.68	13.25	8.85	18.52	8.54	15.42	47.89	15.20
16.03.2011	7.72	13.21	8.74	18.41	8.42	16.32	46.60	20.35
22.03.2011	7.60	14.05	9.12	17.59	7.75	15.19	51.23	22.15
23.03.2011	8.11	13.32	8.86	18.56	8.42	16.52	55.62	14.50
29.03.2011	8.08	14.12	9.11	17.85	7.55	15.42	58.42	16.32
30.03.2011	7.85	13.28	9.10	17.92	8.63	16.47	59.73	22.85
05.04.2011	8.09	13.56	8.81	17.81	8.56	15.51	55.23	23.60
06.04.2011	7.74	14.21	9.08	17.65	7.72	16.33	56.45	15.85
12.04.2011	8.15	13.78	9.09	18.52	8.52	15.48	49.25	23.45
13.04.2011	8.08	14.32	9.11	18.34	8.34	15.62	51.42	23.60
19.04.2011	8.11	13.95	9.12	17.67	8.44	15.36	52.36	22.44
20.04.2011	7.86	13.74	8.95	18.44	7.85	16.47	48.25	15.85
26.04.2011	8.12	14.52	8.98	17.68	7.92	14.85	49.78	19.75
27.04.2011	7.81	13.62	9.09	18.52	8.45	14.91	55.36	20.65
03.05.2011	8.08	14.72	9.11	18.60	8.32	16.55	58.42	15.68
04.05.2011	7.75	13.58	9.12	17.52	7.45	15.52	54.23	18.55
10.05.2011	8.08	14.47	8.85	18.57	7.55	15.37	51.23	23.42
11.05.2011	7.52	13.59	8.91	18.42	8.25	16.44	50.22	22.65
17.05.2011	8.11	14.63	8.87	18.60	8.42	15.98	48.22	21.44
18.05.2011	8.01	14.52	9.05	18.51	8.26	16.49	47.21	19.82
24.05.2011	7.25	13.59	9.08	17.68	7.65	15.84	58.45	20.32
25.05.2011	8.06	14.61	8.89	17.82	7.58	16.58	55.23	22.44
31.05.2011	7.42	14.35	8.92	18.41	8.25	15.42	56.47	23.41
01.06.2011	8.09	14.39	8.78	17.42	8.59	16.43	59.55	19.53
07.06.2011	8.08	14.72	9.11	18.60	8.32	16.55	58.22	21.59
08.06.2011	7.75	13.58	9.12	17.52	7.45	15.52	52.21	22.55

	SO_2	NO_x	PM_{10}	$PM_{2.5}$
Max.	9.12	18.60	59.73	23.60
Min.	7.60	13.21	46.60	14.50
98%tile	9.12	18.60	59.64	23.60

AMBIENT AIR QUALITY

LOCATION: SA2 Village Shikathi **(Unit µg/m³)**

DATE OF MONITORING	CLOCK HOURS							
	00 – 08		08 – 16		16 – 24		24 HOURS	24HOURS
	SO_2	NO_x	SO_2	NO_x	SO_2	NO_x	PM_{10}	$PM_{2.5}$
15.03.2011	7.68	13.92	8.21	18.85	8.12	16.58	52.55	16.54
16.03.2011	7.59	13.85	8.28	19.45	7.59	17.96	58.32	15.00
22.03.2011	8.01	13.67	7.95	17.36	8.16	16.78	54.23	15.45
23.03.2011	7.56	15.75	8.25	19.55	8.09	19.01	60.21	16.35
29.03.2011	7.92	14.12	8.26	18.98	8.07	18.51	65.81	18.56
30.03.2011	8.06	14.29	7.99	19.32	7.66	17.56	64.32	19.75
05.04.2011	7.58	13.69	7.86	19.41	8.04	17.84	65.75	20.36
06.04.2011	7.56	14.26	8.19	18.57	7.52	16.44	63.21	21.86
12.04.2011	8.02	13.85	8.20	17.52	8.07	19.05	59.62	23.45
13.04.2011	8.11	14.19	7.68	18.92	8.06	19.11	52.41	24.63
19.04.2011	7.77	15.25	7.94	19.47	8.11	18.54	57.69	24.52
20.04.2011	7.82	13.67	8.12	17.32	7.44	17.93	65.32	19.85
26.04.2011	8.10	15.23	8.11	17.55	8.08	18.56	59.45	20.45
27.04.2011	7.65	14.32	7.97	19.42	8.12	17.56	55.42	22.56
03.05.2011	7.85	15.42	8.28	18.65	8.10	19.05	59.25	24.63
04.05.2011	7.69	13.75	8.25	18.79	7.42	18.65	61.24	23.51
10.05.2011	8.06	15.41	7.97	19.55	8.12	19.09	63.55	24.51
11.05.2011	7.56	16.07	7.58	19.35	8.09	18.74	65.74	18.57
17.05.2011	7.84	15.32	8.12	18.75	8.01	16.52	65.74	19.65
18.05.2011	8.08	14.58	7.99	18.65	7.23	18.42	52.10	21.32
24.05.2011	7.76	16.11	8.24	19.45	7.24	17.98	55.65	22.45
25.05.2011	7.93	15.47	8.28	17.62	8.05	18.62	62.48	18.65
31.05.2011	7.62	16.22	7.98	18.75	8.11	19.25	65.81	24.63
01.06.2011	8.09	15.13	7.84	19.42	8.12	19.09	59.25	22.75
07.06.2011	8.11	14.52	8.21	18.56	7.41	18.75	61.32	21.41
08.06.2011	7.89	13.42	8.25	19.51	8.13	17.68	65.42	19.45

	SO_2	NO_x	PM_{10}	$PM_{2.5}$
Max.	8.28	19.55	65.81	24.63
Min.	7.56	13.67	52.10	15.00
98%tile	8.28	19.53	65.81	24.63

AMBIENT AIR QUALITY

LOCATION: SA3 Village Rajapur **(Unit µg/m³)**

DATE OF MONITORING	CLOCK HOURS							
	00 – 08		08 – 16		16 – 24		24 HOURS	24HOURS
	SO_2	NO_x	SO_2	NO_x	SO_2	NO_x	PM_{10}	$PM_{2.5}$
15.03.2011	8.16	14.92	9.41	19.78	9.21	16.56	56.85	17.85
16.03.2011	8.12	15.10	9.52	19.65	8.45	17.82	59.52	19.52
22.03.2011	9.01	14.80	8.85	20.00	9.26	16.65	55.10	27.13
23.03.2011	8.24	14.86	9.35	19.52	9.31	17.75	65.42	25.42
29.03.2011	8.16	15.21	8.62	18.85	8.32	16.45	69.52	20.65
30.03.2011	9.05	16.05	8.95	18.65	8.25	18.12	67.42	22.41
05.04.2011	9.08	15.28	9.43	19.42	9.24	18.25	59.44	19.52
06.04.2011	8.19	14.99	8.86	19.76	8.21	17.89	62.21	25.41
12.04.2011	9.02	16.11	8.95	19.85	8.24	17.75	69.45	23.65
13.04.2011	8.22	15.62	9.41	18.65	9.21	16.52	69.52	22.78
19.04.2011	9.06	15.78	9.36	19.65	8.26	18.54	59.75	19.85
20.04.2011	8.24	14.85	8.90	19.82	9.24	17.42	61.32	20.69
26.04.2011	8.18	14.52	9.41	18.99	8.34	16.45	68.45	22.15
27.04.2011	9.06	15.36	8.78	20.00	8.29	18.56	62.32	18.56
03.05.2011	9.08	16.11	9.52	19.86	8.27	16.78	56.21	27.13
04.05.2011	8.15	16.15	9.50	18.98	9.12	18.65	57.64	26.55
10.05.2011	9.08	15.75	8.87	19.79	9.18	18.95	68.55	20.54
11.05.2011	9.02	14.95	9.48	20.00	8.27	19.01	69.42	22.63
17.05.2011	8.15	15.32	9.41	19.99	8.29	17.85	58.23	21.54
18.05.2011	9.01	14.90	8.95	18.98	9.14	19.65	56.21	20.45
24.05.2011	8.12	15.74	9.41	19.79	9.18	17.56	66.45	21.75
25.05.2011	9.01	15.42	9.45	20.00	8.29	18.92	66.32	18.90
31.05.2011	8.15	16.19	9.52	19.89	8.27	19.06	67.25	22.15
01.06.2011	8.16	15.62	8.54	19.88	9.16	17.88	69.52	21.45
07.06.2011	9.02	15.32	8.69	20.00	9.19	18.05	68.72	26.75
08.06.2011	9.11	15.41	8.92	19.78	8.25	18.65	55.85	25.89

	SO_2	NO_x	PM_{10}	$PM_{2.5}$
Max.	9.52	20.00	69.52	27.13
Min.	8.12	14.80	55.10	16.50
98%tile	9.52	20.00	69.52	27.13

AMBIENT AIR QUALITY

LOCATION: SA4 Village Dekhwah **(Unit µg/m³)**

DATE OF MONITORING	CLOCK HOURS							
	00 – 08		08 – 16		16 – 24		24 HOURS PM_{10}	24 HOURS $PM_{2.5}$
	SO_2	NO_2	SO_2	NO_2	SO_2	NO_2		
15.03.2011	7.39	13.45	8.72	16.59	7.52	17.21	55.42	15.85
16.03.2011	8.12	14.15	7.89	18.32	7.59	16.98	53.20	14.60
22.03.2011	7.59	13.32	8.90	17.35	8.05	18.01	60.21	19.86
23.03.2011	7.82	15.11	8.85	17.86	7.62	17.26	62.35	20.56
29.03.2011	8.30	14.16	7.99	18.42	8.09	17.45	64.75	22.36
30.03.2011	8.72	13.52	8.54	18.22	7.58	16.85	61.52	24.75
05.04.2011	7.52	13.85	7.92	16.95	7.46	18.06	55.45	23.61
06.04.2011	7.61	14.25	8.85	18.21	8.08	17.69	64.75	21.85
12.04.2011	7.39	15.16	7.91	17.85	8.11	18.11	55.85	19.85
13.04.2011	8.41	16.08	8.56	16.34	7.54	17.29	56.75	23.74
19.04.2011	7.82	15.85	7.84	18.42	8.06	18.14	59.31	24.75
20.04.2011	7.89	16.14	8.63	17.95	7.51	16.92	60.42	23.58
26.04.2011	8.41	14.58	7.95	18.35	8.25	17.53	63.41	19.85
27.04.2011	7.83	17.06	7.68	17.92	7.65	18.11	54.21	20.32
03.05.2011	7.54	15.36	8.45	16.74	7.52	18.09	63.24	24.32
04.05.2011	7.62	14.58	8.55	18.36	8.29	17.56	62.14	23.52
10.05.2011	8.52	13.92	8.90	17.58	8.27	16.98	59.85	20.56
11.05.2011	7.49	17.12	7.98	16.52	7.85	16.58	53.20	21.46
17.05.2011	7.62	16.25	8.85	18.35	8.24	17.86	54.72	22.38
18.05.2011	8.38	15.48	8.76	16.85	7.65	18.11	53.61	16.48
24.05.2011	8.36	14.63	7.65	17.59	7.54	16.54	63.58	19.56
25.05.2011	7.69	17.56	8.87	16.78	8.32	17.56	64.52	22.85
31.05.2011	7.52	16.32	8.94	18.31	8.54	16.42	61.42	24.65
01.06.2011	7.87	15.74	7.85	17.56	7.82	18.13	62.74	23.52
07.06.2011	8.41	16.53	7.65	18.42	8.45	17.41	64.32	22.41
08.06.2011	8.45	14.25	8.75	18.21	8.41	18.06	63.22	21.78

	SO_2	NO_2	PM_{10}	$PM_{2.5}$
Max.	8.9	18.42	64.75	24.75
Min.	7.34	13.32	53.20	14.60
98%tile	8.9	18.42	64.75	24.75

AMBIENT AIR QUALITY

LOCATION: SA5 Village Madihan **(Unit µg/m³)**

DATE OF MONITORING	CLOCK HOURS							
	00 – 08		08 – 16		16 – 24		24 HOURS	24 HOURS
	SO_2	NO_2	SO_2	NO_2	SO_2	NO_2	PM_{10}	$PM_{2.5}$
17.03.2011	8.25	16.85	9.52	20.55	8.42	17.85	60.21	20.53
18.03.2011	8.32	15.65	9.65	19.78	8.35	16.99	58.40	25.46
24.03.2011	8.10	17.12	8.85	20.62	9.15	17.68	65.56	18.25
25.03.2011	9.12	15.60	9.52	21.06	8.47	18.12	59.85	18.0
31.03.2011	9.10	17.19	8.76	20.75	9.18	17.48	67.63	19.65
01.04.2011	8.52	16.55	9.49	19.85	9.20	17.95	71.35	22.14
07.04.2011	9.08	15.92	9.32	18.89	8.52	16.39	70.88	23.56
08.04.2011	8.36	17.32	8.76	21.06	9.19	17.48	58.40	27.45
14.04.2011	9.09	18.05	8.89	20.74	9.25	18.16	59.65	28.14
15.04.2011	8.41	16.51	9.41	19.58	8.49	17.52	68.75	26.58
21.04.2011	9.08	15.60	8.91	19.99	8.52	18.09	58.40	20.45
22.04.2011	8.64	17.45	8.95	20.87	9.32	16.78	71.35	21.98
28.04.2011	9.17	18.11	9.54	21.04	8.57	17.95	64.23	20.57
29.04.2011	8.35	17.56	9.61	20.51	8.61	18.09	58.40	28.14
05.05.2011	8.16	18.15	8.85	18.78	9.22	17.45	62.52	27.65
06.05.2011	9.14	16.87	8.79	19.56	8.47	16.58	65.78	24.58
12.05.2011	8.22	17.75	9.42	21.06	9.16	17.96	71.35	23.45
13.05.2011	8.19	18.09	8.84	20.65	8.25	16.85	70.56	22.74
19.05.2011	9.16	17.62	9.51	19.85	9.31	18.10	69.52	27.65
20.05.2011	8.10	16.58	9.46	18.72	8.21	18.11	68.32	26.41
26.05.2011	8.16	15.75	8.79	19.84	8.29	17.85	66.42	25.42
27.05.2011	9.17	16.66	8.99	20.31	9.27	15.63	65.42	24.85
02.06.2011	8.24	17.33	9.60	21.06	8.23	17.82	66.32	23.12
03.06.2011	8.21	16.44	9.61	20.89	9.25	16.89	62.41	22.14
09.06.2011	9.11	18.09	8.91	19.88	8.22	18.14	71.35	20.14
10.06.2011	8.12	15.89	9.68	20.54	8.21	17.96	70.41	19.85

	SO_2	NO_2	PM_{10}	$PM_{2.5}$
Max.	9.65	21.06	71.35	28.14
Min.	8.10	15.60	58.40	18.00
98%tile	9.63	21.06	71.35	28.14

AMBIENT AIR QUALITY

LOCATION: SA6 Village Dadiram **(Unit µg/m3)**

DATE OF MONITORING	CLOCK HOURS							
	00 – 08		08 – 16		16 – 24		24 HOURS PM10	24 HOURS PM2.5
	SO2	NO2	SO2	NO2	SO2	NO2		
17.03.2011	8.12	16.25	9.19	20.95	8.25	18.57	58.52	18.60
18.03.2011	8.22	17.14	8.85	21.24	9.09	17.98	57.96	19.86
24.03.2011	9.01	15.84	9.20	19.42	8.34	18.65	56.40	20.52
25.03.2011	8.00	15.20	8.75	21.39	8.39	16.58	68.52	26.62
31.03.2011	8.19	16.85	9.20	18.75	9.06	18.95	69.48	25.85
01.04.2011	9.12	18.12	8.72	20.88	8.52	17.88	65.32	19.52
07.04.2011	8.19	16.58	8.99	21.26	8.41	16.47	66.52	24.63
08.04.2011	8.17	17.19	8.74	21.31	9.11	16.38	69.12	26.62
14.04.2011	9.08	15.68	9.20	20.87	8.45	18.69	56.40	25.45
15.04.2011	8.17	18.16	9.15	19.45	8.52	17.95	58.92	23.85
21.04.2011	9.04	17.41	9.17	18.89	9.12	16.52	56.40	19.85
22.04.2011	8.16	16.32	8.95	20.77	8.46	17.94	57.89	17.50
28.04.2011	8.32	16.52	8.79	18.56	9.11	18.31	58.63	19.45
29.04.2011	9.09	17.86	9.20	19.65	8.53	16.55	65.42	20.52
05.05.2011	8.18	18.32	9.15	20.75	8.34	17.49	68.32	24.63
06.05.2011	8.26	16.59	8.65	21.39	9.11	18.52	69.48	22.52
12.05.2011	9.17	17.45	8.67	20.58	9.06	17.92	59.62	20.54
13.05.2011	8.27	18.21	9.11	18.45	8.27	18.54	68.42	21.69
19.05.2011	9.18	17.51	9.19	19.86	8.26	16.91	69.48	26.62
20.05.2011	8.35	18.32	9.20	20.65	9.01	19.32	60.85	25.45
26.05.2011	9.05	15.85	8.88	21.39	9.07	18.75	62.45	24.32
27.05.2011	8.32	16.85	8.95	21.25	8.29	19.22	59.65	22.12
02.06.2011	9.01	18.13	9.18	19.85	8.43	17.85	61.45	21.85
03.06.2011	8.45	18.41	9.15	20.65	9.09	19.45	69.48	20.15
09.06.2011	9.09	17.32	8.89	21.21	9.06	18.32	67.45	19.85
10.06.2011	8.52	18.11	8.88	20.69	8.65	19.76	66.85	18.75

	SO2	NO2	PM 10	PM 2.5
Max.	9.20	21.39	69.48	26.62
Min.	8.00	15.20	56.40	17.50
98%tile	9.20	21.39	69.48	26.62

AMBIENT AIR QUALITY

LOCATION: SA7 Village Vindampal **(Unit µg/m3)**

DATE OF MONITORING	CLOCK HOURS							
	00 – 08		08 – 16		16 – 24		24 HOURS PM_{10}	24HOURS $PM_{2.5}$
	SO_2	NO_x	SO_2	NO_x	SO_2	NO_x		
17.03.2011	6.23	13.42	8.19	16.85	6.58	15.95	50.52	16.58
18.03.2011	7.11	12.95	8.25	17.55	7.54	14.52	51.63	18.52
24.03.2011	5.89	12.80	7.89	16.67	8.09	14.62	60.52	20.42
25.03.2011	5.78	13.35	8.31	17.72	7.65	15.75	63.53	22.61
31.03.2011	6.32	14.01	8.29	17.69	8.01	15.69	62.58	21.10
01.04.2011	5.91	14.09	7.95	16.58	6.62	14.52	58.52	19.65
07.04.2011	6.19	13.46	7.84	17.64	8.07	15.32	55.32	22.61
08.04.2011	5.85	12.85	8.25	15.85	6.64	13.89	61.45	19.58
14.04.2011	7.22	12.80	8.32	17.66	8.10	14.75	48.70	22.61
15.04.2011	5.78	13.89	7.89	15.47	7.58	13.95	49.65	15.00
21.04.2011	6.42	12.52	7.95	17.72	7.68	14.62	52.36	16.85
22.04.2011	7.19	13.41	8.29	17.65	8.10	15.92	62.51	21.56
28.04.2011	6.51	12.89	8.32	16.69	8.11	13.65	60.42	20.64
29.04.2011	6.48	13.49	6.99	15.75	7.42	14.55	51.77	19.85
05.05.2011	5.89	12.80	7.84	17.59	7.62	13.78	52.95	18.75
06.05.2011	5.79	14.09	7.77	15.74	8.08	15.65	63.53	17.64
12.05.2011	6.45	13.42	6.89	16.85	7.74	14.58	62.21	21.46
13.05.2011	7.19	12.95	8.31	17.52	8.10	15.42	60.28	20.35
19.05.2011	6.38	14.09	8.21	17.41	7.75	13.65	59.75	22.61
20.05.2011	7.18	13.62	8.19	16.85	8.15	14.68	56.42	20.85
26.05.2011	6.41	12.80	7.88	16.84	6.74	15.52	53.23	21.62
27.05.2011	5.78	13.54	6.94	17.56	8.19	13.69	54.75	20.92
02.06.2011	5.91	14.05	7.86	17.65	7.75	14.85	55.32	19.85
03.06.2011	6.54	14.11	8.16	16.85	8.20	15.95	50.21	20.63
09.06.2011	7.14	13.52	7.89	15.75	8.19	15.62	49.85	22.61
10.06.2011	6.41	13.69	8.17	16.85	7.75	14.25	48.57	22.54

	SO_2	NO_x	PM_{10}	$PM_{2.5}$
Max.	8.32	17.72	63.53	22.61
Min.	5.78	12.80	48.70	15.00
98%tile	8.31	17.70	63.53	22.61

AMBIENT AIR QUALITY

LOCATION: SA8 Village Kotwa Pandey **(Unit µg/m3)**

DATE OF MONITORING	CLOCK HOURS							
	00 – 08		08 – 16		16 – 24		24 HOURS PM_{10}	24HOURS $PM_{2.5}$
	SO_2	NO_x	SO_2	NO_x	SO_2	NO_x		
17.03.2011	7.15	15.96	8.25	18.85	7.52	16.85	55.62	17.58
18.03.2011	6.59	15.74	8.34	17.76	8.01	16.95	58.69	19.56
24.03.2011	6.45	14.20	7.89	19.61	6.89	17.88	54.20	22.56
25.03.2011	7.25	16.12	6.95	19.58	8.09	18.52	61.25	21.45
31.03.2011	7.20	14.59	8.37	18.86	7.88	17.89	65.36	16.50
01.04.2011	6.52	15.78	6.87	17.59	6.84	16.92	66.36	20.36
07.04.2011	6.66	14.25	8.31	19.58	7.58	17.94	61.52	25.59
08.04.2011	7.26	15.69	7.92	18.82	7.42	16.84	59.86	20.45
14.04.2011	6.89	16.09	8.25	17.56	8.10	16.92	60.23	18.96
15.04.2011	7.32	15.85	6.99	19.52	7.64	17.42	65.42	21.56
21.04.2011	7.21	16.11	8.21	18.45	8.10	18.65	59.85	25.59
22.04.2011	6.78	15.89	8.29	18.75	7.86	18.63	60.32	24.58
28.04.2011	6.84	14.63	7.78	17.58	8.09	17.85	66.36	22.56
29.04.2011	7.21	14.20	7.81	19.45	8.06	16.52	55.89	21.45
05.05.2011	6.89	15.69	6.85	18.47	8.01	16.78	59.62	20.36
06.05.2011	6.95	15.85	8.34	19.58	7.95	17.85	60.21	21.47
12.05.2011	7.26	14.62	7.89	19.61	8.13	16.79	61.52	20.58
13.05.2011	6.97	15.78	7.95	17.59	7.85	18.32	63.52	19.85
19.05.2011	7.25	15.45	8.24	18.83	7.74	18.41	59.68	18.75
20.05.2011	6.98	16.12	7.89	19.45	6.92	18.28	63.52	17.63
26.05.2011	6.45	15.75	8.19	18.56	8.21	16.79	64.59	18.54
27.05.2011	6.55	16.15	8.16	19.55	7.96	17.42	66.36	20.32
02.06.2011	7.21	15.95	8.26	19.42	8.19	18.51	65.45	21.52
03.06.2011	7.25	16.18	7.84	17.49	8.17	17.43	60.21	25.59
09.06.2011	6.56	14.32	6.89	18.88	7.88	16.88	61.25	24.32
10.06.2011	7.21	15.79	7.81	19.61	7.68	16.45	62.45	23.25

	SO_2	NO_x	PM_{10}	$PM_{2.5}$
Max.	8.34	19.61	66.36	25.59
Min.	6.45	14.20	54.20	16.50
98%tile	8.34	19.61	66.36	25.59

AMBIENT AIR QUALITY

LOCATION: SA9 Village Dadri Garhiya

(Unit µg/m3)

DATE OF MONITORING	CLOCK HOURS							
	00 – 08		08 – 16		16 – 24		24 HOURS PM_{10}	24HOURS $PM_{2.5}$
	SO_2	NO_x	SO_2	NO_x	SO_2	NO_x		
17.03.2011	6.55	15.96	8.25	18.85	7.52	16.85	58.62	27.58
18.03.2011	6.49	15.74	8.34	17.76	7.01	16.95	59.76	29.56
24.03.2011	6.45	14.87	7.89	19.07	6.45	15.74	54.20	32.56
25.03.2011	6.65	16.12	7.95	19.58	6.65	14.87	61.25	29.45
31.03.2011	6.70	15.59	8.37	18.86	6.70	16.12	53.12	26.90
01.04.2011	6.52	15.78	7.87	17.59	6.52	15.59	55.36	30.36
07.04.2011	6.66	14.95	8.31	19.11	6.66	15.78	57.52	35.59
08.04.2011	6.76	15.69	7.92	18.82	6.76	14.95	59.86	30.45
14.04.2011	6.89	16.09	8.25	17.56	6.89	15.69	60.23	38.96
15.04.2011	6.82	15.85	6.99	19.25	6.82	16.09	55.42	31.56
21.04.2011	6.40	16.11	8.21	18.45	6.40	15.85	59.85	35.59
22.04.2011	6.78	15.89	8.29	18.75	6.78	16.11	66.11	34.58
28.04.2011	6.84	15.63	8.78	17.58	6.84	15.89	61.36	32.56
29.04.2011	6.71	14.98	7.81	19.15	6.45	15.63	65.89	31.45
05.05.2011	6.89	15.69	8.85	18.47	8.01	14.98	59.62	30.36
06.05.2011	7.95	15.85	8.34	19.08	7.95	15.85	60.21	31.47
12.05.2011	6.86	14.62	9.10	19.11	8.13	14.62	61.52	30.58
13.05.2011	6.97	15.78	8.95	17.59	7.85	15.78	53.12	39.85
19.05.2011	6.85	15.45	8.24	18.83	7.74	15.45	59.68	38.75
20.05.2011	6.98	16.12	8.89	18.45	6.92	16.12	63.52	37.63
26.05.2011	6.45	15.75	8.19	18.56	8.21	15.75	64.59	41.41
27.05.2011	6.55	16.15	9.06	19.15	7.96	16.15	62.36	30.32
02.06.2011	6.91	15.95	8.96	19.22	8.19	15.95	63.45	31.52
03.06.2011	6.95	16.18	8.84	18.49	8.17	16.18	62.21	35.59
09.06.2011	7.56	15.32	8.89	18.88	7.88	15.85	65.10	34.32
10.06.2011	7.21	15.79	8.81	18.61	7.68	14.62	62.45	33.25

	SO_2	NO_x	PM_{10}	$PM_{2.5}$
Max.	9.10	19.25	66.11	41.41
Min.	6.40	14.62	53.12	26.90
98%tile	9.03	19.23	66.0	40.63

AMBIENT AIR QUALITY

LOCATION: SA10 Village Chakulia

(Unit µg/m3)

DATE OF MONITORING	CLOCK HOURS							
	00 – 08		08 – 16		16 – 24		24 HOURS PM_{10}	24HOURS $PM_{2.5}$
	SO_2	NO_x	SO_2	NO_x	SO_2	NO_x		
17.03.2011	6.35	15.96	8.12	17.85	7.52	16.85	58.62	37.58
18.03.2011	6.49	15.74	8.14	17.76	7.01	16.95	56.12	39.56
24.03.2011	6.45	14.87	7.89	18.07	6.70	15.74	64.20	35.56
25.03.2011	6.65	16.12	7.95	17.58	6.42	14.87	60.10	39.45
31.03.2011	6.70	15.59	8.17	17.86	6.66	16.12	63.36	36.90
01.04.2011	6.42	15.78	7.87	17.59	6.96	15.59	62.36	34.36
07.04.2011	6.66	15.95	8.11	17.11	6.89	15.78	61.52	35.59
08.04.2011	6.96	15.49	7.92	17.82	6.72	14.95	59.86	33.96
14.04.2011	6.89	16.09	8.20	17.56	6.40	15.69	60.23	38.96
15.04.2011	6.72	15.85	7.99	17.25	6.78	16.09	65.42	36.56
21.04.2011	6.40	16.11	7.21	17.45	6.84	15.85	59.85	35.59
22.04.2011	6.78	15.89	7.99	18.20	6.71	16.11	60.32	34.58
28.04.2011	6.84	15.63	7.78	17.58	6.70	15.89	66.36	38.56
29.04.2011	6.71	15.98	7.81	18.15	6.42	15.63	65.89	42.33
05.05.2011	6.89	15.69	8.00	17.47	8.01	14.98	67.12	41.36
06.05.2011	7.95	15.85	8.14	18.08	7.95	15.85	60.21	40.47
12.05.2011	6.86	15.62	8.10	18.11	6.71	14.62	61.52	41.58
13.05.2011	6.97	15.78	7.95	17.59	6.89	15.78	63.52	39.85
19.05.2011	6.85	15.45	8.14	17.83	7.95	15.45	58.06	38.75
20.05.2011	6.98	16.12	7.89	18.05	6.86	16.12	63.52	37.63
26.05.2011	6.45	15.75	8.19	18.16	6.97	15.75	64.59	41.41
27.05.2011	6.55	16.15	8.06	18.15	6.85	16.15	60.36	36.32
02.06.2011	6.91	16.95	7.96	18.12	6.98	15.95	63.45	39.52
03.06.2011	6.95	16.18	7.84	17.49	6.45	16.18	60.21	35.59
09.06.2011	7.56	16.32	7.89	17.88	6.71	15.85	65.10	34.32
10.06.2011	7.21	16.79	7.81	17.61	6.89	14.62	62.45	37.25

	SO_2	NO_x	PM_{10}	$PM_{2.5}$
Max.	8.20	18.20	67.12	42.33
Min.	6.28	15.20	56.12	33.96
98%tile	8.17	18.15	66.74	41.95

AMBIENT AIR QUALITY

LOCATION: SA11 Near By Danti RF **(Unit µg/m3)**

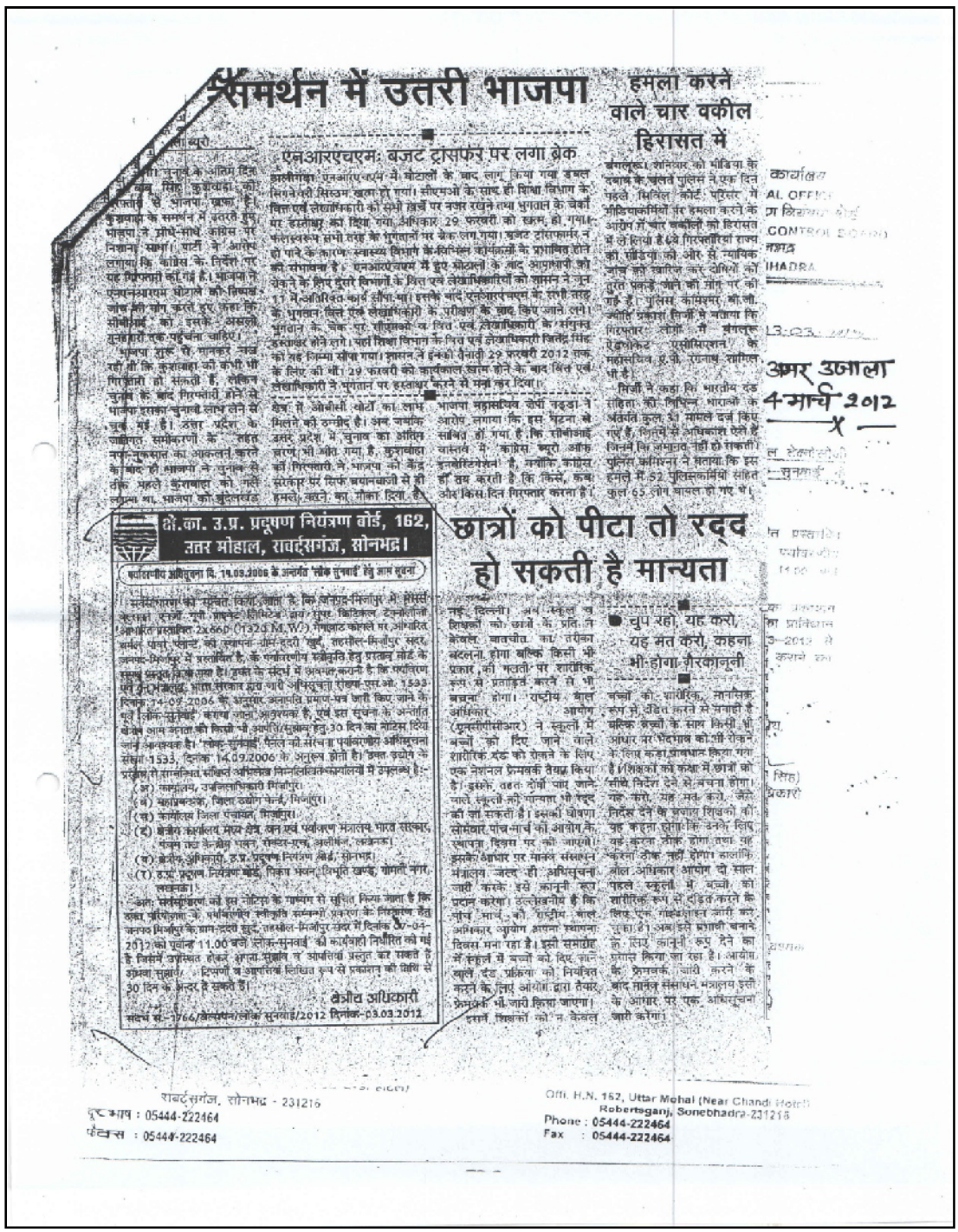
DATE OF MONITORING	CLOCK HOURS							
	00 – 08		08 – 16		16 – 24		24 HOURS PM_{10}	24HOURS $PM_{2.5}$
	SO_2	NO_x	SO_2	NO_x	SO_2	NO_x		
17.03.2011	8.35	15.66	8.12	15.85	8.52	15.78	52.62	27.58
18.03.2011	8.49	15.74	8.14	15.76	8.01	15.95	54.76	29.56
24.03.2011	8.45	14.87	8.89	16.07	8.49	15.69	51.57	30.56
25.03.2011	8.65	15.62	8.95	15.58	8.45	15.74	50.22	34.45
31.03.2011	8.70	15.59	9.17	15.86	8.65	14.87	53.36	31.90
01.04.2011	8.42	15.78	8.87	15.59	8.70	15.62	52.36	34.36
07.04.2011	8.66	15.95	9.11	16.11	8.42	15.59	51.52	35.59
08.04.2011	8.96	15.69	8.92	16.82	8.66	15.78	59.86	33.96
14.04.2011	8.89	16.09	9.20	16.09	8.96	15.95	50.23	38.96
15.04.2011	8.72	15.85	8.99	16.25	8.89	15.69	55.42	36.56
21.04.2011	8.40	16.11	9.11	16.40	8.72	16.09	59.85	35.59
22.04.2011	8.18	15.89	8.99	16.20	8.40	15.85	50.32	34.58
28.04.2011	8.84	15.63	8.78	15.58	8.84	16.11	56.36	38.56
29.04.2011	8.71	15.98	8.81	16.39	8.71	15.89	55.89	32.33
05.05.2011	8.89	15.69	9.00	16.27	8.89	15.63	57.62	41.36
06.05.2011	8.95	15.85	9.14	16.10	8.95	15.78	60.13	40.47
12.05.2011	8.86	15.62	9.10	16.11	8.86	15.98	51.52	41.58
13.05.2011	8.97	15.78	8.95	16.39	8.97	15.69	53.52	39.85
19.05.2011	9.00	15.59	9.14	16.23	8.40	15.85	57.06	38.75
20.05.2011	8.98	16.12	8.89	16.05	8.18	15.62	53.52	37.63
26.05.2011	8.45	15.75	9.19	16.16	8.84	15.78	54.59	41.87
27.05.2011	8.55	15.85	9.06	16.35	8.71	15.59	58.89	36.32
02.06.2011	8.91	15.95	8.96	16.29	8.89	15.63	53.45	39.52
03.06.2011	8.95	16.18	8.84	16.39	8.95	15.98	54.67	38.59
09.06.2011	8.56	16.32	8.89	15.88	8.86	15.69	55.10	34.32
10.06.2011	8.21	15.79	8.81	15.61	8.97	15.85	52.45	37.25

	SO_2	NO_x	PM_{10}	$PM_{2.5}$
Max.	9.20	16.40	60.13	41.87
Min.	8.18	15.51	50.22	26.63
98%tile	9.17	16.38	59.99	41.72

Annexure-IV

Public Hearing Document

1. Public Hearing Advertisement Copy



समर्थन में उतरी भाजपा

एनआरएचएमः बजट ट्रासफर पर लगा ब्रेक

हमला करने वाले चार वकील हिरासत में

छात्रों को पीटा तो रद्द हो सकती है मान्यता

क्षे.का. उ.प्र. प्रदूषण नियंत्रण बोर्ड, 162, उत्तर मोहाल, रावर्ट्सगंज, सोनभद्र।

रावर्ट्सगंज, सोनभद्र - 231216
दूरभाष : 05444-222464
फैक्स : 05444-222464

Offi. H.N. 162, Uttar Mohal (Near Chandi Hotel)
Robertsganj, Sonebhadra-231216
Phone : 05444-222464
Fax : 05444-222464

In Loving Memory of
Shri. Raj Kumar Ji
04.03.2011

A year has passed with
Silent Tears in my eyes.
Your absence is felt everyday.
May God Confer Eternal
Peace to Your Noble Soul.

Deeply Remembered by:-
Saroj Arora - Wife
Manmohan Chugh - Nephew
Harsh Mitter Bamval - Brother-in-law

(1912-2012)

With profound grief we regret to inform the sad demise of our respected father
SHRI R B MALHOTRA on 02.03.2012
Uthala will be held on Monday,
5th March 2012 between 3 and 4 pm
at Arya Samaj Mandir, West Patel Nagar, ND 08

Sudhir & Kailash Malhotra
Veena & Lt Gen (Retd.) Surinder Nath
Vikram & Anshu Malhotra
Sumit & Monica Malik
Vineet & Deepti Malik
Vishal & Smriti Arora
Arjun, Vidur, Parth, Anvi, Medha, Mrida
Mob.: 9818674438, 9891884408

KRIYA / UTHALA
We inform the sad demise of our beloved
Mrs. Neena Gupta
W/o Justice Devinder Gupta (Retd. Chief Justice)
Passed away on 01/03/2012
Kriya / Uthala will be held on 04/03/2012 (Sunday) between 4 and 5 PM at Sri Sathya Sai International Centre Auditorium, Pragati Vihar, Institutional Area, Lodhi Road, New Delhi-110003

Devinder Gupta (Husband)
Rajesh Gupta and Anu Taneja (Son & Daughter in law)
Neeraj Gupta and Jyotika (Son & Daughter in law)
Deepa Butail & Gaurav Butail (Daughter & Son in law)
Dr. Pavanender Gupta (Brother in law)
Dr. Navinender Gupta (Brother in law)
Bhupinder Gupta (Brother in law)
A-61, (IIIrd Floor) South Extn Part-II, New Delhi Ph. 9818065456, 9810087071

क्षे.का. उ.प्र. प्रदूषण नियंत्रण बोर्ड
162, उत्तर मोहाल, राबर्ट्सगंज, सोनभद्र

पर्यावरणीय अधिसूचना दि. 14.09.2006 के अन्तर्गत 'लोक सुनवाई' हेतु आम-सूचना

सर्वसाधारण को सूचित किया जाता है कि जनपद-मिर्जापुर में मेसर्स वेल्सपन एनर्जी यूपी प्राइवेट लिमिटेड द्वारा सुपर क्रिटिकल टेक्नोलोजी आधारित प्रस्तावित 2X660 (1320 M.W.) मेगावाट कोयला आधारित थर्मल पावर प्लांट की स्थापना ग्राम-दरारी खुर्द, तहसील-मिर्जापुर सदर, जनपद-मिर्जापुर में प्रस्तावित है, के पर्यावरणीय स्वीकृति हेतु प्रस्ताव बोर्ड के समक्ष प्रस्तुत किया गया है। उक्त के संदर्भ में अवगत कराना है कि पर्यावरण एवं वन मंत्रालय, भारत सरकार द्वारा जारी अधिसूचना संख्या-एस.ओ. 1533 दिनांक 14-09-2006 के अनुसार अनापत्ति प्रमाण-पत्र जारी किए जाने के पूर्व 'लोक-सुनवाई' कराया जाना आवश्यक है, एवं इस सूचना के अन्तर्गत क्षेत्रीय आम जनता को किसी भी आपत्ति/सुझाव हेतु 30 दिन का नोटिस दिया जाना आवश्यक है। 'लोक-सुनवाई' पैनल की संरचना पर्यावरणीय अधिसूचना संख्या 1533, दिनांक 14.09.2006 के अनुरूप होनी है। उक्त उद्योग के प्रस्ताव से सम्बन्धित संक्षिप्त अभिलेख निम्नलिखित कार्यालयों में उपलब्ध है:- (अ) कार्यालय, उप जिलाधिकारी, मिर्जापुर। (ब) महाप्रबंधक, जिला उद्योग केन्द्र, मिर्जापुर। (स) कार्यालय जिला पंचायत, मिर्जापुर। (द) क्षेत्रीय कार्यालय मध्य क्षेत्र, वन एवं पर्यावरण मंत्रालय भारत सरकार, पंचम तल, केन्द्रीय भवन, सेक्टर-एच, अलीगंज, लखनऊ। (य) क्षेत्रीय अधिकारी, उ0प्र0 प्रदूषण नियंत्रण बोर्ड, सोनभद्र। (र) उ0प्र0 प्रदूषण नियंत्रण बोर्ड, पिकप भवन, विभूति खण्ड, गोमती नगर, लखनऊ। अतः सर्वसाधारण को इस नोटिस के माध्यम से सूचित किया जाता है कि उक्त परियोजना के पर्यावरणीय स्वीकृति सम्बंधी प्रकरण के निस्तारण हेतु जनपद मिर्जापुर के ग्राम-दरारी खुर्द, तहसील-मिर्जापुर सदर में दिनांक 07-04-2012 को पूर्वाह्न 11.00 बजे 'लोक-सुनवाई' की कार्यवाही निर्धारित की गयी है, जिसमें उपस्थित होकर अपना सुझाव व आपत्तियां प्रस्तुत कर सकते हैं अथवा सुझाव/टिप्पणी व आपत्तियां लिखित रूप से प्रकाशन की तिथि से 30 दिन के अंदर दे सकते हैं।

संख्या - 1767/वेल्सपन/लोक सुनवाई/2012/03.03.2012 **क्षेत्रीय अधिकारी**

TERVI / PAGRI

(21.02.1935 - 21.02.2012)

With profound grief and sorrow we inform you the sad demise of our beloved
Smt. Kusum Lata Aggarwal on 21.02.2012
Terwi / Pagri Rasam will be held on
4th March 2012 (Sunday) from **4 - 5 pm** at
Chinmay Mission Centre, Lodhi Road, New Delhi.

In Grief

Lajpat Rai
Arun & Vishakha Aggarwal
Akansh Aggarwal
Anita & Dr. Vijay Kansal
Alka & Arun Gupta
Anusha Aggarwal

Nav Bharat Traders, Naya Bazar | Nav Bharat Impex, Lawrence Road
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FORM IV
(See Rule 8)

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2. Photographs Showing Public Hearing

Hona'ble Head of the Public Hearing

3. Minutes of the Public Hearing in Hindi

मे0 वेल्स्पन एनर्जी यूपी. प्राइवेट लिमिटेड के 2x660 (1320) मेगावाट ग्रीन फील्ड सुपर क्रिटिकल थर्मल पावर प्रोजेक्ट, मिर्जापुर कोयले पर आधारित तापीय विद्युत परियोजना के स्थापनार्थ दिनांक 07–04–2012 को ग्राम–ददरी खुर्द, तहसील सदर, जिला मिर्जापुर, उत्तर प्रदेश का "लोक सुनवाई" का कार्यवाही विवरण।

सदस्य–सचिव, उ0प्र0 प्रदूषण नियंत्रण बोर्ड, लखनऊ के पत्र संख्या–एफ 95860/सी–9/एन0ओ0सी0/सोनभद्र/106/2011 दिनांक 09.12.2011 के अनुपालन में उपरोक्त उद्योग द्वारा प्रस्तावित ग्रीन फील्ड 2x660 मेगावाट कोयले पर आधारित विद्युत परियोजना के स्थापनार्थ दिनांक 07–04–2012 को पूर्वान्ह 11:00 बजे ग्राम ददरी खुर्द, तहसील सदर, जिला मिर्जापुर, उत्तर प्रदेश में "लोक सुनवाई" आयोजित की गई।

"लोक सुनवाई" की आम सूचना दैनिक समाचार पत्र अमर उजाला, मीरजापुर में दिनांक 04.03.2012 को तथा हिन्दुस्तान टाइम्स नई दिल्ली में दिनांक 04.03.2012 को प्रकाशित की गई थी, जिनकी प्रतियॉ संलग्न है (संलग्नक–1)।

"लोक सुनवाई" की अध्यक्षता श्री श्रीश चन्द्र श्रीवास्तव, अपर जिलाधिकारी (वि/रा0), मीरजापुर एवं श्री कालिका सिंह क्षेत्रीय अधिकारी, उ0प्र0 प्रदूषण नियंत्रण बोर्ड, सोनभद्र द्वारा की गई। "लोक सुनवाई" में श्री दयाशंकर पाण्डेय उपजिलाधिकारी (सदर, मीरजापुर) भी उपस्थित थे। वेल्स्पन एनर्जी यूपी. प्राइवेट लिमिटेड की तरफ से श्री कुक्कू टेक्कर उपाध्यक्ष (परियोजना), श्री जी. उदय भास्कर उपाध्यक्ष (पर्यावरण), श्रीमती जया अब्राहम उपाध्यक्ष (सी.एस.आर.), श्री रविकान्त वर्मा वरिष्ठ महाप्रबन्धक, श्री वीरेन्द्र पाण्डेय क्षेत्रीय महाप्रबन्धक, श्री सुरंजन सरकार उपमहाप्रबन्धक (पर्यावरण), एवं श्री एच. एस. सोनी वरिष्ठ प्रबन्धक (पर्यावरण), उपस्थित थे। उ0प्र0 प्रदूषण नियंत्रण बोर्ड, सोनभद्र की तरफ से सहायक वैज्ञानिक अधिकारी, उ0प्र0 प्रदूषण नियंत्रण बोर्ड, सोनभद्र श्री प्रदीप कुमार विश्वकर्मा एवं अन्य अधिकारी उपस्थित थे।

जनप्रतिनिधियों में प्रमुख रूप से श्री कृपाशंकर मिश्रा पूर्व अध्यक्ष डिस्ट्रिक्ट बार एसोसिएशन, मिर्जापुर एवं जिलाध्यक्ष जिला कांग्रेस कमेटी मीरजापुर, श्री हरिशंकर सिंह, किसान संरक्षण संघ एवं पूर्व जिला पंचायत सदस्य, लाल बहादुर सिंह पूर्व जिलाध्यक्ष भा0ज0पा0, मीरजापुर, श्रीमती निर्मला राय, भा0ज0पा0 नेता, मिर्जापुर, श्री अनिल सिंह सर्व सेवा समिति संस्थान मिर्जापुर, श्री शिवशंकर पाण्डेय जिलाध्यक्ष राष्ट्रीय लोकदल, रोहित शुक्ला उर्फ लल्लू, मिर्जापुर, छात्र नेता बिन्नानी कालेज आदि मुख्य रूप से उपस्थित थे (उपस्थिति का विवरण संलग्नक–2, में संलग्न है)।

"लोक सुनवाई" प्रारम्भ करते हुए क्षेत्रीय अधिकारी, उ0प्र0 नियंत्रण बोर्ड, सोनभद्र द्वारा सभी उपस्थित व्यक्तियों का स्वागत करते हुए अवगत कराया गया कि वेलस्पन एनर्जी यूपी प्राइवेट लिमिटेड मीरजापुर द्वारा ग्राम ददरी खुर्द, तहसील सदर, जिला मीरजापुर में प्रस्तावित 2x660 मेगावाट थर्मल पावर परियोजना का प्रस्ताव पर्यावरणीय स्वीकृति हेतु प्रेषित किया गया है। उन्होंने परियोजना के सम्बन्ध में विस्तृत जानकारी परियोजना प्रस्तावकों द्वारा प्रस्तुत करने हेतु अनुरोध किया।

क्रमशः 2/पर.....

श्री विरेन्द्र पाण्डेय क्षेत्रीय महाप्रबन्धक ने परियोजना के सम्बन्ध में विस्तृत जानकारी दी है तथा यह बताया कि प्रदेश में भारी विद्युत की कमी को दृष्टिगत रखते हुए 2x660 मेगावाट की कोयले पर आधारित परियोजना के स्थापित होने से मॉग और आपूर्ति के बीच का अन्तर कम किया जा सकेगा तथा प्रस्तावित परियोजना के आने से स्थानीय लोगों को प्रत्यक्ष एवं अप्रत्यक्ष रोजगार के अवसर उपलब्ध होंगे। साथ ही परियोजना में प्रयोग किये जाने वाले संसाधनों की विस्तृत जानकारी दी जैसा कि–परियोजना हेतु 6.74 एम.टी.पी.ए. कोयले की आपूर्ति घरेलू कोयले के रूप में एन.सी.एल./एस.ई.सी.एल./सी.सी.एल. से की जायेगी तथा घरेलू कोयला न उपलब्ध होने की स्थिति में आयातित कोयले का इस्तेमाल किया जायेगा एवं 36 एम.सी.एम. पानी गंगा नदी से अपर खजूरी बॉध में वर्षा ऋतु में पम्प किया जायेगा, वहॉ से पाइप लाइन द्वारा परियोजना स्थल पर लाया जायेगा, जिसके लिये उत्तर प्रदेश सरकार और केन्द्रीय जल आयोग द्वारा स्वीकृति प्राप्त की जा चुकी हैं। परियोजना के लिए 875 एकड़ भूमि की आवश्यकता है, जिसमें से 180 एकड़ भूमि का उपयोग ऐश पॉन्ड के रूप में होगा।

इसके उपरान्त पर्यावरणीय के सभी आधारभूत घटकों के बारे में तथा इनमें पड़ने वाले प्रभाव तथा पर्यावरण प्रबन्धन की विस्तृत जानकारी दी गयी इनमें क्रमशः 1–परवेशीय वायु गुणवत्ता, 2–ध्वनि गुणवत्ता, 3–जल गुणवत्ता, 4–मृदा गुणवत्ता, 5–वनस्पति एवं जीव जन्तुओं और सामाजिक एवं आर्थिक सर्वेक्षण के आकड़े प्रस्तुत किये। इसके उपरान्त चिमनी से निकले वाले धुएं के उत्सर्जन को नियंत्रित करने हेतु 99.9 प्रतिशत दक्षता वाले इ0एस0पी0 के साथ 275 मीटर ऊँची चिमनी का निर्माण किया जायेगा, तथा परियोजना से निकलने वाले जल को शुद्धिकरण के पश्चात् पुनः प्रयोग में लाया जायेगा। प्लान्ट के चारों तरफ 50 से 100 मीटर चौड़ी तीन स्तरीय हरित पट्टिका (ग्रीन बेल्ट) का विकास किया जाएगा जिसमें स्थानिय प्रजाती के पौधों का इस्तेमाल होगा, यह यू0पी0पी0सी0बी0, सी0पी0सी0बी0 एवं एम0ओ0इ0एफ0 के दिशा–निर्देशों के अनुसार होगा।

अन्त में स्थानीय लोगों के सामुदायिक विकास के बारे में विस्तृत जानकारी दी गयी मुख्यतः योजना निर्माण जैसेः– शिक्षा के स्तर में सुधार के लिए शिक्षण प्रशिक्षण, पुस्तकालय जैसी बुनयादी सुविधाओं की स्थापना, और छात्रवृति, जल आपूर्ति और वर्षा जल संचयन संरचनाएँ, साफ–सफाई, शौचालय निर्माण के लिए समर्थन, युवाओं और महिलाओं के लिए कौशल विकास कार्यक्रम, स्थानीय हस्तकला उद्योग का प्रोत्साहन, मंदिरो और अन्य पूजा स्थलों का सुधार, स्वास्थ्य शिविरों और टीकाकरण शिविरों का आयोजन आदि की व्यवस्था की जायेगी।

तत्पश्चात् क्षेत्रीय अधिकारी, उ0प्र0 प्रदूषण नियंत्रण बोर्ड, सोनभद्र द्वारा उपस्थित जन समूह से प्रस्तावित विद्युत परियोजना के बारे में पर्यावरण संरक्षण से सम्बन्धित अपने सुझाव/टिप्पणी एवं आपत्तियॉ प्रकट करने हेतु अनुरोध किया गया, प्राप्त सुझाव/टिप्पणी निम्नवत् हैः–

1. <u>श्री हाशमी जी, इमामबाड़ा, मिर्जापुर :–</u> द्वारा कहा गया कि हमें खुशी है कि मिर्जापुर जिलें में हमारे यहां परियोजना लग रही है इसके आने से हमारी कई आवश्यकताओं की पूर्ति होगी जैसे सभी को रोजगार मिलेगा एवं इसके साथ हमें छोटे बड़े काम करके अपने जीवन स्तर सुधारने का मौका मिलेगा। हमें बहुत खुशी है कि कम्पनी द्वारा किसानों द्वारा मॉगी गयी कीमत पर जमीन ली गयी। लेकिन हमें लगता है कि कुछ पाने के लिए कुछ खोना पड़ता हैं। अगर प्रदूषण की बात करें तो इस परियोजना से होने

क्रमशः 3/पर.....

वाले प्रदूषण से ज्यादा चुनार में प्रदूषण ईंट–भट्टे से होता है जिसे हम आसानी से सहते हैं। इस परियोजना के आने से दूध के व्यापार, सब्जी के व्यापार एवं अन्य तरह के व्यापार के लिए अब बाजार खोजने की जरूरत नहीं होगी। हम आसानी से अपने घर में ही रहकर अपना जीवन–यापन अच्छे से कर सकते हैं।

2. <u>श्री हरिशंकर सिंह, किसान संरक्षण संघ :–</u> ने कहा कि मैं वेलस्पन का अभिनन्दन करना चाहता हूँ कि यह प्लान्ट पहले गाजीपुर लगना था लेकिन वेलस्पन के द्वारा हमारे क्षेत्र को चूना गया। हमारे यहां बेरोजगारी है जिसका स्थानीय स्तर पर कोई विकल्प नहीं है। यह कम्पनी हमारे लिए एक विकल्प की तरह है, जिससे हमारी बेरोजारी कम होगी। इसलिए हमें इसका सहयोग करना चाहिए। इसके साथ ही हमारे क्षेत्र में टमाटर एवं मूँगफली की खेती बड़े स्तर पर की जाती है। कम्पनी से अनुरोध है कि इनसे सम्बन्धित उद्योग लगाने का कार्य करें।

3. <u>श्री मदन तिवारी, ग्राम भोड़सर :–</u> मैं एक छोटा कास्तकार हूँ मैने अपनी खुशी से कम्पनी को जमीन दिया। साथ ही शासन से अपील करता हूँ कि कम्पनी की मद्द करें ताकि हम बेरोजगारों को आसानी से रोजगार उपलब्ध हो सके।

4. <u>श्री अजय बहादुर सिंह, ग्राम ददरी खुर्द</u> :–द्वारा कहा गया कि मैंने स्वेच्छा से कम्पनी को जमीन दी है और मैं कम्पनी का समर्थन करता हूँ।

5. <u>श्री रोहित शुक्ला उर्फ लल्लू, मिर्जापुर, छात्र नेता बिनानी कालेज :–</u> कम्पनी के आने से युवा बेरोजगारों को काम मिलेगा। परियोजना के लिए गंगा नदी से अपर खजुरी बाँध में पानी आयेगा जिससे सिंचाई के लिए हम सभी लोगों को पानी मिलेगा।

6. <u>श्री शकील अहमद, मिर्जापुर :–</u> द्वारा कहा गया कि मैने अपनी जमीन परियोजना के लिए स्वेच्छा से दी हैं।

7. <u>मोहम्मद चाँद बाबू, मिर्जापुर :–</u> द्वारा कहा गया कि कम्पनी हमारे सहयोग के लिए प्लान्ट लायी है इससे अप्रत्यक्ष रूप से 20000 नहीं लाखों लोगों को रोजगार मिलेगा, और हमें अपने क्षेत्र से बाहर नहीं जाना पड़ेगा।

8. <u>श्रीमती निर्मला राय, बी.जे.पी. जिलाध्यक्ष, मिर्जापुर :–</u> द्वारा कहा गया कि हमें पेपर के माध्यम से पता चला कि जन सुनवाई का आयोजन किया जा रहा हैं। हम यहां आये हैं कि जान सके कि परियोजना से क्या फायदा होगा। हमें खुशी है कि मिर्जापुर के विकास के लिए कोई आया है। हमारा कम्पनी से अनुरोध है कि कम्पनी महिलाओं के स्वालम्बन के लिए योजना बद्ध तरीके से काम करें।

9. <u>श्री राजीव चौबे, ग्राम–भरपूरा, मिर्जापुर :–</u> ने कहॉ कि हमे बहुत खुशी है कि परियोजना के लिए कम्पनी ने ददरी खुर्द को चुना। हमारे यहां कोई स्कूल, हास्पिटल नहीं है। परियोजना के आने से अच्छी स्वास्थ्य सेवायें मिलेगी साथ ही शिक्षा के स्तर में सुधार होगा।

क्रमशः 4/पर....

10. श्री शिवशंकर पाण्डेय, जिलाध्यक्ष लोकदल, मिर्जापुर :– द्वारा कहा गया कि कम्पनी के आने से हमारे पूरे क्षेत्र का विकास होगा साथ ही हमारे यहां से लोग दूसरे जिले के कम्पनियों में काम करने जाते है लेकिन इस कम्पनी के आने से अब हमें बाहर जाने की जरूरत नहीं है क्योकि हमें घर में ही रोजगार प्राप्त होगा। प्लान्ट के लगने से मिर्जापुर का नाम पूरे देश में जाना जायेगा।

11. श्री अनिल सिंह, सर्व सेवा समिति संस्थान, ग्राम–शाहपुर :– द्वारा कहा गया कि कम्पनी मिर्जापुर को नई पहचान देगी। हम आपका सहयोग करते है लेकिन आप भी सहयोगी भूमिका निभाये। कम्पनी किसी एक पिछड़े गॉव को गोद लेकर एक आदर्श गॉव बनाने का कार्य करे।

12. श्री लालबहादुर सिंह, ग्राम लहौराइ(पूर्व जिलाध्यक्ष एवं सदस्य प्रदेश कार्य समिति भा0ज0पा0):–ने कहा कि कम्पनी द्वारा इस निर्जन पठारी भूमि को खरीद लेने से एक तरह से यहां के कास्तकारों को इस जमीन से मुक्ति मिली है। कम्पनी द्वारा प्रदूषण को रोकने के लिए जो हरितपट्टी के विकास की बात की जा रही है उसमें लम्बी उम्र के वृक्ष जैसे–बरगद, नीम, गुलर, पीपल, आम, जामुन, महुआ इत्यादि कम्पनी द्वारा लगाये जायॅ।

13. श्री विरेन्द्र कुमार तिवारी, ग्राम–ददरी खुर्द, मिर्जापुर :– द्वारा कहा गया कि परियोजना में प्रदूषण रोकने के लिए प्रदूषण नियंत्रक यंत्र लगाये जायेंगे, तथा मैं कम्पनी का समर्थन करता हूॅ।

14. श्री उमेश पाण्डेय, ग्राम पड़रीः– द्वारा कहा गया कि मैं कम्पनी का स्वागत करता हूॅ।

15. श्री शिव प्रकाश पाण्डेय, मिर्जापुर :– द्वारा कहा गया कि परियोजना के लिए पानी गंगा नदी से खजुरी बॉध में लाया जायेगा उससे आस–पास के कम से कम 20 हजार बीघा जमीन की सिंचाई होगी। इस तरह से भी अप्रत्यक्ष रूप से लोगों की आर्थिक स्थिति में सुधार होगा।

16. श्री संजय सिंह, ग्राम पहाड़ी :–द्वारा कहा गया कि हम कम्पनी का स्वागत करते हैं और हम आशा करते है कि कम्पनी के द्वारा शिक्षा के स्तर में सुधार किया जायेगा।

17. श्री रविन्द्र शुक्ला :–इन्होंने कहा कि कम्पनी से प्रदेश का विकास होगा, साथ ही हमे इस परियोजना के सकारात्मक पहलूओं पर ज्यादा जोर देने की जरूरत है ताकि हमें ज्यादा से ज्यादा लाभ प्राप्त हो सके।

18. श्री विकास दूबे मिर्जापुर :–द्वारा कहा गया कि यदि बेरोजगार युवाओं को इस कम्पनी के द्वारा रोजगार के अवसर प्राप्त होंगे, तो बेरोजगार युवाओं के लिए इससे अच्छा कुछ नहीं हो सकता। वह अपने क्षेत्र में नौकरी कर सकेंगे, हमारा अनुरोध है कि स्थानीय लोगों को प्राथमिकता दी जाए।

क्रमशः 5 / पर.....

19. श्री गब्बर सिंह :–हमने अपनी जमीन कम्पनी को स्वेच्छा से दी है, और कम्पनी का स्वागत करते हैं।

20. श्री आलोक पाठकः–द्वारा कहा गया कि कम्पनी की स्थापना पर्यावरण को ध्यान में रख कर किया जाय एवं स्थानीय स्तर पर रोजगार उपलब्ध करवाकर पलायन को रोका जाय।

21. श्री शिवशंकर सिंह, विन्ध्याचल :– इन्होंने कहा कि अगर प्लान्ट क्षेत्र में रहने वाले मूल निवासियों में कोई कोल एवं भील जाति के लोग हों तो उनके विकास एवं रोजगार के अवसर उपलब्ध कराये जाए एवं पलायन के प्रतिशत को कम करने का प्रयास किया जाय। इसके साथ ही साथ वन्य जीव जन्तुओं के संरक्षण के लिए भी उपाय किये जायं।

22. श्री अमरीश मिश्रा, (पत्रकार–द टाइम्स आफ इण्डिया):–इन्होंने कहा कि कम्पनी के द्वारा जो तकनीकी जानकारी दी गई है हम आशा करते हैं कि परियोजना उसी के अनुरूप कार्य करेगी। हरित पट्टिका में परंपरागत एवं लाभकारी पेड़ पौधे लगाये जाएंगें। साथ ही परियोजना के 1/5 हिस्से में राख कुण्ड बनाया जाएगा जिससे प्रदूषण होने की संभावना कम हो जाएगी।

23. श्री रामगोपाल सिंह विंध्यांचल – हमें समाचार पत्र से इस जन–सुनवाई के बारे में पता चला साथ ही हम कम्पनी से आशा करते है कि जमीन देने वाले गरीब एवं बेरोजगार परिवारों को प्राथमिकता देकर कार्य किया जाय।

24. श्री सुशील कुमार मिश्रा मिर्जापुर – हम आशा करते हैं कि परियोजना के आने से आसपास के गांव ही नही वरन पूरे जनपद का विकास होगा ।

25. श्री जय सिंह पाल मिर्जापुर – इन्होने कहा कि कम्पनी ने मिर्जापुर में बिजली उत्पादन की परियोजना लगाकर बहुत बड़ा योगदान दिया है एवं इससे हमें रोजगार मिलेगा साथ ही घरेलू उद्योगों को प्रोत्साहन मिलेगा लेकिन हम कम्पनी को बताना चाहेंगें कि जन सुनवाई के लिये यहां पर इतनी पुलिस और सुरक्षा की जरूरत नही थी सभी आपका सहयोग करेंगें। हमें खेद इस बात का है कि आसपास की जनता इतने कम संख्या में उपस्थित है।

26. श्री कृपाशंकर मिश्रा (पूर्व अध्यक्ष डिस्ट्रिक्ट बार एसोसिएशन मिर्जापुर)– इन्होने कहा कि लोगों ने जमीन अपने मन से दिया है क्यों कि अभी तक रजिस्ट्री में किसी भी तरह कि कोई भी रुकावट नही हुई है एवं सारा काम लोगों की सहमती से किया जा रहा है, पर्यावरण के सम्बन्ध में जो भी सुझाव आये हैं हम आशा करते है कि कम्पनी के द्वारा उन सुझावों को मानते हुए कार्य किया जाएगा । हमारा कम्पनी से अनुरोध है कि जब सरकार के द्वारा बिजली क्रय करने का एग्रीमेंट किया जाय तो उसमें मिर्जापुर को प्राथमिकता दिया जाय।

क्रमशः 6/पर... ...

अन्त में वेल्स्पन एनर्जी यूपी. प्राइवेट लिमिटेड की तरफ से श्री वीरेन्द्र पाण्डेय, क्षेत्रीय महाप्रबन्धक ने 'लोक–सुनवाई' में आये सभी विषयों पर विस्तार से प्रकाश डालते हुए कहा कि रोजगार से संबंधित जो प्रश्न आयें है उसमें मै बताना चाहूंगा कि कम्पनी के द्वारा सबसे पहले जिनकी जमीन ली गई है उनको रोजगार दिया जाएगा फिर मिर्जापुर जिले को योग्यता के आधार पर वरीयता दी जाएगी अगर कम्पनी के मांग के आधार पर स्थानीय स्तर पर योग्य लोगों की उपलब्धता नहीं होगी तब बाहर से योग्य व्यक्तियों को बुलाया जाएगा।

तत्पश्चात वीरेन्द्र पाण्डेय जी ने कहा कि महिलाओं से संबंधित जो प्रश्न आये हैं उस संबंध में मै बताना चाहूंगा कि हमारे कम्पनी में कार्यरत महिला कर्मचारियों द्वारा महिलाओं के कौशल विकास हेतु विभिन्न कार्यक्रम चलाए जाते हैं एवं घर–घर जाकर उन्हे जागरूक किया जाता है। हम आपको विश्वास दिलाते हैं कि इसी तरह के कार्यक्रम यहां भी नियमित रूप से किये जाएंगें।

पर्यावरण से संबंधित जो प्रश्न किया गया है उसमें मै बताना चाहूंगा कि यह परियोजना सुपर क्रिटिकल तकनीक पर आधारित है जिसमें पानी एवं कोयला की खपत अपेक्षाकृत कम है साथ ही प्रदूषण नियंत्रण के लिये ई.एस.पी. एवं ड्स्ट सप्रेशन सिस्टम लगाये जाएंगें। हरित पट्टी से संबंधित दिये गये सुझावों को मानते हुए मै विश्वास दिलाता हूं कि आपके कहे अनुसार कम्पनी वन विभाग के सहयोग एवं समन्वय के द्वारा हरित पट्टिका में बड़े वृक्षों का रोपण किया जाएगा।

अंत में श्री वीरेन्द्र पाण्डेय जी ने बताया कि हम इन कार्यो के अतिरिक्त शिक्षा एवं स्वास्थ्य पर भी विशेष रूप से कार्यक्रम आयोजित करेंगें ।

लोक सुनवाई की अध्यक्षीय सम्बोधन में श्रीश चंद्र श्रीवास्तव अपर जिलाधिकारी (वि0/रा0), मिर्जापुर ने कहा कि स्थानीय एवं मिर्जापुर की जनता बहुत खुश है। मै यहां की जनता एवं वेल्स्पन कम्पनी को बधाई देता हूँ। इस कम्पनी के आने से जनपद को ही लाभ होगा। साथ ही जन–सुनवाई की सूचना न होने के जवाब में कहा कि स्थानीय एवं राष्ट्रीय दैनिक समाचार पत्रों में एक माह पूर्व ही जन–सुनवाई की सूचना विज्ञापन के माध्यम से दी जा चुकी है। क्षेत्रीय अधिकारी, उत्तर प्रदेश प्रदूषण नियंत्रण बोर्ड, सोनभद्र ने कहा कि इस जन–सुनवाई में जो भी सुझाव एवं आपत्तियां आपके द्वारा प्रस्तुत की गई हैं उन्हे ई.आई.ए. अधिसूचना 2006 के अनुसार यथावत् पर्यावरण एवं वन मंत्रालय, नई दिल्ली को प्रेषित कर दिया जाएगा।

उपरोक्त विचारों, सुझावों, टिप्पणीयों एवं आपत्तियों के अतिरिक्त और कोई मुद्दा "लोक सुनवाई" के दौरान नहीं उठाया गया। उपस्थित जनसमूह ने सर्वसम्मति से इस परियोजना के स्थापना हेतु अपनी सहमति जताई एवं इसके जल्द से जल्द क्रियान्वयन का आग्रह किया। अन्त में क्षेत्रीय अधिकारी, उ0प्र0 प्रदूषण नियंत्रण बोर्ड द्वारा पर्यावरणीय 'लोक–सुनवाई' में उपस्थित गणमान्य नागरिकों/अधिकारियों आदि द्वारा दिए गए सुझाव के प्रति आभार प्रकट किया गया।

क्रमशः 7/पर.....

उपरोक्त मन्तव्य के साथ पर्यावरणीय दृष्टिकोण से मेसर्स वेल्स्पन एनर्जी यूपी. प्राइवेट लिमिटेड, मिर्जापुर के प्रस्तावित परियोजना 2x660(1320 M.W.) मेगावाट के स्थापना हेतु 'सशर्त' अनापत्ति प्रमाण–पत्र निर्गमन हेतु आख्या प्रेषित है।

कालिका सिंह
क्षेत्रीय अधिकारी,
उ0प्र0 प्रदूषण नियंत्रण बोर्ड,
सोनभद्र

श्रीश चन्द्र श्रीवास्तव
अपर जिलाधिकारी (वि0/रा0),
मिर्जापुर

वेल्स्पन एनर्जी यूपी. प्राइवेट लिमिटेड, मिर्जापुर द्वारा प्रस्तावित 2x660 मेगावाट तापीय विद्युत परियोजना की ई0आई0ए0 नोटिफिकेशन संख्या–1533 दिनांक 14–09–2006 के अन्तर्गत प्राविधानित 'लोक–सुनवाई' के कार्यवाही का विवरण आपके अवलोकनार्थ सादर प्रेषित।

कालिका सिंह
क्षेत्रीय अधिकारी,
उ0प्र0 प्रदूषण नियंत्रण बोर्ड,
सोनभद्र

जिलाधिकारी, मिर्जापुर

अतिरिक्त जिला / अपर जिलाधिकारी
जिला मिर्जापुर

4. Attendance Sheet of the Public Hearing

मेसर्स वेल्सपन एनर्जी यूपी प्राइवेट लिमिटेड, ग्राम–ददरी खुर्द, तहसील–मिर्जापुर सदर, जनपद–मिर्जापुर(उ0प्र0) द्वारा सुपर क्रिटिकल टेक्नोलोजी आधारित प्रस्तावित **2x660 (1320 M.W.)** मेगावाट कोयला आधारित थर्मल पावर प्लान्ट की स्थापना से पूर्व जनपद–मिर्जापुर के ग्राम–ददरी खुर्द, तहसील मिर्जापुर सदर में दिनांक 07–04–2012 को पूर्वाह्न 11:00 बजे "लोक सुनवाई" के दौरान उपस्थित अधिकारियों, पत्रकार बन्धु एवं गणमान्य नागरिक।

क्रमांक	नाम	पदनाम एवं विभाग	हस्ताक्षर
1.	श्री शचन्द्र श्रीवास्तव	A-DM MZP	
2.	कालिका सिंह	R.O. U.P. PCB. Sonbhadra.	
3.	डी0एस0 पाण्डेय	SDM SADAR MZP	
4.	[illegible]	SP City	
5.	[illegible]	[illegible]	
6.	[illegible]	Project Head	
7.	[illegible]	[illegible]	
8.	[illegible]	[illegible]	
9.	Chandra Shekhar	Junior Engineer UPPCB	
10.	Rajesh Rajh	Scientific Assistant	
11.	Rajiv Kumar	monitoring Asst UPPCB	
12.	Suneel Kumar Yadav	T/e	
13.	B. Chaubey	DEO UPPCB, Sonbhadra	
14.	Vijay Kumar	UPPCB.	
15.	Pawan Kumar Verma.	JM. Environet. Pvt. Ltd. Gurgaon	
16.	J. KUMAR	[illegible]	
17.	Virendra Pandey	Reg Gen. Manager Welspun.	
18.	Sanjan Sinha	Dy GM - EHS	
19.	H. S. Soni	Sr. Manager	
20.	Shobhit Aggarwal	Engg Environment	
21.	Anurag Chaturvedi	Govt. Affairs	

क्रमशः 2/पेज....

क्रमांक	नाम	पदनाम एवं विभाग	हस्ताक्षर
22.	निर्मला राय	जि० उपाध्यक्षा भारतीय जनता पार्टी	निर्मला राय
23.	सरोज मिश्रा	[illegible]	सरोज मिश्रा
24.	रेखा मिश्रा	[illegible]	रेखा मिश्रा
25.	कीर्ति केशरी	गृहिणी	Kirti Kesharwani
26.	बिन्दु देवी	गृहिणी	बिन्दु
27.	किरन गुप्ता	अन्तरराष्ट्रीय [illegible]	Kiran
28.	सुनीता सोनी	ब्यूटी पार्लर	सुनीता
29.	सुनीता सोनी	ब्यूटी पार्लर	सुनीता सोनी
30.	शोभा केसरवानी	ब्यूटी	Shobha
31.	राजेश तिवारी	[illegible]	राजेश तिवारी
32.	[illegible]	[illegible]	[illegible]
33.	[illegible]	[illegible]	
34.	[illegible] सिंह	[illegible] पहाड़	S. K. S.
35.	उपेन्द्र सिंह	[illegible]	[illegible]
36.	अनिल कुमार [illegible]	पूर्व-प्रमुख [illegible]	अनिल कुमार
37.	आनन्द कुमार सिंह	[illegible]	आनन्द सिंह
38.	अजय बहादुर सिंह	रेनुकूट सोनभद्र	A. B. Singh
39.	अमित मिश्रा	[illegible]	Amit
40.	ओम प्रकाश सिंह	व्यापार	[illegible]
41.	[illegible]	[illegible]	[illegible]
42.	AKash Yadav	[illegible]	AKash Yadav
43.	अशोक कुमार पाण्डेय	[illegible]	[illegible]
44.	विजय शंकर पाठक	ग्राम [illegible] मिर्जापुर	विजय शंकर पाठक
45.	काशीनाथ पाण्डेय	[illegible]	काशीनाथ पाण्डेय
46.	उपेन्द्र कुमार दूबे	[illegible]	उपेन्द्र

क्रमशः 3/पर....

5. Minutes of the Public Hearing in English, Issues Raised, Replies from the clients and Action plan for CSR Activities

S. No.	Name	Issues Raised	Response/action plan by PP.
	Issues Related to Employment		
1.	Mr. Hashmi, Imammbada	He stated that we are happy to know that the upcoming project is located in Mirzapur district. This project will meet many of our demands like, Employment opportunities, which will improve our standard of living. We are happy that company has provided the compensation, as per demands of farmers. But we feel that one has to lose something to gain something. As per the pollution concerned for the project activity, much more pollution is caused by the Brick manufacturing industries in Chunar, which we are bearing easily. With the upcoming project there will be no need to search market for milk, vegetables etc. We can easily earn our living, staying in our area only.	Company will give preference to those who have given their land to the company while providing jobs. Only after that job will be provided to the locals as per their Qualification and eligibility. People from outside will be employed only when eligible locals are not available.
2.	Mr. Madan Tiwari, Village, Bhodsar	I am a small farmer and I have given my land to the company with my full consent. I request the authorities to support the project, so that unemployed can get employment.	Company will give preference to those who have given their land to the company while providing jobs. Only after that job will be provided to the locals as per their Qualification and eligibility. People from outside will be employed only when eligible locals are not available.
3	Vikash Dubey	He said that, nothing can be better for unemployed youth if they will be employed by this company. They will be able to work at their native place; we request to prefer	Local are given preference for employment and People from outside will be employed only when eligible loca

		locals for the jobs.	Welspun will provide training to youth so that they become capable to take up the jobs.
4	Shiv Shankar Singh, vindhyanchal	He said that, if kol and bheel caste people are present in the local community then opportunities for their development and employment should be made available to stop percentage of migration. Required measures should be adopted for wild life conservation.	. Welspun will set up a separate CSR team for development activities in the area. Activities such as Health care facilities, setting up and refurnishing of schools and general improvement of infrastructure will be done. Other than this there will generation of lots of indirect employment for which Welspun will provide training to youth so that they become capable to take up the jobs. Other activities will also be taken up as per the needs of the area from time to time. These measures will help to stop migration. Welspun has already deputed a consultants for conducting wildlife conservation study and the recommendations of the study will be implemented.
5	Ram Gopal Singh, Vindhyanchal	He stated that we came to know by the News paper for Public hearing. We hope that project will commence with preference in jobs for poor and unemployed land losers.	Employment preference to local is proposed.. People from outside the district will be employed only when eligible locals are not available.
	Issues Related to Women Empowerment		
6	Mrs. Nirmala Rai, BJP District President, Mirzapur.	She stated that we came to know about the project from the daily newspapers and we have participated here to know how the project will be beneficial for the area. We are happy to know that	The company believes in women empowerment and it is one of the thrust program in company CSR. Various programs on skill deve

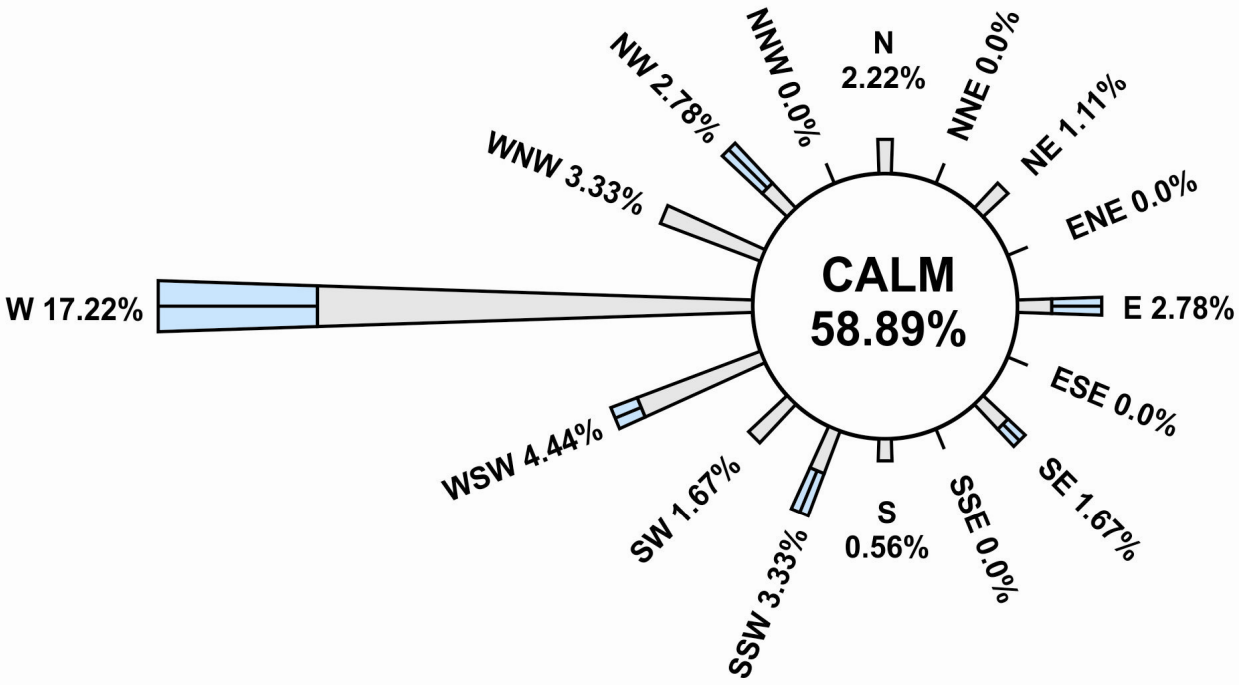
		someone has taken the initiative for the upliftment of the Mirzapur. We request the company to plan for the women empowerment.	are proposed once the project is grounded.
	Issues Related to Pollution Control Equipments		
7	Veerendra Kumar Tiwari, Villa Dadri khurd, Mirzapur	He said that, to minimize the pollution, pollution control Instruments should be installed and I support the company.	The project is based on Super Critical Technology to conserve coal and water.the pollution control facility installed will be the best technology equipments eg ESP, bag filters and dust suppression system etc.. Other pollution control measures like Green belt development proper consultation with forest department will be done to select the appropriate local species.
8	Alok Pathak	He said that, establishment of the project should be done considering the environmental aspects and local should be preferred for the Jobs to stop migration.	To take care of Environmental aspect a EIA studies has conducted and the recommendations of the study will be implemented to mitigate adverse impact . Employment preference to local is proposed. People from outside the district will be employed only when eligible locals are not available.
9	Shri Amrish Mishra, (Reporter-The Times of India)	He said that, we hope that all technical measures as explained by the company will be adopted in the project activity. Conventional and beneficial plant should be planted for green belt development. It is good that 1/5 part of the land will be used for Ash disposal so chances of pollution will be less.	The project is based on Super Critical Technology to conserve coal and water is. In addition to this for pollution control ESP and dust suppression system will be installed. As far as Green belt development is concerned company will take inputs from local forest department and

			suggestions given by the locals as well as by forest department.
	Issues Related to Education & Medical Facilities		
10	Sanjay Singh, Vill. Pahadi.	He said that, we welcome the company and we hope that education level will improve by the company.	The company will undertake various programmes related with health and education. Moreover The health & education facilities will be provided free of cost to the project affected families. People from neighboring villages may also avail the service at a nominal cost.
11	Mr. Rajeev Chaube	He stated that we are happy to know that company has selected village Dadri Khurd for setting up their proposed Project. Our area lacks the facility of schools and hospitals. We hope that with the setting up of upcoming project we will be getting good medical Facilities and the level of Education in our area will also improve.	The company will undertake various programmes related with health and education. Moreover The health & education facilities will be provided free of cost to the project affected families. People from neighboring villages may also avail the service at a nominal cost.

WINDROSE DIAGRAM AT SITE

MONTHS : Dec. TO Fab. - 2011

N



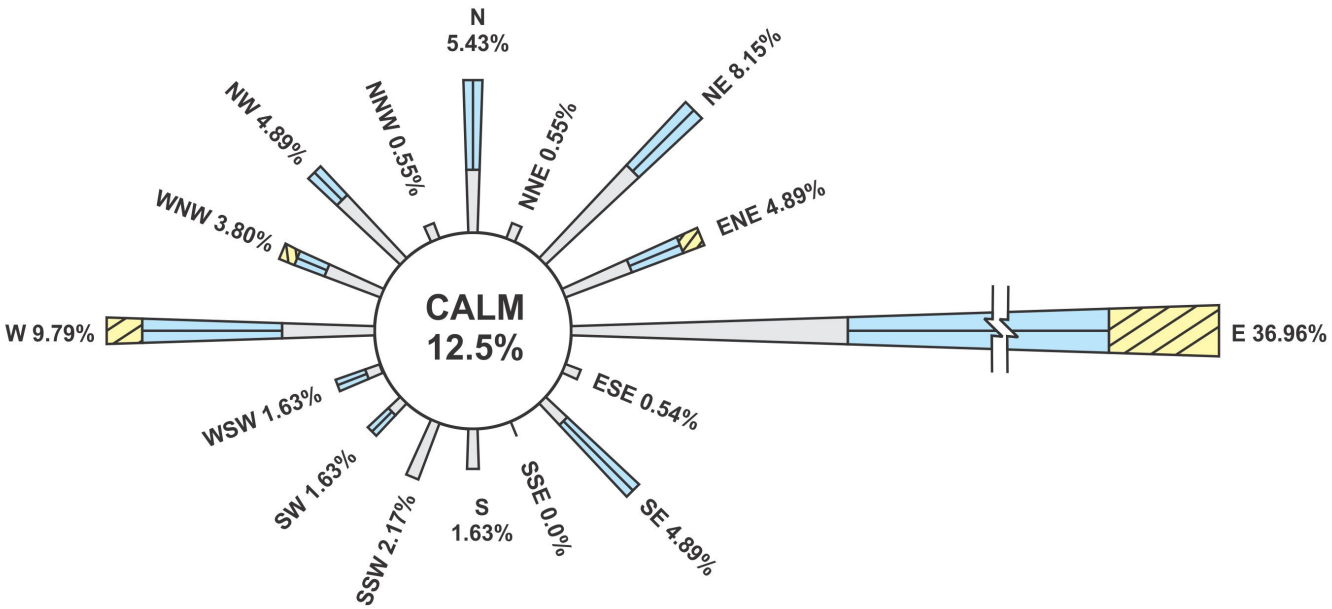
Scale 1cm. = 2.08%

Wind Speed Kmph	<1.8 Calm	1.8 - 5	5 - 10	10 - 15	>15

WINDROSE DIAGRAM AT SITE

MONTH : JUNE TO AUGUST - 2010

N



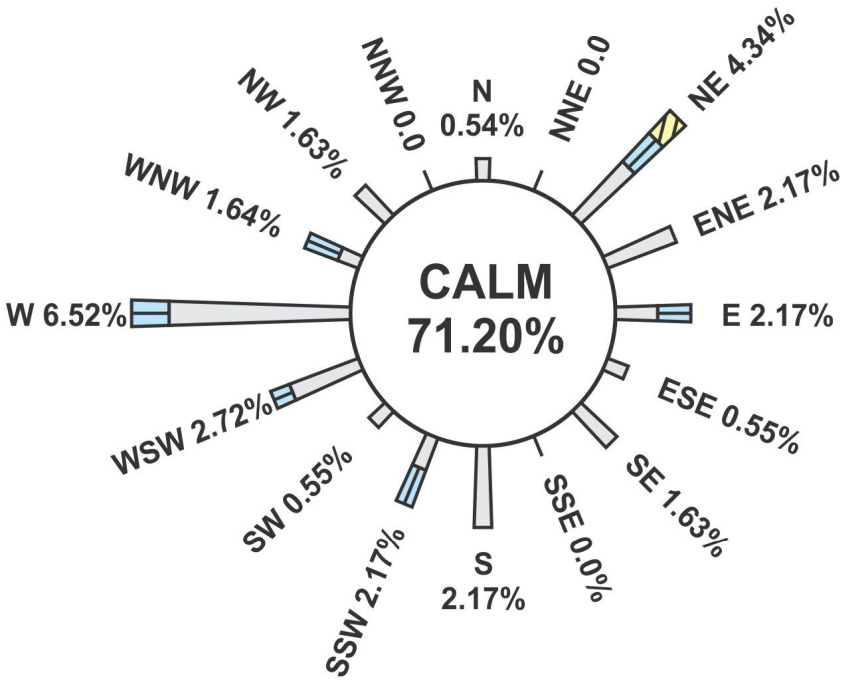
Scale 1cm. = 2.08%

Wind Speed Kmph	<1.8 Calm	1.8 - 5	5 - 10	10 - 15	>15

WINDROSE DIAGRAM AT SITE

MONTHS : Oct. to Dec. - 2010

N



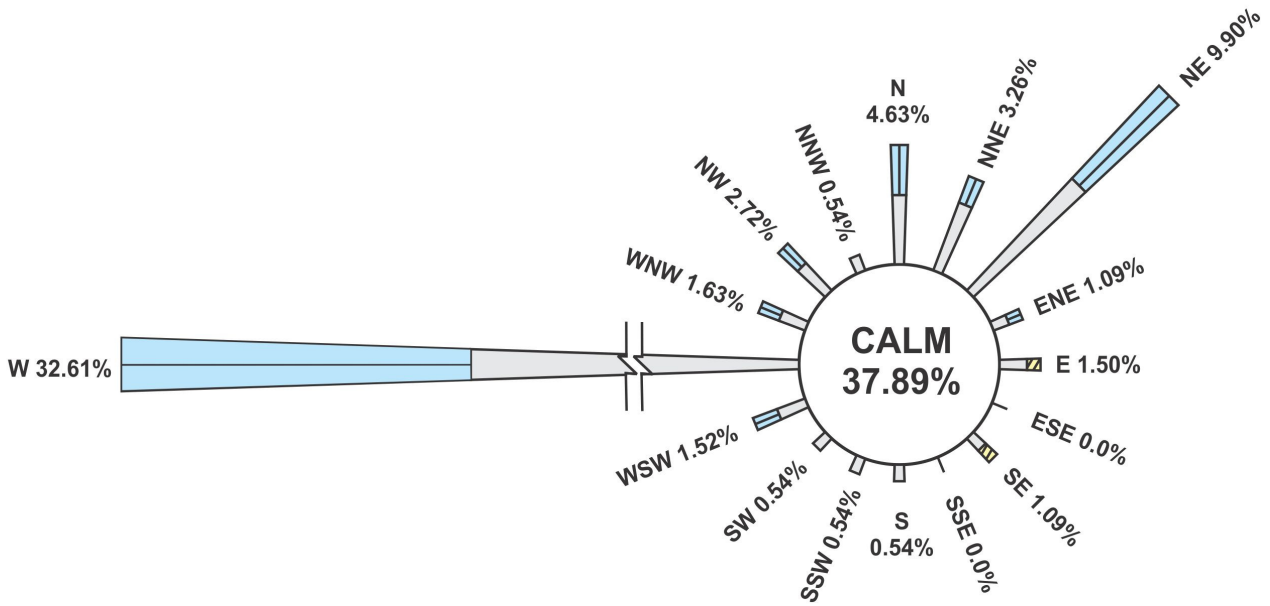
Scale 1cm. = 2.08%

Wind Speed Kmph	<1.8 Calm	1.8 - 5	5 - 10	10 - 15	>15

WINDROSE DIAGRAM AT SITE

MONTHS : MARCH TO MAY - 2011

N



Scale 1cm. = 2.08%

Wind Speed Kmph	<1.8 Calm	1.8 - 5	5 - 10	10 - 15	>15

PRISM CEMENT LIMITED
Central Marketing Office :
S-20/56-D. Kennedy Road. The Mall,
Varanasi - 221002 (Uttar Pradesh)
Ph : (0542) 2508011-15, Fax : 2505400

Ref:PRISM/23/441

Date: 23 November 2011

To,
Mr. Swapan Panda
Vice president
Welspun Energy Up Private Limited
C-11, Sector-65,
Noida

Subject: lifting of Fly Ash from our proposed 2x660 MW TPP in Mirzapur project

Dear Sir,

This has reference to the discussion we had and your proposal to supply Fly Ash from your 1320 MW Mirzapur Power project being established by Welspun Energy UP Private Limited at Dadri Khurd village, Mirzapur Sadar tehsil, Mirzapur district, Uttar Pradesh.

We confirm and agree to lift 2.0 MMTPA of flyash from your upcoming facility to be utilized in our proposed grinding unit to be set up proximity to your power project on mutually agreeable terms & Conditions.

Thanks and Regards,

Prism Cement Limited

Prism Cement Limited • Varanasi C.M.O. •

Authorised Signatory

CHUNAR CEMENT FACTORY
(A UNIT OF UP CEMENT PLANT)

JAIPRAKASH ASSOCIATES LIMITED

JAL/CCF/2012
April 4, 2012

To,
Project Head
M/s. Welspun Energy U P Pvt Ltd
Mirzapur Unit

K/A.: Shri Kuku Tacker ji

Dear Sir,

Further to our message dt. 27.3.12 regarding utilisation of Flyash generated from your 2 x 660 MW Coal Based Thermal Power Plant being set up at Village Dadrikurd, Mirzapur, followed by our discussions on the subject, it is to confirm that we shall be able to utilize approx. 1 Million Ton Per Annum Flyash generated at the plant for manufacturing of cement at our Chunar Cement Factory provided it is made available to us free of cost and no administrative charges are levied.

Expenses towards the transportation of Flyash from your Plant to our Factory shall be to our account.

We wish you the very best for Project execution.

Thanking you,

Yours faithfully
For JAIPRAKASH ASSOCIATES LTD.

(AJAY SHARMA)
EXECUTIVE PRESIDENT

Annexure VII

Hourly Micro meteorology Table

YEAR	MONTH	DATE	HOUR	TEMP.	RELATIVE HUMIDITY	SPEED	DIRECTION
11	3	15	1	11.8	47	1.1	23
11	3	15	2	11.9	51	2.2	180
11	3	15	3	11.7	53	2.8	45
11	3	15	4	11.5	68	1.7	180
11	3	15	5	12	65	0.0	0.0
11	3	15	6	12.1	62	2.8	270
11	3	15	7	12.2	61	1.9	225
11	3	15	8	12.1	59	1.4	45
11	3	15	9	12.2	53	0.0	0.0
11	3	15	10	12.2	49	3.1	45
11	3	15	11	12.4	46	0.0	0.0
11	3	15	12	15.4	41	1.9	270
11	3	15	13	16	38	0.0	0.0
11	3	15	14	18	31	2.2	360
11	3	15	15	20	35	0.0	0.0
11	3	15	16	20.3	39	2.8	225
11	3	15	17	20.5	41	0.0	0.0
11	3	15	18	20.8	49	2.2	45
11	3	15	19	21	55	3.1	23
11	3	15	20	20.0	59	2.8	270
11	3	15	21	20	62	0.0	0.0
11	3	15	22	20.0	65	1.7	45
11	3	15	23	18	69	0.0	0.0
11	3	15	24	16.0	72	1.9	270
11	3	16	1	16.2	73	2.8	225
11	3	16	2	15	74	1.9	45
11	3	16	3	15.0	76	0.0	0.0
11	3	16	4	15.1	78	2.8	45

11	3	16	5	15.3	75	0.0	0.0
11	3	16	6	15.6	71	2.8	270
11	3	16	7	15.9	65	2.8	360
11	3	16	8	16	60	2.2	23
11	3	16	9	16.2	55	0.0	0.0
11	3	16	10	16	51	1.9	45
11	3	16	11	16.3	49	0.0	0.0
11	3	16	12	16.6	43	1.9	270
11	3	16	13	16.7	39	0.0	0.0
11	3	16	14	16.9	25	2.8	225
11	3	16	15	17.0	32	1.9	23
11	3	16	16	17.4	35	2.8	360
11	3	16	17	17.8	39	3.3	45
11	3	16	18	17.8	41	1.9	270
11	3	16	19	20	43	0.0	0.0
11	3	16	20	20	45	2.8	360
11	3	16	21	19.9	49	0.0	0.0
11	3	16	22	19.3	51	2.2	270
11	3	16	23	19	52	0.0	0.0
11	3	16	24	19.0	56	1.9	225
11	3	17	1	18.9	59	0.0	0.0
11	3	17	2	18.9	65	1.7	180
11	3	17	3	15.3	69	2.8	23
11	3	17	4	13.9	75	2.8	270
11	3	17	5	13.9	72	0.0	0.0
11	3	17	6	14	69	1.9	270
11	3	17	7	14.4	68	0.0	0.0
11	3	17	8	14.8	50	6.0	315
11	3	17	9	15	50	6.0	315
11	3	17	10	15.5	58	0.0	0.0
11	3	17	11	16	55	1.9	360
11	3	17	12	16.8	48	2.2	270
11	3	17	13	20	41	0.0	0.0
11	3	17	14	32.5	35	2.8	225

11	3	17	15	32.2	39	3.1	135
11	3	17	16	32.3	45	2.8	23
11	3	17	17	30.3	24	12.0	270.0
11	3	17	18	30	24	12.0	270
11	3	17	19	28	51	3.1	180
11	3	17	20	28.1	55	2.2	45
11	3	17	21	28.1	59	1.4	270
11	3	17	22	25.0	62	1.9	23
11	3	17	23	24.8	65	2.8	360
11	3	17	24	24.3	69	2.2	45
11	3	18	1	24	72	0.0	0.0
11	3	18	2	24.3	75	1.7	270
11	3	18	3	24.3	76	2.2	225
11	3	18	4	11.6	79	1.1	45
11	3	18	5	24.5	71	2.8	225
11	3	18	6	24.5	65	2.8	270
11	3	18	7	24.6	62	2.2	135
11	3	18	8	28.5	34	0.0	0
11	3	18	9	28.3	34	0.0	0.0
11	3	18	10	28.4	55	2.8	45
11	3	18	11	31.2	51	2.2	180
11	3	18	12	31.6	45	3.1	225
11	3	18	13	31.8	41	1.9	135
11	3	18	14	34.1	32	0.0	0.0
11	3	18	15	32.0	35	2.8	360
11	3	18	16	32	42	1.9	45
11	3	18	17	32	26	4.0	225
11	3	18	18	31.9	26	4.0	225
11	3	18	19	31.8	59	1.9	135
11	3	18	20	31.8	62	0.0	0.0
11	3	18	21	30	69	2.8	45
11	3	18	22	28	70	2.2	270
11	3	18	23	28	71	1.4	360
11	3	18	24	29.4	73	1.9	135

11	3	19	1	27.5	75	2.8	45
11	3	19	2	24.2	76	2.8	360
11	3	19	3	22.5	78	1.9	225
11	3	19	4	18	79	0.0	0.0
11	3	19	5	18	75	1.7	315
11	3	19	6	18.7	65	1.9	360
11	3	19	7	25.6	58	0.0	0.0
11	3	19	8	26.9	42	1.4	135
11	3	19	9	28.5	38	2.8	360
11	3	19	10	28.6	35	1.7	225
11	3	19	11	30.5	32	0.0	0.0
11	3	19	12	31.6	29	1.4	45
11	3	19	13	31.9	25	3.1	23
11	3	19	14	32.3	18	1.4	180
11	3	19	15	31.5	19	2.2	225
11	3	19	16	31.6	20	0.0	0.0
11	3	19	17	30.0	21	2.2	135
11	3	19	18	29.3	25	1.1	270
11	3	19	19	29.0	28	2.8	360
11	3	19	20	28.9	31	2.2	45
11	3	19	21	27.5	35	0.0	0.0
11	3	19	22	26.3	38	3.1	45
11	3	19	23	25.2	42	2.8	360
11	3	19	24	23.2	45	1.9	270
11	3	20	1	23.4	47	2.2	225
11	3	20	2	23.1	51	2.8	360
11	3	20	3	22	53	1.9	225
11	3	20	4	20.0	55	2.8	45
11	3	20	5	30.9	52	0.0	0.0
11	3	20	6	31.6	51	2.2	360
11	3	20	7	12.5	48	2.8	225
11	3	20	8	24.2	42	1.4	45
11	3	20	9	25.3	38	0.0	0.0
11	3	20	10	26.8	35	1.1	135

11	3	20	11	28.5	32	1.4	270
11	3	20	12	29.2	29	0.0	0.0
11	3	20	13	30.5	25	1.4	225
11	3	20	14	32.6	21	2.2	45
11	3	20	15	32.4	23	0.0	0.0
11	3	20	16	32.4	24	0.0	0.0
11	3	20	17	29.2	27	2.2	360
11	3	20	18	28.5	29	1.1	225
11	3	20	19	28.2	31	0.0	0.0
11	3	20	20	29.9	34	1.9	45
11	3	20	21	27.5	36	2.8	23
11	3	20	22	27.4	38	3.1	270
11	3	20	23	26.5	42	2.2	225
11	3	20	24	26.3	45	1.7	360
11	3	21	1	24.5	48	0.0	0.0
11	3	21	2	20.7	49	0.0	0.0
11	3	21	3	23.2	51	2.2	45
11	3	21	4	20	52	0.0	0.0
11	3	21	5	20	49	2.8	270
11	3	21	6	21.5	45	1.9	225
11	3	21	7	27.5	43	0.0	0.0
11	3	21	8	28.6	41	2.8	135
11	3	21	9	29.5	38	2.2	45
11	3	21	10	20.8	35	1.4	225
11	3	21	11	22.2	33	0.0	0.0
11	3	21	12	23.4	25	1.7	270
11	3	21	13	24.2	22	0.0	0.0
11	3	21	14	24.7	17	1.9	23
11	3	21	15	24.1	18	2.8	45
11	3	21	16	23.2	20	1.9	270
11	3	21	17	22.4	21	1.7	225
11	3	21	18	21.2	22	0.0	0.0
11	3	21	19	20.8	25	1.9	45
11	3	21	20	29.5	28	0.0	0.0

11	3	21	21	28.5	32	1.9	45
11	3	21	22	27.3	35	0.0	0.0
11	3	21	23	26.4	38	2.2	23
11	3	21	24	26.1	41	2.9	270
11	3	22	1	25.8	50	0.0	0.0
11	3	22	2	24.9	59	2.8	45
11	3	22	3	18.5	68	0.0	0.0
11	3	22	4	17	75	2.2	23
11	3	22	5	17.9	71	1.7	225
11	3	22	6	20	68	1.9	270
11	3	22	7	22.5	65	1.9	360
11	3	22	8	28.5	61	2.2	225
11	3	22	9	29.3	59	1.9	45
11	3	22	10	29.4	55	0.0	0.0
11	3	22	11	29.8	50	1.7	23
11	3	22	12	30	49	0.0	0.0
11	3	22	13	32	44	1.4	45
11	3	22	14	32	35	1.9	225
11	3	22	15	31.8	38	2.2	270
11	3	22	16	31.9	41	0.0	0.0
11	3	22	17	31.7	42	1.9	225
11	3	22	18	30.8	45	2.2	135
11	3	22	19	29	49	2.8	45
11	3	22	20	29	52	0.0	0.0
11	3	22	21	27.3	54	2.8	360
11	3	22	22	27.4	59	2.2	270
11	3	22	23	27.1	62	1.4	225
11	3	22	24	27.0	64	1.7	45
11	3	23	1	26.3	66	0.0	0.0
11	3	23	2	26.1	68	1.4	225
11	3	23	3	25.8	70	1.9	45
11	3	23	4	20	71	1.4	45
11	3	23	5	20.3	65	1.9	135
11	3	23	6	26.5	62	1.1	270

11	3	23	7	27.5	60	2.2	225
11	3	23	8	27.5	58	0.0	0.0
11	3	23	9	28	55	2.2	225
11	3	23	10	28.5	52	1.9	270
11	3	23	11	28.6	48	1.7	338
11	3	23	12	28.7	41	2.2	23
11	3	23	13	29	38	2.2	135
11	3	23	14	33	31	0.0	0.0
11	3	23	15	33	35	1.9	270
11	3	23	16	32.8	39	2.2	225
11	3	23	17	32.1	42	1.7	45
11	3	23	18	30	45	1.7	360
11	3	23	19	28.4	48	0.0	0.0
11	3	23	20	28.3	50	1.9	45
11	3	23	21	28.2	52	0.0	0.0
11	3	23	22	27.0	54	2.2	45
11	3	23	23	27	56	1.9	225
11	3	23	24	28.9	59	1.1	270
11	3	24	1	28.1	42	0.0	0.0
11	3	24	2	27.5	44	2.8	45
11	3	24	3	22.0	46	1.4	135
11	3	24	4	20	52	1.1	270
11	3	24	5	22	50	2.8	23
11	3	24	6	22.8	49	1.9	225
11	3	24	7	27.6	46	1.9	225
11	3	24	8	28.5	57	2.2	45
11	3	24	9	29.3	51	1.4	360
11	3	24	10	30.4	49	2.2	270
11	3	24	11	30.2	45	2.8	338
11	3	24	12	30.5	41	2.8	225
11	3	24	13	31.5	32	1.7	23
11	3	24	14	34	41	0.0	0.0
11	3	24	15	34.0	42	2.5	225
11	3	24	16	33.8	44	1.9	270

11	3	24	17	33	45	1.1	68
11	3	24	18	32	49	2.2	23
11	3	24	19	30.8	52	1.7	225
11	3	24	20	30.5	54	1.4	338
11	3	24	21	29	59	2.8	225
11	3	24	22	29	62	1.4	270
11	3	24	23	29	64	2.2	45
11	3	24	24	28.6	69	1.4	225
11	3	25	1	28.1	71	1.1	23
11	3	25	2	27.1	71	0.0	0.0
11	3	25	3	20.0	72	1.1	270
11	3	25	4	18.1	73	1.4	225
11	3	25	5	18.5	68	1.1	338
11	3	25	6	19	62	1.9	270
11	3	25	7	19.8	58	2.2	135
11	3	25	8	22	36	1.9	225
11	3	25	9	25	36	12.0	225
11	3	25	10	25.6	36	12.0	45
11	3	25	11	25.7	35	1.9	270
11	3	25	12	25.7	32	2.2	225
11	3	25	13	25.8	25	0.0	0.0
11	3	25	14	33.2	15	1.4	270
11	3	25	15	35.2	17	0.0	0.0
11	3	25	16	34.3	18	2.2	23
11	3	25	17	33.5	18	8.0	225
11	3	25	18	32.8	18	8.0	225
11	3	25	19	31.4	23	1.1	225
11	3	25	20	30.3	25	1.9	270
11	3	25	21	30.1	29	2.2	270
11	3	25	22	29.8	31	1.1	270
11	3	25	23	29.6	35	0.0	0.0
11	3	25	24	29.4	38	1.9	23
11	3	26	1	28.5	45	0.0	0.0
11	3	26	2	27.5	49	1.9	225

11	3	26	3	26.3	53	1.7	270
11	3	26	4	28.1	56	1.1	45
11	3	26	5	28.1	52	1.7	225
11	3	26	6	27.5	49	1.9	270
11	3	26	7	28.9	44	1.9	270
11	3	26	8	30.2	32	5.0	315
11	3	26	9	31.6	32	5.0	315
11	3	26	10	32.8	31	1.9	225
11	3	26	11	32.7	29	0.0	0.0
11	3	26	12	34.5	26	1.4	270
11	3	26	13	35.7	23	2.2	270
11	3	26	14	36.2	18	1.9	360
11	3	26	15	36.2	20	2.8	270
11	3	26	16	36.2	22	1.7	45
11	3	26	17	34.3	18	8.0	270.0
11	3	26	18	33.2	18	8.0	270
11	3	26	19	32.4	27	1.7	135
11	3	26	20	30.5	29	1.1	270
11	3	26	21	29.1	30	1.9	338
11	3	26	22	29.2	35	1.1	270
11	3	26	23	27.5	37	0.0	0.0
11	3	26	24	24.3	40	1.7	270
11	3	27	1	24.2	42	2.2	360
11	3	27	2	23.5	45	2.8	270
11	3	27	3	23.4	47	2.2	225
11	3	27	4	24.1	53	0.0	0.0
11	3	27	5	25.3	52	1.9	270
11	3	27	6	25.5	50	1.4	135
11	3	27	7	26.2	49	0.0	0.0
11	3	27	8	26.9	48	2.2	270
11	3	27	9	27.5	45	1.1	45
11	3	27	10	27.8	42	1.4	270
11	3	27	11	28.5	35	2.2	23
11	3	27	12	28.2	33	1.7	270

11	3	27	13	29.2	25	1.4	225
11	3	27	14	31.1	18	2.2	270
11	3	27	15	31.8	19	0.0	0.0
11	3	27	16	31.5	20	2.8	270
11	3	27	17	29.5	21	1.9	270
11	3	27	18	29.6	25	1.7	45
11	3	27	19	29.3	28	0.0	0.0
11	3	27	20	28.8	30	2.2	23
11	3	27	21	28.5	34	2.8	270
11	3	27	22	24.1	36	3.3	225
11	3	27	23	24.6	39	3.1	270
11	3	27	24	23.9	40	0.0	0.0
11	3	28	1	23.5	42	1.4	23
11	3	28	2	23.2	45	1.1	270
11	3	28	3	23.6	47	2.2	225
11	3	28	4	22.4	51	1.9	45
11	3	28	5	22.8	49	0.0	0.0
11	3	28	6	24.6	45	2.2	270
11	3	28	7	25.9	43	1.4	45
11	3	28	8	25.5	41	1.9	360
11	3	28	9	26.5	38	2.2	225
11	3	28	10	25.6	34	2.8	270
11	3	28	11	26.8	31	1.7	338
11	3	28	12	28.5	28	2.2	270
11	3	28	13	30.5	25	1.1	360
11	3	28	14	31.5	15	1.4	270
11	3	28	15	31.1	17	0.0	0.0
11	3	28	16	29.8	19	2.8	270
11	3	28	17	29.4	20	0.0	0.0
11	3	28	18	28.5	24	2.8	225
11	3	28	19	28.3	26	2.2	270
11	3	28	20	27.4	29	1.9	270
11	3	28	21	26.9	31	1.1	23
11	3	28	22	26.5	35	1.7	338

11	3	28	23	25.8	38	2.8	270
11	3	28	24	25.1	41	1.9	225
11	3	29	1	24.9	45	2.2	270
11	3	29	2	27.5	47	1.7	360
11	3	29	3	24.2	48	2.8	270
11	3	29	4	22.9	52	1.4	23
11	3	29	5	24.5	49	1.7	270
11	3	29	6	25.6	45	2.2	45
11	3	29	7	27.5	43	0.0	0.0
11	3	29	8	28.6	41	1.9	360
11	3	29	9	29.5	38	0.0	0.0
11	3	29	10	28.8	35	1.1	270
11	3	29	11	28.2	33	2.8	225
11	3	29	12	29.4	25	1.4	270
11	3	29	13	29.2	22	2.2	338
11	3	29	14	30	17	1.4	270
11	3	29	15	34.1	18	1.7	113
11	3	29	16	33.2	20	1.9	225
11	3	29	17	32.4	21	2.8	45
11	3	29	18	31.2	22	3.3	360
11	3	29	19	30.8	25	0.0	0.0
11	3	29	20	29.5	28	1.9	270
11	3	29	21	28.5	32	1.4	338
11	3	29	22	27.3	35	1.7	225
11	3	29	23	26.4	38	1.4	270
11	3	29	24	26.1	41	1.9	270
11	3	30	1	25.8	42	2.8	113
11	3	30	2	25.3	44	1.9	45
11	3	30	3	24.8	46	2.2	270
11	3	30	4	24.1	52	0.0	0.0
11	3	30	5	25.8	50	2.2	360
11	3	30	6	26.4	49	2.8	45
11	3	30	7	27.6	46	1.9	23
11	3	30	8	28.5	45	1.4	270

11	3	30	9	29.3	41	1.9	225
11	3	30	10	30.4	38	1.4	113
11	3	30	11	31.2	35	0.0	0.0
11	3	30	12	32.6	32	1.9	270
11	3	30	13	34.5	25	1.7	270
11	3	30	14	36.2	15	2.2	45
11	3	30	15	35.2	17	1.4	360
11	3	30	16	34.3	18	1.1	270
11	3	30	17	33.5	19	0.0	0.0
11	3	30	18	32.8	22	2.8	23
11	3	30	19	31.4	23	1.9	338
11	3	30	20	30.3	25	1.1	270
11	3	30	21	30.1	29	1.9	225
11	3	30	22	29.8	31	2.8	45
11	3	30	23	29.6	35	1.9	270
11	3	30	24	29.2	38	1.4	23
11	3	31	1	28.8	48	0.0	0.0
11	3	31	2	26.2	59	0.0	0.0
11	3	31	3	25.2	65	1.4	270
11	3	31	4	23.9	75	0.0	0.0
11	3	31	5	25.9	71	1.1	113
11	3	31	6	27.5	70	2.8	23
11	3	31	7	28.9	62	1.9	45
11	3	31	8	28.2	59	1.7	270
11	3	31	9	28.6	55	1.9	270
11	3	31	10	28.8	51	0.0	0.0
11	3	31	11	28.7	49	1.9	45
11	3	31	12	28.8	42	2.2	113
11	3	31	13	29	39	1.7	23
11	3	31	14	29.1	31	0.0	0.0
11	3	31	15	30	39	1.9	270
11	3	31	16	29.8	40	1.4	270
11	3	31	17	29.3	41	0.0	0.0
11	3	31	18	29.2	49	2.2	315

11	3	31	19	28.4	52	1.1	45
11	3	31	20	27.5	55	0.0	0.0
11	3	31	21	27.1	59	1.9	270
11	3	31	22	26.8	62	2.8	270
11	3	31	23	26.5	67	1.7	23
11	3	31	24	20.9	69	0.0	0.0
11	4	1	1	19.9	71	2.2	270
11	4	1	2	20	73	1.9	270
11	4	1	3	20.1	75	2.8	225
11	4	1	4	20.1	77	2.2	315
11	4	1	5	20.8	65	2.8	23
11	4	1	6	21.4	63	1.4	113
11	4	1	7	17.6	61	1.4	270
11	4	1	8	18.5	60	1.1	225
11	4	1	9	19.3	55	2.2	270
11	4	1	10	20.4	51	3.1	45
11	4	1	11	21.2	49	0.0	0.0
11	4	1	12	25.4	42	1.9	360
11	4	1	13	28.5	35	0.0	0.0
11	4	1	14	29.5	31	1.4	270
11	4	1	15	26.5	34	1.1	225
11	4	1	16	24.3	36	2.2	225
11	4	1	17	23.5	43	0.0	0.0
11	4	1	18	22.8	46	1.1	360
11	4	1	19	21.4	51	2.8	270
11	4	1	20	20.3	53	1.1	225
11	4	1	21	20.1	55	1.7	23
11	4	1	22	19.8	58	0.0	0.0
11	4	1	23	19.6	62	1.4	315
11	4	1	24	19.4	64	2.8	270
11	4	2	1	18.1	69	1.9	225
11	4	2	2	15.2	71	1.7	113
11	4	2	3	12.1	73	2.2	270
11	4	2	4	10.6	75	0.0	0.0

11	4	2	5	15.8	65	1.7	45
11	4	2	6	16.4	61	2.8	360
11	4	2	7	17.6	59	1.4	270
11	4	2	8	18.5	57	1.7	225
11	4	2	9	19.3	55	3.3	225
11	4	2	10	20.4	51	1.9	113
11	4	2	11	21.2	49	0.0	0.0
11	4	2	12	22.6	46	1.4	360
11	4	2	13	24.5	41	0.0	0.0
11	4	2	14	26.2	35	0.0	0.0
11	4	2	15	25.2	39	2.8	270
11	4	2	16	24.3	40	1.9	293
11	4	2	17	23.5	42	1.1	360
11	4	2	18	22.8	45	2.2	270
11	4	2	19	21.4	49	1.9	225
11	4	2	20	20.3	55	1.1	315
11	4	2	21	20.1	59	2.2	113
11	4	2	22	19.8	62	1.9	45
11	4	2	23	19.6	69	2.8	360
11	4	2	24	19.4	70	0.0	0.0
11	4	3	1	18.5	71	1.4	45
11	4	3	2	17.5	71	2.5	270
11	4	3	3	16.3	72	1.9	293
11	4	3	4	15.3	73	2.2	225
11	4	3	5	16.8	65	0.0	0.0
11	4	3	6	17.5	52	2.8	45
11	4	3	7	18.9	44	0.0	0.0
11	4	3	8	20.2	38	2.2	360
11	4	3	9	21.6	35	0.0	0.0
11	4	3	10	22.8	31	1.9	293
11	4	3	11	23.7	29	1.9	270
11	4	3	12	24.5	26	2.2	225
11	4	3	13	25.7	23	0.0	0.0
11	4	3	14	26.9	18	1.9	360

11	4	3	15	26.4	20	1.1	315
11	4	3	16	25.2	22	1.7	45
11	4	3	17	24.3	24	0.0	0.0
11	4	3	18	23.2	25	2.8	293
11	4	3	19	22.4	27	1.9	360
11	4	3	20	20.5	29	0.0	0.0
11	4	3	21	20.1	30	3.3	225
11	4	3	22	19.8	35	2.8	270
11	4	3	23	19.5	37	1.9	315
11	4	3	24	18.9	40	2.8	293
11	4	4	1	16.5	42	2.2	113
11	4	4	2	14.6	44	1.4	45
11	4	4	3	12.4	45	0.0	0.0
11	4	4	4	17	49	2.8	270
11	4	4	5	9.5	45	1.1	225
11	4	4	6	10.5	44	0.0	0.0
11	4	4	7	12.5	43	1.1	270
11	4	4	8	14.6	44	2.0	270
11	4	4	9	15.8	44	2.0	270
11	4	4	10	16.7	35	1.4	45
11	4	4	11	17.5	33	2.2	315
11	4	4	12	17.8	31	2.5	45
11	4	4	13	18.1	22	0.0	0.0
11	4	4	14	35.7	19	2.2	270
11	4	4	15	17.8	20	1.9	225
11	4	4	16	16.5	21	1.1	315
11	4	4	17	18.7	21	6.0	270.0
11	4	4	18	19.6	21	6.0	270
11	4	4	19	24.5	29	1.9	225
11	4	4	20	22.7	31	1.4	225
11	4	4	21	21.8	35	2.8	68
11	4	4	22	21.5	41	0.0	0.0
11	4	4	23	24.8	45	1.9	270
11	4	4	24	29.6	48	1.7	225

11	4	5	1	29.1	50	2.2	293
11	4	5	2	28.5	53	2.8	270
11	4	5	3	28.1	51	0.0	0.0
11	4	5	4	26.8	49	2.2	315
11	4	5	5	26.8	45	1.1	270
11	4	5	6	28.9	43	1.7	315
11	4	5	7	29.5	42	1.9	225
11	4	5	8	29.9	45	6.0	225
11	4	5	9	30.6	45	6.0	225
11	4	5	10	31.8	31	2.2	360
11	4	5	11	32.2	29	1.1	270
11	4	5	12	33.4	24	2.8	45
11	4	5	13	35.6	21	0.0	0.0
11	4	5	14	35.2	15	2.8	270
11	4	5	15	35.4	17	0.0	0.0
11	4	5	16	34.6	19	1.1	315
11	4	5	17	33.5	16	6.0	270
11	4	5	18	32.8	16	6.0	270
11	4	5	19	31.5	26	2.8	315
11	4	5	20	30.7	29	2.2	225
11	4	5	21	32.4	31	0.0	0.0
11	4	5	22	33.1	35	1.9	270
11	4	5	23	34.8	38	0.0	0.0
11	4	5	24	35.6	42	1.7	225
11	4	6	1	35.2	44	1.7	45
11	4	6	2	34	45	2.2	270
11	4	6	3	29	47	1.4	225
11	4	6	4	28.0	53	0.0	0.0
11	4	6	5	29.5	52	2.8	360
11	4	6	6	30.5	50	2.2	270
11	4	6	7	31.2	49	2.8	225
11	4	6	8	31.9	48	1.4	315
11	4	6	9	32.5	45	0.0	0.0
11	4	6	10	33.2	42	2.2	360

11	4	6	11	34.5	35	0.0	0.0
11	4	6	12	36.2	33	1.9	225
11	4	6	13	36.2	25	2.8	270
11	4	6	14	34.3	18	2.2	360
11	4	6	15	29.8	19	2.8	315
11	4	6	16	27.5	20	0.0	0.0
11	4	6	17	26.5	21	1.7	45
11	4	6	18	29.6	25	2.8	225
11	4	6	19	34.3	28	3.1	68
11	4	6	20	33.8	30	2.5	270
11	4	6	21	32.5	34	1.9	315
11	4	6	22	32.1	36	2.2	360
11	4	6	23	11.6	39	2.8	315
11	4	6	24	10.9	40	2.8	225
11	4	7	1	10.5	42	3.1	315
11	4	7	2	10.2	45	1.1	270
11	4	7	3	9.6	47	0.0	0.0
11	4	7	4	10.4	62	1.1	225
11	4	7	5	29.8	60	0.0	0.0
11	4	7	6	30.6	59	2.8	45
11	4	7	7	30.9	56	0.0	0.0
11	4	7	8	31.5	54	1.9	270
11	4	7	9	33.5	51	0.0	0.0
11	4	7	10	35.6	49	2.2	225
11	4	7	11	36.8	45	2.8	270
11	4	7	12	33.5	41	1.9	315
11	4	7	13	30.5	35	0.0	0.0
11	4	7	14	25.9	31	2.2	45
11	4	7	15	20.1	32	0.0	0.0
11	4	7	16	19.8	36	1.9	68
11	4	7	17	19.4	39	1.1	225
11	4	7	18	18.5	41	2.2	270
11	4	7	19	18.3	42	1.9	315
11	4	7	20	17.4	45	0.0	0.0

11	4	7	21	16.9	49	1.1	90
11	4	7	22	16.5	51	1.7	270
11	4	7	23	15.8	53	2.5	315
11	4	7	24	15.1	54	2.2	68
11	4	8	1	14.9	56	0.0	0.0
11	4	8	2	11.2	58	1.7	45
11	4	8	3	10.8	60	1.1	90
11	4	8	4	9.6	62	0.0	0.0
11	4	8	5	10.5	59	2.2	270
11	4	8	6	12.8	56	2.8	315
11	4	8	7	15.6	54	1.7	225
11	4	8	8	18.6	52	0.0	0.0
11	4	8	9	19.5	48	2.8	270
11	4	8	10	20.8	45	1.9	360
11	4	8	11	22.2	41	1.4	315
11	4	8	12	23.4	38	1.1	45
11	4	8	13	23.9	35	0.0	0.0
11	4	8	14	24.2	31	1.7	315
11	4	8	15	23.5	35	2.2	270
11	4	8	16	23.2	39	2.8	315
11	4	8	17	22.4	40	1.1	360
11	4	8	18	21.2	42	2.2	315
11	4	8	19	20.8	45	0.0	0.0
11	4	8	20	19.5	48	2.2	270
11	4	8	21	18.5	50	0.0	0.0
11	4	8	22	17.3	52	1.9	360
11	4	8	23	16.4	59	1.9	315
11	4	8	24	16.1	62	0.0	225.0
11	4	9	1	15.8	65	1.9	270
11	4	9	2	15.3	69	0.0	0.0
11	4	9	3	14.8	71	1.4	45
11	4	9	4	14.1	72	0.0	0.0
11	4	9	5	15.8	65	1.1	270
11	4	9	6	16.4	52	2.2	315

11	4	9	7	17.6	46	0.0	0.0
11	4	9	8	18.5	45	3.1	360
11	4	9	9	19.3	41	2.8	225
11	4	9	10	20.4	38	2.2	270
11	4	9	11	21.2	35	2.5	315
11	4	9	12	22.6	32	0.0	0.0
11	4	9	13	24.5	25	2.2	360
11	4	9	14	26.4	15	3.1	315
11	4	9	15	25.2	17	1.7	68
11	4	9	16	24.3	18	0.0	0.0
11	4	9	17	23.5	19	1.1	360
11	4	9	18	22.8	22	0.0	0.0
11	4	9	19	21.4	23	1.7	270
11	4	9	20	20.3	25	2.2	315
11	4	9	21	20.1	29	1.7	315
11	4	9	22	19.8	31	1.1	315
11	4	9	23	19.6	35	1.9	270
11	4	9	24	19.2	38	1.9	360
11	4	10	1	17.5	52	2.2	45
11	4	10	2	15.2	63	2.8	180
11	4	10	3	13.9	71	2.2	270
11	4	10	4	12.6	75	0.0	0.0
11	4	10	5	16.8	71	1.9	45
11	4	10	6	17.5	68	0.0	0.0
11	4	10	7	18.9	65	1.9	270
11	4	10	8	20.2	62	0.0	0.0
11	4	10	9	21.6	58	2.8	315
11	4	10	10	22.8	54	1.4	315
11	4	10	11	23.7	49	2.2	270
11	4	10	12	24.5	42	2.2	45
11	4	10	13	26.5	40	0.0	0.0
11	4	10	14	28.7	33	1.4	360
11	4	10	15	26.4	36	2.8	270
11	4	10	16	25.2	39	1.1	225

11	4	10	17	24.3	40	1.7	315
11	4	10	18	23.2	44	0.0	0.0
11	4	10	19	22.4	46	2.2	90
11	4	10	20	20.5	49	2.8	270
11	4	10	21	20.1	51	1.1	315
11	4	10	22	19.8	53	0.0	0.0
11	4	10	23	19.5	59	2.8	225
11	4	10	24	18.9	62	1.7	315
11	4	11	1	16.9	65	1.9	45
11	4	11	2	15.3	69	2.8	270
11	4	11	3	13.2	71	1.7	315
11	4	11	4	11.8	73	2.2	360
11	4	11	5	15.8	68	1.9	315
11	4	11	6	16.4	65	1.4	315
11	4	11	7	17.6	60	1.1	225
11	4	11	8	18.5	57	2.2	270
11	4	11	9	19.3	51	1.9	68
11	4	11	10	20.4	49	2.2	45
11	4	11	11	21.2	45	2.8	315
11	4	11	12	22.6	41	1.9	360
11	4	11	13	26.2	39	1.7	315
11	4	11	14	27.9	35	1.7	270
11	4	11	15	25.2	31	2.8	225
11	4	11	16	24.3	29	1.9	90
11	4	11	17	23.5	37	2.8	45
11	4	11	18	22.8	42	2.2	225
11	4	11	19	21.4	45	2.8	315
11	4	11	20	20.3	49	1.1	270
11	4	11	21	20.1	52	2.8	180
11	4	11	22	19.5	53	1.7	315
11	4	11	23	17.2	55	2.8	225
11	4	11	24	15.3	59	0.0	0.0
11	4	12	1	11.2	61	1.7	270
11	4	12	2	10.8	62	1.1	315

11	4	12	3	9.5	63	1.9	315
11	4	12	4	21	52	2.2	45
11	4	12	5	8.9	49	0.0	0.0
11	4	12	6	9.5	45	1.9	225
11	4	12	7	10.5	43	0.0	0.0
11	4	12	8	10.8	49	0.0	0
11	4	12	9	11.3	49	0.0	0.0
11	4	12	10	11.8	32	1.1	68
11	4	12	11	12.6	29	2.8	270
11	4	12	12	13.8	26	2.2	45
11	4	12	13	14.5	24	1.7	315
11	4	12	14	38.5	21	1.7	315
11	4	12	15	14.3	22	1.9	270
11	4	12	16	14.1	24	2.2	90
11	4	12	17	13.8	24	4.0	315
11	4	12	18	13.2	24	4.0	315
11	4	12	19	12.6	31	1.1	315
11	4	12	20	12.2	34	1.7	68
11	4	12	21	11.8	36	0.0	0.0
11	4	12	22	11.4	38	2.2	270
11	4	12	23	10.9	41	0.0	0.0
11	4	12	24	10.6	42	1.9	315
11	4	13	1	28.5	45	0.0	0.0
11	4	13	2	28.1	46	1.9	68
11	4	13	3	27.9	48	1.7	270
11	4	13	4	19.6	50	2.2	45
11	4	13	5	28.1	48	1.1	90
11	4	13	6	28.8	41	2.2	315
11	4	13	7	29.3	39	2.8	360
11	4	13	8	29.9	42	2.0	270.0
11	4	13	9	30.5	42	2.0	270.0
11	4	13	10	30.9	29	2.3	45
11	4	13	11	31.5	24	1.9	315
11	4	13	12	32.7	21	2.8	68

11	4	13	13	33.5	19	0.0	0.0
11	4	13	14	37.5	18	1.9	270
11	4	13	15	34.0	21	0.0	0.0
11	4	13	16	33.2	22	2.8	225
11	4	13	17	32.5	23	8.0	225
11	4	13	18	31.4	23	8.0	225
11	4	13	19	31.0	31	0.0	0.0
11	4	13	20	30.2	35	2.9	360
11	4	13	21	29.2	39	1.1	270
11	4	13	22	28.4	42	2.2	90
11	4	13	23	26.2	44	1.4	68
11	4	13	24	25.2	46	0.0	0.0
11	4	14	1	9.2	48	2.8	225
11	4	14	2	8.8	49	2.2	270
11	4	14	3	8.6	50	0.0	0.0
11	4	14	4	8.0	53	1.4	68
11	4	14	5	9.5	52	2.2	45
11	4	14	6	10.5	50	0.0	0.0
11	4	14	7	11.2	49	2.2	225
11	4	14	8	11.9	48	1.1	270
11	4	14	9	12.5	45	0.0	0.0
11	4	14	10	13.2	42	1.7	315
11	4	14	11	14.5	35	0.0	0.0
11	4	14	12	16.2	33	1.9	45
11	4	14	13	18.2	25	0.0	0.0
11	4	14	14	20.6	18	2.2	90
11	4	14	15	19.8	19	0.0	0.0
11	4	14	16	17.5	20	1.9	360
11	4	14	17	16.5	21	1.4	270
11	4	14	18	15.6	25	2.2	225
11	4	14	19	14.3	28	0.0	0.0
11	4	14	20	13.8	30	2.8	315
11	4	14	21	12.5	34	1.1	270
11	4	14	22	12.1	36	0.0	0.0

11	4	14	23	11.6	39	2.8	225
11	4	14	24	10.9	40	1.9	360
11	4	15	1	18.5	47	1.1	23
11	4	15	2	16.2	51	2.2	180
11	4	15	3	15.4	53	2.8	270
11	4	15	4	14.9	55	1.7	180
11	4	15	5	16.8	52	0.0	0.0
11	4	15	6	17.5	49	2.8	360
11	4	15	7	18.9	44	1.9	225
11	4	15	8	20.2	38	2.8	270
11	4	15	9	21.6	35	0.0	0.0
11	4	15	10	22.8	31	3.1	45
11	4	15	11	23.7	29	1.1	315
11	4	15	12	24.5	26	1.9	315
11	4	15	13	25.7	23	0.0	0.0
11	4	15	14	26.8	18	2.2	360
11	4	15	15	26.4	19	0.0	0.0
11	4	15	16	25.2	21	2.8	270
11	4	15	17	24.3	22	0.0	0.0
11	4	15	18	23.2	25	2.2	45
11	4	15	19	22.4	27	3.1	225
11	4	15	20	20.5	29	2.8	270
11	4	15	21	20.1	30	0.0	0.0
11	4	15	22	19.8	35	1.7	45
11	4	15	23	19.5	37	0.0	0.0
11	4	15	24	18.5	40	1.9	270
11	4	16	1	17.5	42	2.8	360
11	4	16	2	15.2	44	1.9	225
11	4	16	3	14.1	46	0.0	0.0
11	4	16	4	13.2	52	2.8	45
11	4	16	5	14.5	50	1.1	225
11	4	16	6	15.1	49	2.8	270
11	4	16	7	16.2	46	0.0	0.0
11	4	16	8	17.3	45	2.2	23

11	4	16	9	18.1	41	0.0	0.0
11	4	16	10	19.5	38	1.9	45
11	4	16	11	20.1	35	0.0	0.0
11	4	16	12	21.6	32	1.9	45
11	4	16	13	22.3	25	0.0	0.0
11	4	16	14	23.4	15	2.8	270
11	4	16	15	20.2	25	1.9	225
11	4	16	16	18.1	35	0.0	0.0
11	4	16	17	16.5	45	2.2	180
11	4	16	18	14.3	56	1.9	270
11	4	16	19	12.1	69	0.0	0.0
11	4	16	20	10.5	82	2.8	360
11	4	16	21	10.1	86	0.0	0.0
11	4	16	22	9.8	89	2.2	45
11	4	16	23	9.5	91	0.0	0.0
11	4	16	24	9.0	93	1.9	45
11	4	17	1	8.5	95	0.0	0.0
11	4	17	2	38.1	97	1.7	270
11	4	17	3	37.9	98	2.8	225
11	4	17	4	35.9	99	1.1	315
11	4	17	5	8.9	98	0.0	0.0
11	4	17	6	30.2	96	1.9	45
11	4	17	7	31.5	95	0.0	0.0
11	4	17	8	32.3	94	2.8	45
11	4	17	9	34.3	88	0.0	0.0
11	4	17	10	35.6	85	0.0	0.0
11	4	17	11	38.3	81	1.9	270
11	4	17	12	20.2	78	2.2	225
11	4	17	13	21.5	71	0.0	0.0
11	4	17	14	22.4	59	2.8	45
11	4	17	15	21.8	60	3.1	270
11	4	17	16	20.8	61	2.8	23
11	4	17	17	29.6	63	0.0	0.0
11	4	17	18	29.1	65	2.8	45

11	4	17	19	28.5	68	3.1	180
11	4	17	20	27.9	69	2.2	45
11	4	17	21	37.4	70	1.4	270
11	4	17	22	36.8	72	1.9	225
11	4	17	23	16.5	73	0.0	0.0
11	4	17	24	15.8	74	2.2	45
11	4	18	1	14.3	71	0.0	0.0
11	4	18	2	13.2	68	1.7	315
11	4	18	3	12.5	63	2.2	270
11	4	18	4	11.1	61	1.1	45
11	4	18	5	13.5	59	2.8	23
11	4	18	6	14.6	58	0.0	0.0
11	4	18	7	16.8	56	2.2	135
11	4	18	8	18.5	55	1.7	225
11	4	18	9	19.6	50	0.0	0.0
11	4	18	10	20.5	49	2.8	270
11	4	18	11	21.6	45	2.2	180
11	4	18	12	25.2	42	3.1	315
11	4	18	13	26.2	39	1.9	135
11	4	18	14	27.3	30	0.0	0.0
11	4	18	15	26.5	35	2.8	360
11	4	18	16	25.9	39	1.9	270
11	4	18	17	23.5	41	0.0	0.0
11	4	18	18	22.1	42	2.2	225
11	4	18	19	20.5	45	1.9	135
11	4	18	20	19.8	49	0.0	0.0
11	4	18	21	18.6	51	2.8	270
11	4	18	22	17.5	53	2.2	180
11	4	18	23	16.5	55	1.4	360
11	4	18	24	14.5	60	1.9	135
11	4	19	1	13.6	65	2.8	270
11	4	19	2	13.1	67	0.0	0.0
11	4	19	3	12.5	69	1.9	315
11	4	19	4	11.6	72	0.0	0.0

11	4	19	5	12.9	69	1.7	270
11	4	19	6	13.4	65	1.9	225
11	4	19	7	15.6	61	0.0	0.0
11	4	19	8	16.9	59	1.4	23
11	4	19	9	18.5	55	0.0	0.0
11	4	19	10	19.6	51	1.7	360
11	4	19	11	22.5	49	0.0	0.0
11	4	19	12	24.3	46	1.4	45
11	4	19	13	25.9	41	3.1	270
11	4	19	14	26.4	31	1.4	180
11	4	19	15	25.6	32	2.2	45
11	4	19	16	24.1	35	0.0	0.0
11	4	19	17	23.4	38	4.5	270
11	4	19	18	21.1	42	1.1	225
11	4	19	19	20.5	46	0.0	0.0
11	4	19	20	18.9	49	2.2	45
11	4	19	21	17.5	51	0.0	0.0
11	4	19	22	16.3	53	3.1	270
11	4	19	23	15.2	54	2.8	360
11	4	19	24	13.2	56	1.9	135
11	4	20	1	11.4	47	2.2	23
11	4	20	2	11.1	51	0.0	0.0
11	4	20	3	10.8	53	1.9	225
11	4	20	4	20.0	55	2.8	270
11	4	20	5	10.9	52	0.0	0.0
11	4	20	6	11.6	51	2.2	360
11	4	20	7	12.5	48	0.0	0.0
11	4	20	8	14.2	55	4.0	315
11	4	20	9	15.3	55	4.0	315.0
11	4	20	10	16.8	35	1.1	135
11	4	20	11	18.5	32	1.4	270
11	4	20	12	19.2	29	0.0	0.0
11	4	20	13	20.5	25	1.4	315
11	4	20	14	37.3	21	2.2	270

11	4	20	15	20.4	23	1.1	315
11	4	20	16	19.5	24	0.0	0.0
11	4	20	17	19.2	36	5.0	360
11	4	20	18	18.5	36	5.0	360
11	4	20	19	18.2	31	0.0	0.0
11	4	20	20	17.9	34	1.9	270
11	4	20	21	17.5	36	2.8	23
11	4	20	22	17.4	38	3.1	135
11	4	20	23	16.5	42	2.2	225
11	4	20	24	16.3	45	1.7	360
11	4	21	1	14.5	48	0.0	0.0
11	4	21	2	13.5	49	0.0	0.0
11	4	21	3	13.2	51	2.2	225
11	4	21	4	23	52	0.0	0.0
11	4	21	5	14.5	49	2.8	270
11	4	21	6	15.6	45	1.9	23
11	4	21	7	17.5	43	0.0	0.0
11	4	21	8	18.6	44	4.0	45
11	4	21	9	19.5	44	4.0	45
11	4	21	10	20.8	35	1.4	225
11	4	21	11	22.2	33	0.0	0.0
11	4	21	12	23.4	25	1.7	270
11	4	21	13	24.2	22	0.0	0.0
11	4	21	14	38.3	17	1.9	23
11	4	21	15	24.1	18	2.8	225
11	4	21	16	23.2	20	1.9	135
11	4	21	17	22.4	28	6.0	135
11	4	21	18	21.2	28	6.0	135.0
11	4	21	19	20.8	25	1.9	270
11	4	21	20	19.5	28	0.0	0.0
11	4	21	21	18.5	32	1.9	45
11	4	21	22	17.3	35	0.0	0.0
11	4	21	23	16.4	38	2.2	270
11	4	21	24	16.1	41	2.9	225

11	4	22	1	15.8	42	0.0	0.0
11	4	22	2	15.3	44	2.8	45
11	4	22	3	14.8	46	0.0	0.0
11	4	22	4	14.1	52	2.2	270
11	4	22	5	15.8	50	1.7	225
11	4	22	6	16.4	49	1.9	270
11	4	22	7	17.6	46	1.9	360
11	4	22	8	18.5	45	2.2	135
11	4	22	9	19.3	41	1.9	45
11	4	22	10	20.4	38	0.0	0.0
11	4	22	11	21.2	35	1.7	23
11	4	22	12	22.6	32	0.0	0.0
11	4	22	13	24.5	25	1.4	270
11	4	22	14	26.4	15	1.9	225
11	4	22	15	25.2	17	2.2	315
11	4	22	16	24.3	18	0.0	0.0
11	4	22	17	23.5	19	1.9	270
11	4	22	18	22.8	22	2.2	135
11	4	22	19	21.4	23	2.8	45
11	4	22	20	20.3	25	0.0	0.0
11	4	22	21	20.1	29	2.8	360
11	4	22	22	19.8	31	2.2	270
11	4	22	23	19.6	35	1.4	225
11	4	22	24	19.2	38	1.7	45
11	4	23	1	18.8	48	0.0	0.0
11	4	23	2	17.5	51	1.4	270
11	4	23	3	16.3	53	1.9	45
11	4	23	4	15.3	62	1.4	225
11	4	23	5	16.8	52	1.9	270
11	4	23	6	17.5	49	1.1	23
11	4	23	7	18.9	44	2.2	225
11	4	23	8	20.2	38	1.7	360
11	4	23	9	21.6	35	0.0	0.0
11	4	23	10	22.8	31	1.9	270

11	4	23	11	23.7	29	1.7	338
11	4	23	12	24.5	26	2.2	315
11	4	23	13	25.7	23	2.2	135
11	4	23	14	26.9	20	0.0	0.0
11	4	23	15	18.5	29	1.9	270
11	4	23	16	17.2	35	2.2	45
11	4	23	17	15.1	42	1.1	225
11	4	23	18	13.2	44	1.7	270
11	4	23	19	12.8	46	0.0	0.0
11	4	23	20	12.1	59	1.9	45
11	4	23	21	11.9	65	0.0	0.0
11	4	23	22	11.1	72	2.2	270
11	4	23	23	10.9	79	1.9	225
11	4	23	24	10.5	82	1.1	315
11	4	24	1	10.1	85	0.0	0.0
11	4	24	2	9.8	93	2.8	270
11	4	24	3	9.1	96	1.4	135
11	4	24	4	8.4	98	1.1	45
11	4	24	5	11.2	95	2.8	270
11	4	24	6	11.9	92	1.9	225
11	4	24	7	12.1	90	1.9	270
11	4	24	8	12.9	87	2.2	338
11	4	24	9	13.5	75	1.4	360
11	4	24	10	14.2	71	2.2	135
11	4	24	11	16.2	69	2.8	270
11	4	24	12	18.5	65	2.8	225
11	4	24	13	20.2	55	1.7	315
11	4	24	14	22.2	46	0.0	0.0
11	4	24	15	20.5	49	2.5	360
11	4	24	16	19.5	50	1.9	270
11	4	24	17	18.2	51	0.0	0.0
11	4	24	18	17.4	58	2.2	23
11	4	24	19	16.9	62	1.7	270
11	4	24	20	15.5	69	1.4	338

11	4	24	21	14.9	71	2.8	360
11	4	24	22	14.1	74	1.4	135
11	4	24	23	13.9	76	2.2	270
11	4	24	24	12.2	79	1.4	225
11	4	25	1	12.1	80	1.1	315
11	4	25	2	11.9	81	0.0	0.0
11	4	25	3	11.1	82	1.1	360
11	4	25	4	10.9	84	1.4	270
11	4	25	5	12.2	81	1.1	338
11	4	25	6	13.2	75	1.9	270
11	4	25	7	15.2	68	0.0	0.0
11	4	25	8	16.2	60	3.3	360
11	4	25	9	18.3	59	1.7	135
11	4	25	10	20.2	51	1.1	45
11	4	25	11	21.6	49	1.9	270
11	4	25	12	22.2	47	2.2	360
11	4	25	13	24.6	40	0.0	0.0
11	4	25	14	25.9	31	1.4	45
11	4	25	15	23.5	32	0.0	0.0
11	4	25	16	21.4	36	2.2	270
11	4	25	17	20.4	39	1.1	45
11	4	25	18	19.5	42	1.4	270
11	4	25	19	19.0	43	1.1	360
11	4	25	20	18.5	47	1.9	135
11	4	25	21	18.1	59	2.2	225
11	4	25	22	17.9	62	1.1	270
11	4	25	23	16.5	63	0.0	0.0
11	4	25	24	16.1	68	1.9	23
11	4	26	1	15.8	65	0.0	0.0
11	4	26	2	14.2	61	1.9	45
11	4	26	3	12.2	59	1.7	225
11	4	26	4	10.2	69	1.1	45
11	4	26	5	12.2	68	1.7	270
11	4	26	6	15.3	65	1.9	225

11	4	26	7	18.9	63	1.9	45
11	4	26	8	20.2	62	0.0	0.0
11	4	26	9	21.6	60	1.1	225
11	4	26	10	22.8	59	1.9	270
11	4	26	11	23.7	57	0.0	0.0
11	4	26	12	24.2	55	1.4	23
11	4	26	13	24.8	51	0.0	0.0
11	4	26	14	25.4	41	1.9	270
11	4	26	15	24.2	43	2.8	225
11	4	26	16	23.1	44	1.7	45
11	4	26	17	22.5	45	1.0	113
11	4	26	18	22.1	61	2.2	225
11	4	26	19	21.5	63	1.7	135
11	4	26	20	20.5	69	1.1	270
11	4	26	21	20.1	72	1.9	338
11	4	26	22	19.2	73	1.1	23
11	4	26	23	18.5	75	0.0	0.0
11	4	26	24	18.2	77	1.7	270
11	4	27	1	17.5	86	2.2	225
11	4	27	2	16.8	89	2.8	270
11	4	27	3	15.2	91	2.2	315
11	4	27	4	14.4	94	0.0	0.0
11	4	27	5	15.6	92	1.9	270
11	4	27	6	16.8	88	1.4	270
11	4	27	7	18.5	85	0.0	0.0
11	4	27	8	21.5	79	2.2	360
11	4	27	9	23.5	75	1.1	45
11	4	27	10	25.4	72	1.4	338
11	4	27	11	27.4	68	2.2	270
11	4	27	12	28.4	65	1.7	270
11	4	27	13	29.4	61	1.4	270
11	4	27	14	30.0	59	0.0	0.0
11	4	27	15	28.5	65	0.0	0.0
11	4	27	16	26.4	68	2.8	360

11	4	27	17	25.2	75	1.9	270
11	4	27	18	23.2	77	1.7	270
11	4	27	19	21.3	79	0.0	0.0
11	4	27	20	20.5	81	2.2	23
11	4	27	21	19.5	83	2.8	270
11	4	27	22	18.6	85	3.3	225
11	4	27	23	17.8	87	3.1	45
11	4	27	24	16.9	89	0.0	0.0
11	4	28	1	16.5	90	1.4	270
11	4	28	2	16.2	92	1.1	270
11	4	28	3	15.5	94	2.2	270
11	4	28	4	22	96	1.9	45
11	4	28	5	15.6	94	0.0	0.0
11	4	28	6	18.6	91	2.2	270
11	4	28	7	20.6	85	1.4	45
11	4	28	8	23.5	46	4.0	135
11	4	28	9	25.3	46	4.0	135
11	4	28	10	25.8	71	2.8	23
11	4	28	11	27.9	68	1.7	225
11	4	28	12	28.6	64	2.2	113
11	4	28	13	29.1	62	1.1	360
11	4	28	14	37.3	59	1.4	45
11	4	28	15	30.1	68	0.0	0.0
11	4	28	16	29.6	74	2.8	270
11	4	28	17	28.5	31	8.0	45.0
11	4	28	18	27.4	31	8.0	45
11	4	28	19	24.3	83	2.2	360
11	4	28	20	22.5	85	1.9	270
11	4	28	21	21.6	86	1.1	270
11	4	28	22	19.8	88	1.7	338
11	4	28	23	17.4	90	2.8	360
11	4	28	24	16.3	92	1.9	270
11	4	29	1	14.9	93	2.2	45
11	4	29	2	13.5	93	1.7	360

11	4	29	3	13.2	94	2.8	270
11	4	29	4	19.4	95	1.4	270
11	4	29	5	14.5	85	1.7	113
11	4	29	6	15.6	70	2.2	45
11	4	29	7	17.5	65	0.0	0.0
11	4	29	8	18.6	62	0.0	0
11	4	29	9	19.5	62	0.0	0.0
11	4	29	10	20.8	49	1.1	23
11	4	29	11	22.2	45	2.8	45
11	4	29	12	23.4	41	1.4	270
11	4	29	13	24.2	38	2.2	270
11	4	29	14	37.5	35	1.4	360
11	4	29	15	24.1	37	1.7	113
11	4	29	16	23.2	41	1.9	23
11	4	29	17	22.4	25	4.0	225
11	4	29	18	21.2	25	4.0	225
11	4	29	19	20.8	49	0.0	0.0
11	4	29	20	19.5	51	1.9	45
11	4	29	21	18.5	53	1.4	270
11	4	29	22	17.3	55	1.7	23
11	4	29	23	16.4	56	1.4	270
11	4	29	24	16.1	58	1.9	360
11	4	30	1	15.8	59	2.8	270
11	4	30	2	15.3	60	1.9	45
11	4	30	3	14.8	62	2.2	23
11	4	30	4	14.1	63	0.0	0.0
11	4	30	5	15.8	52	2.2	270
11	4	30	6	16.4	49	2.8	45
11	4	30	7	17.6	46	1.9	23
11	4	30	8	18.5	45	1.4	270
11	4	30	9	19.3	41	1.9	270
11	4	30	10	20.4	38	1.4	113
11	4	30	11	21.2	35	0.0	0.0
11	4	30	12	22.6	32	1.9	23

11	4	30	13	24.5	25	1.7	270
11	4	30	14	26.4	20	2.2	270
11	4	30	15	20.2	35	1.4	360
11	4	30	16	18.5	45	1.1	113
11	4	30	17	17.2	55	0.0	0.0
11	4	30	18	16.3	65	2.8	270
11	4	30	19	15.8	72	1.9	338
11	4	30	20	14.2	79	1.1	45
11	4	30	21	13.9	82	1.9	360
11	4	30	22	13.2	85	2.8	270
11	4	30	23	12.1	89	1.9	270
11	4	30	24	11.8	91	1.4	23
11	5	1	1	11.1	94	0.0	0.0
11	5	1	2	10.5	96	0.0	0.0
11	5	1	3	10.1	98	1.4	360
11	5	1	4	9.8	99	0.0	0.0
11	5	1	5	10.2	98	1.1	113
11	5	1	6	11.2	97	2.8	23
11	5	1	7	12.5	97	1.9	45
11	5	1	8	13.2	97	2.2	270
11	5	1	9	14.5	95	1.9	360
11	5	1	10	15.6	90	0.0	0.0
11	5	1	11	18.5	85	1.9	45
11	5	1	12	20.2	81	2.2	270
11	5	1	13	20.8	79	1.7	23
11	5	1	14	21.6	71	0.0	0.0
11	5	1	15	20.5	72	1.9	360
11	5	1	16	20.1	73	1.4	270
11	5	1	17	19.8	75	1.9	45
11	5	1	18	18.5	76	2.2	315
11	5	1	19	17.2	79	1.1	45
11	5	1	20	16.1	81	0.0	0.0
11	5	1	21	15.2	83	1.9	360
11	5	1	22	14.2	85	2.8	270

11	5	1	23	13.1	89	1.7	23
11	5	1	24	12.2	90	0.0	0.0
11	5	2	1	12.1	91	2.2	360
11	5	2	2	11.8	92	1.9	270
11	5	2	3	31.5	92	2.8	45
11	5	2	4	30.6	93	2.2	315
11	5	2	5	35.8	91	2.8	23
11	5	2	6	36.4	89	1.4	113
11	5	2	7	17.6	88	1.4	45
11	5	2	8	18.5	86	1.1	360
11	5	2	9	19.3	80	2.2	270
11	5	2	10	20.4	79	3.1	45
11	5	2	11	21.2	75	0.0	0.0
11	5	2	12	22.6	71	1.9	360
11	5	2	13	22.9	68	0.0	0.0
11	5	2	14	23.5	58	1.4	315
11	5	2	15	22.9	59	1.1	270
11	5	2	16	21.4	60	2.2	45
11	5	2	17	20.2	62	0.0	0.0
11	5	2	18	19.6	65	1.1	360
11	5	2	19	18.2	69	2.8	113
11	5	2	20	17.5	72	1.1	45
11	5	2	21	16.9	74	1.7	23
11	5	2	22	15.2	76	0.0	0.0
11	5	2	23	14.9	78	1.4	270
11	5	2	24	13.9	80	2.8	360
11	5	3	1	13.6	81	1.9	315
11	5	3	2	12.5	83	1.7	113
11	5	3	3	12.1	85	2.2	23
11	5	3	4	22.1	86	0.0	0.0
11	5	3	5	15.8	75	1.7	270
11	5	3	6	16.4	52	2.8	360
11	5	3	7	17.6	46	1.4	45
11	5	3	8	18.5	45	0.0	0

11	5	3	9	19.3	45	0.0	0
11	5	3	10	20.4	38	1.9	113
11	5	3	11	21.2	35	0.0	0.0
11	5	3	12	22.6	32	1.4	270
11	5	3	13	24.5	25	0.0	0.0
11	5	3	14	35.1	15	0.0	0.0
11	5	3	15	25.2	17	2.8	45
11	5	3	16	24.3	18	1.9	293
11	5	3	17	23.5	43	6.0	135
11	5	3	18	22.8	43	6.0	135
11	5	3	19	21.4	23	1.9	293
11	5	3	20	20.3	25	1.1	270
11	5	3	21	20.1	29	2.2	113
11	5	3	22	19.8	31	1.9	45
11	5	3	23	19.6	35	2.8	360
11	5	3	24	19.4	38	0.0	0.0
11	5	4	1	18.5	45	1.4	45
11	5	4	2	17.5	49	2.5	270
11	5	4	3	16.3	53	1.9	293
11	5	4	4	22	65	2.2	45
11	5	4	5	16.8	63	0.0	0.0
11	5	4	6	17.5	61	2.8	270
11	5	4	7	18.9	59	0.0	0.0
11	5	4	8	20.2	49	4.0	315
11	5	4	9	21.6	49	4.0	315.0
11	5	4	10	22.8	49	1.9	293
11	5	4	11	23.7	48	1.9	45
11	5	4	12	24.5	42	2.2	45
11	5	4	13	25.7	39	0.0	0.0
11	5	4	14	36.1	35	1.9	360
11	5	4	15	25.8	38	1.1	315
11	5	4	16	25.2	39	1.7	270
11	5	4	17	24.3	39	4.0	225.0
11	5	4	18	23.2	39	4.0	225

11	5	4	19	22.4	49	1.9	360
11	5	4	20	21.5	52	0.0	0.0
11	5	4	21	20.1	55	3.3	45
11	5	4	22	19.8	59	2.8	315
11	5	4	23	19.5	62	1.9	360
11	5	4	24	18.9	65	2.8	293
11	5	4	1	16.5	69	2.2	113
11	5	4	2	14.6	71	1.4	45
11	5	4	3	12.4	72	0.0	0.0
11	5	4	4	11.0	73	2.8	45
11	5	4	5	12.5	65	1.1	45
11	5	4	6	13.8	55	0.0	0.0
11	5	4	7	14.2	45	1.1	270
11	5	4	8	15.4	36	1.9	315
11	5	4	9	18.2	31	1.1	293
11	5	4	10	20.5	29	1.4	45
11	5	4	11	21.6	25	2.2	90
11	5	4	12	23.8	21	2.5	270
11	5	4	13	24.2	19	0.0	0.0
11	5	4	14	26.7	18	2.2	360
11	5	4	15	23.2	23	1.9	270
11	5	4	16	20.5	29	1.1	90
11	5	4	17	18.9	36	0.0	0.0
11	5	4	18	16.2	42	2.2	360
11	5	4	19	15.8	46	1.9	315
11	5	4	20	15.5	49	1.4	270
11	5	4	21	15.1	52	2.8	68
11	5	4	22	14.9	56	0.0	0.0
11	5	4	23	14.5	59	1.9	45
11	5	4	24	14.2	62	1.7	270
11	5	5	1	13.8	68	2.2	293
11	5	5	2	13.5	75	2.8	360
11	5	5	3	13.1	84	0.0	0.0
11	5	5	4	12.9	86	2.2	90

11	5	5	5	13.5	82	1.1	45
11	5	5	6	16.9	81	1.7	315
11	5	5	7	18.5	74	1.9	68
11	5	5	8	20.6	70	2.8	270
11	5	5	9	22.5	65	1.1	90
11	5	5	10	24.3	62	2.2	360
11	5	5	11	26.5	59	1.1	293
11	5	5	12	27.5	57	2.8	270
11	5	5	13	28.5	55	0.0	0.0
11	5	5	14	29.5	53	2.8	360
11	5	5	15	28.4	62	0.0	0.0
11	5	5	16	27.3	68	1.1	315
11	5	5	17	25.4	72	1.9	360
11	5	5	18	24.2	76	1.4	293
11	5	5	19	23.2	78	2.8	270
11	5	5	20	22.4	80	2.2	90
11	5	5	21	21.2	82	0.0	0.0
11	5	5	22	20.1	84	1.9	360
11	5	5	23	19.4	86	0.0	0.0
11	5	5	24	18.5	87	1.7	68
11	5	6	1	17.6	89	1.7	45
11	5	6	2	15.2	91	2.2	360
11	5	6	3	12.8	92	1.4	315
11	5	6	4	10.9	94	0.0	0.0
11	5	6	5	13.5	90	2.8	360
11	5	6	6	19.5	86	2.2	270
11	5	6	7	21.5	80	2.8	90
11	5	6	8	22.2	78	1.4	45
11	5	6	9	24.5	75	0.0	0.0
11	5	6	10	26.8	71	2.2	360
11	5	6	11	27.2	67	0.0	0.0
11	5	6	12	28.5	65	1.9	68
11	5	6	13	29.6	63	2.8	293
11	5	6	14	30.0	59	2.2	360

11	5	6	15	29.2	65	2.8	90
11	5	6	16	28.6	72	0.0	0.0
11	5	6	17	25.2	76	1.7	270
11	5	6	18	23.1	77	2.8	90
11	5	6	19	20.2	79	3.1	68
11	5	6	20	18.6	80	2.5	45
11	5	6	21	16.5	82	1.9	315
11	5	6	22	15.2	84	2.2	360
11	5	6	23	14.3	86	2.8	315
11	5	6	24	13.2	87	2.8	45
11	5	7	1	12.5	88	3.1	270
11	5	7	2	12.1	89	1.1	360
11	5	7	3	11.8	91	0.0	0.0
11	5	7	4	11.2	92	1.1	68
11	5	7	5	11.9	89	0.0	0.0
11	5	7	6	12.5	85	2.8	270
11	5	7	7	12.9	80	0.0	0.0
11	5	7	8	13.2	77	1.9	45
11	5	7	9	15.9	72	0.0	0.0
11	5	7	10	18.9	69	2.2	360
11	5	7	11	20.5	65	2.8	315
11	5	7	12	25.3	61	1.9	270
11	5	7	13	27.3	59	0.0	0.0
11	5	7	14	28.3	35	2.2	45
11	5	7	15	25.3	36	0.0	0.0
11	5	7	16	24.2	37	1.9	270
11	5	7	17	23.1	39	1.1	360
11	5	7	18	22.2	42	2.2	315
11	5	7	19	21.2	45	1.9	270
11	5	7	20	20.1	49	0.0	0.0
11	5	7	21	19.5	52	1.1	90
11	5	7	22	19.0	55	1.7	360
11	5	7	23	18.5	59	2.5	315
11	5	7	24	18.1	72	2.2	270

11	5	8	1	14.9	82	0.0	0.0
11	5	8	2	13.5	89	1.7	45
11	5	8	3	13.2	95	1.1	90
11	5	8	4	12.5	98	0.0	0.0
11	5	8	5	14.5	95	2.2	360
11	5	8	6	15.6	92	2.8	90
11	5	8	7	17.5	88	1.7	45
11	5	8	8	18.6	85	0.0	0.0
11	5	8	9	19.5	80	2.8	270
11	5	8	10	20.8	79	1.9	360
11	5	8	11	22.2	65	1.4	315
11	5	8	12	23.4	55	1.1	45
11	5	8	13	25.8	41	0.0	0.0
11	5	8	14	27.0	20	1.7	90
11	5	8	15	24.1	21	2.2	270
11	5	8	16	23.2	22	2.8	315
11	5	8	17	22.4	23	1.1	360
11	5	8	18	21.2	25	2.2	90
11	5	8	19	20.8	27	0.0	0.0
11	5	8	20	19.5	30	2.2	68
11	5	8	21	18.5	32	0.0	0.0
11	5	8	22	17.3	35	1.9	360
11	5	8	23	16.4	38	1.9	315
11	5	8	24	16.1	41	0.0	0.0
11	5	9	1	15.8	42	1.9	270
11	5	9	2	15.3	44	0.0	0.0
11	5	9	3	14.8	46	1.4	45
11	5	9	4	14.1	52	0.0	0.0
11	5	9	5	15.8	50	1.1	68
11	5	9	6	16.4	49	2.2	315
11	5	9	7	17.6	46	0.0	0.0
11	5	9	8	18.5	45	3.1	360
11	5	9	9	19.3	41	2.8	270
11	5	9	10	20.4	38	2.2	90

11	5	9	11	21.2	35	2.5	315
11	5	9	12	22.6	32	0.0	0.0
11	5	9	13	24.5	25	2.2	360
11	5	9	14	26.4	15	3.1	270
11	5	9	15	25.2	17	1.7	68
11	5	9	16	24.3	18	0.0	0.0
11	5	9	17	23.5	19	1.1	360
11	5	9	18	22.8	22	0.0	0.0
11	5	9	19	21.4	23	1.7	68
11	5	9	20	20.3	25	2.2	315
11	5	9	21	20.1	29	1.7	45
11	5	9	22	19.8	31	1.1	315
11	5	9	23	19.6	35	1.9	270
11	5	9	24	19.2	38	1.9	360
11	5	10	1	18.8	55	2.2	45
11	5	10	2	17.5	64	0.0	0.0
11	5	10	3	16.3	68	2.2	68
11	5	10	4	15.3	72	0.0	0.0
11	5	10	5	16.8	79	1.9	45
11	5	10	6	17.5	74	0.0	0.0
11	5	10	7	18.9	71	1.9	90
11	5	10	8	20.2	69	2.2	360
11	5	10	9	21.6	65	2.8	270
11	5	10	10	22.8	61	1.4	315
11	5	10	11	23.7	58	2.2	68
11	5	10	12	24.5	55	2.2	45
11	5	10	13	25.7	51	0.0	0.0
11	5	10	14	26.9	35	1.4	360
11	5	10	15	26.4	39	0.0	0.0
11	5	10	16	25.2	41	1.1	315
11	5	10	17	24.3	42	1.9	270
11	5	10	18	23.2	45	0.0	0.0
11	5	10	19	22.4	49	2.2	90
11	5	10	20	20.5	51	2.8	45

11	5	10	21	20.1	53	1.1	315
11	5	10	22	19.8	55	0.0	0.0
11	5	10	23	19.5	57	2.8	270
11	5	10	24	18.9	58	0.0	0.0
11	5	11	1	15.4	59	1.9	45
11	5	11	2	14.5	62	0.0	0.0
11	5	11	3	12.4	65	1.7	315
11	5	11	4	23.3	62	2.2	360
11	5	11	5	12.5	61	1.9	315
11	5	11	6	14.6	58	1.4	68
11	5	11	7	17.6	55	1.1	45
11	5	11	8	18.5	44	6.0	270
11	5	11	9	19.3	44	6.0	270
11	5	11	10	20.4	50	2.2	45
11	5	11	11	21.2	49	0.0	0.0
11	5	11	12	24.2	42	1.9	360
11	5	11	13	25.2	39	0.0	0.0
11	5	11	14	38.7	31	1.7	45
11	5	11	15	25.2	33	2.8	315
11	5	11	16	24.3	38	1.9	45
11	5	11	17	23.5	17	8.0	248
11	5	11	18	22.8	17	8.0	248
11	5	11	19	21.4	48	2.8	315
11	5	11	20	20.3	55	1.1	360
11	5	11	21	20.1	59	0.0	0.0
11	5	11	22	19.5	62	0.0	0.0
11	5	11	23	17.2	68	2.8	270
11	5	11	24	15.3	69	0.0	0.0
11	5	12	1	11.2	70	1.7	45
11	5	12	2	10.8	71	0.0	0.0
11	5	12	3	9.5	72	1.9	315
11	5	12	4	20.7	73	2.2	45
11	5	12	5	10.5	65	0.0	0.0
11	5	12	6	15.6	61	1.9	270

11	5	12	7	18.2	59	0.0	0.0
11	5	12	8	20.6	32	8.0	270
11	5	12	9	22.3	32	8.0	270.0
11	5	12	10	23.6	49	1.1	68
11	5	12	11	24.5	46	2.8	315
11	5	12	12	25.8	42	2.2	45
11	5	12	13	26.2	35	1.7	315
11	5	12	14	38.0	31	0.0	0.0
11	5	12	15	26.3	32	1.9	270
11	5	12	16	25.4	34	2.2	90
11	5	12	17	34.2	20	4.0	270
11	5	12	18	33.2	20	4.0	270
11	5	12	19	31.2	46	1.1	315
11	5	12	20	35.3	52	1.7	68
11	5	12	21	38.6	59	0.0	0.0
11	5	12	22	37.9	62	2.2	270
11	5	12	23	36.5	65	0.0	0.0
11	5	12	24	35.3	69	1.9	315
11	5	13	1	34.2	76	0.0	0.0
11	5	13	2	39.9	78	1.9	270
11	5	13	3	39.5	80	0.0	0.0
11	5	13	4	39.1	82	2.2	45
11	5	13	5	35.8	61	1.1	90
11	5	13	6	36.4	49	2.2	315
11	5	13	7	37.6	46	2.8	360
11	5	13	8	38.5	45	0.0	0.0
11	5	13	9	39.3	41	0.0	0.0
11	5	13	10	38.4	38	2.3	270
11	5	13	11	41.2	35	1.9	315
11	5	13	12	42.6	32	2.8	68
11	5	13	13	44.5	25	0.0	0.0
11	5	13	14	36.4	15	1.9	270
11	5	13	15	35.2	17	0.0	0.0
11	5	13	16	34.3	18	2.8	360

11	5	13	17	33.5	19	0.0	0.0
11	5	13	18	39.8	22	2.2	270
11	5	13	19	41.4	23	0.0	0.0
11	5	13	20	40.3	25	2.9	360
11	5	13	21	40.1	29	1.1	315
11	5	13	22	39.8	31	2.2	90
11	5	13	23	39.6	35	1.4	270
11	5	13	24	39.2	38	0.0	0.0
11	5	14	1	35.4	84	2.8	45
11	5	14	2	39.2	85	2.2	315
11	5	14	3	40.3	87	0.0	0.0
11	5	14	4	38.9	88	1.4	270
11	5	14	5	42.5	85	2.2	45
11	5	14	6	34.6	81	0.0	0.0
11	5	14	7	37.6	78	2.2	315
11	5	14	8	38.5	72	1.1	360
11	5	14	9	39.3	65	0.0	0.0
11	5	14	10	20.4	62	1.7	315
11	5	14	11	21.2	59	0.0	0.0
11	5	14	12	22.6	52	1.9	270
11	5	14	13	24.5	49	0.0	0.0
11	5	14	14	27.5	45	2.2	90
11	5	14	15	25.2	51	0.0	0.0
11	5	14	16	24.3	57	1.9	360
11	5	14	17	23.5	66	1.4	315
11	5	14	18	22.8	69	2.2	270
11	5	14	19	21.4	75	0.0	0.0
11	5	14	20	20.3	78	2.8	315
11	5	14	21	18.2	80	1.1	45
11	5	14	22	16.2	82	0.0	0.0
11	5	14	23	14.3	85	2.8	90
11	5	14	24	12.1	86	1.9	360
11	5	15	1	18.5	47	1.1	270
11	5	15	2	16.2	51	2.2	180

11	5	15	3	15.4	53	2.8	45
11	5	15	4	14.9	55	1.7	180
11	5	15	5	16.8	52	0.0	0.0
11	5	15	6	17.5	49	2.8	360
11	5	15	7	18.9	44	1.9	180
11	5	15	8	20.2	38	2.8	45
11	5	15	9	21.6	35	0.0	0.0
11	5	15	10	22.8	31	3.1	270
11	5	15	11	23.7	29	0.0	0.0
11	5	15	12	24.5	26	1.9	180
11	5	15	13	25.7	23	0.0	0.0
11	5	15	14	26.8	18	2.2	360
11	5	15	15	26.4	19	0.0	0.0
11	5	15	16	25.2	21	2.8	270
11	5	15	17	24.3	22	0.0	0.0
11	5	15	18	23.2	25	2.2	45
11	5	15	19	22.4	27	3.1	23
11	5	15	20	20.5	29	2.8	180
11	5	15	21	20.1	30	0.0	0.0
11	5	15	22	19.8	35	1.7	270
11	5	15	23	19.5	37	0.0	0.0
11	5	15	24	18.5	40	1.9	180
11	5	16	1	17.5	42	2.8	360
11	5	16	2	15.2	44	1.9	45
11	5	16	3	14.1	46	0.0	0.0
11	5	16	4	13.2	52	2.8	45
11	5	16	5	14.5	50	0.0	0.0
11	5	16	6	15.1	49	2.8	180
11	5	16	7	16.2	46	0.0	0.0
11	5	16	8	17.3	45	2.2	270
11	5	16	9	18.1	41	0.0	0.0
11	5	16	10	19.5	38	1.9	45
11	5	16	11	20.1	35	0.0	0.0
11	5	16	12	21.6	32	1.9	270

11	5	16	13	22.3	25	0.0	0.0
11	5	16	14	23.4	15	2.8	180
11	5	16	15	20.2	25	1.9	23
11	5	16	16	18.1	35	0.0	0.0
11	5	16	17	16.5	45	2.2	180
11	5	16	18	14.3	56	1.9	45
11	5	16	19	12.1	69	0.0	0.0
11	5	16	20	10.5	82	2.8	360
11	5	16	21	10.1	86	0.0	0.0
11	5	16	22	9.8	89	2.2	270
11	5	16	23	9.5	91	0.0	0.0
11	5	16	24	9.0	93	1.9	45
11	5	17	1	8.5	95	0.0	0.0
11	5	17	2	8.1	97	1.7	180
11	5	17	3	7.9	98	2.8	270
11	5	17	4	5.9	99	0.0	0.0
11	5	17	5	8.9	98	0.0	0.0
11	5	17	6	10.2	96	1.9	45
11	5	17	7	11.5	95	0.0	0.0
11	5	17	8	12.3	94	2.8	45
11	5	17	9	14.3	88	0.0	0.0
11	5	17	10	15.6	85	0.0	0.0
11	5	17	11	18.3	81	1.9	360
11	5	17	12	20.2	78	2.2	270
11	5	17	13	21.5	71	0.0	0.0
11	5	17	14	22.4	59	2.8	45
11	5	17	15	21.8	60	3.1	135
11	5	17	16	20.8	61	2.8	23
11	5	17	17	19.6	63	0.0	0.0
11	5	17	18	19.1	65	2.8	270
11	5	17	19	18.5	68	3.1	180
11	5	17	20	17.9	69	2.2	45
11	5	17	21	17.4	70	1.4	135
11	5	17	22	16.8	72	1.9	23

11	5	17	23	16.5	73	0.0	0.0
11	5	17	24	15.8	74	2.2	270
11	5	18	1	14.3	71	0.0	0.0
11	5	18	2	13.2	68	1.7	360
11	5	18	3	12.5	63	2.2	135
11	5	18	4	11.1	61	1.1	45
11	5	18	5	13.5	59	0.0	0
11	5	18	6	14.6	58	0.0	0.0
11	5	18	7	16.8	56	2.2	135
11	5	18	8	18.5	55	1.9	360
11	5	18	9	19.6	50	0.0	0.0
11	5	18	10	20.5	49	2.8	45
11	5	18	11	21.6	45	2.2	180
11	5	18	12	25.2	42	3.1	270
11	5	18	13	26.2	39	1.9	135
11	5	18	14	27.3	30	0.0	0.0
11	5	18	15	26.5	35	2.8	360
11	5	18	16	25.9	39	1.9	45
11	5	18	17	23.5	41	0.0	0.0
11	5	18	18	22.1	42	2.2	23
11	5	18	19	20.5	45	0.0	0
11	5	18	20	19.8	49	0.0	0.0
11	5	18	21	18.6	51	2.8	45
11	5	18	22	17.5	53	2.2	270
11	5	18	23	16.5	55	1.4	360
11	5	18	24	16.1	60	1.9	135
11	5	19	1	15.8	65	2.8	45
11	5	19	2	14.3	67	0.0	0.0
11	5	19	3	14.1	69	1.9	23
11	5	19	4	22.8	72	0.0	0.0
11	5	19	5	13.8	69	1.7	270
11	5	19	6	14.5	65	1.9	360
11	5	19	7	15.6	61	0.0	0.0
11	5	19	8	16.9	59	4.0	180

11	5	19	9	18.5	59	4.0	180.0
11	5	19	10	19.6	45	4.0	360
11	5	19	11	22.5	41	0.0	0.0
11	5	19	12	24.3	32	1.4	270
11	5	19	13	26.2	30	3.1	23
11	5	19	14	38.2	29	1.4	180
11	5	19	15	25.6	32	2.2	45
11	5	19	16	24.1	34	0.0	0.0
11	5	19	17	23.4	33	4.0	135
11	5	19	18	21.1	33	4.0	135
11	5	19	19	20.5	46	0.0	0.0
11	5	19	20	18.9	49	2.2	270
11	5	19	21	17.5	51	0.0	0.0
11	5	19	22	16.3	53	3.1	45
11	5	19	23	15.2	54	2.8	360
11	5	19	24	14.8	56	1.9	135
11	5	20	1	14.2	47	2.2	23
11	5	20	2	13.5	51	0.0	0.0
11	5	20	3	13.1	53	1.9	270
11	5	20	4	22.5	62	2.8	225
11	5	20	5	13.9	61	0.0	0.0
11	5	20	6	14.5	60	2.2	360
11	5	20	7	16.2	59	0.0	0.0
11	5	20	8	18.5	33	0.0	0
11	5	20	9	20.6	33	0.0	0.0
11	5	20	10	22.5	51	1.1	135
11	5	20	11	23.7	49	1.4	23
11	5	20	12	25.6	47	0.0	0.0
11	5	20	13	26.8	45	1.4	270
11	5	20	14	38.2	41	0.0	0
11	5	20	15	28.2	35	0.0	0.0
11	5	20	16	26.5	39	0.0	0.0
11	5	20	17	24.2	19	4.0	225
11	5	20	18	22.1	19	4.0	225

11	5	20	19	20.2	43	0.0	0.0
11	5	20	20	17.9	45	1.9	270
11	5	20	21	17.5	49	2.8	23
11	5	20	22	17.4	52	3.1	135
11	5	20	23	16.5	55	2.2	45
11	5	20	24	16.3	59	1.7	360
11	5	21	1	14.5	62	0.0	0.0
11	5	21	2	13.5	63	0.0	0.0
11	5	21	3	13.2	64	2.2	45
11	5	21	4	12.2	65	0.0	0.0
11	5	21	5	14.5	60	2.8	270
11	5	21	6	15.6	55	1.9	23
11	5	21	7	17.5	43	0.0	0.0
11	5	21	8	18.6	41	2.8	135
11	5	21	9	19.5	38	0.0	0
11	5	21	10	20.8	35	1.4	225
11	5	21	11	22.2	33	0.0	0.0
11	5	21	12	23.4	25	1.7	360
11	5	21	13	24.2	22	0.0	0.0
11	5	21	14	24.7	17	1.9	270
11	5	21	15	24.1	18	2.8	45
11	5	21	16	23.2	20	1.9	135
11	5	21	17	22.4	21	1.7	360
11	5	21	18	21.2	22	0.0	0.0
11	5	21	19	20.8	25	1.9	270
11	5	21	20	19.5	28	0.0	0.0
11	5	21	21	18.5	32	1.9	45
11	5	21	22	17.3	35	0.0	0.0
11	5	21	23	16.4	38	2.2	23
11	5	21	24	16.1	41	2.9	135
11	5	22	1	15.8	42	0.0	0.0
11	5	22	2	15.3	44	2.8	270
11	5	22	3	14.8	46	0.0	0.0
11	5	22	4	14.1	52	2.2	23

11	5	22	5	15.8	50	1.7	225
11	5	22	6	16.4	49	1.9	45
11	5	22	7	17.6	46	1.9	360
11	5	22	8	18.5	45	2.2	135
11	5	22	9	19.3	41	1.9	270
11	5	22	10	20.4	38	0.0	0.0
11	5	22	11	21.2	35	1.7	23
11	5	22	12	22.6	32	0.0	0.0
11	5	22	13	24.5	25	1.4	45
11	5	22	14	26.4	15	1.9	225
11	5	22	15	25.2	17	2.2	360
11	5	22	16	24.3	18	0.0	0.0
11	5	22	17	23.5	19	1.9	270
11	5	22	18	22.8	22	2.2	135
11	5	22	19	21.4	23	2.8	45
11	5	22	20	20.3	25	0.0	0.0
11	5	22	21	20.1	29	2.8	360
11	5	22	22	19.8	31	2.2	338
11	5	22	23	19.6	35	1.4	225
11	5	22	24	19.2	38	1.7	45
11	5	23	1	18.8	48	0.0	0.0
11	5	23	2	17.5	51	1.4	270
11	5	23	3	16.3	53	1.9	45
11	5	23	4	15.3	62	1.4	45
11	5	23	5	16.8	52	1.9	135
11	5	23	6	17.5	49	1.1	23
11	5	23	7	18.9	44	2.2	225
11	5	23	8	20.2	38	1.7	360
11	5	23	9	21.6	35	0.0	0.0
11	5	23	10	22.8	31	1.9	270
11	5	23	11	23.7	29	1.7	338
11	5	23	12	24.5	26	2.2	23
11	5	23	13	25.7	23	2.2	135
11	5	23	14	26.9	20	0.0	0.0

11	5	23	15	18.5	29	1.9	360
11	5	23	16	17.2	35	0.0	0
11	5	23	17	15.1	42	1.1	225
11	5	23	18	13.2	44	1.7	360
11	5	23	19	12.8	46	0.0	0.0
11	5	23	20	12.1	59	1.9	270
11	5	23	21	11.9	65	0.0	0.0
11	5	23	22	11.1	72	2.2	45
11	5	23	23	10.9	79	1.9	225
11	5	23	24	10.5	82	1.1	23
11	5	24	1	10.1	85	0.0	0.0
11	5	24	2	9.8	93	2.8	45
11	5	24	3	9.1	96	1.4	135
11	5	24	4	8.4	98	1.1	45
11	5	24	5	11.2	95	2.8	270
11	5	24	6	11.9	92	1.9	225
11	5	24	7	12.1	90	1.9	45
11	5	24	8	12.9	87	2.2	338
11	5	24	9	13.5	75	1.4	360
11	5	24	10	14.2	71	2.2	135
11	5	24	11	16.2	69	2.8	45
11	5	24	12	18.5	65	2.8	225
11	5	24	13	20.2	55	1.7	270
11	5	24	14	22.2	46	0.0	0.0
11	5	24	15	20.5	49	2.5	360
11	5	24	16	19.5	50	1.9	45
11	5	24	17	18.2	51	0.0	0.0
11	5	24	18	17.4	58	2.2	23
11	5	24	19	16.9	62	1.7	270
11	5	24	20	15.5	69	1.4	338
11	5	24	21	14.9	71	2.8	360
11	5	24	22	14.1	74	1.4	135
11	5	24	23	13.9	76	2.2	45
11	5	24	24	12.2	79	1.4	225

11	5	25	1	12.1	80	1.1	270
11	5	25	2	11.9	81	0.0	0.0
11	5	25	3	11.1	82	1.1	360
11	5	25	4	10.9	84	1.4	45
11	5	25	5	12.2	81	1.1	338
11	5	25	6	13.2	75	1.9	45
11	5	25	7	15.2	68	0.0	0.0
11	5	25	8	16.2	60	1.9	270
11	5	25	9	18.3	59	1.7	135
11	5	25	10	20.2	51	0.0	0
11	5	25	11	21.6	49	1.9	45
11	5	25	12	22.2	47	2.2	360
11	5	25	13	24.6	40	0.0	0.0
11	5	25	14	25.9	31	1.4	45
11	5	25	15	23.5	32	0.0	0.0
11	5	25	16	21.4	36	2.2	270
11	5	25	17	20.4	39	2.8	338
11	5	25	18	19.5	42	1.4	45
11	5	25	19	19.0	43	1.1	360
11	5	25	20	18.5	47	1.9	135
11	5	25	21	18.1	59	2.2	225
11	5	25	22	17.9	62	1.1	270
11	5	25	23	17.5	63	0.0	0.0
11	5	25	24	16.8	68	1.9	23
11	5	26	1	16.2	65	0.0	0.0
11	5	26	2	15.5	61	1.9	45
11	5	26	3	14.8	59	1.7	338
11	5	26	4	13.5	69	1.1	45
11	5	26	5	15.9	64	1.7	270
11	5	26	6	17.5	61	1.9	225
11	5	26	7	20.6	58	1.9	45
11	5	26	8	22.5	54	2.2	360
11	5	26	9	23.6	51	1.1	135
11	5	26	10	24.8	50	1.9	270

11	5	26	11	25.9	49	0.0	0.0
11	5	26	12	26.3	42	1.4	23
11	5	26	13	28.9	39	0.0	0.0
11	5	26	14	29.9	31	1.9	360
11	5	26	15	28.5	33	2.8	225
11	5	26	16	26.5	35	1.7	270
11	5	26	17	24.2	37	0.0	0.0
11	5	26	18	23.9	42	2.2	360
11	5	26	19	22.5	45	1.7	135
11	5	26	20	21.6	49	0.0	0
11	5	26	21	20.1	52	1.9	338
11	5	26	22	19.2	55	1.1	270
11	5	26	23	18.5	57	0.0	0.0
11	5	26	24	18.2	59	1.7	45
11	5	27	1	17.5	62	2.2	360
11	5	27	2	16.8	64	2.8	270
11	5	27	3	15.2	66	2.2	23
11	5	27	4	24.6	69	0.0	0.0
11	5	27	5	15.6	60	0.0	0
11	5	27	6	16.8	59	1.4	135
11	5	27	7	18.5	55	0.0	0.0
11	5	27	8	21.5	44	4.0	270
11	5	27	9	23.5	44	4.0	45
11	5	27	10	25.4	42	1.4	338
11	5	27	11	27.4	39	2.2	23
11	5	27	12	28.4	35	1.7	270
11	5	27	13	29.4	31	1.4	225
11	5	27	14	39.0	28	0.0	0.0
11	5	27	15	28.5	30	0.0	0.0
11	5	27	16	26.4	31	2.8	360
11	5	27	17	25.2	41	6.0	23
11	5	27	18	23.2	41	6.0	270
11	5	27	19	21.3	39	0.0	0.0
11	5	27	20	20.5	42	0.0	0

11	5	27	21	19.5	45	2.8	135
11	5	27	22	18.6	52	3.3	338
11	5	27	23	17.8	56	3.1	270
11	5	27	24	16.9	59	0.0	0.0
11	5	28	1	16.5	65	1.4	225
11	5	28	2	16.2	72	1.1	270
11	5	28	3	15.5	75	2.2	360
11	5	28	4	25.4	77	0.0	0
11	5	28	5	15.6	75	0.0	0.0
11	5	28	6	18.6	71	2.2	270
11	5	28	7	20.6	69	1.4	45
11	5	28	8	23.5	53	4.0	135
11	5	28	9	25.3	53	4.0	135
11	5	28	10	25.8	61	2.8	270
11	5	28	11	27.9	60	1.7	338
11	5	28	12	28.6	59	0.0	0
11	5	28	13	29.1	55	1.1	360
11	5	28	14	35.1	51	1.4	45
11	5	28	15	30.1	62	0.0	0.0
11	5	28	16	29.6	74	2.8	23
11	5	28	17	28.5	48	4.0	180.0
11	5	28	18	27.4	48	4.0	180
11	5	28	19	24.3	83	2.2	360
11	5	28	20	22.5	85	1.9	270
11	5	28	21	21.6	86	1.1	23
11	5	28	22	19.8	88	1.7	270
11	5	28	23	17.4	90	2.8	360
11	5	28	24	16.3	92	1.9	45
11	5	29	1	14.9	93	2.2	45
11	5	29	2	13.5	93	1.7	270
11	5	29	3	13.2	94	2.8	270
11	5	29	4	12.9	95	1.4	23
11	5	29	5	14.5	85	1.7	113
11	5	29	6	15.6	70	2.2	45

11	5	29	7	17.5	65	0.0	0.0
11	5	29	8	18.6	61	1.9	360
11	5	29	9	19.5	52	0.0	0.0
11	5	29	10	20.8	49	1.1	270
11	5	29	11	22.2	45	2.8	45
11	5	29	12	23.4	41	1.4	270
11	5	29	13	24.2	38	2.2	338
11	5	29	14	24.7	35	1.4	360
11	5	29	15	24.1	37	1.7	113
11	5	29	16	23.2	41	0.0	0
11	5	29	17	22.4	43	2.8	270
11	5	29	18	21.2	46	3.3	360
11	5	29	19	20.8	49	0.0	0.0
11	5	29	20	19.5	51	1.9	270
11	5	29	21	18.5	53	1.4	338
11	5	29	22	17.3	55	0.0	0
11	5	29	23	16.4	56	1.4	270
11	5	29	24	16.1	58	1.9	360
11	5	30	1	15.8	59	2.8	113
11	5	30	2	15.3	60	1.9	270
11	5	30	3	14.8	62	2.2	23
11	5	30	4	14.1	63	0.0	0.0
11	5	30	5	15.8	52	2.2	360
11	5	30	6	16.4	49	2.8	270
11	5	30	7	17.6	46	1.9	23
11	5	30	8	18.5	45	1.4	270
11	5	30	9	19.3	41	1.9	360
11	5	30	10	20.4	38	1.4	113
11	5	30	11	21.2	35	0.0	0.0
11	5	30	12	22.6	32	1.9	270
11	5	30	13	24.5	25	1.7	270
11	5	30	14	26.4	20	0.0	0
11	5	30	15	20.2	35	1.4	360
11	5	30	16	18.5	45	1.1	113

11	5	30	17	17.2	55	0.0	0.0
11	5	30	18	16.3	65	2.8	270
11	5	30	19	15.8	72	0.0	0
11	5	30	20	14.2	79	1.1	45
11	5	30	21	13.9	82	1.9	360
11	5	30	22	13.2	85	2.8	45
11	5	30	23	12.1	89	1.9	270
11	5	30	24	11.8	91	1.4	270
11	5	31	1	11.1	94	0.0	0.0
11	5	31	2	10.5	96	0.0	0.0
11	5	31	3	10.1	98	1.4	360
11	5	31	4	9.8	99	0.0	0.0
11	5	31	5	10.2	98	1.1	113
11	5	31	6	11.2	97	0.0	0
11	5	31	7	12.5	97	1.9	270
11	5	31	8	13.2	97	2.2	270
11	5	31	9	14.5	95	1.9	360
11	5	31	10	15.6	90	0.0	0.0
11	5	31	11	18.5	85	1.9	45
11	5	31	12	20.2	81	2.2	113
11	5	31	13	20.8	79	0.0	0
11	5	31	14	21.6	71	0.0	0.0
11	5	31	15	20.5	72	1.9	270
11	5	31	16	20.1	73	1.4	270
11	5	31	17	19.8	75	0.0	0
11	5	31	18	18.5	76	2.2	315
11	5	31	19	17.2	79	1.1	45
11	5	31	20	16.1	81	0.0	0.0
11	5	31	21	15.2	83	1.9	360
11	5	31	22	14.2	85	2.8	270
11	5	31	23	13.1	89	1.7	23
11	5	31	24	12.2	90	0.0	0.0
11	6	1	1	12.1	91	2.2	360
11	6	1	2	11.8	92	1.9	270

11	6	1	3	11.5	92	2.8	45
11	6	1	4	10.6	93	2.2	315
11	6	1	5	15.8	91	2.8	23
11	6	1	6	16.4	89	1.4	113
11	6	1	7	17.6	88	1.4	45
11	6	1	8	18.5	86	1.1	360
11	6	1	9	19.3	80	2.2	270
11	6	1	10	20.4	79	3.1	45
11	6	1	11	21.2	75	0.0	0.0
11	6	1	12	22.6	71	1.9	360
11	6	1	13	22.9	68	0.0	0.0
11	6	1	14	23.5	55	1.4	315
11	6	1	15	22.9	58	1.1	23
11	6	1	16	21.4	60	2.2	45
11	6	1	17	20.8	62	0.0	0.0
11	6	1	18	20.5	65	1.1	360
11	6	1	19	19.8	69	2.8	270
11	6	1	20	19.3	72	1.1	45
11	6	1	21	18.5	74	1.7	23
11	6	1	22	18.1	75	0.0	0.0
11	6	1	23	17.9	76	1.4	270
11	6	1	24	17.6	77	2.8	360
11	6	2	1	16.8	79	1.9	315
11	6	2	2	16.3	81	1.7	113
11	6	2	3	15.5	81	2.2	23
11	6	2	4	28.0	82	0.0	0.0
11	6	2	5	15.8	75	1.7	270
11	6	2	6	16.4	65	2.8	360
11	6	2	7	17.6	54	12.0	45
11	6	2	8	18.5	54	12.0	45
11	6	2	9	20.5	41	3.3	23
11	6	2	10	22.9	38	1.9	113
11	6	2	11	24.5	35	0.0	0.0
11	6	2	12	26.5	32	1.4	360

11	6	2	13	29.5	25	0.0	0.0
11	6	2	14	41	20	0.0	0.0
11	6	2	15	26.5	26	2.8	270
11	6	2	16	24.3	31	1.9	293
11	6	2	17	23.5	47	5.0	90
11	6	2	18	22.8	47	5.0	90
11	6	2	19	21.4	45	1.9	293
11	6	2	20	20.3	52	1.1	270
11	6	2	21	20.1	54	2.2	113
11	6	2	22	19.8	56	1.9	45
11	6	2	23	19.6	62	2.8	360
11	6	2	24	19.4	66	0.0	0.0
11	6	3	1	18.5	68	1.4	45
11	6	3	2	17.5	71	2.5	315
11	6	3	3	16.3	73	1.9	293
11	6	3	4	31	75	2.2	270
11	6	3	5	16.8	62	0.0	0.0
11	6	3	6	17.5	61	2.8	45
11	6	3	7	18.9	59	0.0	0.0
11	6	3	8	20.2	53	0.0	0
11	6	3	9	21.6	53	0.0	0.0
11	6	3	10	22.8	38	1.9	293
11	6	3	11	26.5	35	1.9	270
11	6	3	12	28.5	32	2.2	45
11	6	3	13	29.5	26	0.0	0.0
11	6	3	14	42.0	21	1.9	360
11	6	3	15	28.5	25	1.1	315
11	6	3	16	27.2	29	1.7	45
11	6	3	17	24.3	46	5.0	315
11	6	3	18	23.2	46	5.0	315
11	6	3	19	22.4	49	1.9	360
11	6	3	20	21.5	52	0.0	0.0
11	6	3	21	20.1	55	3.3	270
11	6	3	22	19.8	59	2.8	315

11	6	3	23	19.5	62	1.9	360
11	6	3	24	18.9	65	2.8	293
11	6	4	1	16.5	69	2.2	113
11	6	4	2	14.6	71	1.4	270
11	6	4	3	12.4	72	0.0	0.0
11	6	4	4	11.0	73	2.8	45
11	6	4	5	12.5	65	1.1	45
11	6	4	6	13.8	55	0.0	0.0
11	6	4	7	14.2	45	1.1	360
11	6	4	8	15.4	36	1.9	315
11	6	4	9	18.2	31	1.1	293
11	6	4	10	20.5	29	1.4	45
11	6	4	11	21.6	25	2.2	270
11	6	4	12	23.8	21	2.5	45
11	6	4	13	24.2	19	0.0	0.0
11	6	4	14	26.7	18	2.2	360
11	6	4	15	23.2	23	1.9	293
11	6	4	16	20.5	29	1.1	90
11	6	4	17	28.9	36	0.0	0.0
11	6	4	18	26.2	42	2.2	360
11	6	4	19	25.8	46	1.9	315
11	6	4	20	25.5	49	1.4	45
11	6	4	21	25.1	52	2.8	270
11	6	4	22	24.9	56	0.0	0.0
11	6	4	23	24.5	59	1.9	45
11	6	4	24	24.2	62	1.7	90
11	6	5	1	23.8	68	2.2	293
11	6	5	2	23.5	75	2.8	360
11	6	5	3	33.1	84	0.0	0.0
11	6	5	4	32.9	86	2.2	90
11	6	5	5	33.5	82	1.1	45
11	6	5	6	36.9	81	1.7	315
11	6	5	7	38.5	74	1.9	68
11	6	5	8	30.6	70	2.8	270

11	6	5	9	32.5	65	1.1	90
11	6	5	10	24.3	62	2.2	360
11	6	5	11	26.5	59	1.1	293
11	6	5	12	27.5	57	2.8	45
11	6	5	13	28.5	55	0.0	0.0
11	6	5	14	29.5	53	2.8	360
11	6	5	15	28.4	62	0.0	0.0
11	6	5	16	27.3	68	1.1	315
11	6	5	17	25.4	72	1.9	360
11	6	5	18	24.2	76	1.4	293
11	6	5	19	23.2	78	2.8	270
11	6	5	20	22.4	80	2.2	90
11	6	5	21	21.2	82	0.0	0.0
11	6	5	22	20.1	84	1.9	360
11	6	5	23	29.4	86	0.0	0.0
11	6	5	24	28.5	87	1.7	270
11	6	6	1	27.6	89	1.7	45
11	6	6	2	25.2	91	2.2	360
11	6	6	3	32.8	92	1.4	315
11	6	6	4	30.9	94	0.0	0.0
11	6	6	5	33.5	90	2.8	360
11	6	6	6	36.5	86	0.0	0
11	6	6	7	21.5	80	2.8	270
11	6	6	8	22.2	78	1.4	45
11	6	6	9	24.5	75	0.0	0.0
11	6	6	10	26.8	71	2.2	360
11	6	6	11	27.2	67	0.0	0.0
11	6	6	12	28.5	65	1.9	270
11	6	6	13	29.6	63	2.8	293
11	6	6	14	30.0	59	2.2	360
11	6	6	15	29.2	65	2.8	90
11	6	6	16	28.6	72	0.0	0.0
11	6	6	17	25.2	76	1.7	45
11	6	6	18	23.1	77	2.8	270

11	6	6	19	20.2	79	3.1	68
11	6	6	20	18.6	80	2.5	45
11	6	6	21	16.5	82	0.0	0
11	6	6	22	15.2	84	2.2	360
11	6	6	23	14.3	86	2.8	315
11	6	6	24	13.2	87	2.8	270
11	6	7	1	12.5	88	3.1	90
11	6	7	2	12.1	89	1.1	360
11	6	7	3	11.8	91	0.0	0.0
11	6	7	4	30	92	1.1	68
11	6	7	5	11.9	89	0.0	0.0
11	6	7	6	12.5	85	2.8	270
11	6	7	7	12.9	80	0.0	0.0
11	6	7	8	13.2	50	0.0	0
11	6	7	9	15.9	50	7.0	45.0
11	6	7	10	18.9	69	2.2	360
11	6	7	11	20.5	65	2.8	315
11	6	7	12	25.3	61	1.9	90
11	6	7	13	27.3	59	0.0	0.0
11	6	7	14	42	35	0.0	0
11	6	7	15	25.3	36	0.0	0.0
11	6	7	16	24.2	37	1.9	270
11	6	7	17	23.1	45	16.0	90
11	6	7	18	22.2	45	16.0	90
11	6	7	19	21.2	45	1.9	45
11	6	7	20	20.1	49	0.0	0.0
11	6	7	21	19.5	52	0.0	0
11	6	7	22	19.0	55	1.7	360
11	6	7	23	18.5	59	0.0	0
11	6	7	24	18.1	72	2.2	68
11	6	8	1	14.9	82	0.0	0.0
11	6	8	2	13.5	89	1.7	45
11	6	8	3	13.2	95	0.0	0
11	6	8	4	27	98	0.0	0.0

11	6	8	5	14.5	95	2.2	360
11	6	8	6	15.6	92	2.8	270
11	6	8	7	17.5	88	1.7	45
11	6	8	8	18.6	47	5.0	90.0
11	6	8	9	19.5	47	5.0	90
11	6	8	10	20.8	79	1.9	360
11	6	8	11	22.2	65	1.4	315
11	6	8	12	23.4	55	1.1	45
11	6	8	13	25.8	41	0.0	0.0
11	6	8	14	39.0	20	1.7	90
11	6	8	15	24.1	21	2.2	45
11	6	8	16	23.2	22	2.8	315
11	6	8	17	22.4	43	14.0	68
11	6	8	18	21.2	43	14.0	68
11	6	8	19	20.8	27	0.0	0.0
11	6	8	20	19.5	30	2.2	68
11	6	8	21	18.5	32	0.0	0.0
11	6	8	22	17.3	35	1.9	360
11	6	8	23	16.4	38	1.9	315
11	6	8	24	16.1	41	0.0	0.0
11	6	9	1	15.8	42	1.9	68
11	6	9	2	15.3	44	0.0	0.0
11	6	9	3	14.8	46	1.4	270
11	6	9	4	14.1	52	0.0	0.0
11	6	9	5	15.8	50	1.1	68
11	6	9	6	16.4	49	2.2	315
11	6	9	7	17.6	46	0.0	0.0
11	6	9	8	18.5	45	3.1	360
11	6	9	9	19.3	41	2.8	45
11	6	9	10	20.4	38	2.2	270
11	6	9	11	21.2	35	2.5	315
11	6	9	12	22.6	32	0.0	0.0
11	6	9	13	24.5	25	2.2	360
11	6	9	14	26.4	15	3.1	90

11	6	9	15	25.2	17	1.7	68
11	6	9	16	24.3	18	0.0	0.0
11	6	9	17	23.5	19	1.1	360
11	6	9	18	22.8	22	0.0	0.0
11	6	9	19	21.4	23	1.7	68
11	6	9	20	20.3	25	2.2	315
11	6	9	21	20.1	29	1.7	270
11	6	9	22	19.8	31	1.1	315
11	6	9	23	19.6	35	1.9	90
11	6	9	24	19.2	38	1.9	360
11	6	10	1	18.8	55	2.2	45
11	6	10	2	17.5	64	0.0	0.0
11	6	10	3	16.3	68	2.2	270
11	6	10	4	14.9	72	0.0	0.0
11	6	10	5	16.8	65	1.9	0
11	6	10	6	17.5	58	0.0	0.0
11	6	10	7	18.9	55	1.9	90
11	6	10	8	20.2	48	2.2	90
11	6	10	9	21.6	45	2.8	0
11	6	10	10	22.8	41	1.4	315
11	6	10	11	23.7	38	2.2	270
11	6	10	12	24.5	34	2.2	45
11	6	10	13	25.7	31	0.0	0.0
11	6	10	14	31.2	28	1.4	360
11	6	10	15	26.4	30	0.0	0.0
11	6	10	16	25.2	32	1.1	315
11	6	10	17	24.3	35	0.0	0.0
11	6	10	18	23.2	42	1.9	68
11	6	10	19	32.4	49	2.2	270
11	6	10	20	37.5	52	2.8	45
11	6	10	21	37.1	59	1.1	315
11	6	10	22	39.8	62	0.0	0.0
11	6	10	23	39.5	69	2.8	0
11	6	10	24	38.9	72	0.0	0.0

11	6	11	1	38.5	74	1.9	270
11	6	11	2	37.9	75	0.0	0.0
11	6	11	3	36.8	77	1.7	315
11	6	11	4	35.6	78	2.2	360
11	6	11	5	26.9	75	1.9	315
11	6	11	6	28.5	68	1.4	68
11	6	11	7	20.6	59	1.1	45
11	6	11	8	22.5	50	0.0	0.0
11	6	11	9	23.1	49	1.9	68
11	6	11	10	24.2	42	2.2	45
11	6	11	11	25.6	35	0.0	0.0
11	6	11	12	27.8	31	1.9	360
11	6	11	13	28.2	29	0.0	0.0
11	6	11	14	29.8	25	1.7	270
11	6	11	15	27.2	29	2.8	315
11	6	11	16	24.3	30	1.9	45
11	6	11	17	23.5	33	2.2	225
11	6	11	18	22.8	45	2.2	68
11	6	11	19	34.4	48	2.8	315
11	6	11	20	30.3	55	1.1	360
11	6	11	21	37.1	59	0.0	0.0
11	6	11	22	39.5	62	0.0	0.0
11	6	11	23	47.2	68	2.8	68
11	6	11	24	45.3	69	0.0	0.0