

## **FOREWARD**

This report contains rapid EIA and EMP for the proposed Power plant of **capacity 180 MW of M/s Bajaj Hindusthan Ltd.** at Vill. Itai Maida, Block-Shriduttganj, Tehsil-Utraula, Distt.- Balrampur (U.P.).

For the purpose of the preparation of The Environmental Impact Statement, the check list of Ministry of Environment & forests notification on Environmental Impact Assessment of development projects, New Delhi. The EIA Notification (MoeF) So-1533, of 14.09.2006 has been taken as the basis.

The environmental parameters, such as the levels of pollutants and noise in ambient air, pollutants in ground and surface waters, have been determined by actual tests conducted in our own lab/site. The data of flora and Fauna, rainfall, wind direction and speed, temperature and humidity have been collected is actual on site. The present report is an interim report of EIA study based on field data obtained from (01 NOV, 2009 to 31 JAN, 2010). The Environmental Impact Statement identifies the various negative and positive environmental impacts of the project. It is based on the environmental impact analysis and studies. The Environmental management plan incorporates the measures, which are envisaged to mitigate the adverse environmental impacts as well as to enhance environmental and ecological values.

The reports has been prepared not only to meet the statutory requirement for the award of "No Objection Certificate" by the Pollution Control Board, but also to appraise the project proponent of the steps, which should be taken to minimize damages to environment and to enhance environmental and socio-economic.

There are many individual who have helped us in the preparation of this report are District Statistical Officer Balrampur, Block Office Shriduttganj, Director of Meteorological Department Lucknow, District forest officer, Balrampur deserve my special thanks.

*I am also thankful to **Dr. S. Prasad of Siva Test House, Patna** (Approved by MoeF and NABL) for their guidance and co-operation to prepare this report.*

I am also thankful to the Management of **M/S BAJAJ HINDUSTHAN LTD.** for giving to us this opportunity to prepare this report.

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LUCKNOW(U.P)

Date .....

# **CHAPTER-I**

## **INTRODUCTION**

### **1.1 Purpose of the Report :**

Bajaj Hindusthan Ltd. Proposes to install New Independed Power Project of capacity 180 MW Coal based plant at Vill. Itai Maida, Block-Shriduttganj, Tehsil-Utraula, Distt.- Balrampur (U.P.).

The proposed establishment falls under category B-1 Project as per Environmental Impact Assessment (EIA) notification SO1533, of 14.09.2006 which necessary obtaining the Environmental clearance from SEAC Uttar Pradesh.

As per the requirement of EIA notification BHL had submitted the necessary obligation to MoeF for approval of Terms of reference (TOR). The Terms of reference approved by SEAC, U.P. vide SEAC letter No. 38/Parya/SEAC/369/09 dated 06th January, 2010.

EIA report incorporating the Terms of reference is presented below.

### **1.2 Bajaj Hindusthan Ltd. Group & Power Scenario in Uttar Pradesh :**

Bajaj Hindusthan Ltd. belongs to the renowned "Bajaj Group" which was founded by the country's foremost industrial pioneers, Jamnalal Bajaj nearly a century ago. The Group comprises of Bajaj Hindusthan Ltd., Bajaj Hindusthan Sugar & Industries Ltd., Bajaj Eco-tec Products Ltd., Bajaj Consumer Care Ltd. and Bajaj Corp Ltd. The registered/corporate office of these Group Companies is situated in Mumbai.

#### **INDUSTRY LEADERSHIP:**

Bajaj Group, is leader in sugar, ethanol, and alcohol business. Besides, it has its major presence in Medium Density Fiber (MDF) and Particle Boards. The Group also has considerable experience in power generation and supply to grid.

Bajaj Hindusthan Ltd. (BHL) is the flagship company of Bajaj Group. BHL, with its strategic and aggressive expansion of sugar and ethanol production capacities over the last three years, has emerged as India's largest and world's fourth largest sugar producing company. BHL has also become the India's largest and world's 10th largest ethanol producing company.

BHL along with the other units managed by it has twelve sugar plants, located across the State of Uttar Pradesh (UP) with a total cane crushing capacity of 107,000 ton per day. Thus, BHL group currently produces nearly 1.6 million ton of sugar a year. BHL also has a capacity to produce 640000 liters of alcohol per day from its distilleries.

BHL has pioneered the India's bio-fuel (ethanol) program, producing/supplying currently around 160 million liters of ethanol to various oil companies in a year and thus, catering to nearly 20% of all India demand at 5% ethanol doping.

BHL, under its subsidiary, Bajaj Eco-tec Products Ltd. (BEPL) is now pioneering the manufacture of environment-friendly and completely wood-free Medium Density Fiber (MDF) Boards, Particle Boards, High Density Fiber (HDF) Boards (all both plain & pre-laminated) and Laminated Flooring, produced from sugarcane bagasse waste from its sugar mills. With three plants spread across UP, the Company commenced production MDF and Particle Boards. With a total manufacturing capacity of 210,000 M<sup>3</sup> per annum (160,000 M<sup>3</sup> of MDF Boards and 50,000 M<sup>3</sup> of Particle Boards), these wood-substitute products will meet the rapidly growing demand of the construction and furniture sectors, conserving valuable forests and preserving the precious environment. It reflects the environmental consciousness of the Bajaj Hindusthan Group that BEPL's production of 1,60,000 M<sup>3</sup> of MDF Boards will save an estimated 1,00,000 mature trees from being cut down in a year.+

Bajaj Consumer Care. Ltd., (BCCL) a renowned FMCG company has to its credit of being the second largest company in hair oil segment of FMCG. Bajaj Corp Ltd. is its subsidiary.

### **HANDS ON EXPERIENCE IN POWER GENERATION**

Bajaj Group's flagship company BHL & two other plants managed by BHL, presently have a combined cogeneration capacity of approx. 355 MW at its sugar plants and after meeting its in house captive requirements, surplus power of approx. 90 MW is being exported to the UP State Grid. It could be seen that, BHL does have to its credit, rich experience in power generation and supply.

### **PROFESSIONAL TEAM OF MANAGERS**

All the projects within the group of BHL shall be executed from its corporate office located in NOIDA and the proposed power plant proposals also will be executed from NOIDA only. Therefore Bajaj Group has got a highly experienced team of professionals, who are capable of executing large projects efficiently, effectively and well in time. The Group's ability to manage each of its business lines and its leadership in each of these segments is clear indication of the capability of its highly experienced and skilled professionals. Group's ability to manage its business in diversified areas such as Sugar, Ethanol, FMCG, MDF and Cogeneration can be leveraged in the power sector as well. In addition to the existing strength, Group has already set up and is in the process of expanding the project organization comprising of highly skilled professionals with vast experience in power project development, execution and operations.

### **ENVIRONMENT-FRIENDLY GROUP**

Environmental friendliness is at the core value of the Bajaj Group. This can be evidenced from its flagship company, BHL's endeavour of promoting eco-friendly substitutes for non-renewable fossil fuels. The company has the installed capacity of approximately 355 MW of Bagasse based cogeneration projects which have replaced the fossil fuel based

energy. Further, BEPL has also endeavored in bring out a wood-substitute MDF Board manufactured from Bagasse, which another example of etc, eco-friendly strategy.

### **FINANCIAL CAPABILITY OF GROUP:**

Bajaj Group has financial strength and capacity to undertake large projects, including power projects. The select data in terms of Net worth, Revenue and Internal Accruals may be briefed as follows:

- **Net worth;** Group's current net worth is over Rs. 3,351 Crores (after the recent QIP by BHL). It may be pertinent to mention that the net worth of Rs. 3,351 Crores qualifies us for around 6700 MW as per the competitive bidding requirements as illustrated below:
- **Profitability and Internal Accruals:** The companies in the Groups are profitable and have good internal accruals. Therefore, Group would be able to generate more than Rs. 1500 Crores

### **DIVERSIFICATION INTO POWER GENERATION:**

With the above background and with hands on experience in power generation and export of power from its captive plants to State Grid, Bajaj Group is contemplating diversification in to Power generation.

As environmental friendliness is one of the core values of the company, the company would undertake environmental friendly technology for the proposed power project that may be economically viable.

### **POWER SCENARIO IN UTTAR PRADESH AND NORTHERN REGION.**

Northern region and the State of UP are short of power to the extent of 10.5% & 18.5% energy respectively and 16.7 & 22.7 % peaking energy respectively (April-June 09 as published by CEA Planning wing). As all our units (existing and proposed) are located in the Northern Region, the addition of another 90 MW in the 11th plan period will help the region significantly.

**UTTAR PRADESH****1. INSTALLED CAPACITY (AT THE END OF 10TH PLAN) (FIGURES IN MW)**

Sector	Hydro	Thermal				Nuclear	R.E.S. (MNRE)	Total
		Coal	Gas	Diesel	Total			
STATE	541.1	4380	0.0	0.0	4380	0.0	11.4	4932.5
PRIVATE	0.0	0.0	0.0	0.0	0.0	0.0	78.5	78.5
CENTRAL	1073	2381.1	550	0.0	2941.1	204	0.0	4218.1
<b>TOTAL</b>	<b>1614.1</b>	<b>6771.1</b>	<b>550</b>	<b>0.0</b>	<b>7321.1</b>	<b>204</b>	<b>89.9</b>	<b>9225.0</b>

**2. INSTALLED CAPACITY AS ON 30.6.2009 (FIGURES IN MW)**

Sector	Hydro	Thermal				Nuclear	R.E.S. (MNRE)	Total
		Coal	Gas	Diesel	Total			
STATE	527.4	4120	0.0	0.0	4120	0.0	25.1	4872.5
PRIVATE	0.0	0.0	0.0	0.0	0.0	0.0	377.9	377.9
CENTRAL	1073	2895.8	550	0.0	3245.8	204	0.0	4522.3
<b>TOTAL</b>	<b>1600.3</b>	<b>6815.8</b>	<b>550</b>	<b>0.0</b>	<b>7365.8</b>	<b>204</b>	<b>403</b>	<b>9573.1</b>

**3. ACTUAL POWER SUPPLY POSITION**

Period	Peak Demand (MW)	Peak Met (MW)	Peak deficit/ Surplus (MW)	Peak Deficit/ Surplus (%)	Energy Requirement (MU)	Energy Availability (MU)	Energy Deficit/ Surplus (MU)	Energy Deficit/ Surplus (%)
9TH PLAN END	7584	6887	497	-9.2	48332	43545	4787	-9.9
2002-03	6700	5750	-950	-14.2	44777	38789	-7988	-17.8
2003-04	7218	8029	-1189	-18.5	48552	40399	-6153	-13.2
2004-05	7877	8268	-1609	-20.4	52017	41585	-10432	-20.1
2005-08	8175	6588	-1587	-19.4	55882	44033	-11649	-20.9
2006-07	9184	7531	-1653	-18.0	57441	48370	-9071	-15.8
2007-08	11104	8588	-2538	-22.8	82828	51335	-11293	-18.0
2008.2009	10587	8248	-2339	-22.1	88003	53798	-14207	-20.9
APR-JUNE 2009	11080	8563	-2517	-22.7	17770	14478	-3294	-18.5
JUNE 2009	11080	7215	-3885	-34.8	5228	4898	-528	-10.1

NOTE :- PEAK DEMAND -11024 MW, ENERGY REQUIREMENT- 68725 MU FOR THE YEAR 2008-2009 (AS PER 17TH EPS REPORT), OCCURENCE OF PEAK AS PER ACTUAL POWER SUPPLY POSITION IN THE MONTH(S)-DECEMBER & JANUARY

## 4. CAPACITY ADDED DURING XTH PLAN:

CENTRAL SECTOR : 1000MW (RIHAND -II)  
210MW (UNCHAHAHAR -III)

\* SHARE OF CENTRAL SECTOR PROJECTS INCLUDED IN ITEM NO. 1

STATE SECTOR : 420 MW (PARICHA EXTN)  
PRIVATE SECTOR : NIL

## 5. LIKELY POWER SUPPLY POSITION AT THE END OF 2011-12\* (DEMAND AS PER 17TH EPS)

Period	Peak Demand (MW)	Peak Met (MW)	Peak deficit/ Surplus (MW)	Peak Deficit/ Surplus (%)	Energy Requirement (MU)	Energy Avail-ability (MU)	Energy Deficit/ Surplus (MU)	Energy Deficit Surplus (%)
2011-12	13947	11709	-2238	-16.0	79268	78600	.\$65	-0.8

\* Peak and Energy availability from all IPPs to be commissioned during 11th Plan are taken in the respective state.

## 6. PROJECTS PLANNED FOR XITH PLAN (STATE SECTOR/ PRIVATE SECTOR/CENTRAL SECTOR)

S. NO.	PROJECT	AGENCY	STATUS	TYPE	CAPACITY (MW)	LIKELY YEAR/ DATE OF COMMISSIONING
1	DADRIEXTU-5,6	NTPC	Under Construction	COAL	980	2009-11
	SUB TOTAL-Central sector				980	
2	PARICHAEXTU-5,8	UPRVUNL	Under Construction	COAL	500	2010-11
3	HARDUAGANJEXTU-5.6	UPRVUNL	Under Construction	COAL	500	2010-11
4	ANPARA-D	UPRVUNL	Under Construction	COAL	1000	2011-12
	SUB TOTAL-state sector				2000	
6	ANPARA-C	LANCO	Under Construction	COAL	1200	2011-12
7	ROSASM	ROSA POWER	Under Construction	COAL	600	2003-11
9	ROSAST-II	ROSA POWER	Under Construction	COAL	600	2011-12
	SUB TOTAL-private sector				2400	
	TOTAL (UP)				5380	

Linkage required for Anpara D U2, 500 MW.



**7. LIKELY CAPACITY ADDITION DURING 11TH PLAN  
FOR THE STATE : - UTTAR PARDESH**

Project Name	Type	Status	Installed Capacity (IMF)	Capacity Addition During XIIth Plan (IMI)	Benefits Shares of state (MW)	Commissioned/ slipped during 2007-2012 (MW)	Last Unit Commissioning Date/ (Likely Date of Commissioning)
<b>CENTRAL-SECTOR</b>							
*PARBATIST-H	H	U	800.00	800.00	169.00		(2011-2012)
*PARSATIST-ii!	H	U	520.00	mm	110.00		(2010-2011)
*CHAMERAIli	H	U	231.00	231.00	49.00		(2010-2011)
*SEWASTH	H	U	120.00	120.00	25.00		(2009-2010)
*URUI	H	U	240.00	240.00	51.00		(2010-2011)
*KOLDAM	H	U	800.00	800.00	189.00		(2010-2011)
*LOHARINAGPALA	H	U	600.00	600.00	127.00		(2011-2012)
*TAPOVANVGARH	H	U	520.00	520.00	110.00		(2011-2012)
NCP PROJECTORS	T	U	980.00	980.00	98.00		(2009-2011)
*RAMPUR	H	U	412.00	412.00	87.00		(2011-2012)
*KOTESHWAR	H	U	400.00	400.00	152.00		(2010-2011)
*RAPPU-546	N	U	440.00	440.00	101.00		(2008-2009)
*KAHALGAONS,7	T	U	1000.00	1000.00	100.00	COMM 500.00	16.03.2008
*SU8ANS1RILOWE	H	U	2000.00	2000.00	179.00		(2011-2012)
*KAMENG	H	U	600.00	600.00	54.00		(2011-2012)
<b>CENTRAL-SECTOR TOTAL:-</b>					<b>1581.00</b>		
<b>STATE-SECTOR</b>							
ANPARA 'D' <sup>1</sup>	T	U	1000.00	1000.00	1000.00		(2011-2012)
HARDUAGANJ EXT 5,6	T	U	500.00	500.00	500.00		(2010-2011)
PAWCHHA EXTN 5, 6	T	U	500.00	500.00	500.00		(2010-2011)
<b>STATE-SECTOR TOTAL-</b>					<b>2000.00</b>		
<b>PRIVATE-SECTOR</b>							
ROSA I	T	U	600.00	600.00	600.00		(2010-2012)
SANPARA 'C'	T	U	1200.00	1200.00	1200.00		(2011-2012)
ROSA II	T	U	600.00	600.00	600.00		(2011-2012)
<b>PRIVATE-SECTOR TOTAL:-</b>					<b>2400.00</b>		
UMPP							
ULTRA MEGA SASAN	H	U	3960.00	1320.00	165.00		(2011-2012)
TOTAL-UMPP					165.00		
<b>GRAND TOTAL:-</b>					<b>6146.00</b>		

NOTE:- U - UNDER CONSTRUCTION PROJECTS

C - CONSTRUCTION YET TO START (LOA TO BE PLACED)

\* SHARES FROM CENTRAL SECTOR PROJECTS FOR WHICH M.O.P. ORDERS ARE YET TO BE ISSUED ARE TENTATIVE.

**8. T&D LOSSES**

2003-04-35.17%

2004-05-34.39%

2005-06-32.63%

2006-07-33.49%

**9 PEAK & ENERGY TABLE**(As per 17<sup>th</sup> EPS Report vs Actual Achieved)

YEAR	PEAK		ENERGY	
	Requirement as per 17 <sup>th</sup> EPS	Actual Achieved	Requirement as Per 17 <sup>th</sup> EPS	Actual Achieved
2004-05	8057	6263	53033	41585
2005-06	8714	6588	56167	44033
2006-07	8425	7531	59486	48370
2007-08	10193	8568	63002	51335
2008-09	11024	6248	66725	53796
2009-10	11923		70668	
2010-11	12896		74845	
2011-12	13947		79268	

**NORTHERN REGION****1. INSTALLED CAPACITY (AT THE END OF 10TH PLAN) (FIGURES IN MW)**

Sector	Hydro	Thermal				Nuclear	R.E.S. (MNRE)	Total
		Coal	Gas	Diesel	Total			
STATE	6718.4	10977.5	1011.2	15.0	12003.7	0.0	247.9	18967.9
PRIVATE	786.0	0.0	0.0	0.0	0.0	0.0	565.5	1351.5
CENTRAL	5498.0	7216.0	23120.0	0.0	8528.0	1180.0	0.0	18208.0
<b>TOTAL</b>	<b>13000.3</b>	<b>18193.5</b>	<b>3323.2</b>	<b>15.0</b>	<b>21531.7</b>	<b>1180.0</b>	<b>313.4</b>	<b>36525.4</b>

**2. INSTALLED CAPACITY AS ON 30.6.2009 (FIGURES IN MW)**

Sector	Hydro	Thermal				Nuclear	R.E.S. (MNRE)	Total
		Coal	Gas	Diesel	Mai			
STATE	71411.0	11757.5	1219.2	13.0	12989.7	0.0	6488.0	20779.7
PRIVATE	786.0	0.0	0.0	0.0	0.0	0.0	1117.5	1903.5
CENTRAL	54880.0	8250.7	2312.0	0.0	10562.7	1180.0	0.0	17240.7
<b>TOTAL</b>	<b>13425.1</b>	<b>20008.2</b>	<b>3531.2</b>	<b>13.0</b>	<b>23552.4</b>	<b>1180</b>	<b>1766.4</b>	<b>39923.9</b>

**3. ACTUAL POWER SUPPLY POSITION**

Period	Peak Demand (MW)	Peak Met (MW)	Peak Deficit Surplus (MW)	Peak Deficit Surplus (%)	Energy /Requirement (MU)	Energy Avail-ability (MU)	Energy Deficit/ Surplus (MU)	Energy Deficit/ Surplus (%)
9TH PLAN END	23200	21346	-1854	-8	150383	142410	-7973	-5.3
20D2-03	24092	21889	-2203	-9.1	156810	144218	-12392	-7.9
2003-04	23817	22271	-1546	4.5	161595	152743	-8852	-55
2004-05	26834	24125	-2709	-10.1	175498	159358	-16140	32
2005-06	28154	25200	-2954	-10.5	188794	168611	-20183	-10.7
2006-07	31516	26644	-4872	-15.5	202125	179988	-22139	-11
2007-08	32462	29495	-2967	-9.1	219797	196147	-23650	-10.8
2008-09	33034	25504	-3530	-10.7	224218	199928	-24290	-10.8
APR-JUNE ,2009	35491	29574	-5917	-16.7	59583	53318	-8247	-10.5
JUNE 2009	35491	29574	-5917	-16.7	19541	17835	-1906	-9.8

NOTE:- PEAK DEMAND - 38021WN, ENERGY REQUIREMENT - 239807 MU FOR THE YEAR 2008-2009 AS PER 17TH EPS REPORT.OCCUPENCE OF PEAK AS PER ACTUAL POWER SUPPLY POSITION IN THE MONTHS - JUNE, JULY & AUGUST

**4. CAPACITY ADDITION DURING 11TH PLAN (AS PER PLANNING COMMISSION TARGET)**

Region	Hydro	Thermal				Nuclear	Wind	Total
		Coal	Gas	Diesel	Total			
STATE	964.0	5870.0	1720.0	0.0	7590.0	0.0	0.0	85540.0
PRIVATE	17920.0	2680.0	0.0	0.0	2880.0	0.0	0.0	4472.0
CENTRAL	47320.0	2730.0	0.0	0.0	2730.0	440.0	0.0	7902.0
<b>TOTAL</b>	<b>7488.0</b>	<b>11280.0</b>	<b>1720.0</b>	<b>0.0</b>	<b>13000.0</b>	<b>440.0</b>	<b>0.0</b>	<b>20928.0</b>

**5. LIKELY POWER SUPPLY POSITION AT THE END OF 2011-12 (DEMAND AS PER 17<sup>TH</sup> EPS)**

Period	Peak Demand (MW)	Peak Met (MW)	Peak Deficit/ Surplus	Peak Deficit/ Surplus (%)	Energy Requi -rement (MU)	Energy Avail-ability (MU)	Energy Deficit/ Surplus MU)	Energy Deficit/ Surplus (%)
2011-12	48137	48266	129	0.3	29441	314885	20044	6.8

### 1.3 Details Of Proposed Plant

M/s Bajaj hindusthan Ltd. is a limited company incorporated Promoted by Mr Shishir Bajaj

Company has incorporated in its object clause to carry on the business of manufacturers, producers etc. in the field of Sugar, MDF, Alcohol and Captive Power.

#### Proposed project

Bajaj has existing sugar & power plant( Baggasse based) at Vill. - Itaimaida Block- Shridattganj Tehsil-Utraula Distt.-Balrampur (U.P.).

Now bajaj decided to install a Independent Power ( Coal based) in the same existing premises . The details of the proposed project are are shown in Table 1.0

**Table 1.0: Details of the proposed project**

Details	Specification	Expected Commercial Operation Date
<ul style="list-style-type: none"> <li>Power generation</li> <li>Fuel( 100 % coal)</li> <li>Turbine</li> <li>Water consumption</li> <li>Working days</li> </ul>	180 MW Coal- 3200 T/day 4x45 Mw each 13968 KLPD 300 days in year	March, 2011

The plant capacity has been worked out based on a working of 300 days in a year on 3 shift basis per day Power Plant.

**Justification**

Power generation will help to meet the requirement of shortage of Power in Utter Pradesh.

**1.4 Location Details**

The Proposed power plant at Vill. Itai Maida, Block-Shriduttganj, Tehsil-Utraula, Distt.- Balrampur (U.P.) with an installation of Power Plant & has 51.0 acres of land within existing premises. The total project cost is Rs. 640.00 crores. Layout of the proposed site is shown in figure-01 & Salient Feature of the project is given in table-2.

**Land details:**

Land for plant & machinery - 16.0 acre

Land for Green area- 25 Acre

Land for Ash pond -10 Acre

**1.5 The Approach****1.5.1 Road**

The plant is connected by developed road connected to District-Basti & Balrampur.

**1.5.2 Rail**

The nearest railway station is Balrampur 30.0 km from the site.

**1.5.3 Airport**

Nearest airport Gorakhpur is approx. 165 km away from the site.

**Table 2.0 : Salient Features of the study area for Proposed Plant Site (Power Plant)**

<b>Features</b>	<b>Details :</b>
Longitude	27° 20' 825" North
Latitude	082° 10' 966' East
Village, Tehsil, District and State	Vill. Itai Maida, Block-Shriduttganj, Tehsil-Utraula, Distt.- Balrampur (U.P.)
Maximum Temperature	46.0° C during summer
Minimum Temperature	5.8° C during winter
Average Relative Humidity	70-100%
Annual Rainfall (district)	1200 mm
Land Availability	51.0 acres
Nearest River	Rapti River, approx 5.0 km towards NE Direction Kuwano River, approx 17.0 km towards SW direction
Nearest Highway	NH-27 (80 km from Site)
Nearest Railway Station	Balrampur Railway Station 30.0 km.
Nearest Air port	Lucknow-165 km
Nearest Forest	None with in 10 Km. radius of the site.
Sensitive Places	None within 10 km radius of the site
Historical Places	None within 10 km radius of the site
Industries	NONE

## **1.6 SCOPE AND METHODOLOGY OF REIA STUDY**

### **1.6.1 SCOPE OF REIA**

The scope of the study include detailed characterization of various environmental components like air, noise, water, land and socio-economics within an area of 10 km radius around the proposed power Plant( within existing premises), Vill. Itai Maida, Block-Shriduttganj, Tehsil-Utraula, Distt.- Balrampur (U.P.) The main objectives includes:

- Literature review that includes identification of relevant data and articles from various publications, various government agencies and other sources;
- Collection of available secondary data
- Environmental monitoring so as to establish the baseline environmental status of the study area
- Identify various existing pollution loads due to industrial and domestic activities in the ambient zone;
- Prediction of impacts on environmental attributes
- Evaluate the predicted impacts on the various environmental attributes in the study area by using scientifically developed and widely accepted Environmental Impact Assessment (EIA) Methodologies
- Preparation an Environmental Management Plan (EMP) outlining the measures for improving the environmental quality
- Identify critical environmental attributes required to be monitored]

### **1.6.2 METHODOLOGY OF REIA**

Environmental Impact Assessment study has been conducted within an area of 10 km radius around the proposed power plant. The various steps involved in the study for a particular project are divided into three following phases

- Identification of significant environmental parameters and assessing the status within the impact zone
- Prediction of Impacts envisaged due to proposed scheme on various environmental parameters
- Evaluation of impacts after superimposing the predicted scenario over the baseline scenario to prepare Environmental Management Plan

Accordingly, field studies were carried out during Post-Monsoon (1st NOV-2009 - 31st Jan 2010) to establish the existing conditions of environmental attributes are outlined in **Table 3.0**

**Table: 3.0 : Environmental Attributes and Frequency of Monitoring**

Attribute	Parameters	Frequency of Monitoring
<b>Ambient Air Quality</b>	SPM, RPM, SO <sub>2</sub> , NO <sub>x</sub> & CO	24 hourly samples twice a week for 13 weeks at 8 locations.
<b>Meteorology</b>	Surface: Wind Speed, direction, temperature, relative humidity and rainfall	Surface : Continuous monitoring station for one non-monsoon on hourly basis and also data collection from secondary sources.
<b>Water Quality</b>	Physical, Chemical and Bacteriological Parameters	Once during the study season at 8 locations for surface and ground water samples.
<b>Ecology</b>	Existing Flora and Fauna	Through field visit during the study period and substantiated through secondary sources.
<b>Noise Levels</b>	Noise levels in db (A)	Hourly observations for 24 hours per location at eight locations.
<b>Soil Characteristics</b>	Parameters related to agricultural and afforestation potential	Once during the season at eight locations.
<b>Land Use</b>	Trend of land use change for different categories	Data from various Government agencies
<b>Socio-economic aspects</b>	Socio-economic characteristics, labour force characteristics, population statistics and existing amenities in the study area.	Based on area surveys and data collected from secondary sources (Census Handbooks, 2009).



## CHAPTER-2

### 2.0 PROJECT DESCRIPTION :

Independent Power Plant of capacity - 180 MW coal based, along with 4x45 MW turbines & 4 x190 TPH CFBC boilers in phase wise manner (Phase I-90 MW & Phase-II - 90 MW).

The Plot plan of the Project is shown in Figure - 2.0.

### 2.1 PLANT DETAILS :

To avoid the dependency on erratic grid power during peak production period, it is proposed to install a 4x45 MW coal based thermal power plant.

To meet the steam requirement of the 180 MW power plant, Bajaj Group proposes to install a CFBC boiler of 4 x 190 TPH capacity where Indian coal will be used. The quantity of coal requirement is estimated to be about 134 tonnes/hour.

**SALIENT FEATURES OF 4x45 MW POWER PLANT :** All the details given in below are for Phase-I plant of 90 MW & same will be for Phase-II Plant of 90 MW.

#### **PHASE-I PLANT (90 MW) :**

The power plant is designed based on Circulating Fluidised Bed Combustion (CFBC) Boiler design, which is Environment Friendly Technology. This CFBC design allows burning of high ash content coals, multi-fuel operation, low stack gas temperatures and low fly ash generation. The boiler is designed for a. rated steam output of 2x190 TPH TPH at a pressure of 110 ata and 540 deg. C. As in the case of any other thermal power plant the process involves production of super heated steam. The enthalpy of the steam is converted into mechanical energy in a condensing the turbines, which drives turbo-generator system to produce alternative current.

For condensing the steam, Water Cooled condenser is provided.

Salient feature of the power plant are given in **Table -4.0**

### **2.5.1 POWER GENERATION PROCESS**

Power generation process is based on Rankine Steam cycle. The steam generated in the boiler when expanded through a turbine, turns the turbine shaft, which is tandem coupled to an electric power generator. The schematic diagram of the power generation process is shown in Figure-3.0

Proposed Power plant is aimed at generation of 4x45 MW of electric power. The power plant is designed based on Circulating Fluidized Bed Combustion (CFBC) Boiler design, which is an Environment Friendly Technology. This CFBC design allows burning of high ash content coals, multi-fuel operation, low stack gas temperatures and low fly ash generation. The boiler will be designed for a rated steam output of 4x190 TPH at a pressure 110 ata and 540° C.

TABLE -4.0

**SALIENT FEATURES OF POWER PLANT (PHASE-I & PHASE-II)**

	Details
Location	Vill. Itai Maida, Teh.- Utraula.
Total Land (Acres)	51.0 Acres
Capacity (MWe)	90 MW x 2
Steam Generators Capacity (CFBC boiler), tph	4 x 190
Steam Turbine - Capacity, MW	4 x 45
Fuel	Indian Coal
Fuel Consumption, tpd (design value)	3200 TPD
Calorific Value of Coal	(Calorific Value considered for computation is 3000 kcal/kg).
Ash Content in Coal	(Ash content considered for computation is 40%).
Sulphur Content in coal	0.6% (Worst Case)
Fuel Supply	Indian Coal.
Height of Chimney	110 m Two Chimney with Four Boilers.
Source of Water	Tubewell
Water Consumption, m <sup>3</sup> /day	13968
Type of cooling	Water cooled condensate system

**2.1.2 RAW MATERIAL**

Indian coal is the fuel proposed for operation of the power plant. The required coal for the production of steam will be supplied by from Bihar orrisa. Coal yard will be located adjacent for the ease of transportation and handling purpose. Coal to the power plant from Source will be conveyed through trucks/rail to the coal stock yard. Coal will be crushed in the crusher to a size of 50 mm and is transported by belt conveyor and stacked in the form of piles by stacker. The stacked coal will be utilized as

per the requirement by reclaimer. Adequate coal handling system will be provided for handling of the coal.

The coal consumption of proposed Thermal power plant will be 67tonnes/hour as per design values considering ash content of 40 % and sulphur content of 0.6%

<b>Parameter</b>	<b>As per Design (Phase-I) 90 MW</b>	<b>As per Design (Phase-II) 90 MW</b>
Coal consumption	66.6 TPH	66.6 TPH
Total ash generation	26.66 TPH	26.66 TPH
Sulphur content in the coal	0.6% Max. for design	0.6% Max. for design
SO <sub>2</sub> emission rate	222 g/sec.	222 g/sec.
Temperature of flue gas exit	140-155° C	140-155° C
Ash content	40%	40%

The sources of water are from Tube well. The total water requirement of the power plant will be 13968 m<sup>3</sup>/day.

### **2.1.3 TECHNICAL FEATURES OF PROPOSED POWER PLANT (Phase-I Plant and same will be for Phase-II Plant)**

In order to take advantage of efficient steam generators having greater flexibility in using low grade coals and reduce emissions, it is proposed to use Circulating Fluidised Bed Combustion type boiler.

The following paragraphs detail the technical features of proposed units of the power plant.

#### **2.1.3.1 PLANT HEAT RATE**

The gross plant heat rate of the proposed power plant will be 2617 kcal/kWh.

#### **2.1.3.2 STEAM GENERATORS AND AUXILIARIES**

The steam generator would be of coal fired, circulating fluidised bed combustion type and semi outdoor unit. In this process the mixture of coal and primary air is fed in to the boiler furnace by pneumatic underfeed

system. The major advantage of FBC system is getting ash with low unburnt carbon on one hand and collecting less bottom ash rather than fly ash.

The rating of each steam generator would be 2x190 TPH at a pressure of 110 ata and temperature of 540 +/- 5°C at the superheater outlet when supplied with feed water at a temperature of 230°C. The steam generator will be provided with fuel oil system using HSD which would be used during start-up of steam generators.

### **2.1.3.3 STEAM TURBINE GENERATORS**

The steam turbine would be horizontal split casing, extraction cum condensing type. The following are the technical specifications of the steam turbine

#### **SPECIFICATIONS OF TURBINE**

Multistage impulse cum reaction condensing with uncontrolled Extraction turbine.

Horse Power : 2x45 MW

Inlet steam pressure : 110 ata

Inlet steam temp. : 535°C

The turbines would be complete with all the accessories customarily supplied by the manufacturers such as governing and protection system, turbine oil system and its auxiliaries, turbine gland seal system, turning gear, supervisory and operating instruments with all necessary indicating and control devices to permit the unit to be placed on turning gear, rolled, accelerated and synchronized from the central control room.

#### **GENERATOR**

The generators stator core, stator coil and rotor would be air-cooled. The following are the technical specification of the generators.

**SPECIFICATION OF SYNCHRONOUS GENERATOR**

Output	:	56.25 MVA
No. of phases	:	3
No. of poles	:	4
Voltage	:	11000 V
Frequency	:	50 Hz
Speed	:	1500 rpm
P.F.	:	0.80.
Rating	:	Continuous

**2.1.4 PLANT CYCLE****2.1.4.1 MAIN AND EXTRACTION STEAM SYSTEMS**

Steam delivered from the steam generators would be conveyed to the turbines through alloy steel piping. A branch pipe from the main steam piping would supply steam to the Auxiliary Pressure Reducing And Desuperheating Station (APRDS) where the steam condition will be reduced to about 10 ata and 400°C. The steam requirements of steam jet air ejectors, steam turbine gland sealing and deaerator heating/pegging during start-up would be supplied by the APRDS. Steam would be extracted from three non-regulated extraction points of the turbine for feed water heating.

**2.1.4.2 REGENERATIVE FEED WATER HEATING SYSTEM**

The regenerative feed water heating system of the unit would have two feed water heaters besides the deaerator (2HPH +1 Deaerator + 1LPH). Condensate from the hotwell would be pumped by 2 x 100% capacity condensate extraction pumps to the deaerator through the low pressure heaters, drain cooler, ejector condenser and gland steam condenser. Feed water would be pumped from the deaerator to the economiser section of the steam generators through the high pressure heater by means of 2 x 100 % boiler feed pumps. The deaerating feed water heater

would be spray type of spray-cum-tray type mounted on a feed water storage tank having 16 minutes storage capacity.

### **2.1.5 WATER SYSTEMS RAW WATER SYSTEM**

The source of water is Ground Water. A raw water storage reservoir of required capacity to 2 days requirement will be provided.

#### **Service Water System**

The service water for plant miscellaneous services would be met directly from the service water storage tank.

#### **Water Treatment Plant**

- Details of water treatment is given below :
- One no. of 16200 m<sup>3</sup> capacity are proposed for storage of raw water.
- Raw water will be passed through the clarification plant and clarified water is stored in clear water tank.
- Water from raw water tank is passed through demineralization plant to remove all suspended and dissolved impurities like anions, cations and dissolved gases. The pure demineralized water stored for further use in boiler.

### **EFFLUENT DISPOSAL SYSTEM**

Wastewater generated from the Auxiliary cooling water system (ACW), Boiler blow down and DM plant contains high turbidity and TSS. Auxiliaries, Cooling Water (ACW) System.

ACW treatment will also include advanced polymer based eco-friendly chemicals for de-scaling and biological growth control.

The wastewater streams will be mixed with each other and the diluted water will be utilized for green belt development, dust suppression within the plant.

### **Fire Protection System**

It is proposed to provide a full fledged fire protection system namely, hydrant system for all the areas of power plant, high velocity water spray system for transformers, turbine lube oil tanks, medium velocity spray system for cable vault/gallery, portable fire extinguishers for all the buildings of the plant as per best industry practices.

#### **2.1.6 WATER COOLED CONDENSER (WCC)**

##### **Condenser cooling tower**

The Condenser cooling tower with required number of cells to maintain 10°C At is proposed for circulating the cooling water to the Steam Condensers of both TGs. And also the Turbine and Generator auxiliaries like lube oil cooler and Generator air cooler, heat exchangers and gland cooling. Necessary dosing system for controlling the pH of cooling water and also metering system for the dosing system shall be provided. Monitoring system for the cooling water chemistry also shall be provided. Chlorination system with all safety gadgets shall be provided to maintain the residual chlorine in order to have proper control on algy and fungy to maintain a clean condenser. Necessary level control system along with the level transmitter shall be provided to control the level of fore bay, there by controlling the overflowing of the sump-which ensures the saving of water and chemicals added and also indication of level of sump in DCS. Further auto blow down system shall be provided for the auto blow down of cooling tower to maintain the designed COC.

The cooling tower shall be provided with the fans for exhausting the vapors generated during heat rejection from the cooling tower and the fans will be driven by electric motors controlled by variable frequency drives to optimize the consumption of energy during winter season and also to reduce the impact on the shaft during starting.

The cooling water from the fore bay will be circulated using 3X100 % capacity cooling water circulating pumps with necessary motor operated suction and discharge valves, NRV and necessary instrumentation for the



local indication of pressure and flow. One flow transmitter shall be provided in the common discharge line of each condenser to monitor the flow of cooling water to each of the condenser to monitor the efficiency of the condensers.

#### **2.1.7 FUEL OIL SYSTEM**

It is proposed to use HSD as fuel for initial start-up of boiler. A HSD storage and handling facilities are proposed.

#### **2.1.8 AIR CONDITIONING AND VENTILATION SYSTEM**

It is proposed to air condition the control room, ESP, CHS and Ash handling control rooms and DM plant control room. A dry bulb temperature of  $22^{\circ}\text{C} \pm 1^{\circ}\text{C}$  and relative humidity not exceeding 60% will be maintained uniformly in all air-conditioned rooms.

For the DM plant control room and ESP control room split packaged air conditioners would be provided.

For the ventilation of station building evaporative cooling plant would be provided. The plant would consist of centrifugal supply air fans, ducting, air washer, louvers and filters and circulating water pumps. Exhaust of hot air out of the station building would be achieved by provision of roof extractors and wall mounted exhaust fans. All other buildings would be provided with supply air fans or exhaust air fans or a suitable combination of both.

#### **2.1.9 AIR SYSTEM**

The required air for the combustion is heated in the air pre-heater before feeding into the Boiler. Excess air is maintained in the order of (20 to 30%) of the stoichiometric air composition in order to burn the coal completely and to reduce the un-burnt carbon in the fly ash. Bajaj proposes to use the fly ash and bottom ash in the production of cement & for filling of low laying areas.

The feed air is passed through air pre-heater and hot flue gases at 210 deg. C passed through the vertically fitted pipes in the air preheater. The heat of flue gas is transferred to the input air.

#### **2.1.10 FUEL HANDLING SYSTEM**

The unloaded coal from the wagons will be stored in the coal stock yard and the coal will be crushed to below 6mm size and will be stored in coal bunker and fed in to the boiler by means of pressurized air. The combustion of coal (in suspension) takes place in the boiler furnace to generate the required heat. The water circulated through the boiler tubes is converted in to steam by application of heat. The steam is used to drive the turbo generator.

The proposed FBC boiler is envisaged to give maximum operational flexibility in terms of fuel usage and meet the stringent Environmental Emission guidelines.

#### **COAL HANDLING SYSTEM**

Coal will be transported by trucks/rail and is unloaded into hoppers and fed to the belt conveyor by plough feeders or vibrating feeders. The coal is conveyed through the tunnel and fed to belt conveyors and reach the crusher house where it is crushed to <10 mm size. From there it is fed to coal bunkers or to stock yard for stacking.

#### **CRUSHING SYSTEM**

The coal-unloading conveyor will feed coal to crushers to crush the coal <10 mm size. Crushed coal will be either fed to forward conveyors or to the stacking conveyor.

Necessary inline magnetic separators will be provided in the conveyors feeding the crusher house. Adequately sized surge hoppers/feed chutes/flap gates will be provided to have maximum flexibility in the flow of material. The crushing and screening system will be 2x100%. Crushers are supported by RCC floor and isolated from other foundation work.

Necessary anti-vibration dampers will be provided for the crushers as required.

### **STACKING AND RECLAIMING SYSTEM / STOCKPILE**

Crushed coal will be sent to stockpile when coal is not required in the bunkers. Stacking/reclaiming of coal will be done by bucket wheel type stacker/reclaimer moving on rails. The stacker/ reclaimer can stack coal on either sides of the pile.

When coal is required in the bunkers and crusher is not in operation, coal will be reclaimed by the stacker/reclaimer and fed to boiler bunkers. An emergency reclaim hopper will be provided to reclaim coal by dozers when stacker/reclaimer is not in operation. Required no. of dozers/mobile equipment will be supplied.

The stockpile of coal will have adequate storage for atleast 15days coal consumption considering a plant load factor of 0.8 Coal stockpile height will be 8m and area of coal stockpile will be 1200m<sup>2</sup>.

The stockpile will be provided with necessary fire hydrant system, compacting and dust suppression system.

### **CONVEYING SYSTEM / BUNKER FEEDING SYSTEM**

The capacity of the forward conveying system from secondary crusher onwards will be to meet the 16 Hrs.

Coal samplers and belt weigh scales will be provided in the junction tower prior to bunker feeding conveyor.

In line magnetic separators and metal detectors will be also be provided.

Bunker top will be sealed to have effective ventilation system in the bunker floor and necessary tipper arrangement will also be provided on bunker top.

**DUST EXTRACTION / DUST SUPPRESSION / VENTILATION SYSTEM**

Dust extraction system/Dust suppression system will be provided in all the transfer towers and crusher house to minimise the air pollution problem.

Dust suppression system will also be provided to the coal stock pile. Necessary spray system and arrangement will be provided in the stock Pile.

Bunker ventilation/dust extraction will be provided to extract the dust due to bunker filling operation.

The system will be designed for air quality in which respirable particulate matter (size less than 10 microns) will not exceed (8 hrs) micro gram/m<sup>3</sup> on work hours basis.

**2.1.11 FLUE GASES**

The quantity of the flue gas discharged is entirely dependent on the air required for complete combustion of coal in the fluidized boiler. For complete combustion of coal, a minimum amount of excess air in the boiler is required. In FBC boiler system, the excess air requirement is marginally low which in turn helps in the reduction of the heat loss through stack flue gases and the stack gas temperatures less than 150°C are attainable.

BHL will provide a stack of 110 m to exhaust flue gas from the proposed 2x190 boiler.

**Design Of Stack Height**

Design of stack heights is based on SO<sub>2</sub> emission rates, SO<sub>2</sub> emission is computed for the coal consumption of 40% ash content and 0.6% Sulphur and calorific value of 3000 kcal/kg. BHL propose to provide a combined stack. The height of stack is computed as follows :

Coal consumption of proposed thermal power plant = 66.6 TPH

SO<sub>2</sub> emission in g/sec based on 0.6% coal content = 222.2

Stack height -  $14 (Q)^{0.3} = 104.2$  m.

## **A ELECTROSTATIC PRECIPITATORS**

An electrostatic precipitator will be installed in the flue gas path to collect the fly ash generated from the boiler. The outlet concentration of PM will be maintained 100 mg/Nm<sup>3</sup> with all fields in service and 100 with One field out of service.

### **2.1.12 ASH HANDLING SYSTEM**

Burning of coal in the boiler results in generation of both coarse ash and fly ash. The coarse ash collected from bed ash coolers, economizer and air heater hoppers will be conveyed to ash silo by pneumatic system. The fly ash will be collected in electrostatic precipitator (ESP) hoppers. The fly ash collected in ESP hoppers will be transported through pneumatic conveyors and will be stored in the fly ash silos.

The fly ash thus collected will be sent to cement plant and will be used in the cement manufacturing process or in manufacturing of ash bricks. Approximately 640 tonnes (worst estimate based on ash concentration) per day of total ash will be generated from the captive power plant.

### **2.1.13 PLANT ELECTRICAL SYSTEM**

The major electrical systems comprise generator, 11 kV generation switchgear, 132/11 kV switchyard, generator transformer (GT), station auxiliary transformers (SAT), station service transformers (SST), 11 kV switchgear, 415 Volts auxiliary system, DC system, UPS system and emergency 415 volts system.

**2.1.14 INSTRUMENTATION AND CONTROL SYSTEM**

The control of the power plant would be accomplished using state-of-the-art microprocessor based Distributed Control System (DCS). The DCS would integrate the control and monitoring functions for the steam generator, turbine generator, their auxiliaries, the balance of the plant auxiliary systems and the electrical systems.

The distributed microprocessor based instrumentation and control system would have complete control capabilities that include closed loop control, open loop control, computation and interfacing for data acquisition, graphic displays, logging, trending, performance calculations, annunciation, sequence of events recording (SER), data storage and retrieval. The system will be provided with redundancy at various levels thereby ensuring reliability of the system. The system would allow for CRT operation from the control desk.

**2.7.15 POLLUTION CONTROL SYSTEM OF THE THERMAL POWER PLANT****FLUE GASES**

The quantity of the flue gas discharged is entirely dependent on the air required for complete combustion of coal in the fluidized boiler. For complete combustion of coal, a minimum amount of excess air in the boiler is required. In FBC boiler system, the excess air requirement is marginally low which in turn helps in the reduction of the heat loss through stack flue gases and the stack gas temperatures less than 150 °C are attainable. The design flue gas emission will be in the order of 25.0 m<sup>3</sup>/sec.

Due to burning of coal in the captive power plant, the major pollutants expected from the power plant, will be suspended particulate matter, Sulphur dioxide.

## ELECTROSTATIC PRECIPITATOR

An electrostatic precipitator will be installed in the flue gas path to collect the fly ash generated from the boiler. The outlet concentration of SPM will be maintained less than 100 mg/Nm<sup>3</sup> throughout the operation of the power plant.

## STACK HEIGHT

Design of stack height is based on SO<sub>2</sub> emission rates, SO<sub>2</sub> emission computed for the coal consumption of 40% ash content and 0.6% Sulphur.

### SO<sub>2</sub> EMISSION RATE AND STACK HEIGHTS

Parameter	As per Design
Coal consumption (t/hr)	67
Sulphur content in coal (%)	0.6
SO <sub>2</sub> emission rate (gm/sec.)	222
Required stack height based on SO <sub>2</sub>	110 meter

## NO<sub>x</sub> CONCENTRATIONS

NO<sub>x</sub> will be released from the coal based power plants due to fuel bound Nitrogen as well as Thermal Nitrogen. Thermal Nitrogen oxides will be generated due to the reaction of inert Nitrogen with Oxygen at high temperatures in the burning zone. In coal based power plants, thermal NO<sub>x</sub> will be approximately 85% of the total NO<sub>x</sub> generated from the boilers. Due to adoption of fluidised bed boilers the NO<sub>x</sub> emissions were reduced drastically.

## WASTE WATER GENERATION

Wastewater is generated from DM plant, cooling tower blow down and plant floor wash will be 1000 m<sup>3</sup>/day. The major source of wastewater from the power plant is cooling water blow-down & softening plant.

Blowdown effluent will be slightly alkaline with considerable amount of TDS and cooling water from DM plant is slightly acidic and contains no TDS and TSS. The cooling water blowdown is just similar to and which will be utilized for dilution and neutralization of the combined effluent to bring all the parameters well within the limits & finally treated in EA waste treatment Plant and treated effluent will utilize for Recycle / Reuse dust suppression and gardening purpose.

#### **FLY ASH UTILISATION**

Burning of coal in the boiler results in generation of both coarse ash and fly ash. The coarse ash collected from bed ash coolers, economizer and air heater hoppers will be conveyed to ash silo by pneumatic system. The total ash will be collected in electrostatic precipitator (ESP) hoppers. The fly ash collected in ESP hoppers will be transported through pneumatic conveyors and will be stored in the fly ash silos. Fly ash generation will be approx. 640 T/day which will be utilized as per plan given in EMP Chapter.



**CHAPTER-3****EXISTING ENVIRONMENTAL STATUS**

The existing Environmental status of the area 10.0 Km. radius around the proposed project 180 MW Power Plant has been studied. Hence forth this area shall be called "STUDY AREA". The parameters covered up for the base line Environmental status are as follows.

- 3.1 Land use studies (Land Pattern)
- 3.2 Meteorology (Aerial Environment)
- 3.3 Ambient Air Quality (Aerial Environment)
- 3.4 Noise Quality (Aerial Environment)
- 3.5 Water Quality (Water Environment)
- 3.6 Soil Quality ( Land Environment)
- 3.7 Ecology (Biological Environment)
- 3.8 Demography (Socio-Economic Environment)

We have selected TEN (9) locations for sampling/data collection for the period 01 Nov, 2009 to 31 Jan, 2010 around the 10.0 Km. radius of the proposed factory, details are as under. Map showing sampling points are enclosed in Figure-4.0 & 5.0.

**Table-5.0 : STUDY AREA**

<b>Sr. No.</b>	<b>Study Area</b>	<b>Location from the factory</b>	<b>Distance from the proposed site (Km.)</b>
1.	Village - Bisambherpur	E	2.5
2.	Village - Chandapur	NE	5.4
3.	Village - Kihaura	SE	3.84
4.	Village - Ramwapur	SE	7.5
5.	Village - Pandri	NW	5.4
6.	Village - Dewario	NW	4.8
7.	Village - Sanjwal	W	3.6
8.	Village - Shivdayalpur	SW	2.4
9.	Factory Site	-	-

### 3.0 Baseline Environmental Quality

The scope of the baseline studies includes detailed characterization of various components like Meteorological Observations, Ambient Air Quality, Noise Levels, Water Quality, Soil Quality and Demographic Pattern.

The main object of baseline studies is

- To Assess the existing baseline environmental status
- To Identify the impacts due to emission from various sources
- To evaluate the impacts envisaged due to proposed industrial activities
- Preparation of Environmental Management Plan with control technologies
- To regulate the environmental quality of the study within the prescribed standards of Central Pollution Control Board

**TABLE: 6.0 : SALIENT FEATURES OF BASELINE ENVIRONMENTAL PARAMETERS**

Parameter	Inference
Micrometeorological Studies	To assess wind pattern to identify air pollution impacts on neighboring environment
Air Quality Data	To assess baseline air quality status of the area
Noise Quality Studies	To identify noise producing areas and anticipated noise levels
Water Quality	To identify baseline water quality
Soil Quality Studies	To identify existing soil quality
Biological Environment	Flora & Fauna of the study area presence of any endangered species in the area and impacts due to proposed activities
Socio-economic & Demographic studies	To know the baseline socio-economic status of the study area.

**TABLE: 7.0: STANDARD METHODS APPLIED FOR ENVIRONMENTAL MONITORING**

S.No	ACTIVITY	POLLUTANT	DETAILS OF METHOD
1.	<b>Air Quality Monitoring</b>	Suspended Particulate Matter (SPM) Respirable Particulate Matter (RPM) Sulfur Dioxide (SO <sub>2</sub> ) Oxides of Nitrogen (NO <sub>x</sub> ) Carbon Monoxide (CO) Hydrocarbons (HC)	IS 5182 Part—I to Part-XXII
2.	<b>Water Quality Monitoring</b>	Physical, Chemical, Bacteriological and Heavy Metals	IS: 10500 & IS: 3025
3.	<b>Noise Level Measurement</b>	Noise Levels	IS 4954
4.	<b>Soil Quality Testing</b>	Physical, Chemical and Heavy Metals	Standard Methods

### 3.1 LAND USE STUDIES

Studies on land use aspects of eco-system play important roles for identifying sensitive issues, if any, and taking appropriate actions for maintaining the ecological balance in the development of the region. The objective of this section is to define the present environmental status and wherever possible evaluate the changes that have occurred during the last decade due on account of industrialization and urbanization in the region.

#### 3.1.1 Objectives

The objectives of land use studies are:

- To determine the present land use pattern;
- To analyze the impacts on land use pattern due to the industrial activities in the study area; and
- To give recommendations for optimizing the future land use pattern in light of increasing industrial and mining activities in the study area and its associated impacts.

### 3.1.2 Methodology

For the study of land use, literature review of various secondary sources such as District Census Handbooks, regional maps regarding topography, zoning settlement, industry, forest etc. were taken. The data was collected from various sources like District Census Handbook, Revenue records, state and central government offices and Survey of India (SOI) Toposheets and also through primary field surveys.

The landuse pattern of the study area has been studied by analyzing the available secondary data published in the District Primary Census abstract of the year 2009, as the latest (2009) Census land use data has not yet been finalized by the Census Department shown in table-8.0.

**TABLE -8.0**

S.No.	Classification	Area (Hectare)
1.	Total reported land	324852 (16793)
2.	Forest	58940 (612)
3.	Banjar Land fit for cultivation	2921 (300)
4.	Current fallow land	7786 (1003)
5.	Other fallow land	3095 (294)
6.	Usar not fit for agricultural purposes	3465 (NIL)
7.	Garden/Bagh/Shrubs	5208 (94)
8.	Pasture land	235 (20)
9.	Zaid crop	144185 (7886)
10.	Kharif crop	171229 (171218)
11.	Rabi	2012 (248)
12.	Net irrigated area	82336 (10019)
13.	Gross irrigated area	98574 (10084)
14.	Land prepared for cane	95 (95)

The figures inside the brackets pertain to the whole of the Block-Shriduttganj.

### 3.1.3 LAND USE BASED ON SECONDARY DATA (Through Satellite Imagery)

Based on the census report, the Proposed Power Plant is located at Tehsil: Utraula, Dist: Balrampur, Uttar Pradesh State. The 10-km radial distance around the Plant lease boundary has been considered in the study. These areas were studied in detail to get the idea of land use pattern in the study area. The land use pattern of the study area is given in **Table-9.0**. The land use land cover pattern of the 10-km area based on IRS Imagery is shown in **Figure- 6.0 & 7.0**

#### **Study Area Land Use / Land Cover Classification System**

Using the standard land use classification system proposed by NRSC, about five classes of level I, twelve of level II and four of level III land use / land cover classes were identified and mapped using satellite data in the present study. The imagery is interpreted and ground checked for corrections.

The land use / land cover of Itai Maida- Village, Balrampur- District, Uttar Pradesh State, is given in table 9.0.

**Table 9.0 shows Landuse / land cover statistics of the study area**

S.NO.	LULC Land Classification	AREA KM <sup>2</sup>	Percentage
1	Built up area/road	11.68	3.719
2	Waste Land	3.23	1.028
3	Fallow Land	161.74	51.50
4	River bed	2.89	0.90
5	Dry Sand Area	22.41	7.13
6	Water Bodies	14.36	4.57
7	Plantation/forest	13.32	4.24
8	Crop	19.55	6.22
9	Scrub	61.83	19.69
<b>TOTAL</b>		<b>314</b>	<b>100.6</b>

### **3.2 METEOROLOGY (AERIAL ENVIRONMENT)**

Micrometeorological data within the study area during the air quality survey period is an indispensable part of the air pollution study. The meteorological data recorded during the survey period is very useful for proper interpretation of the baseline information as well as for input, to predictive 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.

#### **3.2.1 Methodology**

The methodology adopted for monitoring surface observations is done as per the standard norms laid down by Bureau of Indian Standards and Indian Meteorological Department (IMD).

#### **METEOROLOGICAL DATA COLLECTED BY ETRC (ANALYSIS)**

##### **Temperature**

Table 64-155 shows the daily hourly temperature data collected by ETRC field team during Nov-09, Dec-09 & Jan-2010. The daily 24 hourly average temperature ranged between 9.2 to 29.3 deg. C during study period. The temperature profile matches well with IMD data for these months.

##### **Relative Humidity**

Relative humidity observed during the study period, shown in Table 64-155 ranged between 55% - 78 % with average daily minimum and maximum with an overall average of 76%.

##### **Wind Velocity**

Wind velocity is one of the most important meteorological parameters which govern dispersion, diffusion, transportation of pollutants into the atmosphere.

Wind pattern of the study area recorded during the study period is presented in summarized form in Tables 64-155. Wind speed recorded is 1.2 - 3.2 km/hr. The data for wind speed and direction are

depicted as wind rose diagrams enclosed which yields a graphic picture of the frequency and velocity of winds from sixteen directions. On the basis of 24 hour data, the following points emerge.

The overall calm period was recorded as 48% during study period. The calm was 47%, 46% and 42% during the months of Nov., Dec.-2009 and Jan-2010 respectively.

### **3.3 AMBIENT AIR QUALITY (AERIAL ENVIRONMENT)**

The Ambient Air Quality with respect to the study zone of 10 km radius around proposed site forms the baseline information. The study area represents mostly in rural environment. The various sources of air pollution in the region include industrial activities, vehicular traffic, and dust arising from unpaved village roads. The prime objective of the baseline air quality study was to assess the existing ambient air quality of the study area.

The scenario of the existing Ambient Air Quality in the study region has been assessed through a network of eight Ambient Air Quality locations. The expected impact is mainly on ambient levels of Oxides of Nitrogen (NO<sub>x</sub>), Sulphur dioxide (SO<sub>2</sub>), Suspended Particulate Matter (SPM), Respirable Particulate Matter (RPM) and partly on Hydrocarbons (HC) and Carbon Monoxide (CO) levels. These parameters were monitored at 8 selected stations. The following points were taken into consideration in designing the network of sampling stations.

- Topography / Terrain of the study area
- Human Settlements
- Prevailing wind pattern
- Representation of Regional Background levels
- Health status
- Accessibility of Monitoring site
- Resource Availability

Pre-calibrated Samplers (for PM-10, PM-2.5 & TS PM) have been used for monitoring the existing AAQ status. Methodologies adopted for sampling and analysis were as per the approved methods of Central Pollution Control Board (CPCB).

Maximum, Minimum, Average and Percentile values have been computed from the raw data collected at all individual sampling stations to represent the Ambient Air Quality Status.

The Ambient Air Quality studies were carried out during Post-Monsoon (1<sup>st</sup> NOV – 31<sup>ST</sup> JAN 2010). The significant parameters viz., Suspended Particulate Matter (SPM), Respirable Particulate Matter, PM-10, PM-2.5 Sulphur dioxide (SO<sub>2</sub>), Oxides of Nitrogen (NO<sub>x</sub>), CO and HC were monitored in the core and buffer zones. The data thus obtained is considered for determining the baseline ambient air quality status.

A total number of 9 (Nine) stations were monitored. The duration, period and frequency of sampling is as per the guidelines of National Ambient Air Quality (NAAQ) Standards prescribed by Central Pollution Control Board (CPCB), New Delhi and are as given below:

Duration	: Post Monsoon (01 NOV– 31 JAN 2010).
Period	: a. 24 hrs for SPM, PSPM, PM-10, PM-2.5, SO <sub>2</sub> & NO <sub>x</sub> b. 8 hr for CO & HC
Frequency	: Twice a week for the entire study period.

Details of location of AAQ monitoring stations are shown in **Table 10.0** and the Location map showing the AAQ monitoring Stations is presented as **Figure 4.0**



**TABLE: 10.0 AMBIENT AIR QUALITY LOCATIONS**

<b>S.No</b>	<b>CODE</b>	<b>NAME OF SAMPLING STATION</b>	<b>DIRECTION</b>	<b>DISTANCE</b>
1	A-1	Village - Bisambherpur	E	2.5
2	A-2	Village - Chandapur	NE	5.4
3	A-3	Village - Kihaura	SE	3.84
4	A-4	Village - Ramwapur	SE	7.5
5	A-5	Village - Pandri	NW	5.4
6	A-6	Village - Dewario	NW	4.8
7	A-7	Village - Sanjwal	W	3.6
8	A-8	Village - Shivdayalpur	SW	2.4
9.	A-9	Factory Site	-	-

### 3.3.1 Details of the Sampling Locations

All the sampling locations are described below. The stations were selected to assess present pollution levels.

**TABLE 11.0 : AMBIENT AIR QUALITY MONITORING LOCATIONS**

<b>Sampling Station</b>	<b>Description of the Sampling Station</b>
<b>A-1: Vill.- Bisambherpur</b>	The Ambient Air Quality monitoring station was installed at the village Bisambherpur that is 2.5 km towards E direction and is free from any obstructions.
<b>A-2: Vill.- Chandapur</b>	The sampling station was located in the village Chandapur is 5.4 km in the NE direction from the site.
<b>A-3: Vill.- Kihaura</b>	The sampling station was located in the village Kihaura that is 3.84 km in the SE direction from the proposed site.
<b>A-4: Vill.- Ramwapur</b>	The sampling station was located in the village Ramwapur that is 7.5 km from the proposed site towards SE direction.
<b>A-5: Vill.- Pandri</b>	The sampling station was located in the village Pandri that is 5.4 km in the crosswind direction from the proposed site towards NW direction.
<b>A-6: Vill.- Dewaria</b>	The sampling station was located in the village Dewaria that is 4.8 km in the crosswind direction from the proposed site towards NW.
<b>A-7: Vill.-Sanjwal</b>	The sampling station was located in the village Sanjwal that is 3.6 km in the upwind direction from the proposed site towards W down wind direction.
<b>A-8: Vill.- Shivdayalpur</b>	The sampling station was located in the village Shivdayalpur that is 2.4 km at SW downwind direction.
<b>A-9: Factory premises</b>	Within Existing Premises.

**3.3.2 Sampling And Testing Methodology**

**Table 12.0** below gives the standard procedure for sampling and testing. The procedures are all in compliance with CPCB & MoEF.

**TABLE 12.0 : Sampling And Testing Methodology**

Parameter	Duration of Sampling	Recommended Analytical Procedure
SPM & RPM	24 hours - continuous	Gravimetric Method as per IS: 5182
SO <sub>2</sub>	8 hours - continuous	Pararosaniline – Colorimetric method (Modified West & Gaeke Procedure)
NO <sub>x</sub>	8 hours - continuous	Modified Jacob & Hochheiser Method
HC	Grab Sample	As per IS 5182
CO	Grab Sample	As per IS 5182

**3.3.3 Analysis of Baseline Concentrations**

The Ambient Air Quality levels in the study area are summarized below in **Table 13.0**. Detailed AAQ results including percentile values of all the locations are given in **Table 14 - 20**

**TABLE 13.0 : 98<sup>th</sup> Percentile Values**

Pollutant Location		TSPM µg / m <sup>3</sup>	PM <sub>10</sub> µg / m <sup>3</sup>	PM <sub>2.5</sub> µg / m <sup>3</sup>	SO <sub>2</sub> µg / m <sup>3</sup>	NO <sub>x</sub> µg / m <sup>3</sup>
A-1	Village - Bisambherpur	127.46	39.02	24.70	9.75	11.90
A-2	Village - Chandapur	128.92	38.58	25.11	9.69	11.38
A-3	Village - Kihaura	126.46	38.79	23.83	9.45	11.38
A-4	Village - Ramwapur	128.50	39.15	24.55	9.70	11.55
A-5	Village - Pandri	128.50	38.55	24.55	9.70	11.70
A-6	Village - Dewario	128.00	38.60	24.50	9.75	11.80
A-7	Village - Sanjwal	128.00	38.20	24.25	9.80	11.85
A-8	Village - Shivdayalpur	128.00	38.70	24.40	9.89	11.70
A-9	Factory Site	158.50	63.40	39.40	17.82	17.75

**TABLE 14.0****AMBIENT AIR QUALITY OF VILLAGE-BISAMBHERPUR**

<b>LOCATION: Village A1</b>								
Sr. No	Date of Sampling	PM (Less than 10 micron)	PM (Less than 2.5 micron)	TSPM	SO <sub>2</sub>	NO <sub>x</sub>	HC	CO
Unit		µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	PPM	PPM
1	01.11.2009	27.5	22.1	121	8.4	9.3	<1	<1
2	02.11.2009	30.6	22.4	123	7.6	10.5	<1	<1
3	08.11.2009	28.2	18.8	119	9.4	11.5	<1	<1
4	09.11.2009	32.8	17.2	120	9.4	9.8	<1	<1
5	15.11.2009	36.4	21.7	118	7.4	11.7	<1	<1
6	16.11.2009	25.7	18.3	124	8.8	8.6	<1	<1
7	22.11.2009	29.5	21.6	126	9.9	8.3	<1	<1
8	23.11.2009	39.4	23.5	125	7.6	11.8	<1	<1
9	29.11.2009	32.4	21.7	123	8.1	11.2	<1	<1
10	30.11.2009	31.5	24.8	120	8.3	9.9	<1	<1
11	06.12.2009	34.5	18.9	126	8.3	9.5	<1	<1
12	07.12.2009	31.8	19.5	127	9.8	11.6	<1	<1
13	13.12.2009	27.6	21.4	118	9.2	10.8	<1	<1
14	14.12.2009	27.3	24.6	122	8.9	9.6	<1	<1
15	20.12.2009	28.7	23.8	117	7.2	8.9	<1	<1
16	21.12.2009	34.1	21.3	123	9.4	10.7	<1	<1
17	27.12.2009	30.2	24.6	120	8.3	11.2	<1	<1
18	28.12.2009	33.5	23.3	119	7.7	11.9	<1	<1
19	03.01.2020	35.1	17.9	124	9.3	8.5	<1	<1
20	04.01.2010	38.4	21.3	128	8.5	11.6	<1	<1
21	11.01.2010	35.8	18.7	122	7.8	9.3	<1	<1
22	12.01.2010	32.7	21.5	120	8.2	11.7	<1	<1
23	18.01.2010	34.7	24.9	124	7.8	8.5	<1	<1
24	19.01.2010	38.6	21.4	119	9.6	9.3	<1	<1
25	25.01.2010	31.8	20.6	126	7.2	11.8	<1	<1
26	26.01.2010	37.9	22.4	121	8.1	9.3	<1	<1
27	30.01.2010	33.2	24.7	119	7.6	11.9	<1	<1
28	31.01.2010	36.4	21.6	123	8.3	8.3	<1	<1
				3417.00	122.04			
<b>OBSERVATION</b>								
Parameters		PM -10	PM -2.5	TSPM	SO <sub>2</sub>	NO <sub>x</sub>	HC	CO
Minimum Value		25.7	17.2	117	7.2	8.3	<1	<1
Maximum Value		39.4	24.9	128	9.8	11.8	<1	<1
Arithmetic Mean		32.73	21.59	122.04	8.43	10.25	<1	<1
Standard Deviation		3.77	2.23	3.01	0.81	1.29	-	-
98 percentile		39.04	24.7	127.46	9.75	11.90	-	-

**TABLE 15.0****AMBIENT AIR QUALITY OF VILLAGE-CHANDAPUR**

LOCATION: Village A 2								
Sr. No	Date of Sampling	PM (Less than 10 micron)	PM (Less than 2.5 micron)	TSPM	SO <sub>2</sub>	NO <sub>x</sub>	HC	CO
Unit		µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	PPM	PPM
1	01.11.2009	35.8	22.6	120	7.4	10.5	<1	<1
2	02.11.2009	33.7	23.1	124	8.3	7.1	<1	<1
3	08.11.2009	26.8	25.6	119	7.6	8.6	<1	<1
4	09.11.2009	28.1	18.2	123	9.4	8.1	<1	<1
5	15.11.2009	32.8	17.9	118	9.1	9.4	<1	<1
6	16.11.2009	32.7	20.7	120	7.5	9.2	<1	<1
7	22.11.2009	25.6	21.6	122	8.2	7.3	<1	<1
8	23.11.2009	30.1	23.8	126	8.6	8.3	<1	<1
9	29.11.2009	33.7	19.8	123	7.2	8.1	<1	<1
10	30.11.2009	37.8	17.2	120	8.3	8.5	<1	<1
11	06.12.2009	32.5	16.2	117	8.4	8.2	<1	<1
12	07.12.2009	29.7	24.5	126	9.6	9.2	<1	<1
13	13.12.2009	25.7	22.6	124	8.1	8.3	<1	<1
14	14.12.2009	33.6	21.8	128	7.3	9.1	<1	<1
15	20.12.2009	38.4	21.3	123	7.9	9.1	<1	<1
16	21.12.2009	24.7	20.9	130	8.7	8.4	<1	<1
17	27.12.2009	33.5	23.1	125	8.1	11.1	<1	<1
18	28.12.2009	31.4	22.8	119	9.8	10.4	<1	<1
19	03.01.2020	29.8	24.7	122	7.8	11.6	<1	<1
20	04.01.2010	28.2	23.5	120	9.4	10.4	<1	<1
21	11.01.2010	31.5	21.9	125	7.6	9.9	<1	<1
22	12.01.2010	32.6	20.2	123	7.5	9.5	<1	<1
23	18.01.2010	33.4	22.6	121	8.6	10.8	<1	<1
24	19.01.2010	34.7	23.2	127	8.1	11.2	<1	<1
25	25.01.2010	38.8	21.1	124	8.5	9.5	<1	<1
26	26.01.2010	33.5	18.7	120	9.3	8.8	<1	<1
27	30.01.2010	37.9	21.4	118	8.3	10.5	<1	<1
28	31.01.2010	33.1	19.8	125	8.1	11.2	<1	<1
				3432.00	122.57			
OBSERVATION								
Parameters	PM -10	PM -2.5	TSPM	SO <sub>2</sub>	NO <sub>x</sub>	HC	CO	
Minimum Value	24.7	16.2	117	7.2	7.1	<1	<1	
Maximum Value	38.8	25.6	130	9.8	11.6	<1	<1	
Arithmetic Mean	32.15	21.46	122.57	8.31	9.367857	<1	<1	
Standard Deviation	3.85	2.32	3.26	0.73	1.23	-	-	
98 percentile	38.58	25.11	128.92	9.69	11.38	-	-	

**TABLE 16.0****AMBIENT AIR QUALITY OF VILLAGE-KIHAURA**

<b>LOCATION: Village A 3</b>								
Sr. No	Date of Sampling	PM (Less than 10 micron)	PM (Less than 2.5 micron)	TSPM	SO <sub>2</sub>	NO <sub>x</sub>	HC	CO
Unit		µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	PPM	PPM
1	01.11.2009	28.9	23.6	119	8.5	9.1	<1	<1
2	02.11.2009	26.5	22.4	120	9.1	10.3	<1	<1
3	08.11.2009	35.7	19.8	123	7.5	11.1	<1	<1
4	09.11.2009	36.8	15.9	124	7.2	11.6	<1	<1
5	15.11.2009	38.7	17.6	125	8.2	8.2	<1	<1
6	16.11.2009	34.5	23.5	120	9.1	9.2	<1	<1
7	22.11.2009	37.8	24.1	119	9.5	8.4	<1	<1
8	23.11.2009	38.9	19.5	126	7.4	8.9	<1	<1
9	29.11.2009	36.7	16.8	117	8.3	8.7	<1	<1
10	30.11.2009	34.5	22.8	127	7.6	9.3	<1	<1
11	06.12.2009	36.8	23.1	123	9.4	9.7	<1	<1
12	07.12.2009	32.1	20.2	121	9.1	7.5	<1	<1
13	13.12.2009	30.8	18.5	124	7.5	7.3	<1	<1
14	14.12.2009	29.5	22.2	126	8.2	8.6	<1	<1
15	20.12.2009	27.5	21.1	120	8.6	8.1	<1	<1
16	21.12.2009	25.1	20.5	118	7.2	9.4	<1	<1
17	27.12.2009	33.5	19.8	123	9.3	9.2	<1	<1
18	28.12.2009	34.5	18.5	124	9.1	7.9	<1	<1
19	03.01.2020	25.4	22.2	120	8.2	8.5	<1	<1
20	04.01.2010	28.9	21.1	124	7.6	8.3	<1	<1
21	11.01.2010	29.3	18.7	126	7.5	9.4	<1	<1
22	12.01.2010	27.4	19.4	121	8.2	7.1	<1	<1
23	18.01.2010	26.3	16.7	118	7.6	7.6	<1	<1
24	19.01.2010	31.3	20.6	123	9.3	7.9	<1	<1
25	25.01.2010	34.5	21.8	125	8.4	8.5	<1	<1
26	26.01.2010	36.7	22.2	123	7.6	7.8	<1	<1
27	30.01.2010	38.4	21.4	119	8.6	8.7	<1	<1
28	31.01.2010	32.1	20.7	124	9.2	9.3	<1	<1
<b>OBSERVATION</b>								
Parameters		PM -10	PM -2.5	TSPM	SO <sub>2</sub>	NO <sub>x</sub>	HC	CO
Minimum Value		25.1	15.4	117	7.2	7.1	<1	<1
Maximum Value		38.9	24.1	127	9.5	11.6	<1	<1
Arithmetic Mean		32.47	20.53	122.21	8.32	8.771429	<1	<1
Standard Deviation		4.40	2.21	2.83	0.75	1.06	-	-
98 percentile		38.79	23.83	126.46	9.45	11.33	-	-

**TABLE 17.0****AMBIENT AIR QUALITY OF VILLAGE-RAMWAPUR**

<b>LOCATION: Village A 4</b>								
Sr. No	Date of Sampling	PM (Less than 10 micron)	PM (Less than 2.5 micron)	TSPM	SO <sub>2</sub>	NO <sub>x</sub>	HC	CO
Unit		µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	PPM	PPM
1	03.11.2009	30.6	21.8	121	8.9	9.7	<1	<1
2	04.11.2009	31.9	23.8	124	8.4	8.2	<1	<1
3	10.11.2009	26.7	22.7	119	7.8	8.1	<1	<1
4	11.11.2009	25.1	20.2	123	7.9	9.3	<1	<1
5	17.11.2009	32.7	16.2	125	9.3	8.4	<1	<1
6	18.11.2009	29.2	17.3	120	9.4	9.3	<1	<1
7	24.11.2009	31.7	23.7	119	8.8	9.5	<1	<1
8	25.11.2009	35.2	24.3	124	7.7	8.7	<1	<1
9	01.12.2009	32.7	19.8	118	7.8	11.2	<1	<1
10	02.12.2009	31.9	16.5	123	7.6	10.5	<1	<1
11	08.12.2009	30.2	21.9	120	8.5	9.3	<1	<1
12	09.12.2009	38.5	24.7	117	8.9	10.7	<1	<1
13	15.12.2009	33.8	22.6	124	9.8	11.5	<1	<1
14	16.12.2009	37.2	21.3	126	8.8	9.8	<1	<1
15	22.12.2009	32.6	21.5	118	7.5	8.4	<1	<1
16	23.12.2009	28.8	18.9	128	7.7	7.8	<1	<1
17	29.12.2009	26.1	17.2	120	8.4	8.4	<1	<1
18	30.12.2009	35.8	23.6	126	8.6	9.7	<1	<1
19	05.01.2020	36.6	22.3	125	9.6	7.2	<1	<1
20	06.01.2010	38.2	20.7	119	7.5	10.3	<1	<1
21	13.01.2010	34.9	19.8	129	9.6	10.2	<1	<1
22	14.01.2010	37.2	19.2	124	7.3	9.2	<1	<1
23	20.01.2010	39.8	23.5	122	7.7	8.5	<1	<1
24	21.01.2010	36.3	24.4	126	8.5	7.8	<1	<1
25	27.01.2010	34.7	20.8	123	9.4	8.2	<1	<1
26	28.01.2010	33.2	21.4	117	8.2	8.1	<1	<1
<b>OBSERVATION</b>								
Parameters		PM -10	PM -2.5	TSPM	SO <sub>2</sub>	NO <sub>x</sub>	HC	CO
Minimum Value		25.1	16.2	117	7.3	7.2	<1	<1
Maximum Value		39.8	24.7	129	9.8	11.5	<1	<1
Arithmetic Mean		33.14	21.16	122.31	8.45	9.153846	<1	<1
Standard Deviation		3.91	2.49	3.40	0.76	1.12	-	-
98 percentile		39.15	24.55	128.50	9.70	11.35	-	-

**TABLE 18.0****AMBIENT AIR QUALITY OF VILLAGE-PANDRI**

<b>LOCATION: Village A 5</b>								
Sr. No	Date of Sampling	PM (Less than 10 micron)	PM (Less than 2.5 micron)	TSPM	SO <sub>2</sub>	NO <sub>x</sub>	HC	CO
Unit		µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	PPM	PPM
1	03.11.2009	35.8	22.6	119	8.4	9.3	<1	<1
2	04.11.2009	32.3	24.8	125	8.1	9.7	<1	<1
3	10.11.2009	30.2	20.5	120	9.4	8.2	<1	<1
4	11.11.2009	25.8	19.1	118	9.7	10.1	<1	<1
5	17.11.2009	28.4	15.6	123	8.9	10.5	<1	<1
6	18.11.2009	26.7	23.2	124	7.3	11.2	<1	<1
7	24.11.2009	31.6	19.1	128	7.6	9.9	<1	<1
8	25.11.2009	33.2	21.7	123	8.4	8.2	<1	<1
9	01.12.2009	34.8	23.6	120	8.8	8.7	<1	<1
10	02.12.2009	36.2	20.9	118	9.4	10.3	<1	<1
11	08.12.2009	33.4	18.3	129	9.5	9.7	<1	<1
12	09.12.2009	30.1	16.2	124	7.8	8.4	<1	<1
13	15.12.2009	29.8	15.9	122	8.1	8.3	<1	<1
14	16.12.2009	28.1	19.2	126	8.5	9.7	<1	<1
15	22.12.2009	24.9	22.1	121	9.6	10.7	<1	<1
16	23.12.2009	32.4	24.3	120	7.3	11.7	<1	<1
17	29.12.2009	34.6	20.5	119	7.1	10.6	<1	<1
18	30.12.2009	36.7	18.3	117	8.3	9.3	<1	<1
19	05.01.2020	37.9	22.6	126	8.2	9.7	<1	<1
20	06.01.2010	39.2	21.8	120	8.7	10.2	<1	<1
21	13.01.2010	32.4	20.3	119	9.7	11.7	<1	<1
22	14.01.2010	30.5	19.4	117	8.5	9.3	<1	<1
23	20.01.2010	29.4	18.7	120	9.3	8.9	<1	<1
24	21.01.2010	29.4	21.9	125	7.4	10.7	<1	<1
25	27.01.2010	30.1	21.3	127	7.1	11.4	<1	<1
26	28.01.2010	34.8	18.2	121	8.9	10.7	<1	<1
<b>OBSERVATION</b>								
Parameters		PM -10	PM -2.5	TSPM	SO <sub>2</sub>	NO <sub>x</sub>	HC	CO
Minimum Value		24.9	14.6	117	7.1	8.2	<1	<1
Maximum Value		39.2	24.8	128	9.7	11.7	<1	<1
Arithmetic Mean		31.87	20.39	121.96	8.46	9.89	<1	<1
Standard Deviation		3.70	2.49	3.47	0.84	1.05	-	-
98 percentile		38.55	24.55	128.50	9.70	11.70	-	-



**TABLE 19.0****AMBIENT AIR QUALITY OF VILLAGE-DEWARIA**

<b>LOCATION: Village A 6</b>								
Sr. No	Date of Sampling	PM (Less than 10 micron)	PM (Less than 2.5 micron)	TSPM	SO <sub>2</sub>	NO <sub>x</sub>	HC	CO
Unit		µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	PPM	PPM
1	03.11.2009	28.9	22.6	119	8.6	9.3	<1	<1
2	04.11.2009	32.6	20.3	123	8.2	10.1	<1	<1
3	10.11.2009	30.2	19.5	124	9.6	10.7	<1	<1
4	11.11.2009	34.7	15.3	121	9.7	11.3	<1	<1
5	17.11.2009	28.5	21.7	118	8.2	11.7	<1	<1
6	18.11.2009	29.1	20.9	120	7.6	9.3	<1	<1
7	24.11.2009	25.2	21.1	121	9.5	8.7	<1	<1
8	25.11.2009	31.6	16.3	126	8.7	9.4	<1	<1
9	01.12.2009	37.3	19.7	122	9.3	9.2	<1	<1
10	02.12.2009	38.4	19.9	120	9.7	8.9	<1	<1
11	08.12.2009	30.8	21.1	126	8.2	11.5	<1	<1
12	09.12.2009	27.1	20.8	123	8.6	11.2	<1	<1
13	15.12.2009	26.8	24.2	128	8.1	10.9	<1	<1
14	16.12.2009	25.7	24.8	121	7.4	9.2	<1	<1
15	22.12.2009	28.3	23.6	117	9.5	10.4	<1	<1
16	23.12.2009	29.1	22.1	124	9.8	11.5	<1	<1
17	29.12.2009	27.8	18.9	123	8.3	10.3	<1	<1
18	30.12.2009	26.7	19.7	128	7.2	11.9	<1	<1
19	05.01.2020	31.5	16.8	126	7.5	9.2	<1	<1
20	06.01.2010	34.1	20.2	120	8.9	9.8	<1	<1
21	13.01.2010	36.2	21.3	122	8.3	8.4	<1	<1
22	14.01.2010	38.8	22.6	117	9.5	10.1	<1	<1
23	20.01.2010	32.5	21.7	124	8.4	11.6	<1	<1
24	21.01.2010	30.3	19.3	120	9.5	9.3	<1	<1
25	27.01.2010	32.6	17.2	126	8.1	9.5	<1	<1
26	28.01.2010	34.7	20.7	121	9.7	10.2	<1	<1
				3180.00	122.31			
<b>OBSERVATION</b>								
Parameters		PM -10	PM -2.5	TSPM	SO <sub>2</sub>	NO <sub>x</sub>	HC	CO
Minimum Value		25.2	15.3	117	7.2	8.4	<1	<1
Maximum Value		38.4	24.8	128	9.7	11.9	<1	<1
Arthmetic Mean		31.13	20.47	122.31	8.70	10.13846	<1	<1
Standard Deviation		3.88	2.31	3.12	0.81	1.05	-	-
98 percentile		38.60	24.50	128.00	9.75	11.80	-	-

**TABLE 20.0****AMBIENT AIR QUALITY OF VILLAGE-SANJWAL**

<b>LOCATION: Village A 7</b>								
Sr. No	Date of Sampling	PM (Less than 10 micron)	PM (Less than 2.5 micron)	TSPM	SO <sub>2</sub>	NO <sub>x</sub>	HC	CO
Unit		µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	PPM	PPM
1	05.11.2009	33.4	22.3	123	9.7	9.1	<1	<1
2	06.11.2009	38.8	23.4	120	8.9	8.7	<1	<1
3	12.11.2009	37.6	19.6	121	7.2	7.8	<1	<1
4	13.11.2009	31.2	16.3	119	7.5	10.2	<1	<1
5	19.11.2009	27.5	18.2	118	7.1	10.7	<1	<1
6	20.11.2009	29.6	23.8	120	8.2	11.3	<1	<1
7	26.11.2009	34.1	21.6	125	8.7	10.9	<1	<1
8	27.11.2009	25.7	19.3	123	9.8	10.2	<1	<1
9	03.12.2009	31.8	20.2	120	9.4	9.3	<1	<1
10	04.12.2009	32.7	18.1	118	8.2	9.6	<1	<1
11	10.12.2009	33.9	19.5	125	8.7	10.1	<1	<1
12	11.12.2009	37.1	22.9	124	9.5	11.8	<1	<1
13	17.12.2009	36.5	24.7	129	7.6	11.3	<1	<1
14	18.12.2009	34.7	23.6	121	9.5	9.1	<1	<1
15	24.12.2009	32.1	21.3	124	8.4	8.4	<1	<1
16	25.12.2009	30.6	20.9	120	7.3	9.2	<1	<1
17	31.12.2009	28.6	18.3	121	7.8	10.4	<1	<1
18	01.01.2010	27.1	16.7	119	8.2	11.9	<1	<1
19	07.01.2020	29.7	21.1	126	9.8	10.4	<1	<1
20	08.01.2010	31.6	23.7	123	8.7	9.3	<1	<1
21	15.01.2010	32.8	22.2	127	7.3	9.7	<1	<1
22	16.01.2010	35.9	20.7	120	8.4	8.1	<1	<1
23	22.01.2010	36.1	19.4	118	9.7	10.4	<1	<1
24	23.01.2010	28.6	23.6	125	8.9	11.2	<1	<1
25	29.01.2010	31.1	21.6	127	7.3	9.7	<1	<1
26	30.01.2010	36.3	19.3	122	7.6	10.2	<1	<1
<b>OBSERVATION</b>								
Parameters		PM -10	PM -2.5	TSPM	SO <sub>2</sub>	NO <sub>x</sub>	HC	CO
Minimum Value		25.7	16.3	118	7.1	7.8	<1	<1
Maximum Value		38.8	24.7	129	9.8	11.9	<1	<1
Arthmetic Mean		32.50	20.86	122.23	8.44	9.9615385	<1	<1
Standard Deviation		3.51	2.30	3.10	0.91	1.09	-	-
98 percentile		38.20	24.25	128.00	9.80	11.85	-	-

**TABLE 21.0****AMBIENT AIR QUALITY OF VILLAGE-SHIVDAYALPUR**

<b>LOCATION: Village A 8</b>								
Sr. No	Date of Sampling	PM (Less than 10 micron)	PM (Less than 2.5 micron)	TSPM	SO <sub>2</sub>	NO <sub>x</sub>	HC	CO
Unit		µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	PPM	PPM
1	05.11.2009	32.7	16.5	124	8.2	10.4	<1	<1
2	06.11.2009	33.1	19.3	120	9.3	11.3	<1	<1
3	12.11.2009	25.5	21.7	126	9.8	9.4	<1	<1
4	13.11.2009	28.3	20.1	122	7.3	9.1	<1	<1
5	19.11.2009	31.8	22.6	124	7.1	9.9	<1	<1
6	20.11.2009	33.5	23.8	120	8.5	10.3	<1	<1
7	26.11.2009	34.1	24.9	119	8.9	11.2	<1	<1
8	27.11.2009	38.3	20.5	127	8.3	10.4	<1	<1
9	03.12.2009	39.1	18.4	119	9.7	11.8	<1	<1
10	04.12.2009	29.4	16.4	120	8.3	9.7	<1	<1
11	10.12.2009	30.2	19.2	118	7.5	11.2	<1	<1
12	11.12.2009	32.9	20.3	121	7.8	10.3	<1	<1
13	17.12.2009	28.2	21.2	120	9.3	10.6	<1	<1
14	18.12.2009	27.4	18.7	124	9.1	9.5	<1	<1
15	24.12.2009	31.1	21.1	126	9.8	9.3	<1	<1
16	25.12.2009	34.2	15.6	123	8.4	9.7	<1	<1
17	31.12.2009	36.8	18.4	122	8.6	8.3	<1	<1
18	01.01.2010	32.4	17.6	121	9.1	9.8	<1	<1
19	07.01.2020	30.9	18.3	120	7.8	10.2	<1	<1
20	08.01.2010	34.2	20.1	119	7.4	11.6	<1	<1
21	15.01.2010	32.1	21.8	124	8.1	9.4	<1	<1
22	16.01.2010	31.7	22.3	126	8.6	9.6	<1	<1
23	22.01.2010	30.2	20.1	130	9.6	8.8	<1	<1
24	23.01.2010	29.4	23.9	124	8.3	11.3	<1	<1
25	29.01.2010	33.2	23.8	128	8.9	10.5	<1	<1
26	30.01.2010	27.2	21.3	123	7.9	10.2	<1	<1
<b>OBSERVATION</b>								
Parameters		PM -10	PM -2.5	TSPM	SO <sub>2</sub>	NO <sub>x</sub>	HC	CO
Minimum Value		25.5	15.6	118	7.1	8.3	<1	<1
Maximum Value		39.1	24.9	130	9.8	11.8	<1	<1
Arthmetic Mean		31.84	20.30	122.69	8.52	10.14615	<1	<1
Standard Deviation		3.28	2.45	3.15	0.79	0.89	-	-
98 percentile		38.70	24.40	129.00	9.80	11.70	-	-

**TABLE 22.0****AMBIENT AIR QUALITY OF VILLAGE-FACTORY PREMISES**

<b>LOCATION: Factory Premises</b>								
Sr. No	Date of Sampling	PM (Less than 10 micron)	PM (Less than 2.5 micron)	TSPM	SO <sub>2</sub>	NO <sub>x</sub>	HC	CO
Unit		µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	µg/ M <sup>3</sup>	PPM	PPM
1	05.11.2009	54.3	32.7	145.0	12.3	14.2	<1	<1
2	06.11.2009	56.8	35.1	148.0	13.1	14.8	<1	<1
3	12.11.2009	59.3	36.5	143.0	13.8	15.9	<1	<1
4	13.11.2009	56.4	38.9	152.0	12.5	15.7	<1	<1
5	19.11.2009	63.1	35.6	150.0	13.4	14.6	<1	<1
6	20.11.2009	55.8	31.7	146.0	12.2	14.2	<1	<1
7	26.11.2009	58.3	32.2	144.0	13.7	16.2	<1	<1
8	27.11.2009	54.6	33.4	149.0	12.1	17.6	<1	<1
9	03.12.2009	56.1	36.7	156.0	13.4	17.1	<1	<1
10	04.12.2009	55.8	38.0	152.0	12.6	16.9	<1	<1
11	10.12.2009	60.5	31.7	146.0	13.1	16.7	<1	<1
12	11.12.2009	62.7	34.2	147.0	12.8	16.2	<1	<1
13	17.12.2009	58.3	39.9	150.0	13.8	15.8	<1	<1
14	18.12.2009	61.8	33.2	151.0	13.6	15.3	<1	<1
15	24.12.2009	58.2	32.9	156.0	13.9	14.2	<1	<1
16	25.12.2009	55.3	34.3	153.0	13.1	15.1	<1	<1
17	31.12.2009	59.7	35.7	157.0	12.7	17.2	<1	<1
18	01.01.2010	56.2	35.6	159.0	12.2	16.7	<1	<1
19	07.01.2020	62.7	33.2	146.0	13.2	14.5	<1	<1
20	08.01.2010	63.6	34.6	154.0	13.1	17.9	<1	<1
21	15.01.2010	56.7	35.7	146.0	12.8	17.4	<1	<1
22	16.01.2010	57.2	36.5	147.0	12.4	16.2	<1	<1
23	22.01.2010	58.4	37.8	156.0	12.2	16.8	<1	<1
24	23.01.2010	60.3	37.3	158.0	13.1	14.1	<1	<1
25	29.01.2010	61.8	38.5	150.0	13.9	14.8	<1	<1
26	30.01.2010	63.2	34.4	146.0	12.7	16.2	<1	<1
<b>OBSERVATION</b>								
Parameters		PM -10	PM -2.5	TSPM	SO <sub>2</sub>	NO <sub>x</sub>	HC	CO
Minimum Value		54.3	31.7	144	12.1	14.1	<1	<1
Maximum Value		63.6	39.9	159	13.9	17.9	<1	<1
Arithmetic Mean		58.73	35.24	150.27	12.99	15.86	<1	<1
Standard Deviation		2.93	2.29	4.68	0.58	1.18	-	-
98 percentile		63.40	39.40	158.50	13.90	17.75	-	-

### AAQ In Study Area

- TSPM monitored in the study area are in the range of 126.46 - 158.50  $\mu\text{g}/\text{m}^3$
- PM-10 monitored in the study area are in the range of 38.20 - 63.40  $\mu\text{g}/\text{m}^3$
- $\text{SO}_2$  monitored in the study area are in the range of 9.45 - 17.82  $\mu\text{g}/\text{m}^3$
- NOX monitored in the study area are in the range of 11.33 - 17.75  $\mu\text{g}/\text{m}^3$
- HC and CO concentration at all locations was found to be less the 1ppm

**The values of SPM,  $\text{SO}_2$ ,  $\text{NO}_x$ , HC and CO monitored at all locations were found to be well within the NAAQ Standards.**

## 3.4 NOISE ENVIRONMENT (AERIAL ENVIRONMENT)

### 3.4.1 Reconnaissance

A reconnaissance survey was conducted in order to establish the baseline status of the environment with respect to noise levels in the study area. The objective of the present study is to assess the impacts of noise generated proposed units inside the plant premises and its impact on the human settlements within 10.0 km radius, Location of sampling points are shown Table-23.0

**Table: 23.0 : Details of Noise Quality Monitoring Locations**

S.No	CODE	NAME OF SAMPLING STATION	DIRECTION	DISTANCE
1	N-1	Villlage - Bisambherpur	E	2.5
2	N-2	Villlage - Chandapur	NE	5.4
3	N-3	Villlage - Kihaura	SE	3.84
4	N-4	Villlage - Ramwapur	SE	7.5
5	N-5	Villlage - Pandri	NW	5.4
6	N-6	Villlage - Dewario	NW	4.8
7	N-7	Villlage - Sanjwal	W	3.6
8	N-8	Villlage - Shivdayalpur	SW	2.4
9.	N-9	Factory Site	-	-

Table 24.0

## Noise level Monitoring Data

NOISE LEVEL MONITORING DATA									
TIME IN HRS	N 1	N 2	N 3	N 4	N 5	N 6	N 7	N 8	N 9
NAME OF STATION									Factory Premises
7.00	46.6	47.3	46.2	45.7	47.2	46.3	46.9	45.9	52.3
8.00	47.1	47.9	47.3	46.2	48.4	47.4	47.5	46.5	53.3
9.00	48.3	48.4	48.2	46.9	49.1	48.2	48.1	47.1	55.1
10.00	49.2	49.3	48.9	47.4	49.9	49.1	48.8	47.9	56.8
11.00	50.3	50.2	49.4	48.1	50.7	49.9	49.6	48.5	58.9
12.00	51.0	51.3	50.2	48.8	51.3	50.5	50.6	49.2	60.8
13.00	51.4	52.1	51.1	49.4	51.9	51.2	51.4	50.5	63.6
14.00	52.2	52.7	51.8	50.3	52.5	51.9	52.3	51.6	65.4
15.00	52.9	53.2	52.4	51.8	53.4	52.5	53.1	52.7	69.4
16.00	52.2	52.5	52.1	51.1	52.6	52.3	52.3	52.1	67.3
17.00	51.6	51.8	51.4	50.5	51.8	51.6	51.6	51.5	65.9
18.00	50.8	50.8	50.6	49.7	50.9	50.8	50.6	50.9	63.1
19.00	49.9	50.1	49.5	48.8	50.3	49.7	50.0	49.5	61.5
20.00	49.1	49.3	48.9	48.2	49.5	49.2	49.1	49.1	60.5
21.00	48.5	48.7	48.3	47.8	48.8	48.5	48.5	48.3	58.4
22.00	47.1	47.3	46.8	46.1	47.5	46.9	47.2	46.6	53.5
23.00	46.5	46.7	46.3	45.9	46.8	46.6	46.5	46.4	52.4
24.00	45.4	45.5	45.2	44.7	45.7	45.5	45.3	45.2	50.3
1.00	44.8	44.6	44.7	44.1	44.8	44.8	44.6	44.5	48.5
2.00	44.2	44.4	44.1	43.8	44.6	44.3	44.5	44.1	47.4
3.00	43.7	43.8	43.5	43.1	43.9	43.6	43.7	43.4	45.5
4.00	44.2	44.5	44.1	43.8	44.7	44.3	44.4	44.1	47.8
5.00	44.8	45.1	44.5	44.2	45.4	44.7	45.2	44.5	49.9
6.00	45.7	46.2	45.4	45.1	46.5	45.5	46.1	45.3	51.3
OBSERVATION									
L <sub>Min</sub>	43.7	43.8	43.5	43.1	43.9	43.6	43.7	43.4	45.5
L <sub>Max</sub>	52.9	53.2	52.4	51.8	53.4	52.5	53.1	52.7	69.4
L <sub>d</sub>	50.2	50.5	49.9	48.8	50.7	50.0	50.1	49.5	61.0
L <sub>n</sub>	45.5	45.7	45.3	44.9	45.9	45.5	45.6	45.2	50.5

N-1	Village - Bisambherpur	N-6	Village - Dewario
N-2	Village - Chandapur	N-7	Village - Sanjwal
N-3	Village - Kihaura	N-8	Village - Shivdayalpur
N-4	Village - Ramwapur	N-9	Factory Site
N-5	Village - Pandri		

### 3.4.2 EXISTING NOISE ENVIRONMENT

Noise levels were measured once at various locations during Post-Monsoon (1 NOV - 31 JAN 2010), in order to evaluate the ambient Noise level in the study area. Noise monitoring was carried out at 9 locations on hourly basis. The hourly values are given in table- 24.0

The equivalent noise levels in locations are summarized as below in **Table 25.0**

**Table 25.0 : Equivalent Noise Levels in the Study Area**

Sl. No.	Pollutant Location	Equivalent Noise Levels dB (A)			
		L min	L max	Ld	Ln
N-1	Village - Bisambherpur	43.7	52.9	50.2	45.5
N-2	Village - Chandapur	43.8	53.2	50.5	45.7
N-3	Village - Kihaura	43.5	52.4	49.9	45.3
N-4	Village - Ramwapur	43.1	51.8	48.8	44.9
N-5	Village - Pandri	43.9	53.4	50.7	45.9
N-6	Village - Dewario	43.6	52.5	50.0	45.5
N-7	Village - Sanjwal	43.7	53.1	50.1	45.6
N-8	Village - Shivdayalpur	43.4	52.7	49.5	45.2
N-9	Factory Site	45.5	69.4	61.0	50.5

**Note :**  $L_{min}$  - Minimum Noise Level Recorded

$L_{max}$  - Maximum Noise Level Recorded

$L_d$  - Day Equivalent

$L_n$  - Night Equivalent

The Noise Levels were within the prescribed limits when compared with Ambient Noise Level standards in respect of noise vide rule-3 of Environmental (protection) Rule 1986.

### **3.5 WATER QUALITY (WATER ENVIRONMENT)**

#### **3.5.1 Introduction**

- Assessment of baseline data on water quality includes
- Identification of surface water sources
- Identification of ground water sources
- Collection of water samples
- Analyzing water samples collected for physico-chemical and biological parameters

The details of the above are presented below

#### **3.5.2 Surface Water Quality**

##### **Surface Water Resources (Shown in table-26.0)**

Surface water resources in the study region includes :

1. Rapti river in NE direction from the proposed plant site(SWR-1) 5.0 km
2. Kuwano river in SW direction from the proposed plant site (SWF-2) 11.0 km
3. Karja river in N from the proposed site (SWR-3) 2.0 km
4. Bisuhi river in SW from the proposed site (SWR-4) 22.0 km.

##### **Methodology**

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

- Location of the water bodies
- Usage of the water
- Areas that can represent baseline conditions

Surface water samples were collected from rivers.



**3-5-3 Ground Water Quality (Shown in table-27.0)**

Most of the villages in the study area depend on ground water source for their domestic and agricultural needs. In order to assess the physico-chemical characteristics of the ground water sources MNE samples were collected, analysed and reported as per Indian Standards IS 10500 (Drinking Water Standards)

**Samples**

A total of Thirteen water samples (4 surface water and 9 ground water samples) have been collected from the study area. Details of location of water quality monitoring stations is given in **Table 26.0** and represented in **Table 27 .0**

**Table: 26.0 Surface Water Quality Monitoring Stations**

S.No	Code	Name of Sampling Station	Source of Water
1	SWR-1	River Rapti	Surface Water
2	SWR-2	River Kuwano	Surface Water
3	SWR-3	River Karja	Surface Water
4	SWR-4	River Bsuhi	Surface Water

**Table: 27.0 Ground Water Quality Monitoring Stations**

S.No	Code	Name of Sampling Station	Source of Water
1	GW-1	Village - Bisambherpur	Borewell
2	GW-2	Village - Chandapur	Borewell
3	GW-3	Village - Kihaura	Borewell
4	GW-4	Village - Ramwapur	Borewell
5	GW-5	Village - Pandri	Borewell
6	GW-6	Village - Dewario	Borewell
7	GW-7	Village - Sanjwal	Borewell
8	GW-8	Village - Shivdayalpur	Borewell
9	GW-9	Factory Site	Borewell

**Observation****Surface Water :**

The detailed water quality analysis data are given in Table 28.0 From the analysis of the data the following general observations were made Surface Water Samples.

- It is observed that the pH of the surface water samples is in the range of 7.15 - 7.23
- Total dissolved solids (TDS) in the samples were in the range 87-127 mg/l.
- Total hardness of the surface samples was found to vary between 56-67 mg/l
- Fluoride concentration was found to vary between 0.06 - 0.30 mg/l
- Heavy metal concentrations in all the samples were found to be well within the limits.

**Ground Water (Table- 29.0 - 31.0)**

- It is observed that the pH of the ground water samples is in the range of 7.60 - 8.23
- Total dissolved solids (TDS) in the samples were in the range 267-316
- Total hardness of the ground water samples was found to vary between 191 - 308 mg/l
- Fluoride concentration was found to vary between 0.15 - 0.28 mg/l
- Heavy metal concentrations in all the samples were found to be well within the limits.

**Ground water samples collected from all the locations within the study area showed compliance of all parameters with the drinking water standard of IS 10500.**

Table -28.0

SURFACE WATER QUALITY OF THE STUDY AREA						
SL.NO	PARAMETRS	RESULTS				
		UNITS	SWR 1	SWR 2	SWR 3	SWR 4
ESSENTIAL CHARACTERISTICS						
	Name of River					
1	Colour	Hazen	<5	<5	<5	<5
2	Odour	-	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
3	Total Suspended Solids	mg/l	13	15	19	20
4	Turbidity	NTU	6	8	10	12
5	pH	-	7.19	7.21	7.15	7.23
6	Total Hardness as CaCO <sub>3</sub>	mg/l	56	59	64	67
7	Iron as Fe	mg/l	0.09	0.11	0.12	0.125
8	Chloride as Cl	mg/l	24.5	28.6	32.1	37.9
9	Conductivity	mg/l	138	128.5	148.7	150.8
DESIRABLE CHARACTERISTICS						
10	Dissolved Solids	mg/l	87	94	113	127
11	Calsium as Ca	mg/l	24	28.9	33.6	38.5
12	Magnesium as Mg	mg/l	9.2	8.2	10.2	11.2
13	Copper as Cu	mg/l	BDL	BDL	BDL	BDL
14	Manganese as Mn	mg/l	BDL	BDL	BDL	BDL
15	Sulphate as SO <sub>4</sub>	mg/l	23	18.9	31.8	29.4
16	Nitrate as NO <sub>3</sub>	mg/l	7.8	7.6	11.3	12.7
17	Floride as F	mg/l	0.3	0.06	0.18	0.15
18	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH	mg/l	BDL	BDL	BDL	BDL
19	Mercury as Hg	mg/l	BDL	BDL	BDL	BDL
20	Cadmium as Cd	mg/l	BDL	BDL	BDL	BDL
21	Selenium as Se	mg/l	BDL	BDL	BDL	BDL
22	Arsenic as As	mg/l	BDL	BDL	BDL	BDL
23	Cyanide as Cn	mg/l	BDL	BDL	BDL	BDL
24	Lead as Pb	mg/l	BDL	BDL	BDL	BDL
25	Zinc as Zn	mg/l	BDL	BDL	BDL	BDL
26	Sulphide as S <sup>-</sup>	mg/l	BDL	BDL	BDL	BDL
27	Cromium as Cr <sup>+6</sup>	mg/l	BDL	BDL	BDL	BDL
28	Oil & Grease	mg/l	<1	<1	<1	<1
29	Alkalinity	mg/l	52.5	61.8	76.1	79.8
30	Barium	mg/l	BDL	BDL	BDL	BDL
31	Boron as B	mg/l	0.07	0.31	0.35	0.39
32	Sodium as Na	mg/l	11.5	12.8	18.2	20.3
33	Percent Sodium	mg/l	20.3	22.7	24.8	25.1
34	Nitrite as NO <sub>2</sub>	mg/l	BDL	BDL	BDL	BDL
35	Nickel as Ni	mg/l	BDL	BDL	BDL	BDL
36	Silver as Ag	mg/l	BDL	BDL	BDL	BDL
37	Dissolved Sxygen	mg/l	5.2	5.6	4.5	4.7
38	Ammonium Nitrate	mg/l	BDL	BDL	BDL	BDL
39	Kjeldhal Nitrogen	mg/l	BDL	BDL	BDL	BDL
40	Free Ammonia	mg/l	BDL	BDL	BDL	BDL
41	Residual Na <sub>2</sub> CO <sub>3</sub>	mg/l	Nil	Nil	Nil	Nil
42	Dissolved Phosphate	mg/l	BDL	BDL	BDL	BDL
43	Chemical Oxygen Demand	mg/l	9	8	13.8	15.5

BDL: BELOW DETECTABLE LIMIT

Table -29.0

DRINKING WATER QUALITY DATA							
SL. NO	PARAMETRS	RESULTS				IS 10500 DRINKING WATER STANDARD	
		UNITS	DWQ 1	DWQ 2	DWQ 3	DESIRABLE LIMITS	PERMISSIBLE LIMITS
	Name of sampling station						
1	Odour		Odourless	Odourless	Odourless	-	-
2	Taste		Agreeable	Agreeable	Agreeable	-	-
3	Colour	Hazen	Colourless	Colourless	Colourless	5	25
4	pH		7.79	7.72	7.89	6.5 to 8.5	6.5 to 8.5
5	Turbidity	NTU	1.03	1.03	1.07	5	10
6	Total Hardness as CaCO <sub>3</sub>	mg/l	192.4	191	195.3	300	600
7	Iron as Fe	mg/l	0.082	1.15	1.09	0.3	1
8	Chloride as Cl	mg/l	92.3	93.8	98.5	250	1000
9	Dissolved Solids	mg/l	281.5	278.4	284.6	500	2000
10	Calcium as Ca	mg/l	83.4	91.8	89.7	75	200
11	Copper as Cu	mg/l	BDL	BDL	BDL	0.05	1.5
12	Manganese as Mn	mg/l	BDL	BDL	BDL	1.1	0.3
13	Sulphate as SO <sub>4</sub>	mg/l	19.3	20.7	19.8	200	400
14	Nitrate as NO <sub>3</sub>	mg/l	1.25	1.33	1.25	45	200
15	Fluoride as F	mg/l	0.21	0.24	0.15	0.6 to 1.2	1.5
16	Mercury as Hg	mg/l	BDL	BDL	BDL	0.001	0.001
17	Cadmium as Cd	mg/l	BDL	BDL	BDL	0.01	0.01
18	Selenium as Se	mg/l	BDL	BDL	BDL	0.01	0.01
19	Arsenic as As	mg/l	BDL	BDL	BDL	0.05	0.05
20	Cyanide as CN	mg/l	BDL	BDL	BDL	0.05	0.05
21	Lead as Pb	mg/l	BDL	BDL	BDL	0.05	0.05
22	Zinc as Zn	mg/l	BDL	BDL	BDL	5	15
23	Chromium as Cr <sup>+6</sup>	mg/l	Absent	Absent	Absent	0.05	0.05
24	Pesticides	mg/l	Absent	Absent	Absent	Absent	Absent
25	Alkalinity	mg/l	91.8	88.5	97.2	200	600
26	Boron as B	mg/l	Nil	Nil	Nil	1	5
27	Magnesium as Mg	mg/l	9.4	7.6	9.8	30	100
28	MPN of Coliform count/100 ml	mg/l	Nil	Nil	Nil	10 (E. Coli = Absent)	10 (E. Coli = Absent)

BDL: Below Detectable limit

Table -30.0

DRINKING WATER QUALITY DATA							
SL. NO	PARAMETRS	RESULTS				IS 10500 DRIKING WATER STANDARD	
		UNITS	DWQ 4	DWQ 5	DWQ 6	DESIRABLE LIMITS	PERMISSIBLE LIMITS
	Name of sampling station						
1	Odour		Odourless	Odourless	Odourless	-	-
2	Taste		Agreeable	Agreeable	Agreeable	-	-
3	Colour	Hazen	Colourless	Colourless	Colourless	5	25
4	pH		8.19	8.23	8.17	6.5 to 8.5	6.5 to 8.5
5	Turbidity	NTU	1.11	1.13	1.16	5	10
6	Total Hardness as CaCO <sub>3</sub>	mg/l	197.5	201.9	203.5	300	600
7	Iron as Fe	mg/l	0.093	1.12	0.08	0.3	1
8	Chloride as Cl	mg/l	96.4	93.8	89.7	250	1000
9	Dissolved Solids	mg/l	297.4	293.6	267.8	500	2000
10	Calcium as Ca	mg/l	95.4	88.9	93.4	75	200
11	Copper as Cu	mg/l	BDL	BDL	BDL	0.05	1.5
12	Manganese as Mn	mg/l	BDL	BDL	BDL	1.1	0.3
13	Sulphate as SO <sub>4</sub>	mg/l	22.5	22.3	21.6	200	400
14	Nitrate as NO <sub>3</sub>	mg/l	1.46	1.49	1.31	45	200
15	Floride as F	mg/l	0.22	0.19	0.18	0.6 to 1.2	1.5
16	Mercury as Hg	mg/l	BDL	BDL	BDL	0.001	0.001
17	Cadmium as Cd	mg/l	BDL	BDL	BDL	0.01	0.01
18	Selenium as Se	mg/l	BDL	BDL	BDL	0.01	0.01
19	Arsenic as As	mg/l	BDL	BDL	BDL	0.05	0.05
20	Cyanide as CN	mg/l	BDL	BDL	BDL	0.05	0.05
21	Lead as Pb	mg/l	BDL	BDL	BDL	0.05	0.05
22	Zinc as Zn	mg/l	BDL	BDL	BDL	5	15
23	Cromium as Cr <sup>+6</sup>	mg/l	Absent	Absent	Absent	0.05	0.05
24	Pesticides	mg/l	Absent	Absent	Absent	Absent	Absent
25	Alkalinity	mg/l	94.1	93.2	99.2	200	600
26	Boron as B	mg/l	Nil	Nil	Nil	1	5
27	Magnesium as Mg	mg/l	8.2	8.7	7.9	30	100
28	MPN of Coliform count/100 ml	mg/l	Nil	Nil	Nil	10 (E. Coli = Absent)	10 (E. Coli = Absent)

**BDL: Below Detectable limit**

Table -31.0

DRINKING WATER QUALITY DATA							
SL. NO	PARAMETRS	RESULTS				IS 10500 DRINKING WATER STANDARD	
		UNITS	DWQ 7	DWQ 8	DWQ 9	DESIRABLE LIMITS	PERMISSIBLE LIMITS
	Name of sampling station				Factory Premises		
1	Odour		Odourless	Odourless	Odourless	-	-
2	Taste		Agreeable	Agreeable	Agreeable	-	-
3	Colour	Hazen	Colourless	Colourless	Colourless	5	25
4	pH		8.11	7.6	8.02	6.5 to 8.5	6.5 to 8.5
5	Turbidity	NTU	1.12	1.3	1.31	5	10
6	Total Hardness as CaCO <sub>3</sub>	mg/l	199.8	197	308	300	600
7	Iron as Fe	mg/l	0.082	0.09	0.14	0.3	1
8	Chloride as Cl	mg/l	85.5	76.2	97.5	250	1000
9	Dissolved Solids	mg/l	286.1	274.8	316	500	2000
10	Calcium as Ca	mg/l	85.2	76.2	190	75	200
11	Copper as Cu	mg/l	BDL	BDL	BDL	0.05	1.5
12	Manganese as Mn	mg/l	BDL	BDL	BDL	1.1	0.3
13	Sulphate as SO <sub>4</sub>	mg/l	20.7	18.7	26	200	400
14	Nitrate as NO <sub>3</sub>	mg/l	1.35	1.42	1.54	45	200
15	Fluoride as F	mg/l	0.17	0.22	0.28	0.6 to 1.2	1.5
16	Mercury as Hg	mg/l	BDL	BDL	BDL	0.001	0.001
17	Cadmium as Cd	mg/l	BDL	BDL	BDL	0.01	0.01
18	Selenium as Se	mg/l	BDL	BDL	BDL	0.01	0.01
19	Arsenic as As	mg/l	BDL	BDL	BDL	0.05	0.05
20	Cyanide as CN	mg/l	BDL	BDL	BDL	0.05	0.05
21	Lead as Pb	mg/l	BDL	BDL	BDL	0.05	0.05
22	Zinc as Zn	mg/l	BDL	BDL	BDL	5	15
23	Chromium as Cr <sup>+6</sup>	mg/l	Absent	Absent	Absent	0.05	0.05
24	Pesticides	mg/l	Absent	Absent	Absent	Absent	Absent
25	Alkalinity	mg/l	92.6	94.3	110	200	600
26	Boron as B	mg/l	Nil	Nil	Nil	1	5
27	Magnesium as Mg	mg/l	10.2	11.9	11.4	30	100
28	MPN of Coliform count/100 ml	mg/l	Nil	Nil	Nil	10 (E. Coli = Absent)	10 (E. Coli = Absent)

BDL: Below Detectable limit

### **3.6 LAND ENVIRONMENT**

#### **3.6.1 GEOLOGY/HYDROLOGY OF DISTRICT BALRAMPUR (U.P.)**

District Gonda occupying an area of 7,352 km<sup>2</sup> is a part of Middle Ganga Plain-West. The territory of Nepal runs in the north-east of the district. On the east the Arrah river separates it from Nepal for some 35 kms while the remaining portion of the boundary is formed by Basti district. The southern borders are washed by the river Ghaghara, across which lies the districts of Faizabad and Bara-Banki. In the west lies the district Bahraich demarcated by various rivers, streams etc. Northern part of the district depicts tarai characteristics. Floods are frequent in the area. This part of the district is unhealthy and famous for malarial fever. Uparhar runs from north-west to south-east a few miles north of the Terhi river and passing through a short distance to the south of Gonda town. The whole tract is raised plateau which is broken by various rivers. These divides it into several fertile plains. The Uparhar embraces the part of Utraula, large part of Gonda and a portion of Mahadewa and Nawabganj parganas and is moist area. The level of this area is low about fifteen feet below that of upland and covered with alluvial loam. Because just below the surface of this tract sub-soil water is found, so there is no danger of draught but the floods are very common in the season of abnormal rainfall. This tract comprises whole of Tarabganj tahsil and Paharpur pargana.

The geology of the district does not expose anything except generally Gangetic alluvium with the exception of the boulders detritus brought down from the hills in the north. The slope of the district is slight and runs from north-west to south-east. It is 390 feet above the level of the sea in the north and it drops to 360 feet at Tulsipur and 350 feet at Balrampur. The surface in the central part is higher than this. The Tarhar is lowest part of the district with height ranging from 355 feet at Colonelganj to about 310 feet opposite to Ayodhya. The soils of the district belong to the Aqualfs-Aquefts-Udalfs, Aqualfs-Fluents, Ochrepts-Aquepts-Ustalfs, Ochrepts-Orthents-Udalfs and Aquolls-Ustolls sub-order associations. The

soil of the district is not bhur or usar as in other district but in tarai generally a stiff heavy clay is found while at some places it has rich alluvial loam. In uparhar loam predominates and in tarhar it is porous loam with sandy soil. The climate of the district is similar to other adjoining districts, Bahraich and Basti During summer the climate becomes hottest and during winter the coldest. A large proportion of area are under forest in Tulsipur along the Kuwana and Bisuhi rivers and south of the Mankapur and north of Nawabganj. The main trees are sal, assina, haldu, khair etc. Agriculture is the important source of income of the people of the district. About 70 per cent area is under cultivation of which 33 per cent is irrigated. Canals and tubewells are the main sources of irrigation. The district is well connected by roads and rails with other parts of the state and also has advantages of direct connection with the remote places of all sides.

On the basis of geology, climate, topography soils and natural vegetation the district is sub-divided in the following four sub-micro regions:

1. Gonda Tarai
2. Rapti Flood Plain
3. Gonda Plain
4. Ghaghara Khadar

A brief description of these regions is given below:-

1. Gonda Tarai: It is situated in the northern part of the district covering major portion of Balrampur tahsil. The northern limit of the region coincides with indo-Nepal international boundary whereas southern limit extends to the high bank of the Rapti river. There are numerous rivulets which drain from north to south direction. These rivulets are wide and change their courses. It is difficult to define the channel of the streams. The surface along these streams are eroded.

The extent of such erosion decreases as the streams drain southward. During the rains all these streams are flooded and water drain as a sheet rather than gully. The main streams are Gandhela, Kachni, Khanjhar,



Kather, Siria, Nakti, Kataha. Bhambhar etc. Besides above streams Girgithi. Ganeshpur. Baghelkhand and Kohargaddi Tals are very significant. A 100 meter contour passes through the eastern part of the region. The geology of the region is marked with Alluvium and Dun gravels of Recent formation and the soil sub-order association belongs to Aquents-Fluents. There is a continuous zone of reserved forest spread over along international boundary from one end to other. The important belts of reserved forests are Tulsipur, Rampur, Bankatwa and Bhambhar. These forests are dense mixed jungles mainly of Sal tree. There is lack of irrigational facilities. A few canals are constructed by the diversion of the stream channel. Similarly there are physical limitation in the development of roads. Most of the roads are jeepable and run parallel to the streams. A loop line of the N.E. Railway passes through the region and terminates at Jarwa. Agriculture is mainly rainfed and rice is the main crop. Besides stone quarry is main economic activity in the region. The streams draining in this tract bring a large amount of stone boulders from Nepal Himalayas which are collected here and supplied to other regions of state. Settlements are scattered. The average inter-village distance is approximately 3.88 km<sup>2</sup>. There are 464 villages and two urban centres which are spread over 1803.9 km<sup>2</sup> area. It is mainly a rural tract where 449.886 rural population reside. It has the lowest density (261 persons/km<sup>2</sup>) among all the regions of the district. Tulsipur (12,497) is headquarters of the newly created tahsil whereas pachperwa (9,335) is a block headquarters and a new town.

2. Rapti Flood Plain: The region is situated on both sides of the river Rapti in east-west direction. The north-south extent of this plain coincides with the raised surface which is the limit of the flood water. Rapti flood is a common feature every year. The river enters the district from the west and drains out in the east. Suwawan is the old channel of Rapti which drains in the southern part of the region parallel to it. Pera and Kharjhar are the right bank tributaries. Some natural depressions or tals are also situated here. There are embankments to protect and divert the flood water. A 100 meter contour crosses the region in the eastern part but western side is

still higher than this. The region has Alluvium and Dun gravels (Recent) geological formations. Its soil belongs to Aquolls-Ustolfs sub-order association. Due to flood the area is lagging far behind in terms of transport and agriculture. The linkages in south of Rapti are more developed than in the north. Irrigational facilities are absent. Settlements are sparsely located. The average inter settlement distances are comparatively lesser than that in Tarai tract. There are variations in the settlement patterns in north and south of Rapti river also. The total area of the region is 927.8 km<sup>2</sup> where 356 rural and 2 urban centres are situated. The breakup of rural and urban populations is 326.699 and 63.655 respectively. The total density of population of this region is 421. Balrampur (46.058) is an old princely estate and tahsil headquarters. Utraula (17,597) is another tahsil town. The above towns have special significance in the district.

3. Gonda Plain: The region is situated in the centre of the district covering major parts of Utraula and Gonda tahsils. It is a flat plain locally known as Uparhar. The north and south limits of the region is marked by the old high bank of the Rapti and the Ghaghara rivers. The master slope is from north-west to south-east direction. There are numerous streams flowing in the above slope direction and join Ghaghara beyond the region. These streams are Kuwana, Bisuhi and Terh. In the western part Terhi river forms meanders and surface along the stream is also eroded. There are large number of water bodies of different sizes spread over the area. Suhela and Pathri Tals are among them. Being raised surface land, it is devoid from flood havoc. A 100 metre contour passes from the eastern part of the region. Geologically this region is endowed with Alluvium and Dun gravels (Recent) and its soils pertain to AquolfsUstolfs-Ochrepts-Orthents-Udolfs sub-order association. There are patches of reserved forest spread over along the river sides. Utraula reserved forest along Bisuhi, Kuwana reserve forest along Kuwana. Tikri along Manewar are worth mentioning. Being a plain tract, this region is well served by transport links. There number of main roads which connect the region with other parts of the state. Similarly North-Eastern Railway also serve the area. Although

canals are not very prominent yet agricultural pursuits are well developed. Gonda (70.847) is the district headquarters which is connected with roads and railways with all parts. The total area of the region is 3296.5 km<sup>2</sup> where 1.673 villages and 6 towns are situated. It ranks first in rural (1.346.148), urban (110.923) populations as well as in density (442 persons/km<sup>2</sup>) among all the regions. This fact indicates the development of this region. In comparison to other regions. Mankapur (4,4181) is the centre of Indian Telephone Industry. Other places of significance are Katra (3.630). Kharagpur (5,712). Itai Rampur (11,283) and Colonganj (14.984).

4. Ghaghara Khadar: It is a flood plain locally known as Tarhar. The region is delimited by the extent of flood water of Ghaghara. The area nearby the river is also called Manjha. In this zone numerous rivulets are situated which are flooded with the back flow of water from the Ghaghara river during rains and cause flood in the entire area. Tarhar is slightly higher surface area but liable to flood during heavy rains. To check the extent of flood water embankment has been constructed along the Ghaghara river. This embankment protects the people from flood havoc. Besides, there are number of ox-bow lakes which represent the old course of the rivers. Barpati and Aranga lakes are very prominent. Geology of this region is marked by Alluvium and Dun gravels (Recent) and the soil is of Aquents - Fluvents-Ochrepts-Udalfs-Orthents sub-order association. A part of Tikaria reserved forest falls in this region. Since it is a khadar tract, land productivity is very high. Rabi crops are mainly cultivated. Development of roads are restricted and canals are absent because of physical factors. There are 436 villages and one urban centre spread over an area of 1367.9 km<sup>2</sup>. The average space between settlements are approximately 3.36 kilometres. The productivity of land attracts a large number of people (504.305) to reside in these rural areas. Its rural density is 370 persons/km<sup>2</sup>. Nawabganj is the only urban centre in this region. It is a famous sugar industry centre.

### 3.6.2 Soil Sampling and Analysis

Reconnaissance survey was undertaken and monitoring locations were finalized based on Table- 32.0

- Agricultural activity
- Variation in slope, colour, texture, crop growth
- Land usage

Based on the above features Nine locations were selected for analyzing the soil quality status around the proposed project site during Pre-Monsoon (1st Nov-2009 - 31 Jan, 2010). The soil samples were collected from the Core & Buffer Area. All the samples have been analyzed for physico-chemical parameters results are shown in table:33.0

The Sampling Location are shown in the **Table 32.0**

**Table: 32.0 : List of Soil Sampling Location**

S.No	Code	Name Of Sampling Station	Direction	Distance
1	S-1	Village - Bisambherpur	E	2.5
2	S-2	Village - Chandapur	NE	5.4
3	S-3	Village - Kihaura	SE	3.84
4	S-4	Village - Ramwapur	SE	7.5
5	S-5	Village - Pandri	NW	5.4
6	S-6	Village - Dewario	NW	4.8
7	S-7	Village - Sanjwal	W	3.6
8	S-8	Village - Shivdayalpur	SW	2.4
9.	S-9	Factory Site	-	-

**Note: SL - Sandy Loam, C - Clay, SCL - Sandy Clay Loam**

As per the textural class, the soil quality falls under Clay category. Most of the samples are Alkaline in nature except for one sample which is slightly acidic in nature. The pH values obtained are in the range of 6.77 - 7.44. The nutrients like N, P, K are in moderate concentration in the samples from all nine localities

Texture	Sandy loam.
Nature	Slightly Alkaline
pH Range	6.77 - 7.44
N, P, K Levels	Moderate

The complete analysis of soil quality is given in the **Table-33.0**

Table -33.0

SOIL QUALITY DATA OF THE STUDY AREA										
PARAMETERS	UNIT	RESULTS								
		S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9
										Factory Premises
pH (1:2 soil water extract)		7.18	6.77	7.16	6.55	7.19	6.78	7.44	6.89	7.24
Electrical Conductivity	µS/ cm	222	215	221.6	245	217.5	227	221.8	218	224
Total Soluble Salts	mg/Kg	230	238	229	247	238	221	247	229	214
Nitrate as N	mg/l	21.5	22.3	22.7	19.9	21.6	22.1	23.1	22.7	22.4
Phosphorous as P <sub>2</sub> O <sub>5</sub>	mg/Kg	19.8	19.5	20.6	17.5	19.8	20.1	21.3	19.4	21.8
Potash as K <sub>2</sub> O	mg/Kg	190.4	189.3	183	120	188	183.9	197.2	189.2	185
Sodium as Na <sub>2</sub> O	mg/Kg	265	257	258	229.9	265.3	256.3	260.8	262.4	218.5
Calcium as Ca	mg/Kg	1956	1953	1959	1429	2004	1947	2027	1956	2014
Magnesium as Mg	mg/Kg	379	346	373.2	99.3	364.8	331.4	387.3	332.9	222.5
Chloride as Cl	mg/Kg	47.3	42.5	47.6	53.9	47.9	45.8	48.9	42.3	49.6
Organic carbon	%	1.03	1.04	1.01	0.99	1.04	1.07	1.19	1.06	1.07
Texture		SL	SL	SL	SL	SL	SL	SL	SL	SL
Sand	%	17.3	16.9	17.8	13.7	17.1	17.8	16.4	15.9	16.4
Silt	%	24.6	23.9	24.5	26.1	24.8	24.1	25.4	23.1	24.2
Clay	%	46.2	43.5	45.9	47.7	45.3	45.7	47.1	45.8	45.7
Iron as Fe	mg/Kg	18.3	18.4	17.1	15.3	17.8	18.2	19.7	17.4	17.3
Boron as B	mg/Kg	0.13	0.12	0.13	0.8	0.12	0.11	0.15	0.13	0.13

**LOCATIONS :**

S-1	Village - Bisambherpur	S -6	Village - Dewario
S -2	Village - Chandapur	S -7	Village - Sanjwal
S -3	Village - Kihaura	S -8	Village - Shivdayalpur
S -4	Village - Ramwapur	S -9	Factory Site
S -5	Village - Pandri		

**3.6.2.1 MICROBIAL QUALITY OF SOIL**

Microbial organisms like total heterotrophs, fungi and actinomycetes have also been carried out by plate count method. The purpose of the examination of soil samples is to assess the microbial population in the soil samples, which are good indicator organisms for soil fertility.

Total Heterotrophs count ranged from 126 to 203 x 10<sup>5</sup> while fungi is ranged from 82 to 120 x 10<sup>5</sup> and 42 to 86 x 10<sup>5</sup> respectively. The total count of heterotrophs in soils are comparatively higher than fungi and actinomycetes. The microbial population values are not abnormal and are not indicating any soil contaminations (Table 34)

TABLE 34.0

**MICROBIAL QUALITY OF SOIL SAMPLES IN STUDY AREA**

Sr. No.	Location	Total Heterotrophs CPU x 10 <sup>5</sup>	Fungi CPU x 10 <sup>5</sup>	Actinomycetes CPU x 10 <sup>5</sup>
1.	Village - Bisambherpur	132	82	42
2.	Village - Chandapur	180	112	68
3.	Village - Kihaura	203	120	86
4.	Village - Ramwapur	198	92	58
5.	Village - Pandri	172	96	48
6.	Village - Dewario	142	102	44
7.	Village - Sanjwal	126	92	59
8.	Village - Shivdayalpur	172	96	48
9.	Factory Site	158	64	62

**3.6.3 LAND USE AND AGRICULTURE :****LAND USE AND AGRICULTURE :**

Table 35.0 gives land use pattern of Distt. Balrampur and Block-Shriduttganj in which proposed site is situated. The data pertaining to the ratio of the net to total cultivated area, area cultivating food crops. Total irrigated area have been included in this table.

Table-36.0 contain the relevant data, under different crops of cereals, dals, oil seeds and miscellaneous crops including sugar cane.

Table 37.0 contain the number and the corresponding areas in hectares of Various sizes of land holding i.e. less than 0.5 ha, 0.5-1.0ha, 1.0 – 2.0ha 2.0 – 4.0ha, 4.0 – 10 ha, and over 10 hectare has been shown is this table.

Table 38.0 contains area irrigated by different source of medium of Distt. Balrampur and Block - Shriduttganj, like canal, own tubewell, well, ponds and other sources.

**TABLE 35.0****LAND USE PATTERN OF DISTT-BALRAMPUR AND  
BLOCK-SHRIDUTTGANJ****IN WHICH PROPOSED SITE IS SITUATED**

S.No.	Classifiacion	Area (Hectare)
1.	Total reported land	324852 (16793)
2.	Forest	58940 (612)
3.	Banjar Land fit for cultivation	2921 (300)
4.	Current fallow land	7786 (1003)
5.	Other fallow land	3095 (294)
6.	Usar not fit for agricultural purposes	3465 (NIL)
7.	Garden/Bagh/Shrubs	5208 (94)
8.	Pasture land	235 (20)
9.	Zaid crop	144185 (7886)
10.	Kharif crop	171229 (171218)
11.	Rabi	2012 (248)
12.	Net irrigated area	82336 (10019)
13.	Gross irrigated area	98574 (10084)
14.	Land prepared for cane	95 (95)

The figures inside the brackets pertain to the whole of the Block-Shriduttganj.



**TABLE - 36.0**  
**AREA UNDER DIFFERENT CROPS (Hectare)**  
**OF DISTT. - BALRAMPUR AND BLOCK-SHRIDUTTGANJ**

1. Rice	2. Wheat
(i) Total –116107 (11286)	(i) Total – 90872 (5950)
(ii) Irrigated-2038 (6)	(ii) Irrigated – 61803(4047)
3. Jawar	4. Bajra
(i) Total –72 (4)	(i) Total – 124 (11)
(ii) Irrigated - NIL (NIL)	(ii) Irrigated – 124 (112)
5. Maize kharif	6. Maize Zaid
(i) Total – 5595 (93)	(i) Total – 123 (21)
(iii) Irrigated - 33 (NIL)	(ii) Irrigated – 123 (21)
7. Sawa Kharif	8. Sawa Zaid
(i) Total – 46 (2)	(i) Total – NIL (NIL)
(ii) Irrigated – NIL (NIL)	(ii) Irrigated – NIL (NIL)
9. Kodo	10. Barley
(i) Total – NIL (NIL)	(i) Total – 32699 (454)
(ii) Irrigated - NIL (NIL)	(ii) Irrigated – 4137 (248)
11. Urad Total	12. Massor
(iii) Total – 1943 (82)	(i) Total – 32699 (454)
(iv) Irrigated - 40 (NIL)	(ii) Irrigated - 4137 (248)
13. Moong Total	14. Gram
(i) Total – 192 (10)	(i) Total – 1082 (194)
(ii) Irrigated - 192 (10)	(ii) Irrigated - 578 (85)
15. Arhar	16. Tobacco
(i) Total –7146 (204)	(i) Total – NIL (NIL)
(ii) Irrigated - 188 (10)	(ii) Irrigated – NIL (NIL)

- |                              |                            |
|------------------------------|----------------------------|
| 17. Total Dal                | 18. Sanai                  |
| (i) Total – 45183 (1001)     | (i) Total – NIL (NIL)      |
| (ii) Irrigated-6625 (483)    | (ii) Irrigated – NIL (NIL) |
| 19. Mustard                  | 20. Haldi                  |
| (i) Total –16889 (312)       | (i) Total – NIL (NIL)      |
| (ii) Irrigated-7808 (195)    | (ii) Irrigated – NIL (NIL) |
| 21. Pea                      | 22. Fodder (Rabi)          |
| (i) Total – 294 (10)         | (i) Total – 330 (32)       |
| (ii) Irrigated - 201 (9)     | (ii) Irrigated – 59 (6)    |
| 23. Til                      | 24. Fodder (Kharif)        |
| (i) Total – 2 (NIL)          | (i) Total – 835 (61)       |
| (ii) Irrigated - 1 (NIL)     | (ii) Irrigated – 770 (12)  |
| 25. Ground Nut               | 26. Fodder (Zaid)          |
| (i) Total – 72 (7)           | (i) Total – 82 (12)        |
| (ii) Irrigated – NIL (NIL)   | (ii) Irrigated – 82 (12)   |
| 27. Cane                     |                            |
| (i) Total – 38368 (6182)     |                            |
| (ii) Irrigated– 17133 (5063) |                            |
| 29. Potato                   |                            |
| (i) Total – 1733 (128)       |                            |
| (ii) Irrigated – 1398 (114)  |                            |

**TABLE –37.0**  
**LAND HOLDING SIZES OF DISTRICT - BALRAMPUR**

Classification	No	Area (Sq.- Hectare)
Less than – 0.5	143592 (5194)	40152 (1469)
Between - 0.5 - 1.0 ha	59529 (2357)	42153 (2014)
Between – 1.0 – 2.0 ha	38888 (1497)	52534 (2110)
Between – 2.0 – 4.0 ha	17563 (542)	45593 (1134)
Between – 4.0 – 10 ha	3813 (115)	20188 (626)
10 ha and above	81 (2)	1029 (22)

**TABLE – 38.0**  
**AREA IRRIGATED BY DIFFERENT SOURCE OF MEDIUM**  
**OF DISTT. - BALRAMPUR (IN HECTARE)**

(i) Total Irrigated area	82336 (9992)
(ii) Area irrigated by canal	5677 (NIL)
(iii) Own Tubwell	2181 (273)
(iv) Govt. tubewell	69322 (9077)
(v) Well	4021 (500)
(vi) Ponds	769 (101)
(vii) Other Sources	366 (41)

The figures inside the brackets pertain to the whole of the Block-Shriduttganj

### **3.7 BIOLOGICAL ENVIRONMENT (TERRESTRIAL ECOLOGY)**

The environment literally the surrounding, the environment of a plant or animal consisting of those things and set of conditions which directly or indirectly influence not only the life of organisms but also of communities. Ecology is an important components of the environment and comprises flora (Vegetation and micro plant species) and fauna (wild life and aquatic/terrestrial micro organisms). In ecology, we study the relationship between biotic and abiotic worlds. The abiotics includes topography, soil, climate etc. which are influenced by natural perils and pollutions.

Organism interact with each other and also with physical conditions that are present in the habitat form an ecosystem. No plant or animal lives as isolated individuals. Plant and animals generally prefer to live in groups. In any biological organization, plants and animals are very closely related and inter depended and at a particular place, plants and animals share the same set of conditions and same environment. The species living together in groups exhibit various degrees of adjustment among themselves and with their physical habitats as well when certain imposed changes takes place in a community. A series of recognizable system alternations may occur, which are called Ecological successions.

An ecological imbalance on change in habitat on ecosystem results when living things show various responses and sensitivities to outside influences. An ecology of the environment is also altered by changes in pollution levels.

The pollutants of concern for this project would be domestic waste water, air emission (such as SPM) SO<sub>2</sub>, NO<sub>x</sub>, CO etc.), solid waste (Fly ash). Beyond certain permissible limits, the pollutants results in harmful effects to the flora and fauna of the area in a number of ways.

In this section, flora and fauna in the study area is mentioned in 3.7.1 to 3.7.2.

**3.7.1 TERRESTRIAL FLORA :****Table-39.0**

Abrus precatorius, L.,  
 Acacia catechu wild.,  
 Acacia concinna Dc.,  
 Acacia nilotica wild.,  
 Acacia pennata wild.,  
 Achyrdnthes aspera L.,  
 Adhatoda vasica Nees.,  
 Adina cordifolia Hook F.,  
 Ailanthus excelsa Roxb.,  
 Ajangium solnifolium L.,  
 Baliosperum montanum wild.,  
 Bambusa arundianacea wild.,  
 Barringtonia arundinacea wild,  
 Barringtonia actuangula Gaertn.,  
 Bauhinia Purpurea L.,  
 Bauhinia Vahlil W & A.,  
 Bauhinia Racemosa Vah.,  
 Caeaslpinia Crista L.,  
 Caesalpina Decapethlla Reth.,  
 Caesalpina Digyna Rott.,  
 Callicarpa Arborea Roxb.,  
 Carissa Opaca Stopt.,  
 Casearia Graveolens Belz.,  
 Cassia Auriculata L.,  
 Cassia Tora L.,  
 Careya Arbrea Roxb.,  
 Celastrus paniculate wild.,  
 Dactylodenum Aegyptium Beaur.,  
 Delbergia Latifoilia Roxb.,  
 Dalbergia Sissoo Roxb.,  
 Dalbergia Vaolubitis Roxb.

Delnix Regia.,  
Dellenia Aurea Smith.,  
Dendro Calamus Strictus Nees.,  
Dichanthium Pulchellum.,  
Ehretica Laevies Roxb.,  
Elaeodendron Glavcum Pers.,  
Emblica Tsjcrium Gaertn.,  
Feronia Limonia L.,  
Ficus Bengalesnsis L.,  
Ficus Hispida L.,  
Ficus Lacor L.,  
Ficus Microcarpa,  
Ficus Racemosa L.,  
Ficus Religiosa L.,  
Gardenia Turgida Roxb.,  
Garuga Pinnata Roxb.,  
Glycosmis Pentaphylla Correa.,  
Grewia Asiatica L.,  
Grewia Asiatica Vohl.,  
Grewia Sersulata.,  
Grewia Tiliaefolia Vohl.,  
Heteropogan Contortus L.,  
Hiptage Bengalensus Kustz.,  
Holarhena Antidysenterrica Wall.,  
Holicteres Isora L.,  
Ichnocarpus frutescenes Br.,  
Kirkgamelia Reticulatix (Rom) Bill.,  
Kydia Calycina Roxb.,  
Mallotus Phillipensis Mevelus Aug.,  
Mangifera Indica L.,  
Melanthesa Shamnoides (Retz) Bl.  
Melia Azedirachta L.,  
Miliusd Tomentosa Roxb.,

Millettia Auriculata Bak.,  
Millinytonia Hortensis  
Nelumbo Nucifera Gowitz.,  
Narenga Porphyrocoma (Hance) Bork.  
Nyctanthes arbortristis L.,  
Oacetta Indica L.,  
Phragmiter Karka trim.,  
Phoenix Sylvestris Roxb.,  
Phronix Acaulis Buch-Han.,  
Piper Langum L.,  
Piptadenia Oudhensis Brandia.,  
Sacharum Spontaneum L.,  
Scinlapsus Officinalis (Roxb) Schhoot.,  
Semecarpus Anacardium L.,  
Sclerostachya Awsca Camis.,  
Shorea Robusta Gaertrn.,  
Tamarandus Indica.,  
Tectona Grandis L.,  
Tillacora Acuminata Legislature Micrr.,  
Tephrosia Candida D.C.,  
Terminalia Alata L.,  
Terminalia Arjan Royle.,  
Terminalia Chebuka Roxb.,  
Urena Labata L.,  
Uvaira Hamitoni H.K.,  
Vetiveria Zizanioides L.,  
Vitex Negundo L.,  
Viscum Nepalensis Spreng L.,  
Wendlandia Tinctoria D.G.  
Woodfordia Fruticosa Kwoz.,

**Economic Crops**

<b>Botanical Name</b>	<b>Common Name</b>
Allium cepa L.,	Onion
Allium sativum	Garlic
Artocarpus heterophyllus	Jack fruit
Beeta Vulgaris	Beet
Brassica deracea L.,	Cabbage
Brassica hirta moench	White mustard
Brassica compestris L.,	Sarson
Cyampsis tetranonoloba	Gwar
Cajanus cajan will	Arhar
Cicer arctivum L.,	Chana
Cucurbite pepo	Summer squash
Dolichoss lablab	Bean dolichos
Dacicus wrota L.,	Carrot
Impomeea batatas L.,	Sweet Potata
Lycopersicon esculentum	Tomato
Nclumbo nucifera	Lotus
Orija sativum	Peas
Raphanus sativus	Raddish
Solanum melogena L.,	Brinjal
Saccharum Officinalis L.,	Sugar cane (Main Crops)



TABLE - 40.0

## 3.7.2 TERRESTRIAL FAUNA

Sl.No.	Zoological Name	English/Common Name
	<b><u>ANNELIDS</u></b>	
1.	Hirundinarisa sp.	Leech
2.	Pheretimaposthuma	Earth worm
	<b><u>ARTHROPODS</u></b>	
3.	Camponotus comoressus	Black ant
4.	Gravallus sp.	Cricket
5.	Hieroolyohus sp.	Grass hopper
6.	Microtermes sp.	White ant
7.	Oecophila maragdina	Red ant
8.	Palamneus	Scorpion
9.	Paratelphyse Hydromus	Crab
10.	Piucris brasscal	Butter flies
11.	Scolopendra sp.	Centipedes
	<b><u>MOLLUSCS</u></b>	
12.	Lamallidens marginalis	Fresh Water mussels
13.	Pila globasa	Snail
	<b><u>AMPHIBIANS</u></b>	
14.	Bufo melanostictus	Toad
15.	Rana tigrina	Frog
	<b><u>REPTILES</u></b>	
16.	Bungarus caeruleus	Krait
17.	Calotes versicolor	Lizard
18.	Crocodilus Palustris	Magar
19.	Hemidactylus flaviviridis	Wall Lizard
20.	Lachesis gramineus	Viper
21.	Naia tripudians	Cobra
22.	Ptyas mucosus	Dhaman

23.	Python molurus	Python
24.	Trachichium fuscum	Water snake
25.	Varanus monitor	Land monitor
26.	Zamenis muscosus	Rat snake
	<b><u>AVIANS</u></b>	
27.	Accipitar badius	Sparrow hawk
28.	Anser indicus	Barheaded goose
29.	Bubo bubo	Owl
30.	Cuculus varius	Common hawk cuckoo
31.	Columba livia	Pigeon
32.	Corvus splendens	House crow
33.	Cridotheres tristis	Myna
34.	Dinopium bengalensis	Wood pecker
35.	Elenus careruleus	Cheer
36.	Egretta garzetta	Bagula
37.	Eudynamis scolopacea	Koel
38.	Alco sp.	Baz
39.	Francolinus sp.	Partridges
40.	Gallus domesticus	Common fowl
	<b><u>MAMMALS</u></b>	
41.	Bandicota indica	Wild rat
42.	Bos indicus sp.	Cow
43.	Bubalus indicus	Buffalo
44.	Canis aureus	Jackal

### **3.7.3. PLANKTONS**

Phytoplankton and Zooplankton are indicators of environmental stress. The quantity and quality of such biological species in a particular environmental largely depends on various physico-chemical characteristics of water such as pH, conductivity, nutrients, BOD, alkalinity etc.

Diversity is an index to measure the level of pollution. With increasing levels of pollution, diversity of plankton decreases. Higher the value of diversity, higher the stability to resist the adverse environmental factors. Generally, the Shannon Weaver formula to measure the diversity index in both the cases is used. According to this formula for clean water, the diversity index in case of phytoplankton should be 6 it may differ slightly in different locations. Decreases in the value of index indicates pollution. For zooplankton index value 3 and above indicates healthy conditions, values between 1 and 2 show mild pollution.

The summary of plankton/Zooplanktons of River Rapti / Kuwano depicted in Table 41.0 & 42.0. Results shows that Rivers are free from pollution.

**TABLE : 41.0 : Summary of Phytoplankton of River Rapti/Kuwano**

Sampling Station	Period	Dominant	TNIS/ml	Organisms in Groups		Shanon Weaver's index
Rapti River	Dec 2009	<i>Chlymydononas</i> <i>Gonium</i> <i>Nitzschia</i> <i>Mircrocystis</i> <i>Phacus</i>	72	<i>Chlorophyceae</i> <i>Cyanophyceae</i> <i>Euglenophyceae</i> <i>Baccillariophyceae</i>		7.21
Kuwano River	Jan 2010	<i>Pediastrum</i> <i>Phacus</i> <i>Udorina</i> <i>Oscillatoria</i> <i>Chlamydomonas</i> <i>Lyngbya</i> <i>Anabaena</i> <i>Microcystis</i>	48	<i>Chlorophyceae</i> <i>Cyanophyceae</i> <i>Euglenophyceae</i> <i>Baccillariophyceae</i>		6.82
Rapti River	Dec 2009	<i>Fragilaria</i> <i>Oscillatoria</i> <i>Udorina</i> <i>Gonium</i> <i>Pediastrum</i> <i>Navicula</i> <i>Phacus</i> <i>Nitzschia</i>	68	<i>Chlorophyceae</i> <i>Cyanophyceae</i> <i>Euglenophyceae</i> <i>Baccillariophyceae</i>		6.42
Kuwano River	Jan 2010	<i>Chlamydomonas</i> <i>Euglena</i> <i>Gonium</i> <i>Pediastrum</i> <i>Nitzschia</i> <i>Navicula</i> <i>Synedra</i>	66	<i>Chlorophyceae</i> <i>Cyanophyceae</i> <i>Euglenophyceae</i> <i>Baccillariophyceae</i>		8.40

**TABLE : 42.0 : Summary of Zooplankton of River Rapti/Kuwano**

<b>Sampling Station</b>	<b>Period</b>	<b>Dominant</b>	<b>TNIS/ml</b>	<b>Organisms in Groups</b>		<b>Shanon Weaver's index</b>
Rapti River	Dec 2009	Polyartha Keratella Moina Vorticella Polyphemus Daphnia	32	Rotifers Crustaceans		3.42
Kuwano River	Jan 2010	Polyartha Filnia Moina	24	Rotifers Crustaceans		4.20
Rapti River	Dec 2009	Moina Cyclops Mesocyclops Diffugia	42	Rotifers Protozoans Curstaceans Copepodes		3.30
Kuwano River	Jan 2010	Polyartha Daphnia Filnia Moina	56	Protozoans Rotifers Curstaceans		4.60

### **3.8 SOCIO-ECONOMIC ENVIRONMENT :**

#### **3.8.1 DEMOGRAPHY OF DISTT-BALRAMPUR, TEHSIL-UTRAULA & VILL-ITAIMAIDA.**

Demographic features of Distt-Balrampur, Tehsil-Utraula & Vill Itaimaida, in which the factory is situated have also been included in this section. Table 43.0, 44.0 & 45.0 contains data pertaining to the number of habitated and inhabited villages sex-wise rural population, area in Km, number of houses and households, sex-wise population of scheduled casts and scheduled tribes.

#### **3.8.2 AVAILABILITY OF INFRASTRUCTURAL FACILITIES :**

The Table 46.0 contains information regarding the distances of the villages from the nearest fair price shops. The part C provides information on the distance from the villages of the nearest available infrastructure facilities, such as repair facilities for agriculture implements, bazzars/Haats, veterinary hospitals etc. The part gives the whole sale markets, cold storages, seed godowns, veterinary hospitals etc. The part D gives the status of electrification of villages. It contains information on electrification, including electrified villages and those in which L.T. main lines have been provided.

#### **3.8.3 MEDICAL AND HEALTH SERVICES :**

The table 48.0 provides information on the availability of medical and health services for all the three currently popular systems of medicine in Block.

#### **3.8.4 HUMAN RESOURCES DEVELOPMENT :**

The information in respect of education facilities has been presented in table 49.0

**TABLE - 43.0 : DEMOGRAPHY OF DISTT-BALRAMPUR**

DETAILS	Population	Male	Female
Population - Total	1682350	887939	794411
Population - Rural	1546770	816561	730209
Population - Urban	135580	71378	64202
Population (0-6)	339432	173130	166302
SC Population	226753	121676	105077
ST Population	19347	10130	9217
Number of literates	464587	327694	136893
Number of illiterates	1217763	560245	657518
Total Workers	714059	466059	248000
Main workers	501620	398612	103008
Marginal workers	212439	67447	144992
Non workers	969291	421880	546411
Cultivators	393815	268746	125069
Agricultural labourers	226437	117774	108663
Workers in household industries	16077	11149	4928
Other workers	77730	68390	9340

DETAILS	Population	Male	Female
Proportion of SC Population (%)	13.5	13.7	13.2
Proportion of ST Population (%)	1.1	1.1	1.2
Literacy Rate (%)	34.6	45.8	21.8
Illiteracy Rate (%)	90.7	78.4	104.7
Work Participation Rate (%)	42.4	52.5	31.2
Proportion of Main workers (%)	29.8	44.9	13.0
Proportion of Marginal Workers (%)	12.6	7.6	18.3
Proportion of Non Workers (%)	57.6	47.5	68.8
Proportion of Cultivators to workers (%)	55.2	57.7	50.4
Proportion of agricultural labourer to total workers (%)	31.7	25.3	43.8
Proportion of workers in household industries to total workers (%)	2.3	2.4	2.0
Percentage of other workers to total workers (%)	10.9	14.7	3.8

No. of Households	256300
Household size	7.0
Proportion of Urban population (%)	8.1
Sex Ratio (females per 1000 males)	895
Sex Ratio (0-6 Years)	961
Sex Ratio (SC)	564
Sex Ratio (ST)	910

**TABLE - 44.0 : DEMOGRAPHY OF TEHSIL-UTRAULA**

DETAILS	Population	Male	Female
Population - Total	556292	283059	273233
Population - Rural	528790	268543	260247
Population - Urban	27502	14516	12986
Population (0-6)	117575	60131	57444
SC Population	70043	36244	33799
ST Population	19	12	7
Number of literates	161477	110682	50795
Number of illiterates	394815	172377	222438
Total Workers	232515	138534	93981
Main workers	154444	118608	35836
Marginal workers	78071	19926	58145
Non workers	323777	144525	179252
Cultivators	138483	86201	52282
Agricultural labourers	69121	31206	37915
Workers in household industries	3795	2615	1180
Other workers	21116	18512	2604

DETAILS	Population	Male	Female
Proportion of SC Population (%)	12.6	12.8	12.4
Proportion of ST Population (%)	0.0	0.0	0.0
Literacy Rate (%)	36.8	49.6	23.5
Illiteracy Rate (%)	90.0	77.3	103.1
Work Participation Rate (%)	41.8	48.9	34.4
Proportion of Main workers (%)	27.8	41.9	13.1
Proportion of Marginal Workers (%)	14.0	7.0	21.3
Proportion of Non Workers (%)	58.2	51.1	65.6
Proportion of Cultivators to workers (%)	59.6	62.2	55.6
Proportion of agricultural labourer to total workers (%)	26.7	22.5	40.3
Proportion of workers in household industries to total workers (%)	1.6	1.9	1.3
Percentage of other workers to total workers (%)	9.1	13.4	2.8

No. of Households	83928
Household size	7.0
Proportion of Urban population (%)	4.9
Sex Ratio (females per 1000 males)	965
Sex Ratio (0-6 Years)	955
Sex Ratio (SC)	933
Sex Ratio (ST)	583



**TABLE - 45.0 : DEMOGRAPHY OF VILL-ITAIMAIDA**

DETAILS	Population	Male	Female
Population - Total	1024	517	507
Population - Rural	1024	517	507
Population - Urban	0	0	0
Population (0-6)	211	127	84
SC Population	81	51	30
ST Population	0	0	0
Number of literates	355	256	99
Number of illiterates	669	261	408
Total Workers	531	262	269
Main workers	430	230	200
Marginal workers	101	32	69
Non workers	493	255	238
Cultivators	318	168	150
Agricultural labourers	200	86	114
Workers in household industries	0	0	0
Other workers	13	8	5

DETAILS	Population	Male	Female
Proportion of SC Population (%)	7.9	9.9	5.9
Proportion of ST Population (%)	0.0	0.0	0.0
Literacy Rate (%)	43.7	65.6	23.4
Illiteracy Rate (%)	82.3	66.9	96.5
Work Participation Rate (%)	51.9	50.7	53.1
Proportion of Main workers (%)	42.0	44.5	39.4
Proportion of Marginal Workers (%)	9.9	6.2	13.6
Proportion of Non Workers (%)	48.1	49.3	46.9
Proportion of Cultivators to workers (%)	59.9	64.1	55.8
Proportion of agricultural labourer to total workers (%)	37.7	32.8	42.4
Proportion of workers in household industries to total workers (%)	0.0	0.0	0.0
Percentage of other workers to total workers (%)	2.4	3.1	1.9

No. of Households	147
Household size	7.0
Proportion of Urban population (%)	0.0
Sex Ratio (females per 1000 males)	981
Sex Ratio (0-6 Years)	661
Sex Ratio (SC)	588
Sex Ratio (ST)	0

TABLE - 46.0

## INFRASTRUCTURE

Distance of various Infrastructure facilities of Block-Shriduttganj,  
District-Balrampur

S.No.	Particular	Within Village	Less than 1.0Km	1.0-3.0 Km	3.0-5.0 Km	5.0 Km and above	Total
1.	Vikas Khand	1	-	10	15	68	94
2.	Gram panchyat vikas Kendra	53	2	31	1	7	94
3.	Fair price shop	45	1	31	9	8	94
4.	Drinking water source	94	-	-	-	-	94
5.	Hat Bazar	7	1	15	30	41	94
6.	Whole sale market	1	-	1	1	91	94
7.	Cold Storage	-	-	2	1	91	94
8.	Godown, fertilizer/ Seed/ Inseetiede	1	1	12	13	67	94
9.	Veterinary Hospital	2	1	16	15	60	94
10.	Artificial Insemination centre	2	1	14	17	60	94
11.	Agriculture loan Sahkari Samiti	-	-	-	-	94	94
12.	Sale/Purchase Sahkari Samiti	-	-	2	5	87	94
13.	Govt. Purchase centre	3	1	6	10	74	94
14.	Senior basic School (Boys)	12	-	29	23	30	94
15.	Senior basic School (Girls)	3	-	12	16	63	94
16.	Higher Secondary School (Boys)	1	-	8	12	71	94
17.	Higher Secondary School (Girls)	1	-	10	7	76	94
18.	Ayurvedi Hospital/Alopathic	3	-	9	20	62	94
19.	Homeopathic Hospital	-	-	5	7	82	94
20.	Pitch Road (Pucca)	36	1	39	14	4	94
21.	Family Planning center	16	7	10	16	45	94
22.	Post Office	14	1	34	27	18	94
23.	Telegraph Office	-	-	7	4	83	94
24.	Phone (PCO)	15	1	24	11	41	94
25.	Railway station/Halt	-	-	1	1	92	94
26.	Bus Stand/Stop	5	-	12	21	56	94
27.	Post Office Saving bank	14	-	21	19	40	94
28.	Bank Co-operative/industrial	1	1	18	27	47	94

TABLE 47.0

**C- STATUS OF ELECTRIFICATIONS OF BLOCK- SHRIDUTTGANJ, DISTRICT-BALRAMPUR**

No. of Electrified Villages (as per defination)	No. of Villages in which L.T. Lines provided	No. of Electrified Harijan Basti	No. of energized private tubwells/ Pumping sets
70	67	45	110

TABLE - 48.0

**MEDICAL AND HEALTH SERVICES IN BLOCK - SHRIDUTTGANJ, DISTRICT-BALRAMPUR**

No. of allopathic Hospital (Govt.)	No. of Primary Health Centre	No. of beds available	No. of Doctors available	Paramedical	Other
2	1	14	1	3	41

TABLE - 49.0

**EDUCATIONAL FACILITIES IN BLOCK- SHRIDUTTGANJ, DISTRICT-BALRAMPUR**

S.No.		No. of School/ College	No. of Teachers	No. of Students
A.	Junior basic school	95	228	10450
B.	Senior Basic school	21	73	1636
C.	Higher Secondary School	3	27	469
D.	Degree College	-	-	-
E.	Post-graduate College	-	-	-

## **CHAPTER 4**

### **PREDICTION AND ASSESSMENT OF IMPACT**

#### **4.1 IMPACT IDENTIFICATION**

The environmental consequences, which may get affected by activities undertaken by the industry, are identified in this section. Those aspects of the environment, which are likely to be damaged or disturbed due to implementation and continuation and/or up-gradation of the project, are represented as parameters. As the first step towards, prediction and assessment, the various activities during the construction and operational phase, which are likely to cause an impact on these parameters, have been listed. The next step would be to evaluate quantitatively and qualitatively the impact imposed on the various aspects of the environment. For evaluation of impacts due to proposed manufacturing activities of the unit, the baseline data of environment parameters related to ongoing/proposed industrial activity have been superimposed on the present environmental setting data. The changes in the environmental parameters and their impact, whether short term or long term, are predicted and are discussed in detail; -

##### **4.1.1 Aspects of The Environment**

The aspects of the environment have been segregated as mentioned below:

- Air pollution levels
- Water pollution levels
- Soil, topology, subsurface condition.
- Vegetation and natural areas
- Surrounding land use and physical character
- Infrastructure and public services
- Socio-economic development

**4.1.2 Activities which can create impact****4.1.2.1 Construction Phase:**

	Type of Activities	Potential Impacts
1.	Level And Road Laying	Dust emission, Soil Compaction change in traffic pattern
2.	Earthwork comprising of excavation, grading, trenching	Increase in erosion, soil compaction, increase in transport facilities; increase in employment.
3.	Foundation Work	Dust emission, Noise, Decrease in water table
4.	Mechanical erection	Noise, fumes due to welding, generation of used welding rods

**4.1.2.2 During Operational Phase :**

	Type of Activities	Potential Environmental Impacts
1.	Trial runs and manufacturing activities	Gaseous emission. Noise, increase in vehicular traffic, increase in employment.
2.	Material Handling	Noise, Visual. Impact, Dust Emission.
3.	Utilities	Increase in traffic, increase in services.
4.	Tree plantation	Visual, Decrease in run off, Increase in ground water table.

**4.2 PREDICTION AND ASSESSMENT OF IMPACTS DURING CONSTRUCTION ACTIVITIES**

This project would be installed in the phased manner. As the installation of the power plants is to be undertaken progressively; the time period of the construction activities will be elongated. Due to this, the following short term impacts will be incurred on the environment for a period of time. However, due care will be taken to take best suitable measures and complying all the applicable rules and regulations to minimise the negative impacts if any to the environment.

**4.2.1 Air Environment**

The major construction activities from which air emission may occur are; excavation, loading and unloading of material, operation of batching plant etc.

To minimise the air pollution during the construction stage; following mitigation measures are proposed:

- Water will be sprayed for dust suppression.
- The sand and other such dispersible material will be stored at site for minimum working period.
- Tarpaulin or jute covering will be used wherever required to catch the dust spreading into atmosphere.
- The equipment design shall be chosen for least suspension of dust/sand into atmosphere.

These impacts on air environment will be negligible and short-term.

**4.2.2 Water Environment**

Ground water through tube wells will be utilised for the construction phase. There will not be any impact on availability of natural resources during this stage.

The wastewater generation will be from the domestic activities; which will be disposed off through septic tank/soak pit system.

**4.2.3 Noise Environment**

The noise generated from construction machinery shall be kept low by keeping the moving parts serviced and properly lubricated.

The noise impacts will be local; limited to the premises and short-term;

**4.2.4 Socio-economic Environment:**

During the construction activities, there shall be major positive impacts on the socio-economic environment of the region. During construction activities, there shall be employment generation as direct impact the indirect impacts shall be brought about with the welfare activities proposed by the industry. The unit shall be equipped with the medical and other facilities; which shall also kept open for local population.

## **4.3 PREDICTION AND ASSESSMENT OF IMPACT ON AIR ENVIRONMENT**

### **4.3.1 General:**

Quality of the air environment plays very critical role for all living organism, as Air is a prime requirement for life. In nature, there exists a balance between the constituents of air which helps the environment to be in equilibrium. The industrial activities have started disturbing the natural equilibrium of the environment. Air pollution can be defined as the unbalanced state of the environment.

The term air pollution for considering environmental impact will broadly cover the following things:

1. Focusing on the out-door atmosphere without covering the industrial working - environment.
2. Pollution caused by single contaminant gas or particulate or by combination thereof
3. Concentration of air pollutants
4. Duration of exposure or the persistence of a given concentration level of pollutant
5. Effects of air pollutants on living things, inanimate objects and the aesthetic feature of the area.
6. Air Pollution due to construction activities/due to traffic.

### **4.3.2 Identification of Air Pollutants**

The process emissions from the Power generation activity include dust particles & SO<sub>2</sub>. The emissions from Crusher house, screen house involve particulate matter only. Fool-proof air pollution control measures are installed at various sources for abatement of pollution. The industry has installed bag-houses. Electrostatic precipitators for reducing the dust emission from different sources. The detailed description along with the

total dust load to atmosphere is calculated base on the equipment efficiency enumerated below:

#### 4.3.2.1 Waste Load Study (Phase-I & Phase-II)

Details of all the flue gas stack and process gas stacks are as follows:

##### 1. Power plant stacks

Details	Values	Proposed Stack 1 (Phase-I)	Proposed Stack 2 (Phase-II)
Boiler Capacity	TPH	190x2 (Coal based)	190x2 (Coal based)
Stack Height	Meter	110.0	110.0
Stack Diameter	Meter	2.8	2.8
Flue Gas Exit Velocity	m/sec.	15.0	15.0
Flue Gas Exit Temperature	K	428.0	428.0
Volumetric Flow Rate	Nm <sup>3</sup> /hr	334493.44	334493.44
Coal Consumption	Tons/hr	67.0	67.0
<b>Emission Rate</b>			
SPM*	g/sec	9.85	9.85
SO <sub>2</sub> *	g/sec	222.2	222.2

##### 2. Crusher House Stack (for each Phase)

Stack attached to : Crusher House and Screen House

Air Pollution Control Mechanism : Bag house

Stack height from GL : 30 m

Stack Dia. at sampling point : 0.6 m

Pollutants load : 0.21 gm/sec

#### 4.3.3 Summary of air pollution control measures

The industry has provided efficient air pollution control system attached to all the equipment prone of emitting any dust load. Maintenance is carried out regularly to check proper functioning of the equipment. Regular checks are carried out to confirm the efficiency of dust collectors, bag-filters, ESP etc.



#### 4.3.4 Assessment of Air Impact based on Application of ISCT<sub>3</sub> model:

The industry has installed stacks for gaseous emission in the form of flue gas emission. Although, the full-proof air pollution control system will be installed for abatement of air pollution, there is possibility as we have seen above; for minute quantity of gases emitted in the atmosphere. To assess the impact of gaseous emissions through stack, the mathematical model for the Ground Level Concentration (GLC) has been developed by using Gaussian plume equation.

##### MODELING :

Based on the data, the ground level concentration of various pollutants at different distances within 10-Km radius from the source, the calculation was carried out regarding dispersion.

##### Stack Height Calculation

The required stack height with the proposed boiler was calculated by using the following formula (EPA Notification, GSR 176(E), 2<sup>nd</sup> April 1996).

$$H=14Q^{0.3}$$

Where H = Total stack height in meters from ground level

Q = Sulphur dioxide (SO<sub>2</sub>) emission rate in kg/hr

The estimated SO<sub>2</sub> emission rate was 800 kg/hr based on the following designed parameters Coal Consumption: 1600mt/day (for each Phase).

Sulphur content: 0.6%

$$H = 104.01$$

Therefore the proposed stack height of 110m each / Two Nos. for the proposed boilers is as per the requirement.

#### **4.3.5 MODELING**

##### **Meteorological Data**

The hourly micro-meteorological data were recorded near the site continuously for three months November 2009 to January 2010. This site specific hourly met data like wind direction, wind speed, ambient temperature have been used for dispersion modeling.

##### **Determination of Atmospheric Stability**

In the present study the Pasquill - Gifford Stability Classes were determined using Turner's method and solar isolation. The hourly solar isolation at Barkhara was determined using equation suggested in "Assessment of impact to air environment: guidelines for conducting air quality modeling", CPCB (1998) - Programme Objective Series: PROBES/70/1997-98.

##### **Application of ISCT3 Model**

The impacts of stack emission on the ground level concentration (GLC) of SPM, and SO<sub>2</sub> in the ambient air have been predicted through Industrial Source Complex - Short Term Model (Version 02035). The assumptions made for short-term computations are as follows: -

1. The ISC short-term model for stacks uses the steady state Gaussian plume equation for a continuous elevated source
2. The wind power law is used to adjust the observed wind speed, from a reference measurement height of 10m, to the stack or release height.
3. Calm processing is ignored.
4. The plume rise is estimated by, Briggs formulae.
5. Buoyancy Induced Dispersion is used to describe the increase in plume dispersion during the preliminary phase
6. Stack tip down wash is not considered
7. It is assumed that the pollutants do not undergo any physicochemical transformation and that there is not pollutant removal by dry deposition.

8. Washout by rain is not considered
9. Polar coordinate system has been used for computations, and
10. The model computations have been done for 7 km and isopleths are drawn for the same.

### Presentation of Results

**Table: 50.0 Highest 24 Hourly Short Term Incremental Concentration**

Pollutants	Cumulative Impact (all Three stacks)			Proposed Stack		
	Incremental GLC $\mu\text{g}/\text{m}^3$	Distance (Meters)	Direction	Incremental GLC $\mu\text{g}/\text{m}^3$	Distance (Meters)	Direction
SPM	6.53	1000	N	2.78	1000	N
SO <sub>2</sub>				52.82	1000	N

The isopleths and wind roses for 24 hourly concentrations of SPM and SO<sub>2</sub> are presented in following figures.

The results show the maximum concentration of pollutant occurs 1000 meter distance from the emission source, i.e. the maximum impact of air pollution would be observed within industrial premises. In some case, however the maximum concentration of pollutant was observed at 1 to 10 km distance but these concentrations are very minute and negligible. We consider the worst condition, the Centerline Ground Level concentrations are remaining very well within the norms stipulated by the statutory bodies. The GLCs are calculated based on extreme concentration of the pollutants like SO<sub>2</sub> in the Stack outlet. The actual concentrations will be kept below the allowable norms resulting eventually in reduction in ambient Air concentration. Result shown in Table- 50.0

In general, there is no significant adverse impact on the environment due to gaseous emission from manufacturing activities.

**Table - 51.0 Data considered for calculation of GLC**

		<b>Existing Stack 1 Sugar Plant</b>	<b>Proposed Stack 1 (Phase-I)</b>	<b>Proposed Stack 2 (Phase-II)</b>
Boiler Capacity	TPH	90X2(Bagasse based)	190x2 (Coal based)	190x2 (Coal based)
Stack Height	Meter	70.0	110.0	110.0
Stack Diameter	Meter	2.6	2.8	2.8
Flue Gas Exit Velocity	m/sec.	10.0	16.0	16.0
Flue Gas Exit Temperature	K	373.0	428.0	428.0
Volumetric Flow Rate	Nm <sup>3</sup> /hr	191037.6	334493.4	334493.4
Fuel	Tons/hr	1500 T/day Bagasse	1600 T/day Coal	1600 T/day Coal
<b>Emission Rate</b>				
SPM*	g/sec	5.31	9.85	9.85
SO <sub>2</sub> *	g/sec	-	222.2	222.2

**Baggas fired, calculated based on 100 mg/Nm<sup>3</sup> limit, estimated, for coal- 100 mg/Nm<sup>3</sup>**

The Ground Level Concentration for the proposed power plant considering all the three separate stacks for two power plants & and one sugar plant (existing).

**Table No. - 52.0**

**Pre-Project Scenario (µg/m<sup>3</sup>) of Ambient Air Quality observed in the study.  
(98th Percentile values)**

<b>Pollutant Location</b>		<b>TSPM µg / m<sup>3</sup></b>	<b>SO<sub>2</sub> µg / m<sup>3</sup></b>
A-1 :	Village - Bisambherpur	127.46	9.75
A-2 :	Village - Chandapur	128.92	9.69
A-3 :	Village - Kihaura	126.46	9.45
A-4 :	Village - Ramwapur	128.50	9.70
A-5 :	Village - Pandri	128.50	9.70
A-6 :	Village - Dewario	128.00	9.75
A-7 :	Village - Sanjwal	128.00	9.80
A-8 :	Village - Shivdayalpur	128.00	9.89
A-9 :	Factory Site	158.50	17.82

Predicted maximum ground level concentrations computed for 24-hour mean meteorological data of post monsoon season are superimposed on the maximum baseline concentrations obtained during the study period to estimate the post project scenario. The Post Project Scenario with predicted ground level concentrations over the baseline is shown below.

**Table No. - 54.0**  
**Post Project Scenario ( $\mu\text{g}/\text{m}^3$ )**

<b>24-Hourly Concentrations</b>	<b>Suspended Particulate Matter (SPM)</b>	<b>Sulphur Dioxide (<math>\text{SO}_2</math>)</b>
Baseline Scenario (98th percentile) max	128.92	9.89
Predicted incremental Ground level Concentration (Max)	6.53	52.82
Overall Scenario (worst case)	<b>135.45 (200)</b>	<b>62.71 (80)</b>

**Note :** The values in parentheses is the CPCB limit for rural and residential areas.

It can be seen that for different stability class the concentration predicted are incremental values and by taking into account the ambient air quality monitoring data, the total values shall be kept within the norms by induction of appropriate air pollution control measures by the proposed Industry. Also incremental concentration are not significant so as to have a negative impact on environment. Hence it can be concluded that establishment of proposed industry is not likely to adversely affect the air environment of the region.

### Results

1.	Resultant concentration of SPM after running of power plant	<b>135.45 <math>\mu\text{g}/\text{m}^3</math></b>
2.	Resultant concentration of $\text{SO}_2$ after running of power plant	<b>62.71 <math>\mu\text{g}/\text{m}^3</math></b>

Note : Oxides of Nitrogen was not modeled because this pollutant has not been considered in the emission standards notification relating to the bagasse/coal fired boilers published till date.

Isopleths for GLC of SPM &  $\text{SO}_2$  & wind-rose diagrams are shown in Fig. 8 & 9

## **4.4 PREDICTION AND ASSESSMENT OF IMPACT ON WATER ENVIRONMENT :**

### **4.4.1 General**

Water is essential for human, agriculture, industry and commercial use. The industrial activity shall have direct impact on the end users. The water environment broadly covers the following points for consideration of impact.

- Industrial operations, their effect on water quality and ground water potential of study area.
- Identifying potential sources of pollutants focusing specifically on discharge of the wastewater.

## **ASSESSMENT OF IMPACT**

### **4.4.2 Impact of raw water usage**

The main source of water supply for the industrial operations is Tube well and site is not under critical area, permission from CGWA has been granted for extraction of water from ground.

### **4.4.3 Impact due to Disposal of effluent/sewage:**

The main source of wastewater from proposed power plant will be from Cooling' Tower, Boiler Blow Down, Back wash from Softening and DM plant. The major constituents in wastewater generated as Boiler blow down and from Cooling tower, is Total Dissolved Solids (TDS) and that to be utilized after treatment for dust suppression in raw material storage yard and sprinkling on the road or gardening purpose. Flow Diagram of Existing ETP & waste generation is shown in Figure - 10.0 & 11.00

The quantum of water consumed for domestic purposes is 30 m<sup>3</sup>/day. The sewage emanated from the same is 20 m<sup>3</sup>/day. The industry has proposed soak pit for disposal of sewage. Hence, no significant impact is proposed due to this parameter.

#### **4.5 PREDICTION AND ASSESSMENT OF IMPACT DUE TO SOLID / HAZARDOUS WASTE**

The types of Hazardous/Solid waste are Ash and used/spent oil. Management system for all such types of wastes is discussed in this section. The Ash generated will be handled as follows:

##### **4.5.1 ASH HANDLING SYSTEM**

Dry type dense phase pneumatic conveying system is envisaged for ash collection. Ash vassals below each ash discharge point shall be sized based on expected ash generation. ASH evacuation from the ash vessels shall be automatic. The conveying cycle will be staggered by level switch in the ash vessel. One silo is provided for. bed ash and two silos are provided fly ash. Silo is sized for storage based on the following consideration.

(For Phase-I & Phase-II)

Expected ash generation per hour	:	54.0 TPH
Ash generation per day	:	1200 MT
Total bed ash generation per day	:	80 MT
Total fly ash generation per day	:	1280 MT

Unloading system with ash conditioner shall be provided below ash silo for loading on to covered dumper. Ash silo will be of Plastic Lined construction. One working and one standby compressor shall be provided for supplying the conveying air. Air receiver of suitable capacity shall be provided.

The estimated quality of the proposed ash generation.

**Table 54.0 Quality of Fly Ash**

Sr. No.	Parameter	Value
1	SILICA	13.4-15.5%
2	FERRIC OXIDE	12.4-14.7%
3	CALCIUM OXIDE	21.8-22.7%
4	MAGNESIUM OXIDE	4.02-4.34%
5	ALUMINA	17.3-20.2%
6	ALKALIES (NA <sub>2</sub> O )	4.9 - 5.04%
7	ALKALIES (K <sub>2</sub> O)	0.29-0.39%
8	SO <sub>3</sub>	18.3-20.1%

**4.5.2 ACTION PLAN FOR FLY ASH UTILIZATION**

Fly ash will be transported through covered dumper and utilization plan will be as follows:

- A. Installation of brick/paver block manufacturing plant.
- B. Utilize for soil conditioning.
- C. Supply to cement manufacture
- D. Road Construction

**4.5.3 Spent oil/waste oil:**

The waste oil/spent oil discarded after usage shall be collected in the drum and stored at predefined place earmarked for the same. The quantity of the oil will be 300lit/month. The oil shall be sold to registered recyclers.

**4.6 PREDICTION AND ASSESSMENT OF IMPACT ON NOISE ENVIRONMENT**

The industry is located in rural area away from major human settlement. The adequate steps are proposed to control the noise. The upcoming Power Plant will not result in any significant impact on noise environment. The minor increase in vehicular transportation due to increase material handling will not generate any significant excessive noise. Hence, there shall not be any significant negative impact on noise environment of the study area.



**4.7 PREDICTION AND ASSESSMENT OF IMPACT ON SOCIO-ECONOMIC ENVIRONMENT**

There will be positive impact on the economic environment. Aesthetic environment, character of community, employment centers and Commercial facilities community facilities and services. With commissioning of this project, there shall be increase in employment generation. Along with the direct emolument in the industry; there shall also be indirect employment opportunities; as the upcoming industrial activity may require many ancillary products/services which are to be captured from the nearby available sources.

In addition, to this, there shall be major impact on power generation factor. The system will work in synchronization with the GEB Power supply. The synchronization will result in optimized utilization of the energy both from GEB and the proposed Power Plant.

The Unit proposes to undertake the Rurc' development activities; which will be concentrating upon the Adult Education Program; provision of Medical facilities; and supporting other development programs as proposed by the villages. The industry proposes to have a group of persons looking after this activity.

**4.8 ENVIRONMENTAL IMPACT ANALYSIS :**

In this section, area of our focus will be environmental impact analysis. While the quantitative assessment has been already discussed in above subsections, the qualitative analysis is presented below" The environmental consequences along with their present status, direction of change and the probable final condition is presented in matrix format.

**Abbreviations:**

- A- Major Positive Impact
- B- Minor Positive Impact.
- C- Major negative impact
- D- Minor negative impact
- E- Impact exists, its magnitude or direction cannot be determined at present.

**4.8.1 Project Elements : Casual Factors**

Site preparation; Construction and Erection Phase

Altered element		Operation stage	Initial condition	Direction of change	Possible final condition	Mitigative measures/Remark
A)	Air Environment					
	Dust	D	Low	Increase	High	Temporary impact. During the construction activity, civil work may enhance the dusting in addition to transportation activities. It will be curbed by water sprinkling and is limited within project site.
B)	Water environment					
1	Ground water table	C	Low	No Change	Low	Industry will use the ground water. No impacts to be observed on existing ground water scenario
2	Quality	E	Good	No change	Good	As there is no discharge of wastewater; there shall not be any impact on ground water quality. The soak-pit shall be provided for labour colony during construction activity
C)	Ecological Environment					
1	Open space	D	Good	Decrease	Good	The industry will use 16 acre Land for construction activities
2	Grazing Land	E	Fair	No change	Fair	The land being used is un-irrigated land
3	Vegetation	E	Fair	No change	Fair	The land being used is un-irrigated land

#### 4.8.2 Project Elements : Casual Factors Operation activities

Altered element		Operation stage	Initial condition	Direction of change	Possible final condition	Potential corrective measures/Remark
A) Air Environment						
a.	Suspended Particulate Matter	C	Fair	Increase	Fair	The flue gases will be discharged through the stacks of adequate height. Full-proof air pollution control system installed at appropriate points of discharge. Due care will be taken for the concentrations remaining in the prescribed norms
b.	Gaseous Emission	C	Fair	Increase	Fair	The system shall work -to keep the concentration of Sulphur Dioxide and Nitrogen Oxides well below the norms
c	Dusting	C	Low	No Change	Low	Tarred roads are provided within the industrial premises. Water is Sprinkled at regular intervals
B) Water Environment						
a.	Water Requirement	E				
1.	Ground water table	E	Low	No change	Low	The Industry proposes to use the Water from Ground.
2.	Quality of intake water	E	Good	No change	Good	Ground water will be used which is well within the standards as per results obtained.
b.	Disposal of sewage					
	Quantity	C	Low	Increase	Low	The sewage is disposed off through soak pit/septic tank

Altered element		Operation stage	Initial condition	Direction of change	Possible final condition	Potential corrective measures/Remark
C)	Land					
a.	Disposal of Ash	C	None	Increase	Fair	The Bad Ash only will be used for land filling in own land only. The fly ash to be sold to cement manufacturers and brick manufacturers.
b.	Percolation/ Seepage	E	None	No change	None	The wastewater from effluent pit shall be used for gardening, sprinkling on own land only.
D)	Ecological Environment					
a.	Vegetation	E	Fair	No change	Fair	The activity of the industry shall not create any impact on vegetation and floral/faunal elements of the study area. In-house green belt shall be developed comprise of various shrubs, plants
b	Flora/founa	E	Fair	No change	Fair	
E)	Socio Economic Environment					
a.	Per Capita Income	E	Low	Increase	Fair	The industry will create direct/indirect employment centres due to upcoming project
b.	Population per Sq. Km.	E	Low	Increase	Low	The industry shall employ 50 personnel for the plant
c.	Transportation facilities	E	Good	Increase	Good	Transportation and communication facilities are very well developed in the study area. No alteration due to upcoming activity
d.	Communication facilities	E	Good	No change	Good	
e.	Medical facilities	E	Fair	No change	Fair	No impact on medical facility availability of the study area
F)	Noise Environment	D	Low	Increase	Low	<ul style="list-style-type: none"><li>Equipment design shall be kept to keep the noise below prescribed norms</li><li>Enclosures shall be provided to moving parts</li><li>Periodical lubrication is carried out</li><li>Ear-plugs are provided to workers in high-noise area</li></ul>

**CHAPTER - 5****ENVIRONMENTAL MANAGEMENT PLAN (EMP)**

From construction and operation activities of the process, environmental impact has been identified, predicated and evaluated to mitigate the standards specified by the statutory authority and minimize the impact on eco system Environmental Management Plan (EMP). Environmental Management Plan provided control measures of potential environmental impacts. Environmental Management System for different environmental attributes is discussed in subsequent topics.

	Type of Impact	Mitigation Measures
<b>5.1</b>	<b>AIR ENVIRONMENT :</b>	
<b>A)</b>	<b>Construction Phase :</b>	
	<b>a. Excavation</b>	<b>a) Excavation :</b> During excavation, care shall be taken that the excavator shall not release the sand from higher elevation. The piling of sand shall be done uniformly and proper storage shall be maintained to avoid dusting because of wind. If required temporary windshield barrier shall be provided with help of galvanized sheets and bamboos. Water Sprinkling shall be done continuously on the site and periodically on the roads where vehicle movement is more.
	<b>b. Mechanical erection</b>	<b>b) Mechanical erection:</b> Fume generation shall be there due to welding and allied activities; this impact will be negligible and restricted to project. Site. The workers would be trained to use welding shields and use safer practices.

	<b>c. Vehicle Movement</b>	<b>c) Vehicular Movement:</b> The proper maintenance of construction machines shall be ensured and the engine oils and filter shall be replaced regularly. When the machinery is not in use the engine shall be switched off. All vehicles shall be properly maintained and should have valid PUC registration. This has to be checked periodically.
<b>B)</b>	<b>Operation Phase : Flue gas Emissions :</b>	
	<b>i) Power Generation</b>	<b>i) Flue Gas Emissions from Power Plant</b> The proposed power plant will be operated on coal where SPM, SO <sub>2</sub> and NO <sub>x</sub> are the major pollutants emitted. The bottom ash generated in the form of clinker is collected in the hoppers. The clinker is ground into ash and used for cement manufacturing. In order to regulate fly ash emission to atmosphere, BHL proposes to install an ESP. ESP of 99.9% efficiency with required number of fields to arrest the particulate emission will be connected to each boiler along with stack of height - 110 mtr. Electro static precipitators will be designed to give a final outlet particulate concentration of less than 50 mg/NM <sup>3</sup> . Therefore the impact due to particulate emission due to burning of coal leading to raise of suspended particulate concentration in the ambient air is found to be negligible. The fly ash collected in the hopper of ESP will be removed through dry collection system.

	<b>ii) Crusher House</b>	<b>ii) Crusher House</b> Crusher house shall be equipped with bag house to control particulate matter.
	<b>iii) Fumes in Ash storage</b>	<b>iii) Fumes in Ash Storage</b> Dry pneumatic system is proposed for handling of Ash. Plastic Lined Silo is constructed to store the ash. Water will be regularly sprinkled in the ash dykes and the approach roads. Wall of adequate height shall be constructed to control the ash. Section diagram of lined ash pond is shown in Figure- 12.0
	<b>iv. Vehicle Movement</b>	<b>iv) Vehicular Movement :</b> The proper maintenance of construction machines shall be ensured and the engine oils and filter shall be replaced regularly. When the machinery is not in use the engine shall be switched off. All vehicles shall be properly maintained and should have valid PUC registration. This has to be checked periodically.
	<b>v) Sewage</b>	<b>v) Sewage wastewater :</b> Sewage wastewater generated shall be disposed off through soak pit and septic tank arrangement.
	<b>vi) Process effluent</b>	<b>vi)</b> Effluent from factory which is approx 1960 m <sup>3</sup> /day will be treated in effluent treatment plant and 100% treated effluent will be recycled/reuse in the process.

<b>5.2</b>	<b>NOISE ENVIRONMENT</b>	
	<b>A) Construction Phase :</b>	<p>i) During the construction phase the noise levels are expected to rise due to movement of vehicles, equipments and heavy machinery. The mitigation measures will include maintenance of the vehicles and heavy machinery and provision of personal protective equipment to the workers working in high noise level. This impact is supposed to be temporary and restricted within premises.</p>
	<b>B) Operation Phase :</b>	<p>i) The major noise generating source in the power plant will be steam turbines. The proposed equipment would be designed for noise levels not exceeding 90 dB(A). Proper encasement of noise generating sources will be done to control the noise levels below 75 dB(A) at plant boundary, wherever feasible. The steam turbine would be housed in a closed building which will considerably reduce the noise.</p> <p>In case of maintenance, the persons working near the steam turbine generator building would be provided with ear muffs.</p> <p>ii) In general the following methods will be adopted to control the noise pollution.</p> <ul style="list-style-type: none"> <li>• The use of concrete and masonry walls and barriers - keeping in view the benefits of stiffness weight and cavity construction and the need to provide well sealed sound attenuating doors and windows.</li> </ul>



		<ul style="list-style-type: none"> <li>• The use of complete or partial enclosures.</li> <li>• Attenuation by use of sound absorbents on walls and fixed or suspended ceilings.</li> <li>• Introduction of control and monitoring rooms having good sound insulation properties.</li> <li>• The reduction or elimination of noise leakage paths</li> <li>• The use of vibration insulation techniques</li> <li>• The use of ducts and plenum chambers</li> <li>• The use of mufflers, sound attenuation and acoustic louvers in air flow paths, taking particular care to direct inlet and discharge an opening away from critical areas wherever possible, so as to take advantage of direct effects.</li> <li>• Proper plantation of trees depending on the wind velocity can reduce noise pollution on the surrounding area.</li> <li>• Providing ear muffs and earplugs to the plant personnel.</li> </ul>
<b>5.3</b>	<b>SOLID WASTE</b>	
	<b>A) Construction Phase :</b>	<p>i) During construction phase major solid waste generated is construction and domestic solid waste. The construction waste will be utilized for leveling and road construction in plant premises. Generated domestic waste will be sent to nearest municipal solid waste landfill sites,</p>

		ii) The used welding rods will be disposed off through registered metal recyclers. iii) Used oil generated from construction machinery will be collected, stored separately and sold to authorized recyclers.
<b>B)</b>	<b>Operation Phase :</b>	i) During operation phase major solid waste generated is-fly ash and bed Ash, which will be approx..-640T/day. Action Plan is prepared as per the guidelines of Statutory authorities; which will be strictly followed. Fly Ash will be utilized by selling to Cement/Brick manufactures.
		<b>Used oil:</b> Very small quantity of used oil shall be generated from the plant. This shall be sent to approved recycler or rousers.

#### 5.4 Socio Economic Impacts

Programs for environmental education and public participation may be developed with the help of audio visual aids to create awareness about the activities. Camps to apprise people of likely environmental hazards due to existing and proposed faculties could be organized. Certain welfare measures will be implemented for the benefit of local population. The operation of the plant will generate direct/indirect employment for local population. No rehabilitation & resettlement is required for the above project area.

#### 5.5 OCCUPATIONAL HEALTH AND SAFETY

Large industries, multifarious activities are involved during construction, erection, testing, commissioning, operation & maintenance, the men, materials and machines are the basic inputs. Along with the boons, the industrializations generally bring several problems one of them is occupational health and safety.

The industrial planner, therefore, has to properly plan and take the steps to minimize the impacts of industrialization and to ensure appropriate occupational health, safety including fire plans. All these activities again may be classified under construction & erection, and operation & maintenance. The proposed safety plan is given below:

### **5.5.1 OCCUPATIONAL HEALTH**

Occupational health needs attention both during construction & erection and operation & maintenance phases. However, the problem varies both in magnitude and variety in the above phases.

#### **CONSTRUCTION & 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 personnel protective equipments shall also need to be supplied to workers.

#### **OPERATION AND MAINTENANCE**

The problem of occupational health, in the operation and maintenance phase is hearing loss due to noise. Suitable personnel protective equipments should be given to employees.

The working personnel 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 ends.
- ◆ Zero power goggles with cut type filters on both sides and blue colour glasses.
- ◆ Welder's equipment for eye & face protection.
- ◆ Cylindrical type earplug.
- ◆ Earmuffs.

- ◆ Self Contained breathing apparatus.
- ◆ Leather apron.
- ◆ Aluminised fiberglass fix proximity suit with hood and gloves.
- ◆ Boilersuit.
- ◆ Safety belt/line man's safety belt.
- ◆ Leather hand gloves.
- ◆ Canvas cum leather hand gloves with leather palm.
- ◆ Electrical safety shoes without steel tie.

### **5.5.2 SAFETY AND EMERGENCY PLAN**

Safety of both men and materials during construction and operation phases is of concern. The preparedness of an industry for the occurrence of possible disasters is known as emergency plan, which described as Disaster Management Plan (DMP) in Chapter-5. Safety requirement during construction, operation and maintenance phases the safety policy with the following regulations may be observed.

- ◆ 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, equipments 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 aptitude 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 & 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 ensure that professional advice is made available wherever potentially hazardous situations exist or might arise.
- ◆ To organize collection, analysis and presentation of data on accident, sickness and incident involving personal injury or injury to health with a view to taking corrective, remedial and preventive action.
- ◆ To organize collection, analysis 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 project.

- ◆ To ensure regular safety inspection by a competent person at suitable intervals of all buildings, equipments, work places and operations.
- ◆ In operation, the safety guidelines have to be framed in consultation with manufacturer's and be implemented.

**Hazard due to Transmission Lines :** Transmission Towers would be quite away from the road, hence not posing any hazards.

### **5.5.3 SAFETY ORGANISATION**

#### **CONSTRUCTION & ERECTION PHASE**

A Qualified and Experienced safety officer has to be posted. The responsibilities of the safety Officers include identification of the hazardous condition and unsafe acts of workers and advise on corrective action, organize training programmes 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.

#### **OPERATION & MAINTENANCE PHASE**

When the construction is complete 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.

#### **SAFETY CIRCLE**

In order to fully develop the capabilities in identification of hazardous processes and improving safety and health, safety Circle 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 every week.

#### **HEALTH AND SAFETY MONITORING PLAN**

All the potential occupational hazardous workplace such as chlorine storage area, acid and alkali storage areas will be monitored regularly. The health of employees working in these areas will be monitored once in a year for early detection of any ailment due to exposure to hazardous chemicals.

### **5.6 WATER ENVIRONMENT & IMPACTS**

#### **Water Requirement :**

Water requirement of the Power Plant will be total 6984 m<sup>3</sup>/day in operational phase. This requirement will be met from borewells.

Table - 55.0

**WATER REQUIREMENT (M<sup>3</sup>/day) (for Phase-I & Phase-II)**

Process	Quality
1. Cooling, dust suppression, Green best, workshop etc.	13908
2. Domestic	60
<b>Total</b>	<b>13968</b>

Factory is located in the tarrai belt of the Uttar Pradesh, plenty of Ground water is available in the region of plant, so no negative impact will be arises. We have also obtained the ground water extraction permission of the quantity @ 6954 m<sup>3</sup>/day from Central ground water board, New Delhi. for first phase, and we have applied for another applied for 6954 m<sup>3</sup>/day for second phase operation.

**5.7 WATER CONSERVATION AND RECHARGING OF GROUND WATER :**

No treated effluent will be discharge from the unit, 100% treated water will be recycled & reuse in the process operations.

The separate net work of storm water drains will be designed to collect the rain water from the roof tops. The water collected from the root tops will be routed to the rain harvesting pits proposed at various locations within the premises.

**5.6.3 Waste Water Generation (for Phase-I & Phase-II) :**

Waste water generation will be approx. 1972 m<sup>3</sup>/day from DM Plant, cooling tower & floor washings.

**Table : 56.0**

Sr. No.	Process	Quantity M <sup>3</sup> /day
1	DM Plant	144
2.	Cooling Water	1684
3.	Floor Washings	144
<b>Total</b>		<b>1972 M<sup>3</sup>/day</b>

**5.9 WASTE WATER TREATMENTS :****(A) DM Plant (Primary Treatment) :**

Collection Pit

Flash Mixer

Neutralization Pit

**(B) Cooling Water (Primary Treatment) :**

Collection Pit

R O Plant to reduce the Quantity of effluent.

**(C) Floor Washing (Primary Treatment) :**

Gravity Settler

**Final Treatment System for All Streams : (A+B+C)**

Existing effluent treatment plant of sugar unit will be used for treatment, which has surplus treatment space, along with sugar in season. Flow diagram enclosed as Figure-8.0

**5.10 Green Belt Development**

- Adequate green belt will be provided all around the plant and inside the plant premises (approx. 40% of total land).
- Approximately about 2000 plants will be planted annually.
- The green belt will be developed especially around dust generating areas like crushers, screens, conveyors of raw material handling, cooler discharge, magnetic separators and solid waste disposal area are densely covered.
- Two number of nurseries are planned to meet the requirement of plants for green belt development
- Suggested plant species are shown in Table-57-59



Table 57.0: Plant Species Recommended For Reduction Of Noise Level

S.No	Scientific name	Common Name
1	Azadirachta indica	Neem
2	Aegle marmelos	Bel
3	Calbezia trochera	Dhala sirisa
4	Carissa carandas	Karaunda
5	Peltophorum inerme	Perungondrai
6	Saraca indica	Asoka
7	Syzygium cumini	Zaman
8	Tamarindus indica	Imli
9	Pongamia pinnata	Beng
10	Cassia siamea	Chakundi

Table 58.0 : Plant Species Recommended For Protection Against Gases And Particulates

S.No	Scientific name	Common Name
1	Butea monosperma	Dhak
2	Cassia fistula	Amaltas
3	Cassia siamea	Kassod
4	Citrus toona	Mahanim
5	Dalbergia sissoo	Shisham
6	Dillenia indica	Chalta
7	Ficus religiosa	Pipal
8	Hardwick binata	Anjan
9	Mathura indica	Mahua
10	Millingtonia hortensis	Akash nim

Table 59 : Suggested Plant Species For Green Belt Development

**Large Plants**

S.No	Scientific name	Common Name
1	Cedreia toona	Mahanim
2	Dalbergia sissoo	Shisham
3	Azadirachta indica	Neem
4	Delonix regia	Gul mohr
5	Millingtonia hortensis	Aksh nim
6	Mimosops elengi	Maulsari
7	Peltophorum inerme	Perungondrai
8	Samania saman	Debdari
9	Thespisia populnea	Paras pipal

**Medium Plants**

S.No	Scientific name	Common Name
1	Cassia siamia	Kassod
2	Dillenia indica	Chalta
3	Mathuca indica	Mahua
4	Casuriana equisetifolia	Jungali Sum
5	Pongamia pinnata	Beng
6	Tabulia spasiola	-
7	Ticoma stans	
8	Terminalia catappa	Jangli badam
9	Thevetia peruviana	Pile kamer
10	Lucaena leucocephala	Subabul

**Small Plants**

S.No.	Scientific name	Common Name
1	Averehoa carabbola	Carabola
2	Nallotus philippensis	Sundur
3	Artaboteys odoratissimus	Madanmast
4	Caesalpinia pulcherima	Gulotora
5	Callistemon lanceolatus	Bottle brush
6	Caryota urens	Mari
7	Cestrum dirunum	Din-Ka Raja
8	Nelia azedarch	

**5.11 Proposal for Roof Top Rain Water Harvesting**

1	Total roof area (A)	M <sup>2</sup>	20,000
2	Rain fall per hour (I)	MM	80
3	Run off co-efficient (C)		0.90
4	Discharge M <sup>3</sup> /hr = 10 CIA	M <sup>3</sup>	1440 m <sup>3</sup> /hr.

**A. Total Storm water flow :**  $1440 \times 0.75 \text{ m}^3/\text{Hour} = 1080 \text{ m}^3/\text{Hour}$

\*Considering coefficient for evaporation / spillage and first flush etc. = 0.25

**B. Volume of storm water :**  $1080 \text{ m}^3 \times 0.0833 = 89 \text{ m}^3$

\*Considering 5 min (0.833 hr) retention time :

**C. Design of Rain water harvesting pit of size 4.50 m dia and depth 3.5 m effective depth.**

$$\begin{aligned}
 \text{Volume of 1 no. of RWH pit} &= 1 \times 3.14 \times R^2 \times \text{Depth} \\
 &= 1 \times 3.14 \times (2.25)^2 \times 3.5 \\
 &= 56.6 \text{ M}^3
 \end{aligned}$$

**D. Design of Rain water harvesting pit = Total Volume / 1 No. of RWH pit**

$$\begin{aligned}
 &= 89.00 / 55.60 \\
 &= 1.60 \text{ or Say 2 Nos.}
 \end{aligned}$$

**D. Size of Rain water harvesting pit for roof top area 20,000 M<sup>2</sup>**

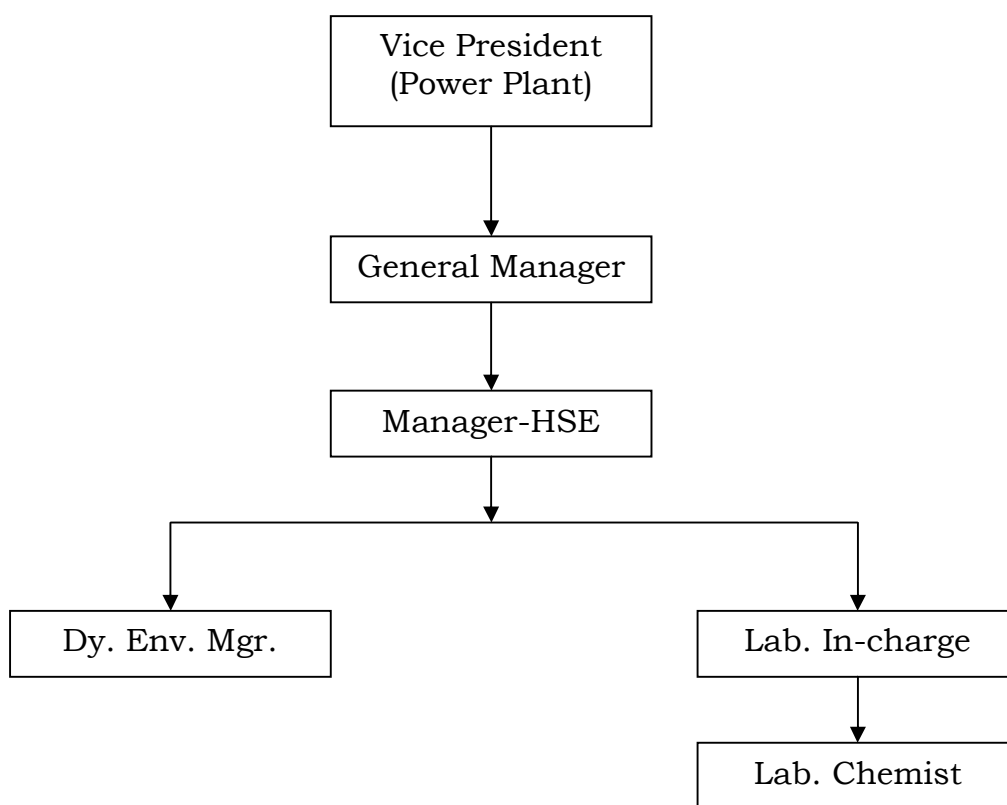
1	No. of pit	No	2.00
2	Dia of pit	MTR	2.25
3	Depth of pit	MTR	3.50

Design of harvesting pit is enclosed in Figure - 13.0

**Note :** The above values are for roof top area 20,000 M<sup>2</sup> for Phase-I and same will be for Phase-II.

### 5.12 Environment management cell

A separate Environment Management Cell will be earmarked for monitoring of pollutants and development of greenbelt as per Environmental Management Plan. Environmental Management Cell (EMC) will meet at least once a month to assess the progress and analyze the data collected for the month. Any deviation/variation noticed shall be immediately taken into consideration for improvement of the same. Yearly action plan of EMP will be updated with respect to results achieved and proposed activities for next year.



### 5.13 Environmental Monitoring During Operation Phase

Regular monitoring of important parameters is of immense importance to assess the status of environment during plant operation. With the knowledge of baseline conditions, a properly planned monitoring program can serve as an indicator for assessment of any deterioration in

environmental conditions. This will facilitate undertaking suitable measures to mitigate adverse impacts during the operation of the plant and further help to protect the environment in the area.

The main attributes for which monitoring shall be carried out are:

1. Ambient air Quality
2. Stack Emission
3. Wastewater Quality
4. Noise Level
5. Hazardous Waste

#### **5.13.1. Ambient Air Monitoring**

Air quality monitoring for sulfur dioxide, nitrogen dioxide and particulate matter will be carried within plant & outside the plant boundary.

#### **5.13.2. Stack Monitoring**

Stack emissions shall be monitored, as per the given guidelines for Suspended Particulate Matter, Sulphur Oxide and Nitrogen Oxides.

#### **5.13.3. Water Quality Monitoring**

The quality of the treated effluents shall be monitored as per the mentioned parameters like pH, Temperature, Color, Oil & Grease, Suspended Solids, Ammoniacal Nitrogen, Total Residual Chloride, Nickel, Hexavalent Chromium, Total Chromium, and total metal content.

#### **5.13.4. Noise Monitoring**

Noise Monitoring will be carried out inside the plant, within the factory premises and outside the premises as per the frequency and duration suggested by the CPCB.

1. Environmental monitoring plan are shown in Table - 60.0
2. Details of Environmental budget (recurring and capital) are shown in Table - 61.0

**Table 60.0 ENVIRONMENT MONITORING PLAN**

Sr.No	Activity	Schedule
<b>Meteorological Data</b>		
	Wind velocity. Wind Direction, Temperature, Relative Humidity	Daily or as required by statutory authority
<b>Air Pollution Monitoring</b>		
2.	Stack Monitoring of flue gas stack	Once a month or as specified by Gujarat Pollution Control Board
3.	Ambient Air Quality within premises	Once every fortnight or as specified by Gujarat Pollution Control Board
4.	Ambient Air Monitoring at locations outside premises at three location 120° to each other	Once every Season or as specified by Gujarat Pollution Control Board
<b>Water quality</b>		
5.	Raw water Quality	Once every Quarter
6.	Cooling tower and Boiler Blow down	Daily or as required by statutory Authority
<b>Noise Monitoring</b>		
7.	Work Zone Noise Levels	Once every Quarter or as required by statutory Authority
8.	Ambient Noise Levels	Once every Quarter or as required by statutory Authority
<b>Occupational Health</b>		
9.	Employee Health Checkups	Half-yearly or as required by Statutory Authority

**Table 61.0 Details of Estimated expenses for Environmental Matters.**

Sr. No.	Area of Expenditure	Recurring Cost per Annum (Rs. In Lacs)	Capital Cost (Rs. in Lacs)
1.	Air Pollution Control	380.00	1400.00
2.	Water pollution control	26.00	80.00
3.	Noise pollution control	1.80	6.00
4.	Environment Monitoring and Management	25.00	6.00
5.	Occupational Health	16.00	8.00
6.	Green Belt	14.00	20.00
7.	Others (pl. Specify)	5.00	5.00
	<b>Total</b>	<b>467.80</b>	<b>1523.00</b>

## **CHAPTER-6**

### **6.1 RISK ASSESSMENT AND AN APPROACH TO EMERGENCY PREPAREDNESS PLAN**

Increasing use of hazardous chemicals as raw materials, intermediates and finished products has attracted attention of the Government and the public, at large, in view of the chemical disasters which occurred during the last decade. The serious nature of the accidents, which cause damage to the plant, personnel and public, has compelled industries to pay maximum attention to the safety issues and also effectively manage the hazardous material and operations. After the ill-fated Bhopal tragedy, the Government of India has made it mandatory for the industries handling hazardous chemicals/ flammable materials to maintain specified safety standards and generate an 'on-site' emergency plan.

Risk assessment study includes study of nature of hazards due to the proposed activities of the power plant including operations involved in use of hazardous chemicals/fuels storage and handling. The study includes:

- Identification of chemicals and hazards.
- Preliminary identification of hazardous area of the plant and threat of storage with respect to Fire and Explosion index.
- Identification of accident sequences and consequences
- Visualization and Analysis of Maximum Credible accidental scenarios.
- Estimation of damage criteria for heat radiation and toxic concentration levels with recourse to health criteria and dose response.
- Study of onsite and offsite population characteristics.
- Study of characteristics of risk levels through study of nature of exposure, pathways and consequences of maximum credible accidental scenarios and presentation of results in terms of risk contours.
- For developing an "On-site" and "Off-site" Emergency Management Plan incorporating measures of safety prevention, mitigation and control of Hazardous events.

Hazard identification provides information on onsite hazardous substances, their nature, quantities and details of storage.

Preliminary hazard Identification is used to identify typical and often relatively apparent risk sources and damage events in a system. As each hazard is identified, the potential causes, effects, and severity of accidents and possible corrective and/or preventive measures are also listed.

Hazards of significant nature whose consequences potential is of worth consideration and wherein a specified area or where more number of personnel likely to be present etc., are considered in identifying the hazards. The following hazards have been are evaluated:

1. Fire Hazards
2. Explosion Hazards.
3. Toxic Hazards.

#### **6.1.1 PRELIMINARY HAZARD ANALYSIS.**

Coal is the fuel used in large quantities. The other hazardous materials stored are LDO.

##### **A Type of Accidents.**

BHL will handle considerable quantity of toxic/ flammable/ explosive materials like- Coal, LDO & HP steam. The characteristics of the above materials can lead to thermal radiation and toxic effects. In general accidents can occur in three stages.

- Construction, commissioning, start-up or shut down stages.
- Normal process operation and
- Storage and transfer operation.



**B Construction/commissioning / start up / shut down stages / vessel / tankage entry.**

- During construction stage, most of the accidents occur due to;
- Human errors (by-passing safety rules and regulations).
- Improper laying of cables.
- Improper Housekeeping (keeping combustible material near welding/gas cutting operations)
- Material handling.
- Handling of tools.
- Working at heights/ elevated levels.
- Material handling with equipments like crane, hydraulic payloaders, JCB, Pociain.
- Earth moving and filling.
- Pressure testing of lines.
- Uncovered trenches, Pressuring of the line etc.
- Unsafe electrical practices.

**C Process Operations**

Accidents in thermal power plants generally occur due to Fire, Explosion and Toxic gas release, High pressure steam leakages and electrical short circuits.

- Malfunctioning of equipment.
- Power failures.
- Failure to take corrective steps in time,
- Failure of utilities.
- System failure.
- Ageing of equipments.
- Improper communication.

**D Storage and Transfer Operations.**

- Accidents due to material spillage/over filling, mechanical failure and external impacts.
- Accident can also occur during opening & maintenance of pipelines, drums, columns, pumps, flanges, drains etc.
- Static electricity.
- Thunder and lightning. :
- On the job accident due to human error.

**E. System Elements/ Event that can lead to Major Accidents.**

The system like storage vessels/tanks, columns, pipe lines involving highly flammable and hazardous chemicals can lead to major accidents under abnormal conditions. The various systems and its possible events are listed below.

**Table : 62.0**

Sl.No	Systems	Type Of Events
01.	Pipelines	Leak/ Rapture
02.	Columns/strippers/ Vessel	Dislocation of internals
03.	Boiler	Tube leak/ Over pressure
04.	Burners	Flange leak
05.	Pumps	Mechanical failure/Utility failure
06.	Compressors	Over pressure
07.	Valves	Leak
08.	Boilers	Over pressure / Utility failure
09.	Storage	Over filling/ over pressure/ static Electricity
10.	Hoses	Leak / rupture
11.	Coal Storage	Spontaneous Ignition of Coal

### **6.1.2 POTENTIAL HAZARDS**

Hazard is an event / incident that can lead to damage of equipment or personal injury. The following are the potential areas in a power plant that can lead to major accidents.

- a) Coal storage and handling
- b) LDO storage and handling
- c) Electrical Hazards

#### **Nature of possible hazards**

There can be three kinds of major hazards

- Spontaneous ignition of coal - Explosion and Fire hazard
- Leakage of LDO tanks leading to pool fire - Explosion and Fire hazard
- Electrical Hazards like flashover and short circuits

### **6.1.3 MAXIMUM CREDIBLE ACCIDENT ANALYSIS**

Maximum Credible Accident Analysis (MCA Analysis) is one of the methodologies evolved to identify worst credible accident with maximum damage distance, which is still believed to be probable. The analysis does not include quantification of probability. The following is an attempt in that direction.

Hazardous substance may be released as a result of failures of catastrophes, causing damage to the surrounding area. The physical effects resulting from the release of hazardous substances are calculated by means of models. The results thus obtained through modeling are used to translate the physical effects in terms of injuries and damage to exposed population and environment.

Details of the models which are based on the formulae published in the Yellow book by the TNO Netherlands are given below:

### **POOL FIRE MODEL**

The heat load on objects outside the burning pool of liquid can be calculated with the heat radiation model. This model uses an average radiation intensity which is dependent on the liquid. Account is also taken of the diameter to height ratio of the fire, which depends on the burning liquid. In addition, the heat load is also influenced by the following factors :

- Distance from the fire
- The relative humidity of the air (water vapour has a relatively high heat absorbing capacity)

### **DISPERSION MODEL**

The gas or vapour released either instantaneously or continuously will spread in the surrounding area under the influence of the atmospheric turbulence. The concentrations of the gas released in the surrounding area can be calculated by means of the dispersion model.

### **SCENARIOS FOR MCA ANALYSIS**

The above models are selected after studying the failure modes. The following are the worst case scenarios which are considered for MCA analysis

- Fire at coal handling plant/coal mills due to coal dust explosion.
- Pool fire due to rupture of storage and outflow of LDO

### **FIRE DUE TO SPONTANEOUS COMBUSTION OF COAL DUST**

Coal-dust when dispersed in air: and ignited would explode. Crusher Houses 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
- dust concentrations must be reasonably uniform
- minimum explosive concentration for coal dust (33% volatile.) is 50 grams/m<sup>3</sup>.

Failure of dust extraction and suppression systems may lead to abnormal conditions and increasing 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 up to 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 time, 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

Stock pile areas shall be provided with automatic garden type sprinklers for dust suppression.

### **POOL FIRE OF LDO STORAGE**

Two tanks of 400 KL capacity will be provided to store LDO. In the event of spilling its contents through a small leakage or due to rupture of the pipeline connecting the tank and on ignition, fire will eventuate. As a worst case it is assumed that the entire contents are leaked out. As the tanks are provided within the dyke the fire will be confined within the dyke wall.

#### **A FAILURE SCENARIOS OF LDO STORAGE TANK**

The spill out of LDO on ignition will result in a pool fire. The injuries in this case are mainly caused by heat radiation.

The heat radiation intensities due to the pool fire are computed using the pool fire model. The results obtained are presented in the following Table

**SCENARIOS : POOL FIRE OF LDO STORAGE**

Details	LDO tank
Quantity of Storage m <sup>3</sup>	2X400
Intensity of Heat Radiation at the centre of the pool (kW/m <sup>2</sup> ) Damage Criteria	80.16
100 % Lethality (37.5 kW/m <sup>2</sup> )	5
50 % lethality (25.0 kW/m <sup>2</sup> )	15
1 %Lethality (12.5 kW/m <sup>2</sup> )	35
First Degree burns (4.5 kW/m <sup>2</sup> )	55
Normal Intensity with no discomfort (1.6 kW/m <sup>2</sup> )	140

**B DAMAGE CRITERIA FOR HEAT RADIATION**

The following table indicates likely damage level for different level of heat radiations:

**Table – 63 DAMAGE CRITERIA FOR HEAT RADIATION**

Incident Radiation Intensity (kW/m <sup>2</sup> )	Type Of Damage
62.0	Spontaneous ignition of wood
37.5	Sufficient to cause damage to process equipment
25	Minimum energy required to ignite wood at infinitely long exposure (non piloted)
12.5	Minimum energy required for piloted ignition of wood, melting plastic tubing etc.
4.5	Sufficient to cause pain to personnel if unable to reach cover within 20 seconds; however blistering of skin (1st degree burns) is likely.
1.6	Will cause no discomfort to long exposure.
0.7	Equivalent to solar radiation

**C CRITICAL RADIATION ON HUMAN BODY**

- |    |                             |   |               |
|----|-----------------------------|---|---------------|
| 1. | Unprotected skin continuous | - | 0.15 W/Sq.cm. |
| 2. | Blisters in skin at 30 sec  | - | 0.5 W/Sq.cm.  |
| 3. | Protected skin              | - | 0.5 W/Sq.cm.  |
| 4. | Special Protection          | - | 0.8 W/Sq.cm.  |

For continuous presence of persons, the following thermal radiation intensity levels are usually assumed.

- |                       |   |                        |
|-----------------------|---|------------------------|
| 4.5 kW/m <sup>2</sup> | - | for Plant Operators    |
| 1.6 kW/m <sup>2</sup> | - | for outside population |

These criteria are followed where peak load conditions may occur for a short time but mostly without warning. If the operators are properly trained and clothed, they are expected to run to shelter very quickly.

For the secondary fires, a thermal incident radiation of 2.5 kW/m<sup>2</sup> is adopted as minimum criteria.

**D PHYSICAL EFFECT OF THRESHOLD THERMAL DOSES**

The effects of heat radiation depend upon the intensity and duration of exposure. Intensity and duration put together is the thermal dose. The consequence on human body for different thermal doses are tabulated here:

Dose Threshold kJ/m <sup>2</sup>	Effects
375	3 <sup>rd</sup> degree burns
250	2 <sup>nd</sup> degree burns
125	1 <sup>st</sup> degree burns
65	Threshold of pain, no reddening or blistering of skin caused.

#### **6.1.4 SUMMARY OF MCA ANALYSIS**

##### **A LDO STORAGE TANK FAILURE**

The vulnerable zone of heat radiation intensities due to failure LDO tanks extends up to a distance of about 55 m (4.5 KW/M<sup>2</sup>) from the edge of pool. . 100% lethality (37.5 KW/M<sup>2</sup>) zone will extend up to a distance of about 5 m. 1% lethality (12.5 KW/M<sup>2</sup>) zones extend up to a distance of about 35 m from the edge of the pool.

Failure of LDO tank showed vulnerable area up to 55 m from the edge of the pool.

#### **6.1.5 CONSEQUENCE ANALYSIS**

Consequence analysis of certain failure cases are carried out with the objective to study how many persons are involved in an accident and are likely to get killed or injured, or how large is the area which is likely to be destroyed or rendered unusable so that a true assessment of the safety of the plant can be made.

The total no. of employees at power plant would be about 211. The power plant would run in three shifts-24 Hrs. Thus, at any point of time, the maximum strength of all cadres including greenbelt development workers of power plant in general shift would be about 150.

Meteorological information plays a major role to identify the zone which is likely to be affected. Heat radiation intensities are dependent on the humidity conditions of that particular area.

##### **LDO tank failure**

LDO storage tank failure will result in 100 % and 50 % lethality within 5 m from the edge of the pool. No manual attendance at this location is envisaged.



**6.1.6 FIRE PROTECTION AND SAFETY MEASURES FOR FIRE AND EXPLOSION HAZARDS**

For protection of the plant against fire, all buildings/equipment, storage yards and plant would be protected by any one or a combination of the following system.

- Hydrant System
- Medium velocity water spray system
- High velocity water spray system
- Low expansion foam system
- Mobile & portable fire extinguishing equipment
- Fire alarm & detection system

The system will be designed in accordance with the recommendations of TAC/ National Fire Protection Association (NFPA), USA will be followed, as applicable. While designing the fire protection system for this power station its extreme ambient condition will be taken into account.

The water for hydrant and water spray system will be met from a dedicated firewater storage tank. The hydrant system will be fed by electric motor driven fire pumps with diesel driven standby pump (100%) of similar capacity. The pressure in the system will be maintained by means of jockey pumps. Fire hydrants are located throughout the plant covering the following buildings:

- Boiler area
- Turbine buildings
- Coal bunkers
- ESP
- Transformer & Switchyard
- Fuel oil storage area & pump house
- Administration building and canteen
- Workshop & stores
- Water treatment plant area
- Coal handling area & storage area

All fire hydrants are provided with necessary accessories and hose houses.

An automatic medium velocity water spray system with heat detection system will be provided for fuel oil storage tanks, cable spreader/ trench area. A manual type medium velocity water spray system will be provided for air heaters. Water for the spray system is drawn from the hydrant main ring.

High velocity water spray system will be provided for steam turbine lube oil tanks, generator transformer & unit auxiliary transformer. Dry pilot quartzoid bulbs type heat detection system will be used for detection of fire in the above area.

Fire water for HVWS system will be from an independent pipe network fed by electric motor driven pump. The hydrant network standby pump will also serve as standby to HVWS networks.

Fuel oil storage tanks will be provided with low expansion foam "system to extinguish the fire in tanks. Water for foam system will be drawn from hydrant mains."

Dry powder type fire extinguisher and CO2 type portable and mobile fire extinguishers will be kept at strategic locations in the plant area. In addition to these, manual call points will also be provided at different locations and there will be one mobile fire tender consisting of fire water storage, pump, hose reels, foam proportioner, foam containers, standby diesel pump etc. stationed within the plant premises.

Automatic fire detection & alarm system comprising of smoke/ heat/ fire sensors will be provided as per NFPA 72 recommendation.

#### **6.1.7 EMERGENCY PREPAREDNESS PLAN**

As per the rules 10 to 13 under Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 of Environment (Protection) Act, 1986, the occupier of the industry using hazardous chemicals in its manufacturing activity should develop an Emergency Management Plan.

This includes description of the emergencies likely to arise out of the activity together with proposed measures to overcome the situation.

The purpose of the Emergency Preparedness Plan is to minimize the danger to life and property in the event of a Plant emergency. To achieve this goal, well-defined, clear-cut steps are to be taken. For the purpose of this Plan, emergency procedures will be implemented for fires and explosions, material spills or natural disasters which require immediate emergency action and/or evacuation of the Plant.

An onsite emergency in the industries involving hazardous processes or in hazardous installations is one situation which has potential to cause serious injury or loss of life. It may cause extensive damage to property and serious disruption in the work area and usually, the effects are confined to factory or in several departments of factory, premises.

A quick and effective response during an emergency can have tremendous significance on whether the situation is controlled with little loss or it turns into a major emergency. Therefore, the purpose of this preliminary Onsite Emergency Plan (OSEP) is to provide basic guidance to the personnel for effectively combating such situations to minimize loss of life, damage to property and loss of property.

The plant authorities will prepare a detailed **On-site Emergency Preparedness Plan** before commissioning the Power plant after incorporating the relevant details like responsibilities of individual officers or staff, telephone numbers, communication system designated emergency exits etc. Similarly, a detailed **Off-site Emergency Preparedness Plan** shall be prepared before commissioning the plant after incorporating relevant details like telephone numbers of statutory authorities (fire, police etc), nearby hospitals , nearby medical stores, press etc.

### **6.1.8 STRUCTURE OF EMERGENCY MANAGEMENT**

The following is the general approach for handling any emergency. The steps include

1. Noticing the accident
2. Informing the Declarer
3. Declaration of Emergency
4. Interaction with the outside agencies

#### **Noticing the Accidents**

The workers in the working zone most probably notice emergencies though an emergency is to be controlled by a senior person. Therefore, the first person that comes to know that the emergency situation has risen would be the shift in charge working in the shift. This shift in charge on assessing the situation will get in touch with the Declarer of emergency. Depending on the nature of the accident, the shift in charge may initiate the action for shutting down the Plant. In case of minor accident, the shift in charge can continue with operations.

The emergency has to be controlled from one particular spot. This spot should be away from the likely points of accident and is easily accessible. The control room of a power plant is one such area where the management of emergency can be handled. The following facilities will be provided in the Control Room:

- I) Plant layout
- II) Emergency telephone numbers
- III) General telephone numbers
- IV) Emergency lighting
- V) Daily number of people working in hazardous area
- VI) Population around the Plant site
- VII) Hot lines to District Magistrate, Police control room, Fire brigade, Hospitals, antidotes and telephone number of pharmacy, etc.

- VIII) Safety equipment
- IX) Personal protection equipment
- X) Tools and tackles.

### **Informing Declarer of Emergency**

Shift incharge will be responsible to inform the declarer of emergency through phone/messenger/ siren for immediate attention at work spot for taking the management of emergency during the period. Every one including the shift-in-charge will know the declarer of Emergency as well as his alternate. In case the main declarer of emergency is not available, the alternate has to be got in touch with.

### **Declaration of Emergency**

The declarer of emergency at accident spot will assess the situation. If he finds that the accident could result in an On-site or Off-site emergency situation, he will immediately declare the emergency by a coded, siren to inform the workers of the Plant that an emergency situation has arisen and they would have to shutdown the operations of the Plant and move towards safer areas which have been pre-decided.

Incase the emergency is of onsite nature, the management of the emergency will be entirely in the hands of 'Declarer'. On the other hand, if the situation is so serious that its effects are likely to be felt outside the Plant premises, it would be 'offsite\* emergency situation and the declarer has to get in touch with the pre-decided authority who will come and take over the management of emergency situation. The management of the emergency will be conducted from a control room or its alternate, both of which will have to be pre-decided.

### **Functions of Declarer**

The declarer will have to perform number of functions simultaneously. Firstly, the declarer has to find out the nature of accident and has to get in touch with the Incident controller. Incident controller will have two teams under him for each shift. Incident controller will come to the accident spot

along with the trained two teams. These two teams under the supervision of Incident controller will start functioning. One team will look for injured workers and help those who are not injured to be located and shifted to a safer spot. This team will also have to bring out injured workers to a safer spot from where arrangements have to be made for them to be taken to the hospital. The second team will try to control the cause of emergency. These two teams will have all the protective equipment available in the control room for such an emergency situation.

**Interaction with Outside Agencies:**

The Controller of Emergency (Incident controller) will also get in touch with other industries and nearby population. The question of nearby population arises only if emergency is an 'Offsite' one and the actual contact with the public will be done through the Police department. The declarer of Emergency will have detailed information about the hospital, ambulances and antidotes which will be made available in the control room. The arrangement to carry the injured to the hospital also will have to be decided before hand.

The declarer of emergency will inform the police personnel about the possible hazards before hand so that they would be ready to undertake the work. Further, the declarer of emergency will inform the Fire Brigade if necessary and give all information to the local authorities like Chief Inspector of Factories and Police control room. He will also request Police Department to make statement to the Press and give information to the public. Only one person who will be entrusted this work will perform this job and nobody else would be authorized to make any statement regarding the state of emergency.

Finally when the Incident Controller has brought the emergency under control, the declarer of emergency will give an "All Clear Signal", the code of which will be decided before hand. Thus the workers and the public would come to know that the emergency situation has now come under control.

### **6.1.9 EVACUATION OF WORKERS AND SHUT DOWN OF OPERATIONS**

#### **Evacuation of workers**

When the Emergency is declared, all workers will have to leave their places of work and reach the safe place. However, in the confusion and excitement, the workers may not exactly know which path to follow. If it is night time, the paths themselves may not be visible. Further, when the emergency is in the same section in which a particular worker is working, there will be so much smoke or fumes that it may be difficult for him to find the path of exit and he will require some special guidance. Thus, it is very necessary that there are guide paths for the workers to follow in case of emergency so that they can reach the safe place/gate.

There may be some workers who have been hurt and are unable to come out. To help them, team members will be made available to the incident controller who will send this team with hailers to the Plant area along with necessary safety equipment which will be kept ready for use in main control room. This team will pick up those workers who are injured and make arrangements to bring them to safe place/Gate.

At the gate, there will be arrangement for counting of the workmen reporting there. All the workers who have arrived at the main gate will be counted against the number which had entered. The total number that has been put together consists not only the workers but also visitors and contract labourers.

When the injured workers are brought to the safe place/gate, they have to be shifted to the hospitals with or without the help of Police. For this, arrangements will be made for a number of vehicles, ambulances, etc.

If outside public in nearby villages is affected, Police will do their evacuation. However, such situation is a remote possibility in case of BHL Plant.

### **6.1.10 CONTROL OF EMERGENCY**

Apart from bringing the injured workers out and looking after their welfare, it will be necessary that the emergency be controlled. This will be done under the direction of the Incident Controller.

### **6.1.11 EMERGENCY EQUIPMENT**

Emergency handling teams will consider maintaining on-site equipment to help mitigate damage. The common practice is to have disaster 'bins' at strategic points around the building containing paper towels, plastic sheeting, torches and similar supplies. Ready made disaster bins and optional extras will be obtained. Contents of a disaster recovery bin will include:

recovery bin	CO2 fire Extinguishers
blotting paper	bucket butchers paper
cotton gloves	dust mask
extension cord	fire blanket
freezer bags	glove liners
hand towel	knife
Note pad/folder	Paperclips
paper towel	pegs
pencil	plastic canister
plastic bin liners	plastic sheeting
post it notes	power board
rubber gloves	scissors
sponge	tags/ties torch and batteries
waterproof marking pens	
apron	



### **6.1.12 TRAINING FACILITIES**

All employees, including maintenance and contractor employees will be made aware of the safety and health hazards which can occur in the power plant.

The purpose of training is to establish and verify the organization's ability to prevent fires and to effectively respond to fire emergencies. BHL will provide training through its training department. Training considerations include:

**1. Actions to be taken in the event of a fire:**

When to evacuate, how to extinguish a fire, whom to notify, what equipment to shut down.

**2. Portable fire extinguishers**

The correct extinguisher and its proper operation on a particular type of fire (e.g., metals, electrical, chemical, wood or paper). The training should be "hands-on" to give employees experience in extinguishments techniques.

**3. Familiarity with Plant:**

A tour of the entire facility, with emphasis on the location of exits, fire extinguishers, hazardous operations, and restricted areas.

**4. Care and maintenance of equipment or machinery they will be operating:**

To reduce fire loss potential by helping to keep equipment from malfunctioning or breaking down.

**5. Alarms**

The meaning of various alarms and the actions to take when they are sounded.

**6. Hot-Work Permits**

How to protect against fire hazards caused from welding/cutting/brazing and other hot work.

**7. Flammable Liquids:**

How to safely handle, use, and store Flammable liquids.

However, additional training in subjects such as operating procedures and safety work practices, emergency evacuation and response, safety procedures, routine and non routine work authorization activities, and other areas pertinent to process safety and health will also be covered.

Operating personnel, who will work in a control room or at control panels, will be trained on power plant simulator. Upset conditions of various types could be displayed on the simulator, such that the employee could go through the proper operating procedures to bring the simulator back to the normal operating parameters.

BHL will periodically- evaluate their training programs to see if the necessary skills, knowledge, and routines are being properly understood and implemented by their trained employees. The means or methods for evaluating the training will be developed along with the training program goals and objectives. Training program evaluation will help BHL to determine the amount of training their employees understood, and whether the desired results were obtained. If, after the evaluation, it appears that the trained employees are not at the level of knowledge and skill that was expected, BHL will revise the training program, provide retraining, or provide more frequent refresher training sessions until the deficiency is resolved.

**6.1.13 INTERACTION WITH OUTSIDE AGENCIES****Treatment of affected persons:**

Based on the maximum accidental analysis, it is observed that the accidents are mainly confined to Plant boundary and will not call for off

site emergency. However, as a safety measure, it is assumed that the accident will call for offsite emergency. In case of offsite emergency, the effects will be felt not only within the Plant premises but outside by general public around the factory premises. BHL will provide all first aid facilities and medicines to handle the affected.

Injured person will be shifted to hospital on urgent basis. BHL will utilize the ambulance services of the nearby hospitals and own vehicles for transport of injured persons. BHL will register with the nearby hospitals to handle the injured cases.

#### **Interaction with Police**

BHL will inform the nearby police station about the nature of possible hazards that can occur.

#### **Interaction with Fire Brigade**

BHL along with its own fire fighting facility and the service of the nearest fire station will be utilized to bring the situation under control.

### **6.1.14 INTERACTION WITH PUBLIC & PRESS**

Based on the maximum accidental analysis, it is observed that the accidents are mainly confined to Plant boundary and will not call for off site emergency. However, as a safety measure, it is assumed that the accident will call for offsite emergency. In the case of Off site emergency the Plant personnel will not interact directly with the public. In such instances, information will be given by Police Department only. Police Department will be informed about possible hazards.

Incase of a major accident, public and press will be informed about the status at different interval. Apart from this, it will also be necessary" to inform the concerned people about the status of the injured. Incase of deaths, the bodies of the dead will be handed over to the relatives. The police will perform these functions with assistance of the controller of emergency.

Authorized person of BHL will have contact with general public, relatives of workers and representative of the press. BHL will inform the statutory authorities like chief inspector of factories and boilers, Andhra Pradesh Electricity Board to draw their attention to the Declaration of Emergency. This will be done with the help of telephone/telex/messenger.

The controller of Emergency will ensure that the neighboring settlements are informed of the emergency on an appropriate basis through phone or messenger.

#### **6.1.15 ALL CLEAR SIGNAL**

The moment when the situation of emergency is brought under control, it will be necessary to bring this attention of public, press etc. This will be done by siren.

#### **6.1.16 CLEAN DEVELOPMENT MECHANISM (CDM)**

Proposed Power Plant is coal based and coal as a fuel will be used. Coal is fossil fuel and also it is not the renewable.

So we are not capable for CDM qualifications.

## **CHAPTER -7**

### **PROJECT BENEFITS**

#### **7.1 PROJECT BENEFITS**

Any industrial activity will help in improving the socio-economic benefits in areas like employment, communication, educational etc.

#### **7.2 EMPLOYMENT POTENTIAL**

A total of about 150-200 persons under direct employment will be benefited due to implementation of the project. About 200-250 (peak) people will benefit during construction activity under each phase. Apart from this, about 250-300 people will get benefited under indirect employment during operation of the power plant in areas like house keeping, security, ash management, horticulture and maintenance of infrastructure.

#### **7.3 REACHING OUT TO THE COMMUNITY**

All socio-economic development activities will be done under the aegis of BHL. Social responsibility begins with good governance, efficient utilization of resources and protection of stakeholder and consumer interests. It is for a successful corporate to take initiatives for socially relevant activities and causes. BHL will strive to achieve the following objectives:

##### **Objective**

- To provide basic amenities for the rural poor
- To save arts/crafts of historical relevance which are on the verge of extinction.
- To develop integrated programmes for the disabled
- To encourage fresh talents in the area of sports
- To take up other humanitarian activities
-

#### **7.4 CORPORATE SOCIAL RESPONSIBILITY**

BHL is committed to develop the surrounding areas in a well-coordinated and balanced manner while safeguarding the environmental and social aspects. BHL will provide employment to the locals wherever possible, buy goods and services, encourage local entrepreneurs for providing support services, generate awareness about health and encourage local traditions and local crafts.

BHL had earmarked a budget of Rs 60 lakhs spread over three years for implementation of the need based community development plan.

The following activities will be taken up by BHL:

- Provide free health checkup facility,
- Medicine to poor villagers
- Donating building materials and furniture for school buildings, stationery for schools
- Sponsoring training programmes in association with ITI's and local polytechnic colleges.

During construction and operation of the project, BHL will develop an effective public relations strategy by encouraging local youth in the surrounding villages and availing the services of people like plumbers, masons vehicle repair shops, electricians, shopkeepers and traders, hotels etc.

## **CHAPTER-8**

### **RECOMMENDATIONS**

Following recommendations are delineated for evolving and creating effective environment management plan. These would entail planning to control land, air, noise pollution due to industrial activity during establishment as well as operational phase of proposed industry.

- ❖ During expansion phase preparation of site such as clearing of site if operation like excavation, leveling, transportation that generate dust could be controlled by utilizing water spray wherever possible.
- ❖ Proper drinking water supply & sanitation facilities should be provided to the workers so as to have minimum environment impact and they shall not hinder the domestic waste disposal profile of surroundings.
- ❖ Constructional and installation activities must be carried out in such a way that any liquid waste emanating from these shall be properly treated & disposed. The transportation vehicles should be properly maintained to minimize smoke emissions. Spillage of oil shall be adequately taken care of. Any other type of solid waste obtained should be properly disposed off in suitable dumping areas provided for the purpose. Noise level arising due to fabrication, erection site preparation could be controlled by keeping it below 75dB(A) near residential by way of placing acoustic barriers, creating temporary earth bunds of soil at site.
- ❖ Judicious use of water in various plant practices & its recycle will reduce the volume of waste to a great extent. Floor washings, cooling waste could be recycled leakages should be minimized by way of collection provisions and then recycled back to process stream.
- ❖ Green belt provision should be done within premises all along as per given details.

- ❖ In order to have a close monitoring on water use & conservation in plant, the industry could go for installing flow measuring devices at various points of intake as well as interconnecting drains of discharge. The flow and water consumption could be easily monitored on regular basis. Any overuse could then be controlled and points of recycle be identified.
- ❖ Attempts should be made to evolve an exhaustive procedure of environmental operational matrix by the industry during operational phase of its proposed establishment. This should than be compared with baselines matrix consisting of biological, physical, chemical, cultural, bio-cultural linkages in terms of evaluation with respect to scale of importance, scale of operational phase and scale of management by rating system..



## **CONCLUSION**

*There is no denying the fact that the proposed establishment of **Power plant** activities may have some impact on the existing environment. The measures required to mitigate these impacts have been dealt with in detail. From the detailed analysis of the environmental impacts and the remedial measures suggested/ recommended. It can be concluded that no significant deterioration in the ecosystem likely to occur due to the proposed establishment of plant. On the other hand, several benefit like employment generation; afforestation and economic growth in the area will increase and also contribute to the overall development of the nearby area.*

*From the detailed study of the environmental impact on account of proposed plant and the remedial measures suggested thereof in the Environmental management plan it could be concluded that no significant deterioration in the ecosystem is likely to be caused in the long run.*

***The proponents **M/S BAJAJ HINDUSTAN LTD.** are industrialist of repute and having highly experienced administrative and technical staff, capable of managing the industry with full confidence.***

***So, it is recommended without any reservations that 'Environmental Clearance for the establishment of this project be granted.***

**Dr Manoj Garg**  
Director  
(Consultant - Environment)  
Environmental & Technical Research Centres

Date :