

PRE-FEASIBILITY REPORT

**2X660 MW COAL BASED SUPER CRITICAL THERMAL POWER
PLANT**

**AT DADRI KHURD VILLAGE, MIRZAPUR SADAR TEHSIL,
MIRZAPUR DISTRICT, UTTAR PRADESH**

**PROJECT DEVELOPER
WELSPUN ENERGY (U.P) PRIVATE LIMITED**

Chapter 1

Executive Summary

1. EXECUTIVE SUMMARY

1.1 INTRODUCTION

M/s Welspun Energy UP Pvt. Ltd., a special purpose vehicle of Welspun Energy Limited, proposes to set up a super-critical Thermal Power Plant of 2x660 MW capacity at village Dadri Khurd, in Tehsil Mirzapur Sadar, in District Mirzapur, in Uttar Pradesh. The proposal is based on imported coal and will cover an area of 875 acres.

1.2 PROJECT LOCATION & CONNECTIVITY

The project site lies between latitude 24°58'41.645" N to 25°00'16.887" N and longitude 82°39'50.425" E to 82°41'03.728" E. The site is well connected by SH-5 which is just 1.5 km from the site in SW direction. Sarsongram is the nearest railway station which is around 15.5 km from the site in E direction.

The site is under possession of the Proponent and diverted for industrial use.

1.3 PROJECT BRIEF

The project occupies an area of 875 acres (354 ha) and involves generation of 1320 MW of electricity through super-critical boilers. Imported Coal requirement will be 5.27 MTPA and domestic coal requirement is 6.74 MTPA (whichever is applicable). The plant layout for the proposed station has been developed keeping in view the optimum use of available land, direction of road and rail access, operational ease and financial requirements.

The water requirement for the project is 36 MCM which will be sourced from River Ganga and pumped into Upper Khajuri Dam located at a distance of 5.5 km from the project site. A reservoir will be built at site to which water will be brought from Upper Khajuri Dam through pipeline. The reservoir will have a capacity of 4 days' storage. The plant will be based on zero discharge concept with RO system and using the treated effluent water for dust suppression and in greenbelt.

Water Allocation has been already granted by Irrigation dept. Govt. of UP vide letter dated Vide letter no. 3613/11-27Irr-04-174 (W) /11 dated 09.09.2011. CWC/MoWR has already approved water allocation of 36 MCM from River Ganga Vide letter no. 7/2/18/UP/2008/IP(N)/804 dated 12.10.2011.

The coal will be received through dedicated railway siding.

For power evacuation, two 400kV transmission lines from the power plant switchyard to the nearby 400kV PGCIL grid sub-station have been envisaged.

Chapter 2

Introduction

2. INTRODUCTION

2.1 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

Welspun Energy UP Private Limited (WEUPPL) is a Special purpose Vehicle (SPV) of Welspun Energy limited for developing the proposed 2x660 MW Coal Based Thermal Power Plant (TPP) based on supercritical technology. "Looking at the growing energy needs of Uttar Pradesh, Welspun Energy Limited envisages initiating a 2 x 660 MW super-critical thermal power plant in Mirzapur District.

2.2 BRIEF DESCRIPTION OF NATURE OF PROJECT

The proposed coal based power plant is of 1320 MW capacity will comprise of two units of 660 MW capacity each, based on super-critical technology. The project will utilize imported coal from Indonesia as primary fuel. The plant will be designed for base load operation with a plant design life of about 25 years.

The proposed power plant will have two units with a total power generation capacity of 1320 MW. The land requirement for the project is 875 acres including power plant, ash pond and other auxiliaries and the estimated cost of the project is about Rs 10,956 Crores.

The proposed plant site is located at Dadri Khurd village in Mirzapur Sadar tehsil, Mirzapur district in Uttar Pradesh. Varanasi town is located at a distance of about 50 km from the proposed plant site, whereas the district head-quarter of Mirzapur is located at a distance of about 18 km from the proposed plant site.

2.3 NEED FOR THE PROJECT & ITS IMPORTANCE TO THE COUNTRY

Though there has been substantial growth in power sector infrastructure in India, the power supply position is still characterized by shortages, both in terms of demand met during peak periods and the overall energy supply. Many parts of the country continue to reel under severe power shortages. The all India region-wise forecast for electrical energy requirement and peak demand scenario are presented in Table 1.

Table 1: Long term Forecast of Power Demand

Sl. No.	Region	Electrical Energy Requirement (TWh)			Peak Electric Load (GW)		
		2011-12	2016-17	2021-22	2011-12	2016-17	2021-22
1	Northern	294.8	411.5	556.8	48.1	66.6	89.9
2	Western	294.9	409.8	550.0	47.1	64.3	84.8
3	Southern	253.4	380.1	511.7	40.4	60.4	80.5
4	Eastern	111.8	168.9	258.2	19.1	28.4	42.7

Sl. No.	Region	Electrical Energy Requirement (TWh)			Peak Electric Load (GW)		
		2011-12	2016-17	2021-22	2011-12	2016-17	2021-22
5	North-Eastern	13.3	21.1	37.0	2.5	3.8	6.2
6	All India	968.7	1392.1	1914.5	152.7	218.2	298.3

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

The peak power supply position in the country during 2016-17 is given in **Table 2**. The region wise power supply position in the country for the year 2015 – 2016 is given in **Table 3**.

Table 2: Peak power Supply Position

Year	Peak Demand (MW)	Peak Met (MW)	Peak Deficit (%)
2016-17*	156,934	-2,608	-1.6

*April 2016 to February 2017

Source: Central Electricity Authority

Table 3: Region Wise Power Supply Position-2016-2017*

Region	Peak Demand (MW)	Peak Met (MW)	Peak Deficit (%)
Northern	53,372	52,612	-1.4
Western	47,881	47,844	-0.1
Southern	42,052	41,610	-1.1
Eastern	18,790	18,596	-1.0
North Eastern	2,487	2,475	-0.5

*April 2016 to January 2017

Source: Central Electricity Authority

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

2.4 DEMAND-SUPPLY GAP

Among Northern Region States, Uttar Pradesh stands at the second most power deficit area as is evident from **Table 4**.

Table 4: Power Supply Position in Northern Region-2016-2017*

States	Peak Demand (MW)	Peak Met (MW)	Peak Deficit (%)
Delhi	6,342	6,261	-1.3
Haryana	9,262	9,262	0.0
Himachal Pradesh	1,492	1,492	0.0
Jammu & Kashmir	2,675	2,140	-20.0
Punjab	11,408	11,408	0.0

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States	Peak Demand (MW)	Peak Met (MW)	Peak Deficit (%)
Rajasthan	10,613	10,348	-2.5
Uttar Pradesh	17,183	15,501	-9.8
Uttarakhand	2,037	2,037	0.0

*April 2016 to January 2017

Source: Central Electricity Authority

It may be noted that the power supply demand in Uttar Pradesh is highest among the Northern states.

2.5 IMPORTS V/S INDIGENOUS PRODUCTION

No imports for production have been proposed for the project.

2.6 EXPORT POSSIBILITY

No export possibilities are envisaged.

2.7 DOMESTIC/EXPORT MARKETS

Not envisaged

2.8 EMPLOYMENT GENERATION

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

Chapter 3

Project Description

3. PROJECT DESCRIPTION

3.1 TYPE OF PROJECT INCLUDING INTERLIKED OR INTERDEPENDENT PROJECT

The project is for generation of 1320 MW of electricity from imported coal. The project is not linked or interdependent on any other projects.

3.2 PROJECT LOCATION

The project is located in Dadri Khurd village in Mirzapur Sadar Tehsil, Mirzapur District, Uttar Pradesh. The locational details of the project are given in **Table 5**. The site marked in Toposheet is given in **Annexure 6**.

Table 5: Location Details

Description	Details		
Location	Dadri Khurd Village, Mirzapur Sadar Tehsil, Mirzapur District, Uttar Pradesh		
Plant Co-ordinates	Points	Latitude	Longitude
	A	25° 00' 16.887"N	82° 40' 29.204"E
	B	24° 59' 45.117"N	82° 41' 03.728"E
	C	24° 58' 41.858"N	82° 40' 23.802"E
	D	24° 58' 41.645"N	82° 39' 50.425"E
	E	24° 59' 08.278"N	82° 40' 00.404"E
	F	24° 59' 44.581"N	82° 40' 00.552"E
Total Area (ha)	875 acres (354 ha)		
Access road	SH-5, 1.5 km, SW		
District headquarters	Mirzapur, 18 km, NW		
Nearest town	Mirzapur, 18 km, NW		
Nearest railway station	Sarsongram Railway Station, 15.5 km, E		
Nearest airport	Varanasi Airport, 50 km, NNE		

Source: Welspun Energy UP Pvt. Ltd.

3.3 DETAILS OF ALTERNATIVE SITES CONSIDERED

The site in Dadri Khurd Village in Mirzapur District was found to be most suitable from among five sites examined for the proposed project. The five sites examined are:

1. Dadri Khurd in Mirzapur District, UP
2. Alor in Sonbhadra District, UP
3. Bishunpur in Mirzapur District, UP
4. Pindari in Sonbhadra District, UP
5. Kesurva in Mirzapur District, UP

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The comparative analysis of these sites is given in Table 6.

Table 6: Comparative Analysis of Alternate Sites

Sl. No.	Parameters	PROJECT SITE -1 (Dadri Khurdh)	PROJECT SITE -2 (Alor)	PROJECT SITE -3 (Bishunpur)	PROJECT SITE -2 (Pindari)	PROJECT SITE -3 (Kesurva)
1.	Village	Dadri Khurdh	Alor & Gurdah	Bishunpur	Pindari	Kesurva
2.	District	Mirzapur	Sonbhadra	Mirzapur	Sonbhadra	Mirzapur
3.	State	Uttar Pradesh	Uttar Pradesh	Uttar Pradesh	Uttar Pradesh	Uttar Pradesh
4.	Latitude	24°58'51.2" N to 25°00'05.43" N	24°35' 17.08"N	24°55' 8.70"N	24° 3'16.91"N	24°59'47.16"N
	Longitude	82° 39'34.1" E to 82° 40'52.71" E	82°58' 41.00" E	82°45' 59.00" E	82°54'39.04" E	82°31'39.07" E
	Elevation above MSL	215m	200 m	262 m	290 m	170 m
5.	Type of Land	Mix of barren and waste land (95 %) and Single crop Agriculture Land (5%)	Mix of Unirrigated Single Crop (60 %) and waste land (40 %)	Mix of Unirrigated Single Crop (61 %) and irrigated double crop (39 %)	Single Crop Agriculture Land (70%) Forest Land (20%) Barren Land (10%)	70% of Land is Barren but portion of it is classified as forest land belongs to Bahuti RF and Endowment Land belongs to Sri Thakur Madan Mohan Ji Trust.
6.	Applicability of R&R Plan	Resettlement would be applicable for the farmers displaced from their agricultural field	R & R is applicable Home oustees: 125 Land oustees: 300	R & R is applicable Home oustees:80 Land oustees:180	Rehabilitation is applicable for the home oustees & Resettlement is applicable for the farmers displaced from their agricultural field.	Rehabilitation is applicable for the home oustees & Resettlement applicable for the farmers displaced from their agricultural field.

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Sl. No.	Parameters	PROJECT SITE -1 (Dadri Khurd)	PROJECT SITE -2 (Alor)	PROJECT SITE -3 (Bishunpur)	PROJECT SITE -2 (Pindari)	PROJECT SITE -3 (Kesurva)
		Home oustees: 0 Land oustees: 50			Home oustees: 100 Land oustees: 550	Home oustees: 10 Land oustees: Trust
7.	Nearest National park, Wildlife Sanctuary, Biosphere Reserve within 10 km radius	Nil	Kaimur Wildlife Sanctuary (8 kms, NE)	Nil	Nil	Nil
8.	Reserve Forests within 10 kms radius	Mirzapur RF, Danti RF, Sarson RF, Gohlanpur RF, Barkachha RF, Karaunda RF, Chandlewa Khurd RF, Nanauti RF, Bahuti RF, Patehra RF, Malua RF, Newaria RF	5-6 patches fall within 10 km	Semri RF, Darwan RF, Pokhraudh RF, Dadra Rampur RF etc.	Khaiabara RF, Muirpur RF, Khatabaran RF etc.	Barkachha RF, Bahuti RF, Karanpur RF etc.
9.	Source of Water	Ganga River (approximately 17 km in NE)/Upper Khajuri Dam (4 km, W)	Son River (1 km, S)/Sirsi Dam (55 km, NW)	Sirsi Dam (28 km, SW)/Ganga River (25 km in SW)/ Upper khajuri dam (18 km, NW)	Govind Ballabh Pant Sagar	Ganga River (approximately 17 km in N)/Upper Khajuri Dam (6.5 km, E)
10.	Source of Coal	Imported coal from Indonesia	Coal Mines, Sources: linkage	Coal Mines, Sources: linkage	Coal Mines, Sources: linkage from NCL (30 Kms)	Coal Mines, Sources: linkage from NCL/ CCL/ SECL

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Sl. No.	Parameters	PROJECT SITE -1 (Dadri Khurd)	PROJECT SITE -2 (Alor)	PROJECT SITE -3 (Bishunpur)	PROJECT SITE -2 (Pindari)	PROJECT SITE -3 (Kesurva)
			from NCL (54 km, S)	from NCL (80 km, S)		(95 km)
11.	Industries Around	No major industries in close proximity	No major industries in close proximity	No major industries in close proximity	Power Plants (NTPC, SUMPP, Essar, Hindalco) and Singrauli Coal Mines	No major industries in close proximity
12.	Nearest Town	Mirzapur (18 km, NW)	Robertsganj (14 Km)	Mirzapur (32 km)	Renukut (approx. 21 Kms, NNE)	Mirzapur (16 km, N)
13.	Nearest Railway Station	Sarsongaon Railway Station (approximately 15.5 km, E)	Chopan (9 km, SE)	Rajegur (1 km, SE)	Renukut Railway Station (approx. 21 km, NNE)	Mirzapur Railway Station (approximately 16 km, N)
14.	Nearest Highway	NH-7 (10 KM NNE) SH-5 (1.5KM SW)	SH 5 (8 km)	SH 5(2.5 km) NH 7(21 km)	NH-75 (23 km NE)	NH-7 (8 KM NW) SH-5 (7.5 KM E)
15.	Nearest Airport	Varanasi Airport (50 km, NNE direction)	Varanasi (81 km, N)	Allahabad (111 km, NW)	Varanasi Airport (155 kms, N direction)	Varanasi Airport (60 kms, NNE direction)
16.	Proximity of State Boundary	None within 25 km	M.P. State boundary within 10 km	None within 25 km	MP and Chhattisgarh	None within 25 km
17.	Suitability	Site found ideal as: <ul style="list-style-type: none"> 95 % of the land is barren and waste land Approximately 50 	Site not preferred due to: <ul style="list-style-type: none"> Mix of unirrigated single and waste land. 	Site not preferred due to: <ul style="list-style-type: none"> Land belongs to a Religious Trust and transfer of 	Site not preferred due to: <ul style="list-style-type: none"> High Number of Land losers and Home oustees. Involvement of Forest 	Site not preferred due to: <ul style="list-style-type: none"> Land belongs to a Religious Trust and transfer of land not permitted

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Sl. No.	Parameters	PROJECT SITE -1 (Dadri Khurd)	PROJECT SITE -2 (Alor)	PROJECT SITE -3 (Bishunpur)	PROJECT SITE -2 (Pindari)	PROJECT SITE -3 (Kesurva)
		land oustees only • Resettlement plan will be required but no Rehabilitation Plan is applicable.	Kaimur Wildlife Sanctuary at about 8 km • Higher number of land oustees (approximately 300) • Approximately 125 home oustees. • R & R Plan is applicable.	land not permitted.	Land • Uncertainty over water allocation.	

Source: Welspun Energy UP Pvt. Ltd.

3.4 SIZE & MAGNITUDE OF OPERATION

The project will occupy an area of 875 acres and will generate 1320 MW of electricity through 2x660 MW super critical boilers.

3.5 PROJECT DESCRIPTION WITH PROCESS DETAILS

The proposed 1320 MW power plant will have a configuration of 2x660 MW with super-critical technology. It is recommended that super-critical technology is the most proven technology. Steam conditions may be chosen and the most applicable steam conditions in India shall be 246 kg/cm², 538° C/566° C The power plant would be provided with main plant equipment and plant auxiliary systems comprising external and internal coal handling systems; raw water pretreatment and post treatment systems, condenser cooling water system, auxiliary cooling water system, plant effluent treatment, ash handling and dumping systems, fuel oil system, service and instrument compressed air systems, air-conditioning and ventilation systems, fire protection system, hydrogen generation system,

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workshop, chemical laboratory, plant electrical system and plant instrument and control systems. It also includes the transmission lines from switchyard a power plant up to nearest 400 kV substation. The project layout is shown in **Annexure 7**.

Stage 1

The first conversion of energy takes place in the boiler. Coal is burnt in the boiler furnace to produce heat. Carbon in the coal and Oxygen in the air combine to produce Carbon Dioxide and heat.

Stage 2

The second stage is the thermodynamic process.

The heat from combustion of the coal boils water in the boiler to produce steam. In modern power plant, boilers produce steam at a high pressure and temperature. The steam is then piped to a turbine. The high-pressure steam impinges and expands across a number of sets of blades in the turbine. The impulse and the thrust created rotates the turbine. The steam is then condensed and pumped back into the boiler to repeat the cycle.

Stage 3

In the third stage, rotation of the turbine rotates the generator rotor to produce electricity.

Air Environment:

The production process involves combustion of fossil fuels in boiler for production of steam which is used for production of electricity. The emissions due to combustion are primarily particulates, SO₂, NO_x, Hg, CO and CO₂. The estimated pollution loads for PM, SO₂, NO_x and Hg emission due to combustion of domestic coal is 156 kg/hr, 520 kg/hr, 520 kg/hr and 0.16 kg/hr respectively. However, as imported coal is envisaged until domestic coal linkage is obtained, thus the pollution loads for PM, SO₂, NO_x and Hg emission due to combustion of imported coal is 122kg/hr, 407 kg/hr, 407 kg/hr and 0.13 kg/hr respectively.

It is proposed to restrict particulate matter emission to 30 mg/Nm³ with use of high efficiency ESPs. Increase in levels of SO₂ and NO₂ will be within permissible limit as a result of use of low sulphur coal (0.34% /w) and use of pulverized coal, low NO_x burners with low NO₂ generation. Additionally, FGD and DeNO_x system shall be provided as per the latest notification which will control Hg emission also. Thus, minimal impact of pollutants emitted in the air environment due to the proposed plant is anticipated.

Noise Environment:

The major noise generations sources are the turbines, turbo-generators, pumps, compressors, fans, coal-handling plant etc. from where noise is continuously generated. Acoustic enclosures shall be provided wherever required to control the noise level below 80 dB (A) in work area. Wherever it is not possible technically to meet the required noise levels, personal noise protection appliances shall be

provided to workers. Efforts will be made to ensure that noise levels at plant boundary after peripheral greenbelt during plant operation does not exceed prescribed limit.

Water Environment:

There will be no discharge of any liquid effluent outside the plant premises and hence no impact is anticipated due to effluents on the water bodies of the study area.

The envisaged scheme for withdrawal of intake water from River Ganga consists of De-siltation chamber for controlling suspended solids in the water before pumping it to Upper Khajuri reservoir for storage, which shall ensure no pollution of the existing water quality of the Upper Khajuri Dam.

Land Environment:

100% Fly Ash Utilisation envisaged for the project However, in emergency situation, ash will be disposed in the ash pond in form of High density slurry. The ash pond will be lined to prevent leaching and subsequent contamination of groundwater.

3.6 RAW MATERIAL REQUIRED

The primary fuel required is imported coal. The coal requirement is estimated to be 5.27 MTPA at 90%PLF with 14% ash content and 0.34% Sulphur. The boiler will be designed for cold start-up and initial warm-up using Light Diesel Oil (LDO) and coal flame stabilization with Heavy Fuel Oil (HFO). HFO and LDO will be received to the proposed plant by means of the road tankers. The annual requirement of secondary fuel by way of LDO and HFO used for start-up and coal flame stabilization is estimated to be around 18,870 KL/annum.

3.7 RESOURCE OPTIMIZATION

The project is based on zero discharge. All efforts and arrangement will be made to achieve or recycling of waste water to attain zero discharge. In inescapable scenario, this quantity will be drained to nearest nallah after meeting the MoEF&CC's stipulated standards.

3.8 AVAILABILITY OF WATER & ITS SOURCE, ENERGY OR POWER REQUIREMENT AND SOURCE

The water requirement for the project is 4002 m³/hr. In principle Water allocation of 36 MCM from Irrigation Department, Lucknow which has further been approved by Gol, Central Water Commission, Irrigation Planning (North) Dept. Vide letter no. 7/2/18/UP/2008/IP(N)/804 dated 12.10.2011.

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

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

Power requirement for the project will be obtained from the nearby Unnao/ Sarnath sub-station from the project site during construction phase. During operation phase, electricity required will be sourced from the generated power itself.

3.9 QUANTITY OF WASTES GENERATION AND SCHEME FOR MANAGEMENT

Solid Waste:

Based on Imported Coal: $5.27 \text{ MTPA} \times 14\% = 0.74 \text{ MTPA ash}$.

Based on Domestic Coal: $6.74 \text{ MTPA} \times 34\% = 2.3 \text{ MTPA ash}$.

100% utilization of fly ash has been proposed as per stipulated norms laid down by MoEF&CC.

Fly ash generated will be supplied to potential buyers for commercial purpose, cement plant, ready mix concrete, brick making, land filling as per requirement/ suitability and balance will be disposed in ash pond.

The municipal solid wastes generated from the colony will be converted to manure and used in gardening.

Recyclable waste will be sold to recyclers. Inert waste will be sent to MSW Disposal sites for land fill.

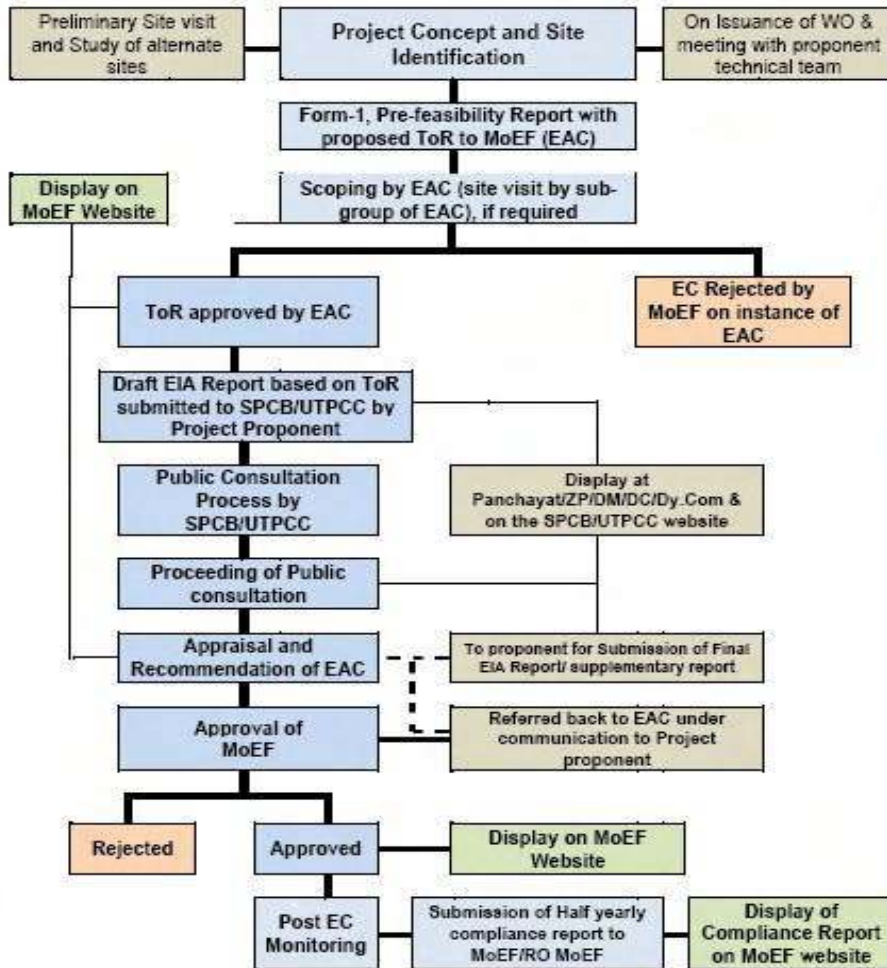
Hazardous waste shall be treated in accordance with Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016.

Liquid Effluent: Effluent treatment plant and Sewage Treatment plant has been planned to be installed to suffice the requirement.

3.10 SCHEMATIC REPRESENTATION OF FEASIBILITY DRAWING WHICH GIVE INFORMATION OF EIA PURPOSE

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Schematic Representation of Environment Clearance Process

Chapter 4

Site Analysis

4. SITE ANALYSIS

4.1 CONNECTIVITY

The site is well connected by SH-5 which is just 1.5 km from the site in SW direction. Sarsongram is the nearest railway station which is around 15.5 km from the site in E direction.

4.2 LAND FORM, LAND-USE & OWNERSHIP

The total land requirement for the proposed project has been optimized to about 875 acres (354.11 ha). This includes the proposed power plant, ash pond, railway siding, colony and other plant facilities. Out of 875 acres, 777.88 acres is private land and 97.13 acres is government land.

The private land area for the plant and for facilities required outside the plant area is being acquired through the respective land owners as per the prevailing norms of Uttar Pradesh Government.

4.3 TOPOGRAPHY

Topography of the site is slightly undulating and slopes towards west. Some level of cutting and filling will need to be done to maintain an even topography.

4.4 EXISTING LAND-USE PATTERN

Existing land-use pattern as per revenue records is given in **Table 7**.

Table 7: Present Land-use Pattern as per Revenue Record

Sr. No.	Land Usage	Area (acres)
1	Fallow land	831.50
2	Banjar land	31.90
3	Water body	10.90
4	Pathrail	0.49
5	Road	0.22
	Total	875

Source: Welspun Energy Pvt. Ltd.

Table 8 shows the sensitive areas are present within 15 km radius of the project site. No national parks or wildlife sanctuaries are present within 15 km radius of the project site.

Table 8: Site Sensitivity

Sl. No.	Features	Distance (km)	Direction
Forests			
1	Mirzapur RF	Adjacent	SE
2	RF	2.0	ESE
3	Danti RF	3.0	NNW
4	Sarson RF	5.6	SE
5	Gohlanpur RF	6.0	ESE

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Sl. No.	Features	Distance (km)	Direction
6	Barkachha RF	6.4	NW
7	Karaunda RF	6.6	SW
8	Chandlewa Khurd RF	7.0	NE
9	Nanauti RF	7.3	SE
10	Bahuti RF	8.0	WNW
11	Patehra RF	8.5	WSW
12	Malua RF	8.5	SSW
13	Newaria RF	9.4	SW
14	RF	10.8	WSW
15	Kakrad RF	11.5	SW
16	Saktesgarh RF	11.5	ESE
17	Piori RF	13.0	SW
18	Dadra Rampur RF	13.0	SE
19	Bhiskuri RF	14.0	NW
20	Gorthara RF	14.5	SSE
Water Bodies			
1	Jogidari Nala	1.5	ESE
2	Jamti hawa Nadi	1.6	WSW
3	Chatar Nadi	3.7	NNE
4	Devri Nala	5.0	SW
5	Pahiti Nadi	5.2	ESE
6	Kuardari Nala	5.6	WNW
7	Dahul Nala	8.1	WNW
8	Berka Nala	9.6	SSE
9	Madho Nala	11.0	NW
10	Bidauli Nala	12.0	S
11	Pachchni Nala	12.2	NW
12	Baginar Nala	12.5	WNW
13	Magardaha Nala	13.0	SE
14	Parbar Nala	13.3	SSW
15	Jirgo Nadi	13.6	ESE
16	Gotutwa Nala	13.7	SSW
17	Sirsi Reservoir	13.7	SSW
18	Balwa Nala	14.7	WSW
19	Kaserva Nala	15.0	W

Source: Sol toposheet.

4.5 EXISTING INFRASTRUCTURE

No infrastructures are present in the project site at present apart from few trees.

4.6 SOIL CLASSIFICATION

The soil is generally red and the terrain generally rocky in the district. Geologically the district is characterized by Vindhyan system and it is overlain by Quaternary alluvium. The upper horizons of alluvium consist of sticky clay, kankar having a thickness 40 m to 50 m.

4.7 CLIMATIC DATA FROM SECONDARY SOURCES

Secondary climatic data as taken from IMD Station, Varanasi which gives climatic data for 1971 to 2000 gives the data as given in **Table 9**.

Table 9: Climatic Data of IMD-Varanasi (1971-2000)

Sl. No.	Parameters	Description of the Season				
1	Rainfall in mm	Total Annual average Rainfall is 265.75 mm				
		Winter (Dec to Feb)	Months	Total rainfall (in mm)		
			December	4.8		
			January	19		
			February	18.2		
			Total	42		
		Summer (Mar to May)	March	8.3		
			April	6.1		
			May	10.3		
			Total	24.7		
		Monsoon (June to Sept)	June	107.3		
			July	309.3		
			August	288.4		
			September	244.9		
			Total	949.9		
		Post-Monsoon (Oct to Dec)	October	32.3		
November	9.3					
December	4.8					
Total	46.4					
2	Temperature (Mean Daily Temp. in °C)	Winter (Dec to Feb)	Months	Max	Min	Avg
			Dec	24.7	10.1	17.4
			Jan	23.0	9.2	16.1
			Feb	26.2	11.6	18.9
			Average	24.6	10.3	17.5
		Summer (Mar to May)	Mar	32.6	16.2	24.4
			Apr	38.5	21.9	30.2
			May	40.3	25.5	32.9
			Average	37.1	21.2	29.2
		Monsoon (June to Sept)	June	38.4	27.2	32.8
			Jul	33.7	25.7	29.7
			Aug	32.9	25.4	29.2
			Sep	32.8	24.4	28.6
			Average	34.5	25.7	30.1
		Post-Monsoon (Oct to Dec)	Oct	32.7	20.6	26.7
			Nov	29.4	14.4	21.9
Dec	24.7		10.1	17.4		

PRE-FEASIBILITY REPORT

FOR PROPOSED 2 X 660 MW SUPER CRITICAL THERMAL POWER PROJECT NEAR
DADRI KHURDH VILLAGE, TEHSIL MIRZAPUR SADAR, DIST. MIRZAPUR (U.P.)

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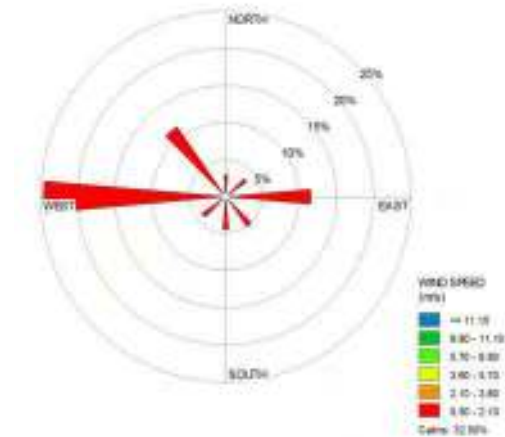
Sl. No.	Parameters	Description of the Season			
		Average	28.9	15.0	22.0
3	Relative Humidity in %	Winter (Dec to Feb)	Month	08.30 hrs	17:30 hrs
			Dec	78	60
			Jan	80	56
			Feb	70	45
			Average	76	53.67
		Summer (Mar to May)	Mar	53	31
			Apr	41	23
			May	49	29
			Average	47.7	27.7
		Monsoon (June to Sept)	Jun	62	48
			July	81	73
			Aug	83	76
			Sep	82	75
			Average	77.0	68.0
		Post-Monsoon (Oct to Dec)	Oct	75	64
			Nov	71	59
December	78		60		
Average	74.7		61.0		
4	Wind-speed	Winter (Dec to Feb)	Month	Speed (kmph)	
			Dec	2.4	
			Jan	2.8	
			Feb	3.5	
			Average	2.90	
		Summer (Mar to May)	Mar	4.2	
			Apr	4.5	
			May	4.9	
			Average	4.53	
		Monsoon (June to Sept)	Jun	4.8	
			July	4.3	
			Aug	3.8	
			Sep	3.5	
			Average	4.1	
		Post-Monsoon (Oct to Dec)	Oct	2.3	
			Nov	1.9	
Dec	2.4				
Average	2.2				

Source: Climatological Normals, 1971-2000, Varanasi, Uttar Pradesh

PRE-FEASIBILITY REPORT

FOR PROPOSED 2 X 660 MW SUPER CRITICAL THERMAL POWER PROJECT NEAR
DADRI KHURDH VILLAGE, TEHSIL MIRZAPUR SADAR, DIST. MIRZAPUR (U.P.)

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Annual Wind Rose-Varanasi IMD

4.8 SOCIAL INFRASTRUCTURE AVAILABLE

Settlements are present in the surroundings; however, no densely populated areas are present within 15 km radius. Schools and health centres are present within 15 km radius.

Chapter 5

Planning Brief

5. PLANNING BRIEF

5.1 PLANNING CONCEPT

The project has been planned keeping in mind the power deficiency in Uttar Pradesh. As power generation from coal is a pollution generating activity, this project has considered all possible pollution control measures to ensure that the surrounding environment remains clean. Installation of associated mechanical and electrical equipment auxiliary units like coal and ash handling plants, water treatment plant, cooling water system, Electrostatic Precipitators (ESPs), low NOx burners, online stack monitoring system etc. will form part of the total installation.

5.2 POPULATION PROJECTION

Inflow of population in this area as a result of this project is expected in two phases:

- During peak construction phase, temporary work force of approximately 3000 workers will be deployed.
- During O&M Phase, the permanent workforce will be 300.

A colony also has been proposed inside the project site to accommodate the permanent employees.

5.3 LAND-USE PLANNING

The land break-up of the proposed project is given in **Table 10**.

Table 10: Proposed Land-use Planning

Particulars	Area (Acres)	Area (ha)
Main Plant	360	145.7
Ash disposal area	180	72.8
Colony	50	20.23
Greenbelt	285	115.3
Total Area	875	354

Source: Welspun Energy UP Pvt. Ltd.

5.4 AMENITIES/FACILITIES

The following amenities/facilities will be developed:

- a. Rest shelters for labours
- b. Toilets
- c. Drinking water facilities
- d. First aid facilities
- e. Regular medical check-up facilities shall be provided to labours and workers.
- f. Residential Colony for permanent workers.

Chapter 6

Proposed Infrastructure

6. PROPOSED INFRASTRUCTURE

6.1 INDUSTRIAL AREA (PROCESSING AREA)

The following facilities have been proposed to be laid down in the processing area:

- Provision to install 2x660 MW Power Plant with Supercritical Parameters
- Coal storage yard for 30 days storage at site for 2X660 MW units
- Ash disposal bund for storage of ash
- Raw water supply and storage facilities
- Railway Siding and Marshalling Yard
- Approach road to the power plant from main road.
- Availability of adequate space for fabrication / construction equipment.

All facilities of the plant are laid out in close proximity to each other to facilitate communication of men and materials movement between the various facilities both during construction and also during subsequent operation and maintenance.

The power plant shall comprise of two nos. boilers and two steam turbine generators with required auxiliaries and equipments.

6.2 RESIDENTIAL AREA

A colony in 50 acres area has been proposed to be constructed inside the plant for permanent employees.

6.3 GREENBELT

A three tier greenbelt will be developed in 285 acres area all around the plant. The species selected for greenbelt will have pollution abatement capacity.

6.4 SOCIAL INFRASTRUCTURE

The project will take care of the needs of the surrounding settlements and villagers. Development of social infrastructure may be included in the CSR after assessing the needs of the local community.

6.5 CONNECTIVITY

The site is well connected by SH-5 which is just 1.5 km from the site in SW direction. A connecting road from the site to SH-5 shall be constructed.

6.6 DRINKING WATER MANAGEMENT

Provision for drinking water will be made for labours and workers during construction and operation phase.

6.7 SEWERAGE SYSTEM

6.8 INDUSTRIAL WASTE MANAGEMENT

180 acres area has been kept for ash disposal. 100% utilization of fly ash has been proposed as per stipulated norms laid down by MoEF&CC. Maximum 2.30 MTPA of ash is expected to be generated from the proposed power plant. The details of waste generation are given in **Table 11**.

Table 11: Waste Disposal Methods

Type of Solid Waste	Maximum Quantity		Mode of Disposal
Fly Ash	0.59 MTPA	0.46 MTPA	Sent to cement industries in dry form. Unutilized ash will be disposed into lined ash pond
Bottom Ash	0.15 MTPA	1.84 MTPA	
Clarifier sludge	0.6 MTPA		It will be disposed along with bottom ash.
Used Oil	70 KLPA		Will be supplied to authorized recyclers

Source: Welspun Energy UP Private Limited

6.9 SOLID WASTE MANAGEMENT

The municipal solid wastes generated from the colony will be collected, segregated and sent to nearest MSW treatment facility.

Recyclable waste will be sold to recyclers. Inert waste will be sent to MSW Disposal sites for land fill.

Hazardous waste shall be treated in accordance with Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016.

6.10 POWER REQUIREMENT, SUPPLY & SOURCE

Power requirement for the project will be obtained from the nearby Unnao/ Sarnath sub-station from the project site during construction phase. During operation phase, electricity required will be sourced from the generated power itself.

Chapter 7

Rehabilitation & Resettlement

7. REHABILITATION & RESETTLEMENT PLAN

The procured land has 210 title holders in 63 khatas from Dadri Khurd village. The entire land has been procured from the willing sellers through direct negotiations. The price paid is determined through mutual negotiation on mutually acceptable terms and conditions. The land has been purchased after obtaining necessary approval under UPZALR Act, 1950. No settlements are present in the project site.

Chapter 8

Project Schedule & Cost Estimate

8. PROJECT SCHEDULE & COST ESTIMATE

The project cost is estimated to be Rs. 10,956 Crores.

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

Chapter 9

Analysis of Proposal

9. ANALYSIS OF PROPOSAL

The project activity and the management will definitely support the local people and provide other form of assistance for the development of public amenities in this region.

The management will recruit the semi-skilled & unskilled workers from the nearby villages. The overall project will improve the socio-economic status of surrounding people and lead to a higher standard of living. Housing, transport, medical, educational and other civic amenities will get a boost in future. This is envisaged as a major positive benefit.

On the basis of the techno-economical feasibility study, the 2x660 MW Coal based power plant with supercritical parameters proposed is found to be viable.

Additional Attachments

Annex 1

Khasra Details



खण्ड-क 1
खण्ड-दक्षिणपूर्व
खण्ड-पूरुब
खण्ड-पूरुव
खण्ड-दक्षिणपूर्व
खण्ड-पूरुव

खण्ड-दक्षिणपूर्व
खण्ड-पूरुब
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खण्ड-पूरुव

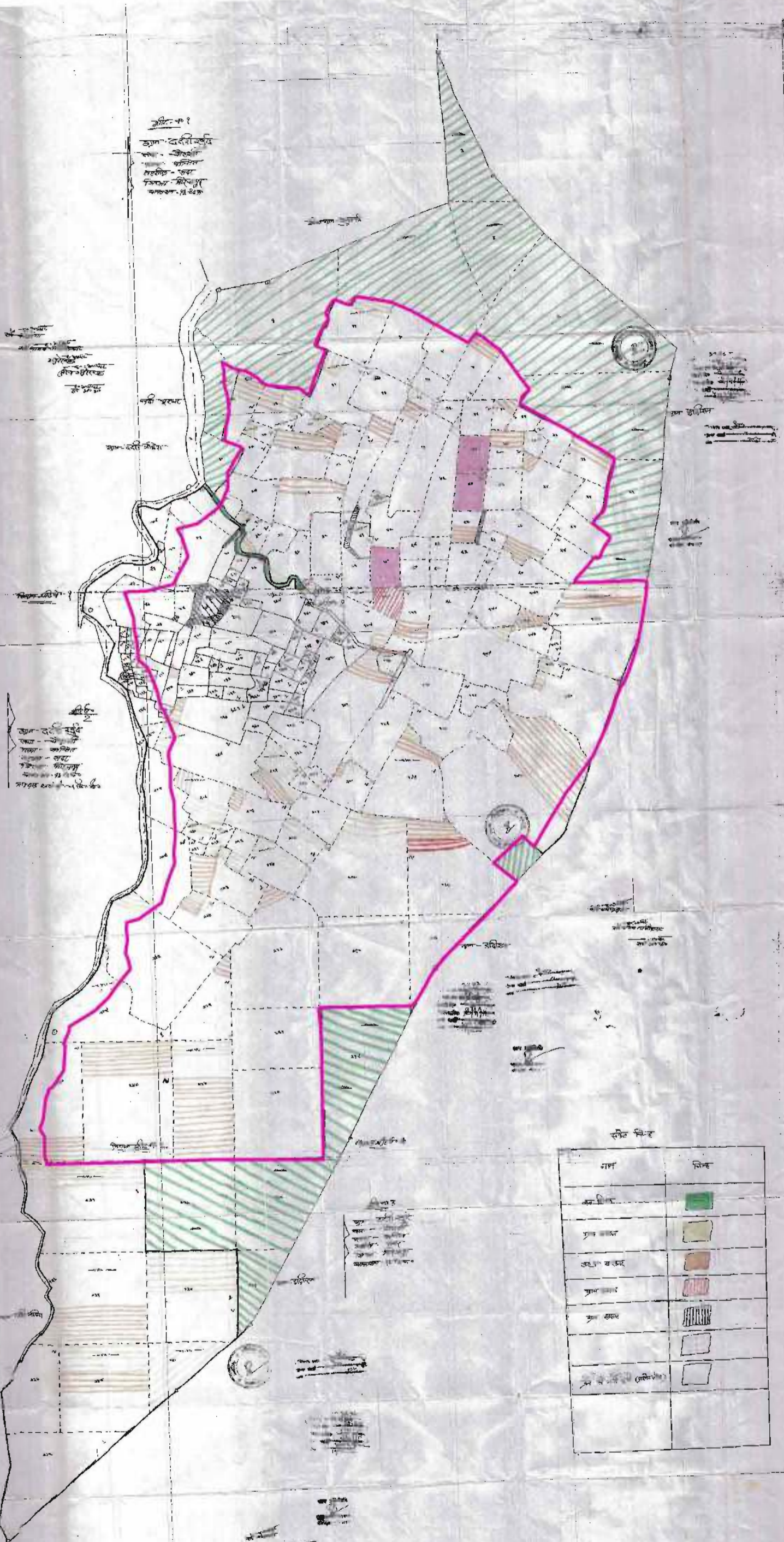
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खण्ड-दक्षिणपूर्व
खण्ड-पूरुब
खण्ड-पूरुव
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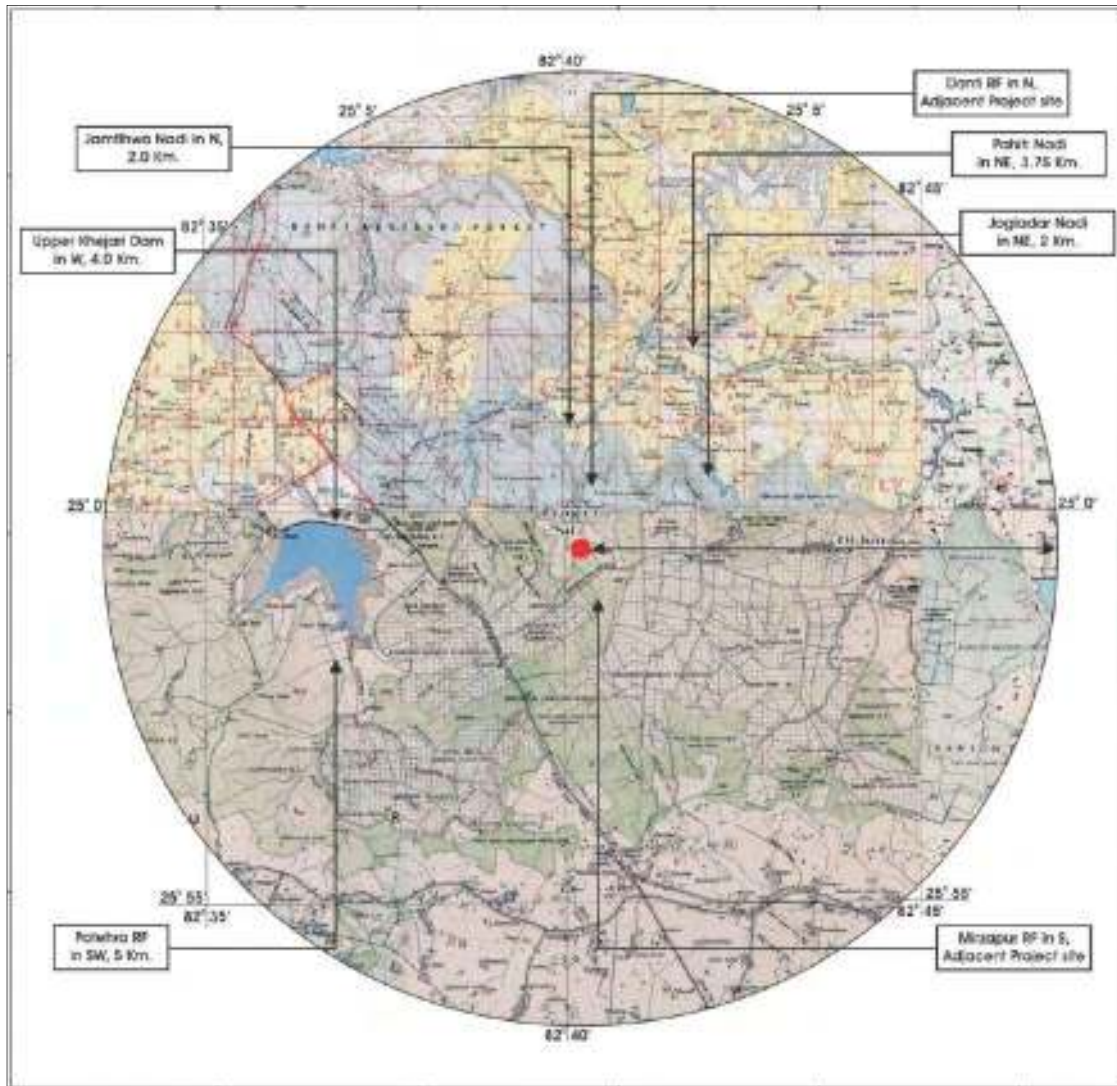
रंग-सूची

वर्ण	चिह्न
खण्ड-दक्षिणपूर्व	
पूरुब	
खण्ड-पूरुव	
खण्ड-दक्षिणपूर्व	
खण्ड-पूरुव	
खण्ड-दक्षिणपूर्व	
खण्ड-पूरुव (खण्ड-क 1)	



Annex 2

Comparison of Alternate Sites



Site in Dadri Khurd

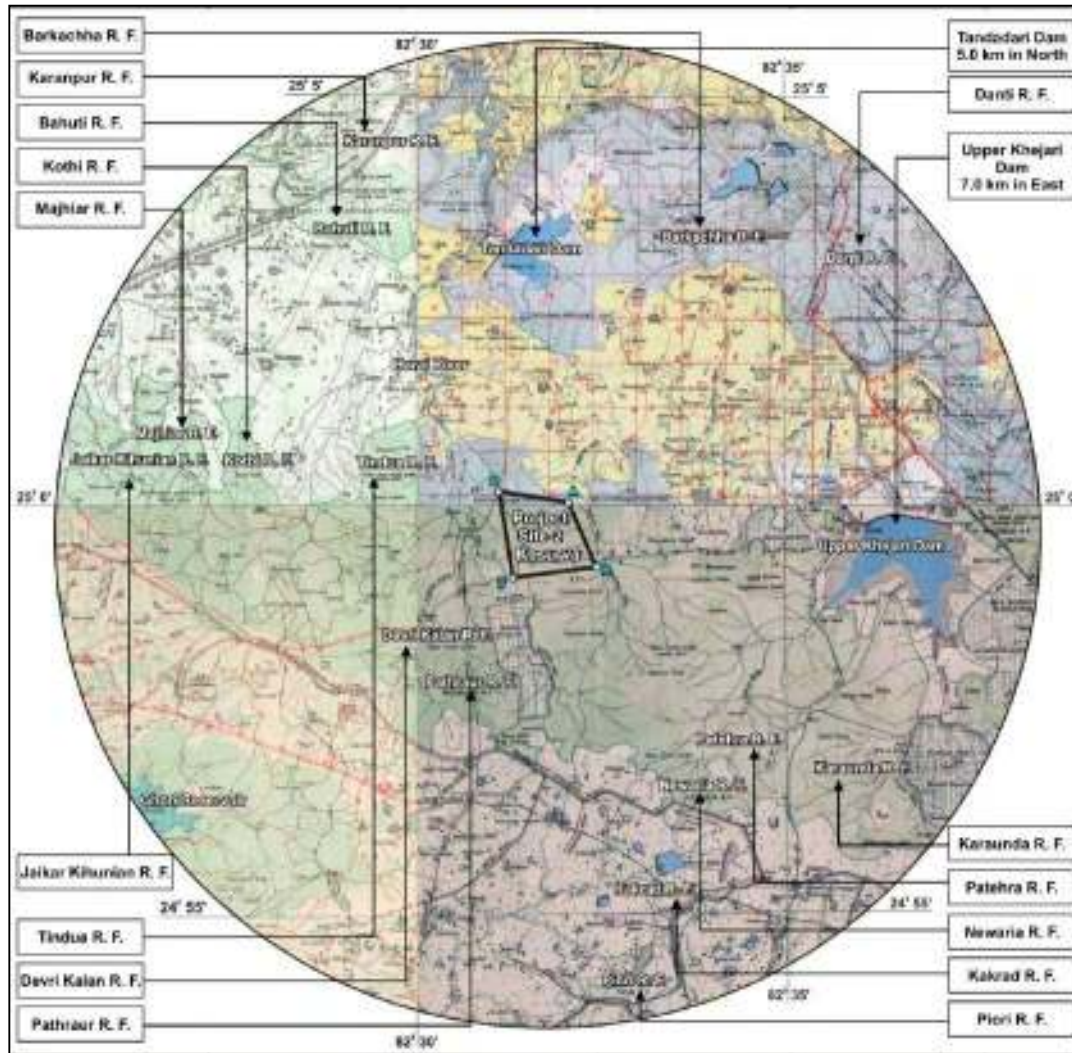
Details of Alternate Locations



INDEX	
Project Boundary	
Buffer Zone Boundary	
National Highway	
State Highway	
Railway Line	
Habitat	

Site in Alor

Details of Alternate Locations



Site in Kesurva

Comparative Analysis of Alternate Locations

Sl. No.	Parameters	PROJECT SITE -1 (Dadri Khurd)	PROJECT SITE -2 (Alor)	PROJECT SITE -3 (Bishunpur)	PROJECT SITE -2 (Pindari)	PROJECT SITE -3 (Kesurva)
1.	Village	Dadri Khurdh	Alor & Gurdah	Bishunpur	Pindari	Kesurva
2.	District	Mirzapur	Sonbhadra	Mirzapur	Sonbhadra	Mirzapur
3.	State	Uttar Pradesh	Uttar Pradesh	Uttar Pradesh	Uttar Pradesh	Uttar Pradesh
4.	Latitude	24°58'51.2" N to 25°00'05.43" N	24°35' 17.08"N	24°55' 8.70"N	24° 3'16.91"N	24°59'47.16"N
	Longitude	82° 39'34.1" E to 82° 40'52.71" E	82°58' 41.00" E	82°45' 59.00" E	82°54'39.04" E	82°31'39.07" E
	Elevation above MSL	215m	200 m	262 m	290 m	170 m
5.	Type of Land	Mix of barren and waste land (95 %) and Single crop Agriculture Land (5%)	Mix of Unirrigated Single Crop (60 %) and waste land (40 %)	Mix of Unirrigated Single Crop (61 %) and irrigated double crop (39 %)	Single Crop Agriculture Land (70%) Forest Land (20%) Barren Land (10%)	70% of Land is Barren but portion of it is classified as forest land belongs to Bahuti RF and Endowment Land belongs to Sri Thakur Madan Mohan Ji Trust.
6.	Applicability of R&R Plan	Resettlement would be applicable for the farmers displaced from their agricultural field Home oustees: 0 Land oustees: 50	R & R is applicable Home oustees: 125 Land oustees: 300	R & R is applicable Home oustees:80 Land oustees:180	Rehabilitation is applicable for the home oustees & Resettlement is applicable for the farmers displaced from their agricultural field. Home oustees: 100 Land oustees: 550	Rehabilitation is applicable for the home oustees & Resettlement applicable for the farmers displaced from their agricultural field. Home oustees: 10 Land oustees: Trust
7.	Nearest National park, Wildlife Sanctuary, Biosphere Reserve within 10 km radius	Nil	Kaimur Wildlife Sanctuary (8 kms, NE)	Nil	Nil	Nil

Comparative Analysis of Alternate Locations

Sl. No.	Parameters	PROJECT SITE -1 (Dadri Khurd)	PROJECT SITE -2 (Alor)	PROJECT SITE -3 (Bishunpur)	PROJECT SITE -2 (Pindari)	PROJECT SITE -3 (Kesurva)
8.	Reserve Forests within 10 kms radius	Mirzapur RF, Danti RF, Sarson RF, Gohlanpur RF, Barkachha RF, Karaunda RF, Chandlewa Khurd RF, Nanauti RF, Bahuti RF, Patehra RF, Malua RF, Newaria RF	5-6 patches fall within 10 km	Semri RF, Darwan RF, Pokhraudh RF, Dadra Rampur RF etc.	Khaiabara RF, Muirpur RF, Khatabaran RF etc.	Barkachha RF, Bahuti RF, Karanpur RF etc.
9.	Source of Water	Ganga River (approximately 17 km in NE)/Upper Khajuri Dam (4 km, W)	Son River (1 km, S)/Sirsi Dam (55 km, NW)	Sirsi Dam (28 km, SW)/Ganga River (25 km in SW)/ Upper khajuri dam (18 km, NW)	Govind Ballabh Pant Sagar	Ganga River (approximately 17 km in N)/Upper Khajuri Dam (6.5 km, E)
10.	Source of Coal	Imported coal from Indonesia	Coal Mines, Sources: linkage from NCL (54 km, S)	Coal Mines, Sources: linkage from NCL (80 km, S)	Coal Mines, Sources: linkage from NCL (30 Kms)	Coal Mines, Sources: linkage from NCL/ CCL/ SECL (95 km)
11.	Industries Around	No major industries in close proximity	No major industries in close proximity	No major industries in close proximity	Power Plants (NTPC, SUMPP, Essar, Hindalco) and Singrauli Coal Mines	No major industries in close proximity

Comparative Analysis of Alternate Locations

Sl. No.	Parameters	PROJECT SITE -1 (Dadri Khurd)	PROJECT SITE -2 (Alor)	PROJECT SITE -3 (Bishunpur)	PROJECT SITE -2 (Pindari)	PROJECT SITE -3 (Kesurva)
12.	Nearest Town	Mirzapur (18 km, NW)	Robertsganj (14 Km)	Mirzapur (32 km)	Renukut (approx. 21 Kms, NNE)	Mirzapur (16 km, N)
13.	Nearest Railway Station	Sarsongaon Railway Station (approximately 15.5 km, E)	Chopan (9 km, SE)	Rajegur (1 km, SE)	Renukut Railway Station (approx. 21 km, NNE)	Mirzapur Railway Station (approximately 16 km, N)
14.	Nearest Highway	NH-7 (10 KM NNE) SH-5 (1.5KM SW)	SH 5 (8 km)	SH 5(2.5 km) NH 7(21 km)	NH-75 (23 km NE)	NH-7 (8 KM NW) SH-5 (7.5 KM E)
15.	Nearest Airport	Varanasi Airport (50 km, NNE direction)	Varanasi (81 km, N)	Allahabad (111 km, NW)	Varanasi Airport (155 kms, N direction)	Varanasi Airport (60 kms, NNE direction)
16.	Proximity of State Boundary	None within 25 km	M.P. State boundary within 10 km	None within 25 km	MP and Chhattisgarh	None within 25 km

Conclusion

Parameters	PROJECT SITE -1 (Dadri Khurd)	PROJECT SITE -2 (Alor)	PROJECT SITE -3 (Bishunpur)	PROJECT SITE -2 (Pindari)	PROJECT SITE -3 (Kesurva)
Suitability	<p>Site found ideal as:</p> <ul style="list-style-type: none"> • 95 % of the land is barren and waste land • Approximately 50 land oustees only • Resettlement plan will be required but no Rehabilitation Plan is applicable. 	<p>Site not preferred due to:</p> <ul style="list-style-type: none"> • Mix of unirrigated single and waste land. • Kaimur Wildlife Sanctuary at about 8 km • Higher number of land oustees (approximately 300) • Approximately 125 home oustees. • R & R Plan is applicable. 	<p>Site not preferred due to:</p> <ul style="list-style-type: none"> • Land belongs to a Religious Trust and transfer of land not permitted. 	<p>Site not preferred due to:</p> <ul style="list-style-type: none"> • High Number of Land losers and Home oustees. • Involvement of Forest Land • Uncertainty over water allocation. 	<p>Site not preferred due to:</p> <ul style="list-style-type: none"> • Land belongs to a Religious Trust and transfer of land not permitted

Annex 3
**Letter of Approval of Biodiversity
& Wildlife Conservation Plan**

कार्यालय प्रमुख वन संरक्षक, वन्य जीव, उत्तर प्रदेश, लखनऊ।

पत्रांक:- /26-11 (वेल्सपन एनर्जी) लखनऊ, दिनांक: अक्टूबर, 15 2014,
सेवा में,

मुख्य वन संरक्षक,
मीरजापुर क्षेत्र, उ०प्र०
मीरजापुर।

विषय:- ग्राम ददरी खुर्द, तहसील-सदर, जनपद मीरजापुर में मेसर्स वेल्सपन एनर्जी यूपी प्राइवेट लि० द्वारा 2X660 एम० डब्लू० सुपर क्वाड्रिकल कोल आधारित थर्मल पावर प्लान्ट की स्थापना के सम्बन्ध में प्रस्तुत Biodiversity Assessment and Preparation of Conservation Management Plan (including wildlife) के अनुमोदन के सम्बन्ध में।

सन्दर्भ:- 1-आपका पत्रांक 1151/मी० क्षे०/33 दिनांक 18-09-2014।
2-प्रभागीय वनाधिकारी, मीरजापुर वन प्रभाग, मीरजापुर का पत्रांक 995/33-वेल्सपन दिनांक 09-09-2014।

महोदय,

कृपया उपरोक्त सन्दर्भित पत्रों से प्रेषित विषयक प्रस्ताव का अवलोकन करें। उल्लेखनीय है कि ग्राम ददरी खुर्द, तहसील-सदर, जनपद मीरजापुर में, मेसर्स वेल्सपन एनर्जी यूपी, प्राइवेट लि० द्वारा 2X660 एम० डब्लू० सुपर क्वाड्रिकल कोल आधारित थर्मल पावर प्लान्ट की स्थापना के सम्बन्ध इस कार्यालय के पत्रांक 272/26-11(वेल्सपन) दिनांक 24-06-2014 से वांछित आख्या के क्रम में प्रभागीय वनाधिकारी, मीरजापुर वन प्रभाग, मीरजापुर द्वारा पत्रांक 995/33-वेल्सपन दिनांक 09-09-2014 से स्पष्ट किया गया है कि प्रश्नगत परियोजना कैमूर वन्य जीव विहार, मीरजापुर की सीमा से लगभग 25 किमी० दूर मीरजापुर वन प्रभाग क्षेत्रान्तर्गत प्रस्तावित है। परियोजना की स्थापना व कार्यान्वयन के सम्बन्ध में प्रस्तावक विभाग द्वारा 10 वर्षों हेतु प्रभाग के पादप व जन्तु जगत के संरक्षण उनसे प्रासंगिक विषयों के सन्दर्भ में प्रस्तुत Biodiversity Assessment and Preparation of Conservation Management Plan (including wildlife) में 184.15 लाख रुपये का प्राविधान किया गया है। उक्त के सम्बन्ध परीक्षण व वांछित आख्या के क्रम में आपके पत्रांक 1151/मी० क्षे०/33 दिनांक 18-09-2014 से प्रश्नगत Biodiversity Assessment and Preparation of Conservation Management Plan (including wildlife) से सहमति के साथ प्रतिहस्ताक्षरित कर अनुमोदन हेतु प्रस्तुत किया गया है।

अतः आपके पत्रांक 1151/मी० क्षे०/33 दिनांक 18-09-2014 द्वारा की गयी संस्तुति के क्रम में प्रस्तुत Biodiversity Assessment and Preparation of Conservation Management Plan (including wildlife) निम्न शर्तों के अधीन अनुमोदित कर संलग्न किया जाता है।

1- उक्त Biodiversity Assessment and Preparation of Conservation Management Plan (including wildlife) में वन्य जीवों के संरक्षण हेतु प्रस्तावित कार्यों का कार्यान्वयन सुनिश्चित

करने हेतु उक्त प्रबन्ध योजना में उल्लिखित Monitoring Committee का गठन कर जिसका अनुमोदन मुख्य वन संरक्षक, वन्य जीव पश्चिमी क्षेत्र, उ०प्र०, कानपुर से प्राप्त करना होगा।

2- जनपद मिर्जापुर व सोनभद्र में कैमूर वन्य जीव विहार क्षेत्र में व सन्निकट आरक्षित वन क्षेत्रों में विचरण करने वाले काले हिरन (Black Buck) के विस्तृत अध्ययन व संरक्षण हेतु एक कार्ययोजना वन्य जीव संस्थान देहरादून से तैयार करवा कर मुख्य वन्य जीव प्रतिपालक, उ०प्र० को प्रस्तुत करना होगा।

भवदीय,

(डा० रूपक डे)

प्रमुख वन संरक्षक, वन्य जीव,
उत्तर प्रदेश, लखनऊ।

पत्रांक 389 / उक्तदिनांकित।

प्रतिलिपि:-निम्नांकित को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित।

1. मुख्य वन संरक्षक, (मध्य क्षेत्र), भारत सरकार केन्द्रीय भवन पॉचवा तल, सेक्टर एच अलीगंज, लखनऊ।
2. मुख्य वन संरक्षक, (वन्य जीव) पश्चिमी क्षेत्र उ०प्र०, कानपुर।
3. प्रभागीय वनाधिकारी, मिर्जापुर वन प्रभाग, मिर्जापुर।
4. प्रभागीय वनाधिकारी, कैमूर वन्य जीव प्रभाग, मिर्जापुर।
5. मुख्य प्रबन्धक, मेसर्स वेल्सपन एनर्जी ग्रुपी प्राइवेट लि० मिर्जापुर।

(डा० रूपक डे)

प्रमुख वन संरक्षक, वन्य जीव,
उत्तर प्रदेश, लखनऊ।

Annex 4

NGT Judgements

**BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH AT NEW DELHI,
NEW DELHI**

Appeal No. 79 of 2014

(M.A. Nos. 694/2014 & 511/2015)

In the matter of:

1. Debadityo Sinha
R/o III Floor, 943A/8,
Govindpuri, Kalkaji,
New Delhi- 110019
 2. Shiv Kumar Upadhyay
R/o 36/30, Shivpuri Colony,
Station Road, Mirzapur,
Uttar Pradesh- 231001
 3. Mukesh Kumar
Room No. 65, Aravalli Hostel,
Rajiv Gandhi South Campus-Banaras Hindu University
Village- Barkachha, District Mirzapur,
Uttar Pradesh
- Appellants

Versus

1. Union of India
Through the Secretary
Ministry of Environment, Forests & Climate Change
Indira Paryavaran Bhavan
Jor Bagh Road,
New Delhi- 110 003
 2. Government of Uttar Pradesh
Through its Chief Secretary
Lal Bahadur Shastri Bhavan
UP Secretariat
Lucknow- 226001
 3. Uttar Pradesh Pollution Control Board
Through its Member Secretary
Vibhuti Khund, Gomti Nagar
Lucknow- 226010
 4. M/s Welspun Energy (U.P) Pvt. Ltd.
III Floor, PTI Building, Parliament Street
New Delhi- 110001
- Respondents

Counsel for appellants:

Ms. Parul Gupta, Advocate for applicant

Counsel for Respondents:

Mr. Vishwendra Verma and Ms. Shivali, Advs.
for respondent no. 1 with Dr.M. Ramesh, Scientist 'D'
Ms. Savitri Pandey, Adv. for respondent nos. 2
Mr. Pradeep Misra, Mr. Manoj Kr. Sharma and
Mr. Daleep Dhayani, Advs for respondent no.3
Mr. Dhruv Mehta, Mr. Sanjeev Kumar, Mr. Varun
Shankar, Mr. Abhishek Puri and Mr. Anshul Seghal,
Advs. for respondent no. 4

Present:

Hon'ble Mr. Justice U.D. Salvi (Judicial Member)

Hon'ble Mr. Ranjan Chatterjee (Expert Member)

JUDGMENT

Per U.D. Salvi J.(Judicial Member)

Reserved on: 5th April, 2016

Pronounced on: 21st December, 2016

1. Environment Clearance dated 21st April, 2014 bearing no. J 13012/12/2011-IA.II (T) granted by the respondent no. 1- Ministry of Environment, Forest and Climate Change (for short MOEF&CC) to the respondent no. 4- M/s Welspun Energy (U.P) Pvt. Ltd. for setting up 2x660 MW Super Critical Coal based Thermal Power Project at Village Dadri Khurd, Teshil Mirzapur, Uttar Pradesh is assailed in the present Appeal.
2. The appellant no. 1-Debadityo Sinha, alumnus of Banaras Hindu University, holding a Masters in Environment Science and Technology, claims to be an Environmentalist working in the field of protection and conservation of environment individually and as a founder of Vindhya Bachao Abhiyan.

The appellant no. 2-Shiv Kumar Upadhyay, states that he is a senior journalist based in Mirzapur and is a co-founder of Vindhya Bachao Abhiyan. The appellant no. 3- Mukesh Kumar states that he is a student of M.Sc.(Tech.) Environmental Science and Technology from Banaras Hindu University at Rajiv Gandhi South Campus of the University in Mirzapur and he is a member of students 'ECO One' organisation specifically formed for active involvement of the students and staff members of the campus in conservation measures in the region.

3. According to the appellants, the Project Proponent suppressed facts to obtain Environment Clearance and there have been violations of the provisions of EIA Notification, 2006 from the beginning of process of grant of clearance till the end; and crucial aspects have been over-looked by the Expert Appraisal Committee and MoEF&CC.
4. Initially, the appellants submit, a proposal for setting up of the project in question was proposed to be located near villages- Hazipur- Katya, Pahai Goura and Katya, Tehsil Jakhnia and Saidpur, District Ghazipur, UP with land requirement of 850 acres for power plant, green belt and ash pond as per Form-1 dated 31st December, 2010 annexure A-2. However, when the proposal came up for consideration for grant of TOR before the 22nd meeting of the reconstituted Expert Appraisal Committee of Thermal Power and Coal Mine projects held on 4th -5th April, 2011, the information regarding the changed location-District

Mirzapur situate at 140Km from the previous location- was submitted as follows:-

“The proposal is for setting up of 2x660 MW Super Critical Coal based Thermal Power Plant at villages Dadri Khurd, in Mirzapur Sadar Taluk, in Mirzapur Distt. in Uttar Pradesh.....

Coal requirements will be 6.4 MTPA. Coal will be obtained from domestic coal block through SECL/NCL/CCL mines.....

There are no National Parks, Wildlife Sanctuaries, Tiger/Biosphere Reserves etc. within 10 Km of the site. Danti RF, Mirzapur RF, Patehra RF and Gorthara RF is situated within 10 Km from the project site.”

5. The EAC did not ask the project proponent to re-file the information in Form 1 and after considering the said facts found the site suggested in District Mirzapur as unsuitable for the development of the proposed project and accordingly deferred the consideration of the proposal with the direction to the project proponent to look for more acceptable alternative sites in the following terms:

“The proposed site may be in the flood plain of river or very close to it and has forests in the vicinity. The Committee also noted that the other sites identified were rejected by the project proponent itself. The Committee therefore, decided that the project proponent shall identify more alternative acceptable sites and accordingly deferred the proposal for re-consideration at a later stage.”

6. In the 24th meeting of re-constituted EAC (Thermal) held on 2nd May, 2011 the project proponent along with his consultant M/s J.M Environet Pvt. Ltd. gave a presentation and provided the following information as per the minutes of the meeting-
“The proposal is for setting up 2x660 MW Super Critical Coal based Thermal Power Project at villages Dadri Khurd, Mirzapur Sadar Taluk in UP. Land requirement will be 1100 acres, out

of which 798 acres is un-irrigated barren land and 77 acres is waste land. 875 acres land will be used for plant and 225 acres land will be used for railway and pipeline corridor..... The project proponent submitted that the Ganges River is about 22Kms from the proposed site and site is not in flood plain of the Ganges. The project proponent also submitted survey of India toposheet in confirmation of their submission. It was also informed that M/s Welspun Energy (U.P) Pvt. Ltd. had conducted pre-feasibility for availability and route of water pipeline from Upper Khajuri Dam till the proposed project site.....The project proponent informed that they have started collection of AAQ data since April and completed monitoring before onset of monsoon. The Committee decided the same can be used for preparation of EIA Report.”

7. The appellants submit that the location of the project possibly lying in the flood plain or close to it and in the vicinity of the forest- had prompted the EAC to seek alternative site for the project; but the EAC did not discuss the issue of forest land involved in the project and proceeded to prescribe detailed Terms of Reference even when the collection of baseline data was already started prior thereto- vide copy of the minutes of 24th meeting of EAC held on 2nd and 3rd May, 2011 annexure A-4 and TOR letter dated 15th June, 2011 annexure A-5.
8. Finding fault with this scoping project as aforesaid, the appellants further submit that a fresh Form-1 mentioning the

project location at District Mirzapur was submitted by the project proponent on 3rd December, 2011 annexure A-6 well after the grant of TOR and preparation of draft EIA report.

9. According to the appellants the public consultation process the main component of EIA process suffered from many lacunae:

A. Inadequate publicity of public hearing. No means other than publishing notice of the public hearing in Amar Ujala, Mirzapur and Hindustan Times, New Delhi were adopted by the authorities, which consequently lead to unawareness of public hearing among the local rural folk, thereby preventing real participation of the locals in the public consultation process.

B. Public hearing was conducted on 7th April, 2012 at Village Dadri Khurd, Tehsil Sadar, Mirzapur under influence of political leaders, police force and armed private individuals and the locals were denied entry to the public hearing premise.

C. Summary EIA and draft EIA were not made electronically available.

10. The appellants submit that the EAC recommended project for EC overlooking its own observations, siting guidelines and without considering the representations/responses of the affected people, namely Banaras Hindu University and site visit report dated 15th September, 2013. The appellants referred to the following siting criteria laid down by the respondent no.1-MoEF&CC:

- A. Availability of adequate uncultivable and unused land for erecting power plant structures;
- B. Vicinity to the railway line for laying railway siding for coal transportation;
- C. Suitability of land from topography, geological aspects;
- D. Environmentally suitable, absence of sensitive areas and major settlements.

11. The appellants further submitted that the EAC did not verify facts at ground level, particularly, the facts: that the major area of the project site is fertile prime agricultural land used for agriculture grazing purpose surrounded by reserved forest, and the railway line proposed to carry coal from 20 Km distance would pass through forest land requiring forest clearance under Forest (Conservation) Act, 1980. EIA report- Chapter III, Section 3.5.2.1 submitted by the project proponent reveals, the appellants pointed out, that the project is located in a valuable Kaimur sand stone reserve. The appellants submit that the EAC overlooked these facts. As regards the location at Mirzapur, the project proponent had advocated for its selection due to NCL coal reserves within 100 km and presented the EIA report on assumption that coal source was from Kaimur NCL mines. However, the EAC in its meeting held on 20th March, 2013 decided to go ahead with imported coal from Indonesia until domestic coal was available without giving thought to reconsideration of the location of the project. The appellants submitted that the EAC did not consider economic and

environmental impacts of transporting water from River Ganga to Upper Khajuri reservoir and then to the project site. The appellants added that the EAC had previously decided to send a sub-group comprising of C.R. Babu, Shri T.K. Dhar, Shri N.K. Verma and a representative of MoEF to carry out site inspection and yet without conducting the site inspection as previously decided it had dealt with Appraisal Process in a most casual manner.

12. The appellants submit that the EAC did not deal with the representation made by the affected people and blindly relied upon the statement of the project proponent claiming that the several critical issues and deficiencies in the EIA, suppression of the existence of forest land, non assumption of the water resources and human health raised by the affected persons particularly, the Banaras Hindu University were resolved in the meeting with the BHU.

13. The respondent no. 1-MoEF&CC filed brief affidavit dated 15th January, 2015 making a claim that the Environment Clearance in question was granted after following due procedure as laid down under EIA Notification, 2006 and amendments thereto with reference to the EAC meetings held on April 4th and 5th 2011 and May, 2nd and 3rd, 2011 for grant of Term of Reference-EACs consenting to use of baseline data collected from April, 2011 and to three EAC meetings held in March, November, 2013 and March, 2014 to highlight deliberations involved in the process of grant of Environment Clearance. The respondent

no.1- MoEF further explained that since a sub-group of EAC could not visit the site, the EAC delegated the said task to State Government officials of Irrigation Department and further extensively deliberated upon the issue of firm water availability for the project and the impact of water drawl by the project.

14. Despite service of notice to respondent no.2- State of Uttar Pradesh and respondent no.3-Uttar Pradesh Pollution Control Board choose not to file their replies. According to them they had very limited role in the entire process and therefore, no replies are necessary.

15. The respondent no.4-the project proponent filed a detailed reply, dated 24th December, 2014(page 272-546 Vol-I-A) with voluminous documents annexure R-1 to R-48. Respondent no. 4 admitted that the project proponent had filed Form-1 dated 31st December, 2010 annexure R-30 for grant of EC to the project proposed to be setting up at District Ghazipur. However, it contended that the project proponent has chosen to re-file the Form 1 dated 31st March, 2011 annexure R-2 changing the proposed project site to district Mirzapur on 31st March, 2011 and intimated all the Members and Member Secretary of the EAC regarding the change of proposed project site from District Ghazipur to District Mirzapur through an e-mail, along with pre-feasibility report annexure R-3 and the UP Power Corporation Limited as well as Ministry of Coal had granted approval to such changes vide letters dated 1st April, 2011- annexure R-4 and letter dated 24th August, 2011- annexure R-6

respectively. The respondent no. 4 further submitted that the EAC was informed by the project proponent in the 24th meeting held in May, 2011 that it has started collection of the AAQ data since April, 2011 in order to complete the monitoring before the onset of the monsoon and this was approved by the EAC. According to the respondent no.4 as per the MoEF guideline the project proponent was required to collect baseline data for one season except for the monsoon season and as such the collection of baseline data for the purpose and April, 2011 and June, 2011 was started and the MoEF was informed of the same and its use for formulating the EIA report vide letter dated 12th May, 2011.

16. The respondent no.4 further submitted that the project site is located well beyond the highest recorded flood level of River Ganga situated at a distance of 17 km from the project. According to the respondent no. 4 there has been no concealment of any material facts, particularly as regards the presence of reserved forests and wildlife; and this fact has been acknowledged by the District Forest Officer and MoEF vide letters dated 20th April, 2011- annexure R-11 and letter dated 11th October, 2013- annexure R-12 respectively. The respondent no. 4 made reference to the EIA report (annexure R-13) in that regard. Respondent no. 4 in its reply referred to the minutes of the 13th meeting dated 25th March, 2015 and 26th March, 2014 wherein the biodiversity and conservation plan prepared by the consultant of the project proponent was found

to be forwarded to the MoEF and to the Expert Member from Wildlife Institute of India, Dehradun and approved by the MoEF thereafter as well as by the Chief Conservator of Forest (Wildlife). The respondent no. 4 further submitted that the MoEF has duly taken into account the impact on the water resources and approved the project after all the concerns were satisfactorily replied by all the senior officials of the Government of UP as recorded in the minutes of the EAC dated 26th March, 2014. The respondent no. 4 further submitted that the EIA report reveals the efforts and arrangements made to recycle the waste water to attain zero discharge and in inescapable scenario to discharge the quantity of waste water in the nearest drain after meeting the CPCB standards; and as such there will be no significant impact on the surface water quality and discharges shall be curbed to the maximum extent. The respondent no. 4 submits that due care has been taken for dust emission and commercial use of the fly ash generated by the Thermal Power Plant. According to respondent no. 4 the public consultation process was duly conducted as per EIA Notification, 2006; and the public hearing was conducted in the presence of Additional District Magistrate, Regional Officer of the UPPCB, Deputy Superintendent of Police, SDM District Sadar and other top police and administrative officers of District Mirzapur and the proceedings were videographed and the minutes were recorded annexure R-24 and R-25.

17. As regards the concerns raised by the Banaras Hindu University and Vindhya Bachao Manch, the respondent no. 4 submitted that the meeting was held with the BHU on 8th October, 2014 and 10th October, 2014 wherein after deliberations the respondent no. 4 gave its commitment to the installation of the ESP's with 99.9% efficiency, to the compliance with conditions of CWC ash utilization plan etc. and has adequately dealt with it by settling the issue. The respondent no. 4 further submitted that it had submitted a detailed point wise clarification to the points raised in the site inspection report by the Vindhya Bachao Manch on 6th February, 2014. Respondent no. 4 further submitted that the proposed Thermal Power Plant would be a boost to sustainable development in the power deficit State of UP and would generate both electricity and employment to improve the socio-economic standards of the locals in the District of Mirzapur. Generally the respondent no.4 controverted the case of the appellants regarding violations of the EIA Notification and suppression/misrepresentation of the material facts with reference to the proceedings in the Appeal and solicited dismissal of the present Appeal.

18. Rival pleadings warrant answers to the following question:

1. Whether the proposal moved for grant of Environment Clearance by the respondent no.4- M/s Welspun Energy (U.P) Pvt. Ltd to the proposed thermal power project in

question was duly appraised and considered by the concerned authorities.

19. We have heard the parties at length and considered the record of the case including the written submissions tendered by the appellants dated 11th April, 2016 and the respondent no. 4 dated 8th April, 2016. State players in the contest, namely, MoEF and Uttar Pradesh Pollution Control Board played supplementary role in support of their roles played in the present case.

20. It is true that there is ever growing demand for the power/electricity for the development and to meet this demand the UP Power Corporation Ltd. entered into a power purchase agreement with respondent no.4- M/s Welspun Energy (U.P) Pvt. Ltd. However, any decision over the issue involving environmental concerns needs to be taken as warranted by the Section 20 of the National Green Tribunal Act, 2010. Principles of Sustainable Development, Precautionary Principle and Polluter's Pay Principle are guiding stars in a journey towards such decision as rightly pointed out in M.C. Mehta's Case [(2004) 12 SCC 118: M.C. Mehta vs. Union of India and Ors.] referred to by the respondent no. 4- M/s Welspun Energy (U.P) Pvt. Ltd. The development has to be a sustainable one for ensuring intergenerational equity. The respondent no. 4- M/s Welspun Energy (U.P) Pvt. Ltd has quoted only a part of the para 48 of the Judgment delivered by the Hon'ble Apex Court in M.C. Mehta's Case (Supra) to highlight its submissions. For

making complete sense of what the Hon'ble Apex Court has to say. One needs to read the entire para. We, therefore, reproduce the entire para 48 herein below for ready reference:

48. Development and the protection of environment are not enemies. If without degrading the environment or minimising adverse effects thereupon by applying stringent safeguards, it is possible to carry on development activity applying the principles of sustainable development, in that eventuality, development has to go on because one cannot lose sight of the need for development of industries, irrigation resources and power projects etc. including the need to improve employment opportunities and the generation of revenue. A balance has to be struck. We may note that to stall fast the depletion of forest, a series of orders have been passed by this Court in T.N. Godavarman case regulating the felling of trees in all the forests in the country. Principle 15 of the Rio Conference of 1992 relating to the applicability of precautionary principle, which stipulates that where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation, is also required to be kept in view. In such matters, many a times, the option to be adopted is not very easy or in a straitjacket. If an activity is allowed to go ahead, there may be irreparable damage to the environment and if it is stopped, there may be irreparable damage to economic interest. In case of doubt, however, protection of Precautionary principle requires anticipatory action to be taken to prevent harm. The harm can be prevented even on a reasonable suspicion. It is not always necessary that there should be direct evidence of harm to the environment.

21. A great caution has, therefore, to be exercised before any developmental activity is allowed to go ahead in order to ensure protection of the environment, which in the words of the Hon'ble Apex Court seeks precedence over economic interest. While concluding the submissions, Learned Counsel appearing

on behalf of the respondent no.4- M/s Welspun Energy (U.P) Pvt. Ltd, fairly made a submission that the project proponent is also open and willing to comply with any additional safeguards in addition to the safeguards stipulated under the EC. We have, therefore, have to cautiously tread our course and reach a balanced decision in the present case.

22. Having realised the need to take such measures necessary for the purpose of preventing and improving the quality of environment and protecting, controlling and abating environmental pollution, the Central Government in exercise of its power under Section 3 of the Environment (Protection) Act, 1986 read with clause d sub-section 3 Rule 5 of the Environment (Protection) Rules, 1986 devised an elaborate mechanism/ procedure to grant prior EC to the projects or the activities as per the EC Regulations, 2006. Environment Clearance Regulations, 2006 categorized the projects and activities into Category A and Category B based on the spatial extent of potential impacts and potential impacts on human health, natural and manmade resources. Admittedly, the project in question is a Category A project and EC Regulations, 2006 envisage in the process of grant of EC therefor the following material stages:

1. Scoping,
2. Public Consultation,
3. Appraisal and
4. Decision for acceptance or rejection of the proposal.

23. In the stage of scoping the Expert appraisal Committee determines detailed and comprehensive Terms of Reference (ToR), addressing all relevant environmental concerns for the preparation of an Environmental Impact Assessment (EIA) report in respect of the project for which prior EC is sought on the basis of information furnished in the prescribed application Form-I/I-A including Terms of Reference proposed by the applicant, outcome of site visit if considered necessary and other information that may be available with the Expert Appraisal Committee. The Terms of Reference so determined are required to be conveyed to the appellants/project proponent by Expert Appraisal Committee within 60 days of the receipt of Form-I. Pertinently, the EAC at this stage itself is conferred with the discretion to recommend to the regulatory authority the rejection of the application for environment clearance and the regulatory authority i.e. MoEF has a discretion to accept such recommendation of the EAC or to reject the application for prior EC. This mechanism build in the EC, Regulations, 2006 emphasises the importance of this stage of scoping, particularly of Form-I therein, which lays the foundation of the Environmental Impact Assessment of the proposed project for its objective appraisal that follows.

24. Next in the chain of the process of evaluation of the potential impacts of the project on environment is the stage of public consultation, a process by which the concerns of the locally affected persons and others, who have plausible stake in the

environmental impact of the project are ascertained. The public Consultation has two components 1) Public hearing and 2) obtaining responses in writing from other concerned persons having a plausible stake in the environmental aspects of the project. Appendix IV to the EC Regulations, 2006 prescribes the manner in which its one of the components- a public hearing has to be carried out. At the outset Appendix IV to the EC Regulations, 2006 prescribes that the public hearing shall be arranged in a systematic, time bound and transparent manner ensuring widest public participation at the project site(s) or in its close proximity district wise, by the concerned State Pollution Control Board. Needless to reiterate that the public hearing is carried out for ascertaining concerns of locally affected persons. Response in writing from other concerned persons having a plausible stake in environment or activity are also required to be obtained as a part of another component of public consultation and as such responses are invited by placing on the website of the concerned State Pollution Control Board, the summary of EAC report prepared in the format given in Appendix III-A by the applicant along with a copy of the application in the prescribed form. After completion of the public consultation the appellants is under obligation to address all the material environmental concerns expressed during this process, and make appropriate changes in the draft EIA and EMP, and prepare a final EIA report and submit it to the concerned regulatory authority for appraisal.

25. Following the public consultation the Expert Appraisal Committee is required to carry out appraisal of the proposal for grant of environment clearance before it categorically recommends to the regulatory authority concerned either the grant or rejection of the application for environment clearance. Appraisal involves detailed scrutiny by the Expert Appraisal Committee of the application and other documents, like the final EIA report, outcome of public consultations including public hearing proceedings in a transparent manner in a proceeding to which the applicant is invited for furnishing necessary clarification in person or through authorized representative. Thus, a conspectus of things previous to the appraisal is taken by the Expert Appraisal Committee for the purpose of objective evaluation of merits of the proposal for grant of EC and the recommendations are made thereupon.

26. The regulatory authority, para 8(ii) of the EC Regulations, 2006 stipulates, shall normally accept the recommendations of the Expert Appraisal Committee; and in case where it disagrees with the recommendations of Expert Appraisal Committee, it shall request reconsideration by the Expert Appraisal Committee while giving the reasons for the disagreement within 45 days of the receipt of the recommendations from the Expert Appraisal Committee. The Expert Appraisal Committee in turn has to consider the observations of the regulatory authority and furnish its view on the same within a further period of 60 days and the decision taken by the regulatory authority after

considering the view of Expert Appraisal Committee is regarded as final. This shows an amount of discretion that is also vested with the regulatory authority-in the present case MoEF and the regulatory authority is expected to exercise such discretion in reasonable manner. Para 8 (vi) of the EC Regulations, 2006 voices the sanctity of information or data material to screening or scoping or appraisal or decision on the application in following terms:

“Deliberate concealment and or submission of false or misleading information or data which is material to screening or scoping or appraisal or decision on the application shall make the application liable for rejection, and cancellation or prior environment clearance granted on that basis”.

The reason for such information or data to be sacrosanct is evident from the entire mechanism which is so interconnected that one false or misleading information and/or its deliberate concealment data in the process necessarily has cascading effect on rest that follows.

27. Keeping this process in mind we have to examine the submissions made by the rival parties. The environment clearance dated 21st August, 2014 makes reference to the letters dated 31st December, 2010, 12th May, 2011, 29th June, 2012, 14th January, 2013, 11th February, 2013, 6th February, 2014, 21st February, 2014 and 6th May, 2014 vide copy of the EC at annexure A-1 to the application. Communication dated

31st December, 2010 is a Form-I submitted by the respondent no.4- project proponent seeking prior EC for setting up the thermal power plant in question at Hazipur- Katya, Pahai Goura and Katya, Teshil Jakhnia and Saidpur, District Ghazipur, UP under the hand of Mr. Abhinav Mayank authorized signatory for project proponent. This fact is not disputed, however, respondent no.4- submitted that the project proponent had duly filed the Form-I for the proposed project site to be located at District Mirzapur on 31st March, 2011 and had also intimated all the Members and the Member Secretary of Expert Appraisal Committee regarding the change of the project site from District Ghazipur to District Mirzapur through an email along with the pre-feasibility report on 31st March, 2011 as per annexure R-2 and R-3 to the reply. Reading of annexure R-3 to the reply reveals that it is a copy of email send by Suranjan Sarkar on behalf of the respondent no.4- M/s Welspun Energy (U.P) Pvt. Ltd. enclosed therewith soft copy of the duly filed Form-I and PFR in respect of 2x660 MW Thermal Power Project in UP to various addresses. According to respondent no. 4 there is mere denial of the email dated 31st March, 2011 by the appellants without there being any basis whatsoever. The respondent no.4 to buttress its contentions referred to the reply filed by the MoEF which makes reference to the proposal for District Mirzapur being considered by the EAC in its 22nd and 24th meeting held on April 4th and 5th, 2011 (erroneously referred to as 4-5) and May 2-5, 2011 for grant of

ToR and to the minutes of the EAC meeting dated May 4th and 5th, 2011 at annexure A-4 (page 80).

28. The respondent no.4 also made reference to disclosure made by Dr. M. Ramesh, Scientist 'D' from MoEF before the Tribunal on 5th April, 2016 in support of the fact that the project was assessed on basis of Form-I dated 31st March, 2011 and the acknowledgment of Mr. C.R. Babu of having acknowledged the consideration of the project on the basis of Form-I dated 31st March, 2011 sent by E-mail. Dr. M. Ramesh, Scientist 'D' produced a file containing Note sheets from pages 1 to 11- authenticated copies of which find place on our record at vol-II (documents). We have perused the Note sheet pages 1 to 11. At page 11 a reference is found made to the communication received from respondent no.4 in respect of the present appeal and passing on the information that the appellants could not access revised Form-I from MoEF record and the respondent no.4-company having already submitted revised Form-I and circulated it amongst all EAC Members and Member Secretary through E-mail dated 31st March, 2011. Dr. M. Ramesh appeared to have made endorsement on the said Note sheet for checking the records for the same and nothing more. However, our scrutiny has not revealed any reference to revised Form-I dated 31st March, 2011 in the said Note sheet except one on page 11 as disclosed herein above and placing of the proposal of respondent no.4 for setting up of thermal power plant at Village Dadri Khurd, Teshil Mirzapur, Uttar Pradesh in 24th meeting of

EAC held on May 2nd and 3rd, 2011 for determination of ToRs at page 2 of the said Note sheet dated 10th June, 2011.

29. Material portion of the minutes of EAC meeting dated May 4th and 5th, 2011 at annexure A-4 (page80) reads as under:

“2.10 2x660 MW Super Critical Coals Based Thermal Power Plant of M/s Welspun Energy UP Private Ltd. at villages Dadri Khurd, in Mirzapur Sadar Taluk, in Mirzapur Distt. in Uttar Pradesh- reg. TOR.

“The proposal was earlier placed for consideration in the 22nd meeting held during April 4-5, 2011 wherein the Committee noted that the proposed site may be in the flood plain of river or very close to it and has forests in the vicinity. The Committee also noted that the other sites identified were rejected by the project proponent itself. The Committee therefore decided that the project proponent shall identify more alternative acceptable sites and accordingly deferred the proposal for re-consideration at a later stage.

The proposal was again placed for re-consideration for determination of terms of reference for undertaking EIA/EMP study as per the provisions of EIA Notification, 2006. The project proponent along with its consultant M/s J.M Environet Pvt. Ltd. gave a presentation and provided the following information:

The proposal is for setting up of 2x660 MW Super Critical Coal Based Thermal Power Plant at Villages Dadri Khurd, in Mirzapur Sadar Taluk, in Mirzapur Distt. in Uttar Pradesh. Land requirement will be 1100 acres, out of which 798 acres is unirrigated barren land and 77 acres is waste land. 875 acres land will be used for plant and 225 acres land will be used for railway and pipeline corridor. The co-ordinates of the plant site are at Latitude 24°58'51.2"N to 25°00'5.43"N and Longitude 82°39'34.1"E to 82°40'52.71"E. Coal requirements will be 6.4 MTPA. Coal will be obtained from domestic coal block through SECL/NCL/CCL mines. Area requirement for ash/pond dyke will be 225 acres including green belt. Water requirement will be 45 MCM/annum, which will be sourced from the Upper Khajuri Dam and Ganga River through a pipeline about a distance of 4km and 17 km respectively from project site. There are no National parks, Wildlife sanctuaries, Tiger/Biosphere reserves etc. within 10 km of the site. Danti RF, Mirzapur RF, Patehra RF and Gorthara RF are situated within 10 km from the project site.

The project proponent submitted that Ganges River is about 22 Kms from the proposed site and site is not in the flood plain of the Ganges. The project proponent also submitted Survey of India toposheet in confirmation to their submission. It was also informed that M/s WAPCOS has conducted pre-feasibility for availability and route of water pipeline from Upper Khajuri Dam till the proposed project site.

The Committee noted that details of water availability need to be extensively examined and a detailed source of water sustainability study shall be submitted.

The project proponent informed that they have started collection of AAQ data since April and complete monitoring before onset of monsoon. The Committee decided that the same can be used for preparation of EIA report.

Based on the information provided and presentation made, the Committee prescribed the following specific ToRs for undertaking detailed study and preparation of EMP.....”

30. Nowhere in the minutes of the 22nd and 24th EAC meeting held on April 4th and 5th, 2011 and May 2nd and 3rd, 2011 respectively we find reference to revised Form-I dated 31st March, 2011 except the fact that it referred to thermal power project at Village Dadri Khurd, Teshil Mirzapur, Uttar Pradesh.
31. In the sur-rejoinder filed by the respondent no.4 (page 2070) the respondent no.4 submitted that in addition to E-mail sent by the project proponent to the EAC and revised Form-I was submitted to the MoEF by hand on 31st March, 2011 which was duly signed by Mr. Ravikant Verma, General Manager, Corporate Affairs with proper verifications; and letter of MoEF had informed that the revised Form-I by hand on 31st March, 2011 was misplaced and as such MoEF made a request to the project proponent to provide a copy of the revised Form-I and as such the revised Form-I was submitted by hand to the MoEF on

3rd December, 2011. A copy of the Board resolution dated 25th March, 2011 authorizing Mr. Ravikant Verma to sign Form-I is annexed to sur-rejoinder at annexure R-48 a copy of the Basic Information Form signed by the authorized signatory Mr. Ravikant Verma dated 31st March, 2011 is also produced along with sur-rejoinder at annexure R-49.

32. The appellants specifically contends in the backdrop of the aforesaid facts as disclosed that the determination of ToR was done on the basis of a basic information- a concise document circulated for the convenience of EAC and not Form-I dated 31st March, 2011. Learned Counsel appearing on behalf of the appellants compared the data furnished through basic information document annexure R-49 (Page 2092), copy of the Form-I dated 31st March, 2011 at page no. 2362 and fresh Form-I dated 3rd December, 2011 submitted after grant of ToR dated 15th June, 2011 (Page 86) and pointed the following discrepancies.

<i>Basic Information</i>	<i>Form-I along with pre-feasibility report</i>	<i>Fresh Form-I</i>
<i>Land Requirement- 1100 acres, out of total land 798 acres is unirrigated barren land, 77 acres is waste land, 875 acres for plant and 225 acres is for railway and pipeline corridor.</i>	<i>Total area of land is 850 acres. Government land: 9.88%, private land 90.12% unirrigated land 93.88%, barren land 5.25% water bodies 0.87%.</i>	<i>Land 875 acres, Government land 11.1% private land 88.9%, single cropped agricultural land 1.78% barren land 97.50%, water bodies 0.62% human settlement 0.02%.</i>

33. Learned Counsel appearing on behalf of the appellants further pointed out that the signatures of the authorised signatory in all the documents, namely, Form-I dated 31st March, 2011 (page 383), Basic Information (page 2094) and Form-I dated

31st December, 2011(page112) vary and lacks proper verification as per EIA amendment dated 1st December, 2009. Learned Counsel appearing on behalf of the respondent no.4 submitted in counter that there is no bar on the EAC to consider the basic information form as the source of information and the project proponent stands by the information submitted in the Form-I dated 31st March, 2011 sent vide e-mail to the EAC Members and as submitted during the course of the arguments as the true facts available to it at the relevant times, and the verification is merely a procedural defect which can be cured and cannot be held fatal to the credibility of the Form-I. In support of his submission Learned Counsel appearing on behalf of respondent no.4 quoted the observations made by the Hon'ble Apex Court as follows:

Kiran Shankar Kathore V Arun Dattaray Sawant (2014) 14 SCC 162

Para34. "... The Court, however upheld the view of the High Court holding that on perusal of the affidavit, there was substantial compliance with the prescribed format. Even when some defect was found in the verification of the election petition, it was held that the said defect is also curable and cannot be held fatal to the maintainability of the Election Petition. In the present case we are concerned with the affidavit which a candidate seeking election is required to file along with his nomination form. At the same time, we proceed on the basis that if there is a substantial compliance with the requirements contained in the said affidavits, in the sense that there is a disclosure of required particulars including assets/liabilities it can be treated as adequate compliance with the provisions of the Act, Rules and Orders."

Shaikh Sail Haji Abdul Khayumsab V Kumar and others (2006) 1 SCC 46

Para 10. "All the rules of procedure are handmaid of justice. The language employed by the draftman of

processual law may be liberal or stringent, but the fact remains that the object of prescribing procedure is to advance the cause of justice.”

Para 13: “... A procedural law should not ordinarily be constructed as mandatory, the procedural law is always subservient to and is in aid to justice. Any interpretation which eludes or frustrates the recipient of justice is not to be followed.”

Para 14: “Processual law is not a tyrant but a servant, not an obstruction but an aid to justice. Procedural prescriptions are the handmaid and not the mistress, a lubricant, not a resistant in the administration of justice.”

Learned Counsel appearing on behalf of the respondent no.4 added that the Form-I is initiation of the entire process and acts as a guide and cannot bind the EAC. In support he quoted from the Judgment delivered in R. Vermani’s case (R. Veeramani vs. Secretary, Public Works Department and Ors.: Appeal No. 31 of 2012) by the Southern Zone Bench of Tribunal as follows:

Para 56: “....The application is merely an expression of the desire of the proponent to commence a particular project and Form IA is intended for the mentioning of the safeguards necessary for the said new project. Thus the application is only initiation of the entire process. It can only be a guide; but it is neither conclusive nor decisive on the project and cannot control the EC. The contents in Form I can only be one of the guiding factors, but they cannot bind either of the committees, Appraisal or Assessment. The Appraisal Committee is an independent body consisting of experts from different fields and equally, the Assessment Committee. They have to consider all available materials before taking a decision to grant or reject the request. They have to make an independent study and decide the necessary parameters and safeguards for a given project.

Thus the EC is wisdom driven of the Members of the Committees and no doubt, it is not driven by the data and particulars furnished by the proponent in the forms alone. The authority cannot base their decision on the application alone or the contents of the Form. After the application is made along with the safeguards stated by the proponent in Form I and Form IA, the Appraisal Authority at the time of appraisal, can add number of safeguards for the project...”

34. If one looks at para 7(i) stage II of the EC Regulations, 2006 dealing with the process of scoping it is not difficult to find that all the information furnished in the prescribed application Form-I, forms the basis of detailed and comprehensive Terms of Reference addressing all relevant environmental concerns for the preparation of Environmental Impact Assessment Report in respect of the project for which prior EC is sought in as much as potential impacts of the project are assessed with reference to the information revealed in Form-I. Though, there is no bar on the EAC to consider basic information as a source of information, the EAC has to consider details of the activity in relation to:

- (i) Construction, operation or decommissioning of the project, involving actions, which will cause physical changes in the locality (topography, land use, changes in water bodies).
- (ii) Use of natural resources for construction or operation of the project (such as land, water, materials or energy, especially any resources which are non-renewable or in short supply)
- (iii) Use, storage, transportation, handling or production of substances or materials, which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health.
- (iv) Production of solid wastes during construction or operation or de-commissioning.

- (v) Release of pollutants or any hazardous, toxic or noxious substances to air.
- (vi) Generation of Noise and Vibration, and Emissions of Light and Heat.
- (vii) Risks of contamination of land or water from releases of pollutants into the ground or into sewers, surface waters, ground water, coastal waters or the sea.
- (viii) Risk of accidents during construction or operation of the project, which could affect human health or the environment.
- (ix) Factors which should be considered (such as consequential development) which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality.
- (x) Environmental sensitivity.

Furnished in Form-I

Before detailed and comprehensive Terms of Reference addressing all relevant Environmental concerns for the preparation of Environmental Impact Assessment Report are determined, it is worthwhile to note, the EAC is expected to be pro-active in as much as to look for other information as to would be available, and secondly it has discretion to reject the application at the stage of scoping upon the total view of the material before it and in that context observations made by the Southern Zone Bench of this Tribunal in R. Veeramani's Case

regarding the role of the EAC and its authority to vet the information furnished and be bound by it are misplaced as regards the present case. However, in view of the discrepancies pointed out in basic information, Form-I and fresh Form- I furnished by the respondent no.4 as pointed earlier, legitimate questions as regards the objective consideration of the information furnished to the EAC for determining the detailed and comprehensive ToRs arise,. In our view all the information furnished and considered by the EAC for the determination of ToR is a raw material for the Terms of Reference determined from which the draft EIA report takes shape- a material step for further stages of public consultations, appraisal, recommendations of EAC and ultimately for grant of EC.

35. Learned Counsel appearing for the appellants submitted that the EIA Notification, 2006 makes it mandatory that all the projects which requires EC need to undergo the scoping process and the appraisal not done on the basis of proper scoping process on the basis of Form-I is a substantial non-compliance. He invited our attention to the observations made by this Tribunal at para 120 of the Judgment delivered in S.P. Muthuraman's case (O.A. No. 37 of 2015): S.P. Muthuraman vs. Union of India & Ors.0 Judgment dated 7th July, 2015 reported in Manu/GT/0016/2015 "that the provisions of this enactments are substantive and mandatory.....if compliance is not made to the provisions of this enactments it will totally frustrate the Polluters Pay Principle and thus Polluters Pay

Principle adversely affect the environment, protection of which is the sole objective of the Act of 1986.....” Thus, we have no hesitation in holding that the provisions of Notification 2006 are mandatory and procedural simplicitor”. We do subscribe to this view in relation to the present case for the simple reason that even the smallest lapse in furnishing the information or data material to screening or scoping or appraisal or decision on the application would leave lasting effects possibly adverse impacts on the environment or sustainable development, if information or data is misleading.

36. Nature of the land involved in the project and its expanse are material aspects in determination of adverse impacts of any project on the environment which going by its definition at Section 2(a) of Environment (Protection) Act, 1986 includes water, air and land and the inter-relationship which exists among and between water, air and land, and human beings and other living creatures, plants micro-organism and property. According to the appellants from the stage of scoping to the final stage of appraisal the project proponent projected a misleading picture about the nature and expanse of the land involved as follows:

- (i) Form I dated 3.12.2011- In response to query at sl. 2.1- **Barren land 97.58 %** (pg 99)
- (ii) Final EIA report- (1) sl no. 9 Present land use at the site- **“mostly barren”** pg 565
(2) para 2.4.1- Factors considered for site selection- **“Availability of adequate uncultivable and unused land for erecting power plant structures”**(pg 579)
- (iii) Letter dated 12.07.2011- Reasons given to Ministry of Coal for change of site from Dist. Gazipur to District Mirzapur

which states **“barren and single crop land”** and **“No forest land involved”**(pg 412)

He further pointed out that use of such wrong terms on which the impugned EC is based found its expression in the EC dated 21st August, 2014 in the following terms “land required will be 875 acres, out of which 15.63 acres will be single cropped agricultural land; 859.37 acres will be barren land”. In support of its contentions that it is not a barren land the applicant invited our attention to the following:

- (i) Study report of project site under taken by WAPCOS.
- (ii) Revenue records of project site in village Dadri Khurd, Teshil Mirzapur, Uttar Pradesh.
- (iii) Additional affidavit filed by the appellants on 5th April, 2016
- (iv) Photographs of irrigation structures check dams, grazing and agricultural lands.

Para 3.1 of Area Drainage Study Report of the project site undertaken by WAPCOS for the project in question reveals that from the observations made by the WAPCOS team upon the site visit and from Study of survey data of plant area, the team observed that most of the plant area was found covered with trees/vegetation and grass; and though no agricultural activity was noticed on entire plant area, the team found that most of the land was being used for grazing and tree plantations and thus dense forest was noticed at South-eastern part of the plant area at higher elevation of about 220 to 233m. Revenue records

of the project site produced by the appellants during hearing on 2th April, 2016 describe the land as 'Parti Bhumi' i.e. fallow land and not a barren land. Additional affidavit of the appellants dated 5th April, 2016 placed before us the relevant extracts from National Resource Census Project Report 2004-2005 of Indian Space Research Organization and Wasteland Atlas of India titled "Control Sheet". Definition of fallow land as found in the National Resource Census Project Report is as under:

Fallow land: These are the lands, which are taken up for cultivation but are temporarily allowed to rest, un-cropped for one or more seasons, but not less than one year"

Barren land from its very description conveys a meaning that it is unfertile not supportive of any vegetation. Definition of barren land in "Wasteland Atlas of India" describes it as: The rock exposures of varying lithology often barren and devoid of soil and vegetation cover. Thus absence of any vegetation is hallmark of a barren land. Description of the land for the project as a 'barren land' is therefore, a misleading description.

37. Learned Counsel appearing on behalf of the appellants further invited our attention to IL&FS Technical EIA Guidelines Manual for thermal power plant- August, 2010 prepared for the MoEF, Government of India. Purpose of developing such sector specific technical guideline manual is to provide clear information on EIA to all the stakeholders. It gives guidelines

for site selection of coal based thermal power station and general siting factors (page 2748 to 2749). At the outset it exhorts the stakeholders to recognise that no forest land shall be used for non-forest activity and no prime agricultural land shall be converted into industrial site. As regards the site selection for thermal power station, it makes reference to the Guidelines of Central Electricity Authority, Government of India for site selection of coal based thermal power station which advice the selection of site near to coal source, accessibility by road and rail. These guidelines spells out the priorities for site selection as follows:

First priority is given to the sites those are free from forest, habitation and irrigated/agricultural land. Second priority is given to those sites that are barren, i.e. wasteland, intermixed with any other land type, which amounts to 20% of the total land identified for the purpose.

38. Guidelines for site selection of coal thermal power station set by MoEF are made available in the said manual as under:

- *Locations of thermal power stations are avoided within 25km of the outer periphery of the following:
 - metropolitan cities;
 - National park and wildlife sanctuaries;
 - Ecologically sensitive areas like tropical forest, biosphere reserve, important lake and coastal areas rich in coral formation;*
- *The sites should be chosen in such a way that chimneys of the power plants do not fall within the approach funnel of the runway of the nearest airport;*
- *Those sites should be chosen which are at least 500m away from the flood plain of river system;*
- *Location of the sites are avoided in the vicinity (say 10km) of places of archaeological, historical, cultural/religious/tourist importance and defense installations;*
- *Forest or prime agriculture lands are avoided for setting up of thermal power houses or ash disposal.*

39. In this backdrop the contentions raised by the appellants that there was deliberate concealment of forest land by the appellants in the present case gains significance. Learned Counsel appearing on behalf of the appellants submitted that the project proponent concealed the presence of forest within the plant boundary in Form-I dated 3rd December, 2011 as well as in the EIA Report (Page 621) with the statement that there is no forest land within plant boundary.

40. Perusal of the Form -1 dated 03-12-2011 (page no. 93) reveals clear statement of the fact at entry in serial no. 21-23 of the Form-1 that no forest land is involved and as such, the proposal does not call for clearances under the Forest Conservation Act, 1980. Perusal of the EIA Report (page no. 621) also reveals a categorical assertion that no forest land is within the plant boundary. It is pointed out by the Appellants from the Form-1 that the project envisages approach road connecting SH-5, 15.5 kms distance railway line from Sarsogram railway station and 17 kms of pipeline (31kms as per the EIA Report page no. 601) to fetch water from River Ganga and all this passes through the Reserve Forest.

41. To highlight this fact the Appellants drew our attention to the table no. 3.18 in the EIA Report (page no. 668) which is reproduced herein below:

S. No.	Name of R. F.	Distance from Project boundary	Direction from Project Boundary
1	Danti RF	Adjacent to the project site	N
2	Barkachha RF	8.5 km	NW
3	Mirzapur RF	Adjacen	S
4	Sarson RF	5.5km	SE
5	Malua RF	8.5km	SW

6	Karaunda RF	5km	SW
7	Patehra RF	5km	SW
8	Bahuti RF	6.5 km	W
9	Newaria RF	10 km	SW
10	Nanutu RF	7 km	E
11	Golhanpur RF	6.5 km	E

42. It is very clear from the aforesaid table that project site is surrounded by reserved forest from all sides. The Appellants also invited our attention to the photographs at page no. 159-159A of the actual site to point out that the SH-5 passes through the reserved forest area as could be noticed from the signboard of forest department (“this road belong to Forest Department Regional Forest Officer Madihan DFO, Mirzapur, Forest Division”).

43. The project Proponent relied upon the site visit reports dated 01-08-2008 and 19-11-2012 to contend that the area where the power plant is proposed is not a notified reserved forest/protected forest and/or forest like area. As against this the Appellants have relied upon the area drainage study report of the project site undertaken by WAPCOS. Photographs (page no. 159-159A), satellite imagery- particularly National land use and land cover mapping using multi-temporal AWiFS data available at Bhuvan website.

44. It is noticed that the WAPCOS team upon visit to the project site (30-09-2011) at Dadri Khurd Village found dense vegetation/forest at Southern-Eastern part of the plant area (page 165). It is also correct that Land Use/Land Cover (LULC) map of District Mirzapur (page no. 2990-2992) shows project area mostly occupied by deciduous forest and part of it by

agriculture, plantation. On the other hand, the Project Proponent relies upon the judgments delivered in Application No. 19(T_{HC})/2013 dated 08-08-2014 titled as Nisraga Vs. Assistant Conservator of Forests as well as in New Okhla Bird Sanctuary case [(2011) 1 SCC 744: in In Re construction of park at Noida near Okhla Bird Sanctuary]. The Hon'ble Apex Court in In Re-construction of park at Noida near Okhla Bird Sanctuary case observed as follows:

“In support of the applicant’s case that there used to be a forest at the project site he relies upon the report of the CCF based on site inspection and the Google Image and most heavily on the FSI Report based on satellite imagery and analyzed by GSI application. A satellite image may not always reveal the complete story. Let us for a moment come down from the satellite to the earth and see what picture emerges from the government records and how things appear on the ground. In the revenue records, none of the khasras (plots) falling in the project areas was ever show as jungle or forest..”

Moreover, the Appellants admit in their affidavit dated 05-04-2016 (page no. 2974) that satellite image per se cannot be relied upon as 100% accurate evidence for forest area. However, it proceeds further to state that the time when the said judgments were passed Google Earth Imagery was most common and Bhuvan Application Services were not developed; and Bhuvan Satellite imagery is based on advance technologies like Multi-temporal(satellite images collected repeatedly over a long time for a year or more), multi-layered(superimposing images from different satellites and sensors) and multi-spectral (involving different radiations other than IR radiation), which when collaborated with ground data gives fairly accurate information

about the present land use and land cover. Even accepting this statement to be correct its collaboration with the ground data is indispensable for giving fairly accurate information. Ground data collection is, therefore, a key to answer the question whether the land was a forest or forest like area.

45. We have therefore to see what site inspection reports have procured for the benefit of decision making. Site visit report dated 01-08-2008 makes a reference to the piece of land in Village Kushiyara and Sangra as having been identified in Thesil Lalganj, Haliya, District Mirzapur and having being identified as a forest like area having specified number of trees mentioned therein. It does not say anything about Village Dadri Khurd. Site Inspection Report dated 19-11-2012 (page no. 508) reveals that the inspection of the project site was purportedly carried out by team of Forest Officials, Scientist from MoEF, Project Proponent, Villagers from Mirzapur and Sh. Balram Singh, President, Van Upvan Conservation of Nature Environment Society. The team after going through the reports of the DFO Mirzapur dated 16-08-2013 and 13-09-2013 as well as revenue records of Village Dadri Khurd drew conclusions as follows:

- 1. Thus from the records available the proposed Welspum Thermal Power Plant site plan included no notified reserved forest/protected forest and forest like area recognized in Mirzapur district in compliance of Hon'ble Supreme Court order.*
- 2. The two Gatas 180 and 216 jha with an area of 1.5 ha included in proposed site plan of Welspum Thermal Power Plant is revenue recorded Jhari (forest). The ownership belongs to UP Govt. and it is in process of transfer to the*

company. If this is used for non-forestry purpose, it requires approval of Central Govt. under Forest (Conservation) Act.

46. Poking holes in this report, the Appellants pointed out that the report is signed only by two officials namely: Dy. Conservator of Forest (Central) and Chief Conservator of Forest (Central) almost a year after and not by all the members of the team.

47. It is further pointed out that Mr. S. N. Mishra, DFO, Mirzapur Forest Division who was the member of the site inspection team addressed a letter dated 16-08-2013 (page no.2051) to the Chief Conservator of Forest(Central) , MoEF making a statement that the project site has 50% of forest like area (page no. 2052). However, there is also a communication dated 13-09-2013 written by the same DFO Mirzapur to the CCF Central, MoEF with reference to list of forest like area prepared by District Level Committee mentioning that no land from the project area has been identified as forest like area. Pertinently, we do not find any collection of ground data in relation to forest density in the area inspected by site inspection team. This leaves us in wilderness of assumptions and presumptions with no categorical answer as to the nature of the area based on ground data collections.

48. Undoubtedly, the approach road, rail line and water line have to pass through forest lands, and these being material components of the project, the Project Proponent ought to have revealed the involvement of the forest land, in Form-1 filed for the purposes of getting EC Paragraph 8 (v) of the EC Regulation, 2006 stipulates that clearances from other regulatory bodies or

authorities shall not be required prior to receipt of applications for prior environmental clearance of project or activities, or screening, scoping and appraisal or decision by regulatory authority concerned, unless any of these is sequentially dependent on such clearance either due to requirement of law, or for necessary technical reasons.

49. Office Memorandum dated 09-09-2011 issued by MoEF stipulates that EC is issued only after stage -1 forest clearance has been submitted by Project Proponent and if same is not submitted within time limit prescribed under the said Office Memorandum proposal of the EC would stand rejected and the entire process of obtaining EC will have to be initiated *de novo*. With reference to the guidance document for taking up of non-forest activity in forest dated 19-12-2012, learned Counsel appearing on behalf of the Appellants submitted that the Project Proponent has to apply simultaneously for Environment and Forest and NBWL clearances and a complete clearance is obtained only when requisite clearances are obtained by Project Proponent. As observed above the proposal for grant of EC involves forest land. It is therefore, not correct to submit that the forest clearance is not a criteria for grant of EC under the EIA Notification.

50. Learned Counsel appearing on behalf of the appellants further brought to our notice that not only the project involves use of forest land for coal transportation, water pipeline but there is no discussion in the EIA report regarding the potential impact

of the fragmentation of the forest and disturbance of wildlife due to the passing of the railway line for coal transportation, construction of transmission line, water pipeline and approach road. From the facts noticed herein above, it is evident that the project is surrounded by forest and involves 'Parti Bhumi' (fallow land) thereby signifying least anthropogenic activity at or around the project site and, thus the issue of wildlife in the area deserves serious consideration. EIA report (page 668) and the table provided therein (Page 669, 675) make mention of having not noticed any endangered species within the area of project site and the area lying in 10 km of the radius therefrom. However, the appellants pointed out to the response received by them to the RTI query dated 27th August, 2013 (page 161, 162) providing the list of Schedule I species- Sloth Bear, Chinkara, Black Buck, Bengal Monitor, Peafowl, crocodile (Magar) etc. within the project site and 10 km radius area. The project proponent relied upon the bio-diversity assessment and conservation plan and submitted that the EAC in its meeting dated 23rd March, 2014 had found the site report/plan in order. It has been pointed out that the site plan was prepared after the EIA report and public hearing and no study was undertaken to assess the impact of the project and its ancillary activity like coal transportation, water pipeline, approach road, ash ponds and such other impacts on the wildlife in the region. Para 4.3.1.3 (page 1058) of the report adds credence to this contention in following terms: *"this survey needs to be carried*

out with the wildlife experts and the State Authority, Department to identify the areas or forest need all the conservation and management interventions which are highly crucial.” Facts revealed before us do not show that any member of the EAC or Expert member of WII conducted any site visit of the project to assess the gravity of exception taken to the project upon the issues raised in relation to the forest and wildlife. Appraisal of the project in this regard, therefore, becomes questionable.

51. Water being important component of environment appraisal of the project for accessing its potential impacts on water resources in course of the process of appraisal is also of material importance for answering the question before us. The project envisages drawl of 36 mcl of water from Ganga and its transportation through 24 km of pipeline to upper Khajuri reservoir and thereafter to make supply of the water through 7 km of pipe line to the project site. Upper khajuri reservoir is a rain fed reservoir which according to the project proponent is meant for irrigation purposes. However, the appellants contend that the water in the upper Khajuri reservoir is not only for irrigation purposes but also used for human consumption and caters to the needs of the wildlife in or around the said reservoir. In this context Learned Counsel appearing on behalf of the appellants submitted that upper Khajuri reservoir feeds water to lower khajuri reservoir lying on the River Khajuri- a tributary of Ganga and there has been representation made by Banaras Hindu University regarding the potential impacts of

taking of untreated contaminated water from Ganga to upper Khajuri reservoir and thereafter to the lower Khajuri reservoir which is catering to the need of Banaras Hindu University; and the EAC had completely over looked the critical issues raised by the Banaras Hindu University in that regard and blindly relied upon the misstatement made by the project proponent that the issue with BHU had been resolved.

52. We find from the record, a letter dated 18th September, 2013 (page 174) addressed by Registrar of the Banaras Hindu University to the Secretary, Government of India, MoEF, New Delhi voicing concerns of the University in following words:

I would like to inform you that a Thermal Power Project with capacity 1320 MW Coal based is going to be installed at nearby Village-Dadari Khurd in District-Mirzapur which is 10 km. away from Rajiv Gandhi South Campus of BHU at Barkachha. It is pointed out that the Rajiv Gandhi South Campus is constituent of BHU having running more than 20 self-financing undergraduate and post-graduate courses and other academic activities. A good number of students, teaching and non-teaching staff and their family members are residing in the campus.

In this connection, we have received a letter of General Secretary, a NGO-“Vindhya Environmental Society” and representation of resident of that area. Further, we have also examined by our Faculty Member who belongs to field of Environmental Science & Technology and he has submitted an Environment Impact Assessment Report of 1320 MW bout proposed Coal based Thermal Power Project, which are self explanatory(copy enclosed).

It is needless to mention here that the negative impact of this project may adversely affect their health of students, teachers and other staff residing in the Rajiv Gandhi South Campus. We would like to highlight the fact that entire drinking water supply of the RGSC is from lower Khajur Dam which is fed by upper Khajuri Dam. Any industrial activity in the upper khajuri Dam will jeopardize our water supply.

Keeping in view of the above fact, I request you to kindly consider for reviewing the shifting of place much ahead from the premises of Rajiv Gandhi South Campus,

Barkachha so that the ambiance and environment of this area may keep intact.

This communication from the Registrar enclosed Environment Impact Assessment Report concerning the project in question prepared by Dr. A.K. Pandey, Assistant Professor, Environment Science and Technology, Rajiv Gandhi South Campus, BHU. The respondent no. 4, it appears, made a presentation before the EAC that the issues raised by BHU were resolved in the meeting held on 8th March, 2014 and 10th March, 2014. In that regard our attention has been invited to minutes of the meeting conducted by the project proponent, BHU Faculty and Campus Members on 8th and 10th March, 2014. Reading of these minutes would persuade a reader to believe that discussion was held on following major points:

1. Air Impact and dispersion modelling
2. Water withdrawal scheme
3. Water utilization
4. Waste water management system
5. Coal Quality
6. Coal Transportation.

and after three hours of deliberations it was decided that Welspun Energy UP Pvt. Ltd-Project proponent would be forwarding the following commitments to BHU:

1. Installing of ESP with 99.9% efficiency and operating the ESP
2. Commitment to comply all condition stipulated by CWC on water withdrawal
3. Comply with the commitment of ash utilisation plan
4. Commitment to operate ETP

It is further revealed that BHU desired to be part of environmental and social management review during the operational phase of the project and the project proponent should submit six monthly compliance report along with online

data as per EC condition to the University along with other stakeholders. Significantly, the minutes of meeting do not disclose what exactly the discussions were in the meeting for thrashing out technical issues involved in the major topics purportedly discussed. The EAC also did a lip service to the process of appraisal by merely recording its nod to the presentation made by the project proponent in following terms:

6. The pp has submitted point wise response to BHU vide their letter dated 29th January, 2014 reg. The adverse impacts on the residents of Rajiv Gandhi South Campus due to the project. The same were presented before the Committee. The PP held meetings with BHU on 08.03.2014 and 10.03.2014 and detailed discussions were held on all the issues and provided satisfactory replies. The issues raised by the NGO, Vindhya Environmental Society in their letter to BHU were also discussed in the said meetings in detail. The Minutes of the said meeting were also submitted before the Committee. As desired by BHU, the commitments regarding installation and operation of ESP (with 99.9% efficiency) and ETP, complying with all conditions stipulated by CWC on water withdrawal and complying with proposed ash utilization plan shall be submitted to BHU. The committee recommended that the environmental cell of the PP shall also work in close coordination with BHU.

To compound this issue further the appellants have pointed out that the persons who raised their concerns did not participate in the meeting nor they authorize any person to hold the meeting on their behalf; and Professor Dr. Vijay Kishna who is shown to have attended the meeting held on 8th and 10th March, 2014 in the minutes annexure R-26 (page 1183) asserted vide email dated 23rd April, 2014 that the said meetings were not authorized by Banaras Hindu University and he participated in his personal capacity (page 2061) annexure

R-30; and this fact was brought to the notice of Secretary, MoEF by appellants no. 3 vide email dated 25th April, 2014 annexure R-31. It was therefore, incumbent upon the MoEF to have thoughtfully considered the relevant record and sought clarification from EAC before proceeding to grant the EC. Nothing of this sort is done in the present case.

53. Learned Counsel appearing for the appellants submitted that transporting the massive quantity of Gangetic untreated/contaminated water to the rain fed upper Khajuri reservoir is bound to change the water quality of upper Khajuri reservoir and consequently have impact on the people downstream using the water for human needs. It is further submitted that water withdrawal of 36,000,000,000 litres annually would undoubtedly affect the ecological flow of Ganga and severely affect the Gangetic Biodiversity including Gangetic Dophins found in Mirzapur stretch; and it is wrongly presumed that water withdrawal during monsoon from Ganga would leave no impact on Gangetic environment when there is a record of decline in rainfall in past year with no sufficient water in river in monsoons vide statistical data of rainfall in District Mirzapur annexure A-28 (page 2058). According to Learned Counsel appearing for the appellants both competitive use of water from river Ganga and upper khajuri reservoir and its comulative impact on upstream and downstream have not been discussed in the EIA report. We do find substance in the submission made.

54. It is further pointed out that the Project Proponent revealed in Form-1 dated 03-12-2011 (entry serial no. 10, page no. 110) that the area in question does not fall in any important high quality or scarce resources zone (ground water resource, surface resource, forestry, agriculture, fishery, tourism and minerals), and the EIA report (page no. 633 and 634) disclosed that the project site does not fall in any economically viable zone as per Regional GSI map.

55. The Appellants further points out that the respondent no. 4 in its reply (page no. 342) made reference to the Geological and Mineral Map of District Mirzapur annexure R-47 to state that the District Mirzapur has presence of Alluvium rather than Kaimur sand stone. Coloured map produced at annexure R-58 (page no. 2924) shows that the project area is adjacent to Marihan identified as a Kaimur sand stone area which is an important mineral resource.

56. The record reveals that the Public Hearing was conducted by UPPCB on 07-04-2012 in village Dadri Khurd, District Mirzapur, after publishing the notice of the public hearing in a National Daily- 'Hindustan Times' Delhi edition on 04-03-2012 and in the local Daily- 'Amar Ujala' of the same date, and the meeting was attended by about 190 persons (page 121-127). Two fold exceptions is taken to this public consultation process firstly, that the notice ought to have been publicized in the National Daily published from Allahabad/Varanasi in order to ensure maximum publicity, and secondly, public hearing was

not conducted in free and fair manner there being presence of men holding guns in the meeting as evident from a video clipping.

57. Perusal of the provision prescribing procedure for conduct of public hearing in Appendix IV of EC Regulations, 2006 reveals that notice of public hearing has to be advertised in one major National Daily and one Regional Vernacular Daily/State official language. The procedure stipulated does not say that it needs to be publicised in National Daily published from a particular place.

58. Learned Counsel for the appellants invited our attention to the purpose of public consultation of which the public hearing is one of the important component as mentioned at para 7 (III)(ii)(a). It is correct that public hearing is held for ascertaining concerns of local affected persons. However, the process of public consultation also envisages obtaining of responses in writing from other concerned persons having plausible stake in environmental aspects or project activity. Keeping in mind the procedure prescribed in clear terms at 3.0 under Appendix IV of EC Regulation, 2006. We are of the considered view that the procedure adopted for publication of notice of public hearing has been duly followed in the present case by its advertisement in national daily and local daily.

59. Additional Affidavit (page no. 2936-2944) with photographs filed by respondent no. 4-Project Proponent points out that other mode for publicity was resorted to by the Project

Proponent with the speaker mounted van/jeep for making announcement regarding the public hearing. Exception taken on this ground, therefore, has no merit. However, as regards the conduct of the public hearing itself the videography has revealed the presence of gun toting men amongst the members attending the public hearing. Learned Counsel appearing on behalf of the respondent no. 4 submitted that Village Dadri Khurd being situated in backward Forest area, it is not unusual to find the locals moving with guns. Assuming this to be true it was necessary for policemen on duty to have dis-armed them before they entered the venue of the public hearing. Arms like guns are bound to strike fear in the hearts of men around and dominate their free will. It is, therefore, difficult to call this public hearing as a free and fairly conducted public hearing.

60. EC Regulations, 2006 lay down a chain of interconnected processes to make a complete mechanism required to assess the potential impacts of the project or activities on the environment made of several components. Every piece of information/data furnished and/or collected at every stage of the process is expected to be wholesome free from any twist or turn in order to truly aid the correct appraisal of the potential impacts of the project. This expectation of law is evident from the checks and balances provided in EC Regulations, 2006.

61. Cumulatively, therefore, the entire process of consideration and appraisal of the proposal to grant EC is found tainted so as to render it less credit worthy than the one expected by law and

as such makes it even more difficult to suggest the safeguards in order to render the project sustainable one. We, therefore, answer the question raised herein above negatively. In our opinion, it is advisable to go through the entire process of EC afresh before green signal is given to the project.

We, therefore, allow this Appeal and pass the following directions:

1. The Appeal is allowed and EC dated 21-08-2014 is set aside.
2. Respondent no. 4 shall not carry out any developmental work at the project site.
3. The respondent no. 4 shall restore the area to its original condition.
4. Work of restoration is stayed for a period of two months.

62. In view of the above directions Appeal No. 79 of 2014 stands disposed of. M.A. Nos. 694 of 2014 and 511 of 2015 also stand disposed of.

....., JM
(U.D. Salvi)

....., EM
(Ranjan Chatterjee)

**BEFORE THE NATIONAL GREEN TRIBUNAL,
PRINCIPAL BENCH, NEW DELHI**

**Review Application No. 02/2017
(M.A. No. 110/2017)
In
Appeal No. 79/2014**

**And
Review Application No. 04/2017
(M.A. No. 325/2017)
In
Appeal No. 79/2014**

**And
Review Application No. 06/2017
(M.A. No. 330/2017 & M.A. No. 331/2017)
In
Appeal No. 79/2014**

Debadityo Sinha & Ors. Vs. Union of India & Ors.

CORAM:

**HON'BLE DR. JUSTICE JAWAD RAHIM, JUDICIAL MEMBER
HON'BLE MR. RANJAN CHATTERJEE, EXPERT MEMBER**

Present: Applicant/Appellant(s) :

**:Mr. Pinaki Mishra, Sr. Adv., Mr. Vijay K. Sindhi, Adv., Mr. Sanjeev Kumar, Adv., Mr. Anshul Sehgal, Adv. Mr. Tarunvir Singh Khehar, Adv.
:Mr. Pradeep Misra and Mr. Daleep Dhyani, Adv.**

Date and Remarks	Orders of the Tribunal
Item Nos. 7 to 9 March 31, 2017 ps	<p><u>M.A. 325/2017.</u></p> <p>The Applicant in the M.A. has presented a Review Application invoking Section 19(4) Act of the NGT Act, 2010 seeking review of the Judgment dated 21.12.2016 passed in Appeal No. 79/2014 and M.A.'s 694/2014 and 511/2015.</p> <p>By M.A. No. 225/2017 the review applicant has sought grant of interim order to stay the judgment under the review dated 21.12.2016.</p> <p>In response to the notice in the Review Application and this M.A, Ms. Parul Gupta has appeared for the applicant (Debaditya Sinha and Ors.-Appeal No.</p>

79/2014) who is respondent in the Review Applications.

She has also filed detailed reply to the review application and a synopsis of the contention opposing the interim relief sought.

We have heard the Learned Designated Senior Mr. Pinaki Mishra, Counsel appearing for the project proponent/review petitioner in Review Application 04 of 2017, Additional Solicitor General for the State of U.P. and the Union of India as also the Learned Advocate appearing for MoEF.

Learned Senior Counsel, Mr. Pinaki Mishra for the project proponent/Applicant would submit that though they have sought for an interim order of stay, presently and they would not press for the said relief but would avail adjudication of the review on its merit. Submission is placed on record.

However, he seeks an interim order to direct the State of U.P. who has entered into power purchase agreement with the project proponent to extend the period of transaction for further period, subject to result of the Review Application.

The relief so sought has met with serious opposition from in Applicant 79 of 2014. Ms. Parul Gupta has filed a brief note of a submission in which she has taken the following contentions:-

1. Approval, renewal and revocation of Power Purchase Agreement is entirely in the domain of the State Electricity Regulatory Commission under the Electricity Act, 2003. Thus, it is entirely upon

the Commission to decide on the relief sought.

2. The Power Purchase Agreement is an agreement between Power Producer and Purchaser. There may be many such agreements entered into by the project proponent but all depend on the validity of the Environmental Clearance. Once the EC has been cancelled by this Tribunal by the order under review, no permission could be granted to revalidate or validate agreement which falls consequent to quashing of the Environmental Clearance.

3. The relief sought for renewal of PPA is based on the presumption that this Tribunal may grant relief in their favour. It is likely to set a bad precedent.

Responding to this contention, Learned Sr. Counsel submits that the applicant has entertained into unjustified apprehension, for reason this Tribunal is considering every issue relating to the Review Application and therefore, there is no question of presuming any interim order passed either would be in favour of the Review Applicant or the Appellant/Respondent.

He submits that the Power Purchase Agreement forms the core and soul of the entire project as the generation of power must be consumed. The State of U.P. has entered into power purchase agreement. Being a party to these proceedings they have also requested that the relief sought by the project proponent to revalidate PPA be granted and therefore, there is no prejudice that is likely to be caused to the Applicant in the Appeal No. 79 of 2014 who is armed with order of the Tribunal.

The Power Purchase Agreement is to expire by flux

of time on 31st March, 2017, unless it is validated. In case the project proponent succeeds in its Review Application it will be next to impossible to get fresh buyers for the power that is likely to be generated by the project and in such as event the consequences following there from will have very adverse impact on the project proponent. He has referred to the intended purpose of the State Government approving the project proponent for the general welfare of the backward area in the State of U. P. which is devoid of the power supply.

He submits that the project is in public interest and therefore, a very pragmatic approach has to be adopted. Lastly, he submits the applicant has failed to point out what prejudice is likely to be caused in case the Tribunal grants interim relief or makes any observation.

The State of UP has virtually championed the cause of project proponent. Learned AAG representing the State of UP would submit that the Power Purchase Agreement entered into by the State with the Project Proponent is in public interest. It will provide electric energy to the remote areas of the State which are deprived of basic amenities and requirement in life. Thus, he submits that Tribunal may permit State of UP and the Project Proponent to renew the Power Purchase Agreement which will expire in a afflux of time on 31st March, 2017.

Having considered the request of applicant and the grounds of opposition, we must observe that this Tribunal is presently seized of the matter in R.A. No. 04/2017. The Appellant who is opposing this review has questioned the maintainability of R.A. on merit and

limitation.

We are yet to hear the R.A. on these two issues.

The fact situation undoubtedly is that the Judgment in Appeal No. 79/2014 dated 21/12/2016 has neither been annulled/modified/or interfered in any appeal action. Therefore, it needs no mention that all concerned and those brought within the mischief of direction of the Tribunal are aware of the consequences flowing from the ultimate decision taken in the said appeal. It is also not in dispute that the EC has been cancelled of course subject to certain conditions in the order under review.

The question raised is whether, under given circumstances, this Tribunal could pass any order directing the parties to renew the power purchase agreement.

Admittedly, the Power Purchase Agreement is a *bi-parte* commercial transaction between the project proponent and the buyer namely the State of U. P. . It is also not in dispute that any such transaction is subject to permission/approval i.e. Electricity Regulation Commission referred to in the Electricity Act, 2003.

As far as this Tribunal is concerned, jurisdiction is confirmed to issue related to Environment and the impugned jurisdiction regarding Environment Clearance in which validity or otherwise of any commercial transaction had not arise for consideration. But the fact situation is the effect of Judgment of this Tribunal on such transaction.

We do not wish to express any opinion on that but

would like to conclude by observing that the power purchase agreement referred to in the application being a bi-partite agreement between the Project Proponent and the purchaser of the electricity by the State of UP. They are competent to transact further.

It is commercial transaction and therefore, they may on their own violation transact and agree upon such terms and conditions with regard to renewal etc by mutual consent for which no specific direction from this tribunal may be necessary.

Liberty to transact further terms and conditions may be permissible under the original agreement as may be suitable for them for extension of period etc for which there need not be any specific direction from this Tribunal to the parties. We further conclude by observation that any order for that matter, the expression does not mean to affect or prejudice the contention of the Review Application or the appellant to be interpreted.

List it for final hearing on 18th April, 2017.

.....JM
(Dr. Jawad Rahim)

.....EM
(Ranjan Chatterjee)

**BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH
NEW DELHI**

.....

**REVIEW APPLICATION NO. 02 OF 2017
(M.A. NO. 110/2017)
IN
APPEAL NO. 79 OF 2014
AND
REVIEW APPLICATION NO. 04 OF 2017
(M.A. NO. 325/2017)
IN
APPEAL NO. 79 OF 2014
AND
REVIEW APPLICATION NO. 06 OF 2017
(M.A. NO. 330/2017 & M.A. NO. 331/2017)
IN
APPEAL NO. 79 OF 2014**

IN THE MATTER OF:

Debadityo Sinha & Ors.

..... Applicant

Versus

Union of India & Ors.

..... Respondents

IN THE MATTER OF:

UNION OF INDIA
Through the Secretary,
Ministry of Environment,
Forests & Climate Change
Indira Paryavaran Bhavan
Jor Bagh Road,
New Delhi-110003

..... Review Applicant

// Versus //

1. DEBADITYO SINHA
R/o III Floor, 943A/8,
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2. SHIV KUMAR UPADHYAY
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Station Road, Mirzapur,
Uttar Pradesh – 231001

3. MUKESH KUMAR
R/o Room no. 65, Aravalli Hostel,
Rajiv Gandhi South Campus,
Banaras Hindu University,
Village – Barkachha,
District Mirzapur,
Uttar Pradesh – 231001
 4. GOVT. OF UTTAR PRADESH
Through its Chief secretary,
Lal Bahadur Shastri Bhavan
UP Secretariat,
Lucknow-226001.
 5. UTTAR PRADESH POLLUTION CONTROL BOARD
Through its Member Secretary
Vibhuti Khund, Gomti Nagar,
Lucknow, Uttar Pradesh -226010
 6. M/S WELSPUN ENERGY (U.P) PVT. LTD.
Through its Authorized Representative
Having its office at:
III Floor, PTI Building, Parliament Street,
New Delhi – 110001
- Respondents

COUNSEL FOR REIEW APPLICANTS:

Ms. Divya Prakash Pande, Advocate
Mr. Sanjeev Kumar & Mr. Anshul Sehgal, Advocate

COUNSEL FOR RESPONDENTS :

Ms. Parul Gupta, Adv. for R-1 to 3
Mr. Neeraj Kishan Kaul, ASG for R-4
Mr. Pradeep Misra, Adv. for UPPCB
Mr. Pinaki Misra, Sr. Adv. for R-6
Mr. Tarunvir Singh Khehar, Adv.
Mr. Tushar Mehta, ASG for R-1
Mr. Abhishek Yadav, Adv. for State of UP

JUDGMENT

PRESENT:

Hon'ble Mr. Justice Swatanter Kumar (Chairperson)

Hon'ble Mr. Justice U.D. Salvi (Judicial Member)

Hon'ble Mr. Bikram Singh Sajwan (Expert Member)

Hon'ble Mr. Ranjan Chatterjee (Expert Member)

Reserved on: 28th April, 2017

Pronounced on: 1st May, 2017

1. Whether the judgment is allowed to be published on the net?
2. Whether the judgment is allowed to be published in the NGT Reporter?

JUSTICE SWATANTER KUMAR, (CHAIRPERSON)

Appeal No. 79 of 2014 was directed against the Environmental Clearance (for short, "EC") dated 21st August, 2014. A Bench of the Tribunal vide judgment dated 21st December, 2016 set aside the EC granted to the project.

Three different review applications have been filed by different respondents seeking review/modification of the judgment dated 21st December, 2016 on different grounds.

2. We have heard the learned Counsel appearing for the respective parties, including the non-applicant, at length. After hearing the parties and perusing the records before us, we are of the considered view that the grounds raised in the present applications for review have no merit and fall within the Appellate Jurisdiction in contradistinction to Review Jurisdiction.

3. However, for proper implementation of the judgement, a clarification needs to be issued which we do hereby issue, that the project proponent is at liberty to approach the MoEF&CC or any other competent authority for processing of the applications for grant of EC

upon making up for/rectifying the defects and deficiencies pointed out in the judgment. However, the authorities concerned are at liberty to process the same in accordance with law while strictly adhering to the content of the judgment.

4. In view of the above, the Review Application Nos. 02 of 2017, 04 of 2017 and 06 of 2017 stand disposed of with no order as to cost. However, the parties would be free to approach the Tribunal if the occasion so arises.

5. M.A. Nos. 110/2017, 325/2017, 330/2017 & 331/2017 do not survive for consideration as the Review Applications have been disposed of. Accordingly, they stand disposed of.

**Swatanter Kumar
Chairperson**

**U.D. Salvi
Judicial Member**

**Bikram Singh Sajwan
Expert Member**

**Ranjan Chatterjee
Expert Member**

New Delhi
1st May, 2017

Annex 5
**Approved Biodiversity Assessment &
Wildlife Conservation Management
Plan**

कार्यालय प्रमुख वन संरक्षक, वन्य जीव, उत्तर प्रदेश, लखनऊ।

पत्रांक:- /26-11 (वेल्सपन एनर्जी) लखनऊ, दिनांक: अक्टूबर, /5 2014.
सेवा में,

मुख्य वन संरक्षक,
मीरजापुर क्षेत्र, उ०प्र०
मीरजापुर।

विषय:- ग्राम ददरी खुर्द, तहसील-सदर, जनपद मीरजापुर में मेसर्स वेल्सपन एनर्जी यूपी प्राइवेट लि० द्वारा 2X660 एम० डब्लू० सुपर क्वाटिकल कोल आधारित थर्मल पावर प्लान्ट की स्थापना के सम्बन्ध में प्रस्तुत Biodiversity Assessment and Preparation of Conservation Management Plan (including wildlife) के अनुमोदन के सम्बन्ध में।

सन्दर्भ:- 1-आपका पत्रांक 1151/मी० क्षे०/33 दिनांक 18-09-2014।
2-प्रभागीय वनाधिकारी, मीरजापुर वन प्रभाग, मीरजापुर का पत्रांक 995/33-वेल्सपन दिनांक 09-09-2014।

महोदय,

कृपया उपरोक्त सन्दर्भित पत्रों से प्रेषित विषयक प्रस्ताव का अवलोकन करें। उल्लेखनीय है कि ग्राम ददरी खुर्द, तहसील-सदर, जनपद मीरजापुर में, मेसर्स वेल्सपन एनर्जी यूपी, प्राइवेट लि० द्वारा 2X660 एम० डब्लू० सुपर क्वाटिकल कोल आधारित थर्मल पावर प्लान्ट की स्थापना के सम्बन्ध इस कार्यालय के पत्रांक 272/26-11(वेल्सपन) दिनांक 24-06-2014 से वांछित आख्या के क्रम में प्रभागीय वनाधिकारी, मीरजापुर वन प्रभाग, मीरजापुर द्वारा पत्रांक 995/33-वेल्सपन दिनांक 09-09-2014 से स्पष्ट किया गया है कि प्रश्नगत परियोजना कैमूर वन्य जीव विहार, मीरजापुर की सीमा से लगभग 25 किमी० दूर मीरजापुर वन प्रभाग क्षेत्रान्तर्गत प्रस्तावित है। परियोजना की स्थापना व कार्यान्वयन के सम्बन्ध में प्रस्तावक विभाग द्वारा 10 वर्षों हेतु प्रभाग के पादप व जन्तु जगत के संरक्षण उनसे प्रासंगिक विषयों के सन्दर्भ में प्रस्तुत Biodiversity Assessment and Preparation of Conservation Management Plan (including wildlife) में 184.15 लाख रुपये का प्राविधान किया गया है। उक्त के सम्बन्ध परीक्षण व वांछित आख्या के क्रम में आपके पत्रांक 1151/मी० क्षे०/33 दिनांक 18-09-2014 से प्रश्नगत Biodiversity Assessment and Preparation of Conservation Management Plan (including wildlife) से सहमति के साथ प्रतिहस्ताक्षरित कर अनुमोदन हेतु प्रस्तुत किया गया है।

अतः आपके पत्रांक 1151/मी० क्षे०/33 दिनांक 18-09-2014 द्वारा की गयी संस्तुति के क्रम में प्रस्तुत Biodiversity Assessment and Preparation of Conservation Management Plan (including wildlife) निम्न शर्तों के अधीन अनुमोदित कर सलग्न किया जाता है।

1- उक्त Biodiversity Assessment and Preparation of Conservation Management Plan (including wildlife) में वन्य जीवों के संरक्षण हेतु प्रस्तावित कार्यों का कार्यान्वयन सुनिश्चित

करने हेतु उक्त प्रबन्ध योजना में उल्लिखित Monitoring Committee का गठन कर जिसका अनुमोदन मुख्य वन संरक्षक, वन्य जीव पश्चिमी क्षेत्र, उ०प्र०, कानपुर से प्राप्त करना होगा।

2- जनपद मिर्जापुर व सोनमद्र में कैमूर वन्य जीव विहार क्षेत्र में व सन्निकट आरक्षित वन क्षेत्रों में विचरण करने वाले काले हिरन (Black Buck) के विस्तृत अध्ययन व संरक्षण हेतु एक कार्ययोजना वन्य जीव संस्थान देहरादून से तैयार करवा कर मुख्य वन्य जीव प्रतिपालक, उ०प्र० को प्रस्तुत करना होगा।

भवदीय,

(डा० रूपक डे)

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उत्तर प्रदेश, लखनऊ।

पत्रांक 389 / उक्तदिनांकित।

प्रतिलिपि:- निम्नांकित को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित।

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2. मुख्य वन संरक्षक, (वन्य जीव) पश्चिमी क्षेत्र उ०प्र०, कानपुर।
3. प्रभागीय वनाधिकारी, मिर्जापुर वन प्रभाग, मिर्जापुर।
4. प्रभागीय वनाधिकारी, कैमूर वन्य जीव प्रभाग, मिर्जापुर।
5. मुख्य प्रबन्धक, मेसर्स वेल्सपन एनर्जी ग्रुपी प्राइवेट लि० मिर्जापुर।

(डा० रूपक डे)

प्रमुख वन संरक्षक, वन्य जीव,
उत्तर प्रदेश, लखनऊ।

**Biodiversity Assessment and Preparation of
Conservation Management Plan including Wildlife of
Welspun Energy UP Private Limited (1320 MW) at
Village – Dadri Khurd Tehsil – Mirzapur Sadar,
District – Mirzapur, Uttar Pradesh**



Report Submitted to:



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February, 2013

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FORWARD

Welspun Energy UP Private Limited (WEUPPL) proposes to setup a Greenfield Coal based Thermal Power Plant (TPP) of 1320 MW (2x660 MW) capacity at Dadri Khurd village, Mirzapur Sadar tehsil, Mirzapur district, Uttar Pradesh. As per the Environmental Impact Assessment (EIA) Notification dated 14th September 2006 as well as its amendment thereafter on 1st December 2009, the proposed thermal power plant project falls under 'Category A' with project or activity type number '1(d)', which requires preparation of EIA Report to get Environmental Clearance (EC) from the Ministry of Environment and Forests (MoEF), New Delhi.

In addition to the EIA study, as part of the Environment Clearance (EC) of MoEF, New Delhi, the project proponent (WEUPPL) need to carryout Ecological and Biodiversity status assessment study to identify endangered (Schedule I species) species and prepare Conservation and Management Plan for the same.

In this context, Green Future Foundation (GFF), New Delhi was given consultancy to carry out the biodiversity assessment study covering the project site and 10km radius buffer. This report discuss the biodiversity status covering major floral and faunal groups in terms of species richness, diversity, distribution and abundance specific to core and buffer zones of the study area. In addition, presence of ecologically sensitive areas were also identified. Based on this, species specific conservation and management plans were suggested for threatened/endangered biota, which include habitat improvement plans suggested under green belt development program to support the threatened fauna and enhance the overall biodiversity of the project study area.

Date:

Authorized Signature
(Project -In-charge)



CHAPTER 1- PROJECT INTRODUCTION

1.1. AN OVERVIEW OF PROJECT PROPONENT

Welspun Energy UP Private Limited (WEUPPL) is a Special purpose Vehicle (SPV) of Welspun Energy for developing the proposed 2x660 MW coal based power plant based on supercritical technology.


VISION OF WEUPPL

“Looking at the growing energy needs of Uttar Pradesh, Welspun Energy Limited envisages initiating a 2 x 660 MW thermal power plant in Mirzapur. This will help the state of Uttar Pradesh to minimize its energy deficit and contribute towards making India energy independent. Environment safety and community interest are paramount to us in this endeavor. We are using super critical technology, which will minimize adverse impact to the environment. We are committed to improving the lives of the local people by generating direct/ indirect employment in this region and would be investing in their health & education. We endeavor to provide the community a sustainable and secure future.”

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

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

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

	<p><i>Biodiversity-Wildlife Conservation and Management Plan for the Proposed 1320 MW (2x660 MW) Thermal Power Plant at Dadri Khurd Village, Mirzapur Sadar Tehsil, Mirzapur District, Uttar Pradesh</i></p>
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1.2. RATIONALE OF THE STUDY

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

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

The EIA report was prepared as per the Terms of Reference (ToR) issued by MoEF, vide letter no. J-13012/12/2011-IA. II (T) dated 15th June, 2011 and submitted. In addition to the EIA study, as part of the Environment Clearance (EC) of MoEF, New Delhi, the project proponent (WEUPPL) need to carryout Ecological and Biodiversity status assessment study to identify endangered (Schedule I species) species and prepare Conservation and Management Plan for the same.

In this context, **Green Future Foundation (GFF), New Delhi** was given consultancy to carry out the ecological study in and around the proposed project site covering 10km radius. This study aimed to identify the presence of threatened biota (flora and fauna), assess their status and provide conservation and management plan for the endangered or Schedule I species of Wildlife Protection act (1972) reported in the project study area.

1.3. PROJECT DETAILS

The proposed coal based power plant is of 1320 MW capacity will comprise of two units of 660 MW capacity each, based on super-critical technology. The project utilize domestic coal from NCL/SECL /CCL / or Imported Coal from Indonesia as primary fuel. The plant will be designed for base load operation with a plant design life of about 25 years. The land requirement for the project is 875 acres including power plant, ash pond and other auxiliaries and the estimated cost of the project is about Rs 7500 Crores.

1.3.1 Location of the Project

The proposed plant site is located at Dadri Khurd village in Mirzapur Sadar tehsil, Mirzapur district in Uttar Pradesh. Varanasi town is located at a distance of about 50 km from the proposed plant site, whereas the district head-quarter of Mirzapur is located at a distance of about 18 km from the proposed plant site. The details of environmental setting are given in **Table-1.1**. The index map of the project site is shown in **Figure-1.1**.

1.3.2. Access to the Site

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

1.3.3 Environmental Setting of the Project Site

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

Table 1.1 Environmental Setting around 10-km radius of WEUPPL Project site

Sr. No	Particular	Details		
		Sr. No.	Latitude	Longitude
1	Location	Dadri Khurd Village, Mirzapur Sadar Tehsil, Mirzapur District, Uttar Pradesh		
2	Coordinate Range			
a	Plant Boundary	1	25° 00' 16.887"N,	82° 40' 29.204"E
		2	24° 59' 45.117"N,	82° 41' 03.728"E
		3	24° 58' 41.858"N,	82° 40' 23.802"E
		4	24° 58' 41.645"N,	82° 39' 50.425"E
		5	24° 59' 08.278"N,	82° 40' 00.404"E
		6	24° 59' 44.581"N,	82° 40' 00.552"E
b	Ash Dyke Area (within plant boundary)	A	82° 40' 27.5"E	25° 0' 14.5"N
		B	82° 40' 57.8"E	24° 59' 57.1"N
		C	82° 40' 43.5"E	24° 59' 54.8"N
		D	82° 40' 8.2"E	24° 59' 46.8"N

Sr. No	Particular	Details		
		E	82° 40' 13.7"E	25° 0' 7.5"N
c	Chimney	C	82°40'26.15" E	24°59'35.08"N
3	Toposheet No.	63 K/12 & 63 L/9		
4	Site elevation	180 m above Mean Sea Level (MSL)		
5	Topography	Slightly undulating		
6	Climatic Conditions : IMD, Varanasi, Pre- Monsoon season	Mean Minimum Temperature: 12.1°C Mean Maximum Temperature: 37.6°C Predominant Wind Direction: W Relative Humidity: At 8:30 hrs: 31 % to 61% and at 17:30 hrs: 14 % to 45 % Rainfall: 47.5 mm		
7	Climatic conditions at site (monitored during Pre Monsoon season, 2011)	Mean Minimum Temperature:11.6°C Mean Maximum Temperature: 42.0°C Predominant Wind Direction: W Relative Humidity: At 8:30 hrs: 32 % to 62 % and at 17:30 hrs: 16 % to 48 % Rainfall: 0 mm		
8	Nearest Habitations (Population as per Census-2001 Data)	Dadri Khurd (Population : 09) Dadri Gahira (Population : 48)		
9	Present land use at the site	Mostly barren		
10	Nearest Major Roads/ Highway	State Highway, SH-5 (1.5 km, SW) National Highway, NH-7 (10.0 km, NNE)		
11	Nearest Railway Line	Broad Gauge Railway line of Northern Railways (NR)		
12	Nearest Railway Station	Sakteshgarh R.S. (15.5 km, ENE) Sarsongram R.S. (15.5 km, E)		
13	Nearest Airport	Varanasi (50 km, NNE)		
14	Nearest Seaport	Haldia		
15	Nearest Town	Mirzapur –District Headquarters (18 km, NW)		
16	Nearest water bodies	Jamtlhwa Nadi (2.0 km, N) Jogiadar Nadi (2 kms, NE) Pahiti Nadi (3.75 kms, NE) Upper Khajuri Dam (4 km, W) Ganga River (17 km, NE)		
17	Eco sensitive Zone (National Part, Wildlife Sanctuary, Biosphere reserve wildlife corridors etc.) Within 10 km radius of the project site.	No Eco sensitive Zone viz. National Park, Wildlife Sanctuary, Biosphere reserve, Wildlife corridors and Protected Forest falling with the 10 km radius of the project site.		
18	Reserved/Protected forests	Danti RF (on northern side of project site) Mirzapur RF (on southern side of project site) Bahati RF(6.0 km in SW) Karaunda RF (5 km, SW) Patehra RF(5.0 km in SW) Malua RF (8.5 km in SW) Chandlewa Khurd RF (6.0 km in NNE) Nanauti RF (7 km in E) Golhanpur RF (6.5 km in E) Sarson RF (5.5 km in SE)		



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

Note: All distances mentioned above in parenthesis are aerial distances



Source: WEUPPL

Map 1.1. Location details of the Proposed Thermal Power plant - WEUPPL

1.4. IMPORTANCE OF THE PROJECT

Though there has been substantial growth in power sector infrastructure in India, the power supply position is still characterized by shortages, both in terms of demand met during peak periods and the overall energy supply. Many parts of the country continue to reel under severe power shortages. The all India region-wise forecast for electrical energy requirement and peak demand scenario are presented in **Table-1.2**.

Table 1.2. Long term forecast of power demand

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

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

The economic growth of any country depends upon the availability and consumption of energy. The level of development of a country is measured in terms of per capita energy consumption. Presently India's per capita energy consumption at 717 KWh/year (during 2007-08), which is less than that of other developing countries like China (1891) and Malaysia (1000). The per capita energy consumption of the developed countries is very much higher like United States of America (13338), Sweden (16665) and Canada (18117). World average per capita energy consumption is 2500 kwh/year. The present installed capacity in India is around 1,49,111 MW as on 31st May, 2009 and requires significantly more generating capacity to match the pace of development taking place in the country as well to bridge the gap between demand and supply. Government is aiming to increase the present installed capacity to 200,000 MW by 2012 and aiming per capita energy consumption of 1000 kwh/year. The investment from public and private sector for capacity addition shall help the nation to achieve the energy availability.

The Central, State and Private contribute to the availability of power in the country. State owns a share of about 52%, central own a share of about 33% of installed capacity and the rest 15% by private sector. Major contribution of energy came from thermal (64%) followed by Hydel energy (25%). Ministry of Power has estimated that by the year 2012, India's peak demand would be 152,746 MW with energy requirement of 975 Billion Unit (BU).

1.4.1. Power Development Scenario-11th Plan Period

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

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

1.4.2. Power Development Scenario-Beyond 11th Plan

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

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

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

As per CEA/Planning Commission, a tentative capacity addition of 82,200 MW has been envisaged for the 12th Plan. This comprises of 30,000 MW hydro, 40200 MW thermal and 12000 MW of Nuclear power plants Considering the slippages in the past, and keeping in view the huge power generation capacity requirement to be added during the 11th and 12th

Plan periods, an urgent need is felt for a large scale thermal power development programme in an environment friendly manner.

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

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

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

1.4.3. Justification of Project

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

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

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

CHAPTER 2: ECOLOGICAL STUDY APPROACH AND METHODOLOGY

2.1. SCOPE OF WORKS

In order to assess the overall status of biological environment of pre-project scenario and status of threatened biota and prepare Conservation and Management Plan for schedule I species the following scope of works have been formulated and studied.

FLORA

- **Assess the status of major floral components of all the terrestrial habitats within the study area (10km radius buffer) of the proposed thermal power plant.**
- **Collection and compilation of secondary information on the status of floral components and habitats from the concerned stakeholders – Forest department and others.**
- **Identification and listing of floral species of conservation significance (Rare, Endangered and Threatened - RET species) accordance with WCMC and BSI in the study area.**

FAUNA

- **Assess the status of major faunal groups (amphibians, reptiles, terrestrial and aquatic birds and mammals) within the study area (10km radius buffer) of the proposed thermal power plant.**
- **Collection and compilation of secondary information on the status of faunal groups and habitat from the concerned stakeholders – Forest department and others.**
- **Identification and listing of faunal species of conservation significance (RET species) in accordance with IUCN / WPA – 1972 act of MoEF in the study area.**

HABITAT

- **Identification of ecologically sensitive area (Protect Area: Sanctuary, National Parks, Biosphere Reserve, pertaining to Faunal diversity) exist in the vicinity of the (Within 10 km Radius) study area**

MANAGEMENT PLAN

- **Provide conservation and management plan to improve the habitat quality of the project area to enhance the overall biological diversity (Flora & Fauna) on need basis**
- **Suggest conservation and management plan for the critically endangered & endangered (schedule I) species if any reported within the study area**

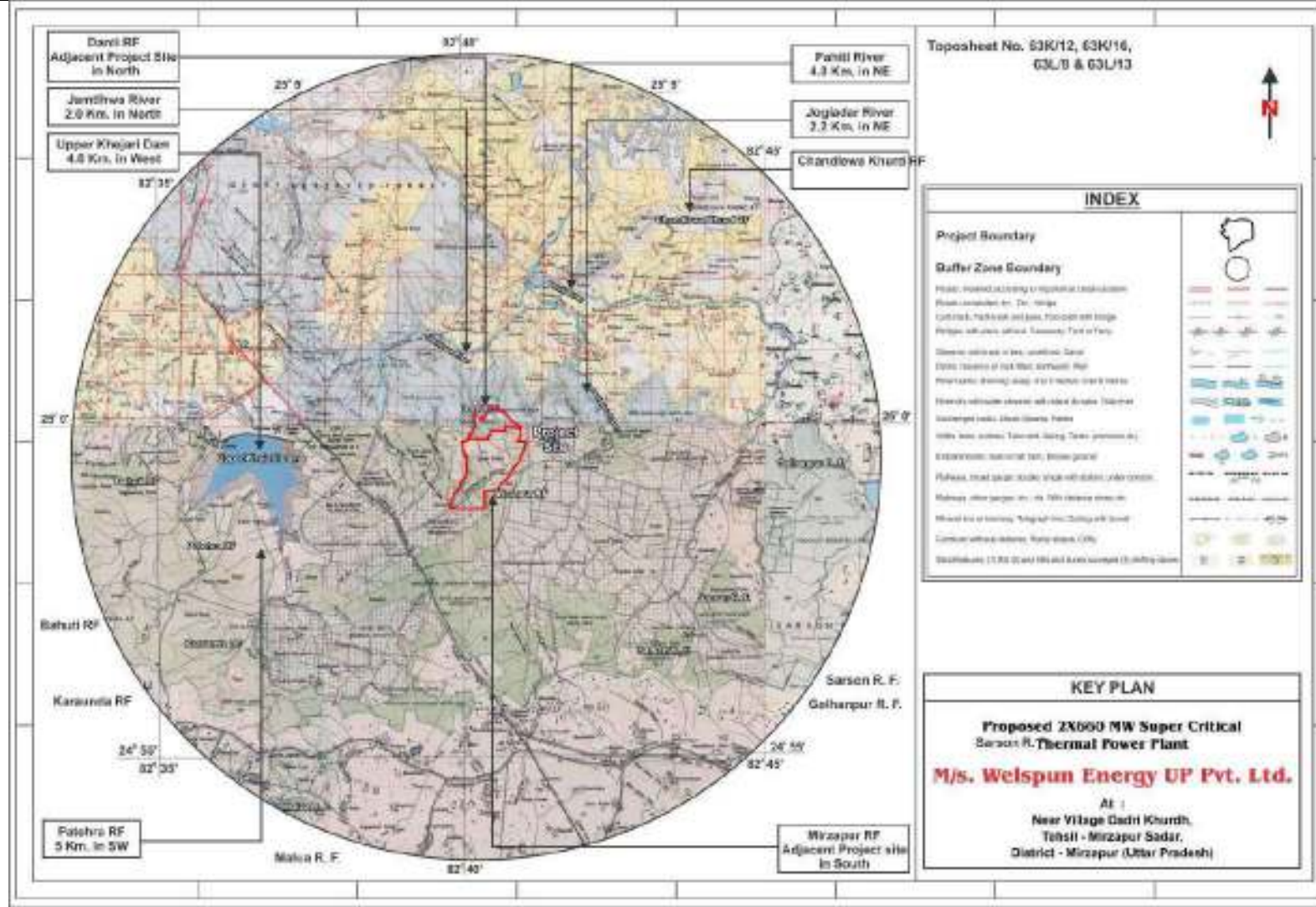
2.2. PROJECT STUDY AREA.

The proposed power plant will have two units with a total power generation capacity of 1320 MW. The land requirement for the project is 875 acres (354.11ha) including power plant, ash pond and other auxiliaries. The proposed plant site is located at Dadri Khurd village in Mirzapur Sadar tehsil, Mirzapur district in Uttar Pradesh. The details of environmental setting are given in **Table-1.1**. The index map of the project site is shown in **Figure-1.1**. The geographical co-ordinates of the proposed plant site on Survey of India (SOI) toposheet No. 63K/12 & 63 L/9 falls between 24°58'41.6"to 25°0'16.8" N Latitudes and 82°39'50.4"E to 82°41'03.7"E longitudes (**Figure 2.1**)

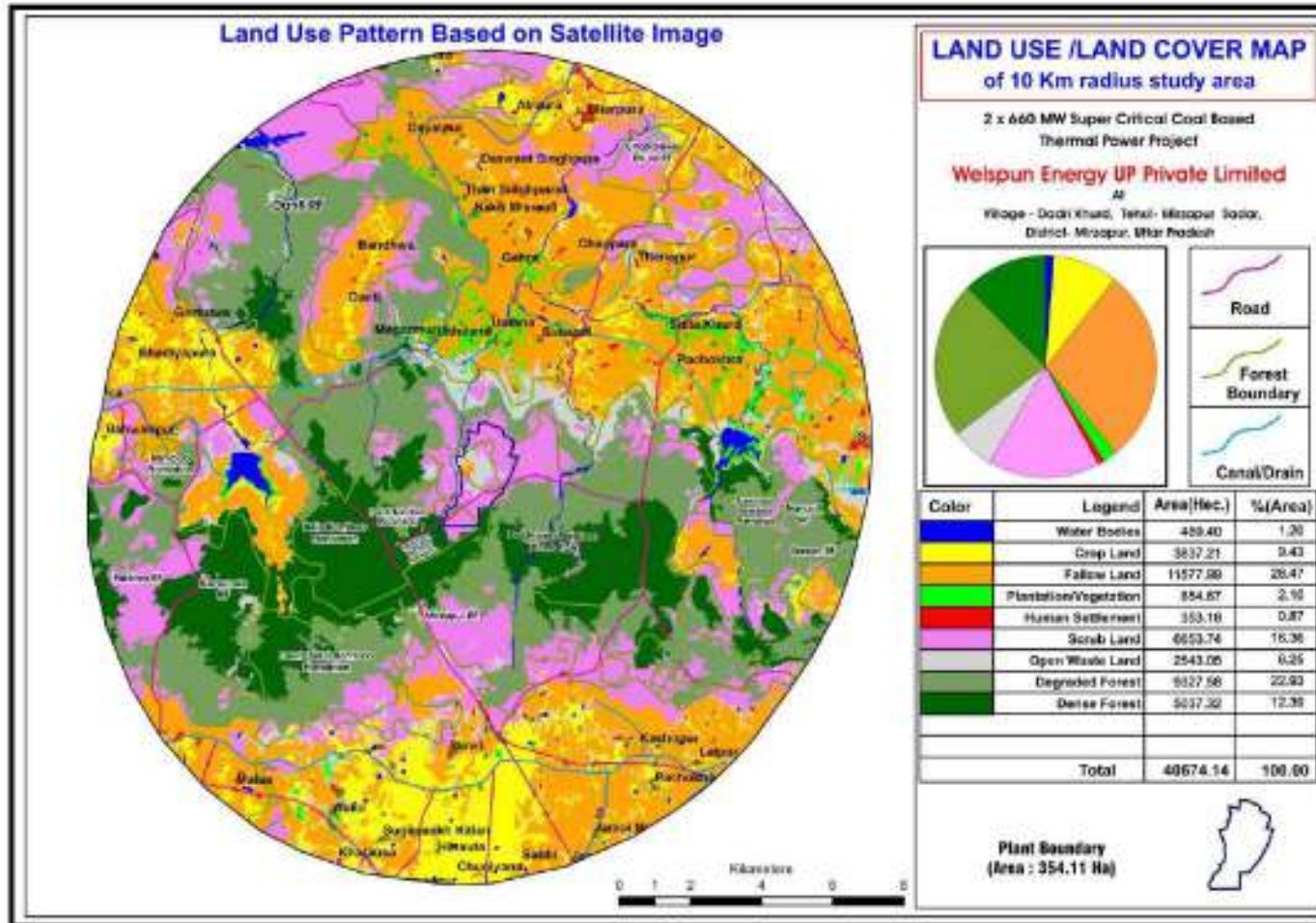
In addition to the 875 acres (354.11 ha) land of the project site, area of 10 km radius from the boundary of the plant site has been taken as buffer zone which covers the total extend of 40674.14 ha. The breakup of the land use and land cover showed nine types of land use and land cover. Among the land use maximum extent of 11,577.99 ha fall under fallow land followed by 9327.58 ha of degraded forests and they contribute 28.47 and 22.93% of the total respectively. Adding the dense forest, overall the study area comprises 14364.90 ha of forest land which shares 35.32% of the land use of the study area **Table 2.1. & Figure 2.2**.

Table 2.1. Land Use /Land cover details of the Study area - WEUPPL

S.no.	Land Use/Land Cover	Area (in Ha)	% (Area)
1	Water bodies	489.40	1.20
2	Crop land	3837.21	9.43
3	Fallow land	11577.99	28.47
4	Plantation /Vegetation	854.67	2.10
5	Human settlement	353.18	0.87
6	Scrub land	6653.74	16.36
7	Open waste land	2543.05	6.25
8	Degrade forest	9327.58	22.93
9	Dense forest	5037.32	12.39
	Total	40,674.14	100.00



Map 2.1. Study Area Map of the Thermal Power Plant Project (10 km radius) - WEUPPL



Map. 2.2 Land use land cover map of the proposed project study area

2.3. STUDY APPROACH AND METHODOLOGY

2.3.1. Study Plan

In order to understand the ecological status of different habitats and the status of biodiversity in and around the proposed Thermal power plant project area of WEUPPL, field work was carried out between April 2012 and June 2012 (**Table 2.2**).

Table 2.2: Field Survey and Report Preparation Schedule

Month	Broad level approach
April 2012	Reconnaissance of the Existing Environmental Setup of the proposed Thermal Power Plant project (WEUPPL) study area with project proponents. Collection of project related secondary information from the project proponent, government departments (forest Dept) and other stakeholders Review of literature – scientific publications
May 2012	Field work and data collection pertaining to different scope of works formulated for the biological components covering flora, fauna and habitat
June 2012	Data analysis and report preparation and submission of draft report
July 2012	Submission of final report

2.3.2. Macro level Approach

2.3.2.1. Reconnaissance Survey

- Rapid survey of project area was carried out to identify and understand the existing biological environments and different land use/land cover of the proposed thermal power plant project study area (10 km radius)
- Interaction and discussion was held with the project proponents (WEUPPL) to understand and get the firsthand information about the project and associated activities.

2.3.2.2. Secondary data collection

- Project related secondary information from the project proponent in the form of base maps and technical reports with brief project technical details were collected.
- Project related information specific to project study components (flora, fauna and habitats) were collected from different stakeholders (State Forest departments, Revenue Dept etc).
- Scientific information available in the form of published papers, reports, books, State flora were collected from the in house facilities and other sources like institutions and e-facilities.

2.3.2.3. Delineation of the Study Area

The study area was delineated into two zones: **Core zone** – which includes the project area i.e., the area, earmarked for the proposed thermal power plant project and associated activities – 875 acres.

Buffer zone; which includes the adjacent land area of 10 km radius from the boundary of the project site or Core zone. Based on the availability and heterogeneity of the land use and land cover or habitat types, field based primary data were collected.

2.3.3. Micro level Approach- Field Data Collection

Micro level approach involves mainly the field based primary data collection using standard field techniques on different components of the scope of works. Field data collection mainly includes aquatic micro biota status (phyto and zooplankton) and terrestrial biodiversity status assessment of major habits of floral species such as trees, shrubs, Climbers, herbs and grass. Faunal diversity was assessed by inventorying and quantifying the major faunal groups like: amphibians, reptiles, birds (both aquatic and terrestrial) and mammals.

2.3.3.1. Aquatic Micro biota (Planktons)

Phytoplankton: The water samples were collected from three locations from each dam site. The samples were collected from 10 cm depth below the water surface. Polythene bottles of different capacity were used for collection of water samples. All sampling bottles were soaked in 10% Nitric acid solution for 24 hrs and then rinsed with distilled water before use. The samples were subjected to phytoplankton and zooplankton analysis using following techniques. The Lackey Drop (micro-transect) Count Method (Lackey, 1938; Edmonson, 1969) is used for obtaining counts of phytoplankton.

Zooplankton: Around 20-50 L of water is passed through plankton net (mesh size 50 μm) to concentrate zooplankton. The entire water is centrifuged, decanted and concentrated to make 1 ml volume for observation in S-R (Sedgwick-Rafter) counting cell. The zooplankton is counted in 10x magnification. For studying community structure, the species are grouped in taxonomic classes and percentages of groups are calculated from total counts of sample.

2.3.3.2. Floral Status

- Status of floral species was assessed in the representative habitat types like; forest, agriculture/fallow land, scrub land and water bodies/wetlands (river, streams and dams) existing in the study area.
- Quantitative data were collected using standard Quadrat methods (Circular plot) following Mueller-Dombois and Ellenberg 1967, Kershaw 1973.
- Status of tree, shrub and annuals (grass and herb) was quantified using circular plots of different sizes of 15m, 8m radius and 2 x 1m² plots respectively.
- List of plant species ascertained from the concerned State Forest Department (Mirzapur Division) was compiled and included in the annexure along with filed data to give near complete floral list of the study area.

2.3.3.3. Faunal Status

Herpetofauna

- Intensive search was made along the hedges of all the aquatic habitats to list the amphibians and relative abundance will be discussed.
- Status of reptiles was assessed using Intensive Time Constrained Search Method covering different micro habitats (Welsh, 1987., Welsh and Lind. 1991).

Birds

Avifaunal status was assessed both in terrestrial and aquatic habitats

- Total count or flock count method was adopted to assess the status of aquatic birds in selected water bodies of the project area (Sridharan 1989, Bhupathy 1991., Thompson 2002 and Steinkamp *et al.*, 2003).
- Point Centre Count and perambulation techniques were applied to assess the status of terrestrial birds (Hutto *et al.*, 1986, Bibby *et al.*, 1992, Rosenstock *et al.*, 2002).
- Additional effort was made to locate/identify the presence of any breeding/nesting sites / roosting sites of avifauna.

Mammals

- Status and distribution of different mammalian fauna was quantified using direct count covering all the terrestrial habitats of the project area adopting Line transect/road count -Burnham *et al.* 1980, Sale and Berkmuller 1988, Rodgers 1991)(**Plate 1**).
- In addition circular (50m Radius) plots were laid in each sampling location and searched for indirect evidences (pellets, dungs, droppings, scats and other tracks and signs) which would provide relative abundance of presence of mammalian fauna (Thompson *et al.*, 1989, Daniels 1992, Henke and Knowlton 1995, Allen *et al.*, 1996).
- In addition, presence of different faunal species was also be ascertained and substantiated by interviewing the local people with the pictorial representation and discussion with local experts
- Secondary information collected from the state forest department was incorporated in the list along with field data to give the near complete list of all the major faunal groups.

2.3.3.4. Statuses of Rare Endangered and Threatened (RET) Flora & Fauna

- List of threatened flora and fauna of the project study area was prepared and quantified based on the primary field data. Final list was prepared with the comparison of secondary information collected from the DFO office (Mirzapur Forest Division). Baseline information were also reviewed the status of the existing threatened species within the study area by refereeing the authorized references (Anon -IWPA 1972, WCMC 1994, IUCN 2010).

2.3.3.5. Habitat

- Habitat structure and quality covering all the forests were studied using authorized maps (So I) and field survey.
- Baseline primary data collected were used to discuss the overall habitat quality
- Identification of ecologically sensitive area and wildlife corridor based on secondary resources and map work

Plate 1. Field Data Collection in different habitats

<p>Floral survey - Open Scrub forest</p>	<p>Survey in <i>A.Cathechu</i> forest</p>
<p>Data collection – Open mixed forest</p>	<p>Data collection –riverine habitat</p>
<p>Checking micro-habitat for Amphibians</p>	<p>Checking Micro habitat for Reptiles</p>
<p>Data collection – wetland (Dam Site)</p>	<p>Data collection – wetland habitat</p>

2.4. ANALYTICAL ASPECTS

2.4.1. Species Diversity

For studying community structure for flora, terrestrial and aquatic birds, the species were grouped into taxonomic classes and percentage of groups were calculated from total counts of sample. The diversity was calculated for each community using Shannon Wiener Diversity Index (SWDI).

$$d = -\sum_{i=1}^n (ni/N) \cdot \log_2(ni/N)$$

Where,

n = number of species

N = total number of individuals of all species

ni = number of individuals of “i” th species

d = Shannon Wiener Diversity Index

Where proportion is obtained by dividing the number of individuals of a species by total number of individuals of all species for which \log_2 proportion is obtained by Index table (Shannon and Weaver, 1963).

2.4.2. Important Value Index -IVI

The following formula was used to estimate the IVI

Abundance:

Abundance of a species is determined as the number of individuals per sample plot.

$$\text{Abundance} = \frac{\text{Total number of individuals of a species}}{\text{No. of plots in which the species occurred}}$$

Density

Density is defined as the number of individuals of a species in a unit area and is an expression of the numerical strength of a species in a community. The density was calculated from the data sampled using the formula

$$\text{Density} = \frac{\text{Total number of individuals}}{\text{Total number of quadrates studied}}$$

Relative Density

Relative density (RD) is the study of numerical strength of a species in relation to total number of all species and is calculated as:

$$\text{Relative Density} = \frac{\text{Number of Individuals of a species} \times 100}{\text{Number of Individuals of all species}}$$

Dominance & Relative Dominance (Basal area and Relative Basal Area):

The basal area and the relative basal area were calculated with the diameter of the stem at breast height using the following formula.

$$\text{Basal Area} = \frac{(\text{GBH})^2}{4\pi}$$

$$\text{Relative Basal Area (Dominance)} = \frac{\text{Total basal area of Individuals} \times 100}{\text{Total basal area of all species}}$$

Frequency, density, dominance and importance value index (IVI) of all woody species were determined according to Misra (1968) and Muller-Dombois and Ellenberg (1974). Basal area, relative density, relative frequency, relative dominance and importance value indices were calculated following the formulae of Curtis and Cottam (1962), where:

- Basal area (m²) = area occupied at breast height (1.3 m) = (π X (dbh/2)²)
- Relative density = number of tree of species / total number of trees
- Relative frequency = number of times the species occurs / total number of species
- Relative dominance = total basal area of a species / total basal area of all species

Importance value index (IVI) = sum of (relative density + relative frequency + relative dominance).

2.4.3. Relative Important Index

Relative important value index is nothing but the added value of only Relative Frequency and Relative Density estimated for RVI. This index was used only for the status assessment of woody shrub species

2.5. SAMPLING DETAILS – FLORA AND FAUNA

2.5.1. Sample Locations

Under the biological components study a total of 22 locations were surveyed in the core zone (Plant site) which includes eight, 5 locations agriculture/fallow land and 16 in scrub/waste land habitats. In case of buffer zone, out of 94 sampling locations, 27 were surveyed in forests, 16 in the agriculture habitats, while three dam sites and 17 sites along the riverine and stream were surveyed. All the three dam sites were also studied for aquatic fauna and flora. Overall 116 locations were intensively surveyed under this study (**Table 2.3, Map 2.3**).

Table 2.3. Number of locations surveyed in different habitats in the project study area

Habitats	Core Zone	Buffer Zone	Study Area
Forest	NA	27	27
Agriculture/Fallow Land	5	16	21
Scrub/wasteland	17	31	48
Water bodies/Wetland (dams & rivers)	NA	20	20
Total	22	94	116

2.5.2. Sample Plots

Within those 116 sampling locations, different sizes of sampling plots were laid to quantify different habits of floral and taxas of faunal species and details are discussed below.

2.5.2.1. Aquatic Ecology

For the study of aquatic ecology total 3 sampling locations were identified. All three samples were taken from dam sites. The dams are situated away from any pollution sources. Some agricultural fields were observed around the dam sites. Since all the rivers and streams are ephemera with only small puddles of water available, only the three dams which had more water was sampled. The details of sampling locations are given below

D1 (Dam 1): Upper Khajuri Dam (UKD) 3 samples, D2 (Dam 2): Lower Khajuri Dam Location (LKD), D3 (Dam 3): Kathua Bandh Location (KBD)

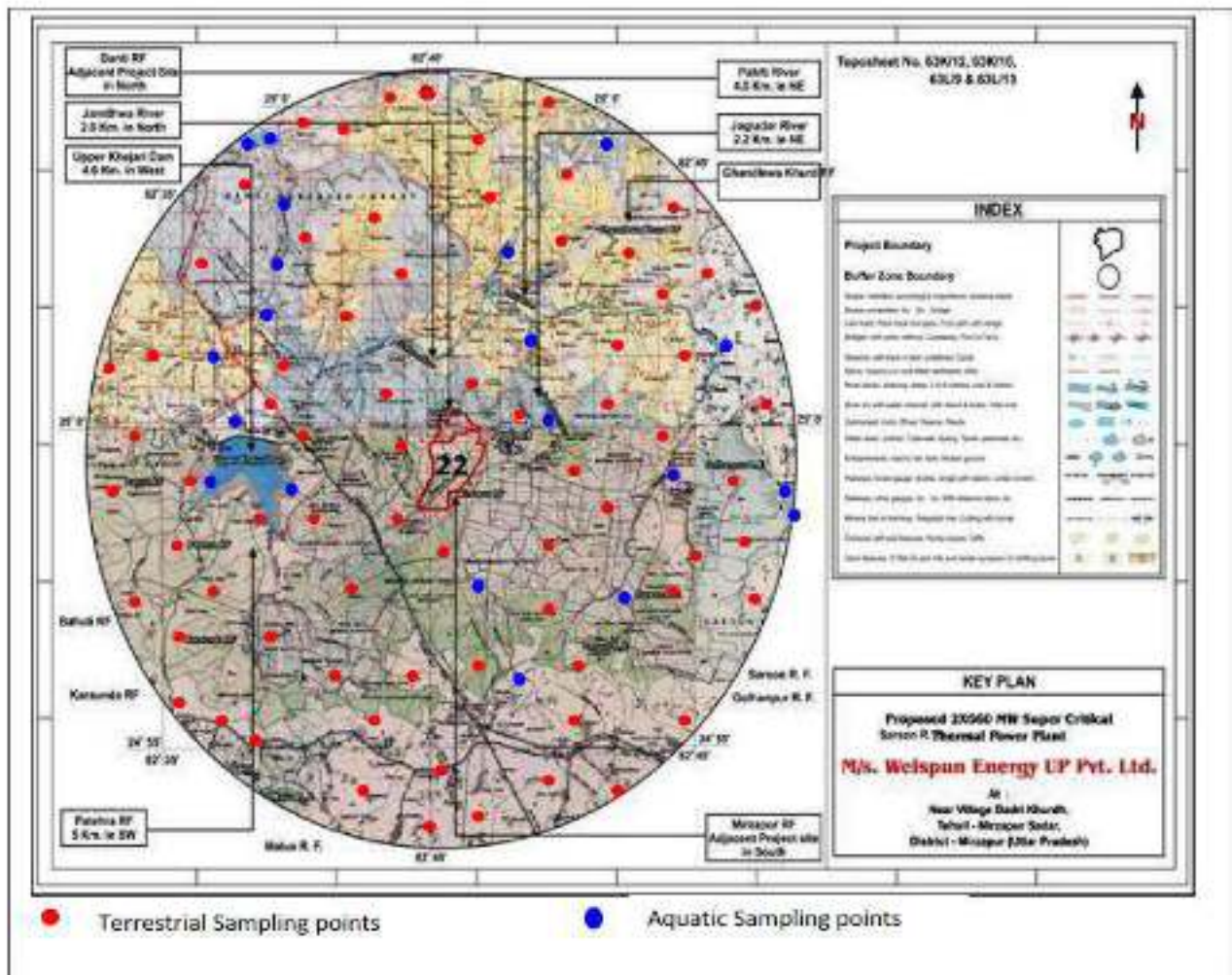
2.5.2.2. Flora

To quantify floral status, a total of 116 x 15 m radius circular plots (22 core zone and 94 buffer zone) were laid and within the sample plots matured tree species > 20 cm gbh were identified and their numbers counted. Within the 15m radius circular plots, 8m radius and 1x1m squire plots were nested to quantify each class of shrub and annuals (herbs, sedges

and grasses).

2.5.2.3. Herpetofauna

A total of 22 and 94 circular plots of 25 m radius were laid and intensively searched all the micro habitats for herpetofauna in both Core and Buffer zones respectively.



Map 2.3. Map showing the sampling locations

2.5.2.4. Birds

To quantify terrestrial birds, 116 x 100m radius Point centre quadrates were used including core and buffer zones. Total count and flock count techniques were used to quantify the aquatic bird species during different times of the study period. A total of 3 dam sites (two

sample in each) and 14 locations along the two river/streams were identified and surveyed for aquatic birds in the buffer zone. Since the core zone / plant site not having any water body aquatic bird survey was not possible

2.5.2.5. Mammals

A total of 116 x 50m radius plots were intensively searched for indirect evidences of mammalian fauna. In addition, roads crisscrossing the project area were traveled exclusively during early morning and late evenings for the direct sightings of mammalian fauna. Details of number of sample plots laid to assess the floral and faunal diversity status are given in **Table 2.4 & Map 2.3.**

All the nomenclature and scientific names have been referred from standard flora for plants and pictorial guides for fauna (Herpetofauna - Daniel J.C. 2002, Birds: Ali, S. 2002, Grimmett, et al.,2006., Mammals: Prater. 2005).

Table 2.4: Details of Sample Plots Used to Assess Floral and Faunal Status: WEUPPL Study Area - Mirzapur, Uttar Pradesh

Components	Plot size	Core Zone	Buffer Zone	Study Area
Planktons			3 Dam sites	
Plants	Trees: 15 m Radius circular plot	22	94	116
	Shrub: 8 m Radius circular plot	22	94	116
	Herbs & Grass: 1m x1m plots	22	94	116
Herpetofauna	25 m Radius circular plot	22	94	116
Birds	Terrestrial: Point centre quadrate method 100 m radius	22	94	116
	Aquatic: Total count and flock count	0	20 (6 in three dams & 14 in rivers)	
Mammals –	Indirect evidences: 50 m Radius circular plot	22	94	116

CHAPTER 3: BASE LINE STATUS OF BIODIVERSITY

3.1 BIODIVERSITY STATUS

This chapter discusses the ecological status of biota (Flora and Fauna) of the Thermal Power Plant of WEUPPL (875 acres or 354.11 ha) and 10 km radius of the project study area (40674.14 ha) in terms of biodiversity covering different life forms of plant species (tree, shrub, herb, grass and others) and major faunal groups (amphibians, reptiles, terrestrial birds, aquatic birds and mammals). Aquatic biology included listing of phyto and zooplanktons of three dam sites and other faunal groups (amphibians and aquatic birds) discussed under major faunal species status. The baseline status of biota (plant and animals) is discussed at three levels; 1. **Core zone:** i.e., only the plant area, 2. **Buffer zone** i.e., area of 10 km radius from the core zone boundary 3. **Study area:** i.e., overall combining of the status of both core and buffer zones.









3.2 STUDY HABITATS AND COMPONENTS

The Survey of India 1:50,000 Topo sheets: # 63L/9, - covers the Core Zone or Plant site, and 63K/12, 63L/13 and 63K/16 cover 10 km radius Buffer zone. Though the study area has been identified 9 land use patterns (**Table 2.1**), however, since delineation of the study area into more sub-habitat types likely to dilute the biodiversity values, they have been grouped into four major habitat types such as: Forest (Dense forest, Degraded forest, Plantation forest) Agricultural land (agro-ecosystem/agriculture fallow land), wetlands (includes riverine habitats and Dams and Scrub land (Open waste land and scrub land) for the ecological study. Since human habitation was influenced by the agricultural area list of common tree species was prepared and rest of the faunal groups reported were included in the agriculture habitat (**Table 3.1 & Plate 2**).

Table 3.1. Land Use /Land cover and details: WEUPPL Study Area - Mirzapur, Uttar Pradesh

S.no.	Land Use/Land Cover	Study Habitats
1	Water bodies	Wetland
2	Agriculture or Crop land	Agriculture/agro ecosystem
3	Fallow land	
4	Scrub land	Scrub Land
5	Open waste land	
6	Degraded forest	Forest Ecosystem
7	Dense forest	
8	Plantation /Vegetation	
9	Human settlement **	

Plate 2. Major Habitat Types of the project study Area

	
Open Scrub/waste land	Open forest – Zizyphus thorn forest
	
Dense forest – <i>Lannea coromandelica</i>	Bamboo plantation
	
Dense forest – <i>Boswellia serrata</i>	Riverine Habitat - <i>Terminalia arjuna</i>
	
Seasonal Stream- puddle of water	Wetland habitat – Dam site

3.3. BASELINE STATUS- AQUATIC ECOLOGY

3.3.1. Phytoplankton

The phytoplankton community in the study area comprised of three major classes namely Chlorophyceae, Bacillariophyceae and Cyanophyceae. In total 19 taxa were recorded at different sites during the study period (**Table 3.2.**). Chlorophyceae and Bacillariophyceae were the most dominant group observed in the study area. Some dominant species observed in all the sampling locations were *Chlamydomonas cingulata*, *Ankistrodesmus falcatus*, *Anacystis spp.*, *Fragilaria capucina*, *Cosmarium spp.*, *Pediastrum spp.*, *Scenedesmus spp.* etc. The result shows that the fresh water sources found in the study area are without any contamination. The species shows that there is lowest to medium level impact of pollution present in the study area.

Table 3.2. Taxa recorded at different Dam sites: Proposed Thermal Power Plant –, WEUPPL Study Area - Mirzapur, Uttar Pradesh

S. No.	Species Observed	Sampling Sites		
		UKD	LKD	KBD
1	<i>Rhopalodia gibba</i>	+	-	-
2	<i>Navicula radiosa</i>	+	++	+
3	<i>Cymbella cistula</i>	-	+	+
4	<i>Nitzschia frustulum</i>	++	++	-
5	<i>Surirella striatula</i>	-	-	+
6	<i>Synedra ulna</i>	+++	++	+
7	<i>Tabellaria fenestrata</i>	+	-	-
8	<i>Chlamydomonas cingulata</i>	++	++	+
9	<i>Ankistrodesmus falcatus</i>	+++	+	++
10	<i>Fragilaria capucina</i>	+	++	++
11	<i>Cyclotella Stelligera</i>	++	++	-
12	<i>Euglena spp.</i>	+	++	+
13	<i>Anabaena spp.</i>	+++	-	++
14	<i>Anacystis spp.</i>	++	+	++
15	<i>Oscillatoria spp.</i>	+	++	-
16	<i>Ulothrix spp.</i>	-	+	++
17	<i>Cosmarium spp.</i>	++	+	+++
18	<i>Pediastrum spp.</i>	+	++	++
19	<i>Scenedesmus spp.</i>	+++	+++	+

UKD-Upper Khajuri Dam, LKD- Lower Khajuri Dam, KBD- Kathua Bandh,
Abundance Category: +=Low, ++=Moderate, +++=High

3.3.2. Zooplankton

Zooplankton, comprised of a total six taxa recorded from the study area (**Table 3.3**) and has shown the presence of two taxa of Rotifer (*Keratella valga* and *Brachionus bidentata*), three taxa of Copepoda (*Nauplius larva*, *Diatomus spp.* and *Cyclops vicinus*) and one taxa of Cladocera (*Daphnia magna*). Zooplankton were observed in all the sampling locations.

Table 3.3. Taxa recorded at different Dam sites: Proposed Thermal Power Plant –, WEUPPL Study Area - Mirzapur, Uttar Pradesh

S. No.	Species Observed	Sampling Locations		
		UKD	LKD	KBD
1	<i>Brachionus bidentata</i>	++	+	+
2	<i>Nauplius larva</i>	+++	++	+++
3	<i>Daphnia magna</i>	+	-	+
4	<i>Keratella valga</i>	++	-	++
5	<i>Cyclops vicinus</i>	+++	+++	+++
6.	<i>Diatomus spp.</i>	+	+	-

UKD-Upper Khajuri Dam, LKD- Lower Khajuri Dam, KBD- Kathua Bandh,
Abundance Category: +=Low, ++=Moderate, +++=High

3.3.3. Aquatic plants

Aquatic plants are also referred as hydrophytes or aquatic macro-phytes. In the study area some hydrophytes were observed during the survey, these are *Azolla spp.*, *Wolffia spp.*, *Spirodella spp.* and *Lemna spp.* These are free floating hydrophytes observed on water surface. These groups of are very important for survival of the fishes and some of the birds that depend on planktons and indirectly the survival of many fish eating water birds present in these water bodies.

3.4 STATUS OF FLORA

3.4.1 Taxonomical status, species richness and diversity of Plant Species

Core Zone: Core zone i.e., the proposed Plant unit area showed species richness of 87 of 74 genera and 36 families. Among the habitats, 61 plant species were reported from open scrub area followed by 48 from the agriculture habitat with the species diversity of H' 2.08 and H' 3.11 in OS/WL and AG/FL areas respectively (**Table 3.4**). Out of the 87 species only 19 species are trees and the list of core zone do not have any threatened or endangered flora

Buffer Zone: The large extent of 10 km radius of the buffer zone reported 259 species of plants come under 203 genera and they belong to 74 families. The agriculture/fallow land habitat recorded maximum of 140 species of 116 genera belongs to 57 families. Forest habitat was identified 96 species of plants fall under 80 genus and 42 families. Due to moisture availability and record of 52 species of herbs in agriculture habitat showed domination of floral species. Added, dryness of forest area and separation of riverine habitat of forested area reasoned for comparatively lower species richness. The estimated diversity for forest and agriculture was 2.71 and 3.58 respectively (**Table 3.4**). The wetland/riverine

habitat (WB/R) was identified with 111 plant species and diversity of H' 3.81, which was the higher than the other habitats of the buffer zone. Minimum of 67 species were recorded from the open scrub/wasteland habitat. Overall the buffer zone covering large extent of area reported 259 plant species with diversity of H'3.77 (**Table 3.4**).

Study Area: Status of floral species in the proposed Thermal power plant of WEUPPL project study area, which include core and buffer zones reported an overall species richness of 271 species of plants belong to 212 genera and 74 families. (**Table 3.4**) Species list with their life forms and common names are given in **Annexure 1**.

Table 3.4: Taxonomical Status of Floral Species - Proposed Thermal Power Plant –, WEUPPL Study Area - Mirzapur, Uttar Pradesh

Parameters	Core Zone		CT	Buffer Zone				BT	SAT
	OS/WL	AG/FL		D/DFR	WB/R	OSWL	AGFL		
Family	33	26	36	42	52	35	57	74	74
Genus	54	40	74	80	99	57	116	203	212
Species	61	48	87	96	111	67	140	259	271
Species Diversity	2.08	3.11	3.24	2.71	3.81	3.28	3.58	3.77	3.76

OSWL- Open Scrub & Waste Land, AG/FL – Agriculture & Fallow Land, D/DFR - Forest, WB/R – Water bodies and Rivers, Ct- Core Zone Total, BT – Buffer Total, SAT- Study Area Total

3.4.2 Habit

Core Zone: In case of core zone annuals (herb and grass) showed high richness (42 species) followed by tree species (19 species, including small and large tree species) and they contributed 48 % and 22 % respectively. Shrub (Woody and small shrub) reported with 14 species and they contributed 16% followed by twiners and creepers 12 species (**Table 3.5**). Though the core zone reported 87 floral species, the annuals which include grass, herbs (44 species) and twiners and creepers (12 species) shared overall 61 % of the habit types. Hence the record of only 12 tree species indicate poor canopy vegetation cover in the project site.

Buffer Zone: Overall the buffer zone recorded 259 species, of which maximum of 116 species were annuals (herb and grass) and shared 44.79 % followed by trees 76 species with 29% (including small and large tree). Woody climbers, Creepers and Twiners contributed a total of 24 species and shared 9% of the list. Shrub habit (woody and small shrub) dominated second and reported 37 species with the share of 14.29% (**Table 3.5**).

Study Area: Inclusive of both the core and buffer zone, a total of 271 species were reported

for the entire study area and dominated by 44% of annuals (herbs and grass) with 118 species, followed by 29% of tree species (79). Only two species of parasitic species were reported in the study area (Table 3.5).

Table 3.5: Habit/life form Status of Floral Species - Proposed Thermal Power Plant –, WEUPPL Study Area - Mirzapur, Uttar Pradesh

Habit/Life form	Core Zone		CT	R%	Buffer Zone				BT	R%	SAT	R%
	OS/WL	AG/FL			D/DFR	WB/R	OSWL	AGFL				
Herb	17	19	31	35.63	23	22	49	52	96	37.07	97	35.79
Grass	8	6	11	12.64	7	8	10	9	20	7.72	21	7.75
Sedge	0	0	0	0.00	0	0	4	1	5	1.93	5	1.85
WC/C/TW	10	4	11	12.64	12	6	9	12	24	9.27	26	9.59
Woody Shrub	6	9	12	13.79	12	9	11	17	26	10.04	30	11.07
Small Shrub	2	2	2	2.30	2	7	3	5	11	4.23	11	4.06
Small Tree	4	2	4	4.60	6	3	2	6	10	3.86	10	3.69
Large Tree	13	6	15	17.24	33	11	22	37	66	25.10	69	25.46
Parasite	1	0	1	1.15	1	1	1	1	2	0.77	2	0.74
Total	61	48	87	100.00	96	67	111	140	260	100	271	100.00

OSWL- Open Scrub & Waste Land, AG/FL – Agriculture & Fallow Land, D/DFR - Forest, WB/R – Water bodies and Rivers, CT- Core Zone Total, BT – Buffer Total, SAT- Study Area Total

3.4.3. Status of Woody shrubs –RVI

Status of woody shrub was assessed based on Relative Value Index. It is similar to IVI but only total values of Relative frequency and Relative density which reflects the abundance and distribution status.

Core Zone: Core zone reported only 11 species woody shrubs of that *Zizyphus xylopyrus*, *Zizyphus oenoplia* and *Cocculus hirsutus* were dominated with 50%, 44% and 32% of RVI values and were first three in order of ranking respectively. Other eight species secured less than 30 % of RVI, therefore only three woody shrubs were dominant in the core zone, which are very common species (Table 3.6).

Buffer Zone: Out of 24 woody shrubs reported for the study area 22 species were identified and enumerate from the different habitats of the buffer zone. Among the species, *Zizyphus xylopyrus* topped in the rank and secured 62.49% of RVI followed by *Carissa congesta* and *Cocculus hirsutus* in the second and third position with 29% and 20% of RVI respectively. *Zizyphus nummularia*, *Securine gavirosa*, *Helicteres isora*, were the other three species secured more than 10% of RVI while rests of 16 species estimated RVI less than 10%. Thus it showed the study area dominated with few woody shrubs (Table 3.6).

Overall Status: Based on top six ranking species of core zone, since they secured more than 10% of RVI and top 10 species of buffer zone (leaving *Lantana camara* as it is an exotic species) a cumulative list of 11 species shared 45.83 of the total list of shrub species and 6 species were common between the zones. These species due to their high population and wider distribution in nature they are promising species to consider for habitat restoration program to develop ground vegetation cover, which would arrests soil erosion and also provide forage for browsers (ungulates) of the study area (**Table 3.6**).

Table 3.6: Relative Value Index (RVI) of Common and Wild Woody Shrub species - Proposed Thermal Power Plant –, WEUPPL Study Area - Mirzapur, Uttar Pradesh

S.no.	Common Woody Shrub species	Core Zone				Buffer Zone				SPS
		RF	RDN	RVI	RO	RF	RDN	RVI	RO	
1	<i>Zizyphus xylopyrus</i>	19.23	30.66	49.89	1	25.95	36.54	62.49	1	*
2	<i>Zizyphus oenoplia</i>	21.15	23.11	44.27	2	3.05	3.31	6.36	9	*
3	<i>Capparis spp.</i>					0.76	0.31	1.08	18	
4	<i>Zizyphus nummularia</i>	19.23	9.43	28.66	4	7.63	8.82	16.45	4	*
5	<i>Cocculus hirsutus</i>	15.38	16.51	31.89	3	10.69	9.29	19.98	3	*
6	<i>Capparis sepiaria</i>					4.58	2.52	7.10	8	*
7	<i>Capparis zeylanica</i>	3.85	1.42	5.26	7	4.58	1.57	6.15	10	*
8	<i>Grewia Sp.</i>					0.76	0.16	0.92	19	
9	<i>Securine gavirosa</i>	1.92	0.94	2.87	9	7.63	4.09	11.73	5	*
10	<i>Helicteres isora</i>					3.82	6.30	10.12	6	*
11	<i>Agave americana</i>					0.76	0.47	1.24	17	
12	<i>Carissa congesta</i>	5.77	7.08	12.84	6	12.98	15.59	28.57	2	*
13	<i>Lantana camara</i>					3.05	4.09	7.15	7	
14	<i>Waltheria indica</i>	7.69	6.60	14.30	5	2.29	1.26	3.55	12	*
15	<i>Cocculus pendulus</i>					3.82	1.57	5.39	11	*
16	<i>Hibiscus sp</i>					0.76	0.47	1.24	17	
17	<i>Woodfordia fruticosa</i>					1.53	0.79	2.31	14	
18	<i>Calotropis procera</i>	1.92	0.47	2.39	10	1.53	0.63	2.16	15	
19	<i>Kirganeli areticulata</i>					0.76	0.94	1.71	16	
20	<i>Ipomoea carnea Subsp. Fistulosa</i>					1.53	0.94	2.47	13	
21	<i>Citrus limon</i>					0.76	0.16	0.92	19	
22	<i>Hibiscus ovalifolius</i>					0.76	0.16	0.92	19	
23	<i>Jatropha curcas</i>	1.92	2.83	4.75	8					
24	<i>Asparagus racemosus</i>	1.92	0.94	2.87	9					
Total species		11				22				11

RF- Relative Frequency, RDN – Relative Density, RVI –Relative Value Index, SA- Study Area, RO - Rank Order, * SP – Selected species

3.4.4. Status of Common Tree species

List of common tree species was prepared simply listing of tree species found in and around the human habitation. This list identified overall 31 species of 27 genera and they belong to

16 families. Among the species 26 were large tree species rests are small trees. Within the list 11 species were selected as domestic use values as fruit trees and suggested for plantation in and around the any residential area proposed to develop under this project **Table 3.7**. These fruit bearing trees are likely to provide food for many bird species. This list also includes some wild tree species commonly found in and around the human habitations.

Table 3.7: Common Tree Species reported in and around the habitation -Proposed Thermal Power Plant –, WEUPPL Study Area - Mirzapur, Uttar Pradesh

S.no.	Family & Species name	Local Name	Size	SP
1	Anacardiaceae			
1	<i>Mangifera indica</i> L.	Ama	L	*
2	Annonaceae			
2	<i>Annona squamosa</i> L.	Shareefa	S	*
3	Apocynaceae			
3	<i>Alstonia scholaris</i> (L.) R. Br.	Saptaparni	S	
4	Arecaceae			
4	<i>Cocos nucifera</i> L.	Narial	L	*
5	<i>Borassus flabellifer</i> L.		L	
5	Caesalpiniaceae			
6	<i>Cassia fistula</i> L.	Amaltas	L	
7	<i>Cassia siamea</i> Lam.	Sandan	L	
8	<i>Delonix elata</i> (L.) Gamble	Gul Mahor	L	
9	<i>Parkinsonia aculeata</i> L.		S	
10	<i>Peltophorum pterocarpum</i>		L	
11	<i>Tamarindus indica</i> L.	Imli	L	*
6	Euphorbiaceae			
12	<i>Emblica officinalis</i> Gaertn.	Aawla	S	*
7	Fabaceae			
13	<i>Dalbergia sissoo</i> Roxb.	Shishu	L	
14	<i>Derris indica</i> (Lam.) Bennet	kiramal,karanj	L	
8	Meliaceae			
15	<i>Azadirachta indica</i> A. Juss.	Neem	L	
9	Mimosaceae			
16	<i>Albizia lebbek</i> (L.) Bth.	Shireesh, Chichola	L	
17	<i>Leucaena latisiliqua</i> (L.) Wt. & Arn.		L	
18	<i>Pithecellobium dulce</i> (Roxb.) Bth.		L	
10	Moraceae			
19	<i>Artocarpus heterophyllus</i> Lamk.	Katahal	L	*
20	<i>Ficus benghalensis</i> L.	Bargad	L	
21	<i>Ficus religiosa</i> L.	Pipal	L	
11	Moringaceae			
22	<i>Moringa oleifera</i> Lam.		L	*
12	Myrtaceae			
23	<i>Eucalyptus globulus</i> Labill.		L	
24	<i>Psidium guajava</i> L.	Amrut	S	*
25	<i>Syzygium cumini</i> (L.) Skells	Jamun	L	*
26	<i>Syzygium heyneanum</i> Wall. ex W. & A.	Kathjamun	L	*
13	Rutaceae			
27	<i>Aegle marmelos</i> (L.) Corr.	Bel	L	*

S.no.	Family & Species name	Local Name	Size	SP
14	Sapotaceae			
28	<i>Madhuca indica</i> J. F. Gmel.	Mahua	L	
29	<i>Manilkara hexandra</i> (Roxb.) Dub		L	
15	Simaroubaceae			
30	<i>Ailanthus excelsa</i> Roxb.		L	
16	Verbenaceae			
31	<i>Tectona grandis</i> L.f.	Sagon	L	

L-Large tree , S- Small Tree , SP –Selected Species

3.4.5. Status of Wild Tree Species

Status of wild tree species was discussed based on Important Value Index (IVI) estimated by combining Relative frequency (RF), Relative density (RDN) and Relative Dominance (RDO) considering only the matured trees of more than 20cm GBH.

Core Zone: Though the core zone showed high species richness of overall 87 species, it reported only 19 tree species (Table 3.5) and within these only 12 wild tree species were reported as large tree2 (> 20cm GBH). Among the 12 species, *Ficus mollis Vahl* (IVI 75%) ranked 1st followed by *Butea monosperma* (55%), *Acacia cathechu* (44%) and *Flacourtia indica* (34%) and they estimated IVI value of more than 30%. These species were dominant in terms of their wider distribution; more in number and larger in size in the study area. *Zizyphus mauritiana*, *Lagerstroemia parviflora*, *Sterculia urens*, *Bauhinia racemosa*, were dominated in the second level with higher than 10% of IVI (**Table 3.8**).

Out of the 19 species reported in the core zone only 12 were of matured trees with more than 20 cm GBH. Among these species *Ficus mollis Vahl* (IVI 75%) ranked 1st followed by *Butea monosperma* (55%), *Acacia cathechu* (44%) and *Flacourtia indica* (34%) and they estimated IVI value of more than 30%. Rest of the nine species were estimated IVI value less than 30 % and it shows their poor distribution, density and dominance.

Buffer Zone: Out of 76 tree species reported in the buffer zone, 39 species identified in the forest habitat while maximum of 43 species were reported in agriculture habitat which had few wild tree species. Overall the larger buffer zone listed 24 large trees with >20cm GBH. Among the species *Terminalia bellerica* (33%), *Ficus mollis* (33%), *Butea monosperma* (32%), *Acacia cathechu* (21%), *Acacia leucophloea* (15%), reported as top five ranking species and they secured more than 15% of IVI values. *Madhuca indica*, *Terminalia arjuna*, *Lagerstroemia parviflora* were dominated as second level with more than 10% IVI values.

Study area: Including both the core and buffer zones, a cumulative list of 27 trees were assessed IVI value since they had GBH > 20cm. The species which are secured more than 10% of IVI in core and buffer zones were selected as potential and promising tree species for habitat improvement and any greenbelt development programs. This list include a total of 13 tree species and among those, *Acacia cathechu*, *Ficus mollis*, *Butea monosperma*, *Lagerstroemia parviflora* were found dominated in both the zones (Table 3.8).

Table 3.8: Status of wild Tree species based on IVI index- Proposed Thermal Power Plant – WEUPPL Study Area - Mirzapur, Uttarpradesh

S.no.	Wild/Forest Tree species	Core Zone				RO	Buffer Zone				RO	SP
		RF	RDN	RDO	IVI		RF	RDN	RDO	IVI		
1	<i>Acacia nilotica</i>						3.27	2.31	0.58	6.16	12	
2	<i>Aegle marmelos</i>						1.96	1.16	0.10	3.22	19	
3	<i>Cassia fistula</i>						1.31	0.66	0.01	1.98	23	
4	<i>Dalbergia sissoo</i>						0.65	3.14	2.00	5.79	14	
5	<i>Emblia officinalis</i>						1.31	0.50	0.33	2.13	21	
6	<i>Ficus benghalensis</i>						1.31	0.50	7.84	9.64	9	
7	<i>Ficus racemosa</i>						3.27	1.49	1.21	5.96	13	
8	<i>Ficus religiosa</i>						0.65	0.17				
9	<i>Madhuca indica</i>						3.27	1.82	8.32	13.41	6	*
10	<i>Syzygium cumini</i>						1.96	0.83	4.34	7.12	11	
11	<i>Syzygium heyneanum</i>						0.65	0.17	1.19	2.01	22	
12	<i>Acacia cathechu</i>	16.67	24.36	2.58	43.61	3	9.80	11.06	0.26	21.12	4	*
13	<i>Terminalia arjuna</i>						3.27	3.96	4.23	11.46	7	*
14	<i>Ficus mollis</i>	2.08	1.92	70.69	74.70	1	1.96	0.50	30.11	32.56	2	*
15	<i>Butea monosperma</i>	20.83	30.77	3.13	54.73	2	12.42	18.48	0.26	31.16	3	*
16	<i>Holoptelea integrifolia</i>	4.17	1.28	2.08	7.53	11	5.23	3.30	0.03	8.56	10	
17	<i>Stereospermum suaveolens</i>						0.65	0.17				
18	<i>Ixora arborea</i>						1.31	1.49				
19	<i>Acacia leucophloea</i>	4.17	2.56	0.60	7.33	12	9.80	5.28	0.07	15.15	5	*
20	<i>Flacourtia indica</i>	18.75	14.74	0.03	33.52	4	3.92	2.15				*
21	<i>Mitragyna parvifolia</i>						0.65	0.17	0.27	1.09	24	
22	<i>Xeromphis uliginosa</i>						1.31	1.16				
23	<i>Bauhinia racemosa</i>	2.08	0.64	8.02	10.74	9	2.61	1.32				*

S.no.	Wild/Forest Tree species	Core Zone				RO	Buffer Zone				RO	SP
		RF	RDN	RDO	IVI		RF	RDN	RDO	IVI		
24	<i>Holarrhena antidysenterica</i>						6.54	13.86				
25	<i>Zizyphus mauritiana</i>	8.33	6.41	1.01	15.76	5	2.61	0.99	0.18	3.79	17	*
26	<i>Xeromphis spinosa</i>	4.17	4.49	0.003	8.66	10	1.96	1.32				
27	<i>Lannea coromandelica</i>	6.25	5.13	0.52	11.90	8	1.96	0.83	0.71	3.50	18	*
28	<i>Diospyros melanoxylon</i>						2.61	1.65				
29	<i>Lagerstroemia parviflora</i>	8.33	4.49	2.84	15.66	6	4.58	6.77	0.09	11.43	8	*
30	<i>Terminalia belerica</i>						0.65	0.17	32.61	33.43	1	*
31	<i>Leucaena latisiliqua</i>						0.65	2.81				
32	<i>Alangium salvifolium</i>						1.31	2.31				
33	<i>Boswellia serrata</i>						1.31	2.31	1.47	5.09	15	
34	<i>Wrightia tinctoria</i>	2.08	0.64				1.31	0.83	0.31	2.45	20	
35	<i>Sterculia urens</i>	2.08	2.56	8.51	13.16	7	0.65	0.17	3.48	4.29	16	*
36	<i>Streblus asper</i>						0.65	3.96				
37	<i>Balanites aegyptiaca</i>						0.65	0.33				
	Total no large tree species	12					24				27	13

RF-Relative frequency, RDN- Relative density, RDO-Relative dominance, IVI – Important Value Index, RO – Rank order.
SP – Selected species

3.4.6. Status of crop Species

As per the secondary sources, Major crops of the study area cultivated during monsoon period (Kharif crop) and in winter months (Rabi crop) include:

Rabi: Wheat, gram, Pea, Arhar, Barley, Lentil and Mustard etc.

Kharif: Paddy, Gingili, Minor millet, Rapeseed, Black gram, Millet, Smaller millet, Green gram and Ground nut.

However, during the study, the list of crop species was prepared based on the casual observation while collecting data in and around the agriculture habitat. Based on the survey a total of 39 species were reported in the study area which were cultivated as major and minor crops, while some species were reported as hedge cultivation in small extent of areas. Based on their use value they have been grouped into five categories.

Among these, three species fall under grain crops, 18 vegetable crops, 11 species of fruit crops, two timber crops, five cash crops. Among the grain crops wheat, paddy, tuvar, millets, grams and ground nut are cultivated extensively as major crops species. Vegetable crops include 18 species; however, bhindi, tamater, chilli, muri and ringna were commonly cultivated as minor vegetable crops. All the 11 species of fruit crops are grown in small areas along the agricultural hedges and mainly for local use. All the five commercial crops are cultivated extensively and they form major income of the local agriculturalists (**Table 3.9**). *Tectona grandis* and *Dalbergia sissoo* are the wild timber species, but few trees grown along the agriculture edges in addition to extensive plantation of *sissoo* under forest plantation.

Since the land use of the core zone has only open scrub/wasteland and agriculture /fallow land and absence of perennial water sources, no intensive agriculture takes place within it.

Table 3.9: List of Agriculture and Commercial Crop Species Reported - Proposed Thermal Power Plant –, WEUPPL Study Area - Mirzapur, Uttarpradesh

S. No	Species Name	Family	Common Name	Habit
1	Grain Crops			
1/1	<i>Cajanus cajan</i>	Fabaceae	Tuvar	Under Shrub
2/2	<i>Oryza sativa</i>	Poaceae	Rice	Grass
3/3	<i>Triticum aestivum</i>	Poaceae	Gehu	Grass
2	Vegetable Crops			
4/1	<i>Abelmoschus esculentus</i>	Malvaceae	Bhindi, Bhindo	Under Shrub
5/2	<i>Allium cepa</i>	Liliaceae	Pyas	Herb
6/3	<i>Amorphophallus campanulatus</i>	Araceae	Sooran	Herb
7/4	<i>Atriplex hortensis</i>	Chenopodiaceae	Palak	Herb
8/5	<i>Capsicum annum</i>	Solanaceae	Green chili	Herb
9/6	<i>Cucumis sativus</i>	Cucurbitaceae	Kheera	Climber
10/7	<i>Cucurbita maxima</i>	Cucurbitaceae	Kaddu	Climber
11/8	<i>Daucus carota</i>	Apiaceae	Gajar	Herb
12/9	<i>Lagenaria siceraria</i>	Cucurbitaceae	Lauki	Climber
13/10	<i>Luffa cylindrica</i>	Cucurbitaceae	Torai	Climber
14/11	<i>Lycopersicon lycopersicum</i>	Solanaceae	Tamater	Herb
15/12	<i>Momordica charantia</i>	Cucurbitaceae	Karela	Climber
16/13	<i>Momordica dioica</i>	Cucurbitaceae	Kheksa	Climber
17/14	<i>Moringa oleifera</i>	Moringaceae		Tree
18/15	<i>Raphanus sativus</i>	Brassicaceae	Muri	Herb
19/15	<i>Solanum melongena</i> var. <i>melongena</i>	Solanaceae	Bhanta	Herb
20/17	<i>Solanum melongena</i> var. <i>insana</i>	Solanaceae	Ringna	Herb
21/18	<i>Trichosanthes dioica</i>	Cucurbitaceae	Parval	Climber
3	Fruit Crops			
22/1	<i>Aegle marmelos</i>	Rutaceae	Bel	Tree

S. No	Species Name	Family	Common Name	Habit
23/2	<i>Annona squamosa</i>	Annonaceae	Shareefa	Small Tree
24/3	<i>Artocarpus heterophyllus</i>	Moraceae	Katahal	Tree
25/4	<i>Carica papaya</i>	Caricaceae	Papita	Small tree
26/5	<i>Citrus limon</i>	Rutaceae	Nimbu	Woody shrub
27/6	<i>Cocos nucifera</i>	Arecaceae	Narial	Tree
28/7	<i>Cucumis melo var. melo</i>	Cucurbitaceae	Kharbooja	Herb
29/8	<i>Embllica officinalis</i>	Euphorbiaceae	Aawla	Tree
30/9	<i>Mangifera indica</i>	Anacardiaceae	Ama	Tree
31/10	<i>Musa paradisiaca</i>	Musaceae	Kela	Herb
32/11	<i>Punica granatum</i>	Punicaceae	Anar	Small Tree
4	Timber Crops			
33/1	<i>Dalbergia sissoo</i>	Fabaceae	Shishu	Tree
34/2	<i>Tectona grandis</i>	Verbenaceae	Sagvan, Sag	Large Tree
5	Cash/Commercial Crops			
35/1	<i>Brassica nigra</i>	Brassicaceae	Rai	Herb
36/2	<i>Foeniculum vulgare</i>	Apiaceae	Saunf	Herb
37/3	<i>Ricinus communis</i>	Euphorbiaceae	Rendi ,Arandi	Shrub
38/4	<i>Saccharum officinarum</i>	Poaceae	Ganna	Grass
39/5	<i>Sesamum indicum</i>	Pedaliaceae	Til	Herb

3.4.7. Overall Species Richnes

During this study a total of 271 plant species of different habits were reported within the study area and they belong to 212 genus and 74 families. The forest department list showed only 82 species of 63 genus and 34 families. All the species given in the forest department list were reported in the sampling plots of the study area and no new species added in the cumulative list. Since the study reported diverse floral species it added 189 species to the forest list. Overall species richness of the study area stands as in case of the study list (Table 3.10 & Annexure 1).

Table 3.10: Overall Species Richness of Flora -Proposed Thermal Power Plant – , WEUPPL Study Area - Mirzapur, Uttar Pradesh

Parameters	Study Area List	State Forest Department Mirzapur Division	Overall
Family	74	34	
Genus	212	63	
Species	271	82	

3.5 STATUS OF FAUNA

This section includes the discussion of major faunal groups like; amphibians, reptiles, birds (terrestrial and aquatic) and mammals. Among the groups, due to taxa specific nature of life, direct sightings of herpetofauna and mammalian fauna was always lower than the avifauna,

which is more active and mobile. Therefore status of herpetofauna and mammal groups were discussed only at species richness and abundance levels based on actual number of animals and indirect evidences recorded for those groups respectively.

3.5.1 Status of Herpetofauna

3.5.1.1 Taxonomical status and Species Richness – Amphibians

Core Zone: In the core zone, i.e., the proposed Thermal Power Plant –, WEUPPL project site no amphibians were reported, which was due to absence of water source and all the small seasonal water bodies were dry (**Table 3.11**).

Buffer Zone: In case of overall buffer zone (OBZ), which is largest extent of area included water bodies/ rivers and agricultural land with water reported three species of amphibians. Maximum of three species were identified from water bodies/rivers, while two species were recorded in agriculture/fallow lands (**Table 3.11**).

Study Area: Since there were was no amphibians recorded in the core, the overall status of the study area was same as in case of buffer zone (**Table 3.11**).

Table 3.11: Taxonomical Status of Amphibians-Proposed Thermal Power Plant –, WEUPPL Study Area - Mirzapur, Uttar Pradesh

Parameters	Core Zone		CT	Buffer Zone				BT	SAT
	OS/WL	AG/FL		D/DFR	WB/R	OS/WL	AG/FL		
Family	0	0	0	0	1	0	1	1	1
Genus	0	0	0	0	3	0	2	3	3
Species	0	0	0	0	3	0	2	3	3

OSWL- Open Scrub & Waste Land, AG/FL – Agriculture & Fallow Land, D/DFR - Forest, WB/R – Water bodies and Rivers , CT- Core Zone Total, BT – Buffer Total, SAT- Study Area Total

3.5.1.2 Abundance Status – Amphibian

Core Zone: No amphibians were reported from the core zone.

Buffer Zone: In the buffer zone, where three species were recorded, Skittering Frog (*Occidozyga cyanophlyctis*) accounted for 30 frogs, which formed 79% of the total 38 reported (**Table 3.12**).

Study Area: Since no amphibians were recorded in the core zone the abundance status of amphibians in the study area was the same as in the buffer zone (**Table 3.12**). Overall the amphibian richness and abundance was poor in the study area.

Table 3.12: Abundance Status of Amphibians -Proposed Thermal Power Plant –, WEUPPL Study Area - Mirzapur, Uttar Pradesh

S.No	Family & Species Name	Common Name	Core Zone		CT	Buffer Zone				BT	SAT
			OS/WL	AG/FL		D/DFR	WB/R	OS/WL	AG/FL		
	Randidae										
1	<i>Limnonectes limnocharis</i>	Cricket Frog	0	0	0	0	3	0	0	3	3
2	<i>Hoplobatrachus tigerinus</i>	Indian Bull Frog	0	0	0	0	3	0	2	5	5
3	<i>Occidozyga cyanophlyctis</i>	Skittering Frog	0	0	0	0	23	0	7	30	30

OSWL- Open Scrub & Waste Land, AG/FL – Agriculture & Fallow Land, D/DFR - Forest, WB/R – Water bodies and Rivers , CT- Core Zone Total, BT – Buffer Total, SAT- Study Area Total

3.5.1.3 Taxonomical Status and Species Richness – Reptiles

Core Zone: Reptilian status in the core zone was represented by only three species belonging to three genera and three families, with two species each found in open scrub/waste land and agriculture /fallow land (**Table 3.13**).

Buffer Zone: In buffer zone nine species of reptiles were recorded, which belonged to eight genera and six families. Among these nine species, maximum of seven species were recorded in water bodies/ river followed by forest (five species) and open scrub/wasteland (four species) others (**Table 3.13**).

Study Area: The overall richness in the study area, that includes both the core and buffer zones, showed that 10 species were recorded in the area (**Table 3.13**).

Table 3.13: Taxonomical Status of Reptiles -Proposed Thermal Power Plant –, WEUPPL Study Area - Mirzapur, Uttar Pradesh

Parameters	Core Zone		CT	Buffer Zone				BT	SAT
	OS/WL	AG/FL		D/DFR	WB/R	OS/WL	AG/FL		
Family	2	2	3	4	4	3	3	6	7
Genus	2	2	3	5	6	3	3	8	9
Species	2	2	3	5	7	4	3	9	10

OSWL- Open Scrub & Waste Land, AG/FL – Agriculture & Fallow Land, D/DFR - Forest, WB/R – Water bodies and Rivers , CT- Core Zone Total, BT – Buffer Total, SAT- Study Area Total

3.5.1.4 Abundance status – Reptiles

Core Zone: In the core zone a total of only seven individuals were recorded of which Garden Lizard (*Calotes versicolor*) was with four individuals followed by Leschenault's Lecertid (*Ophisops leschenaultii*) (two) and Spectacled Cobra (*Naja naja*) (one individual) that was recorded only in the core zone. Maximum of five individuals were recorded in open scrub/waste land (**Table 3.14**). On the whole, the core zone showed poor richness and population /abundance.

Buffer zone: Abundance status of the buffer zone resulted in enumeration of 77 animals of nine species. Among the species, *Calotes versicolor* recorded a maximum of 31 individuals followed by Bronze grass skink - *Mabuya macularia* (20) and *Ophisops leschenaultii* (15) and these species contributed 86 % of the total abundance. There was not much variation among different species in terms of abundance in the buffer zone (**Table 3.14**).

Study Area: The overall abundance status for the study area was 84 individuals with 92% of the total abundance of reptiles found in the buffer zone. The overall status of different species in the study area also showed that *Calotes versicolor* (35 individuals), Bronze *Mabuya macularia* (20) and *Ophisops leschenaultii* (17) were with more individuals (**Table 3.14**). This clearly shows the low richness and abundance of reptiles in the study area.

Table 3.14: Abundance Status of Reptiles -Proposed Thermal Power Plant –WEUPPL Study Area - Mirzapur, Uttar Pradesh

S.No	Family & Species Name	Common Name	Core Zone		CT	Buffer Zone				BT	SAT
			OS/WL	AG/FL		D/DFR	WB/R	OS/WL	AG/FL		
1	Agamidae										
1	<i>Calotes versicolor</i>	Indian Garden Lizard	3	1	4	9	6	10	6	31	35
2	<i>Sitana ponticeriana</i>	Fan-throated Lizard	0	0	0	3	1	0	0	4	4
2	Lacertidae										
3	<i>Ophisops leschenaultii</i>	Leschenault's Lacerta	2	0	2	6	1	8	0	15	17
3	Scincidae										
4	<i>Mabuya macularia</i>	Bronze Grass Skink	0	0	0	2	6	1	11	20	20
5	<i>Mabuya carinata</i>	Common Keeled Grass Skink	0	0	0	0	1	1	0	2	2
4	Gekkonidae										
6	<i>Hemidactylus frenatus</i>	Asian House Gecko	0	0	0	0	0	0	1	1	1
5	Varanidae										
7	<i>Varanus bengalensis</i>	Common Indian Monitor	0	0	0	1	0	0	0	1	1
6	Colubridae										
8	<i>Ptyas mucosa</i>	Rat Snake	0	0	0	0	1	0	0	1	1
9	<i>Xenochrophis piscator</i>	Checkered Keelback	0	0	0	0	2	0	0	2	2
7	Elapidae										
10	<i>Naja naja</i>	Spectacled Cobra	0	1	1	0	0	0	0	0	1
Overall			5	2	7	21	18	20	18	77	84

OSWL- Open Scrub & Waste Land, AG/FL – Agriculture & Fallow Land, D/DFR - Forest, WB/R – Water bodies and Rivers, CT- Core Zone Total, BT – Buffer Total, SAT- Study Area Total, * information from Local People / Forest Staff

3.5.1.5. Overall Species Richness

During the study, including amphibian and reptiles a total of 13 herpetofauna were reported from the study area. The State Forest Department list reported 12 species of reptiles (no amphibian in the list) belonging to 12 genera and 10 families. Inclusive of three species of amphibian and five reptiles that were exclusively recorded during this study, the seven reptile species recorded exclusively by the Mirzapur Forest Division and five species common to the present study and Forest Department list, the cumulative list resulted with 20 species of 18 genera and 13 families for the Mirzapur Forest area (**Table 3.15 & Annexure 2**).

Table 3.15: Overall Species Richness of Herpetofauna-Proposed Thermal Power Plant – WEUPPL Study Area - Mirzapur, Uttar Pradesh

Parameters	Study Area List	State Forest Department Mirzapur Division	Overall
Family	8	10	13
Genus	12	12	18
Species	13	12	20

3.5.2. Status of Avifauna- Terrestrial

3.5.2.1 Taxonomical Status, Species Richness and Diversity

Core zone: Status of birds assessed within the core zone, which had only open scrub / wasteland and agriculture / fallow land habitats, reported a total of 46 species belonging to 35 genera of 22 families and with estimated diversity of $H'=3.1$. Among the two habitats, the status was more in open scrub /wasteland (45 species, $H'=3.1$) compared to 19 species ($H'=2.6$) in the agriculture/ fallow land (**Table 3.16**).

Buffer Zone: The buffer zone area covers the large extent of forest habitat and it had in total 85 terrestrial bird species that come from 63 genera and 30 families with maximum of 58 species from the forest in and around the wetland/river habitat followed by 53 in forest, 45 in agriculture and 41 in open scrub / wasteland. The overall species diversity estimated was $H'=3.7$, and contributed 97% of the total species listed (88 species) in the study area (**Table 3.16**).

Study Area: Including the core and buffer zones, the proposed project study area reported 88 species of 65 genera and 31 families. In the entire study area terrestrial birds were with an estimated species diversity of $H' =3.7$, which is of moderate to high level (**Table 3.16**).

Table 3.16: Taxonomical Status of Terrestrial Birds species -Proposed Thermal Power Plant –, WEUPPL Study Area - Mirzapur, Uttar Pradesh

Parameters	Core Zone		CT	Buffer Zone				BT	SAT
	OS/WL	AG/FL		D/DFR	WB/R	OS/WL	AG/FL		
Family	21	12	22	24	28	20	22	30	31
Genus	34	16	35	37	49	32	38	63	65
Species	45	19	46	53	58	41	45	85	88
Species Diversity	3.1	2.6	3.1	3.2	1.5	2.8	3.3	3.7	3.7

OSWL- Open Scrub & Waste Land, AG/FL – Agriculture & Fallow Land, D/DFR - Forest, WB/R – Water bodies and Rivers , CT- Core Zone Total, BT – Buffer Total, SAT- Study Area Total

3.5.2.2. Abundance Status

Core zone: A total of 385 birds of 46 species were reported from the core zone and it formed only 28% of the total birds counted in the sampling points of the study area. Among the two habitats, open scrub / wasteland recorded 291 birds of 45 species and they accounted for 76% of birds of the core zone while agriculture / fallow land contributed 24% (Table 3.17)

Buffer zone: Within the buffer zone, 997 birds were counted of 85 species. Among the habitats, the vegetation in and around the wetland / rivers recorded 302 birds followed by forest (281 birds) and open scrub / wasteland (233 birds) and they contributed to 30%, 28% and 23% respectively to the overall buffer zone. The contribution of agriculture / fallow land habitat was 43 species and 181 birds with 18% (Table 3.17).

Study area: Overall 1382 terrestrial birds of 88 species were counted in the study area (Table 3.17). However, number of birds enumerated in the study area seems to be low.

3.5.2.3. Abundance Category Status

Abundance status of bird species in the study area was further categorized into five classes based on the number of birds reported in each species. The category wise status is discussed for all the zones.

Core zone: within the core zone, among the two habitats, 93% of the species in the open scrub / wasteland belonged to very low category, while in the agriculture / fallow land all species (19 species) were of very low category, thus reflecting very low abundance of terrestrial birds (Table 3.17).

Buffer Zone: The area of 10km radius reported 85 species, however 76 species (89%) fall under very low category while five species were low. None of the species were found to be under very high abundance categories (**Table 3.17**) Only two species, Red-vented Bulbul (*Pycnonotus cafer* -87 birds) and Laughing Dove (*Streptopelia senegalensis* -88 birds) were found to be abundant with 75-100 birds (**Annexure 3**).

Study area: Since both core and buffer zones, had more species with less than 25 birds, the overall status reflected that 95 % of species fall under very low and low categories. This study showed that though the study area reported 88 birds species, majority of them were found to be in low numbers (**Table 3.17**). Only 6 % of species such as Spotted Dove (*Streptopelia chinensis* -82 birds), Large-grey Babbler (*Turdoides malcolmi* – 99 birds) and Laughing Dove (*Streptopelia senegalensis* -101 birds), Indian Robin (*Saxicoloides fulicata* - 106 birds), Red-vented Bulbul (*Pycnonotus cafer*-135 birds) fall under high and very high categories respectively, which are common bird species (**Annexure 3**).

Table 3.17: Abundance Status of Terrestrial Bird- Proposed Thermal Power Plant –WEUPPL Study Area - Mirzapur, Uttar Pradesh

Parameters	Core Zone		CT	Buffer Zone				BT	SAT	
	OS/WL	AG/FL		D/DFR	WB/R	OS/WL	AG/FL			
Total Species	45	19	46	53	58	41	45	85	88	
Total Birds	291	94	385	281	302	233	181	997	1382	
R %	75.6	24.4	100	28.2	30.3	23.4	18.1	100		
	Abundance Category									
Very Low 1-25 birds	42 (93.3)	19 (100)	42 (91.3)	50 (94.3)	57 (98.3)	41 (100)	45 (100)	76 (89.0)	73 (83.9)	
Low 26-50 birds	3 (6.7)	--	4 (8.7)	3 (5.7)	1 (1.7)	--	--	5 (6.1)	10 (11.4)	
Medium 50-75 birds	--	--	--	--	--	--	--	2 (2.4)		
High 75-100	--	--	--	--	--	--	--	2 (2.4)	2 (2.3)	
Very high >100	--	--	--	--	--	--	--	--	3(3.4)	

OSWL- Open Scrub & Waste Land, AG/FL – Agriculture & Fallow Land, D/DFR - Forest, WB/R – Water bodies and Rivers , CT- Core Zone Total, BT – Buffer Total, SAT- Study Area Total

3.5.2.4. Foraging Status

Foraging guild status was assessed by grouping them based on the major food items the birds feed. Foraging status generally reflects the availability of major and diverse habitat types in the study area. A total of six foraging guilds were identified among all species identified in the study area.

Core Zone: Among the 46 species reported insectivores dominated with 44% (20 species) followed by omnivore (12 species and 26%), Granivores were represented by eight species and formed 17% of the total species recorded (**Table 3.18**).

Buffer Zone: Out of 85 species, 43 species were insectivores forming 51% that contributed the maximum, followed by omnivores and granivores each with 15 and 14 species respectively shared 18% and 17% of the total. Frugivores represented only by six species contributed 7% to the foraging guild (**Table 3.18**).

Study Area: On the whole the study area, that included both the core and buffer zones, was dominated by insectivores (50%) and omnivores (18%), this could be due to domination of insect and extent of forest habitat in the buffer zone. Since the study area had agriculture / fallow land, granivores was also found represented by 14 species, which formed 16% of the overall list (**Table 3.18**).

Table 3.18: Foraging Status of Terrestrial Bird- Proposed Thermal Power Plant – WEUPPL Study Area - Mirzapur, Uttar Pradesh

Foraging Guilds	Core Zone		CT	R%	Buffer Zone				BT	R%	SAT	R%
	OS/WL	AG/FL			D/DFR	WB/R	OS/WL	AG/FL				
Omnivore	12	4	12	26.1	12	12	11	12	15	17.7	16	18.2
Carnivore	2	2	2	4.3	1	3	0	4	5	5.9	6	6.8
Insectivore	20	8	20	43.5	27	27	17	18	43	50.6	44	50.0
Granivore	7	4	8	17.4	9	10	7	6	14	16.5	14	15.9
Frugivore	3	1	3	6.5	3	5	4	3	6	7.1	6	6.8
Nectarivore	1	0	1	2.2	1	1	2	2	2	2.4	2	2.3
Total	45	19	46	100	53	57	41	45	85	100	88	100

OSWL- Open Scrub & Waste Land, AG/FL – Agriculture & Fallow Land, D/DFR - Forest, WB/R – Water bodies and Rivers , CT- Core Zone Total, BT – Buffer Total, SAT- Study Area Total

3.5.2.5. Migratory Status

Core Zone: Among the 46 terrestrial bird species recorded in the core zone, majority of them were resident species, which formed 96% (44 species), while only two species were found to be migrant (**Table 3.19**).

Buffer Zone: In this zone except for one winter visitor rest of the 84 species were residents (**Table 3.19**).

Study Area: Overall the study area supported more local or resident species (86 species & 98%) than the migrant species (two species & 2%) **Table 3.19**. This is because the study was conducted during summer season and does not cover the winter season which is the period when migrants are more.

Table 3.19: Migratory Status of Terrestrial Bird- Proposed Thermal Power Plant – WEUPPL Study Area - Mirzapur, Uttar Pradesh

Migratory status	Core Zone		CT	R%	Buffer Zone				BT	R%	SAT	R%
	OS/WL	AG/FL			D/DFR	WB/R	OS/WL	AG/FL				
Resident	43	19	44	95.7	53	57	41	45	84	98.8	86	97.7
Winter Migrant	2	--	2	4.3	--	1	--	--	1	1.2	2	2.3
Vagrant	--	--	--	--	--	--	--	--	--	--	--	--
Summer visitor	--	--	--	--	--	--	--	--	--	--	--	--
Total	45	19	46	100	53	58	41	45	85	100	88	100

OSWL- Open Scrub & Waste Land, AG/FL – Agriculture & Fallow Land, D/DFR - Forest, WB/R – Water bodies and Rivers , CT- Core Zone Total, BT – Buffer Total, SAT- Study Area Total

3.5.2.6. Overall Species Richness

This study reported presences of 88 terrestrial avifauna within the study area of 65 genera and 31 families. The State Forest Department working plan of Mirzapur forest division had listed 47 species belonging to 40 genera and 20 families, which is for the entire Mirzapur forest landscape. Based on these two lists, the cumulative estimate of species was 107 in and around the Mirzapur forest areas belonging to 76 genera and 31 families (**Table 3.20**). This study added 60 species that were not listed by the forest department and 19 species reported only by the forest department **while** 28 species found to be common to both, forest department and present study (**Annexure 3**).

Table 3.20: Overall Species Richness of Terrestrial Birds in the Proposed Thermal Power Plant – WEUPPL Study Area - Mirzapur, Uttar Pradesh

Parameters	Study Area List	State Forest Department Mirzapur Division	Overall
Family	31	20	31
Genus	65	40	76
Species	88	47	107

3.5.3. Status of Avifauna – Aquatic

3.5.3.1. Taxonomical Status, Species Richness and Diversity

Core Zone: The core zone, which had no permanent water bodies, reported only five aquatic bird species belonging to four genera and three families. This zone estimated low species diversity of 1.4 (**Table 3.21**).

Buffer Zone: This larger extent of buffer zone reported only 31 species and they belong to 28 genera and 16 families. Among the four habitats, wetland / riverine habitat reported maximum of 30 species, while the open scrub / wasteland recorded 16 species. The total species diversity estimated for the buffer zone was $H'=2.5$ (**Table 3.21**)

Study Area: All the 31 aquatic bird species recorded in the buffer zone that included the five species recorded in the core zone, depicts the richness of the study area. Even though the study area had three dam sites and network of river and streams (Nullahs), due to survey in summer and ephemeral in nature of the streams and river, this study reported very low species richness and diversity estimated was moderate of $H'=2.5$ (Table 3.21).

Table 3.21: Taxonomical Status of Aquatic Birds species -Proposed Thermal Power Plant – WEUPPL Study Area - Mirzapur, Uttar Pradesh

Parameters	Core Zone		CT	Buffer Zone				BT	SAT
	OS/WL	AG/FL		D/DFR	WB/R	OS/WL	AG/FL		
Family	1	3	3	0	16	10	3	16	16
Genus	1	4	4	0	27	15	3	28	28
Species	1	5	5	0	30	16	3	31	31
Species Diversity	0	1.5	1.4	0	2.4	2.3	1.1	2.5	2.5

OSWL- Open Scrub & Waste Land, AG/FL – Agriculture & Fallow Land, D/DFR - Forest, WB/R – Water bodies and Rivers, CT- Core Zone Total, BT – Buffer Total, SAT- Study Area Total

3.5.3.2. Abundance Status

Core Zone: Comparatively being a small area, the core zone recorded a total of only 10 aquatic birds, which formed only 1% of the total 740 birds counted in the study area. Since there was no permanent aquatic system in the core area and it being summer and dry, the number of birds recorded were very low with all five species with a total abundance of nine birds recorded from agriculture / fallow land, while the other habitat the open scrub/ wasteland harbored only one species with one bird (Table 3.22).

Buffer Zone: In this zone 730 birds were recorded of which the wetland / riverine habitat accounted for 91% of the abundance. This was followed by open scrub / wasteland (8%) and agriculture / fallow lands that contributed less than 1% (Table 3.22).

Study area: In spite of the presence of diverse habitats in the study area, like dense and open forests, agriculture and network of rivers and few dam sites, the overall estimation of 740 aquatic birds showed low abundance in the study area (Table 3.22).

3.5.3.3. Abundance Category Status

Core Zone: In the core zone, all the five species recorded were under very low abundance category thus showing the low or no availability of the aquatic system (Table 3.22 & Annexure 4).

Buffer Zone: In total 31 species were recorded in this zone of which 90% of the species were in very low and low abundance category, with only two species that formed only 7% falling under very high abundant category. Lesser Whistling Duck (*Dendrocygna javanica*-237 birds) and Cattle Egret (*Bubulcus ibis* -106 birds) were the two species fall under very high category (**Table 3.22 & Annexure 4**).

Study Area: Due to low species richness of aquatic birds, and all species recorded in the buffer zone that included the species reported from core zone, the overall status of the study area was same as the buffer zone (**Table 3.22 & Annexure 4**).

Table 3.22: Abundance Status of Aquatic Bird in Proposed Thermal Power Plant –WEUPPL Study Area - Mirzapur, Uttar Pradesh

Parameters	Core Zone		CT	Buffer Zone				BT	SAT
	OS/WL	AG/FL		D/DFR	WB/R	OS/WL	AG/FL		
Total Species	1	5	5	0	30	16	3	31	31
Total Birds	1	9	10	0	667	60	3	730	740
R %	10	90	100	0	91.4	8.2	0.4	100	100
	Abundance Category								
Very Low 1-25 birds	1 (100)	5 (100)	5 (100)	--	22 (73.3)	16 (100)	3 (100)	22 (71.0)	22 (71.0)
Low 26-50 birds	--	--	--	--	5 (16.7)	--	--	6 (19.3)	6 (19.3)
Medium 50-75 birds	--	--	--	--	1 (3.3)	--	--	1 (3.2)	1 (3.2)
High 75-100					0	--	--	0	--
Very high >100	--	--	--		2 (6.7)	--	--	2 (6.5)	2 (6.5)

OSWL- Open Scrub & Waste Land, AG/FL – Agriculture & Fallow Land, D/DFR - Forest, WB/R – Water bodies and Rivers , CT- Core Zone Total, BT – Buffer Total, SAT- Study Area Total

3.5.3.4. Foraging Status

Core Zone: All five aquatic bird species recorded in the core zone were insectivores. Absence of aquatic systems reflecting the low aquatic bird richness. All five species were found in agriculture / fallow land while one species from open scrub / wasteland (**Table 3.23**).

Buffer Zone: Among the 31 species recorded in this zone 14 were piscivore species, which formed 45% of all foraging guilds, followed by insectivores (12 species- 39%). However, omnivore (three species) and herbivores (two species) were also present they formed comparatively very low proportion (**Table 3.23**).

Study area: Since the all guilds and richness status found in the core zone was among that recorded in the buffer zone, the overall guild status was same as that reported for the buffer zone, with piscivore and insectivores forming the major guilds (**Table 3.23**).

Table 3.23: Foraging Status of Aquatic Birds- Proposed Thermal Power Plant – WEUPPL Study Area - Mirzapur, Uttar Pradesh

Foraging Guilds	Core Zone		CT	R%	Buffer Zone				BT	R%	SAT	R%
	OS/WL	AG/FL			D/DFR	WB/R	OS/WL	AG/FL				
Omnivore	--	--	--	--	--	3	1	--	3	9.7	3	9.7
Carnivore	--	--	--	--	--	-	--	--	--	--	--	--
Herbivore	--	--	--	--	--	2	1	--	2	6.4	2	6.4
Insectivore	1	5	5	100	--	12	6	1	12	38.7	12	38.7
Granivore	--	--	--	--	--	--	--	--	--	--	--	--
Frugivore	--	--	--	--	--	--	--	--	--	--	--	--
Piscivore	--	--	--	--	--	13	8	2	14	45.2	14	45.2
Total	1	5	5	100	--	30	16	3	31	100	31	100

OSWL- Open Scrub & Waste Land, AG/FL – Agriculture & Fallow Land, D/DFR - Forest, WB/R – Water bodies and Rivers , CT- Core Zone Total, BT – Buffer Total, SAT- Study Area Total

3.5.3.5. Migratory Status

Core Zone: Of the five species reported in the core zone, three (60%) were residents and two (40%) species was winter visitors (**Table 3.24**). The winter visitor recorded were in breeding plumage, which would probably stay back or migrate late, however it is a rare phenomenon.

Buffer zone: Out of 31 species recorded in this zone, 23 were residents, while eight species belonged to winter migrant and they shared 74% and 26% respectively of the total species recorded (**Table 3.24**). The winter visitors were the ones that had some individuals that stay back or migrate late.

Study area: Even though the study area had aquatic habitats like river, dam and village ponds, as sampling was done in summer and the season when no winter visitor is present, the study area reported low migratory species (eight species forming 26%) compared to 23 species of residents (74%) (**Table 3.24**).

Table 3.24: Migratory Status of Aquatic Birds- Proposed Thermal Power Plant – WEUPPL Study Area - Mirzapur, Uttar Pradesh

Migratory status	Core Zone		CT	R%	Buffer Zone				BT	R%	SAT	R%
	OS/WL	AG/FL			D/DFR	WB/R	OS/WL	AG/FL				
Resident	1	3	3	60	--	22	15	3	23	74.2	23	74.2
Winter Migrant	--	2	2	40	--	8	1	--	8	25.8	8	25.8
Vagrant	--	--	--	--	--	--	--	--	--	--	--	--
Summer visitor	--	--	--	--	--	--	--	--	--	--	--	--
Total	1	5	5	100	--	30	16	3	31	100	31	100

OSWL- Open Scrub & Waste Land, AG/FL – Agriculture & Fallow Land, D/DFR - Forest, WB/R – Water bodies and Rivers , CT- Core Zone Total, BT – Buffer Total, SAT- Study Area Total

3.5.3.6. Overall Species Richness

During this study 31 species of aquatic avifauna were reported in the study area. The list of state forest department showed 14 species belonging to 13 genera under seven families. The combined list gave a total of 40 species of 35 genera and 18 families. This overall list included nine species that was reported only by the forest department that were not sighted during this study and 26 species recorded during this study that were not listed in the working plan of the forest department, on addition to five species that were common to both (Table 3.25 & Annexure 4). Overall status of aquatic avifauna was found to be moderate to low in the study area.

Table: 3.25: Overall Species Richness of Aquatic Birds -Proposed Thermal Power Plant – WEUPPL Study Area - Mirzapur, Uttar Pradesh

Parameters	Study Area List	State Forest Department Mirzapur Division	Overall
Family	16	7	18
Genus	28	13	35
Species	31	14	40

3.5.4. Status of Mammals

3.5.4.1. Taxonomical status of Mammals

Core Zone: Core zone reported 11 mammalian species and each belong to 11 separate genera and eight families, which was the same as in the open scrub / waste land, one among the two habitat types sampled in the core zone. Agriculture / fallow land recorded nine species of nine genera and seven families (Table 3.26).

Buffer Zone: Overall buffer zone recorded 18 mammalian species each belonging to 18 separate genera and 13 families. Among the habitats forest area reported maximum of 15 species of 15 genera and 12 families, followed by water bodies / rivers (13 species), open scrub / wasteland (nine) and agriculture / fallow land (eight species) (Table 3.26).

Study Area: The overall list of mammalian fauna of the study area includes species recorded in both the core and buffer zones. This showed that in total 19 species belonging to 18 genera and 13 families (Table 3.26).

Table 3.26: Taxonomical Status of Mammals -Proposed Thermal Power Plant –, WEUPPL Study Area - Mirzapur, Uttar Pradesh

Parameters	Core Zone		CT	Buffer Zone				BT	SAT
	OS/WL	AG/FL		D/DFR	WB/R	OS/WL	AG/FL		
Family	8	7	8	12	10	8	7	13	13
Genus	10	9	10	15	13	9	8	18	18

Parameters	Core Zone		CT	Buffer Zone				BT	SAT
	OS/WL	AG/FL		D/DFR	WB/R	OS/WL	AG/FL		
Species	10	9	10	15	13	9	8	18	19

OSWL- Open Scrub & Waste Land, AG/FL – Agriculture & Fallow Land, D/DFR - Forest, WB/R – Water bodies and Rivers , CT- Core Zone Total, BT – Buffer Total, SAT- Study Area Total

3.5.4.2. Abundance status – Mammals

Core Zone: The project area had 10 species and none of the species were sighted directly. In total 184 evidences of these species were recorded in the core zone. Based on indirect evidences Nilgai (*Boselaphus tragocamelus*) (65 evidences - pellets) was found to be more followed by Indian Hare (*Lepus nigricollis*) (53 evidences - pellets & tracks) and Indian Gerbil (*Tatera indica*) (23 evidences - holes & tracks), while other species were less abundant, and reported less than 15 evidences. Among the habitat types, open scrub / waste land reported more evidences with Nilgai, Indian Hare and Indian Gerbil being more common (**Table 3.27**).

Buffer Zone: overall buffer zone area confirmed the presence of 18 species based on 33 direct sightings of animals and 316 indirect evidences. The abundance status showed dominance of Nilgai (107 indirect evidences & 16 direct sightings), followed by Indian Gerbil (45 evidences) Indian Hare (39 evidences), Jackal (38 indirect evidences & one direct evidence), Wild Pig (28 evidences) and Jungle Cat (28 evidences). Among the habitat types, forest area recorded 133 evidences and 27 direct sightings of 15 mammal species followed by open scrub / wasteland with 92 evidences and 19 direct sightings of nine species, water bodies / rivers with 57 evidences and five direct sightings and agriculture / fallow lands reported the least abundance of mammals (**Table 3.27 & Annexure 5**).

Study Area: Within the study area that includes core zone and 10 km radius buffer, in total 500 evidences and 33 direct sightings of 18 mammalian species were reported. Among these species Nilgai, Indian Hare, Indian Gerbil, Jackal, Wild Pig and Jungle Cat were with more abundance, which is based mainly on indirect evidences. Of the 33 direct sightings, Nilgai (16 direct sightings) and Five-striped Palm Squirrel (*Funambulus pennantii*) (seven direct sightings) accounted for 70% of the direct sightings. Though the study area reported 19 species of mammalian fauna, direct sightings of only five species, with maximum sightings of only 16 Nilgai indicate, low population /abundance status in spite of presence of large extent of forest area in the buffer zone (**Table 3.27 & Annexure 5**).

**Table 3.27: Abundance Status of Mammals of the Proposed Thermal Power Plant -WEUPPL
Study Area - Mirzapur, Uttar Pradesh**

S.no.	Families & Species Name	Common Name	Core Zone		CT	Buffer Zone				BT	SAT
			OS/WL	AG/FL		D/DFR	WB/R	OS/WL	AG/FL		
1	Cercopithecidae										
1	<i>Semnopithecus entellus</i>	Common Langur	0	0	0	3	1	0(6)		4(6)	4(6)
2	Cervidae										
2	<i>Axis axis</i>	Spotted Deer	0	0	0	*	0	0	0	*	*
3	Bovidae										
3	<i>Boselaphus tragocamelus</i>	Nilgai	47	18	65	60(3)	14	25(13)	8	107(16)	172(16)
4	<i>Tetracerus quadricornis</i>	Four Horned Antelope	0	0	0	6	0	0	0	6	6
4	Suidae										
5	<i>Sus scrofa</i>	Wild Pig	3	1	4	14	12	2	0	28	32
5	Ursidae										
6	<i>Melursus ursinus</i>	Sloth Bear	0	0	0	1	1	0	0	2	2
6	Canidae										
7	<i>Canis aureus</i>	Jackal	7	4	11	11(1)	12	10	5	38(1)	49(1)
8	<i>Vulpes bengalensis</i>	Indian Fox	1	3	4	1	2	0	0	3	7
7	Hyaenidae										
9	<i>Hyaena hyaena</i>	Striped Hyena	3	1	4	3	0	1	0	4	8
8	Felidae										
10	<i>Felis chaus</i>	Jungle Cat	2	0	2	16	5	5	2	28	30
11	<i>Panthera pardus</i>	Common Leopard	0	0	0	0	3	0	0	3	3
10	Viverridae										
12	<i>Paradoxurus hermaphroditus</i>	Common Palm Civet	0	0	0	1	0	0	0	1	1
11	Herpestidae										
13	<i>Herpestes edwardsii</i>	Common or Grey Mongoose	2	2	4	0	0	0	0	0	4
14	<i>Herpestes smithii</i>	Ruddy Mongoose	0	0	0	0	1(3)	0	1	2(3)	2(3)
12	Leporidae										
15	<i>Lepus nigricollis</i>	Indian Hare	29	24	53	9	3	24	3	39	92
13	Sciuricidae										
16	<i>Funambulus pennantii</i>	Five-striped Palm Squirrel	0	0		0(3)	0(2)		0(2)	0(7)	0(7)
14	Muridae										

S.no.	Families & Species Name	Common Name	Core Zone		CT	Buffer Zone				BT	SAT
			OS/WL	AG/FL		D/DFR	WB/R	OS/WL	AG/FL		
17	<i>Tatera indica</i>	Indian Gerbil	17	6	23	9	1	23	12	45	68
18	<i>Golunda ellioti</i>	Indian Bush Rat	0	0	0	1	0	0	0	1	1
19	<i>Mus booduga</i>	Little Indian Field Mouse	4	10	14	0	2	2	1	5	19
Overall			115	69	184	135(7)	57(5)	92(19)	32(2)	316(33)	500(33)

FR- Forest, AG-Agriculture, WE-Wetland, CT- Core Zone Total, RH- Riverine Habitat, BT - Buffer Zone Total, SAT Study Area Total ; NOs in parenthesis indicates "Direct Sightings" of animals, * information - Locals / Forest Staff

3.5.4.3. Overall Species Richness

During the present study 18 mammalian fauna were reported from the project study area. The State Forest Department Working Plan, which is for a larger mainly the forest under Mirzapur division, listed a total of 29 mammal species belonging to 28 genera of 15 families. Based on the study four species viz. Indian Gerbil (*Tatera indica*), Indian Bush Rat (*Golunda ellioti*) Ruddy Mongoose (*Herpestes smithii*) and Common Palm Civet (*Paradoxurus hermaphroditus*) were added to the list, which gave a cumulative list of 33 species of 31 genera and 16 families in Mirzapur division forest areas (**Table 3.28 & Annexure 5**)

Table 3.28: Overall Species Richness of Aquatic Birds -Proposed Thermal Power Plant –, WEUPPL Study Area - Mirzapur, Uttar Pradesh

Parameters	Study Area List	State Forest Department Mirzapur Division	Overall
Family	13	15	16
Genus	18	28	31
Species	19	29	33

3.6 STATUS OF THREATENED BIOTA (Flora & fauna)

3.6.1. Threatened Plant

During the study within the sampling location a total of two plant species were reported as threatened and those species include *Terminalia arjuna* (24 trees) and *Boswellia serrata* (14 trees) reported in the buffer zone of the study area fall under threatened category (vulnerable) according to WCMC 1994 (**Table 3.29 & Annexure 1**). None of these species were reported from the core zone. *Terminalia arjuna* was mainly reported along the riverine and stream habitats while *Boswellia serrata* was reported in the forest patches of moderately undulating terrain. These species were brought under threatened category due highly restricted distribution and high cutting pressure in general. However, in the study area they were found in few patches of forest habitat which are far from the proposed project site.

Terminalia arjuna was included in the proposed plantation list since it secured 7th rank in IVI value of wild tree species and in addition *Boswellia serrata* (15th rank in IVI **Table 3.8**) was also suggested to grow in the plantation to enhance their population.

Table 3.29: Status of Endangered Flora - Proposed Thermal Power Plant –, WEUPPL Study Area - Mirzapur, Uttar Pradesh

Species & common name and Habits	Project Study Area		Dharmjaygarh-Forest Division
	Core	Buffer	
<i>Terminalia arjuna</i> (arjun) - Large Tree)		24	@
<i>Boswellia serrata</i> – Salai (Large Tree) lai		14	@

3.6.2. Status of Threatened Animals

3.6.2.1 Herpetofauna

Amphibians: Among the three species of amphibians reported within the study area none of them fall under the threatened category of IUCN and Schedule I of Indian Wildlife Protection Act (1972).

Reptiles: Out of 10 species of reptiles reported in the study, only one IUCN Red List species Common Monitor Lizard (one individual) was reported from the forest in the buffer zone area further it fall under schedule II list of IWPA (1972). The other two species Gharial (*Gavialis gangeticus*) and Indian Flapshell Turtle (*Lissemys punctata*) both Schedule I species, were listed by the forest department, which is for the entire Mirzapur forest division and were not recorded during this study within the study area(**Table 3.30 & Annexure 2**).

Table 3.30: Status of Endangered (Schedule I) Herpetofauna- Proposed Thermal Power Plant –, WEUPPL Study Area - Mirzapur, Uttar Pradesh

S.no.	Species & Common Name	Project Study Area		Mirzapur Forest Division
		Core	Buffer	
1	<i>Crocodylus palustris</i> - Mugger / Marsh Crocodile	-		FD@
2	<i>Gavialis gangeticus</i> - Gharial	-		FD@
3	<i>Lissemys punctata</i> - Indian Flapshell Turtle	-		FD@
34	<i>Varanus bengalensis</i> - Common Monitor Lizard	-	Sch II	FD+

FD + = Species listed by Forest department and Present Study, FD@ Species recorded only by Forest Department

3.6.2.2. Avifauna

Terrestrial birds: Among terrestrial birds, however six RET species of birds were found or reported to occur in the Mirzapur forest division, that included four vultures of which three

were had been listed as Critically Endangered, while one Egyptian Vulture (*Neophron percnopterus*) has been listed as endangered IUCN 2011.2, and two species (Indian Peafowl - *Pavo cristatus* and Indian Grey Hornbill - *Ocyrceros birostris*) list as Schedule I in the IWPA 1972. Among these RET species, Egyptian Vulture (one individual- buffer zone), Indian Peafowl (three individual in core zone & 15 in buffer zone) and Indian Grey Hornbill (one bird in buffer zone) were recorded during this study, but their abundance was very low (**Table 3.31**). Other three vultures of critically endangered were not reported within the study area during this study. Conservation status of all the bird species is given in **Annexure 3**

Aquatic birds: There were no RET species of aquatic birds reported during the present study, but the forest department list, which is for the entire Mirzapur forest division that covers a large landscape reported the presence of Sarus Crane that list as vulnerable in IUCN Red List IUCN 2011.2 (**Table 3.31**) and conservation status is given in **Annexure 4**.

Table 3.31: Status of Endangered (Schedule I) Avifauna - Proposed Thermal Power Plant – WEUPPL Study Area - Mirzapur, Uttarpradesh

Species Name	Project Study Area		Mirzapur Forest Division
	Core	Buffer	
Aquatic Birds			
<i>Grus antigone</i> Sarus Crane	Nil	Nil	FD
Terrestrial birds			
<i>Gyps indicus</i> Long-billed Vulture	Nil	Nil	FD
<i>Gyps bengalensis</i> White-rumped Vulture	Nil	Nil	FD
<i>Sarcogyps calvus</i> Red-headed Vulture	Nil	Nil	FD
<i>Pavo cristatus</i> - Indian Peafowl	3	15	FD
<i>Neophron percnopterus</i> Egyptian Vulture	Nil	1	FD

3.6.2.3 Mammals

Based on the present study (19 species) and the list of forest department, a total of 33 mammalian fauna is reported from the Mirzapur forest division. This study reported only three Schedule I (WPA -1972) and IUCN Red List species of mammalian fauna in the study area, while the forest department list had six species more as Schedule I, which was for the entire Mirzapur forest Division. However none of the species had any quantitative information. Common Leopard, Sloth Bear and Four Horned Antelope were recorded based on very few indirect evidences, that to only in the buffer zone. Only two scats of common leopard, one dropping, and one track of Sloth Bear and six pellet groups of Four Horned Antelope were recorded in the study area during this study that to in the forest area of buffer zone (**Table 3.32**). Conservation status of all the mammalian fauna is given in

Annexure 5.

Table 3.32: Status of Endangered (Schedule I) mammalian fauna - Proposed Thermal Power Plant –, WEUPPL Study Area - Mirzapur, Uttar Pradesh

S.no.	Species Name	Project Study Area		Mirzapur Forest Division
		Core	Buffer	
1	<i>Gazella bennettii</i> - Indian Gazelle	-	-	FD
2	<i>Tetracerus quadricornis</i> -Four Horned Antelope		6 IE	FD
3	<i>Melursus ursinus</i> - Sloth Bear	-	2 IE (Sch I)	FD
4	<i>Canis lupus</i> - Wolf			FD
5	<i>Cuon alpinus</i> - Wild Dog			FD
6	<i>Panthera pardus</i> - Common Leopard		3 IE (Sch I)	FD
7	<i>Caracal caracal</i> -Caracal			FD
8	<i>Lutrogale perspicillata</i> -Smooth-coated Otter			FD
9	<i>Melivora capensis</i> -Honey Badger			FD

IE – Indirect Evidences, FD – Forest Department List

3.7. HABITAT ECOLOGY – STUDY AREA

Though the study area has been identified with nine land use patterns (**Table 2.1**), they have been grouped into four major habitat types such as: Forest (Dense forest, Degraded forest, Plantation forest) Agricultural land (agro-ecosystem/agriculture fallow land), wetlands (includes riverine habitats and Dams and Scrub land (Open waste land and scrub land) for the ecological study (**Table 3.1**).

3.7.1. Forest

The forest types within the study area fall under tropical dry deciduous and moist mixed deciduous forest. Forests of the study can be divided into four major types based on the domination of floral composition.

1. Fairly dense mixed forest dominated by bamboo plantation with *Zizyphus species* (*Zizyphus mauritiana*). *Bauhinia racemosa*, *Dalbergia sissoo*, *Cassia fistula* and *Holarrhena antidysenterica* are other tree species scatterdly found in this forest.

2. Open mixed forest dominated by *Acacia catechu* with *Zizyphus*. These forest patches are found in flat terrain. Other forest two types include *Lannea coromandelica* and *Boswellia serrata* dominated forests and mainly found on moderately undulating hillocks.

3. Riverine forest; this forest types found along the major river systems and mainly dominated by *Terminalia arjuna*, *Syzygium cumini*, *Terminalia belerica*, *Holoptelea integrifolia* and *Mitragyna parvifolia*

A total of 11 reserved forest area located within 10 km radius of the project site /study area

and their location details are given **Table 3.33 & Map 2.1**).

Table 3.33. Details of Reserved forests located within 10 km radius of the project site: Proposed Thermal Power Plant –, WEUPPL Study Area - Mirzapur, Uttar Pradesh

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

3.7.2. Open scrubland

Open scrub land is one of the habitat types of the study area come under forest as well as revenue land. This scrub land is dominated by all the *Zizyphus* species with scattered tree species mainly dominated by stunted growth of *Butea monosperma*, *Wrightia tinctoria*, *Bauhinia racemosa*, *Balanites aegyptiaca* and *Aegle marmelos* are found scatterdly

3.7.3. Wetland/ river and streams

Aquatic habitat is concerned there three dam sites are located within 10 km radius of the project sites namely Upper Khajuri dam, Lower Khajuri dam and Kathua Bandh are located 4, 9 and 10 km distance, and west, North and East directions of the project site respectively (**Map 2.1**)

Added, three river systems namely Jamtlhwa river (2 km N), Pahiti river (4 km NE) and Jogidar River (2.2 km NE) flowing south to north cutting across the 10 km radius study area and join (Map 2.1). These, river systems are highly seasonal and therefore not supporting diverse aquatic fauna and flora. The perennial River Ganga located 17km in the NE of the project site.

3.7.4. Agriculture habitat

One of the major habitat types of the study area is Agriculture lands (agro-ecosystem) covers a total of 3837.21 ha of the area. This habitat identified 140 floral species with

adjacent fallow lands. Added, 39 species major, minor, fruit and vegetable crops reported from this habitat with 45 species of terrestrial birds.

3.8. ECOLOGICALLY SENSITIVE ECOSYSTEMS

All the 11 forests are located within the study area fall under Reserved forest category while none of the water bodies (dams and rivers) have been designated as important wetland habitat of the state and/or national. Added, the study area has not having any breeding and feeding grounds of aquatic avifauna. Except the above said habitat types with overall biodiversity of low to moderate level, the project study area do not have any Protected Areas such as: wildlife sanctuary, national park, biosphere reserve and tiger and elephant reserves within 10 km radius.

3.9. WILDLIFE CORRIDOR

Overall the study reported 19 species of mammalian faun during the study period within 10 km radius. The forest department list prepared for the entire Mirzapur forest division showed presence of 29 species and cumulative species list reached to 33 species. However, during the study the abundance status of faunal group showed low status with only 500 indirect evidences and 33 direct sightings with maximum of 16 nilgai (**Table 3.28**). This clearly indicates that, the forest area do not reported and larger group of faunal species and their regular movement cutting across the project site and within the study area to move between two forest ranges. Hence, no wildlife corridors exist within 10 km and well beyond the project study area. Some of the faunal species reported in study area are given in plate (**Plate 3,4 5,6 & 7**).

Plate 3. Herpetofauna reported in the project study area









	
Skittering Frog	Indian Bull Frog
	
Indian Garden Lizard	Fan-Throated Lizard
	
Bronze Grass Skink	Common Keeled Grass Skink
	
Leschenault's Lacerta	Asian House gecko

Plate 4. Terrestrial birds of the study area









	
Ashy-crowned Finch Lark	Asian Pied Starling
	
Greater Cocual	Indian Roller
	
Large grey Babbler	Yellow footed Green Pigeon
	
Yellow wattled Lapwing	Long tailed Shrike

Plate5. Aquatic birds of the study area









	
Bronge winged Jacana	Cattle Egret
	
Intermediate Egret	Lesser Whistling Duck
	
White Stork	Black wined Stilt
	
Indian Pond Heron	White-throated Kingfisher

Plate 6. Track and signs of some mammalian fauna reported in the project study area

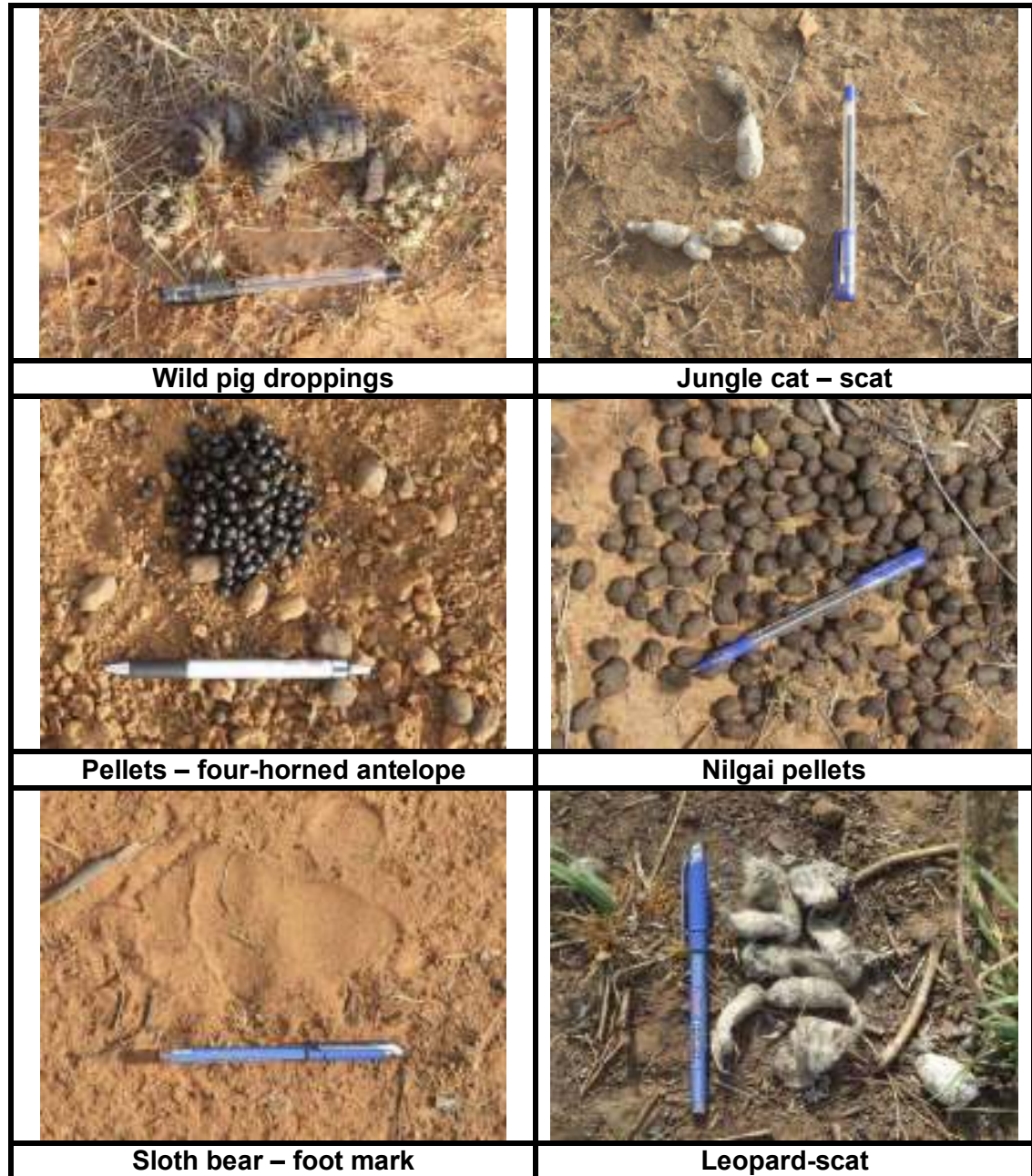


Plate 7 Mammalian fauna sighted in the study area



Common langurs



Jackal



Nilgai



Five-striped Palm Squirrel

Chapter 4. ECO-MANAGEMENT & WILDLIFE CONSERVATION PLAN

4.1 MANAGEMENT PLAN

One of the operating principals in Environmental Impact Assessment is to suggest Environmental Management Plan (EMP) in general and Conservation Plan for the threatened biota reported in the study area which is an appropriate follow-up process, involved monitoring, management, and evaluation that are based on the significance of potential effects. It also provides opportunity for making future improvements in project related activities. Further it is a follow up activity of the EIA study in order to improve the ecological and environmental integrity in and around the proposed project area.

4.2 ECO – MANAGEMENT

There are many scientific studies discussed the performance specific plant species at population and species level which can be related to pollution (Mansfield, 1976., Sanders 1976., Scholz, 1981 and Garsad and Rutter 1982). Therefore, plant species act as bio-monitoring agent to monitor the air environment as well as to keep and maintain the project environ healthy. The two areas of air pollution by gases and by dust need to be urgently attended to, using plants. Such treatments have numerous benefits, especially social and ecological aspects (Chapherkar 1994).

With the above understanding of the role of plant species as bio-filter to control air pollution and changes likely to occur in the ambient air quality of the area in and around the project, appropriate plant species (mainly tree species) have been suggested considering the area/site requirements and needed performance of specific species.

Under Eco-management Plan Three types of plantations have been suggested which include:

1. Greenbelt development along the boundary of the project site with wild tree species (refer Table 4.1)
2. Greenbelt development within the project site with common and wild tree species(refer Table 4.2)

3. Plantation for habitat improvement and to facilitate forage availability for major faunal species especially for the RET species of the project study area (refer Table 4.2, 4.3, 4.4)
4. Plantation for fodder resource development (refer Table 4.5)

4.2.1. Greenbelt - project boundary

In order to enhance and maintain the ambient air quality of project area during the construction and operational phase of the project the following list of wild tree species have been suggested to develop greenbelt along the boundary of the project site (Table 4.1).

Table 4.1: List of Wild Tree species suggested – Greenbelt along the boundary of the project site- Proposed Thermal Power Plant –, WEUPPL Study Area - Mirzapur, Uttar Pradesh

S.no.	Wild/Forest species	Tree	Common Name	IVI RO		DC #	FR
				CZ	BZ		
1	<i>Acacia nilotica</i>	Babul			6.12		
2	<i>Aegle marmelos</i>	Bel, Bili Patra, Bili			18.9	*	
3	<i>Cassia fistula</i>	Amaltas			23.03	*	
4	<i>Dalbergia sissoo</i>	Shesham			17.02		
5	<i>Ficus benghalensis</i>	Gular/Pipal			7.72	*	
6	<i>Ficus religiosa</i>	Pipal			12.94	*	
7	<i>Madhuca indica</i>	Mahua		6			
8	<i>Syzygium cumini</i>	Jamun			14.39	*	
9	<i>Acacia cathechu</i>	Khair,		3	4		
10	<i>Terminalia arjuna</i>	Arjun Sadad			7	30.54	
11	<i>Ficus mollis</i>			1	2		
12	<i>Butea monosperma</i>	Kesudo		2		24.44	
13	<i>Holoptelea integrifolia</i>	Chilbil				35.01	
14	<i>Acacia leucophloea</i>	Shoe Babool			5		
15	<i>Flacourtia indica</i>			4			
16	<i>Bauhinia racemosa</i>	Kaliar		9			
17	<i>Zizyphus mauritiana</i>	Jherberi		5		*	
18	<i>Lannea coromandelica</i>			8			
19	<i>Lagerstroemia parviflora</i>			6	8		
20	<i>Terminalia belerica</i>	Bahrai			1		
21	<i>Sterculia urens</i>			7			
22	<i>Tectona grandis</i>	Teak, Sagon				14.94	
23	<i>Albizia lebbeck</i>	Siris				18.3	
24	<i>Melia azedarch</i>	Bakani Nim				31.77	
25	<i>Boswellia serrata</i>				15		
26	<i>Pithecolobium dule</i>					19.21	
	Total species			13		14	8

CZ-Core Zone, BZ-Buffer Zone. IVI RO – Important Value Index Rank Order,

DC- % of Dust control efficiency, FT-Fruit Trees, # Source-Anon

The list of plant species suggested includes the following criteria.

- A total of 26 tree species suggested for greenbelt development of that 13 species selected based on the species secured more than 10% of IVI values because they are ecologically potential to show high survival and growth rate.
- This list also include 14 tree species which are potential to control dust emission and thereby maintain the ambient air quality of the area in and around the proposed project site.
- *Terminalia arjuna*, *Melia azedarch*, *Holoptelea integrifolia*, *Butea monosperma* and *Cassia fistula* are the tree species control dust emission more that 20% and therefore the project environment likely to have low dust pollution
- Some fruit trees (8 species) were in the selection list to attract specifically frugivore birds of the study area.
- Wild species were suggested to provide habitat for faunal species, increase the species diversity and maintain the naturalness of adjacent wilderness.
- *Terminalia arjuna* and *Boswellia serrate* are threatened plant species of the study area included in the list to improve the local population status.

4.2.2. Greenbelt- Within Project site

The proposed project planned to have different structures like; power plant, godown, Coal yard, administrative premises, colony area, school, hospital or health centre etc. In order to improve the quality of ambient air quality and control other pollutions (gas and noise) and maintain the visual quality many tree species of wild, common and species of aesthetic values are suggested under this plantation program (**Table 4.2**)

Table 4.2. List tree species suggested to develop greenbelt – within the project site area

S.no.	Scientific Name	Common & Local Name	NC@	OGE@	%of DC #	Locations				
						1	2	3 &4	4	5
1	<i>Acacia nilotica (W)</i>	Babul,			6.12	*				
2	<i>Aegle marmelos (W)</i>	Bel,	*		18.9	*				
3	<i>Albizia lebbeck (W)</i>	Siris, Karo Sirish	*	+	18.3	*	*			
4	<i>Annona squamosa (C)</i>	Sugar apple, Jamfal			12.09			*	*	*
5	<i>Azadirachta indica (c)</i>	Neem	*	+	25.54	*	*	*	*	*
6	<i>Bauhinia variegata (W)</i>	Kanchnar			18.58	*	*	*		
7	<i>Butea monosperma (W)</i>	Kesudo	*		24.44	*	*			
8	<i>Cassia fistula (W)</i>	Amaltas			23.03	*	*	*	*	*
9	<i>Dalbergia sissoo (W)</i>	Shesham			17.02	*	*			
10	<i>Delonix regia (c)</i>	Gulmohar			18.05		*	*	*	*
11	<i>Diospyros melanoxylon (w)</i>	Thendu	*			*	*			

S.no.	Scientific Name	Common & Local Name	NC@	OGE@	%of DC #	Locations				
						1	2	3 & 4	4	5
12	<i>Ficus benghalensis (C)</i>	Banyan, Vad	*		7.72		*	*	*	*
13	<i>Ficus recemosa (W)</i>	Gular	*			*				
14	<i>Ficus religiosa (C)</i>	Pipal	*	+	12.94	*	*	*	*	
15	<i>Hibiscus rosa-sinensis (c)</i>	Gurhal, Jasund			21.09			*	*	*
16	<i>Holoptelea integrifolia (W)</i>	Chilbil			35.01	*	*			
17	<i>Leucaena leucocephala (W)</i>	Shoe Babool, Liso bavar			11.24	*	*			
18	<i>Mangifera indica (C)</i>	Mango, Aam			12.25			*	*	*
19	<i>Manilkara zapota (C)</i>	Chikkoo			16.39			*	*	*
20	<i>Melia azedarch (W)</i>	Melia, Bakani Nim	*	+	31.77	*	*			
21	<i>Phoenix dactylifera (C)</i>	Khajoor	*	+	32.07		*	*		
22	<i>Polyalthia longifolia (C)</i>	Ashoka,	*	+	29.84		*	*	*	*
23	<i>Pongamia Pinnata (C)</i>		*					*	*	*
24	<i>Syzygium cumini (W)</i>	Jamun,	*		14.39	*	*	*	*	*
25	<i>Tamarindus indica L. (W)</i>		*			*				
26	<i>Tectona grandis (W)</i>	Teak, Sagon			14.94		*	*		
27	<i>Termanilia catappa (C)</i>	Desi Badam			30.12			*	*	*
28	<i>Terminalia arjuna (W)</i>	Arjun	*	+	30.54	*	*			
29	<i>Terminalia bellirica (W)</i>	Baharai	*			*				
	Total		16	7	24	18	18	16	13	11

@ CN –Control Noise level, OGE – Absorb Gas emission (+ So₂), Source of Plant Species: (Saxena 1991),

Source –Anon 2007 , Location: 1- Industrial or Plant areas, 2 –Roads, 3&4 Residential, 5-Schools, 6- Health centre

The list of plant species suggested includes the following criteria.

A total 29 tree species of were suggested under this greenery development programs keeping the proposed diverse structures likely to developed within the project area and they include 12 common and 17 wild species.

This cumulative list includes 24 species which performs the bio-filter role to control dust emission due to project activities, while 16 species control noise and 7 species absorb gas emission.

A total Of 18 species each was suggested in and around the industrial areas and along the road sides to reduce all the pollution problems

Sixteen to 11 species were suggested to grow areas of office, school, residential and health centre which are common, fruit bearing and also produce colourful flowers to maintain the aesthetic and visual value of the area.

Cassia fistula (yellow), Delonix regia (Orange), Bauhinia variegata (purple), Hibiscus rosa-sinensis (Red) Pongamia Pinnata (pinkish) and Syzygium cumini (white) are the species

produce colourful flowers to improve the visual quality

Annona squamosa, *Ficus benghalensis*, *Ficus recemosa*, *Ficus religiosa*, *Mangifera indica*, *Manilkara zapota* are fruit bearing trees suggested in the areas of people live in

Diverse and local species list suggested to increase the survival, growth rate and also provide habitat for local faunal species specifically avifauna, herpetofauna.

4.3. WILDLIFE CONSERVATION AND MANAGEMENT PLAN

The Welspun Energy UP Private Limited (WEUPPL), to cater growing energy needs of Uttar Pradesh, proposes to setup a Greenfield Coal based Thermal Power Plant (TPP) of 1320 MW (2x660 MW) capacity at DadriKhurd village, Mirzapur Sadar tehsil, Mirzapur district, Uttar Pradesh, which is surrounded by Reserved Forest on all sides. This forest however is under different levels of degradation, which is mainly due to anthropogenic activities mainly due to the villages located within and outside the 10 km buffer zone of the proposed (TPP), who use this forest to cater part their livelihood needs. The survey conducted by Green Future Foundation during April and May 2012 revealed that the forest edges were comparatively more degraded and was sparse to open and mainly dominated by bushes of shrubs and stunted trees. Further, the remaining forest was dense to semi dense dominated by mixed deciduous forest with *Acacia cutachu* trees, bamboo (with already dead after flowering), *Acacia* and *Zizyphus oenphilia* climber (in the form of bushes) in most of the gentle to flat areas, while *Butea monosperma* was more in the moist rich areas with pure dry deciduous found only on the hill tops where *Boswellia serrata* and *Lannea coromendalica* were predominant.

The biodiversity in these forests are more towards the lower side with Nilgai being the most dominant species, indicating the degradedness of the forest. However, Common Leopard, Sloth Bear and Four-horned antelope, all three RET species, were found in these forests their numbers were found to be very low. Added, three wetlands Viz; Upper Khajuri Dam, Lower Khajuri Dam Location (LKD), and Kathua Bandh Location (KBD) falling within the buffer zone are presently the only perennial source of water, which are also habitat for wetland birds and other water depended flora and fauna.

With this being the scenario, the conservation plan is prepared taking all these into

consideration and mainly includes general plans for the betterment of the forest and wildlife. Habitat improvement of their habitat, specific plans for the RET species, mitigating man-bear conflict, which is presently very rare or very occasional. Added, enhancement of the forest resources along the fringes of the forest adjoining the most dependent villages and within their village boundary is very important mainly to reduce the pressure on the forest. This is very crucial as any conservation done in the forest would go waste unless the mainly reason for the degradation and loss is not addressed appropriately.

Conservation plan is much more than the preservation of certain plants and animal species. It is of high necessity for any landscape when it comes to preserving the wildlife or the biodiversity of that area, which governs the ecological functions. To this end based on the present biodiversity study especially the floral and faunal assessment of the core and buffer zones of the proposed Greenfield Coal based Thermal Power Plant (TPP) of Welspun Energy UP Private Limited (WEUPPL) to be setup at DadriKhurd village, Mirzapur Sadar tehsil, Mirzapur district, Uttar Pradesh, the conservation plan is prepared for the betterment of the wildlife in the area, which includes both general and specific plans targeting the threatened species that were sighted or found to be present in the study landscape.

4.3.1. Leopard

The leopard (*Panthera pardus*), another vulnerable species (IUCN 2010), is the most adaptable and widely distributed among the big cats (Nowell and Jackson 1996). This species is known for the use of habitat edges and its ability to live close to human habitation (Seidensticker *et al.* 1990). Leopard feed on a broad spectrum of prey, ranging from smallest rodent to a young buffalo (Qureshi and Advait 2006, Ahmed and Khan 2008 and Ramesh *et al.* 2009). Studies on feeding of leopard have shown that chital, sambar and common langur forms their major diet (Karanth and Sunquist 1995, Sankar and Johnsingh 2002, Ramesh *et al.* 2009 and Mondal *et al.* 2011).

Leopard, scats, in the study landscape was recorded from three locations mainly in stream/riverine habitats. Two scats were recorded along the Jogidari Nala cutting across the forest blocks 1 & 3 of Marihan Range (East to project site) and one scat along Khankardali nala of Bela block of Lalganj Range (south west of project site). However, leopards are adaptable to any type of habitat in and around wilderness areas, it is important

that sufficient prey or food is available in the forest. Though the study area supports good population of Nilgai and Wild pig which can be prey for leopard, as part of conservation plan for this predator, habitat protection and improvement, especially the food availability for both the leopard and the prey species, along with availability of water and salt licks are of priority.

However, many of the tree species used as food by the langurs and the ungulates were available, most of the regeneration and recruitment was low or stunted due to grazing and occasional fire (in some forest areas), that has led to low availability of fodder species in the area. So the nearby forest areas must be protected from fire in addition to improving the fodder availability in and around the high forest dependent villages so as to reduce the grazing pressure and its impact in the forest. Gap plantation and intensive plantation of food plants for major faunal species and also improve their habitat must be taken up in the RFs within the study area especially in the highly degraded parts with the consultation of local forest department. Gap plantation can be done in 10 to 15 locations in the degraded reserve forest areas covering one ha area in each plantation site.

4.3.1.1. Development of Grasslands/patches for prey species of leopard:

Even though the forest department list reported, Chital, Sambar, Indian Muntjac, Indian Gazelle and Four Horned Antelope no sightings and evidences of these species were recorded during this study, except for Sambar and Four Horned Antelope. Of these except for Sambar and Indian Muntjac, rest of the ungulates prefer open habitats with grass. Sambar diet includes large amount of browse in dry season to grass and herbaceous plants in the wet season.

In order to improve the prey species, the habitat improvement should involve developing grass patches in the areas that are open. List of some grass species reported in the study area are suggested for grassland development (**Table 4.3**). This should be done in a minimum of 25ha plots, and at least six such plots, mainly in the degraded patches away from the villages in different directions should be developed.

Table 4.3: List of Grass species suggested for developing grassland/patches

S.no.	Grass Species
1	<i>Apluda mutica</i> L.
2	<i>Cenchrus ciliaris</i> L.
3	<i>Cynodon dactylon</i> (L.) Pers.

4	<i>Desmostachya bipinnata</i> (L.) Stapf
5	<i>Dichanthium annulatum</i> (Forak.) Stapf
6	<i>Eragrostis ciliaris</i> L.
7	<i>Eragrostis</i> Sp.
8	<i>Heteropogon contortus</i> (L.) P.Beauv. ex.R. & S.
9	<i>Sporobolus coromandelianus</i> (Retz.) Kunth
10	<i>Sporobolus</i> sp

4.3.1.2 Bamboo Plantation /forest

The forest habitat within 10 km radius of the study area is dominated by bamboo plantation with thickets of *Zizyphus species*. In most of the cases, bamboo thickets attained maturity and flowered and they are in drying stage. In order to improve the habitat quality it is suggested to remove the dead thickets and do re-plantation of bamboo which provide habitat for some of mammalian fauna wild pig, muntjac, sambar which are prey species of leopard and to enhance the associated biodiversity of this bamboo forest which dominated the study area .

4.3.1.3. Population status assessment

Even though the forest department list showed occurrence of many ungulate species like; chital, sambar, Indian Muntjac, Indian Gazelle, no direct sightings and indirect evidences of these species were reported in during the study in the forest areas.

Therefore, along with habitat protection and improvement, it is highly essential to re-assess the status of leopard population and other major prey species especially ungulates within 10 km radius of the project site.

Regular monitoring of the leopard and its prey population using comparable ecological methods is essential and is one of the other most important actions for leopard conservation.

This survey need to be carried out with the wildlife experts and the state forest department to identify the areas or forest needed all the conservation and management interventions which are highly crucial.

4.3.2. Four-horned Antelope

This is one of the smallest Asian bovids and is endemic peninsular India and small parts of low lands in Nepal. Sexually dimorphic Boselophid of small stature with only males having two anterior and two posterior smooth small horns unique among wild horned mammals. This Tetracerus is monotypic (Leslie and Sharma 2009). They have also mentioned that this

antelope prefers dry deciduous forested habitat and hilly terrain and are secretive.

Rice (1990) reported that Four-horned Antelope occurs in low densities and small population sizes. Further, this small bovid prefers dry deciduous forest especially the short grass habitat associated with stunted and sparse tree growth known as 'tree savanna' than the dry thorn forest (Baskaran *et al.* 2011). They have also mentioned that this antelope is a mixed feeder and the major diet of is grass, followed by browse biomass of herbs and shrubs, and leaves and fruits of few trees.

This being a vulnerable species (IUCN Red List 2011.12) and listed in Schedule I of the Wildlife Protection Act (1972), was recorded in six locations, of that two locations in the open scrub / wasteland along the boundary of the core zone, and four locations in the forests along the rivers during this study. This clearly shows that the animal tends to stay in vegetated areas in the study area. Since forests in most parts of the study area is degraded or disturbed, specific conservation plans to improve the habitat and food availability some shrub species are suggested for their long term existence.

It is important that the habitat needs to have short to medium size grasses, with herbs, shrubs and trees of stunted nature. Care must be taken that only species that are locally available and was said to be present earlier in the landscape should be planted as part of habitat improvement and increasing the food availability.

In addition to 10 grass species suggested (**Table 4.1**), a total of 11 woody shrub species are also suggested to grow in the degraded forest areas to enhance the food availability for ungulates. This list include the species secured more than 10% of RVI values of Core zone and top 10 species of buffer zone of the study area (**Table 4.4**).

These species can also provide food resources for some of the other ungulate species reported by the forest department in addition to four-horned antelope reported during this survey in the study area.

Table 4.4: List of woody shrub species suggested under habitat improvement program.

S.no.	Common Woody Shrub species	Core Zone				Buffer Zone				SPS
		RF	RDN	RVI	RO	RF	RDN	RVI	RO	
1	<i>Capparis sepiaria</i>					4.58	2.52	7.10	8	*
2	<i>Capparis zeylanica</i>					4.58	1.57	6.15	10	*
3	<i>Carissa congesta</i>	5.77	7.08	12.84	6	12.98	15.59	28.57	2	*
4	<i>Cocculus hirsutus</i>	15.38	16.51	31.89	3	10.69	9.29	19.98	3	*
5	<i>Cocculus pendulus</i>					3.82	1.57	5.39	11	*
6	<i>Helicteres isora</i>					3.82	6.30	10.12	6	*

7	<i>Securine gavirosa</i>					7.63	4.09	11.73	5	*
	<i>Waltheria indica</i>	7.69	6.60	14.30	5	2.29	1.26	3.55	12	*
9	<i>Zizyphus nummularia</i>	19.23	9.43	28.66	4	7.63	8.82	16.45	4	*
10	<i>Zizyphus oenoplia</i>	21.15	23.11	44.27	2	3.05	3.31	6.36	9	*
11	<i>Zizyphus xylopyrus</i>	19.23	30.66	49.89	1	25.95	36.54	62.49	1	*
Total species		6			11			11		

4.3.3. Sloth Bear

Sloth bear (*Melursus ursinus*), an omnivore and vulnerable species (IUCN 2010), play a very vital ecological role in the form of seed dispersal (Willson 1993, Sreekumar and Balakrishnan 2002), and aid in improving the diversity of floral species in the forest. Their principal diet is fruits (Bhaskaran *et al.* 1997), followed by termites and ants, in addition to honey. They climb on the tree and feed on fruit and honey, picking fruits fallen on the ground and digging for the termites and ants.

The signs of sloth bear during this study were recorded at two different locations. Of these, one track was in the forest, while the second, a dropping was found in the riverine forest (Pahiti Nadi) adjacent to the thorn mixed forest both in the Sirso forest block 3 of Marihan Range located in the buffer zone. The dropping revealed that it had eaten termites as it had termite and mud. The forest where the sloth bear signs were seen and other forest areas nearby revealed that the fruit availability, which the major diet, was low in the forest. However, now there is very less or occasional conflict, it could become a problem, so action plans need to be developed to address this issue. However, the only one dropping was recorded, the remains of termites (fed mostly during monsoon), it also shows that the availability of the fruits was low.

The specific conservation action needed is improving the habitat through restoration and planting of fruiting trees that are eaten by sloth bear in the forest that would enhance the food availability for this species and also reduce the conflict with humans. Some of the fruit tree species have been suggested to grow in the degraded forest areas to increase the food resources for sloth bear (**Table 4.5**)

Though this list includes 24 tree species, of that 14 species would improve the availability food resources for sloth bear and also support some of the ungulate species reported/said to occur in the forest areas.

In addition some of the shrub species suggested: *Zizyphus nummularia*, *Zizyphus oenoplia*, *Zizyphus xylopyrus*, *Capparis sepiaria*, *Carissa congesta* are also form food species of sloth bear (especially *Zizyphus* spp.) and other ungulate of the project area.

Table 4.5: List of tree species suggested under habitat improvement program for sloth bear

S.no.	Scientific name	Faunal Species				
		SB	CL	NL	FH	CH
1	<i>Acacia cathechu</i>		*	*		
2	<i>Acacia nilotica</i>			*		
3	<i>Aegle marmelos</i>	*				
4	<i>Albizia lebbeck</i>		*			*
5	<i>Butea monosperma</i>			*		
6	<i>Cassia fistula</i>	*				
7	<i>Dalbergia sissoo</i>		*			
8	<i>Diospyros melanoxylon</i>	*			*	
9	<i>Emblica officinalis</i>	*	*		*	
10	<i>Ficus benghalensis SB</i>	*	*			*
11	<i>Ficus mollis</i>	*				
12	<i>Ficus racemosa SB</i>	*	*			
13	<i>Ficus religiosa SB</i>	*	*			
14	<i>Flacourtia indica</i>	*				
15	<i>Holoptelea integrifolia</i>		*			
16	<i>Lannea coromandelica CL</i>		*			
17	<i>Madhuca indica SB</i>	*	*	*	*	*
18	<i>Mangifera indica</i>	*	*			
19	<i>Syzygium cumini SB</i>	*	*			*
20	<i>Syzygium heyneanum SB</i>	*	*			
21	<i>Tectona grandis</i>		*			
22	<i>Terminalia arjuna CL</i>		*			
23	<i>Terminalia bellirica CL</i>		*			
24	<i>Zizyphus mauritiana</i>	*	*	*	*	
	Total	14	17	5	4	4

SB-Sloth bear, CL-Common Langur, NL – Nilgai, FH- Four-horned antelope, CH – Chital

4.3.4. Long-billed Vulture

However, Long-billed vulture, White-rumped Vulture, Red-headed Vulture (all critically endangered) and Egyptian Vulture (endangered) were listed by the Mirzapur forest division, during this study only Egyptian Vulture was sighted once in the buffer zone. Once all these species were found common in India have presently reach to the stage of extinction mainly due to the use of the Diclofenac, a pain killer used to treat livestock which affected these vulture populations since they feed on dead livestock. Habitat loss in the form of removal of forest with tall and large trees and mining the rocks in the areas with rocky cliffs where they nest is another threat for the population decline.

As said above strict protection must be given to the rocky area especially cliffs and ledges, rocky ledges along the rivers and keep them out from mining in addition to restricting human interference in these sites, as these are probably good nesting and roosting habitats.

Secondly, it is very important to create awareness amongst local veterinary doctors and

the livestock keeper mainly to avoid use of Diclofenac which kills the vultures when they feed on livestock carcass. This is because even after banning of this drug in India, it is found that human Diclofenac is being used on livestock and therefore systematic awareness to be provided to the chemists in the area.

Thirdly, monitoring of the nesting sites and the vulture population numbers are very important during October to May, as these species nest during this period.

- Finally as part of habitat improvement, large sized tree species such as *Ficus benghalensis*, *F. religiosa*, *F. recemosa*, *Terminalia arjuna*, *T. tomentosa*, *T. bellirica* and other large sized species can be plant in patches as well as gap plantation keeping in mind the habitat conditions and requirement for other wildlife in the area, that is all open or semi dense forest should not be planted with trees.

4.3.5. Indian Peafowl

The Indian Peafowl (*Pava cristatus*) is an omnivore and listed in Schedule I of IWPA (1972). The Indian Peafowl (*Pavo cristatus*) has been an integral part of the people of the India and their culture for centuries. From religion and mythology to civilization and socio-culture, the Indian Peafowl occupies an important place in the lives of the people. In addition to this, the Indian Peafowl is well recognized for its ecological and aesthetical values, and hence aptly declared as the 'National Bird' of India in the year 1963 . The Indian Peafowl has been widely distributed throughout India except for the Himalayan ranges, north-east India and the Islands (Ali & Ripley 1987). Although the Indian peafowl is widely distributed and locally abundant or fairly common in some areas, the present population status of this species is only speculative and many of its former contiguous range has become fragmented and discontinuous (Choudhury and Sathyakumar 2009).

It is a bird of scrub jungles and forest edges, showing affinity to moist and dry deciduous and semiarid biomes. It is also found in the agriculture fields, along streams with good vegetation and close to human habitations in a semi-feral condition (Johnsgard 1986). It generally prefers a habitat mosaic of scrub and open areas, with adequate sites for dust bathing. Dust bathing is important as this bird has to condition its feathers and remove feather-degrading bacteria and other external parasites (Choudhury and Sathyakumar 2007). It roosts on trees and also uses tall buildings where trees are scarce (Birdlife International 2000).

- During this study only 18 Peafowls was sighted within the study area. However being a schedule - I species of IWPA 1972, it is very crucial to maintain and protect the open scrub habitats mainly through keeping it out from mining, encroachment or expansion

for agriculture and further degradation of the habitat as part of its conservation.

- As part of habitat improvement in the form of increasing the availability of roosting trees, it is important to plant tree species that are tall and with dense branching with good cover like *Ficus benghalensis*, *F. religiosa* and other locally found tall growing species in additions to opening up spaces by way of uprooting the *Lantana camara* in patches and also creating scrub forest by planting local shrub species.
- Educate and create awareness among local people on the significance of this species and its role as a pest controller, why the roosting trees in the area should not be lopped and need for the proper protection of this species especially during breeding as they are ground nesting birds and its habitat.
- Monitoring of the Peafowl population and its habitat is also very crucial.

4.4. HABITAT QUALITY IMPROVEMENT

4.4.1. Developing Check dams

There are three dams (Upper Khajuri Dam, Lower Khajuri Dam and Kathua Bandh) located in and around the study area, and though many rivers and streams are cutting across the study area from north to south, they are highly seasonal and water availability in most of the forest habitats/blocks are totally nil during summer season. Hence, it is suggested that a total of 12 check dams need to constructed across the streams/rivers passing through four reserve forest areas located in the study area (Table 4.6). As suggested the sites should be identified along the major streams/nullahs and construct check dams which would facilitate water availability for all the major faunal species of the study area.

Table 4.6: Reserve Forests identified for the construction of the Check Dams

No	Area	Number of check dams
1	Danti Reserve forest	3
2	Dadhiram Bamboo forest	3
3	Sarson Reserve forest	3
4	Bela Bamboo forest	3

4.4.2. Developing Water holes:

In addition, developing/creating water holes at strategic location in different forest blocks in the study area is suggested. It is very essential to develop small water holes especially in Lalganj and Marihan Ranges where sightings and evidences of more mammalian fauna reported.

Development of additional water resources likely to improve some of the other faunal groups like: amphibians, other Schedule I reptilian fauna; and Indian Flapshell Turtle reported in the study area.

As part of this six water holes are suggested, three each in the Lalgamj and Marihan Ranges and these should be filled with water through tankers frequently during summer and other periods of unavailability of water.

4.4.3. Salt Licks

Requirement of salt is very important for most wildlife, which they often meet from natural salt licks available in the forests, but during the survey there were no such salt licks present in the forest area. So artificial salt licks should be preferably made in the forest near the water holes, where watch and ward is possible to prevent poaching, as these are most vulnerable sites to poaching. This will help these animals and other wildlife to confine in the forest away from the villages.

4.4.4. Protection

It is very important to protect the forest from biotic interference (cutting, lopping, encroachments, expansion of agriculture lands, and other negative influence) caused mainly by the local population. However the forest department is well equipped and with full-fledged protection strategy in place, the project can complement the forest protection activities including a list of duties in the code of conduct of the project employees and more specifically the security guards in stopping and reporting the illegal activities. Provision of communicating equipment for this purpose would also be very important. Capacity building program on protection would be of high significance.

4.4.5. Forest Fire Protection Plan

This being a tropical forest with dry deciduous and thorn forest type, it is prone to fire each year between mid February to June (until onset of rains). Fire lines are to be cleared around the project area and also along the forest boundaries, in addition to clearing along the roads, footpaths and nullahs to prevent fire.

The forest department identified some areas in Marihan Range which are prone to frequent

fire and prepared forest fire map and therefore the above said management plans need to be implemented in those areas. In addition, it is suggested to develop watch towers to monitor fire incidences.

4.4.6. Anti-Poaching Plan

Poaching being one of the causes for depletion of wildlife in general, it is necessary to improve enforcement and create awareness among the people for eliminating poaching /hunting, which is present almost nil or very low, and help in improving the status of the wildlife and its habitat. Towards this end the protection staff has to be strengthened through employing more people (3-4 persons). They along with the forest staff should be provided with appropriate equipment including the anti-poaching kit at the project cost. They should help to prevent poaching and illicit felling after being trained appropriately.

4.4.7. Development of Wetland habitat

Among the three dam sites, the larger one Upper Khajuri dam seems to be a potential wetland habitat of the study area. Since the study was carried out during summer, it had only 25% water and supported 30 species of wetland birds. The reservoir covers large extent of area it can support diverse wetland species with good population (**Plate**). Therefore it has been suggested to develop this dam site as potential wetland habitat of the area. The forest department should have stake to implement the following suggestion with the joint venture of the Irrigation department:

The peripheral area of the dam site need to be planted with larger tree species *Ficus benghalensis*, *Ficus religiosa*, *Syzygium cumini*, *Mangifera indica*, *Holoptelea integrifolia*, *Albizia lebbek*, *Derris indica*, *Azadirachta indica* that can provide habitat for perching and nesting site for some of the aquatic birds species.

The reservoir area need to be developed few (four to five) stone mounds and dead tree shape concrete structures in the middle which can act as perching/resting as well as basking sites for some ducks and cormorants. This would also facilitate for clear sighting of birds by the local visitors and easy counting of birds by professional bird watches visit this wetland.

Two to three watch towers are suggested to construct along the south, east and west sides of the boundary of the reservoir area which can facilitate the tourists and bird watchers to observe birds and to take photograph and bird count.

The forest depart can develop interpretation centre close to dam site with the information

and visuals (photos) of the common birds found in the wetland, breeding birds, migratory birds and species of conservation significance.

4.5. Mitigation of Human – Animal Conflict

4.5.1 Eco-Education and awareness Generation

The project should take up widespread awareness program to sensitize the locals through multimedia (slide shows, films, street plays) on relevant subjects like Diclophenac and its dreadful effect on vulture species and complete stopping of its use, general conservation of biodiversity and their benefits to mankind, significance of different species of animals and plants more specifically the species of conservation significance and also on how to live in harmony with the wildlife in the area.

Conduct Panchayat workshops, school programs and events at the weekly markets using eco-educational packages, which would show the locals the interdependence of nature for survival and development along with instilling them a feeling of love and respect for the flora and fauna. Villagers should be made aware that the wildlife should not be disturbed in the forest during any time of the day.

4.5.2. Light

Since the animals generally enter the fields in the night and cause damage to the property, as they are not visible in the darkness and chance of conflict increases, lights are necessary along the boundary of the villages to reduce the conflicts. It is suggested to provide eco-friendly solar lights in the villages where the problems are very high and frequent.

The project proponent must provide funds and take up all the above mentioned initiatives with the help of the forest department and a subject specialist. All these planning needs to be done after an appropriate survey of the area based on which sites and implementation plans can be developed. All these would be basically planned, implemented and monitored by a specific committee.

4.5.3. Project labour force and increasing pressure on the forest resources

The proposed project activities needed larger labour force for non-technical activities. These, labours may depend on the forest area for their stay (land) and fuel wood requirement and construction materials (small poles) for temporary sheds. The sudden influx

of larger labour forces expected to cut of small poles from the forest area for the construction of temporary sheds and fuel wood demand and they may also involve in illegal hunting of animals

Due to the above said likely impact it is suggested that, the project proponent should provide all the basic requirement like: accommodation, fuel resources for their day to day requirements, portable water.

The project proponent should give very strict instruction to the outside labours working in the project related activities should not involved in any illegal cutting of trees from the nearby forest areas and hunting of animals.

4.6 Management for forest resource dependency

4.6.1. Development of energy resources

One of the major problems identified in the forest areas adjacent to the project site is degradation of forest due to severe wood cutting problems for fuel wood and fodder resources and therefore these issues need to be addressed under conservation and management plan. With the concept being that conservation of RET species and enhancement of the forest resource around the highly dependent villages would preserve a larger ecological system and landscape, thus providing safety to all other biodiversity or flora and fauna surviving within it.

- In order to minimize the fuel wood cutting pressure which degrade forest cover and impact the associated faunal biodiversity, it is suggested to develop energy resources to replace the fuel wood requirement.
- The villagers fall under BPL and fully depend on forest resources for fuel wood should be identified and provided energy efficiency smokeless chullas and solar cooker.
- Those who are having livestock should be trained and bring under the practice of development of biogas and use to reduce the fuel wood cutting from the nearby forest areas.

4.6.2. Development of Fodder Resources

- Local villagers cut trees from the forest areas and also graze their livestock which would reduce the food availability for the wildlife and impact overall biodiversity of the local forest areas. Therefore it is suggested to grow fodder trees in the close vicinity of the villages which depend on the forest resources to meet their fodder requirement.
- It is suggested to develop immediately fodder grass plots within the village Gaucher land (land allotted for grazing) to reduce the grazing pressure in the forests.
- These grass plots should be developed with the grass species which are highly nutritive and locally available with the consultation of local villagers especially livestock keepers.
- Simultaneously, it is suggested to develop fodder plantation within the village waste land or along the agriculture hedges to minimize the lopping pressure in the forest area.
- Since it is essential to allow the plantation to develop, in the initial five years the villagers should depend on the grass fodder and agriculture residues to feed their livestock.
- Both the fodder resources suggested to develop need to be used sustainably under the management of Village Fodder Committee - VFC.
- The following are the tree species suggested to develop under fodder plantation which are having high growth rate and high fodder values and grow locally (**Table 4.6.**)
- Added the fodder plantation likely to increase the vegetation cover locally and expected to support local faunal biodiversity
- These species are wild and common species, selected primarily based on the fodder value above five according to Hocking 1993. Among the species except *Boswellia serrata* and *Tamarindus indica* rests of the species having growth rate value of more

than five.

- Though, except five species having lesser than five value of fuel efficiency, rest of the species are good for fuel wood. However, these species can be extracted sustainably for fuel wood provided if they were grown under this program within their agriculture hedges. This can be an additional management option to reduce wood cutting pressure in the forest area for fuel wood.

Table 4.6: List of tree species suggested to grow under fodder plantation

S.no.	Scientific Name	Local Name	Fodder value *	Growth rate*	Fuel value*
1	<i>Acacia cathechu</i>	Khair	5	5	6
2	<i>Acacia nilotica</i>	Babul	7	6	10
3	<i>Azadirachta indica</i> A. Juss.	Neem	6	6	6
4	<i>Balanites aegyptiaca</i>	Hingu. Hingot	6	6	4
5	<i>Boswellia serrata</i>		5	4	6
6	<i>Derris indica</i>		6	6	7
7	<i>Ficus benghalensis</i>	Bargad	6	7	4
8	<i>Ficus religiosa</i>	Pipal	7	8	4
9	<i>Pithecellobium dulce</i>	Vilayati iimli	8	8	5
10	<i>Syzygium cumini</i>	Jamun	7	6	7
11	<i>Tamarindus indica</i>	Imli	8	2	8
12	<i>Wrightia tinctoria</i>	Mitha indrajau	5	5	4
13	<i>Zizyphus mauritiana</i>	Baer	6	6	8
14	<i>Zizyphus nummularia</i>	Jhadiabar	8	7	3

* Plant list sources; Hocking 1993

4.7 Social Surveys:

Before starting the project or sanctioning the budget for the conservation activities there is a need to carry out social survey to assess the status of forest resources dependency by the local villagers. So that actual data can be collected and collated on species of use for the locals (e.g. fuel-wood species, fodder species and other facilities required- small wood or poles for construction of fencing, gate and cattle sheds etc) Therefore a questioner / social survey need to be carried out in the villagers located within the boundary of the forest areas to exactly identify the areas where the above said management plans need to be implemented.

4.8. MONITORING OF CONSERVATION AND MANAGEMENT ACTION PLANS

The above suggested all the conservation and management plans would be developed and implemented by a different stakeholder's committee that would be headed by the DFO Mirzapur Forest Division. The other members of the committee include DFO (wildlife),



Mirzapur / representative; CEO of Mirzapur block, Project representative, one subject specialist, one NGO working with local people, one NGO working on Wildlife in the area and two representatives from local villages (it would be rotational with two villages getting to represent every year. This committee will be in charge of all issues related to conservation and their implementation, including 25% to 30% or entire fund management along with regular monitoring from the planning, implementing and long term monitoring. The financial budget/ forecast for the Wildlife Conservation and Eco- Management Plan is detailed in the table (**Table 4.7**).

Conservation Plan

Endorsed By

Signature:

Divisional Forest Officer, Mirzapur, UP.

Approved by

Signature:

**PCCF Wildlife, UP State Forest Department,
Lucknow, UP.**



Biodiversity-Wildlife Conservation and Management Plan for the Proposed 1320 MW (2x660 MW) Thermal Power Plant at Dadri Khurd Village, Mirzapur Sadar Tehsil, Mirzapur District, Uttar Pradesh

Table 4.7: Financial Forecast (in lakhs) for the Wildlife Conservation and Eco-Management Plan

No	Activity	Year wise fund Requirement (in lakhs)										Modified Final
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	
1	Protection											
1a	Anti-poaching & Protection											
A	Four Temporary Guards @ Rs.4500/- + Rs.500 travel per persons x 4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	24.00
b	Anti-poaching Kit ,Wireless etc	2.0	0.1	0.1	0.1	0.1	0.5	0.1	0.1	0.1	0.1	03.30
	Sub Total (1a)	4.4	2.5	2.5	2.5	2.5	2.9	2.5	2.5	2.5	2.5	27.30
1b	Fire Protection											
a	Clearance	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5.0
b	Wages of Fire Watchers @ Rs.4000 x 5 months x 2 nos. x 10 yrs	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	4.0
c	Cost of Fire Fighting Equipment	0.5	-	-	0.5	-	-	0.5	-	-	0.5	2.00
d	Training & Drill	0.3	-	-	0.3	-	-	0.3	-	-	0.3	1.20
e	Cost of one Watch Tower & maintenance	3.0	-	-	0.2	-	-	0.2	-	-	0.2	3.60
	Sub Total (1b)	4.7	0.9	0.9	1.9	0.9	0.9	1.9	0.9	0.9	1.9	15.8
	Total (1a+1b)	9.1	3.4	3.4	4.4	3.4	3.8	4.4	3.4	3.4	4.4	43.10
2	Habitat Improvement											
2a	Nursery											
	Development & Maintenance of Nursery	4.5	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	11.25
	Sub Total	4.5	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	11.25
2b	Water Conservation											
a	Game tank / water holes 3 Nos. @ Rs.80,000 each & Maintenance	2.4	-	-	0.3	-	-	0.3	-	-	0.3	3.30
b	Check- Dams 8 Nos. @ Rs.1.25 lakh each & Maintenance	10.0	-	-	0.75	-	-	0.75	-	-	0.75	12.25
	Sub Total	12.4	-	-	1.05	-	-	1.05	-	-	1.05	15.55
2c	Food Availability											
a	Improvement of vegetation - habitat & Food by RDF method with gap plantation in RF 50 ha @ Rs.40,000/- per ha	20.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	25.00
b	Creation & Maintenance of Meadows (Grassland) 5 plots each 25 ha @ Rs.1 lakh per plot	5.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	9.50
	Sub Total	25.0	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	34.50
2d	Salt Licks											

No	Activity	Year wise fund Requirement (in lakhs)										Modified Final
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	
a	Creation of artificial Salt Lick near meadows & water holes	1.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.80
	Sub Total	1.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.80
	Total (2a+2b+2c+2d)	42.9	2.45	1.95	3.0	1.95	1.95	3.0	1.95	1.95	3.0	64.10
3	Man -animal Conflict											
a	Solar lamps 20 Nos. & its Maintenance (5 lamps per village for 4 village with high conflict) @ Rs.6000/- per lamp	1.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	3.0
b	Corpus Fund	8.0	-	-	-	-	-	-	-	-	-	8.0
	Sub Total & Total (3a +3b)	9.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	11.00
4	Livelihood Development, Monitoring and Capacity Building											
a	Eco-development Support FD,BDO & VAS (Livelihood development -fuel & fodder plots) -Four most Forest dependent villages	8.0	1.0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	15
b	Incidental Charges of the Monitoring Committee	0.75	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	3.45
c	Capacity Building / Skill Development training	2.0			1.0			1.0			1.0	5.00
	Sub Total & Total (4)	10.75	1.30	1.05	2.05	1.05	1.05	2.05	1.05	1.05	2.05	23.45
5	Awareness & Education -Biodiversity Significance & Sustainable Use of Resource											
a	School Level	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5.0
b	Village Level	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5.5
c	Gram Panchayat Level & Veterinary doctors, Chemists, Livestock keepers & Project Staff, Security guards	8.0	-	-	-	-	-	-	-	-	-	8.0
	Sub Total & Total (5)	9.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	18.50
6	Wetland (habitat) Development											
a	Mounds (4/3 Nos) & Artificial Dead Tree (4/3 Nos) (RCC)	4.5	-	-	-	-	-	-	-	-	-	4.5
b	Two Watch Towers Construction & Maintenance	5.0	-	-	-	0.5	-	-	-	0.5	-	6.0
c	Interpretation Centre Development & Maintenance	4.0	-	-	-	-	0.5	-	-	-	-	4.5
	Sub Total & Total (6)	13.5	-	-	-	0.5	0.5	-	-	0.5	-	15.00
7	Research & Monitoring - Wildlife (Terrestrial and Wetland)											
a	Population Status Assessment once in a year (FD) & Overall (FD& Wildlife Experts)	3.0	-	-	2.0	-	-	2.0	-	-	2.0	9.0



*Biodiversity-Wildlife Conservation and Management Plan for the Proposed 1320 MW (2x660 MW)
Thermal Power Plant at Dadri Khurd Village, Mirzapur Sadar Tehsil, Mirzapur District, Uttar
Pradesh*

No	Activity	Year wise fund Requirement (in lakhs)										Modified Final
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	
	Sub Total & Total (7)	3.0			2.0			2.0			2.0	9.00
	Grand Total (1+2+3+4+5+6+7)	97.95	08.35	07.60	12.65	08.10	08.50	12.65	07.60	08.10	12.65	184.15

Financial Budget Endorsed by

Financial Budget Approved by

Signature:

Signature:

**Divisional Forest Officer
Mirzapur Forest Division
UP Forest Department
Mirzapur**

**PCCF Wildlife
UP State Forest Department
Lucknow**

Chapter 5 – REFERENCE

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6. Annexures

Annexure 1. Overall status of Floral species - Proposed Thermal Power Plant – WEUPPL Study Area - Mirzapur, Uttarpradesh

S.no.	Scientific Name	Local Name	Habit	FD	Core Zone		Buffer Zone			SA T	OS	
					AG/ FL	OS/ WL	AG/ FL	FR	OS/ WL			R/ WL
1	Acanthaceae											
1	<i>Andrographis paniculata</i> Nees	Kalmegh	Herb	—		+		+			**	
2	<i>Asteracantha longifolia</i> Nees	Talmakhana	Herb	—						+	**	
3	<i>Blepharis repens</i> (Vahl) Roth		Herb	—	3			1	25	5	34	**
4	<i>Dipteracanthus patulus</i> (Jacq.) Nees		Herb	—						4	4	**
5	<i>Justicia</i> spp.		Herb	—			4			2	6	**
6	<i>Lepidagathis trinervis</i> Wall.		Herb	—		6		62	28	2	98	**
7	<i>Peristrophe bicalyculata</i> (Retz.) Nees	Atrilal , Chirchiri	Herb	—		3	35	8		16	61	**
2	Agavaceae											**
8	<i>Agave americana</i> L.	Hathiya chinghar, Rambans	Shrub	—			3				3	**
3	Alangiaceae											
9	<i>Alangium salvifolium</i> (L. f.) Wang.		Tree	—			2			12	14	**
4	Alismataceae											
10	<i>Sagittaria sagittifolia</i> L.,		Herb	—						+		**
5	Amaranthaceae											
11	<i>Achyranthes aspera</i> L.	Lather	Herb	—			29			7	36	**
12	<i>Amaranthus spinosus</i> L.	kateeli chaurai	Herb	—	+		+					**
13	<i>Amaranthus viridis</i> L.		Herb	—			3				3	**
14	<i>Celosia argentea</i> L.		Herb	—	2	9		2			13	**
15	<i>Digera muricata</i> (L.) Mart.		Herb	—			2				2	**
16	<i>Gomphrena globosa</i> L.		Herb	—						3	3	**
6	Anacardiaceae											
17	<i>Buchanania lanzan</i> Spreng.	Chiraunji	Tree	FD			+					FD*
18	<i>Lannea coromandelica</i> (Houtt.)		Tree	FD		8		5			13	FD*
19	<i>Mangifera indica</i> L.	Ama	Tree	FD			21				21	FD*
7	Annonaceae											
20	<i>Annona squamosa</i> L.	Shareefa	Small Tree	—	+	+				+		**
21	<i>Polyalthia longifolia</i> (Sonn.) Thw.	Ashok	Tree	—			1				1	**
8	Apiaceae											
22	<i>Daucus carota</i> L.	Gajar	Herb	—			+					**
23	<i>Foeniculum vulgare</i> Mill.	Saunf	Herb	—			+					**

S.no.	Scientific Name	Local Name	Habit	FD	Core Zone		Buffer Zone			SA T	OS	
					AG/ FL	OS/ WL	AG/ FL	FR	OS/ WL			R/ WL
9	Apocynaceae											
24	<i>Alstonia scholaris</i> (L.) R. Br.	Saptaparni	Tree	—			+	+			**	
25	<i>Carissa spinarum</i> L.		Shrub	FD	15		3	52	20	24	114	FD*
26	<i>Holarrhena antidysenterica</i> (Heyne ex Roth) Wall.	Kutaj	Tree	FD				62	2	20	84	FD*
27	<i>Ichnocarpus frutescens</i> (L.) R.Br.		Climber	FD		2		3			5	FD*
28	<i>Thevetia peruviana</i> (Pers.) Merr.	Pila Kaner	Shrub	—			+					**
29	<i>Wrightia tinctoria</i> R. Br.		Tree	—		1		5			6	**
10	Araceae											
30	<i>Amorphophallus campanulatus</i> (Roxb.) Bl. Ex Decne.	Sooran	Herb	—						+		**
11	Arecaceae											
31	<i>Borassus flabellifer</i> L.		Tree	—			+					**
32	<i>Caryota urens</i> L.		Tree	—			+					**
33	<i>Cocos nucifera</i> L.	Narial	Tree				+					**
34	<i>Phoenix humilis</i> L.		Tree	FD						2	2	FD*
12	Asclepiadaceae											
35	<i>Calotropis gigantea</i> (L.) R. Br.		Shrub	—	+		+					**
36	<i>Calotropis procera</i> (Ait.) R. Br.	Madar	Shrub	FD	1		2			2	5	FD*
37	<i>Telosma pallida</i> (Roxb.) Craib	Kusiyari	Climber	—		+		8	14	6	28	**
13	Asteraceae											
38	<i>Echinops echinatus</i> Roxb.		Under Shrub	FD					3	5	8	FD*
39	<i>Eclipta prostrata</i> (L.) L. Mant.		Herb	—						4	4	**
40	<i>Launaea procumbens</i> (Roxb.) Ram. & Raj.		Herb	—			7		2	4	13	**
41	<i>Oligochaeta ramosa</i> (Roxb.) Wagenitz		Herb	—			1				1	**
42	<i>Parthenium hysterophorus</i> L.	Gajar Ghas	Herb	—		8	67			19	94	**
43	<i>Sphacranthus indicus</i> L.	Mundi	Herb	—						+		**
44	<i>Tridax procumbens</i> L.	Phulni	Herb	—	1		2	26	69	53	151	**
45	<i>Vernonia cinerea</i> (L.) Less.	Sahadaiya	Herb	—	15		24	82	122	60	303	**
46	<i>Xanthium strumarium</i> L.	Gokhur	Herb	—			4				4	**
14	Balanitaceae											
47	<i>Balanites aegyptiaca</i> (L.) Del.		Small Tree	—				2	+		2	**
15	Bignoniaceae											
48	<i>Haplophragma adenophyllum</i> (Wall. ex G. Don) Dop	Kath Sagon	Tree	FD			+	+				FD*

S.no.	Scientific Name	Local Name	Habit	FD	Core Zone		Buffer Zone			SA T	OS	
					AG/ FL	OS/ WL	AG/ FL	FR	OS/ WL			R/ WL
49	<i>Millingtonia hortensis</i> L. f.		Tree	—					+		**	
50	<i>Stereospermum suaveolens</i> DC.		Tree	—						1	1	**
16	Bombacaceae											
51	<i>Bombax ceiba</i> L.		Tree	—			+					**
17	Boraginaceae											
52	<i>Coldenia procumbens</i> L.		Herb	—				2			2	**
53	<i>Heliotropium indicum</i> L.		Herb	—				1			1	**
54	<i>Heliotropium</i> sp		Herb	—					3	1	4	**
18	Brassicaceae											
55	<i>Brassica nigra</i> (Linn.)Kach.	Rai	Herb	—	+		+					**
56	<i>Raphanus sativus</i> L.	Murai	Herb	—			+					**
19	Burseraceae											
57	<i>Boswellia serrata</i> Roxb.	Salai	Tree	FD						14	14	FD*
20	Cactaceae											
58	<i>Opuntia elatior</i> Mill.		Herb	—					+			**
21	Caesalpiniaceae											
59	<i>Bauhinia racemosa</i> Lam.	Kaliar	Tree	FD		1		7		1	9	FD*
60	<i>Bauhinia variegata</i> L.	Kanchaner	Tree	—		+		+				**
61	<i>Cassia fistula</i> L.	Amaltas	Tree	FD				4			4	FD*
62	<i>Cassia occidentalis</i> L.	Kasaundhi	Herb	FD		+				+		FD*
63	<i>Cassia siamea</i> Lam.	Sandan	Tree	FD					10		10	FD*
64	<i>Cassia tora</i> L.	Chakwar	Herb	—	33	2	2	36	74		147	**
65	<i>Delonix elata</i> (L.) Gamble	Gul Mahor	Tree	—				7			7	**
66	<i>Parkinsonia aculeata</i> L.		Small Tree	FD			+					FD*
67	<i>Peltophorum pterocarpum</i> (DC.) Backer ex Heyne		Tree	—			+		+			**
68	<i>Tamarindus indica</i> L.	Imli	Tree	FD	+		+					FD*
22	Cannabinaceae											
69	<i>Cannabis sativa</i> Linn.	Bhang	Herb	—			+					**
23	Cannaceae											
70	<i>Canna indica</i> L.		Under Shrub	—			+					
24	Capparaceae											
71	<i>Capparis sepiaria</i> L.		Straggling Shrub	FD				1	13	2	16	FD*
72	<i>Capparis</i> Sp		Under Shrub	—					2		2	**
73	<i>Capparis zeylanica</i> Linn.		Straggling Shrub	FD		3		5	5		13	FD*
74	<i>Cleome gynandra</i> L. var. <i>gynandra</i>		Herb	—		+						**
75	<i>Cleome viscosa</i> L.	Hurhur	Herb	—		+		+		+		**
76	<i>Maerua oblongifolia</i>		Woody	—		2					2	*8

S.no.	Scientific Name	Local Name	Habit	FD	Core Zone		Buffer Zone			SA T	OS	
					AG/ FL	OS/ WL	AG/ FL	FR	OS/ WL			R/ WL
	(Foeak.) A. Rich.		Twiner									
25	Caricaceae											
77	<i>Carica papaya</i> L.	Papaya	Tree	—			5			5	**	
26	Chenopodiaceae											
78	<i>Atriplex hortensis</i> L.	Palakh	Herb	—			+				**	
79	<i>Chenopodium album</i> L.	Bathua	Herb	—			2			4	6	**
27	Combretaceae											
80	<i>Terminalia arjuna</i> (Roxb.) W. & A.	Arjun Sadad	Tree	FD			5			19	24	FD*
81	<i>Terminalia bellirica</i> (Gaerth) Roxb.	Baharai	Tree	FD			1			1	1	FD*
28	Commelinaceae											
82	<i>Commelina benghalensis</i> L.		Herb	—			19			19		**
83	<i>Commelina diffusa</i> Burm. f.		Herb	—	+		+			+		**
29	Convolvulaceae											
84	<i>Convolvulus microphyllus</i> (Roth) Sieb. ex Spr.		Herb	—					2	10	12	**
85	<i>Evolvulus alsinoides</i> L.	Neel Shankh, Pusp	Herb	—	17	15		52	29	6	119	**
86	<i>Ipomoea carnea</i> Jacq. Subsp. <i>fistulosa</i> Mart. Ex Choisy		Straggling Shrub	—			3			3	6	**
87	<i>Ipomoea pes-tigridis</i> L.		Twining Herb	—				2			2	**
88	<i>Merremia dissecta</i> (Jacq.) Hall. f.		Twining Herb	—						2	2	**
89	<i>Merremia</i> Sp		Twining Herb	—			31	7	4		42	**
90	<i>Merremia tridentata</i> L.		Twining Herb	—					3		3	**
91	<i>Rivea hypocrateriformis</i> Choisy	Rivea	Climber	—			5		1	1	7	**
30	Cucurbitaceae											
92	<i>Citrullus colocynthis</i> (L.) Soland.	Indrayana	Climber	—	+					+		**
93	<i>Coccinia grandis</i> (L.) Voigt	Kundru	Climber	—				+				**
94	<i>Cucumis melo</i> L. var. <i>melo</i>	Kharbooja	Herb	—			+					**
95	<i>Cucumis prophetarum</i> L.		Climber	—			+		+			**
96	<i>Cucumis sativus</i> L.	Kheera	Climber	—			+					**
97	<i>Cucurbita maxima</i> Duch.	Kadhu	Climber	—			+					**
98	<i>Lagenaria siceraria</i> Stardl.	Lauki	Climber	—			+					**
99	<i>Luffa acutangula</i> L.	Jagli Torai	Climber	—						4	4	**

S.no.	Scientific Name	Local Name	Habit	FD	Core Zone		Buffer Zone			SA T	OS		
					AG/ FL	OS/ WL	AG/ FL	FR	OS/ WL			R/ WL	
100	<i>Luffa cylindrica</i> (L.) M. J. Roem.	Torai	Climber	—			+				**		
101	<i>Momordica charantia</i> L.	Karela	Climber	—			+				**		
102	<i>Momordica dioica</i> Roxb.	Kheksa	Climber	—			+				**		
103	<i>Trichosanthes dioica</i> Roxb.	Parval	Climber	—			+				**		
31	Cuscutaceae												
104	<i>Cuscuta reflexa</i> Roxb.	Amerbel	Parasite	FD		+		+	+		FD*		
32	Cyperaceae												
105	<i>Cyperus compressus</i> L.		Sedge	—						+	**		
106	<i>Cyperus rotundus</i> L.	Motha	Sedge	—			2				2	**	
107	<i>Eleocharis sp</i>		Sedge	—							28	28	**
108	<i>Scirpus littoralis</i> auct.		Sedge	—							+	**	
109	<i>Scirpus sp.</i>		Sedge	—							+	**	
33	Ebenaceae												
110	<i>Diospyros melanoxylon</i> Roxb.	Tendu	Tree	—				6		4	10	**	
34	Ehretiaceae												
111	<i>Cordia dichotoma</i> Forst.	Lisora	Tree	FD			+					FD*	
35	Euphorbiaceae												
112	<i>Chrozophora prostrata</i> Dalz.		Herb	—			4				4	**	
113	<i>Chrozophora rottleri</i> (Geis.) Juss.		Herb	—			8				8	**	
114	<i>Croton bonplandianum</i> Baill.		Herb	—	+					+		**	
115	<i>Embllica officinalis</i> Gaertn.	Aawla	Tree	FD			2	1			3	FD*	
116	<i>Euphorbia hirta</i> L.	Doodhi	Herb	—	5	7	2			7	16	**	
117	<i>Euphorbia microphylla</i> Roth		Herb	—	3			8			11	**	
118	<i>Euphorbia milli</i> Ch.		Herb	—				+				**	
119	<i>Euphorbia nivulia</i> Buch.-Ham.	Sehur	Shrub	FD			+					FD*	
120	<i>Euphorbia thymifolia</i> L.		Herb	—			6				6	**	
121	<i>Jatropha curcas</i> L.		Shrub	—	6						6	**	
122	<i>Kirganelia reticulata</i> (Poir.) Baill.		Shrub	—						6	6	**	
123	<i>Phyllanthus fraternus</i> Webst.	Bhui Awala	Herb	—			22				22	**	
124	<i>Putranjiva roxburghii</i> Wall	Putra jeevi	Tree	—				+				**	
125	<i>Ricinus communis</i> L.	Rendi ,Arandi	Shrub	—			+					**	
126	<i>Securinega virosa</i> (Roxb. ex Willd.) Pax & Hoffm		Shrub	FD	2		5	6	3	12	28	FD*	
36	Fabaceae												
127	<i>Abrus precatorius</i> L.	Gumachi, ratti	Climber	FD		2		+			2	FD*	
128	<i>Alysicarpus monilifer</i>		Herb	—	11	6		67	24	16	124	**	

S.no.	Scientific Name	Local Name	Habit	FD	Core Zone		Buffer Zone			SA T	OS	
					AG/ FL	OS/ WL	AG/ FL	FR	OS/ WL			R/ WL
	(L.) DC. var. <i>monilifer</i>											
129	<i>Butea monosperma</i> (Lam.) Taub.		Tree	FD	32	16	8	22	70	12	160	**
130	<i>Cajanus cajan</i> (L.) Millsp.	Tuvar	Under Shrub	—			+					**
131	<i>Clitoria ternatea</i> L.	Aprazita	Twiner	—				+				**
132	<i>Dalbergia paniculata</i> L.		Tree	—		+						**
133	<i>Dalbergia sissoo</i> Roxb.	Shishu	Tree	FD			19	+			19	FD*
134	<i>Derris indica</i> (Lam.) Bennet	kiramal, karanj	Tree	FD			+			+		FD*
135	<i>Indigofera linifolia</i> Retz.		Herb	—					6	4	10	**
136	<i>Mucana prurita</i> Hk. f.	kewanch	Climber	FD				+				FD*
137	<i>Rhynchosia minima</i> (L.) DC. var. <i>minima</i>		Climber	—	9	9		6	2	3	29	**
138	<i>Rhynchosia minima</i> L.		Twiner	—	14	6		10		7	37	**
139	<i>Rhynchosia</i> Sp.		Climber	—				+	+			**
140	<i>Tephrosia purpurea</i> (L.) Pers.	Sharpunkh	Herb	FD		2		2	3		7	FD*
37	Flacourtiaceae											
141	<i>Flacourtia indica</i> (Burm. F.) Merr.		Small Tree	FD	14	9	4	2	7		36	FD*
38	Gentianaceae											
142	<i>Conscora diffusa</i> L.		Herb	—						2	2	**
39	Lamiaceae											
143	<i>Hyptis suaveolens</i> (Linn.) Poir.		Herb	—	3	334	2	106 8	32		143 9	**
144	<i>Leucas cephalotes</i> Spreng.	Dronepushpi	Herb	—		+		+				**
145	<i>Mentha arvensis</i> Linn.	Pudeena	Herb	—			+					**
146	<i>Ocimum sanctum</i> Linn.	Tulsa	Herb	—			+					**
40	Liliaceae											
147	<i>Allium cepa</i> L.	Pyas	Herb	—			+					**
148	<i>Asparagus racemosus</i> Willd.	Satavari	Sarmentose Shrub	FD		2					2	**
149	<i>Drimia indica</i> L.	Jungli pyaz	Herb	—				4			4	**
41	Loranthaceae											
150	<i>Loranthus longiflorus</i> Desr.	Vando	Parasite	—			+			+		**
42	Lythraceae											
151	<i>Ammannia baccifera</i> L.		Herb	—						+		**
152	<i>Lagerstroemia parviflora</i> , Roxb.		Tree	FD		7		36	5		48	FD*
153	<i>Lawsonia inermis</i> L.		Shrub	—		+						**
154	<i>Woodfordia fruticosa</i> Kurz		Shrub	FD				5			5	FD*
43	Malvaceae											
155	<i>Abelmoschus esculentus</i> (L.) Moench	Bhinda, Bhindo	Under Shrub	—			+					**
156	<i>Ceiba pentandra</i> (L.) Gaertn.		Tree	—			+					**

S.no.	Scientific Name	Local Name	Habit	FD	Core Zone		Buffer Zone			SA T	OS		
					AG/ FL	OS/ WL	AG/ FL	FR	OS/ WL			R/ WL	
157	<i>Hibiscus ovalifolius</i> (Forsk.) Vahl		Shrub	—				1			1	**	
158	<i>Hibiscus rosa-sinensis</i> L.	Gurhal	Shrub	—			+					**	
159	<i>Hibiscus sp</i>		Shrub	—				3			3	**	
160	<i>Sida acuta</i> Burm. f.		Herb	—	1			2			3	**	
161	<i>Sida cordifolia</i> L.	Bariyari	Herb	—	6			21	13	+	7	47	**
162	<i>Sida ovata</i> Forsk.		Herb	—				10		1		11	**
44	Meliaceae												
163	<i>Azadirachta indica</i> A. Juss.	Neem	Tree	FD	8	24		7	6	8	49	102	FD*
45	Menispermaceae												
164	<i>Cocculus hirsutus</i> (L.) Diels		Straggling Shrub	FD	18	17		4	17	25	13	94	FD*
165	<i>Cocculus pendulus</i> (Forst.) Diels		Straggling Shrub	—				2	7		1	10	**
166	<i>Tinospora cordifolia</i> Roxb.		Climber	—				1			5	6	**
46	Mimosaceae												
167	<i>Acacia auriculiformis</i> A. Cunn. ex Benth.	Sonjari	Tree	FD					+				FD*
168	<i>Acacia catechu</i> (L.F.) Willd.	Khair, Kattat ha	Tree	FD	2	36		2	59	6		95	FD*
169	<i>Acacia concinna</i> DC.	Shikakai	Climber	—		3		6	26		15	50	**
170	<i>Acacia leucophloea</i> (Roxb.) Willd.		Tree	FD	1	3		4	2	9	17	36	FD*
171	<i>Acacia nilotica</i> (L.) Del. subsp. <i>indica</i> (Bth.) Brenan	Babul	Tree	FD	+			5	+		9	14	FD*
172	<i>Albizia lebeck</i> (L.) Bth.	Shireesh, Chichola	Tree	FD				+					FD*
173	<i>Leucaena latisiliqua</i> (L.) Wt. & Arn.		Tree	—				17				17	**
174	<i>Pithecellobium dulce</i> (Roxb.) Bth.		Tree	FD					4		1	5	
175	<i>Prosopis juliflora</i> (Sw) DC.	Cathela	Shrub	—					+				**
47	Molluginaceae												
176	<i>Mollugo pentaphylla</i> L.		Herb	—							13	13	**
48	Moraceae												
177	<i>Artocarpus heterophyllus</i> Lamk.	Katahal	Tree	—				+					**
178	<i>Ficus benghalensis</i> L.	Bargad	Tree	FD				1	2			3	FD*
179	<i>Ficus mollis</i> Vahl		Tree	—		3			1		2	6	**
180	<i>Ficus racemosa</i> L.	Gular	Tree	FD				2			7	9	FD*
181	<i>Ficus religiosa</i> L.	Pipal	Tree	FD							1	1	FD*
182	<i>Morus alba</i> L.	Sahatoot	Tree	—				+					**
183	<i>Streblus asper</i> Lour.		Small Tree	FD					24	+			FD*
49	Moringaceae												

S.no.	Scientific Name	Local Name	Habit	FD	Core Zone		Buffer Zone			SA T	OS	
					AG/ FL	OS/ WL	AG/ FL	FR	OS/ WL			R/ WL
184	<i>Moringa concanensis</i> Nimmo		Tree	—				1			1	**
185	<i>Moringa oleifera</i> Lam.		Tree	FD				+				FD*
50	Musaceae											
186	<i>Musa paradisiaca</i> L.	Kela	Herb	—				5			5	**
51	Myrtaceae											
187	<i>Callistemon lanceolatus</i> Sweet.Eng.	Bottle Brush	Small Tree	FD				+				FD*
188	<i>Eucalyptus globulus</i> Labill.		Tree	—				9			9	**
189	<i>Psidium guajava</i> L.	Amrut	Tree	—				5			5	**
190	<i>Syzygium cumini</i> (L.) Skells	Jamun	Tree	FD				5			5	FD*
191	<i>Syzygium heyneanum</i> Wall. ex W. & A.	Kathjamun	Tree	FD						1	1	FD*
52	Nyctaginaceae											
192	<i>Boerhavia diffusa</i> L.	gadah- punna	Herb	—		6				4	10	**
193	<i>Bougainvillea spectabilis</i> Willd.		Stragglin g Shrub	—	+							**
53	Oleaceae											
194	<i>Jasminum multiflorum</i> (Burm. F.) Andr.	Chameli	Twining Shrub	—				+				**
195	<i>Jasminum sambac</i> Ait.	Mogro	Twining Shrub	—				+				**
54	Oxalidaceae											
196	<i>Oxalis corniculata</i> L.		Herb	—						+		**
55	Papaveraceae											
197	<i>Argemone mexicana</i> L.	Bharbhanda	Herb	—						4	4	**
56	Pedaliaceae											
198	<i>Sesamum indicum</i> L.	Til	Herb	—				+				**
57	Periplocaceae											
199	<i>Cryptolepis buchanani</i> Roem & Sch.		Woody Climber	FD			1	3			4	FD*
200	<i>Hemidesmus indicus</i> (L.) Schult.	Anantmula	Twiner	—	2	18	4	39	18	21	102	**
58	Poaceae											
201	<i>Apluda mutica</i> L.		Grass	FD	45	42		64			151	FD*
202	<i>Aristida hystrix</i> L.		Grass	FD		18		16	69		113	FD*
203	<i>Bambusa arundinacea</i> (Retz.) Willd.	khokhla baus	Grass	FD		1	14	44	2	13	74	FD*
204	<i>Bothriochloa pertusa</i> (L.) A. Camus		Grass	FD		+		+				FD*
205	<i>Cenchrus ciliaris</i> L.		Grass	FD		4		5	4		13	FD*
206	<i>Cynodon dactylon</i> (L.) Pers.		Grass	FD	12		51			83	146	FD*
207	<i>Desmostachya bipinnata</i> (L.) Stapf		Grass	FD	42	6	109	187	8	32	384	FD*
208	<i>Dichanthium annulatum</i> (Forak.) Stapf		Grass	FD	45	11	85	24	8	40	213	FD*
209	<i>Eragrostis ciliaris</i> L.		Grass	—		48			30		78	**

S.no.	Scientific Name	Local Name	Habit	FD	Core Zone		Buffer Zone			SA T	OS	
					AG/ FL	OS/ WL	AG/ FL	FR	OS/ WL			R/ WL
210	<i>Eragrostis Sp.</i>		Grass	—			35			2	37	**
211	<i>Heteropogon contortus</i> (L.) P.Beauv. ex.R. & S.		Grass	FD	21						21	FD*
212	<i>Imperata cylindrica</i> (L.) Beauv		Grass	—						+		**
213	<i>Oplismenus spp.</i>		Grass	—						+		**
214	<i>Oryza sativa</i> L.		Grass	—			+					**
215	<i>Saccharum officinarum</i> L.	Ganna	Grass	—			+					**
216	<i>Saccharum spontaneum</i> L.		Grass	FD	+					+		FD*
217	<i>Sporobolus coromandelianus</i> (Retz.) Kunth		Grass	—					25	3	28	**
218	<i>Sporobolus sp</i>		Grass	—						1	1	**
219	<i>Triticum aestivum</i> L.	Gehu	Grass	—			+					**
220	<i>Vetiveria zizanioides</i> (L.) Nash		Grass	FD					2		2	**
221	<i>Zea mays</i> L.		Grass	—			+					**
59	Polygonaceae											
222	<i>Polygonum glabrum</i> Willd.		Herb	—						64	64	**
223	<i>Polygonum plebeium</i> R. Br.		Herb	—		4	2	4		17	27	**
60	Portulacaceae											
224	<i>Portulaca oleracea</i> L.	khatti chaulai	Herb	—			+			+		
225	<i>Portulaca quadrifida</i> L.		Herb	—			4				4	**
61	Punicaceae											
226	<i>Punica granatum</i> L.	Anar	Small Tree	—			1				1	**
62	Rhamnaceae											
227	<i>Zizyphus mauritiana</i> Lam.	Jherberi, Ber	Small Tree	FD		1	4	2			7	FD*
228	<i>Zizyphus nummularia</i> (Burm. F.) W. & A.	Jharberi, Jharbaila	Under Shrub	FD	8	12		20	25	11	76	FD*
229	<i>Zizyphus oenoplia</i> Mall.		Shrub	FD	16	33	2	+	18	1	70	FD*
230	<i>Zizyphus xylopyrus</i> Willd.	Ber	Shrub	FD	+	5	8	135	65	24	237	FD*
63	Rubiaceae											
231	<i>Adina cordifolia</i> (Willd. ex Roxb.) Benth. & Hook. f. ex Brandis	Haldu	Tree	FD				+				FD*
232	<i>Borreria articularis</i> (L.f.) F.N. Will.		Herb	—		23		29	20	4	76	**
233	<i>Ixora arborea</i> Roxb. Ex. Sm.		Tree	FD				2		7	9	FD*
234	<i>Mitragyna parvifolia</i> (Roxb.) Korth.		Tree	FD				1			1	FD*
235	<i>Morinda tomentosa</i> B. Heyne ex Roth		Tree	—						+		**

S.no.	Scientific Name	Local Name	Habit	FD	Core Zone		Buffer Zone			SA T	OS	
					AG/ FL	OS/ WL	AG/ FL	FR	OS/ WL			R/ WL
236	<i>Oldenlandia corymbosa</i> L.		Herb	—						4	4	**
237	<i>Xeromphis spinosa</i> L.		Small Tree	—		7	1	4		3	15	**
238	<i>Xeromphis uliginosa</i> (Retz.) Maheshwari		Small Tree	—			4	3			7	**
64	Rutaceae											
239	<i>Aegle marmelos</i> (L.) Corr.	Bel	Tree	FD				5	1	1	7	FD*
240	<i>Citrus limon</i> (L.) Burm. f.	Leembu	Shrub	—			1				1	**
65	Sapotaceae											
241	<i>Madhuca indica</i> J. F. Gmel.	Mahua	Tree	FD			9			2	11	FD*
242	<i>Manilkara hexandra</i> (Roxb.) Dub		Tree	FD				+				FD*
66	Scrophulariaceae											
243	<i>Bacopa monnieri</i> (L.) Pennell	Jalneem	Herb	—						+		**
244	<i>Lindernia ciliata</i> (Colsm.) Penn.		Herb	—						5	5	**
245	<i>Lindernia oppositifolia</i> (Retz.) Mukerjee		Herb	—						3	3	**
67	Simaroubaceae											
246	<i>Ailanthus excelsa</i> Roxb.		Tree	FD			+					FD*
68	Solanaceae											
247	<i>Capsicum annuum</i> var. <i>acuminata</i> Fingerh.	Marcha	Herb	—			+					
248	<i>Datura innoxia</i> Mill.		Under Shrub	—			2				2	**
249	<i>Datura metel</i> L.	Dhaturo	Under Shrub	—					+			**
250	<i>Lycopersicon lycopersicum</i> (L.) Karst.	Tamater	Herb	—			+			+		**
251	<i>Physalis minima</i> L.	Tankari	Herb	—			2				2	**
252	<i>Solanum melongena</i> L. var. <i>insana</i> Prain	Ringna	Herb	—			+					**
253	<i>Solanum melongena</i> L. var. <i>melongena</i>	Bhanta	Herb	—			+					**
254	<i>Solanum nigrum</i> L.	Macoi	Herb	—	+					+		**
255	<i>Solanum surattense</i> Burm. f.	Bhatkataiya	Herb	—	4		4		2		10	**
256	<i>Withania somnifera</i> (L.) Kurz	Ashwagandha	Under Shrub	—			+		+			**
69	Sterculiaceae											
257	<i>Helicteres isora</i> L.		Shrub	FD				37		3	40	FD*
258	<i>Sterculia urens</i> Roxb.		Tree	FD		4	1				5	FD*
259	<i>Waltheria indica</i> L.		Under Shrub	—	7	7	3	5			22	**
70	Tiliaceae											
260	<i>Corchorus aestuans</i> L.		Herb	—			4				4	**
261	<i>Corchorus olitorius</i> L.		Herb	—			4			2	6	**

S.no.	Scientific Name	Local Name	Habit	FD	Core Zone		Buffer Zone			SA T	OS		
					AG/ FL	OS/ WL	AG/ FL	FR	OS/ WL			R/ WL	
262	<i>Grewia flavescens</i> Juss.		Shrub	FD					1		1	FD*	
263	<i>Triumfetta rhomboidea</i> Jacq.		Herb	—	5		10	7	2	7	31	**	
264	<i>Triumfetta rotundifolia</i> Lam.		Herb	—	+	+				+		**	
71	Ulmaceae												
265	<i>Holoptelea integrifolia</i> (Roxb.) Planch.	Chilbil	Tree	FD		2	1	2	5	12	22	FD*	
72	Verbenaceae												
266	<i>Gmelina arborea</i> Linn.	Gmhar	Tree	FD		+						FD*	
267	<i>Lantana camara</i> auct. Non L.		Under Shrub	FD				23	2	1	26	FD*	
268	<i>Phyla nodiflora</i> (L.) Greene		Herb	—						2	2		
269	<i>Tectona grandis</i> L.f.	Sagon	Tree	FD								FD*	
73	Violaceae												
270	<i>Viola cinerea</i> Boiss.		Herb	—						+		**	
74	Vitaceae												
271	<i>Cayratia carnososa</i> (Lam.) Gagnep.		Climber	—			2				2	**	
Total					82	429	803	838	251	949	921	645	
								7			7		

D/DR- Dense Forest / Degraded Forest, WB/R -Water Body /Rivers, OS/WL- Open Scrub / Wasteland, AG/FL- Agriculture/ Fallow Land SAT Study Area Total , FD + = Species listed by Forest department and Present Study, ** Species Reported only by the present Study, OSR – Overall Species

Annexure 2. Overall List and Conservation Status of Herpetofauna of the Proposed Thermal Power Plant -WEUPPL Study Area - Mirzapur, Uttar Pradesh

S.no.	Family and Species name	Common Name	SA	FD	Conservation Status	
					CAMP 1998	WPA 1972
	AMPHIBIANS					
1	Randidae					
1	<i>Occidozyga cyanophlyctis</i>	Skittering Frog	30	**	LR-nt	IV
2	<i>Limnonectes limnocharis</i>	Indian Pond Frog	3	**	-	
3	<i>Hoplobatrachus tigerinus</i>	Indian Bull Frog	5	**	LC	IV
	REPTILES					
2	Crocodylidae					
4	<i>Crocodylus palustris</i>	Mugger / Marsh Crocodile	-	FD@	VU	Sch-I
3	Gavialidae					
5	<i>Gavialis gangeticus</i>	Gharial	-	FD@		Sch-I
4	Trionychida					
6	<i>Lissemys punctata</i>	Indian Flapshell Turtle	-	FD@	LR-nt	Sch-I
5	Gekkonidae					
7	<i>Hemidactylus flaviviridis</i>	Yellow Bellied House Gecko	-	FD@	LR-lc	
8	<i>Hemidactylus frenatus</i>	Asian House gecko	1	**	LR-lc	
6	Lacertidae					
9	<i>Ophisops leschenaultii</i>	Leschenault's Lacerta	17	**	LR-lc	
7	Agamidae					
10	<i>Calotes versicolor</i>	Indian Garden Lizard	35	FD+	LR-nt	
11	<i>Sitana ponticeriana</i>	Fan-Throated Lizard	4	**	LR-lc	
8	Scincidae					
12	<i>Mabuya carinata</i>	Common Keeled Grass Skink	2	**	LR-nt	
13	<i>Mabuya macularia</i>	Bronze Grass Skink	20	**	LR-lc	-
9	Varanidae					
14	<i>Varanus bengalensis</i>	Common Indian Monitor	1	FD+	VU	Sch-II
10	Pythonidae					
15	<i>Python molurus</i>	Indian Rock Python	-	FD@	LR-nt	Sch-IV
11	Colubridae					
16	<i>Ptyas mucosa</i>	Indian Rat Snake	1	FD+	LR-nt	Sch-II
17	<i>Xenochrophis piscator</i>	Checkered Keelback Water Snake	2	FD+	LR-lc	Sch-II
12	Elapidae					
18	<i>Bungarus caeruleus</i>	Common Indian Krait	-	FD@	LR-lc	Sch-IV
19	<i>Naja naja</i>	Spectacled Cobra	1	FD+	LR-nt	Sch-II
13	Viperidae					
20	<i>Daboia russelii</i>	Russell's Viper	-	FD@	LR-nt	Sch-II
	Total Species		13	20		

SAT Study Area Total , FD + = Species listed by Forest department and Present Study, FD@ Species recorded only by Forest Department, ** Species Reported only by the present Study

Annexure 3. Overall List and Conservation Status of Terrestrial Bird Species in the Proposed Thermal Power Plant – WEUPPL Study Area - Mirzapur, Uttar Pradesh

S.no.	Family, Scientific & Common Name	Core Zone		CT	Buffer Zone				BT	SAT	FD	FG	MS	CS*
		OS/WL	AG/FL		D/DR	WB/R	OS/WL	AG/FL						
1	ACCIPITRIDAE													
1	<i>Elanus caeruleus</i> - Black-shouldered Kite				-	1	-	2	3	3	FD+	C	R	LC
2	<i>Accipiter badius</i> - Shikra	1	1	2	2	1	-	1	4	6	FD+	C	R	LC
3	<i>Circaetus gallicus</i> Short-toed Snake Eagle	2	1	3							**	C	R	LC
4	<i>Bufastur teesa</i> White-eyed Buzzard				-	-	-	1	1	1	FD+	C	R	LC
5	<i>Milvus migrans</i> Black Kite										FD@	C	R	LC
6	<i>Haliastur indus</i> Brahminy Kite										FD@	C	R	LC
7	<i>Gyps indicus</i> Long-billed Vulture										FD@	C	R	CR
8	<i>Sarcogyps calvus</i> Red-headed Vulture										FD@	C	R	CR
9	<i>Gyps bengalensis</i> White-rumped Vulture										FD@	C	R	CR
10	<i>Neophron percnopterus</i> Egyptian Vulture				-	-	-	1	1	1	FD+	C	R	EN
2	ALAUDIDAE													
11	<i>Eremopterix grisea</i> Ashy-crowned Sparrow Lark	6	11	17	-	3	7	1	11	28	**	I	R	LC
12	<i>Mirafra cantillans</i> Singing bush Lark	16	4	20	-	4	5	8	17	37	**	I	R	LC
13	<i>Ammomanes phoenicurus</i> Rufous- tailed Lark				-	1	-	2	3	3	**	I	R	LC
3	APODIDAE													
14	<i>Apus affinis</i> Little Swift				1	2	-	1	4	4	**	I	R	LC
4	BUCEROTIDAE													
15	<i>Ocyrceros birostris</i> Indian grey Hornbill					1			1	1	FD+	F	R	Sch-I
5	CAPRIMULGIDAE													
16	<i>Caprimulgus asiaticus</i> Indian Nightjar	3		3	1	2	-	-	3	6	FD+	I	R	LC
17	<i>Caprimulgus indicus</i> Indian Jungle Nightjar										FD@			
18	<i>Caprimulgus affinis</i> Savanna Nightjar				1				1	1	**	I	R	LC
6	CENTROPODIDAE													
19	<i>Centropus sinensis</i> Greater Coucal				3	7	2	3	15	15	**	O	R	LC
7	CISTICOLIDAE													
20	<i>Prinia buchanani</i> Rufous-fronted Prinia				16	10	8	2	36	36	**	I	R	LC
21	<i>Prinia socialis</i> Ashy Prinia	4		4	1	-	1	2	4	8	FD+	I	R	LC

S.no.	Family, Scientific & Common Name	Core Zone		CT	Buffer Zone				BT	SAT	FD	FG	MS	CS*
		OS/WL	AG/FL		D/DR	WB/R	OS/WL	AG/FL						
22	<i>Prinia hodgsonii</i> Grey-breasted Prinia	3		3	2	9	4	-	15	18	**	I	R	LC
23	<i>Prinia inornata</i> Plain Prinia	11	2	13	1	-	1	-	2	15	**	I	R	LC
24	<i>Prinia sylvatica</i> Jungle Prinia	2	3	5	5	0	6	3	14	19	**	I	R	LC
8	COLUMBIDAE													
25	<i>Columba livia</i> Rock Pigeon	1		1	0	9	6	9	24	25	FD+	G	R	LC
26	<i>Streptopelia decaocto</i> Eurasian collared Dove				1	2	2	0	5	5	FD+	G	R	LC
27	<i>Streptopelia senegalensis</i> Laughing Dove	7	6	13	32	27	21	8	88	101	**	G	R	LC
28	<i>Streptopelia chinensis</i> Spotted Dove	33	16	49	14	6	8	5	33	82	**	G	R	LC
29	<i>Streptopelia tranquebarica</i> Red Collared Dove	20		20	5	4	0-	0	9	29	**	G	R	LC
30	<i>Treron phoenicoptera</i> Yellow-footed Green Pigeon	1	1	2	0	1	0	0	1	3	FD+	F	R	LC
9	CORACIIDAE													
31	<i>Coracias benghalensis</i> Indian Roller	2		2	1	4	3	4-	12	14	FD+	I	R	LC
10	CORVIDAE													
32	<i>Aegithina tiphia</i> Common Iora	1		1	2	7	0	0	9	10	**	I	R	LC
33	<i>Aegithina nigrolutea</i> Marshall's Iora				1	2	2	0	5	5	**	I	R	LC
34	<i>Pericrocotus cinnamomeus</i> Small Minivet				1	2	0	0	3	3	**	I	R	LC
35	<i>Corvus splendens</i> House Crow	3	1	4	4	0	0	2	6	10	FD+	O	R	LC
36	<i>Corvus macrorhynchos</i> Large-billed Crow	2		2	2	8	8	8	26	28	FD+	O	R	LC
37	<i>Dendrocitta vagabunda</i> Rufous Treepie	1		1	5	5	1	3	14	15	**	O	R	LC
38	<i>Dicrurus macrocercus</i> Black Drongo				4	7	4	7	22	22	FD+	I	R	LC
39	<i>Dicrurus caerulescens</i> White-billed Drongo	12	3	15	1	0	0	0	1	16	**	I	R	LC
40	<i>Terpsiphone paradisi</i> Asian Paradise Flycatcher				0	3	0	0	3	3	**	I	R	LC
41	<i>Oriolus oriolus</i> Eurasian Golden Oriole				1	3	1	3	8	8	FD+	O	R	LC
42	<i>Rhipidura aureola</i> White-browed Fantail				1	3	0	0	4	4	**	I	R	LC
43	<i>Tephrodornis pondicerianus</i> Common Woodshrike				1	0	0	0	1	1	**	I	R	LC
11	CUCULIDAE													
44	<i>Hierococcyx varius</i> Common Cuckoo Hawk										FD@	I	R	LC
45	<i>Eudynamis</i>	1		1	3	0	2	3	8	9	FD+	F	R	LC

S.no.	Family, Scientific & Common Name	Core Zone		CT	Buffer Zone				BT	SAT	FD	FG	MS	CS*
		OS/WL	AG/FL		D/DR	WB/R	OS/WL	AG/FL						
	<i>scolopacea</i> Asian Koel													
46	<i>Taccocua leschenaultii</i> Sirkeer Malkoha	2		2	0	0	1	0	1	3	**	O	R	LC
12	FALCONIDAE													
47	<i>Falco tinnunculus</i> Common Kestrel				-	1	-	-	1	1	FD+	C	R	LC
13	HIRUNDINIDAE													
48	<i>Hirundo concolor</i> Dusky Crag Martin				-	1	-	-	1	1	**	I	R	LC
49	<i>Riparia paludicola</i> Plain Martin				1	-	-	0	1	1	**	I	R	LC
50	<i>Hirundo smithii</i> Wire-tailed Swallow				-	0	-	1	1	1	**	I	R	LC
51	<i>Hirundo daurica</i> Red-rumped Swallow				0	-	4	0	4	4	FD+	I	R	LC
14	LANIIDAE													
52	<i>Lanius schach</i> Long-tailed Shrike	2		2	2	1	-	-	3	5	**	I	R	LC
53	<i>Lanius vittatus</i> Bay-backed Shrike	3	1	4	2	-	2	-	4	8	**	I	R	LC
54	<i>Lanius meridionalis</i> Southern Grey Shrike	1		1	1	-	-	-	1	2	**	I	R	LC
15	MEGALAIMIDAE													
55	<i>Megalaima zeylanica</i> Brown-headed Barbet				-	2	1	2	5	5	**	F	R	LC
56	<i>Megalaima haemacephala</i> Coppersmith Barbet				2	2	1	-	5	5	**	F	R	LC
16	MEROPIIDAE													
57	<i>Merops orientalis</i> Green Bee-eater	10	2	12	8	16	6	2	32	44	**	I	R	LC
58	<i>Merops philippinus</i> Blue-tailed Bee-eater				2	-	-	-	2	2	**	I	R	LC
17	MUSCICAPIDAE													
59	<i>Phoenicurus ochruros</i> Black Redstart	1		1		1			1	2	**	I	WV	LC
60	<i>Cercomela fusca</i> Brown Rock-chat				-	-	1	-	1	1	**	I	R	LC
61	<i>Saxicoloides fulicata</i> Indian Robin	32	6	38	29	9	25	5	68	106	**	I	R	LC
62	<i>Copsychus saularis</i> Oriental Magpie Robin				-	4	-	-	4	4	FD+	I	R	LC
18	NECTARINIDAE													
63	<i>Dicaeum agile</i> Thick-billed Flowerpecker				0	4	2	1	7	7	**	N	R	LC
64	<i>Cinnyris asiaticus</i> Purple Sunbird	2		2	10	2	7	5	24	26	**	N	R	LC
19	PASSERIDAE													
65	<i>Passer domesticus</i> House Sparrow				-	3	-	-	3	3	**	G	R	LC
66	<i>Lonchura malabarica</i> Indian Silverbill				6	2	9	0	17	17	**	G	R	LC
67	<i>Amandava formosa</i> Green Avadavat				1	0	0	0	1	1	**	G	R	LC
68	<i>Amandava amandava</i> Red Avadavat										FD@	G	R	LC
69	<i>Petronia xanthocollis</i>				10	5	6	0	21	21	**	G	R	LC

S.no.	Family, Scientific & Common Name	Core Zone		CT	Buffer Zone				BT	SAT	FD	FG	MS	CS*
		OS/WL	AG/FL		D/DR	WB/R	OS/WL	AG/FL						
	Chestnut-shouldered Petronia													
70	<i>Anthus rufulus</i> Paddyfield Pipit				-	-	-	1	1	1	**	I	R	LC
71	<i>Ploceus philippinus</i> Baya Weaver		8	8	-	6	-	1	7	15	FD+	G	R	LC
20	PHASIINIDAE													
72	<i>Perdicula asiatica</i> Jungle Bush Quail	1		1	-	-	-	1	1	2	FD+	G	R	LC
73	<i>Coturnix coturnix</i> Common Quail										FD@	G	R	LC
74	<i>Gallus gallus</i> Red Junglefowl										FD@	O	R	LC
75	<i>Galloperdix spadicea</i> Red Spurfowl										FD@	G	R	LC
76	<i>Francolinus pondicerianus</i> Grey Francolin	9	7	16	4	-	7	4	15	31	FD+	G	R	LC
77	<i>Pavo cristatus</i> Indian Peafowl	3		3	1	10	4	-	15	18	FD+	O	R	Sch-I
78	<i>Francolinus pictus</i> Painted Francolin										FD@	G	R	LC
79	<i>Francolinus francolinus</i> Black Francolin										FD@	G	R	LC
21	PICIDAE													
80	<i>Dinopium benghalense</i> Black-rumped Flameback				-	1	-	-	1	1	FD+	I	R	LC
81	<i>Dendrocopos nanus</i> Brown-capped Pygmy Woodpecker				-	-	-	1	1	1	**	I	R	LC
82	<i>Dendrocopos mahrattensis</i> Yellow-crowned Woodpecker	1		1	1	-	-	-	1	2	**	I	R	LC
83	<i>Picus flavinucha</i> Yellow-napped Woodpecker										FD@			
22	PITTIDAE													
84	<i>Pitta brachyura</i> Indian Pitta				-	1	-	-	1	1	**	I	R	LC
23	PSITTACIDAE													
85	<i>Psittacula cyanocephala</i> Blossom-headed Parakeet										FD@	F	R	LC
86	<i>Psittacula krameri</i> Rose-ringed Parakeet	1		1	2	3	2	7	14	15	FD+	F	R	LC
24	PTEROCLIDIDAE													
87	<i>Pterocles indicus</i> Painted Sandgrouse										FD@	G	R	LC
88	<i>Pterocles exustus</i> Chestnut-bellied Sandgrouse	2		2	-	4	-	-	4	6	FD+	G	R	LC
25	PYCNONOTIDAE													
89	<i>Pycnonotus cafer</i> Red-vented Bulbul	42	6	48	36	16	23	12	87	135	FD+	O	R	LC
26	STRIGIDAE													
90	<i>Glaucidium radiatum</i> Jungle Owlet										FD@	O	R	LC

S.no.	Family, Scientific & Common Name	Core Zone		CT	Buffer Zone				BT	SAT	FD	FG	MS	CS*
		OS/WL	AG/FL		D/DR	WB/R	OS/WL	AG/FL						
91	<i>Athene brama</i> Spotted Owllet	1		1	-	1	-	1	2	3	**	I	R	LC
92	<i>Strix leptogrammica</i> Brown-wood Owl										FD@			
27	STURNIDAE													
93	<i>Acridotheres tristis</i> Common Myna	5		5	2	11	8	4	25	30	**	O	R	LC
94	<i>Acridotheres ginginianus</i> Bank Myna				-	-	-	4	4	4	**			
95	<i>Acridotheres fuscus</i> Jungle Myna										FD@			
96	<i>Sturnus pagodarum</i> Brahminy Starling	3		3	2	6	-	3	11	14	**	O	R	LC
97	<i>Sturnus contra</i> Asian Pied Starling				-	7	-	4	11	11	**	O	R	LC
98	<i>Sturnus roseus</i> Rosy Starling	1		1						1	**	O	WV	LC
28	SYLVIIDAE													
99	<i>Orthotomus sutorius</i> Common Tailorbird	4		4	5	5	5	3	18	22	**	I	R	LC
100	<i>Turdoides caudatus</i> Common Babbler	7	2	9	4	7	1	-	12	21	**	O	R	LC
101	<i>Turdoides striatus</i> Jungle Babbler	3		3	8	9	9	14	40	43	FD+	O	R	LC
102	<i>Turdoides malcolmi</i> Large grey Babbler	20	13	33	8	19	15	24	66	99	**	O	R	LC
103	<i>Chrysomma sinense</i> Yellow-eye Babbler				5	3	-	1	9	9	**	I	R	LC
104	<i>Dumetia hyperythra</i> Twany bellied Babbler				-	-	-	1	1	2	**	I	R	LC
29	TURNICIDAE													
105	<i>Turnix suscitator</i> Barred Button Quail				1	-	-	-	1	1	**	G	R	LC
30	UPUPIDAE													
106	<i>Upupa epops</i> Common Hoopoe	3		3						3	**	I	R	LC
31	ZOSTEROPIDAE													
107	<i>Zosterops palpebrosus</i> Oriental White-eye				16	6	2	-	24	24	**	I	R	LC
	Total Species	45	19	46	53	58	41	45	85	88				
	Total Birds	291	94	385	281	302	233	181	997	1382				

D/DR- Dense Forest / Degraded Forest, WB/R -Water Body /Rivers, OS/WL- Open Scrub / Wasteland, AG/FL- Agriculture/ Fallow Land CT- Core Zone Total, BT – Buffer Zone Total, SAT Study Area Total , FG-Foraging Guild, MS- Migratory Status, CS- Conservation Status. FD + = Species listed by Forest department and Present Study, FD@ Species recorded only by Forest Department, ** Species Reported only by the present Study

Annexure 4. Overall List and Conservation Status of Aquatic Bird Species in the Proposed Thermal Power Plant – WEUPPL Study Area - Mirzapur, Uttar Pradesh

S.no.	Family, Scientific & Common Name	Core Zone		CT	Buffer Zone				BT	SAT	FD	FG	MS	CS
		OS/WL	AG/FL		D/DR	WB/R	OS/WL	AG/FL						
1	ANATIDAE													
1	<i>Tadorna tadorna</i> Common Shelduck										FD@	H	WV	LC
2	<i>Anser indicus</i> Bar-headed Goose										FD@	H	WV	LC
3	<i>Sarkidiornis melanotos</i>										FD@	H	R	LC

S.no.	Family, Scientific & Common Name	Core Zone		CT	Buffer Zone				BT	SAT	FD	FG	MS	CS
		OS/WL	AG/FL		D/DR	WB/R	OS/WL	AG/FL						
	Comb Duck													
4	<i>Anas poecilorhyncha</i> Spot-billed Duck										FD@	H	R	LC
5	<i>Anas crecca</i> Common Teal										FD@	H	WV	LC
6	<i>Nettapus coromandelianus</i> Cotton Pigmy-goose	0	0	0	0	52	0	0	52	52	FD+	H	M	LC
2	ARDEIDAE													
7	<i>Bubulcus ibis</i> Cattle Egret	0	0	0	0	102	4	0	106	106	FD+	I	R	LC
8	<i>Egretta garzetta</i> Little Egret	0	0	0	0	16	1	0	17	17	FD+	P	R	LC
9	<i>Mesophoyx intermedia</i> Intermediate Egret	0	0	0	0	5	1	0	6	6	**	P	WV	LC
10	<i>Casmerodius albus</i> Great Egret	0	0	0	0	16	0	0	16	16	**	P	WV	LC
11	<i>Ardea cinerea</i> Grey Heron										FD@	P	WV	LC
12	<i>Ardeola grayii</i> Indian Pond Heron	0	0	0	0	29	12	1	42	42	**	P	R	LC
13	<i>Nycticorax nycticorax</i> Black-crowned Night Heron	0	0	0	0	5	1	0	6	6	**	P	R	LC
14	<i>Butorides striatus</i> Little Heron	0	0	0	0	0	1	0	1	1	**	P	R	LC
3	BURHINIDAE													
15	<i>Burhinus indicus</i> Indian Stone-curlew	0	0	0	0	1	1	0	2	2	**	I	R	LC
4	CERYLIDAE													
16	<i>Ceryle rudis</i> Pied Kingfisher	0	0	0	0	1	1	0	2	2	**	P	R	LC
5	CHARADRIIDAE													
17	<i>Charadrius dubius</i> Little-ringed Plover	0	1	1	0	3	0	0	3	4	**	I	WV	LC
18	<i>Vanellus indicus</i> Red-wattled Lapwing	1	3	4	0	36	5	1	42	46	**	I	R	LC
19	<i>Vanellus malabaricus</i> Yellow-wattled Lapwing	0	1	1	0	1	3	0	4	5	**	I	R	LC
20	<i>Himantopus himantopus</i> Black winged Stilt	0	0	0	0	36	0	0	36	36	**	I	R	LC
6	CICONIIDAE													
21	<i>Anastomus oscitans</i> Asian Openbill	0	0	0	0	27	0	0	27	27	**	P	R	LC
22	<i>Mycteria leucocephala</i> Painted Stork	0	0	0	0	1	0	0	1	1	**	P	WV	LC
23	<i>Ciconia episcopus</i> Woolly-necked Stork	0	0	0	0	1	0	0	1	1	FD+	P	R	LC
24	<i>Ciconia ciconia</i> White Stork	0	0	0	0	2	0	0	2	2	**	p	WV	LC
7	CORVIDAE													
25	<i>Motacilla maderaspatensis</i> White-browed Wagtail	0	0	0	0	3	1	0	4	4	**	I	R	LC

S.no.	Family, Scientific & Common Name	Core Zone		CT	Buffer Zone				BT	SAT	FD	FG	MS	CS
		OS/WL	AG/FL		D/DR	WB/R	OS/WL	AG/FL						
8	DENDROCYGNIDAE													
26	<i>Dendrocygna javanica</i> Lesser Whistling Duck	0	0	0	0	222	15	0	237	237	**	H	R	LC
9	GLAREOLIDAE													
27	<i>Cursorius coromandelicus</i> Indian Courser	0	1	1	0	7	0	0	7	8	**	I	WV	LC
10	GRUIDAE													
28	<i>Grus antigone</i> Sarus Crane										FD@	O	R	VU
11	HALCYONIDAE													
29	<i>Halcyon smyrensis</i> White-throated Kingfisher	0	0	0	0	2	2	1	5	5	FD+	P	R	LC
12	JACANIDAE													
30	<i>Hydrophasianus chirurgus</i> Pheasant tailed Jacana	0	3	3	0	16	4	0	20	23	**	I	R	LC
31	<i>Metopidius indicus</i> Bronze-winged Jacana	0	0	0	0	7	0	0	7	7	**	I	R	LC
13	PASSERIDAE													
32	<i>Motacilla cinerea</i> Grey Wagtail										FD@	I	WV	LC
14	PHALACROCORACIDAE													
33	<i>Phalacrocorax niger</i> Little Cormorant	0	0	0	0	17	2	0	19	19	**	P	R	LC
34	<i>Phalacrocorax fuscicollis</i> Indian Cormorant	0	0	0	0	30	0	0	30	30	**	P	R	LC
15	PODICIPEDIDAE													
35	<i>Tachybaptus ruficollis</i> Little Grebe	0	0	0	0	22	6	0	22	22	**	C	R	LC
16	RALLIDAE													
36	<i>Amaurornis phoenicurus</i> White-breasted Waterhen	0	0	0	0	3	0	0	3	3	**	O	R	LC
17	SCOLOPACIDAE													
37	<i>Tringa nebularia</i> Common Greenshank	0	0	0	0	1	0	0	1	1	**	I	WV	LC
38	<i>Limosa melanuroides</i> Black-tailed Godwit	0	0	0	0	1	0	0	1	1	**	I	WV	LC
39	<i>Gallinago gallinago</i> Common Snipe										FD@	I	WV	LC
18	THRESKIORNITHIDAE													
40	<i>Pseudibis papillosa</i> Black Ibis	0	0	0	0	2	0	0	2	2	**	O	R	LC
	Total Species	1	5	5	0	30	16	3	31	31				
	Total Birds	1	9	10	0	667	60	3	730	740				

D/DR- Dense Forest / Degraded Forest, WB/R -Water Body /Rivers, OS/WL- Open Scrub / Wasteland, AG/FL- Agriculture/ Fallow Land CT- Core Zone Total, BT - Buffer Zone Total, SAT Study Area Total, FG-Foraging Guild, MS- Migratory Status, CS- Conservation Status. FD + = Species listed by Forest department and Present Study, FD@ Species recorded only by Forest Department, ** Species Reported only by the present Study

Annexure 5. Overall List and Conservation Status of Mammals of the Proposed Thermal Power Plant -WEUPPL Study Area - Mirzapur, Uttar Pradesh

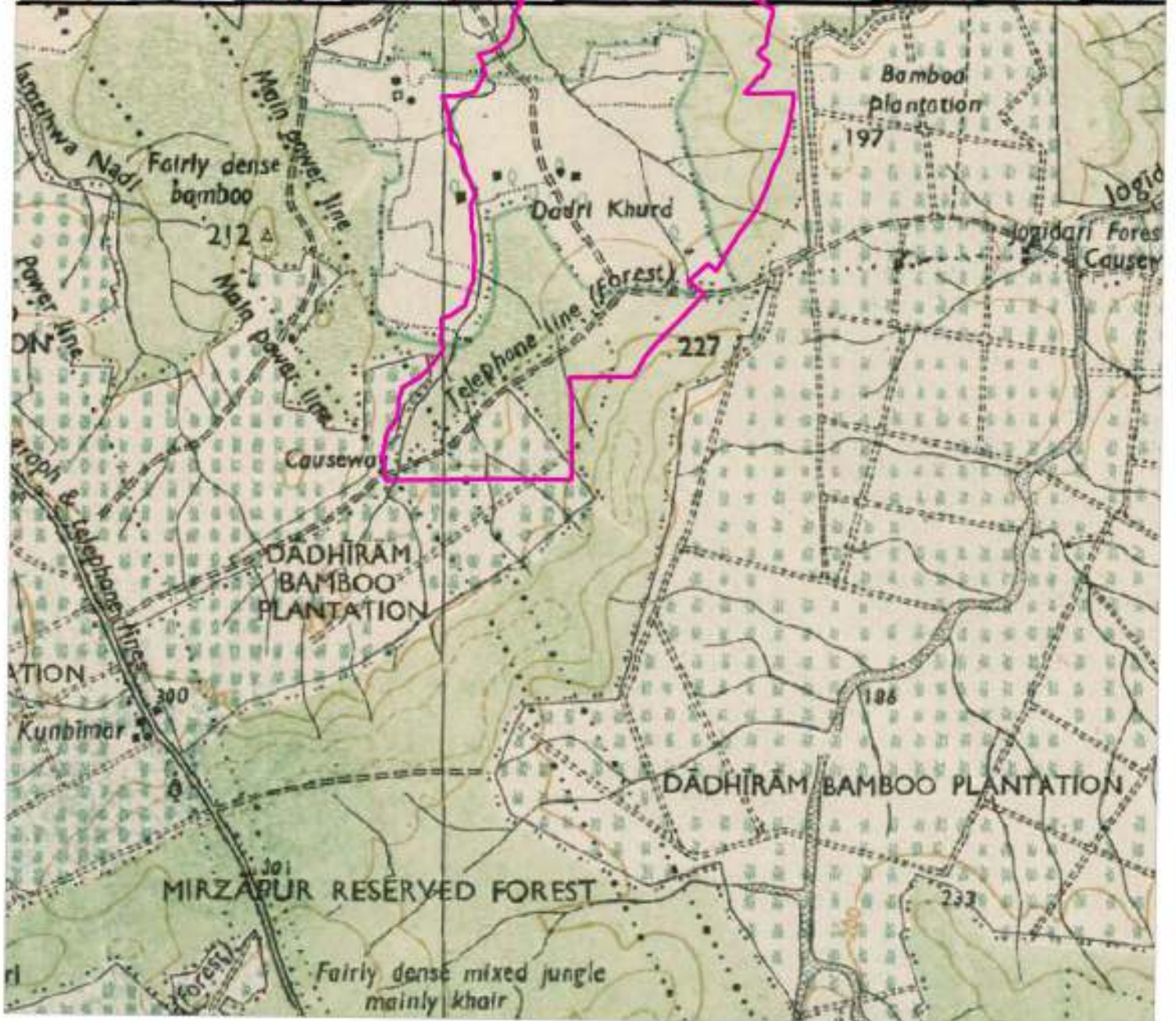
S.no.	Family & Scientific Names	Common name	SAT	FD	Conservation Status	
					CAMP 1998	WPA Anon 1972
1	Cercopithecidae					
1	<i>Macaca mulatta</i>	Rhesus Macaque	-	FD@	LC	Sch.II
2	<i>Semnopithecus entellus</i>	Common /Hanuman Langur	4(6)	FD+	LR-nt	Sch.II
2	Cervidae					
3	<i>Cervus unicolor</i>	Sambar	-	FD@	LC	Sch.III
4	<i>Muntiacus muntjak</i>	Indian Muntjac	-	FD@	LR-cd	Sch.III
5	<i>Axis axis</i>	Spotted Deer	*	FD+	-	Sch.III
3	Bovidae					
6	<i>Boselaphus tragocamelus</i>	Nigai	172(16)	FD+	LR-cd	Sch.III
7	<i>Tetracerus quadricornis</i>	Four Horned Antelope	6	FD+	LR-cd	Sch.III
8	<i>Gazella bennettii</i>	Indian Gazelle	-	FD@	LR-lc	Sch.I
4	Suidae					
9	<i>Sus scrofa</i>	Wild Pig	32	FD+	LR-	Sch.III
5	Ursidae					
10	<i>Melursus ursinus</i>	Sloth Bear	2	FD+	VU	Sch.II
6	Canidae					
11	<i>Canis aureus</i>	Jackal	49(1)	FD+	LR-lc	Sch.II
12	<i>Canis lupus</i>	Wolf	-	FD@	LR-nt	Sch.I
13	<i>Cuon alpinus</i>	Wild Dog	-	FD@	EN	Sch I
14	<i>Vulpes bengalensis</i>	Indian Fox	7	FD+	LR-nt	Sch.II
7	Hyaenidae					
15	<i>Hyaena hyaena</i>	Striped Hyena	8	FD+	LR-nt	Sch.III
8	Felidae					
16	<i>Felis chaus</i>	Jungle Cat	30	FD+	LR-nt	Sch-II
17	<i>Panthera pardus</i>	Common Leopard	3	FD+	VU	Sch.I
18	<i>Caracal caracal</i>	Caracal	-	FD@	LR-nt	Sch.I
9	Mustelidae					
19	<i>Melivora capensis</i>	Honey Badger	-	FD@	LR-lc	Sch-I
20	<i>Lutrogale perspicillata</i>	Smooth-coated Otter	-	FD@	VU	Sch.II
10	Viverridae					
21	<i>Paradoxurus hermaphroditus</i>	Common Palm Civet	1	**	LC	Sch.II
11	Herpestidae					
22	<i>Herpestes edwardsii</i>	Common or Grey Mongoose	4	FD+	LR-lc	Sch.IV
23	<i>Herpestes smithii</i>	Ruddy Mongoose	2(3)	**	LR-lc	Sch.IV
12	Leporidae					
24	<i>Lepus nigricollis</i>	Indian Hare	92	FD+	LR-lc	Sch.IV
13	Soricidae					
25	<i>Suncus murinus</i>	House Shrew	-	FD@	LC	
26	<i>Crocidura attenuata</i>	Grey Woodland Shrew	-	FD@	LC	
14	Sciuridae					
27	<i>Funambulus pennantii</i>	Five-striped Palm Squirrel	(7)	FD+	LR-lc	Sch.IV
15	Muridae					
28	<i>Bandicota indica</i>	Large Bandicoot-rat	-	FD@	LR-lc	
29	<i>Tatera indica</i>	Indian Gerbil	68	**	LR-lc	Sch.V
30	<i>Rattus rattus</i>	Black Rat	-	FD@	LR-lc	Sch.IV
31	<i>Golunda ellioti</i>	Indian Bush Rat	1	**	-	-
32	<i>Mus booduga</i>	Little Indian Field Mouse	19	FD+	LR-lc	



S.no.	Family & Scientific Names	Common name	SAT	FD	Conservation Status	
					CAMP 1998	WPA Anon 1972
16	Vespertilionidae					
33	<i>Scotoecus pallidus</i>	Yellow Desert Bat	-	FD@	LR-Ic	
	Total no. of species		19	33		

SAT Study Area Total , FD + = Species listed by Forest department and Present Study, FD@ Species recorded only by Forest Department, ** Species Reported only by the present Study

Annex 6
Site on Toposheet



Annex 7

Project Layout

