FINAL ENVIRONMENT IMPACT ASSESSMENT REPORT

for

"MEJA THERMAL POWER PROJECT STAGE-II (3X800 MW)

at

Village- Kohdar, Mai Khurd & Patai Dandi
Tehsil-Meja, District-Prayagraj, State-Uttar Pradesh

PROJECT PROPONENT

मेजा ऊर्जा निगम प्रा० लिमिटेड
MEJA URJA NIGAM (P) LIMITED

M/s Meja Urja Nigam Private Limited

Type of Project	Brownfield Project
Total Cost of Project	Rs. 25,081.88 Crores
Category as per EIA notification 2006 and its amendments:	Schedule: 1(d), Thermal Power Plants, Category: A
Proposal No	IA/UP/THE/449702/2023
TOR Details	J-13012/03/2008- IA.II (T) dated 14.12.2023
Monitoring Season	1st October 2023- 31st December 2023
Pblic Hearing	24th June 2024 at Salai Kala Community Center Tehsil Meja, District:Prayagraj

ENVIRONMENTAL CONSULTANT

(Approved Consultant)

EQMS GLOBAL PVT LTD. (Formerly Known as EQMS India Pvt Ltd)

(NABET Accreditation No-NABET/EIA/2225/RA0303)

304-305, 3rd Floor, Plot No. 16, Rishabh Corporate Tower, Community Centre, Karkardooma, Delhi – 110092

Phone: 011-42270087, 43062757 Website: www.eqmsindia.com ; E-mail: eqms@eqmsindia.org

UID No.: EQMS/EIA/NTPC-MEJA/1(d)/PR/726 /August/2024
NABET Acc. No.: NABET/EIA/2225/RA0303 dated 18.11.2023 (Valid till 23.11.2025)
Report Release Date: 29/10/2024 & 04/02/2025 **Revision No**: 02

UNDERTAKING MUNPL

मेजा ऊर्जा निगम प्रा० लिमिटेड

MEJA URJA NIGAM (P) LIMITED

(A Joint Venture of NTPC Ltd. & UPRVUN Limited)

प्रयागराज
Prayagraj

Ref.No. MUNPL/2024-25/09/ Date : 10.08.2024

TO WHOMSOEVER IT MAY CONCERN

Subject: Letter of Authorization

Sh. Anil Kumar, AGM (FES/P&S), Meja Urja Nigam Pvt Ltd, Tehsil Meja, District - Prayagraj (U.P), is authorized to submit application on behalf of Meja Urja Nigam Pvt Ltd for granting TOR, Environmental Clearance, Amendment in TOR / EC etc of Meja TPP, Stage-II. All the documents pertaining to the application process will be signed, authenticated and submitted by the afore-mentioned authorized person.

(Kamlesh Soni)
Chief Executive Officer

Corporate Identity No. U74900DL2008PTC176247
पंजीकृत कार्यालय: एनटीपीसी भवन, कोर-7,स्कोप कॉम्प्लेक्स, इन्स्टीटयूशनल एरिया, लोधी रोड, नई दिल्ली-110 003
Regd. Office: NTPC Bhawan, Core-7, SCOPE Complex, Institutional Area, Lodhi Road, New Delhi-110 003
इलाई: मेजा ऊर्जा प्रोजेक्ट, पो. कोडवार, तहसील मेजा, जिला प्रयागराज -212301
Unit : Meja Thermal Power Project, P.O.Kohdar, Tehsil-Meja, Distt.Prayagraj-212301
Phone Nos. 0532-2693300 / 2693333, Fax – 0532-2693178

TO WHOMSOEVER IT MAY CONCERN

This is to inform you that authorized person Mr. Prateek Gupta of Project Meja Thermal Power Project Stage-II (3 x 800 MW) at Tehsil Meja, District Prayagraj, Uttar Pradesh by M/s Meja Urja Nigam Pvt. Ltd. has been changed and now Mr. Anil Kumar is authorized person for the above said project. Please find the following existing and proposed authorized person details which need to be changed for registered person in the PARIVESH portal.

Existing Details	Proposed to be changed
E-mail address : env.meja@gmail.com	E-mail address: env.meja@gmail.com/anilkumar02@ntpc.co.in
Name- Mr. Prateek Gupta	Name- Mr. Anil Kumar
Designation-AGM	Designation- AGM
Mobile Number- 9650992883	Mobile Number- 9068202233

This is submitted for your records.

Thanks & Regards

Authorized Signatory

अनिल कुमार / Anil Kumar

महा प्रबंधक (पर्यावरण प्रबंधन समूह) (EMG) / AGM (Environment Management Group)

मेजा ऊर्जा निगम (प्रा) लि, प्रयागराज

MEJA URJA NIGAM (P) Ltd, Prayagraj

(एनटीपीसी लिमिटेड एवं उ.प्र.रा.वि.उ.नि.लि./वि.नि.नि. संयुक्त उद्यम)

(A Joint Venture of NTPC Ltd. & UPRVUN Ltd.)

UNDERTAKING CONSULTANT

EQMS GLOBAL PVT. LTD
305, 3rd Floor, Plot No. 16,
Rishabh Towers, Community Centre,
Karkardooma, Delhi – 110 092
Phones: (91 11) 42270087, 43062757
E-mail: eqms@eqmsglobal.com
Url : www.eqmsglobal.com
CIN : U93030DL2018PTC333707

Date: 10-08-2024

UNDERTAKING

I, Mr. Sanjay Kumar Jain, Designation: Director of M/s. EQMS GLOBAL PVT LTD. (Formerly Known as EQMS India Pvt Ltd) located at 304-305, 3rd Floor, Plot No. 16, Rishabh Corporate Tower, Community Centre, Karkardooma, Delhi – 110092, do hereby give undertaking with references to MoEF&CC- OM: No J-11013/41/2006-IA.II (I) dated 04th August 2009, that we have prepared EIA & EMP report for Meja Thermal Power project Stage-II (3 x 800 MW) at Tehsil Meja, District Prayagraj, Uttar Pradesh. TOR Letter has been issued for the project by MoEF&CC vide F.No. J-13012/03/2008- IA.II (T) dated 14th December 2023. The Prescribed ToR have been complied with and that the data submitted is factually correct and owning the contents (information and data) of the EIA report.

EQMS Global Pvt. Ltd. (Formerly Known as EQMS India Pvt Ltd)

Sanjay Kr. Jain,
Director,

REPORT RELEASE

Project: EIA Report for Meja Thermal Power Project Stage-II (3 x 800 MW) at Tehsil Meja, District Prayagraj, Uttar Pradesh by M/s Meja Urja Nigam Pvt. Ltd.

This report is released for the use of M/s Meja Urja Nigam Pvt. Ltd. (MUNPL). The EIA report earlier submitted for EC has been revised in accordance with the ADS issued by the EAC on 23/12/2024. Updates have been incorporated to address the ADS requirements, including details on ash utilization, greenbelt planning, greenbelt budget, and other relevant aspects of the ADS.

PROJECT DETAILS							
Name of Publication	EIA Report for Meja Thermal Power Project Stage-II (3 x 800 MW) at Tehsil Meja, District Prayagraj, Uttar Pradesh By M/s Meja Urja Nigam Pvt. Ltd.						
Project Number	PR-726	**Report No.**	1	**Version**	01	**Released**	August 2024
Managed By	Manager EIA Ratnesh Kotiyal		***Released By*** *EIA Section*		EIA Co-ordinator S.K. Jain		

CONTACT DETAILS

Head Quarter: Delhi / NCR
EQMS India Pvt. Ltd.
304 & 305, 3rd Floor, Rishabh Towers,
Plot No. 16, Community Centre, Karkardooma, Delhi - 110092. (India)
Email: eqms@eqmsindia.org; T: + 91-11-40070087; F: +91-11-22374775

DECLARATION BY EXPERTS CONTRIBUTING TO THE EIA/EMP REPORT

Name of Project: "Meja Thermal Power Project Stage-II (3 x 800 MW) at Tehsil Meja, District Prayagraj, Uttar Pradesh By M/s Meja Urja Nigam Private Limited (MUNPL).

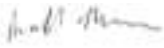
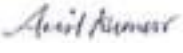
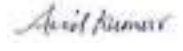
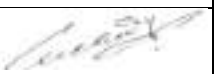
I, hereby, certify that I was a part of the EIA team in the following capacity that developed the above EIA report.

EIA Coordinator

Signature	
Name	Sanjay Jain
Period of involvement	5th April 2023 to till date
Contact Information:	9810297612
Team Member/Associated EIA Coordinator:	Ratnesh Kotiyal Surya Kant Srivastava

Functional Area Experts

Functional Areas	Name of the Expert	Team Member	Involvement)Period and Task(** June 2021 to finalization of report	Signature
Air Pollution Monitoring & Control)AP(	Ms. Sweta Shah	Ms. Kirti Patni	• Preparation of air quality monitoring plan – selecting locations of sampling station and supervision of baseline air and meteorological monitoring • Identification of probable impacts of the different air emissions from the plants/facilities proposed • Identifying the most suitable control device	
Air Quality Modeling and Prediction)AQ(	Ms. Sweta Shah		• Developing micro meteorological data. • Collecting and using secondary data on meteorology like cloud cover, inversion related data, mixing heights etc., • Identification and quantification of pollution impact assessment for the proposed project/activity.	
Noise and Vibration (NV)	Ms. Sweta Shah	Mr. Kapil Singh	• Assessment of noise level and vibration potential due	

			to proposed project and its mitigation measures.	
Water Pollution)WP(	Mr. SK Jain	Mr. Surya Kant Srivastava	• Water Balance • Identification & assessment of quantum of water pollution and its Mitigation measures . • Effluent Treatment scheme/ Technology Suggestion.	
Ecology and Bio-diversity Conservation)EB(	Mr. Ratnesh Kotiyal	-	• Identification & assessment of ecological impact due to proposed project and its Mitigation measures.	
Solid and Hazardous Waste Management)SHW(	Ms. Sweta Shah	-	• Identification of hazardous and non-hazardous wastes . • Reuse and recycling of solid wastes . • Handling and disposal of non-Hazardous solid waste & Hazardous waste.	
Risk and Hazards)RH(	Mr.PK Srivastava	Mr. Surya Kant Srivastava	• Identification of hazards due to proposed project . • Identification of hazardous substances in the proposed project . • Preparation of risk assessment report and onsite emergency plan.	
Land Use (LU)	Mr. Anil Kumar	-	• Assessment of impact of proposed project on land use of the site and surrounding	
Socioeconomic (SE)	Mr. Anil Kumar	Mr. Kaleem Ahmad	• Assessment of impact of proposed project on social environment of the surrounding	
Geology	Mr. Gulam Nabi Chowdry	-	• Recommendations and preparation of reports on geology.	
Hydrogeology	Mr. Yamesh Sharma	-	• Estimation of run-off generation from site & post project development • Formulation of rainwater harvesting plan • Formulation of water conservation plan	

Soil Conservation	Mr. Yamesh Sharma	Mr. Ratnesh Kotiyal	• Impact assessment of project on soil quality and development of management plan	

DECLARATION BY THE HEAD OF THE ACCREDITED CONSULTANT ORGANIZATION

I, S.K. Jain, hereby confirm that the above-mentioned experts prepared the EIA/EMP REPORT for "Meja Thermal Power Project Stage-II (3 x 800 MW) at Tehsil Meja, District Prayagraj, Uttar Pradesh By M/s Meja Urja Nigam Private Limited (MUNPL).

I also confirm that EC has gone through the report, and the consultant organization shall be fully accountable for any mis-leading information mentioned in this statement.

It is certified that no unethical practices including plagiarism have been carried out and external data/ text has not been used without proper acknowledgement, while preparing this EIA report.

Signature:	
Name:	S.K. Jain
Designation:	Director, Technical
Name of the EIA Consultant organization	EQMS Global Pvt .Ltd.
NABET Certificate No .and date	NABET/EIA/2225/RA0303 dated 18.09.2023 (Valid till 23.11.2025)

CERTIFICATE OF CONSULTANT

QUALITY COUNCIL OF INDIA

QCI

NABET

National Accreditation Board for Education and Training

NABET

Certificate of Accreditation

EQMS Global Pvt. Ltd. *formerly known as EQMS India Pvt. Ltd.*, New Delhi

305, 3rd Floor, Plot No. 16, Rishabh Towers, Community Centre, Karkardooma, Delhi – 110 092

*The organization is accredited as **Category-A** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3: for preparing EIA-EMP reports in the following Sectors –*

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1.	Mining of minerals including opencast and underground both	1	1 (a) (i)	A
2.	River Valley projects	3	1 (c)	A
3.	Thermal power plants	4	1 (d)	A
4.	Metallurgical industries (ferrous only)	8	3 (a)	B
5.	Cement plants	9	3 (b)	B
6.	Petroleum refining industry	10	4 (a)	A
7.	Chemical fertilizers	16	5 (a)	A
8.	Pesticides industry and pesticide specific intermediates	17	5 (b)	A
9.	Petro-chemical complexes	18	5 (c)	A
10.	Synthetic organic chemicals industry	21	5 (f)	A
11.	Pulp & paper industry excluding manufacturing of paper from wastepaper and manufacture of paper from ready pulp without bleaching	24	5 (i)	A
12.	Isolated storage & handling of Hazardous chemicals	28	-	B
13.	Air ports	29	7 (a)	A
14.	Industrial estates/ parks/ complexes/areas, export processing Zones (EPZs), Special Economic Zones(SEZs), Biotech Parks, Leather Complexes	31	7 (c)	A
15.	Bio-medical waste facilities	32A	7 (d a)	A
16.	Ports, harbours, break waters and dredging	33	7 (e)	A
17.	Highways.	34	7 (f)	A
18.	Common Effluent Treatment Plants (CETPs)	36	7 (h)	B
19.	Common Municipal Solid Waste Management Facility (CMSWMF)	37	7 (i)	B
20.	Building and construction projects	38	8 (a)	B
21.	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated Aug 22, 2023 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no QCI/NABET/ENV/ACO/23/2878 dated Sept 18, 2023. The accreditation needs to be renewed before the expiry date by EQMS Global Pvt. Ltd, New Delhi following due process of assessment.

Sr. Director, NABET
Dated: Sep 18, 2023

Certificate No.
NABET/EIA/2225/RA 0303

Valid up to
Nov 23, 2025

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to the QCI-NABET website

CERTIFICATE OF LABORATORY

National Accreditation Board for Testing and Calibration Laboratories

NABL

CERTIFICATE OF ACCREDITATION

ADVANCED ENVIRONMENTAL TESTING AND RESEARCH LAB PRIVATE LIMITED

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

63/1, KAILASH VIHAR, GWALIOR, MADHYA PRADESH, INDIA

in the field of

TESTING

Certificate Number: TC-12780

Issue Date: 19/12/2023 Valid Until: 18/12/2025

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.
(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Name of Legal Entity: ADVANCED ENVIRONMENTAL TESTING AND RESEARCH LAB PRIVATE LIMITED

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय भारत सरकार
MINISTRY OF ENVIRONMENT FOREST & CLIMATE CHANGE GOVT OF INDIA

CPCB No. LB/99/7/2021-INST LAB-HO-CPCB-HO/Pvt./9263 Date: 1st February 2024

Recognition Letter

To,

The Head of Laboratory,
M/s Advanced Environmental Testing and Research Lab Private Limited,
63/1, Kailash Vihar, City Center
Gwalior -474011, Madhya Pradesh.

Subject: Recognition of M/s Advanced Environmental Testing and Research Lab Private Limited, 63/1, Kailash Vihar, City Center Gwalior-474011, Madhya Pradesh as Environmental laboratory under the Environmental (Protection) Act- 1986 – reg.

Sir,

With reference to your application dated 24/02/2023 along with acceptance of the terms & conditions of the guidelines for recognition of environmental laboratories under the Environmental (Protection) Act, 1986, submitted to Central Pollution Control Board (CPCB), the Competent Authority of CPCB has accorded approval for renewal of recognition of Environmental laboratory and Govt. Analysts. Subsequently, **M/s Advanced Environmental Testing and Research Lab Private Limited, Madhya Pradesh** shall be notified considering the current requirement of mandatory accreditation/certifications of the laboratory **with a validity up to 18/12/2025** in the Gazette Notification of India.

2. The following analysts have been approved as Government Analysts:
   1. Dr. Arvind K Sharma
   2. Sh. Rajesh Jain
   3. Dr. Dinesh K Uchchariya

3. The laboratory should compulsorily follow the accepted terms and conditions and may undertake the following tests:
   a) **Physical Tests-**Conductivity, Colour, pH, Fixed & Volatile Solids, Total Solids, Total Dissolved Solids, Total Suspended Solids, Turbidity, Temperature, Velocity & Discharge Measurement of Industrial Effluent Stream, Flocculation Test (Jar Test), Odour, Salinity, Settleable Solids and Sludge Volume Index (SVI).
   b) **Inorganic (General and Non-metallic):** Acidity, Alkalinity, Ammonical Nitrogen, Chloride, Chlorine Residual, Dissolved Oxygen, Fluoride, Total Hardness, Total Kjeldahl Nitrogen (TKN), Nitrite Nitrogen, Nitrate Nitrogen, Phosphate, Sulphate Bromide, Carbon Dioxide, Chlorine Demand, Iodine, Sulphide, Sulphite, Silica and Cyanide.
   c) **Inorganic (Trace Metals):** Boron, Cadmium, Calcium, Total Chromium, Chromium Hexavalent, Copper, Iron, Lead, Magnesium, Mercury, Nickel, Potassium, Sodium, Sodium Absorption Ratio, Zinc, Arsenic, Aluminium, Lithium, Manganese, Selenium, Silver, Antimony and Cobalt.
   d) **Organics (General) and Trace Organics:** Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Oil and Grease, Phenolic Compounds, Pesticides (each) (Organo-Chlorine and Organo Nitrogen-Phosphorus), Surfactants, Tannin & lignin, Poly-Chlorinated Biphenyl each (PCB's), Polynuclear Aromatic Hydrocarbon (PAH) each, Organic Carbon (In Solid) and Carbon/Nitrogen Ratio.
   e) **Microbiological Test:** Total Coliform, Faecal Coliform, *E. coli, Faecal Streptococci*, Total Plate Count and *Enterococcus*.
   f) **Toxicological Tests:** Bioassay Method for Evaluation of Toxicity Using Fish (90% survival of fish after 96 hrs in 100% effluent), Measurement of Toxicity Using Daphnia or Other Organism and Measurement of Toxicity Factor Using Zebra Fish (Dimensionless Toxicity Test).

'परिवेश भवन' पूर्वी अर्जुन नगर, दिल्ली-110032
Parivesh Bhawan, East Arjun Nagar, Delhi-110032
दूरभाष/Tel : 43102030, 22305792, वेबसाईट/Website : www.cpcb.nic.in

Contd.

g) **Biological Tests:** Benthic Organism Identification and Count, Macrophytic Identification, Planktonic Identification Count and Measurement of Various Diversity Index.

h) **Characterization of Hazardous Waste:** Preparation of Leachate (TCLP Extract/Water Extract, Corrosivity, Ignibility (Flash Point), Reactivity, Toxicity, and Measurement of Heavy Metals/Pesticides in the Waste/Leachate.

i) **Soil/Sludge/Sediment and Solid Waste:** Boron, Cation Exchange Capacity (CEC), Electrical Conductivity, Nitrogen (Available), Organic Carbon/Matter (Chemical Method pH, Phosphorous (Available), Phosphate (Ortho), Phosphate (Total), Potassium, SAR in Soil Extract, Sodium, Soil moisture, TKN, Calorific Value, Ammonia, Bicarbonate, Calcium, Calcium Carbonate, Chloride, Colour, Gypsum Requirement, H. Acid, Heavy Metal, Magnesium, Mechanical Soil Analysis, Nitrate, Nitrite, PAH, Pesticide, Potash (Available), Sulphate, Sulphur, Total Water Soluble Salt and Water Holding Capacity.

j) **Ambient Air/ Fugitive Emissions:** Nitrogen Dioxide (NO_2), Sulphur Dioxide (SO_2), Total Suspended Particulate Matter, Respirable Suspended Particulate Matter PM_{10}, Ammonia, Carbon Monoxide, Chlorine, Fluoride, Lead, Ozone, Benzene Toluene Xylene (BTX), Polycyclic Aromatic Hydrocarbon (PAH) Benzo-a-Pyrine & Others and $PM_{2.5}$.

k) **Stack Gases/ Source Emission:** Particulate Matter, Sulphur Dioxide, Velocity & Flow, Carbon Dioxide, Carbon Monoxide, Temperature, Oxygen, Oxides of Nitrogen, Acid Mist, Ammonia, Chlorine, Fluoride (Particulate), Fluoride (Gaseous), Hydrogen Sulphide and Carbon Disulphide.

l) **Noise Level:** Noise Level Measurement (20-140 dBa) and Ambient Noise and Source Specific Noise.

m) **Meteorological:** Ambient Temperature, Wind Direction, Wind Speed, Relative Humidity and Rain Fall.

4. The laboratory shall compulsorily participate in the Analytical Quality Control (AQC) Exercise conducted by the CPCB to ascertain the capability of the laboratory and analysts. The lab shall submit quarterly progress report on the sample analysis carried out to CPCB.

5. The surprise inspection / periodic surveillance of the recognized environment laboratory will be undertaken to assess its proper functioning systematic operation and reliability of data generated at the laboratory by a Joint Team as per the Notification.

6. The laboratory should have the mandatory requisite accreditation and certificate of the ISO: 17025 and ISO: 45001 as per rules. This recognition is subject to such accreditations and renewals as applicable and in case of serious non-compliance of any of the terms and conditions, the laboratory may be black listed for a minimum period of two years and civil/criminal proceedings, as applicable, may be initiated for performing functions on behalf of the Government in an unauthorized manner.

7. **M/s Advanced Environmental Testing and Research Lab Private Limited, Madhya Pradesh** is required to apply for further renewal of recognition through online using CPCB web portal (https://cpcbepalab.in/epalab) before expiry of recognition with mandatory accreditation / certification concerned.

Yours faithfully,

1/2/24

(Dr. K. Ranganathan)
Scientist-E & Divisional Head
Instrumentation laboratory

CERTIFICATE OF PLAGIARISM CHECK

Title of EIA Report	EIA Report for Meja Thermal Power project Stage-II (3 x 800 MW) at Tehsil Meja, District Prayagraj, Uttar Pradesh By M/s Meja Urja Nigam Pvt. Ltd.
Name of Accredited Organization	M/s EQMS Global Pvt. Ltd.
Unique Identification Number	EQMS/EIA/ NTPC-MEJA/IA/1(8)/PR-726
Name of EIA Co-ordinator (EC):	Mr. Sanjay Kumar Jain
Name of the Software	Plagiarism Checker X

Declaration by the Head of the accredited consultant organization/ authorized person

I hereby certify that this EIA Report has been evaluated using online/In-house software viz., Plagiarism Checker X. The report produced has been analysed by the system based on it, I certify that the EIA report produced in accordance with good scientific practice.

Date and Sign of EIA Coordinator:

Name: Mr. Sanjay Kumar Jain
Designation: EIA Co-ordinator

Date and Sign of Head of Accredited Organization:
Name of the EIA Consultant Organization: M/s EQMS Global Pvt. Ltd.
NABET Certificate No. & Issue Date: NABET/EIA/2225/RA0303 dated 18.09.2023 (Valid till 23.11.2025)

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A-26	Irrigation and Water Resources Department, Govt of UP, regarding HFL level of River Tons dt.10.01.2025

LIST OF ABBREVIATIONS

Abbreviations	Full Form
AAQ	Ambient Air Quality
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
APCM	Air Pollution Controlling Equipment
APHA	American Public Health Association
B	Boron
BDL	Below Detection Level
BDU	Best Designated Use
BIS	Bureau of Indian Standards
CER	Corporate Environment Responsibility
CGWB	Central Ground Water Board
Cl	Chlorine
CO	Carbon Monoxide
CPCB	Central Pollution Control Board
CTE	Consent to Establish
CTO	Consent to operate
dBA	Decibel (A)
DG	Diesel Generator
DMP	Disaster Management Plan
E	East
EAC	Expert Appraisal Committee
EHS	Environment Health & Safety
EIA	Environment Impact Assessment
EMG	Environment Management Cell
EMP	Environment Management Plan
EPP	Emergency Preparedness Plan
ETP	Effluent Treatment Plant
F	Floride
FCC	False Color Composite
FPS	Fine Particulate Matter Sampler
GIS	Geographic Information System
GLC	Ground Level Concentration
GW	Ground water
HAZOP	Hazard and Operability Study
HC	Hydrocarbon
IRC	Indian Road Congress
IUCN	International Union for Conservation of Nature's
Kg	Kilogram
KLD	Kilo Litre per Day
km	Kilometer
M^2	Square meter
Mbgl	Meter below ground level
Mg/ Nm3	Milligram per Normal meter cube
MoEF&CC	Ministry of Environment, Forests & Climate Change
MT	Metric Tones

N	North
NA	Not Applicable
NAAQS	National Ambient Air Quality Standards
NE	Northeast
NH	National Highway
NH	No Hazard
NH3	Ammonia
NO2	Nitrogen Dioxide
NOC	No Objection Certificate
PCU	Passenger Car Unit
PM	Particulate Matter
PP	Polypropylene
PPEs	Personal protective equipment
PUC	Pollution Under Control
QA/QC	Quality Assurance/ Quality Control
QRA	Quantitative Risk Assessment
RET	Rare, Endangered and Threatened
RO	Reverse Osmosis
RRM	Risk Reduction Measures
RSPM	Respirable suspended particulate matter
S	South
SO2	Sulphur Dioxide
SPCB	State Pollution Control Board
STP	Sewage Treatment Plant
SW	Southwest
ToR	Terms of Reference
TPD	Tons per Day
TSDF	Treatment, Storage, And Disposal Facility
USEPA	United State Environmental Protection Agency
UTM	Universal Transverse Meter
W	West
ZLD	Zero Liquid Discharge
Zn	Zinc
$\mu g/m^3$	Microgram per meter cube

CHAPTER 1. INTRODUCTION

This chapter provides background information of the project, need of the project, need of the EIA study, scope and EIA methodology adopted and structure of the report.

1.1. Prelude

Power development is one of the key infrastructural elements for the economic growth of the country. The development of the power sector in the country since independence has been predominantly through the State Electricity Boards formed in each state under the Electricity (Supply) Act 1948 with responsibility for generation, transmission and distribution of electric power. Central Electricity Authority (CEA) was identified as the nodal agency for centralized planning of generation and transmission system. National Thermal Power Corporation Limited was set up in November 1975 with the objective of promoting, planning and developing thermal power projects in the country.

Meja Urja Nigam Private Limited (MUNPL), a 50:50 Joint Venture Agreement of NTPC Ltd & UPRVUNL was registered as a company on 02.04.2008, with an intent to establish Meja Thermal Power Project. Meja Urja Nigam Private Limited (MUNPL) has an installed capacity of 1320 MW with both units (2X660 MW) under commercial operation since 30.04.2019 and 31.01.2021 respectively. The power plant is located near Villages Kohdar, Mai Khurd and Patai Dandi, Tehsil-Meja, District-Prayagraj, Uttar Pradesh. The power generated by the plant is supplied mainly to Uttar Pradesh along with the states of Uttarakhand, Chandigarh, Rajasthan, Punjab, J&K, Delhi, Madhya Pradesh and Haryana.

1.2. Identification of Project & Project Proponent

1.2.1. *Identification of Project*

MUNPL is planning to install a 3X800 MW Coal based thermal power plant near Villages- Kohdar, Mai Khurd and Patai Dandi, Tehsil-Meja, Prayagraj, Uttar Pradesh in line with MoU with Govt. of Uttar Pradesh within the existing premises of Meja Thermal Power Project. MoM dated 27.12.2022 of Ministry of Power and CEA identified Meja Stage-I Project (2X660 MW) for capacity addition by the year 2030, during the meeting held on 09.12.2022 under the chairmanship of Secretary (Power) Govt. of India.

Ministry of Power vide Office MEMO dated 25.10.2023 reviewed the capacity addition up to year 2031-32 with upgradation of capacity of Meja Project for Stage-II from 2X660 MW to 3X800 MW. A supplementary JV Agreement has been signed between NTPC and UPRVUNL (Uttar Pradesh Rajya Vidyut Urja Nigam Limited)/ Govt. of Uttar Pradesh on 13.09.2023 for the joint development of Meja Stage-II.

1.2.2. *Proposal*

The present proposal is for the installation of three Ultra Super Critical Units (800 MW each) for Meja Stage-II (3X800 MW) with Air Cooled Condenser (ACC) System.

1.2.3. *Identification of Project Proponent:*

Meja Urja Nigam Private Limited (MUNPL), is a 50:50 JV company of NTPC Ltd & UPRVUNL and was registered as a company on 02.04.2008, with an intent to establish Meja Thermal Power Project. Details of the project proponent is as mentioned in Table 1.1 below:

Table 1.1 : Details of Project Proponent

Project Proponent:	**M/s Meja Urja Nigam Private Limited (MUNPL)**
Authorized Signatory:	Mr. Anil Kumar
Correspondence Address:	MUNPL 5th Floor, Sangam Place, Civil Line, Prayagraj
Designation:	AGM
Email Id	env.meja@gmail.com / anilkumar02@ntpc.co.in
Mobile No	9068202233

1.3. Purpose of the Report

As per Environmental Impact Assessment (EIA) Notification dated 14.09.2006 and subsequent amendments of Ministry of Environment and Forests and Climate Change (MoEF&CC), the proposed project falls under Category A of schedule 1(d) and requires prior Environmental Clearance from MoEF&CC. Further, Category A projects also attract the provisions of Public Consultation as per EIA Notification dated 14.09.2006.

An application for grant of ToR (Terms of Reference) for the project was submitted to MoEF&CC on 20.10.2023. ToR Letter has been granted for the project by MoEF&CC vide **F.No. J-13012/03/2008- IA.II (T) dated 14th December 2023.** Copy of the ToR letter is attached as **Annexure-1.**

The Draft EIA/EMP (Environmental Impact Assessment/Environmental Management Plan) report has been prepared by M/s EQMS Global Pvt. Ltd., Delhi (Formerly known as EQMS India Pvt. Ltd.) in accordance with the Terms of Reference (ToR) provided by the Ministry of Environment, Forest and Climate Change (MoEF&CC) and submitted to the Uttar Pradesh Pollution Control Board (UPPCB) for conducting the Public Hearing for the Project. The public hearing for the project was successfully conducted on 24th June 2024. The proceedings of the public hearing and other documents were forwarded by Member Secretary vide letter no: H13497/C-2/NOC-5376/Public Hearing/24 dated 03-07-2024 to MoEF&CC Delhi. The Final EIA report has been prepared after incorporating the comments/ suggestion raised by the public during public hearing.

The main objective of conducting EIA study as per approved ToR is to study the baseline environment status and to prepare the environment monitoring plan and Environment management plan to considerable reduce the activities that may have effects on the environment and thus realising the principles of sustainable development.

Scope of study:

MUNPL has appointed M/s EQMS Global Pvt Ltd., Delhi to prepare the Environment Impact Assessment report for the proposed expansion project based on the ToR accorded by MoEF&CC

vide letter J-13012/03/2008- IA.II (T) dated 14.12.2023 to facilitate & obtain Environment Clearance for the same from Ministry of Environment, Forest & Climate Change (MoEF&CC), Government of India. The scope of this study broadly includes:

- Conduct literature review, collate and compile secondary data including socio-economic data from published literature / government publications.
- Undertake environmental monitoring through field sampling so as to establish the baseline environmental status of the study area.
- Identify existing pollution source and load due to various activities in the ambient levels.
- Identify the basic environmental status including the meteorological parameters and socioeconomic environment of the proposed study area.
- Predicting incremental levels of pollutants in study area due to the proposed expansion of the plant activities.
- Evaluate the predicted impact on the various environmental attributes in the study area by using scientifically developed and widely accepted environmental impact methodologies.
- To prepare an environmental management and monitoring plan outlining the measures for improving the environmental quality for environmentally sustainable development.
- Prepare Risk Assessment and Disaster Management Plan and undertake Additional studies if required.
- Identify critical environment attributes that has to be monitored past project scenario

1.4. Site Selection Criteria

The plant facilities for this proposed expansion Stage-II would be accommodated within the land available in the existing power station of Meja TPP Stage-I. However, about 114 Ha additional land is required for Ash Dyke and Railway siding. The land is proposed to be acquired consists of 110 Ha Govt. and 04 Ha Private land and does not involve any forest land.

1.5. Necessity and Benefit of the Project

The power demand in our country is increasing rapidly due to rapid industrial and infrastructure developments. Lack of availability of sufficient electric power has always been one of the greatest deterrents to the growth of industry in the state.

Modern civilization will not sustain without electricity, so power generation has become very vital and considered as the backbone of industrial development and urbanization. The use of thermal power to generate electrical power has been an age-old mechanism that is still contributing to a major part of electrical consumption. Thermal Power plants are the major source of electricity for country. More than half of the total electricity demand in our country is met by thermal power plants.

1.5.1. *Benefits of the proposed project*

- Project will fulfil the demand supply gap of power.
- Project will ease the dependency of import of power within the country.
- Project will generate employment.
- Project will contribute to overall socio economic development of the area and country.

1.6. Demand/Supply Gap

The Load Generation Balance Report (LGBR) 2024-25 outlines the assessment of the Anticipated Power Supply Position in the country for the year 2024-25. The Report takes into consideration the power availability from various generating stations in operation (both conventional and renewable ones), fuel availability, and anticipated water availability at hydro-electric stations. A conventional capacity addition of 19,680 MW has been considered for the year 2024-25 comprising 14,040 MW of Thermal, 3,790 MW of Hydro and 1,900 MW of Nuclear.

Table 1.2 : All India Power Supply Scenario for the year 2023-24

	2023-24	2022-23	Actual Growth (%)
Energy Requirement (MU)	1,629,670	1,513,497	**7.7**
Energy Supplied (MU)	1,625,253	1,505,914	**7.9**
Peak Demand (MW)	243,271	215,888	**12.7**
Peak Met (MW)	239,931	207,231	**15.8**

During the year 2023-24 total ex-bus Energy Requirement and Supplied increased by 7.7 and 7.9% respectively and Peak Demand increased by 12.7%.

Table 1.3 : All India Actual Power Supply Scenario for the year 2023-24

	Energy				Peak			
	Requirement	Availability	Surplus/ Deficit (-)	Demand	Requirement	Availability	Surplus/ Deficit (-)	Demand
	(MU)	(MU)	(MU)	%	(MW)	(MW)	(MW)	%
All India	1,629,670	1,625,253	4,418	**0.3**	243,271	239,931	3,340	**1.4**

It is evident from the Table 1.4 that the growth in Electricity Supply was commensurate to the growth in Demand in the previous year 2023-24. The above figures indicates that the country witnessed a marginal Demand-supply gap both in terms of Energy and Peak. However, this Demand-supply gap was generally due to factors other than inadequacy of power availability in the country.

Table 1.4 : Anticipated All India Power Supply Position for the year 2024-25

Region	Energy				Peak			
	Requirement	Availability	Surplus/ Deficit (-)		Demand	Availability	Surplus/ Deficit (-)	
	(MU)	(MU)	(MU)	%	(MW)	(MW)	(MW)	%
Uttar Pradesh	160,637	186,900	26,263	16.3	31,917	30,870	(-)1,047	(-)3.3
Northern	510,585	550,390	39,805	7.8	90,612	83,980	(-)6,632	(-)7.3
All-India	1,734,361	1,776,520	42,159	2.4	256,530	245,615	-10,915	-4.3

From the above demand supply scenario, it is observed that both Uttar Pradesh and Northern region are projected to experience peak and energy shortage by end 20th plan without addition of the proposed project.

Considering the above, Meja Urja Nigam Private Limited (MUNPL) STPP Stage-II (3x800 MW) planned to be commissioned, which is justified from demand supply consideration.

The **CEA (Central Electricity Authority) 20th Electric Power Survey Report** projects All India Electricity demand for the next 20 years, viz year wise projection from 2021-22 to 2031-32 and perspective electricity demand projection for the years 2036-37 and 2041-42.

Electrical Energy Consumption, T&D losses, electrical energy requirement and peak electricity demand for the years 2021-22, 2026-27 and 2031-32 on all India basis:

Table 1.5 : All India Electricity Demand Projection

Particulars	Year			CAGR (in %)	
	2021-22	2026-27	2031-32	(2021-22) to (2026-27)	(2026-27) to (2031-32)
Total Energy Consumption - MU	11,38,408	16,10,053	21,33,380	7.18	5.79
T&D losses - MU	2,43,237	2,97,782	3,40,396		
T&D losses (Ex-Bus) - %	17.60	15.61	13.76		
Energy Requirement (Ex-Bus) – MU	13,81,646	19,07,835	24,73,776	6.67	5.33
Annual Load Factor - %	77.65	78.57	77.07		
Peak Demand (Ex-Bus) - MW	2,03,115	2,77,201	3,66,393	6.42	5.74

As per the table, the percentage increase in electricity energy requirement is less than increase in energy consumption, hence reduction in T&D losses are expected in future.

Table 1.6 : 20th EPS (Electric Power Survey) Demand Projection

Particulars	2021-22	2026-27	2031-32	2036-37	CAGR (%)		
					2021-22 to 2026-27	2026-27 to 2031-32	2031-32 to 2036-37
Energy Requirement (in MU)	13,81,646	19,07,835	24,73,776	30,95,487	6.67	5.33	4.59
Peak Demand (in MW)	2,03,115	2,77,201	3,66,393	4,65,531	6.42	5.74	4.91

Table 1.7 : Northern Region Electricity Demand Projection (2021-22 to 2031-32)

	2021-22	2026-27	2031-32
Energy Requirement (in MU)	**4,18,188**	**5,92,312**	**7,73,545**
Peak Demand (in MW)	**73,367**	**97,898**	**1,27,553**

Table 1.8 : CAGR Electrical Energy Requirement and Peak Electricity Demand (2021-22 to 2041-42)

Year	Energy Requirement (MU)	Peak Demand (MU)
2021-22	13,81,646	2,03,115

2026-27	19,07,835	2,77,201
2031-32	24,73,776	3,66,393
2036-37	30,95,487	4,65,531
2041-42	37,76,321	5,74,689

Table 1.9 : CAGR Electrical Energy Requirement and Peak Electricity Demand

Year	Growth in Energy Requirement (MU)	CAGR of Energy Requirement (%)	Growth in Peak Demand (MW)	CAGR of Peak Demand (%)
2021-22 to 2026-27	5,26,189	6.67	74,085	6.42
2026-27 to 2031-32	5,65,941	5.33	89,192	5.74
2031-32 to 2036-37	6,21,711	4.59	99,139	4.91
2036-37 to 2041-42	6,80,834	4.06	1,09,158	4.30

Table 1.10 : Uttar Pradesh Demand Projection at Power Station Bus Bar (Utilities)

Particulars	2021-22	2026-27	2031-32	2036-37	2041-42
Electrical Energy Requirement (MU)	1,29,580	1,91,138	2,53,974	3,20,346	3,87,169
Peak Electricity Demand (MW)	24,991	33,017	44,066	55,592	67,170

As per CEA (Central Electricity Authority), the power generation has increased over previous years:

Table 1.11 : (MOP Website)

Year	Power Generation from all Sources		Fossil Fuel Based Power Generation	
	In Billion Units (BU)	% increase over last year	In Billion Units (BU)	% increase over last year
2017-18	1308.1	5.35	1037.1	4.3
2018-19	1376.0	5.19	1072.2	3.4
2019-20	1389.1	0.95	1042.7	(-) 2.7
2020-21*	1381.8	(-) 0.52	1032.5	(-) 1.0
2021-22	1491.8	7.96	1111.8	7.96
2022-23	1624.4	8.89	1202.9	8.20
2023-24**	1736	6.9	1301.7	9.91

*In year 2020-21, power generation was mainly affected due to less demand during COVID-19 pandemic.
**Upto December (Provisional)

During the recent period, coal-based power generation has increased by 16.1% over the last year. As per the recent study carried by CEA (Central Electricity Authority) on Optimal Generation Capacity Mix for 2029-30, the likely All India installed Capacity is estimated to be 8,17,254 MW by 2029-30.

Table 1.12 : All India Likely Installed Capacity by the end of 2029-30

Fuel Type	Capacity (MW) by 2029-30
Hydro	60,977
PSP	10,151
Small Hydro	5,000
Coal + Lignite	2,66,911

Gas	25,080
Nuclear	18,980
Solar	2,80,155
Wind	1,40,000
Biomass	10,000
Total	**8,17,254**

As per CEA, the likely installed capacity for Coal & Lignite based Power generation is estimated to be 266.9 GW by 2029-30. It was about 217 GW by June 2024. For such generation, about 55 GW of Coal & Lignite based projects need to be added.

1.6.2. *Beneficiary States:*

A PPA was signed with the Uttar Pradesh State on 05.01.2011 for availing 75% power from Stage-II Project with then envisaged capacity (2X660 MW). It was also signed with the Uttarakhand State. Consent from Uttar Pradesh and Uttarakhand after increase in project capacity to 3X800 MW from earlier 2X660MW has been obtained and copy of letter is attached as **Annexure-2.**

1.7. Nature & Size of the Project

As per the Government of India (Ministry of Environment, Forests & Climate Change (MoEF & CC),) EIA Notification, 2006 and further amendments, the proposed project will be covered under Activity 1(d); Category A and hence requires environmental clearance from MoEF& CC, New Delhi. The tentative cost of the project is Rs.25,081.88 Crores. About 1295 Ha of land has been acquired for Meja TPP during Stage-I. The plant facilities of Stage-II shall be accommodated within the existing premises of the Meja STPP. Additional area of 114 Ha for Ash Dyke and Railway Siding shall be acquired, out of which 110 Ha is government land and 04 Ha is private land. No forest land is involved.

Location: Proposed 3x800 MW Super Thermal Power Plant of **M/s Meja Urja Nigam Private Limited (MUNPL),** is located near Villages Kohdar, Mai Khurd and Patai Dandi, Tehsil-Meja, Prayagraj, Uttar Pradesh. The project boundary showing the corner cordinates of the project is given in **Figure 1.1**.

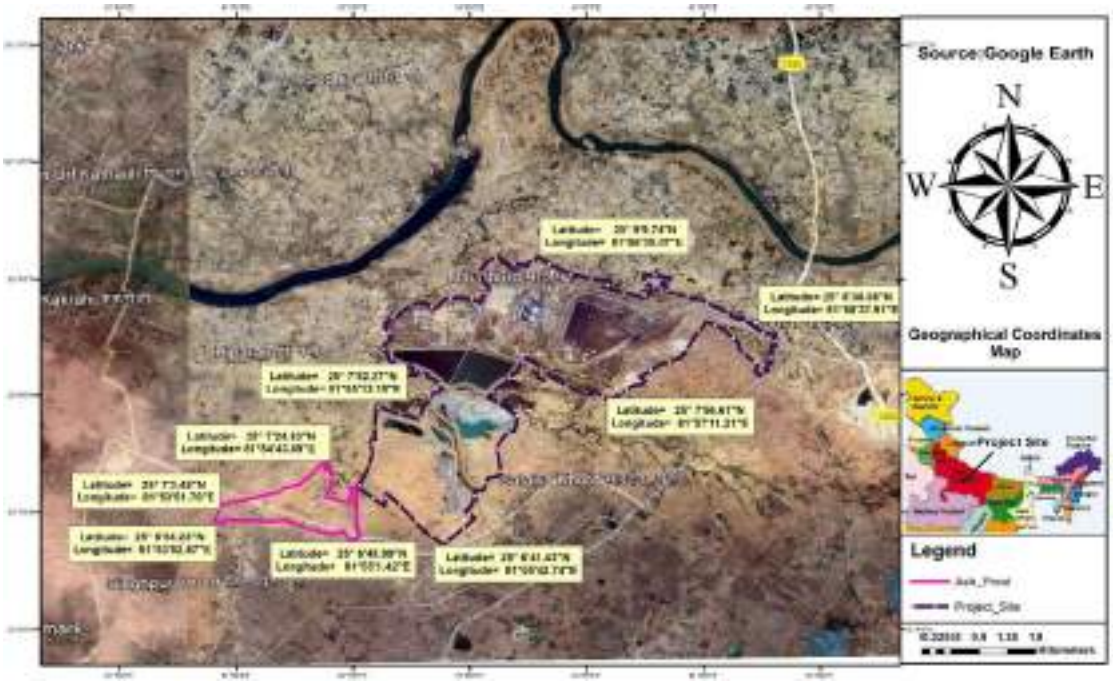


Figure 1.1 : Coordinates of the Project site

Proposed site is well connected through the rail and road. The nearest railway station, Meja Road Railway Station on Prayagraj-Mughalsarai section of North Central Railway is about 14.23 km from the project site in NE direction. The site is in south-west of Prayagraj-Mirzapur Highway. National Highway-135 C is passing about 0.7 km, east of the site. The nearest commercial airport is Prayagraj Airport approximately at an aerial distance of 38 km, NNW. Varanasi Airport is located at a distance of about 100 km in E direction.

Location is presented in **Figure 1.2.** Nearest settlement is Mai Khurd Village abutting the project site. Other villages located within 1 km area of the proposed site are Kohdar (0.37 Km, NNE), Jhadiyahi (0.40 Km, WNW).

Tons River is located at about 0.95 km, WNW of the project site. River Ganga is located at a distance of about 23.24 Km, NNW from the project site. No National Park, wildlife sanctuary, biosphere reserve is present within the 10 km area of the proposed site. However the community conservation area of black buck is located at Chandkhamharia located about 5.5 km from the proposed site in south direction. However, it is a community conservation site which is not notified sensitive location. Few reserved and protected forests are present in the study area. The locational environment features presented in **Table 1.13.** The Google satellite image of the 10 km area of the site is given in **Figure 1.3** and Topo map of 10 Km radius map is given in **Figure 1.4**. Environment sensitivity Map is provided in **Figure 1.5**

Table 1.13 : Salient Environmental Features of Proposed Site

S. No	Parameter	Description
1	Location	Villages Kohdar, Mai Khurd and Patai Dandi, Tehsil-Meja, Prayagraj, Uttar Pradesh
2	Coordinates	**Existing Plant:**

S. No	Parameter	Description
		1 25° 9'9.74"N & 81°56'35.07"E 2 25° 8'30.08"N & 81°58'37.91"E 3 25° 7'56.61"N & 81°57'11.21"E 4 25° 6'41.43"N & 81°55'42.74"E 5 25° 7'52.27"N & 81°55'13.10"E **Existing Ash Dyke:** 1 25° 8'1.03"N & 81°55'41.51"E 2 25° 7'47.12"N & 81°56'23.92"E 3 25° 6'58.24"N & 81°55'46.90"E 4 25° 7'25.45"N & 81°55'10.34"E **Proposed Ash Dyke:** 1 25° 6'45.99"N & 81°55'1.42"E 2 25° 6'54.23"N & 81°53'52.67"E 3 25° 7'3.48"N & 81°53'51.70"E 4 25° 7'24.83"N & 81°54'43.69"E
3	Site elevation above MSL and Topography	The elevation of the project area ranges between 83 to 128 amsl. The project site is sloping slightly towards west and southwest direction
4.	Distance from the HFL of river	The tons river[1] is located about 950 m away from the site. HFL of the Tons River is 87.18 m at Meja Road CWC Gauge near project site.
5.	Reserved /Protected Forests	• Badiha Reserved Forest (7.00 Km, SW) • Gadaria Reserved Forest (5.00 Km, SW) • Singhpur Khurd Reserved forest (0.90 Km, SW) • Salaiya Kalan Reserved forest (Along Southern Boundary) • Salaiya Khurd Reserved forest (Along Southern Boundary) • Kohdar Reserved forest (Along Eastern Boundary) • Murpela Reserved forest (2.70 Km, East) • East Chandhs Reserved Forest (8.00 Km, East) • Sukh Protected Forest (8.50 Km, East)

[1] FINAL FEASIBILITY REPORT ON DETAILED HYDROGRAPHIC SURVEY TONS RIVER by IWAI

S. No	Parameter	Description
6.	Wetland of State and National Interest	None within study area
7.	Presence of Schedule-I Fauna	Peafowl, Jungle Cat, Porcupine, Blackbuck, Hyaena, Rat Snake and Russel's Viper
8.	Critically Polluted Area	None within study area (10 km radius area)
9	Site connectivity	Site is connected to NH-135 C through NTPC Meja Road. NH-135 C, 0.7 km, east.
10	Nearest Rail Station	Meja Road Railway Station, 14.23 km, SE.
11	Nearest Airport	Prayagraj Airport – 36.76 km, NNW
12	Nearest Habitat	Nearest settlement is Mai Khurd Village abutting the project site.
13	Archaeologically important places	None
14	Water Bodies	River Tons (0.95 Km, WNW) River Ganga (23.24 Km, NNW)
15	Seismic zone	Seismic Zone-III (Moderate Risk Zone)
16	Interstate Boundary	None within 10 km area
17	Nearest Industries	None within 10 km radius area
18	Physical Sensitive Receptors	School: Vijay Degree College, Salaiya, Meja, Prayagraj (0.68 Km, SSW) Hospitals: Ma Isaraja Devi Charitable Hospital, Sirihir, Meja, Prayagraj (3.05 Km, SSW)
19	Archaeological Monuments	None within the study area

**Note: All distances mentioned above are aerial distances from the proposed expansion of thermal power plant boundary*

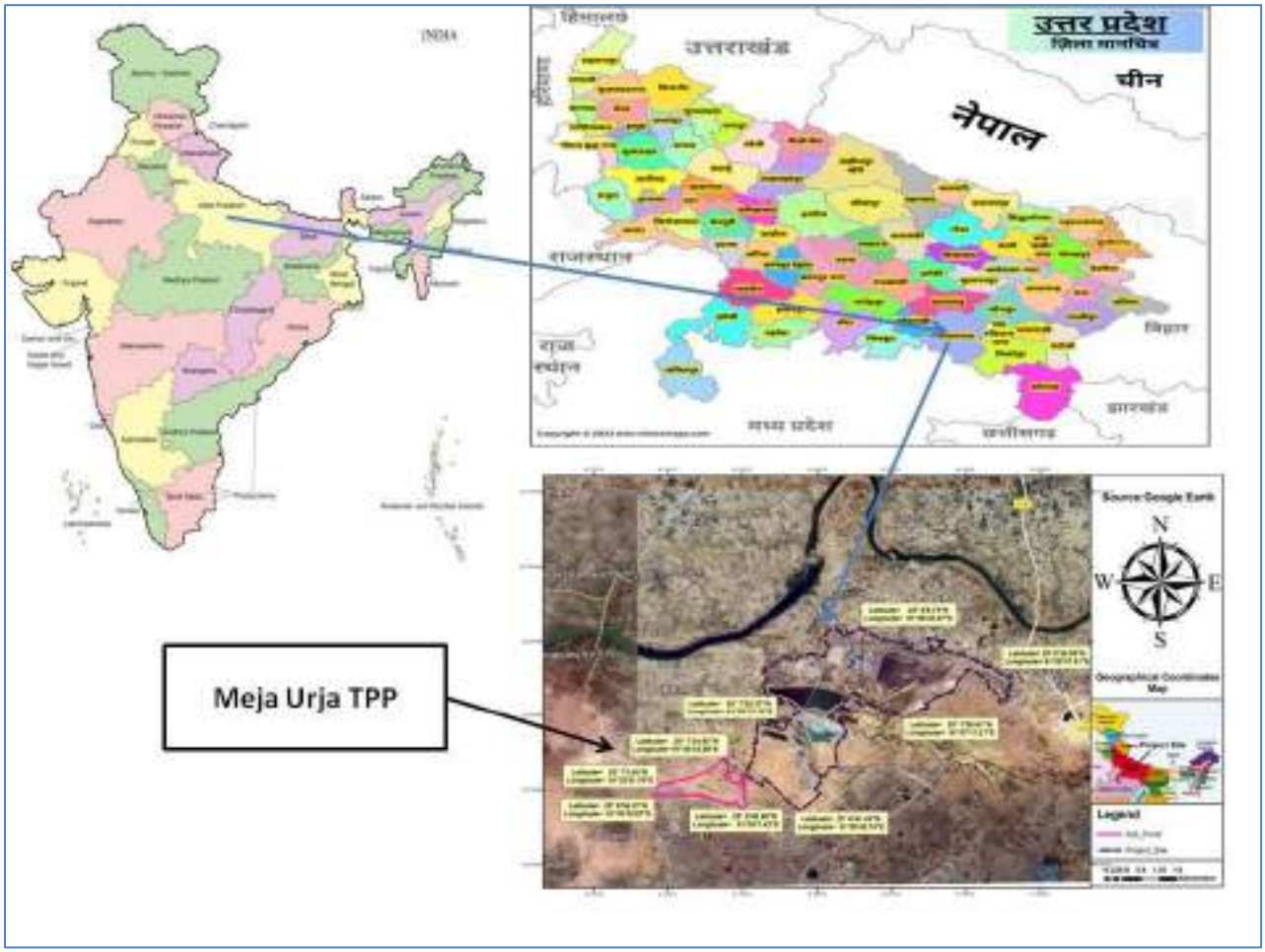


Figure 1.2 : Location Map

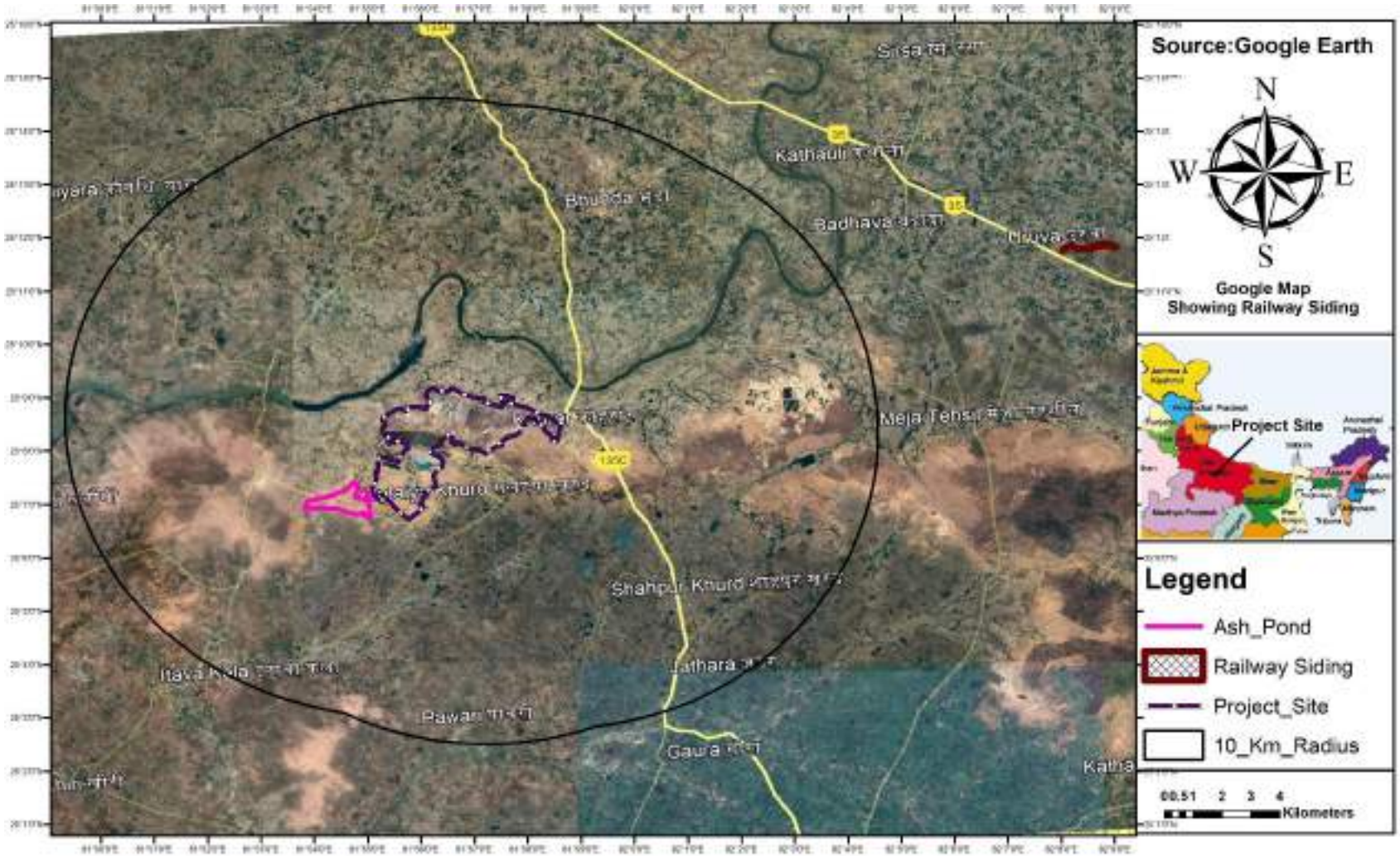


Figure 1.3 : Google Image of Project (Google Earth)

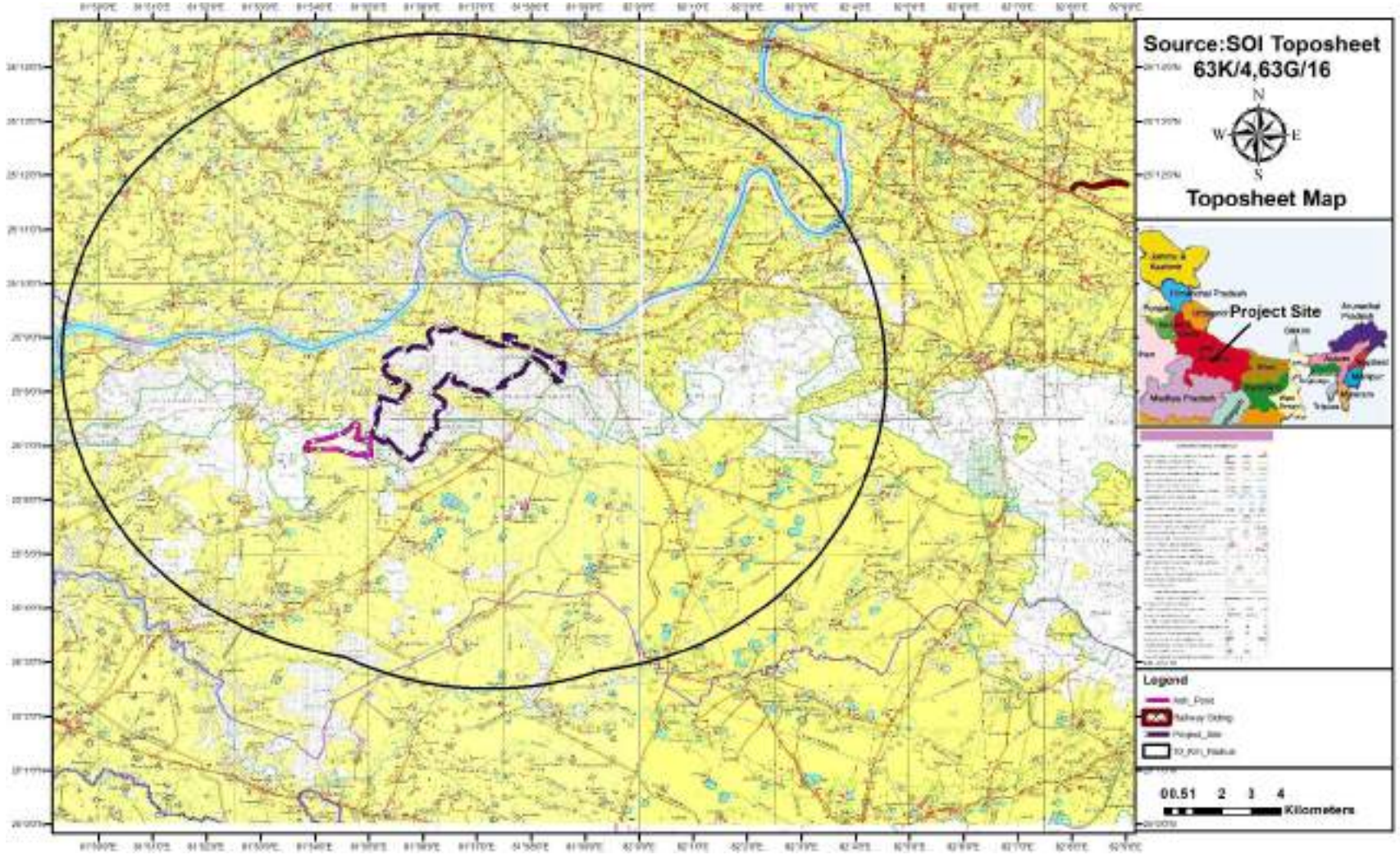


Figure 1.4 : **Topo Map of the Study Area showing project site**

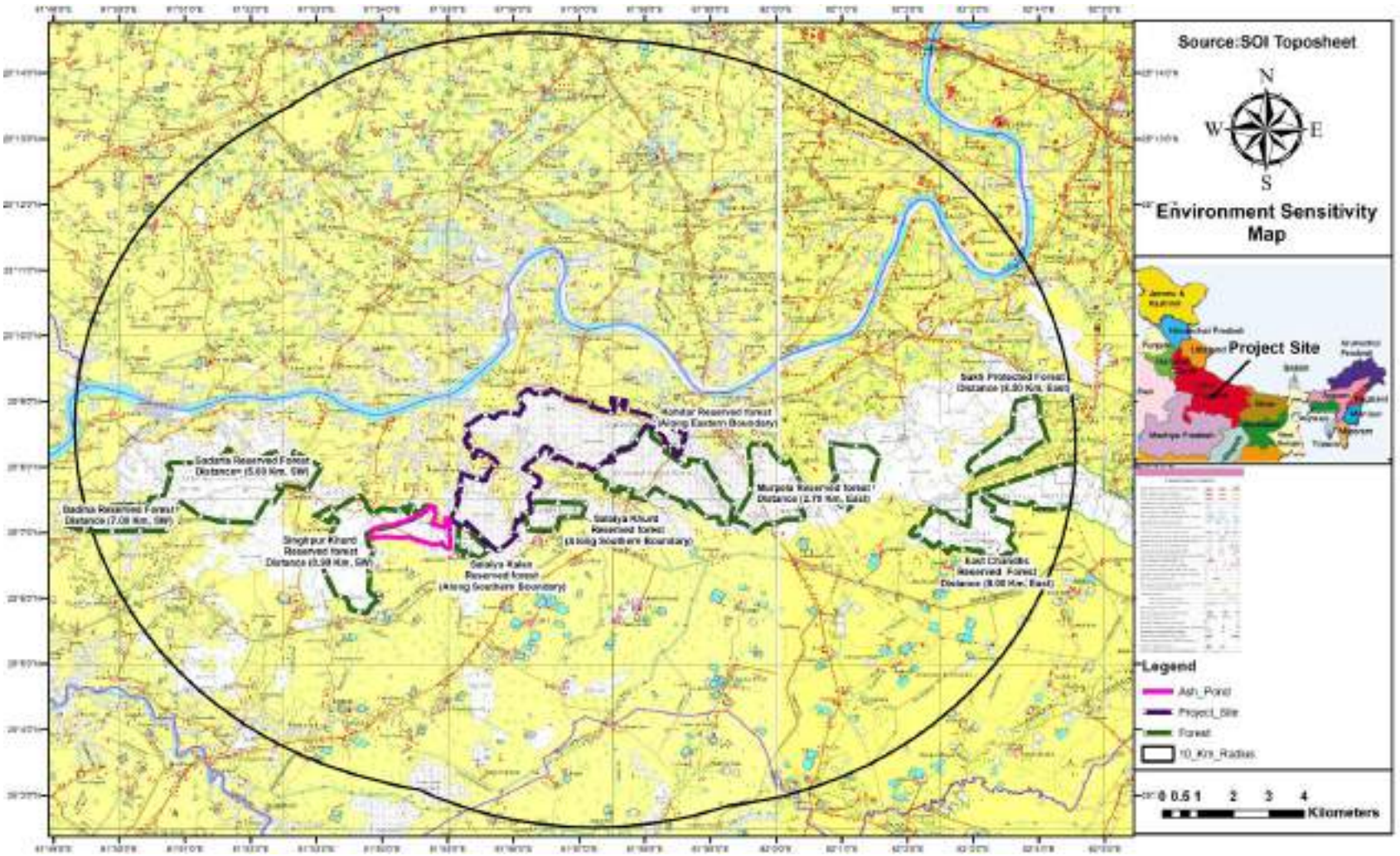


Figure 1.5 : **Environment Sensitivity Map**

1.8. ToR Compliance

In order to identify the environmental impacts due to construction and operation phase of proposed expansion and its associated facilities, and draw a suitable environmental management plan to mitigate adverse impacts, if any, an EIA study has been undertaken, in compliance to Terms of Reference approved by MoEF&CC vide letter No. **J-13012/03/2008- IA.II (T)** dated **14.12.2023** (Copy attached as **Annexure-1).** The compliance report of approved ToR with respect to EIA report is presented in **Table 1.14.**

Table 1.14 : ToR Compliance

S. No		Terms of Reference	Compliance
1. Specific Terms of Reference			
1.1	1	Public Health Delivery Plan including the provisions of Drinking water supply for local population shall be in the EIA/EMP Report. Status of the existing medical facilities in the project area shall be discussed. Possibilities of strengthening of existing medical facilities, Construction of new medical infrastructure etc. will be explored after assessing the need of the labour force and local population.	Details of the existing medical facilities, drinking water facilities and other infrastructure available in the study area are provided in Section 3.12.3, Table 3.62, Chapter 3 of EIA report. MUNPL has a dedicated Aarogyam Hospital having all First Aid and OHC Facilities to plant workmen as well as for the neighbouring villagers. Beside that there are many private and Govt hospitals like Tej Bahadur Saru Hospital, Motilal Nehru Divisional Hospital, Swarup Rani Hospital etc. in the Prayagraja and Meja tehsil to cater basic medical requirement of the population in the study area. Detailed people health management plan provided in Section 10.11, Chapter 10 of EIA report. As a part of STG-II, expansion of drinking water facilities shall be taken up and a budget of Rs. 400.lakhs is provided under CER/CD. Under CER/CD of MUNPL a budget of Rs. 34.55 Cr is allocated for activities like strengthening of existing medical facilities, providing water, infrastructure and livelihood generation etc.
	2	All the tasks including conducting public hearing shall be done as per the provisions of EIA Notification, 2006 and as amended from time to time. Public hearing issues raised and compliance of the same shall be incorporated in the EIA/ EMP report in the relevant chapter.	The public hearing for the project was successfully conducted on 24.06.2024 as per the provision of EIA Notification, 2006. Public hearing details along with the action plan is provided in Section 7.1 and Table 7.1 of EIA report Chapter 7.

S. No		Terms of Reference	Compliance
	3	Statement on the commitments (activity-wise) made during public hearing to facilitate the discussion on the CER in compliance of the Ministry's OM F. No. 22- 65/2017-IA.III dated 30th September 2020 shall be submitted. Tentative no. of project affected families shall be identified and accordingly appropriate Rehabilitation & Resettlement plan shall be prepared.	Public hearing details along with the action plan is provided in Section 7.1 and Table 7.1 of EIA report Chapter 7. R&R Plan is provided in Section 10.15 of EIA Report Chapter 10.
	4	Details of settlement in 10 km area shall be submitted.	Provided in Section 3.12.5 of Chapter 3 in EIA report.
2. Environment Management and Biodiversity Conservation			
2.1	1	Cumulative Environmental Impact Assessment study of all the existing and proposed projects in the 15-km radius of the proposed project shall be conducted.	There are no major industries present or proposed within the 15 km radius of the project site hence the Cumulative Env. Impact Assessment has been conducted for Meja STPP, Stage – I & Stage – II and incorporated in Section 4.5.4, Chapter 4 of EIA report.
	2	PCCF letter shall be obtained stating that no wildlife corridor is passing through the project boundary.	Proposed project is expansion of existing MUNPL Stage-I. Letter from PCCF Forest Dept stating that no wildlife corridor is passing through the project boundary is attached as **Annexure-3**.
	3	Wildlife conservation plan shall be prepared, in consultation with State Forest and wildlife department, with adequate fund for wildlife habitat management, preserving wildlife and its corridors and be submitted along with EIA/EMP report. Human-Wildlife Conflict issue shall be studied and such incidences reported in the study area during last 10 years shall be submitted. No provision for purchasing the vehicle shall be made in the wildlife conservation plan.	There are seven species reported to be Schedule-I species. Wildlife Conservation Plan has been prepared for the same. MUNPL has kept a budget of Rs. 3.51 Crores for conservation of Sch-I species. Human wildlife conflict issues has been addressed in wildlife conservation plan in consultation with Divisional Forest official. Copy of the Wildlife Conservation Plan is attached as **Annexure-4.** No budgetary provision has been made for purchasing vehicles in conservation plan.
	4	Details of the existing rail, road networks and alignment of	The railway siding network of the plant is connected to Indian Railway line at Meja

S. No		Terms of Reference	Compliance
		transmission lines along with quantity of coal being transported/to be transported for existing units and proposed expansion, its source and transportation mode shall be submitted.	Road Station and Unchadih Station. The plant railway line is also connected with EDFC (Eastern Dedicated Freight Corridor). Entire coal for Stage-I is being transported through rail and for Stage-II same rail network shall be used. An additional land of 4 Ha is proposed to be acquired for developing railway siding. Details provided in Section 2.3, Chapter 2 of EIA report.
	5	Radioactivity studies along with coal analysis to be provided (sulphur, ash percentage and heavy metals including Pb, Cr, As and Hg). Details of auxiliary fuel, if any including its quantity, quality, storage, etc should also be given.	Radioactivity of Coal and auxiliary fuel (Light Diesel Oil-LDO) are attached as **Annexure-5.** LDO is used for initial start-up, low load operation and as secondary fuel for pulverized coal flame stabilization at the start-ups / low load operations. LDO Tank of 2000 KL is envisaged, Dyke for LDO storage tank shall be provided. Details are enclosed in Section 2.4.2 and 2.4.4 of Chapter 2 in the EIA report.
	6	A comparative chart shall be prepared with changes observed from previous baseline study and present baseline study.	Comparative study for previous and present baseline is provided in Section 3.10, Table 3.32, 3.33, 3.34 and 3.35 of Chapter 3 in the EIA Report.
	7	Existing green plantation carried out by the project proponent (within or outside the plant boundary) with its survival rate shall be submitted and a plan shall be made to maintain survival rate up to 90%.	MUNPL Stage-I was developed on Plateau/rocky land. Plantation and its survival in such land profile is a challenging. MUNPL has consulted domain expert the Divisional Forest Officer-Prayagraj for plantation in the Study Area. At present about 163 Ha. Certificate from Divisional Forest Officer-Prayagraj for the existing plantation carried by MUNPL Stage-I is attached as **Annexure-22.** Survival rate is 81.7%. Details provided in Section 10.10.1 of Chapter 10 of EIA Report. MUNPL approached Divisional Forest Officer-Prayagraj for assistance in plantation within MUNPL premises and in the surrounding degraded forest land under DFO-Prayagraj. MUNPL has earmarked a total budget of Rs.55.42 Cr

S. No		Terms of Reference	Compliance
			for greenbelt development. Out of this, Rs. 38.72 Cr has already been approved by DFO Prayagraj. Additionally, MUNPL has allocated an extra budget of Rs.16.7 Cr for greenbelt development, which is pending approval from DFO. The proposed greenbelt development plan is mentioned in Section 10.10.2 of Chapter 10 in the EIA report.
	8	Detailed action plan shall be prepared for maintenance of pollution control equipment.	Air pollution control equipment (ESP, FGD, NOx Control and Dust Extraction and Dust Suppression system) are integral part of main plant equipment and the same are shall be maintained as per operation and maintenance philosophy of MUNPL. Details maintenance schedule is provided in Section 10.17 and the cost of the maintenance is incorporated in Section 10.17.1 of Chapter 10 in the EIA report.
	9	Details of Ash management of existing (since operation of the plant) and proposed project shall be submitted, along with 5-year plan for 100 % ash utilization.	The Ash Handling System is provided in Section 2.10, Ash Utilization Plan in Section 2.11 of Chapter 2 in the EIA Report.
	10	Details of Dry Ash handling system along with supplementary coal handling system shall be submitted.	The details for ash and coal handling system is mentioned in Section 2.10 & Section 2.7 of Chapter 2 respectively.
	11	Proper protection measures like HDPE lining, appropriate height of bund and adequate distance between proposed Ash Pond and water body (minimum 500 meter) etc. shall be planned so as to reduce the possibility of mixing of leachate with any fresh water body for under construction ash pond. High Density Slurry disposal plan shall be prepared.	Ash shall be disposed to Ash pond in HCSD and proper protection measures like HDPE lining, appropriate height of bund. Details of lining of ash dyke and its height are provided in Section 2.10.2.3 of Chapter 2 in the EIA report.
	12	Pond and ground water quality (10 locations within 2 km radius of the plant boundary) shall be studied, and report be submitted along with EIA/EMP. Action plan	Ground water quality of hot spots present in the 2 km area is provided in Section 3.8, Chapter 3 of EIA report. Action plan for ground water monitoring on hotspots around the project is

S. No		Terms of Reference	Compliance
		for Ground water monitoring stations on all hotspots like schools/hospitals within 2 km radius of the plant boundary be submitted.	prepared and provided in Section 6.2.2 Chapter-6 of EIA report.
	13	Baseline Study for Heavy metals in Ground water, Surface water and soil to be carried out and incorporated in EIA/EMP report.	No metallic contamination observed in the ground water and soil samples. The details of heavy metals present in the surface and ground water and soil is given in Section 3.8 and 3.9 of Chapter 3 of EIA report.
	14	Details pertaining to water source, treatment and discharge should be provided.	Water requirement for existing Stage-I is about 39 Cusec and is presently being drawn from Ganga River. Govt. of UP (GoUP) has allocated 44 Cusec of water for Stage-I. The water requirement for Stage-I is 39 Cusec and Surplus water available is 5 Cusec. For meeting the requirement of Stage-II, an additional water allocation of 25 Cusec shall be obtained from GoUP from Ganga River. Details of water requirement, treatment and discharge are mentioned in Section 2.4.5 & 2.14.2 of Chapter 2 of EIA report
	15	Zero Liquid Discharge plan shall be submitted.	The project is designed on Zero Liquid Discharge (ZLD) concept. The details are mentioned in Section 4.5.6 of Chapter 4 in EIA report.
	16	Action plan for development of green belt (40% of total project cover area) along the periphery of the project boundary with 80% survival rate shall be provided with a video clip of existing green belt. The plan shall be prepared in consultation with State Forest Department considering the project site is located in rocky area.	MUNPL Meja Stage-I was developed on Plateau/rocky land. Plantation and its survival in such land profile is a challenging. At present about 163 Ha with survival percentage of 81.7% is carried. Certificate from Divisional Forest Officer-Prayagraj for the existing plantation carried by MUNPL Meja in STAGE-I is provided in Section 10.10.1 of Chapter 10 of EIA Report. MUNPL has already established a greenbelt covering 163 Ha within its current facility. Following consultations with the Divisional Forest Office, MUNPL plans to

S. No		Terms of Reference	Compliance
			expand the additional greenbelt of 303.03 Ha area within the plant. This will result in a total of 466.03 Ha i.e 33.08% of 1409 Ha land being dedicated to the greenbelt within the plant premises. Over and above the greenbelt, as carbon sink, additional planation shall be done in 271 Ha of degraded forest area. Native species of trees shall be planted in consultation with DFO, Social forestry department. MUNPL approached Divisional Forest Officer-Prayagraj for assistance in plantation within MUNPL premises and in the surrounding degraded forest land under DFO-Prayagraj. MUNPL has earmarked a total budget of Rs. 55.42 Cr for greenbelt development. Out of this, Rs. 38.72 Cr has already been approved by DFO Prayagraj. Additionally, MUNPL has allocated an extra budget of Rs.16.7 Cr for greenbelt development, which is pending approval from DFO.
	17	PP shall submit action plan for using treated Sewage/Domestic wastewater for its operations.	The treated sewage shall be used for horticulture purpose. There will be no discharge outside the plant premises. MoP has exempted from linking and use of Naini Sewage Treated Water by Meja Thermal Power Plant as it is located across the river. The details are mentioned in Section 4.5.6 of Chapter 4.
	18	Project Proponent to conduct Environmental Cost Benefit Analysis for the project in EIA/EMP Report.	Environment Cost Benefit Analysis is mentioned in Chapter 9 of EIA report.
	19	An action plan shall be prepared for Water shed development within 10 km radius of the plant boundary in consultation with reputed government institution.	MUNPL has conducted Study on Watershed through NIH Roorkee. Report is attached as **Annexure-6.** Watershed study plan and budget is provided in Section 7.16.2 Chapter 7 of EIA report.
	20	A detailed plan need to be submitted for undertaking extensive green plantation within	MUNPL Meja Stage-I was developed on Plateau/rocky land. Plantation and its

S. No		Terms of Reference	Compliance
		10 km radius of the plant focusing on water reservoir, school, hospital and other institutional area and same need to be incorporated in EIA/EMP report	survival in such land profile is a challenging. At present about 163 Ha with survival percentage of 81.7% is carried. Certificate from Divisional Forest Officer-Prayagraj for the existing plantation carried by MUNPL Meja in STAGE-I is provided in Section 10.10.1 of Chapter 10 of EIA Report. MUNPL has already established a greenbelt covering 163 Ha within its current facility. Following consultations with the Divisional Forest Office, MUNPL plans to expand the additional greenbelt of 303.03 Ha area within the plant. This will result in a total of 466.03 Ha i.e 33.08% of 1409 Ha land being dedicated to the greenbelt within the plant premises. Over and above the greenbelt, as carbon sink, additional planation shall be done in 271 Ha of degraded forest area. Native species of trees shall be planted in consultation with DFO, Social forestry department. MUNPL approached Divisional Forest Officer-Prayagraj for assistance in plantation within MUNPL premises and in the surrounding degraded forest land under DFO-Prayagraj. MUNPL has earmarked a total budget of Rs. 55.42 Cr for greenbelt development. Out of this, Rs. 38.72 Cr has already been approved by DFO Prayagraj. Additionally, MUNPL has allocated an extra budget of Rs.16.7 Cr for greenbelt development, which is pending approval from DFO. The proposed greenbelt development plan is mentioned in Section 10.10.2 of Chapter 10 in the EIA report
	21	A detailed note w.r.t. compliance of MoEF&CC notifications dated 31.12.2021 and 30.12.2022 defining the eligibility of thermal power plants for having additional	As per the MoEF&CC notification dated December 30, 2022, new or expanded thermal power plants are permitted to use 0.1 Hectares per Mega Watt for ash dykes. Total power generation for Stage-I

S. No		Terms of Reference	Compliance
		ash pond shall be submitted by the IRO in its compliance report.	and Stage-II is 3720 MW. Land available for Ash Pond for Stage-I&II is 262 Ha. Additional land 110 Ha to be acquired is identified adjacent to Stage-I Ash pond. It shall comply with the stipulated regulation. The acquired land for Stage-I is hilly and extremely sloping, resulting in less usable land. Hence MUNPL proposes additional area for ash pond of 110 Ha, near to the exiting ash pond to run the power plant without interruption throughout the year.
3.0 Disaster Management Plan			
3.1	1	Disaster Management Plan shall be prepared and incorporated in EIA/EMP report.	Disaster Management Plan for Stage-I is in place. Disaster Management plan has been prepared and provided in section 7.14, Chapter 7 of EIA report. Same shall be strengthen for Stage-II.
4.0 Miscellaneous			
4.1	1	Certified compliance report of previous EC to be submitted certified by Regional office of the MoEF&CC. IRO shall provide specific observations on the status of OCMS, ash utilization, green cover and emission control equipment of all units of the plant.	IRO-Lucknow visited MUNPL Meja on 6th and 7th of July, 2024. IRO certified compliance report of previous EC is attached as **Annexure-7.** MUNPL Meja's Action Taken Report towards IRO's compliance report is attached as **Annexure-7.**
	2	PP shall submit details of court cases and its status for the project.	List of the cases and its status is attached as **Annexure-8**
	3	The PP should submit the photograph of monitoring stations & sampling locations. The photograph should bear the date, time, latitude & longitude of the monitoring station/sampling location. In addition to this PP should submit the original test reports and certificates of the labs which will analyze the samples.	Baseline monitoring station photographs with date, time and coordinates is attached in **Annexure-9.** In Chapter 3 sampling locations are represented on topo sheet. Test reports from the Lab are attached as **Annexure-9.**
	4	Arial view video of project site shall be recorded through drone and be submitted	Drone video of project site is recorded and same shall be presented during EAC meeting.

Standard Terms of Reference

S. No	Terms of Reference	Compliance
1.0 statutory Compliance		
1.1	The proposed project shall be given a unique name in consonance with the name submitted to other Government Departments etc. for its better identification and reference.	The proposed project has been given the Unique name i.e. "MEJA THERMAL POWER PROJECT STAGE-II (3X800 MW)" at Village- Kohdar, Mai Khurd & Patai Dandi Tehsil-Meja, District-Prayagraj, State-Uttar Pradesh by M/s. Meja Urja Nigam Private Limited (MUNPL)
1.2	Vision document specifying prospective long-term plan of the project shall be formulated and submitted.	Vision document of the project is enclosed as **Annexure-10**
1.3	Latest compliance report duly certified by the Regional Office of MoEF&CC for the conditions stipulated in the environmental and CRZ clearances of the previous phase(s) for the expansion projects shall be submitted.	IRO-Lucknow visited MUNPL Meja on 6th and 7th of July, 2024. IRO's certified compliance report of previous EC is attached as **Annexure-7.** MUNPL Meja's Action Taken Report towards IRO's compliance report is attached as **Annexure-7.**
2.0 Details of Project and Site		
2.1	The project proponent needs to identify minimum three potential sites based on environmental, ecological and economic considerations, and choose one appropriate site having minimum impacts on ecology and environment. A detailed comparison of the sites in this regard shall be submitted.	The plant facilities for this proposed expansion Stage-II would be accommodated within the land available in the existing power station of Meja Thermal Power Project Stage-I, which was selected after analysis of two alternative site. Details provided in Section 5.1, Chapter 5 of EIA report.
2.2	Executive summary of the project indicating relevant details along with recent photographs of the proposed site (s) shall be provided. Response to the issues raised during Public Hearing and the written representations (if any), along with a time bound Action Plan and budgetary allocations to	Executive summary is attached as Chapter 11, of EIA report. Proposed site photographs are given in Chapter 11. MUNPL (Meja Urja Nigam Private Limited) submitted the application for public hearing to the Chief Environment Officer, UPPCB office on 01.04.2024. The public hearing was conducted on 24.06.2024. Response to the issues raised during Public Hearing and the written representations, along with a time bound Action

S. No	Terms of Reference	Compliance
	address the same, shall be provided in a tabular form, against each action proposed.	Plan and budgetary allocations submitted and is provided in Section 7.1 of Chapter 7 of the EIA report.
2.3	Harnessing solar power within the premises of the plant particularly at available roof tops and other available areas shall be formulated and for expansion projects, status of implementation shall also be submitted.	Solar power shall be harnessed by installing rooftop Solar Photo Voltaic (PV) systems on various buildings of the Power Plant. Estimated capacity for roof top solar under STG-II is 1500kWp. In addition to the above, MUNPL has identified and planned to install rooftop Solar PV of appx.1987kWp within the existing township and plant area. Details are incorporated in Section 10.13 of Chapter 10 of EIA Report
2.4	The geographical coordinates (WGS 84) of the proposed site (plant boundary), including location of ash pond along with topo sheet (1:50,000 scale) and IRS satellite map of the area, shall be submitted. Elevation of plant site and ash pond with respect to HFL of water body/nallah/River and high tide level from the sea shall be specified, if the site is located in proximity to them.	Geographical Coordinates of the project site are in Section 1.7 (Table 1.13) in Chapter 1 of the EIA report. Location of proposed project site and Ash pond on Satellite map and Toposheet is given in Figure 1.3 and Figure 1.4 respectively in Chapter 1 of the EIA report. Tons river is located about 950 m away from the site. Meja Road CWC Gauge the HFL of the Tons River is 87.18 m near project site. Site elevation towards river side is more than 90 amsl, hence no chance of flooding is anticipated. Irrigation and Water Resources Department, Govt of UP, regarding HFL level of River Tons dt.10.01.2025 is attached as **Annexure-26.**
2.5	Layout plan indicating break-up of plant area, ash pond, green belt, infrastructure, roads etc. shall be provided.	General layout plan of the Project showing plant area, ash pond, green belt and others are shown in Figure 2.3 and Land breakup of the Project is given in Table 2.3 in Chapter 2 of the EIA report.
2.6	Land requirement for the project shall be optimized and in any case not more than what has been specified by CEA from time to time. Item wise break up of land requirement shall be provided.	The plant facilities for this proposed expansion Stage-II would be accommodated within the land available in the existing power station of MUNPL Stage-I. However, about 114 Ha additional land is required for Ash Dyke and Railway siding which is to be acquired. Land breakup of the existing and proposed project is mentioned in Table 2.3 in Chapter 2 of the EIA report.
2.7	Present land use (including land class/kism) as per the revenue records and State Govt. records of the proposed site shall be furnished. Information on land to be acquired including coal	The plant facilities for this proposed expansion would be accommodated within the existing power station. Additional 114 Ha of land (110 Ha of land is Government land and 04 Ha is Private land) is proposed to be acquired for Ash dyke and railway siding. No forest land is involved in the project.

S. No	Terms of Reference	Compliance
	transportation system, laying of pipeline, ROW, transmission lines etc. shall be specifically submitted. Status of land acquisition and litigation, if any, should be provided.	Existing facilities i.e. coal transportation, ROW, transmission line are already developed and same shall be used for the proposed project. Details of legal cases against the project is attached as **Annexure-8.**
2.8	If the project involves forest land, details of application, including date of application, area applied for, and application registration number, for diversion under FCA and its status should be provided along with copies of relevant documents.	No forest land is involved in the proposed project.
2.9	The land acquisition and R&R scheme with a time bound Action Plan should be formulated and addressed in the EIA report.	The total plot area of site is 1295 Ha, out of which 535 Ha land is government land, 760 Ha is private land. The land is already in possession of MUNPL. Proposed expansion shall be done with in the existing premises. An additional 114 Ha (110 Ha Govt land and 04 Ha private land) of land shall be procured for Ash dyke and railway siding. No forest land is involved. The land acquisition for ash pond and rail line is in initial stage. Private land shall be acquired from three villages. The no. of project affected families will be approx. 150. Detail R&R plan is yet to be framed after acquisition of complete land. Most of the land shall be acquired from landowner through on one-to-one negotiation. R&R of project affected families shall be applicable as per the R&R Policy of the UP Govt. However, MUNPL has earmarked a fund of 36.24 Cr for addressing the R&R issues involved for acquisition of additional land.
2.10	Satellite imagery and authenticated topo sheet indicating drainage, cropping pattern, water bodies (wetland, river system, stream, nallahs, ponds etc.), location of nearest habitations (villages), creeks, mangroves, rivers, reservoirs etc. in the study area shall be provided.	The land use details provided in Section 3.4, and land use land cover map provided in Figure 3.16, Chapter 3 of the EIA report.
2.11	Topography of the study area supported by toposheet on 1:50,000 scale of Survey of India, along with a large scale map preferably of 1:25,000 scale and the specific information whether the site	Toposheet on 1:50,000 scale is enclosed as Figure – 3.4 in Chapter – 3 of the EIA report. The site is already developed no filling is required. DEM of the project site is provided in Figure 3.6.

S. No	Terms of Reference	Compliance
	requires any filling shall be provided. In that case, details of filling, quantity of required fill material; its source, transportation etc. shall be submitted.	
3.0 Ecology Biodiversity		
3.1	A detailed study on land use pattern in the study area shall be carried out including identification of common property resources (such as grazing and community land, water resources etc.) available and Action Plan for its protection and management shall be formulated. If acquisition of grazing land is involved, it shall be ensured that an equal area of grazing land be acquired and developed and detailed plan submitted.	The land use details provided in Section 3.4, and Figure 3.16, Chapter 3 of the EIA report. There is no grazing land or any common property resources involved in the project.
3.2	Location of any National Park, Sanctuary, Elephant/Tiger Reserve (existing as well as proposed), migratory routes / wildlife corridor, if any, within 10 km of the project site shall be specified and marked on the map duly authenticated by the Chief Wildlife Warden of the State or an officer authorized by him.	PCCF Letter regarding No wildlife corridor and location of any National Park, Sanctuary, Elephant, Tiger Reserve within 10 km radius is attached as **Annexure-3**.
3.3	A mineralogical map of the proposed site (including soil type) and information (if available) that the site is not located on potentially mineable mineral deposit shall be submitted.	Mineralogical map of the project site and study is enclosed as Figure 3.10 of Chapter 3 of EIA report.

S. No	Terms of Reference	Compliance
3.4	The water requirement shall be optimized (by adopting measures such as dry fly ash and dry bottom ash disposal system, air cooled condenser, concept of zero discharge) and in any case not more than that stipulated by CEA from time to time, to be submitted along with details of source of water and water balance diagram. Details of water balance calculated shall take into account reuse and re-circulation of effluents.	Water requirement for existing Stage-I is about 39 Cusec and is presently being drawn from Ganga River. Govt. of UP (GoUP) has allocated 44 Cusec of water for Stage-I. The water requirement for Stage-I is 39 Cusec and Surplus water available is 5 Cusec. For meeting the requirement of Stage-II, an additional water allocation of 25 Cusec shall be obtained from GoUP from Ganga River. The make-up water requirement for this project would be about 3000 m^3/Hr., (30 Cusecs) with ACC bottom ash as lean slurry and fly ash as HCSD system for ash handling. The water requirement has already been optimized with maximum recirculation & reuse of water and concept of Zero Liquid Discharge (ZLD). This is much lesser than the water requirement stipulated by MoEF&CC vide notification dated 07.12.2015 (as amended on 28.06.2018) Detailed water balance is given in Figure – 2.1 of Chapter – 2 of the EIA report.
3.5	Water body/Nallah (if any) passing across the site should not be disturbed as far as possible. In case any Nallah / drain is proposed to be diverted, it shall be ensured that the diversion does not disturb the natural drainage pattern of the area. Details of proposed diversion shall be furnished duly approved by the concerned Department of the State.	No Water body/Nallah is passing through the project site. No diversion of water body is envisaged.
3.6	It shall also be ensured that a minimum of 500 m distance of plant boundary is kept from the HFL of river system / streams etc. and the boundary of site should also be located 500 m away from railway track and National Highways.	As it is an existing project and the proposed Stage – II is limited to the existing plant boundary. The nearest distance of the plant boundary from Tons river is about 950 m. Irrigation and Water Resources Department, Govt of UP, regarding HFL level of River Tons dt.10.01.2025 is attached as **Annexure-26.**
3.7	Hydro-geological study of the area shall be carried out through an institute/ organization of repute to assess the impact on ground and surface water regimes. Specific mitigation measures shall be spelt out and time bound Action Plan for	Detailed hydrogeological study of the project site and surrounding 10 km study was conducted by National Institute of Hydrology (NIH), Roorkee, Uttarakhand. Detailed report is attached as **Annexure-17.** Details provided in Section 3.3.3, Chapter 3 of EIA report.

S. No	Terms of Reference	Compliance
	its implementation shall be submitted	
3.8	Detailed Studies on the impacts of the ecology including fisheries of the River/Estuary/Sea due to the proposed withdrawal of water / discharge of treated wastewater into the River/Sea etc shall be carried out and submitted along with the EIA Report. In case of requirement of marine impact assessment study, the location of intake and outfall shall be clearly specified along with depth of water drawl and discharge into open sea.	The impacts of the water drawl on the aquatic ecology is provided in Section 4.5.11 of Chapter-4. The proposed project is conceptualised on Zero Liquid Discharge (ZLD). Hence no effluents discharge into natural drainage system is envisaged. All effluents will be treated to confirm to the effluent standards and recycled for in-plant use and ash handling. Hence no major impact on natural water bodies is anticipated. Adequate mitigation measures have been proposed for protection of aquatic fauna at Section 4.5.11.2 mitigation measures.
3.9	Source of water and its sustainability even in lean season shall be provided along with details of ecological impacts arising out of withdrawal of water and taking into account inter-state shares (if any). Information on other competing sources downstream of the proposed project and commitment regarding availability of requisite quantity of water from the Competent Authority shall be provided along with letter / document stating firm allocation of water.	Water requirement for existing Stage-I is about 39 Cusec and is presently being drawn from Ganga River. Govt. of UP (GoUP) has allocated 44 Cusec of water for Stage-I. The water requirement for Stage-I is 39 Cusec and Surplus water available is 5 Cusec. For meeting the requirement of Stage-II, an additional water allocation of 25 Cusec shall be obtained from GoUP from Ganga River. Details of water requirement is mentioned in Section 2.4.5 of Chapter 2 of EIA report. Impact on water resource is given in Section 4.4.7 and 4.5.4 of Chapter – 4.
3.10	Detailed plan for rainwater harvesting and its proposed utilization in the plant shall be furnished. In addition, wherever ground water is drawn, PP shall submit detailed plan of Water charging activity to be undertaken.	No ground water shall be used for the project during operation phase. However a comprehensive study of potential assessment of rainwater harvesting in MUNPL plant and township is provided in Section 10.14, Chapter 10 of EIA report
3.11	Feasibility of near zero discharge concept shall be critically examined and its details submitted.	Zero Liquid Discharge (ZLD) concept has been adopted. The details submitted in Section 4.5.6, Chapter 4 of EIA report.
3.12	Optimization of Cycles of Concentration (COC) along with other water conservation measures in the project shall be specified.	For proposed expansion project (Stage-II) Air Cooled Condenser (ACC) has been proposed to optimize the water requirement. Cycle of Concentration in the Aux. Cooling Water (ACW) System shall be 5. AWRS is in

S. No	Terms of Reference	Compliance
		operation for Stage-I and AWRS shall be provided for Stage-II. Details of water conservation and pollution control measures are given in Section 2.5 and 2.14.2 in Chapter-2
3.13	Plan for recirculation of ash pond water and its implementation shall be submitted.	Provided in section 2.10.1 of Chapter 2 of EIA report.
3.14	Detailed plan for conducting monitoring of water quality regularly with proper maintenance of records shall be formulated. Detail of methodology and identification of monitoring points (between the plant and drainage in the direction of flow of surface / ground water) shall be submitted. It shall be ensured that parameter to be monitored also include heavy metals. A provision for long-term monitoring of ground water table using Piezometer shall be incorporated in EIA, particularly from the study area.	Detail of methodology and identification of monitoring points of surface / ground water sampling is provided in Section 3.8, Chapter 3 of EIA report. Long term monitoring plan for ground water, surface water, air and noise environment is provided in Section 6.2.3 of Chapter 6 of EIA report.
3.15	Hazards Characterization: Past incidents of hazard events within 10km radius of project area with detailed analysis of causes and probability of reoccurrence	No industry is present within the 10 km radius of the project. Hence, no such events recorded in last 10 years. There has been no hazard event at Meja TPP since its inception.
4.0 Environment Baseline Study and Mitigation Measures		
4.1	One complete season (critical season) site specific meteorological and AAQ data (except monsoon season) as per latest MoEF&CC Notification shall be collected along with past three year's meteorological data for that particular season for wins speed analysis and the dates of monitoring shall be recorded. The parameters to be covered for AAQ shall include PM10, PM2.5, SO2, NOx, CO and Hg. The location of the monitoring stations should be so decided so as to take into	The details of Ambient Air quality monitoring is provided in Section 3.6.4 (Table 3.9) of Chapter-3.

S. No	Terms of Reference	Compliance
	consideration the upwind direction, pre-dominant downwind direction, other dominant directions, habitation and sensitive receptors. There should be at least one monitoring station each in the upwind and in the pre - dominant downwind direction at a location where maximum ground level concentration is likely to occur.	
4.2	In case of expansion project, air quality monitoring data of 104 observations a year for relevant parameters at air quality monitoring stations as identified/stipulated shall be submitted to assess for compliance of AAQ Standards (annual average as well as 24 hrs).	Three-month AAQ data incorporated in Section 3.6, Chapter 3 of EIA report. Air quality monitoring data of 104 observations a year for relevant parameters at air quality monitoring stations as identified/stipulated is incorporated at **Annexure-9** in EIA report.
4.3	A list of industries existing and proposed in the study area shall be furnished.	No other industry is present or proposed within the 10 km radius of the project.
4.4	Cumulative impacts of all sources of emissions including handling and transportation of existing and proposed projects on the environment of the area shall be assessed in detail. Details of the Model used and the input data used for modelling shall also be provided. The air quality contours should be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any. The windrose and isopleths should also be shown on the location map. The cumulative study should also include impacts on water, soil and socioeconomics.	The emissions from point sources at TPS are very important for impact assessment as these sources are comparatively large, continuous in nature and are released at higher elevations above ground level. The cumulative impact due to proposed expansion (Point source) is likely to have significant impact on air quality of the study area and has been carried out through air modelling. Details are provided in Section 4.5.2 at Chapter 4
4.5	Radio activity and heavy metal contents of coal to be sourced shall be examined and submitted along with laboratory reports.	Sample for coal analysis has been collected and Test report are attached as **Annexure-5.**
4.6	Fuel analysis shall be provided. Details of auxiliary fuel, if any, including its quantity, quality,	Properties of Coal is provided in Section 2.4.2, Chapter 2 of EIA report.

S. No	Terms of Reference	Compliance
	storage etc should also be furnished.	Light Diesel Oil (LDO) shall be used for initial start-up, low load operation and as secondary fuel for pulverized coal flame stabilization at the startups/ low load operations. LDO Tank of 2000 KL is envisaged, Dyke for LDO storage tank shall be provided. Details are enclosed in Section 2.4.4 of Chapter 2 of the EIA report. Analysis report is given as **Annexure-5.**
4.7	Quantity of fuel required, its source and characteristics and documentary evidence to substantiate confirmed fuel linkage shall be furnished. The Ministry's Notification dated 02.01.2014 regarding ash content in coal shall be complied. For the expansion projects, the compliance of the existing units to the said Notification shall also be submitted.	Approx. 9.94 MTPA coal with 85% PLF considering GCV of 3900 Kcal/Kg shall be required for the proposed project. Coal linkage source is allocated from BCCL for Meja STPP Stage-II vide CIL letter dated 20.06.2024. Copy of the Coal linkage is attached as **Annexure-16.** The details are given in Section 2.4.2 at Chapter-2 The MoEF&CC notification dated 02.01.2014 has been superseded with notification dated 20.05.2020 and the provisions of the latest notification shall be complied.
4.8	Details of transportation of fuel from the source (including port handling) to the proposed plant and its impact on ambient AAQ shall be suitably assessed and submitted. If transportation entails a long distance it shall be ensured that rail transportation to the site shall be first assessed. Wagon loading at source shall preferably be through silo/conveyor belt.	Entire coal shall be transported through rail. The railway siding network of the plant is connected to Indian Railway line at Meja Road Station and Unchadih Station. Which is also connected to Dedicated Freight Corridor (DFC). Entire coal is transported by rails. The details are mentioned in Section 2.4.3 of Chapter 2. Baseline Traffic study provided in Section 3.13, Chapter 3 and impact of the road transportation and mitigation measures is provided in Section 4.5.10, Chapter 4 of EIA report. It is proposed to transport LDO (auxiliary fuel) to the power plant by road tankers.
4.9	For proposals based on imported coal, inland transportation and port handling and rail movement shall be examined and details furnished. The approval of the Port and Rail Authorities shall be submitted.	The existing as well as proposed units are based on domestic coal. MUNPL does not proposed to use imported coal except for blending. The existing unit is already complying with the provision of notification dated 20.05.2020 by transporting entire coal by rail route.
4.10	Details regarding infrastructure facilities such as sanitation, fuel, restrooms, medical facilities, safety during construction phase etc. to be	The workers will be housed in a temporary labour colony, which may be located near the project site and proper drainage network will be provided to avoid water logging and outflow. All basic amenities to the

S. No	Terms of Reference	Compliance
	provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase should be adequately catered for and details furnished.	construction workers shall be provided at the site. Details provided in Section 2.5.13, Chapter 2 of EIA report.
5.0 Environmental Management Plan		
5.1	EMP to mitigate the adverse impacts due to the project along with item - wise cost of its implementation in a time bound manner shall be specified.	Chapter – 10 of the Final EIA report is based on Environmental Management Plan. Cost Provision for Environmental Measures are given in Section 10.16 of Chapter 10.
5.2	A Disaster Management Plan (DMP) along with risk assessment study including fire and explosion issues due to storage and use of fuel should be prepared. It should take into account the maximum inventory of storage at site at any point of time. The risk contours should be plotted on the plant layout map clearly showing which of the proposed activities would be affected in case of an accident taking place. Based on the same, proposed safeguard measures should be provided. Measures to guard against fire hazards should also be invariably provided. Provision for mock drills shall be suitably incorporated to check the efficiency of the plans drawn.	Provided in Chapter 7 of Final EIA report.
5.3	The DMP so formulated shall include measures against likely Fires/Tsunami/ Cyclones/ Storm Surges/ Earthquakes etc, as applicable. It shall be ensured that DMP consists of both On-site and Off-site plans, complete with details of containing likely disaster and shall specifically mention personnel identified for the task. Smaller version of the plan for different possible disasters shall be	Provided in Chapter 7 of Final EIA report.

S. No	Terms of Reference	Compliance
	prepared both in English and local languages and circulated widely.	
5.4	Details of fly ash utilization plan as per the latest fly ash Utilization Notification of GOI along with firm agreements / MoU with contracting parties including other usages etc. shall be submitted. The plan shall also include disposal method / mechanism of bottom ash along with monitoring mechanism.	Detail fly ash utilization plan provided in Section 2.11 Chapter 2 of EIA report.
6.0 Greenbelt Development Plan		
6.1	Detailed scheme for raising green belt of native species of appropriate width (50 to 100 m) and consisting of at least 3 tiers around plant boundary not less than 2000 tree per ha with survival rate of more than 85% shall be submitted. Photographic evidence must be created and submitted periodically including NRSA reports in case of expansion projects. A shrub layer beneath tree layer would serve as an effective sieve for dust and sink for CO2 and other gaseous pollutants and hence a stratified green belt should be developed.	MUNPL Meja Stage-I was developed on Plateau/rocky land. Plantation and its survival in such land profile is a challenging. At present about 163 Ha with survival percentage of 81.7% is carried. Certificate from Divisional Forest Officer-Prayagraj for the existing plantation carried by MUNPL Meja in STAGE-I is provided in Section 10.10.1 of Chapter 10 of EIA Report. MUNPL has already established a greenbelt covering 163 Ha within its current facility. Following consultations with the Divisional Forest Office, MUNPL plans to expand the additional greenbelt of 303.03 Ha area within the plant. This will result in a total of 466.03 Ha i.e 33.08% of 1409 Ha land being dedicated to the greenbelt within the plant premises. Over and above the greenbelt, as carbon sink, additional planation shall be done in 271 Ha of degraded forest area. Native species of trees shall be planted in consultation with DFO, Social forestry department. MUNPL has earmarked a total budget of Rs. 55.42 Cr for greenbelt development. Out of this, Rs. 38.72 Cr has already been approved by DFO Prayagraj. Additionally, MUNPL has allocated an extra budget of Rs.16.7 Cr for greenbelt development, which is pending approval from DFO. The proposed greenbelt development plan is mentioned in Section 10.10.2 of Chapter 10 in the EIA report.
6.2	Over and above the green belt, as carbon sink, plan for additional plantation shall	MUNPL Meja Stage-I was developed on Plateau/rocky land. Plantation and its survival in such land profile is a

S. No	Terms of Reference	Compliance
	be drawn by identifying blocks of degraded forests, in close consultation with the District Forests Department. In pursuance to this the project proponent shall formulate time bound Action Plans along with financial allocation and shall submit status of implementation to the Ministry every six months.	challenging. At present about 163 Ha with survival percentage of 81.7% is carried. Certificate from Divisional Forest Officer-Prayagraj for the existing plantation carried by MUNPL Meja in STAGE-I is provided in Section 10.10.1 of Chapter 10 of EIA Report. MUNPL has already established a greenbelt covering 163 Ha within its current facility. Following consultations with the Divisional Forest Office, MUNPL plans to expand the additional greenbelt of 303.03 Ha area within the plant. This will result in a total of 466.03 Ha i.e 33.08% of 1409 Ha land being dedicated to the greenbelt within the plant premises. Over and above the greenbelt, as carbon sink, additional planation shall be done in 271 Ha of degraded forest area. Native species of trees shall be planted in consultation with DFO, Social forestry department. MUNPL approached Divisional Forest Officer-Prayagraj for assistance in plantation within MUNPL premises and in the surrounding degraded forest land under DFO-Prayagraj. MUNPL has earmarked a total budget of Rs. 55.42 Cr for greenbelt development. Out of this, Rs. 38.72 Cr has already been approved by DFO Prayagraj. Additionally, MUNPL has allocated an extra budget of Rs.16.7 Cr for greenbelt development, which is pending approval from DFO. Action Plan of DFO is attached as **Annexure 23**.
7.0 Socio-economic Activities		
7.1	Socio-economic study of the study area comprising of 10 km from the plant site shall be carried out through a reputed institute / agency which shall consist of detail assessment of the impact on livelihood of the local communities.	Socio-economic study of 10 km radius of study area was done by performing field surveys through questionnaire filling and public consultations were undertaken during the baseline field study period. Socio-economic details based on primary survey & secondary data and discussions are provided in Section 3.12 of Chapter-3
7.2	Action Plan for identification of local employable youth for training in skills, relevant to the project, for eventual employment in the project itself shall be formulated and numbers specified during	CSR plant provided in Section 10.8.1, Chapter 10 of EIA report

S. No	Terms of Reference	Compliance
	construction & operation phases of the Project.	
7.3	If the area has tribal population, it shall be ensured that the rights of tribals are well protected. The project proponent shall accordingly identify tribal issues under various provisions of the law of the land.	No forest land is acquired for the proposed project, no tribal population is affected. There is only 0.24% tribal population reported in the study area. MUNPL is already doing the welfare programs for tribal population under CSR program, provided in Section 10.8 Chapter 10 of EIA report.
7.4	A detailed CER plan along with activities wise break up of financial commitment shall be prepared in terms of the provisions OM No. 22-65/2017-IA.III dated 30.09.2020.CER component shall be identified considering need based assessment study and Public Hearing issues. Sustainable income generating measures which can help in upliftment of affected section of society, which is consistent with the traditional skills of the people shall be identified.	MUNPL has earmarked a budget of Rs. 34.55 Cr. for undertaking CER/CSR activities based on need-based analysis. This budget is for upcoming 5 years. This money will be spent for different CER/CSR activities like agro based livelihood, women empowerment, health and community welfare in surrounding villages. The details are mentioned in Section 10.8 of Chapter 10 of EIA report
7.5	While formulating CER schemes it shall be ensured that an in-built monitoring mechanism for the schemes identified are in place and mechanism for conducting annual social audit from the nearest government institute of repute in the region shall be prepared. The project proponent shall also provide Action Plan for the status of implementation of the scheme from time to time and detail the same with any Govt. scheme(s). CER details done in the past should be clearly spelt out in case of expansion projects.	Social audit of MUNPL has been conducted time to time by repeated institute. Copy of the same enclosed as **Annexure-11** Recommendations are incorporated in the CER/CSR budget. MUNPL has proposed a fund of Rs. 34.55 Cr for development programmes under CSR-CD. Details of the CSR plan provided in section 10.8 Chapter 10 of EIA report
7.6	R&R plan, as applicable, shall be formulated wherein mechanism for protecting the rights and livelihood of the people in the region who are likely to be impacted, is taken into consideration. R&R plan shall be formulated after a detailed census	The total plot area of site is 1295 Ha, out of which 535 Ha land is government land, 760 Ha is private land. The land is already in possession of MUNPL. Proposed expansion shall be done with in the existing premises. An additional 114 Ha (110 Ha Govt land and 04Ha private land) of land shall be procured for Ash dyke and

S. No	Terms of Reference	Compliance
	of population based on socio economic surveys who were dependant on land falling in the project, as well as, population who were dependant on land not owned by them.	railway siding and no forest land is involved. The land acquisition for ash pond and rail line is an initial stage. Private land shall be acquired from three villages. The no. of project affected families will be approx. 150. Detail R&R plan is yet to be framed after acquisition of complete land. Most of the land shall be acquired from landowner through on one-to-one negotiation. R&R of project affected families shall be applicable as per the R&R Policy of the UP Govt. However, MUNPL has earmarked a fund of Rs. 36.24 Cr. for addressing the R&R issues involved for acquisition of additional land.
7.7	Assessment of occupational health and endemic diseases of environmental origin in the study area shall be carried out and Action Plan to mitigate the same shall be prepared.	The proposed plant consists of dedicated Hospital having all First aid and OHC Facilities to plant workmen as well as neighbouring Villages. No endemic diseases reported from the study area. The details of endemic diseases mentioned at Section 7.15.14 and Occupational Health Management are mentioned in Section 10.11 of Chapter 10.
7.8	Occupational health and safety measures for the workers including identification of work related health hazards shall be formulated. The company shall engage full time qualified doctors who are trained in occupational health. Health monitoring of the workers shall be conducted at periodic intervals and health records maintained. Awareness programme for workers due to likely adverse impact on their health due to working in nonconductive environment shall be carried out and precautionary measures like use of personal equipment's etc. shall be provided. Review of impact of various health measures undertaken at intervals of two to three years shall be conducted with an excellent follow up plan of action wherever required.	The proposed plant consists of dedicated Hospital having all First aid and OHC Facilities to plant workmen as well as neighbouring Villages. The details of Health Management are mentioned in Section 7.15 of Chapter 7.
8.0 Corporate Environment Policy		
8.1	Does the company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.	Yes, MUNPL/NTPC Environment Policy provided in Section 10.5.2, Chapter 10 of EIA report. The intent of this policy is to meet the environment expectation and to provide

S. No	Terms of Reference	Compliance
		actionable guidance, as MUNPL strives to foster a culture of excellence and challenges itself for continual improvement.
8.2	Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA.	Yes. Well defined SOP's are in place as part of Environment Policy. Standard operating process Provided in Section 10.5 Chapter 10 of EIA report.
8.3	What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions. Details of this system may be given.	The hierarchical structure of Environment Monitoring Cell of the company is shown in figure 10.4 of Chapter-10. Environment Management Group (EMG) at site will ensure the comply of environment clearances conditions of the proposed project.
8.4	Does the company has compliance management system in place wherein compliance status along with compliances / violations of environmental norms are reported to the CMD and the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism should be detailed in the EIA report.	Company has a well laid institutional framework for addressing the Environment Risk as well as non compliances / violations of environment norms if any.
9.0 Miscellaneous		
9.1	All the above details should be adequately brought out in the EIA report and in the presentation to the Committee.	Shall be complied
9.2	Details of litigation pending or otherwise with respect to project in any Court, Tribunal etc. shall invariably be furnished.	Details of litigation pending are enclosed as **Annexure-8**
9.3	In case any dismantling of old plants are envisaged, the planned land use & land reclamation of dismantled area to be furnished.	Not Applicable

1.9. Project Schedule For Approval and Implementation

For Stage-II (3x800 MW) the commercial operation date (COD) of first unit of the project is proposed to be completed in 60 months from the date of award. Subsequent units shall be commissioned at intervals of 09 months each.

1.10. Legislation, Policy and Guidelines

The proposed project falls under Category A of EIA Notification 2006 and schedule Item No. 1(d). The acts, rules, and guidelines applicable for the proposed projects as per Legislation of Government of India are listed in **Table 1.15** below.

Table 1.15 : Summary of Environmental Legislation, policy, and guidelines as applicable on the project

Legislation	Areas / Activities Covered	Applicability
Environment (Protection) Act, 1986 with Rules.	• Overall Environment Protection • Compliance to environmental (Air, Water, Noise) Standards issued under EPR	Applicable.
EIA Notification, 2006 and amendments	• Prepare EIA / EMP report • Obtain Environmental Clearance from MOEF&CC.	Applicable as Category A project
Air (Prevention and Control of Pollution) Act, 1981 with Rules.	• Protection of Air Quality • Consent to Establish (NOC) for establishing and Consent to Operate (CTO) for activities causing air pollution from SPCB	Applicable, involves emissions of flue gases
Water (Prevention and Control of Pollution) Act, 1974 with Rules.	• Protection of Water Quality • Discharge of sewage and effluent • Obtaining Consent to Establish for establishing and Consent to Operate for activities causing water pollution from SPCB and for the discharge of effluents	Applicable
Solid Waste Management Rules, 2016 and amendments thereof	• Collection, segregation, storage, transportation, processing and disposal of municipal solid.	Applicable
Noise Pollution (Regulation and Control) Rules, 2000 and amendemnts thereof	• Compliance with Ambient Noise and emission Standards in accordance to use classification for the area	Applicable
Hazardous and Other Wastes (Management	• Obtaining Authorization from SPCB for handling and storing of	Applicable

Legislation	Areas / Activities Covered	Applicability
and Transboundary Movement) Rules, 2016 and amendments thereof.	hazardous waste like waste oil and lubricants • Following guidelines for handling and storing of such hazardous waste • Management (Collection, Handling, Intermediate Storage) of Ash	
Wildlife Protection Act, MoEF&CC 1972, amended 2010	• Lays down rules and regulations pertaining to Wildlife Sanctuaries and National Parks. • Obtain NBWL Clearance if site is within 10 km radius or within ecosensetive zone of WLS/NP/ Protected Areas	Not applicable
Forest Conservation Act (FCA 1980)	• Lays down rules and regulations pertaining to Forest land • Obtain Forest clearance if Forest land involved	Not applicable
Motor Vehicles Act with Rules, 1989 as amended	• Lay down restriction for vehicles not having Pollution Under Control Certificate (PUCC) or proper labelling to enter premises	Applicable
E-Waste Management Rules, 2016	• Procedure of collection, storage and transportation of E-waste	Applicable
Plastic Waste Management Rules, 2016	• Procedure of segregation, collection, storage, transportation, processing and disposal of plastic waste	Applicable
Construction & Demolition Waste Management Rules, 2016	• Procedure of collection, segregation of concrete, soil and others • Procedure of storage of construction and demolition waste generated	Applicable
Public Liability Insurance Act, 1991	• Taking a insurance policy to provide for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling any hazardous substance and for matters connected therewith or incidental thereto	Applicable

Legislation	Areas / Activities Covered	Applicability
Ash Utilisation Notification, 2021 and their amendments	• Procedure for management and 100% ash utilization as per notification	Applicable

1.11. Statutory clearance

The list of environmental clearances of existing MUNPL thermal power plant is given in Table 1.16

Table 1.16 : List of Environmental Clearances

S. No	Statutory Clearances	Issuing Authority	Letter No	Date of Issue	Remarks
1	2x660 MW Meja Thermal Power plan Stage-I, **Environmental Clearance**	MoEF&CC	J.13012/03/2008-IA.II (T)	10.01.2011	**Annexure -12**
2	2x660 MW Meja Thermal Power plan Stage-I, **Amendment in Environmental Clearance**	MoEF&CC	J.13012/03/2008-IA.II (T)	21.07.2017	
3	2x660 MW Meja Thermal Power plan Stage-I, Extension of validity of **Environmental Clearance**	MoEF&CC	J.13012/03/2008-IA.II (T)	08.01.2018	
4	2x660 MW Meja Thermal Power plan Stage-I, temporary permission for transportation of coal by road and Extension of validity of **Environmental Clearance**	MoEF&CC	J.13012/03/2008-IA.II (T)	28.03.2019	
5	2x660 MW Meja Thermal Power plan Stage-I, Extension of validity and amendment in **Environmental Clearance**	MoEF&CC	J.13012/03/2008-IA.II (T)	08.08.2019	
6	2x660 MW Meja Thermal Power plan Stage-I, Extension of validity of **Environmental Clearance**	MoEF&CC	J.13012/03/2008-IA.II (T)	25.09.2020	
7	**Consent to Establishment** (CTE-NOC) for Stage-I	UPPCB	F92464/C-9/NOC-15/ii dated 19.09.2011	19.09.2011	**Annexure-13**
8	**Consent to Operate (CTO)** under Air and water Act	UPPCB	168397/UPPCB/Allahabad (UPPCBRO) /CTO/both/Prayagraj/2022	16.12.2022 and valid upto 31.12.2024	**Annexure -14**
9	**Hazardous Waste Authorization**	UPPCB	10138/UPPCB/Allahabad (UPPCBRO)/ HWM/ALLAHABAD/2019	26.04.2020 and valid upto 25.04.2025	**Annexure-15**

1.12. Need of the Study

The need for conducting an Environment Impact Assessment arises because the development of such project is likely to have impact on the environment and social aspect of the area. The environment impact assessment study has been conducted to seek environmental clearance under Category 1(d) as per the EIA Notification, 2006 for the proposed project in accordance to the standard Terms of Reference of MoEF&CC and the additional ToR issued by MoEF&CC.

1.13. Scope of the Study

The CEIA report has been prepared based on the ToR accorded by MoEF&CC vide letter J-13012/03/2008- IA.II (T) dated 14.12.2023. The scope of this study broadly includes:

- Reviewing existing literature and gathering relevant data related to the study area.
- Collecting field samples of environmental attributes from various representative locations to establish baseline environmental conditions.
- Gather and organize secondary data, including socio-economic information from published literature and government reports.
- Assess and identify different pollution loads resulting from various activities.

- Assessing the anticipated effects on various environmental attributes in the study area using scientifically established and widely recognized Environmental Impact Assessment (EIA) methodologies.
- Developing an Environment Management Plan (EMP) that outlines strategies for enhancing environmental quality in relation to future projects aimed at sustainable development.
- Identifying key environmental attributes that need to be monitored after the project's completion.

1.14. Structure of The Report

The EIA report contains project features, baseline environmental setup, assessment of environmental impacts, and formulation of mitigation measures, environmental management, and monitoring plan with risk & disaster management plan. EIA report contains the following chapters.

Chapter 1: Introduction

This chapter provides background information on the need of project, need of EIA study and brief of the project. The scope and EIA methodology adopted in preparation of EIA report have also been described in this chapter. It also covers the identification of project & project proponent, brief description of nature, size, location of the project and its importance to the country and the region. Scope of the study details about the regulatory scoping carried out as per the generic structure given in the EIA notification, 2006.

Chapter 2: Project Description

This chapter deals with the details of the project including particulars of upcoming type of industries, size and magnitude of construction, estimated industrial workforce, water requirement and source, sewage generation and its management, solid waste generation and disposal, hazardous waste and its disposal, parking requirements, infrastructure facilities, power requirement, green belt development and emergency facilities, etc.

Chapter 3: Description of the Environment

This chapter presents the existing environmental status of the study area (10 km) around the proposed project including topography, drainage pattern, water environment, geological, climate, transport system, land use, flora & fauna, socio-economic aspects, basic amenities etc. Environmental assessment of the proposed project site regarding its capability to receive the proposed new development is also discussed in this chapter.

Chapter 4: Anticipated Environmental Impacts and Mitigation Measures

This chapter describes the overall impacts of the proposed project activities and underscores the areas of concern, which need mitigation measures during construction and operation phase. It predicts the overall impact of the proposed project on different components of the environment viz. Air, water, land, noise, biological, and socio-economic.

Chapter 5: Analysis of Alternatives

This chapter covers the details of various alternatives in respect of both location of site and technologies to be deployed relevant to the project.

Chapter 6: Environmental Monitoring Programme

This chapter covers the planned Environmental Monitoring Program during construction and operation phase. It includes the technical aspects of monitoring the effectiveness of mitigation measures.

Chapter 7: Additional Studies: Public consultation, Risk Assessment, Social impact assessment (R&R Action Plan)

This chapter details the proceeding of the public consultation carried out along with proposed action plan with timeframe and budgetary allocation and proposed CSR/CER, Detail of risk assessment study for the project and R&R action plan if applicable.

Chapter 8: Project Benefits

This chapter describes the benefits accruing to the locality, neighbourhood, region, and nation as a whole. It brings out details of benefits by way of improvement in the physical infrastructure, social infrastructure, employment potential and other tangible benefits.

Chapter 9: Environmental Cost Benefit Analysis:

Environmental cost-benefit analysis focuses on assessing the economic value of environmental impacts associated with projects or policies. This process involves identifying both the positive and negative effects on the environment, such as changes in biodiversity, pollution levels, and natural resource use. By quantifying these impacts, often using methods like contingent valuation

or ecosystem service valuation, environmental CBA aims to provide a clear picture of how environmental costs and benefits compare.

Chapter 10: Environmental Management Plan

This chapter details the inferences drawn from the environmental impact assessment exercise. It provides mitigation and control measures for environmental management plan (EMP) for minimizing the negative environmental impacts and to strengthening the positive environmental impacts of the proposed project. Technical aspects of monitoring the effectiveness of mitigation measures have been given in this chapter.

This chapter provides mitigation and control measures for environmental management plan (EMP) for minimizing the negative environmental impacts and strengthening the positive environmental impacts of the proposed project.

Chapter 11: Summary and Conclusion

This chapter provides the summary and conclusions of the EIA study of the proposed project with overall justification for implementation of the project and also explanation of how, adverse effects will be mitigated.

Chapter 12: Disclosure of Consultants Engaged

This chapter provides the disclosure of consultants engaged to carry out the EIA study along with other additional studies.

Chapter 2. PROJECT DESCRIPTION

This chapter deals with the project details of the existing & proposed TPP, project location, size & magnitude of operation including associated activities required by and for the project, proposed schedule for approval and implementation, including technical details of raw material, quality, and quantity etc.

2.1. General

Presently, MUNPL (Meja Urja Nigam Private Limited) has an constructed a Thermal Power Plant near Villages-Kohdar, Mai Khurd and Patai Dandi, Tehsil: Meja, Prayagraj, Uttar Pradesh. Installed capacity of this plant is 1320 MW with both units (2X660 MW) under commercial operation since 30.04.2019 and 31.01.2021 respectively. Prior Environmental Clearance was accorded by MoEF&CC vide F.No. J-13012/03/2008-IA. II (T) dated 10th Jan 2011 and CTO granted by UPPCB vide CTO no. 168397/UPPCB/PRAYAGRAJ(UPPCBRO)CTO/both/ PRAYAGRAJ/2022 dated 16/12/2022 valid till 31/12.2024.

MUNPL (Meja Urja Nigam Private Limited) is planning to install 3 units of X 800 MW in line with MoM with Ministry of Power and CEA held on 09.12.2022.

Table 2.1 : Details of Production Capacity

S. No	Product	Quantity
1.	Electricity/Power	Operational Stage-I: 2 x 660 MW (based on supercritical technology) Proposed Stage-II: 3 x 800 MW (based on ultra supercritical technology)

2.2. Type of Project

Meja Stage-II (3x800MW) It's is an expansion project. The existing land available with MUNPL is 1295 Hectare. The proposed expansion shall be done within the existing plant boundary. For proposed expansion Stage-II However, additional land of 114 Ha (110 Ha Govt land for ash dyke and 04 Ha for Railway siding) needs to be acquired. shall be required for acquisition. The tentative cost of the project is Rs. 25,081.88 Crores. Meja Stage-II (3x800MW) shall be an Ultra Super Critical Units. In order to reduce the water consumption, Stage-II units shall be equipped with based on Air Cooled Condensers (ACC). The main components of the proposed plant include:

- Steam Generator and its Auxiliaries
- Steam Turbine and its Auxiliaries
- Electrical Systems: Generator Bus Duct, Transformers, Switchgears, Switch Yard etc.
- Control and Instrumentation Systems
- Air Pollution Control Systems like Dust Suppression and Extraction Systems, Electrostatic Precipitators, Flue Gas Desulphurisation System, NO_x Control System and Dust Suppression and Extraction System
- Water Intake and Treatment Systems

- Air Cooled Condensers
- Fuel Oil Handling and Storage System
- Coal Handling and Storage System
- Ash Handling, Utilisation and Disposal System
- Site Drainage, Effluent Treatment and Sewage Treatment Systems with facilities for Recycle and Reuse.
- Green belt, Afforestation and Landscaping Systems.

2.3. Project size /Magnitude of Operation

The salient feature of the project is tabulated below in **Table 2.2** below.

Table 2.2 : Salient Features of the Project

S. No	Features	Description	
		Existing Stage-I (2X660MW)	Proposed Expansion Stage-II (3X800MW)
1	Capacity/Configuration	2x660 MW	3x800 MW
2	Technology	Super-Critical Technology	Ultra Super-Critical Technology
3	Construction Power	-	4 MW construction power for the Meja Stage II would be met from existing 2 No. power sources (Each having capacity to handle 4MW) installed for Meja Stage-I, from Purvanchal Vidyut Vitran Nigam Limited.
4	Source of Coal	NCL & CCL	BCCL. Coal allotment letter is attached as **Annexure-16**
5	Coal requirement	7.34 MTPA	9.94 MTPA
6	Mode of Transportation	Through Rail	Through Rail
7	Moisture (%)	13-14	13-14
8	Sulphur content	0.3 to 0.5 %	0.3 to 0.5 %
9	Average gross Calorific value (kCal/kg)	3000 (NCL) 3900 (CCL)	3900
10	Capacity of Installed Boiler	2120 TPH	2580 TPH
11	Ash Content in Coal	34-43%	40%
12	Total Ash Generation	2.79 MTPA	3.78 MTPA
13	Fly ash	2.232 MTPA	3.024 MTPA
14	Bottom ash	0.558 MTPA	0.756 MTPA
15	ESP efficiency	>99.90%	>99.90%
16	Stack height (Meters)	One twin flue chimney of 275 M height	One twin flue chimney of 220M height & one single flue chimney of 150M height.
17	Water requirement	Available: 44 Cusecs	Requirement: 30 Cusec

S. No	Features	Description	
		Existing Stage-I (2X660MW)	Proposed Expansion Stage-II (3X800MW)
		Requirement: 39 Cusec Surplus: 5 Cusec	Available: 5 Cusec from Stage-I To be Arranged: 25 Cusec
18	Water source	River Ganga (29 Km, pipeline)	River Ganga (29 Km, pipeline)
19	Land requirement	1295 Ha	Within existing land. Additionally, proposed acquisition - 114 Ha (110Ha. for Ash Pond & 4 Ha. for Railway siding).
20	Project cost	Rs.13,093 Crores	Rs.25,081.88 Crores

Source: MUNPL

2.4. Project Requirement

2.4.1. Land Requirement

The project site is located near Villages-Kohdar, Mai Khurd and Patai Dandi, Tehsil: Meja, Prayagraj, Uttar Pradesh. The latitude and longitude of the project site is presented in Figure 2.1. The total plot area of site is 1295 Ha, out of which 535 Ha land is government land, 760 Ha is private land. The land is already in possession of MUNPL. Proposed expansion shall be done with in the existing permises. For development of Ash pond for the Stage-II additional land of 110 Ha. (Govt land) and 4Ha (Pvt. land) for Railway siding shall be required for acquisition. The land breakup of the project site is shown in **Table 2.3.** Greenbelt details provided in **Table 2.3.1.**

Table 2.3 : Land Breakup of The Project Site

Description	Existing Land Area		Proposed Additional Land requirement for Stage-II (Ha)
	Land area for Stage-I as per EC/EIA (Ha)	Land area for Stage-II already taken with Stage-I (Ha)	
Main Plant	144.2	183.8	0
Ash Pond	262	Shared with Stage-I	110
Township	85	Shared with Stage-I	0
Railway Siding	171	Shared with Stage-I	4
Reservoir	75	Shared with Stage-I	0
Makeup water	5.22	Shared with Stage-I	0
*Existing Green belt *(along plant boundary, reservoir boundary, between reservoir, ash dyke, ash silo etc., area protected/marked*)	87*	0	0
Proposed Greenbelt *(unutilised/vacant area along plant boundary,*	0	186.42	0

Township boundary, reservoir boundary, ash dyke boundary, between reservoir and ash dyke, ash silo etc., area protected/marked)			
**Miscellaneous	**95.36	Shared with Stage-I	0
Sub-Total (Ha)	**924.78**	**370.22**	**114**
Total (Ha): Existing and Proposed	**1295**		**114**
Grand Total (Ha)	**1409**		
***In addition to the 87 Ha of existing greenbelt as mentioned above, additional 76Ha. greenbelt has been already developed within main plant, township & railway siding area thus total greenbelt in existing plant is 163 Ha. (Details given in table below)**			
***** Includes Public roads, vegetable market, Parking, admin building, undulating land, drains, dry fly ash silo, outside area, open areas etc.***			

Source: MUNPL

Table 2.3.1: Existing and proposed Greenbelt details within the MUNPL Premises

Description	Existing Greenbelt area (in Ha)	Proposed Greenbelt area (in Ha)
Green belt within Main Plant area	10	21.15
Green belt within Ash Pond area	0	14.41
Green belt within Township area	22	5.05
Green belt within Railway Siding area	44	76
Green belt within Reservoir area	0	0
Green belt within Makeup water area	0	0
Existing Green belt (*along plant boundary, reservoir boundary, between reservoir and ash dyke, ash silo etc., area protected/marked)*	87	0
Proposed Greenbelt *(unutilised/vacant area along plant boundary, Township boundary, reservoir boundary, ash dyke boundary, between reservoir and ash dyke, ash silo etc., area protected/marked)*	0	186.42
Miscellaneous	0	0
TOTAL	**163**	**303.03**
Grand Total	**466.03**	
% of Total Land (1409 Ha)	**33.08 %**	

2.4.2. Coal/Fuel Requirements

Main raw material required for power plant is Coal. Approx. 9.94 MTPA corresponding to 85% PLF considering GCV of 3900 Kcal/Kg shall be required for the project. Standing Linkage Committee (Long-Term) in its meeting held on 03.01.2024 have recommended for the grant of coal linkage to the project. Coal linkage source is allocated from BCCL for Meja STPP Stage-II

vide CIL letter dated 20.06.2024. Copy is attached as **Annexure-16.** Coal storage of 15 days requirement of coal is proposed at the power plant. Properties of Coal are given below in **Table 2.4.**

Table 2.4 : Properties of Coal

S. No	Parameter	Range
1.	Total moisture content (%)	13-14
2.	Inherent moisture	5.3-6.3
3.	Volatile matter (as received) (%)	20-23
4.	Ash (as received) (%)	40
5.	Sulphur (%)	0.3 to 0.5
6.	Average gross Calorific value (kCal/kg)	3900 kcal/kg
7.	Heat rate (K Cal/ KWhr.)	2200

2.4.3. Coal Handling & Transportation system

The plant's railway siding network is linked to the Indian Railway network via Meja Road Station and Unchadih Station, and also connects with the Eastern Dedicated Freight Corridor (EDFC). Coal for Stage-I of the plant is currently being transported through the Indian Railways network, while coal transport for Stage-II is also planned to be transported by through Indian Railways. Coal from the mines will be transported to the power plant using BOBR or BOX-N wagons and will be unloaded into underground RCC hoppers. BOBR wagon rakes unloading will occur in Track Hopper Yard. BOX-N wagon rakes will be unloaded using wagon tipplers. To accommodate additional rakes for Stage-II, an expansion of the railway siding is planned.

Coal Quality: Analyzing coal for radioactivity is crucial for effective coal management and utilization, given the potential health, safety, and environmental concerns associated with radioactive materials. Consequently, coal samples have been tested for radioactivity and metal content, with the results detailed in Table 2.5. Test report area attached as **Annexure-5**

Table 2.5 : Radioactive Properties of Coal

Parameter	Range of Values (Bq/Kg) Observed in	Clearance level as per AERB directive
	BCCI coal	
Ra-226	≤ 0.21 (MDL)	**1,000**
Ra-228	≤ 7.21 (MDL)	**1,000**
Uranium	≤ 0.24 (MDL)	**1,000**
Th-232	34.75	**1,000**
Pb-210	≤ 1.60 (MDL)	**1,000**
K-40	≤ 3.61 (MDL)	**10,000**
Cs-137	≤ 10.95 (MDL)	**1,000**

Table 2.6 : Metal Contents in Coal

	Range of Values (mg/Kg) Observed in
	BCCL Coal
As	ND
Cd	ND
Co	5.0-7.8

	Range of Values (mg/Kg) Observed in
Cr	56
Cu	15.8
Mn	114.3
Ni	52.3
Pb	ND
Zn	24
Hg	ND
Ba	123.4

2.4.4. Start–Up Fuel:

Light Diesel Oil (LDO) shall be used for initial start-up, low load operation and as secondary fuel for pulverized coal flame stabilization at the startups/ low load operations. The necessary oil supply scheme with pumps, filters and valves will be provided. The burners, air registers etc., will have independent pneumatic drives and the entire operation of purging, insertion, air, and fuel sequencing shall be automatic. Ignition of oil shall be directly by igniters. LDO system shall be sized for 30% BMCR capacity of the Steam Generator. Steam Generator will be so designed that oil firing for flame stabilization will not be required beyond 40% BMCR.

LDO shall be received at the power station in road tankers and unloaded at existing unloading rake/header by gravity. Existing LDO unloading cum transfer pumps located in existing unloading pump house shall be utilized for pumping to storage tanks in view of less fuel oil requirement in regular, augmentation if required shall be detailed out during FSC. The LDO shall be pumped to two (2) numbers of existing storage tanks each of capacity 2000 cubic meter. Additional LDO Tank of 2000 KL is envisaged, Dyke for LDO storage tank shall be provided. The LDO pressurizing pumps will pump the LDO to Boiler through piping.

Table 2.7 : Properties of LDO

S.No	Parameter	Specification	STD. Method	LDO Quality
1	Relative Density @ 15 °C, Kg / m3	Report	IS 1448(P: 32)	855
2	Flash Point (PMC), °C	66 Min.	IS 1448(P: 21)	74
3	Viscosity, Kinematic @ 40°C, cSt	2.5 to 15.7 Max.	IS 1448(P: 25)	5
4	Ramsbottom Carbon Residue (RCR), percent by mass	1.50 Max	IS 1448(P: 8)	1.3
5	Copper Strip Corrosion, 3 hrs at 100°C	Not Worse than No. 2	IS 1448(P: 15)	No.1
6	Water content % by Vol.	1.0 Max.	IS 1448(P: 40)	<0.05
7	Sediment % by Mass	0.10 Max.	IS 1448(P: 30)	0.04
8	Ash % by Mass.	0.02 Max	IS 1448(P: 4)	0.01
9	Acidity, Inorganic, mg KOH/gm,	NIL	IS 1448(P: 2)	Nil
10	Sulphur, Total % by Mass	1.8 Max	IS 1448(P: 33) & P: 35	1.2

11	Pour Point, °C	21°C for Winter, Max 21°C for Summer, Max	IS 1448(P: 10)	Minus 3

2.4.5. Water requirement

Construction Phase*:* Approx. 400 KLD of water shall be required during the construction phase. Source of water requirement will be from the surplus water from the existing plant. However, ground water shall be used as contingent arrangement during construction phase of Stage-II.

Operational Phase:

Water requirement for existing Stage-I is about 3000 m^3/Hr (30 Cusec) and is presently being drawn from Ganga River. Govt. of UP (GoUP) has allocated 44 Cusec of water for Stage-I. The water requirement for Stage-I is 39 Cusec and Surplus water available is 5 Cusec. For meeting the requirement of Stage-II, an additional water allocation of 25 Cusec shall be obtained from GoUP from Ganga River.

The make-up water requirement for this project would be about 3000 m^3/Hr., (30 Cusecs) with bottom ash as lean slurry and fly ash as HCSD system for ash handling. Air Cooled Condensers (ACC) is envisaged for Stage-II (3x800 MW) units. The consumptive water requirement for Stage-II includes make up water, evaporation losses and effluent. Existing water pipeline infrastructure shall be used. The makeup water required at various locations involving the process of the power generation, other losses like evaporation and effluent generation are given in the following **Table 2.8**. Water balance diagram provided in **Figure 2.1.**

Table 2.8 : Water Requirement for Stage II (3 X 800 MW)

Plant Water Usage/Loss	Water Requirement (m^3/ hr)
Auxiliary Cooling Towers	320
Ventilation System makeup water	150
Potable Water system	50
Ash handling	1115
Loss in Power Cycle	65
FGD	655
Service water system	455
DM Clarifier	190
Total	**3000**

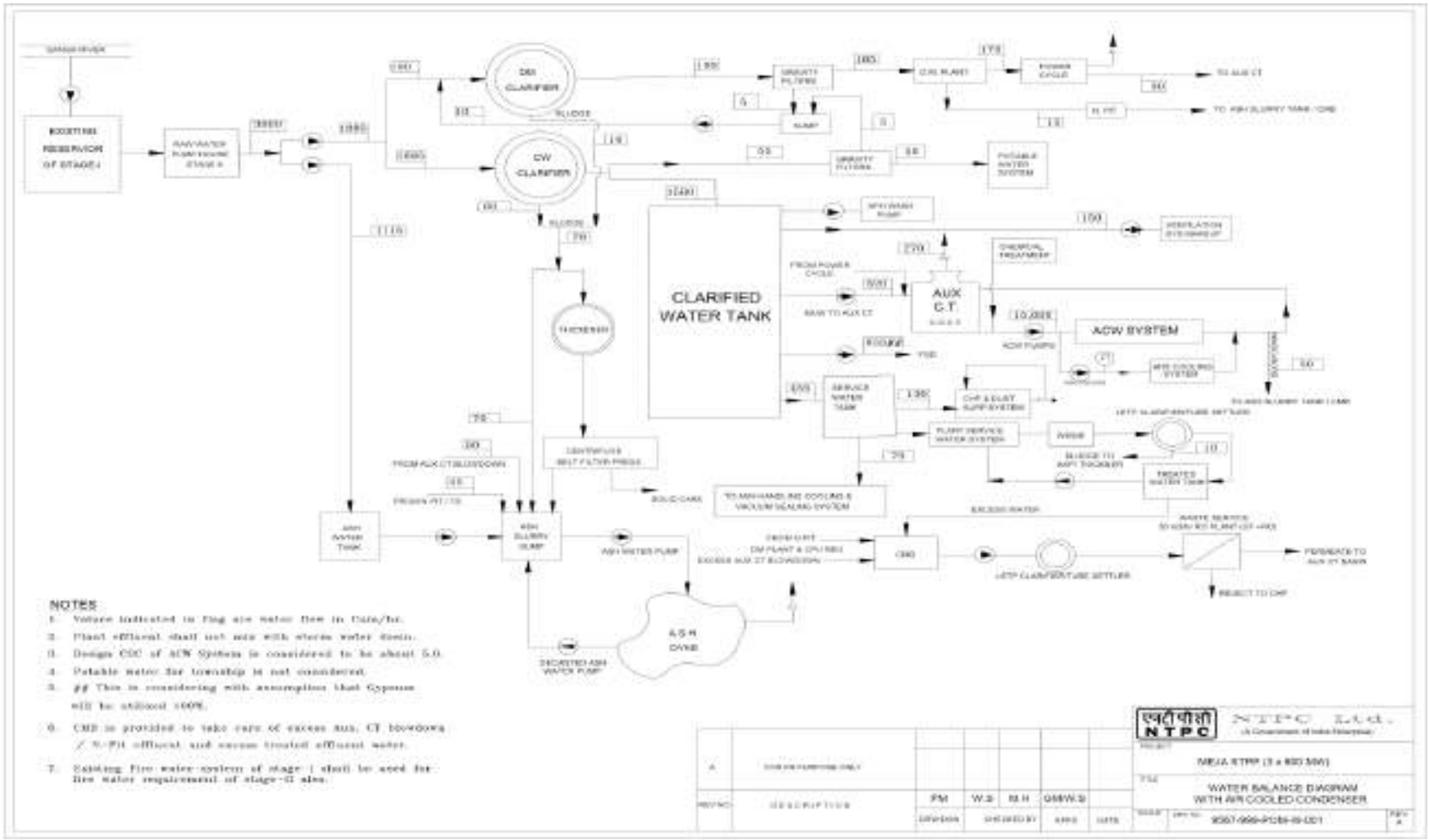


Figure 2.1 : Water Balance Diagram

2.4.6. Manpower requirement

The proposed expansion power plant will require skilled, semi-skilled and unskilled personnel during construction and operational phase. Many of the people from neighbouring villages, as found suitable will get opportunity for indirect employment through contractors during construction and operational phase. The total manpower from various agencies during construction of Stage-II would be about 5046 (60 permanent and 4986 temporary) during peak deployment and during operation period is estimated to be about 5250 (210 permanent and 5040 temporary). However, the exact numbers may vary during construction and operation phases.

Details of the employment generation from the proposed project is given in Table 2.9 below:

Table 2.9 Employment generation

S. No	Phase	Existing		Proposed	
		Permanent	Temporary	Permanent	Temporary (no of peak labour)
1	Construction	--	--	60	4986
2	Operation	229	1603	210	5040

2.5. Technology & process Description

In a thermal power plant, the chemical energy of the fuel (coal) is first converted into thermal energy (during combustion), which is then converted into mechanical energy (through a turbine) and finally into electrical energy (through a generator). The schematic diagram of the process of power generation from a coal based thermal power plant is shown in **Figure-2.2.** Lay out plan of the project is given in **Figure 2.3**. The process has the following steps:

1. The coal is transferred from the coal handling plant by conveyor belt to the coal bunkers, from where it is fed to the pulverizing mills, which grind it to fine powder. The finely powdered coal, mixed with air is then blown into the boiler by a fan where it burns like a gas.
2. **The process of combustion releases thermal energy from coal**. The boiler walls are lined with boiler tubes containing high quality demineralized water (known as boiler feed water). The combustion heat is absorbed by the boiler tubes and the heat converts the boiler feed water into steam at high pressure and temperature. The steam, discharged through nozzles on the turbine blades, makes the turbine to rotate, which in turn rotates the generator coupled to the end of the turbine. Rotation of generator produces electricity, which is passed to the step-up transformer to increase its voltage so that it can be transmitted efficiently. The power is evacuated via switchyard through a Transmission System.
3. During combustion, the non-combustible part of coal is converted into ash. A small part of ash (about 20%) binds together to form lumps, which fall into the ash pits at the bottom of the furnace. This part of ash, known as bottom ash is water quenched ground and then conveyed to pits for subsequent disposal to ash disposal area or sale.
4. Major part of the ash (about 80%) is in fine powder form, known as fly ash, and is carried out of the boiler along with the flue gas. The flue gas, after heat recovery, is passed

through the electrostatic precipitators, where the ash is trapped by electrodes charged with high voltage electricity.

5. The flue gases exiting from the Electrostatic Precipitators (ESPs) are discharged through a tall chimney for wider dispersal of remaining ash particles and gases. The ash collected in the ESP hoppers is extracted in dry form and conveyed to dry ash storage silos from where it is supplied to user industries. Unused part of fly ash shall be taken to ash ponds for disposal.
6. Then the flue gases shall be passed through the Flue Gas Desulphurization system (FGD) where lime will be fed in to the system to quench the sulphur dioxide and gypsum is precipitated.
7. The steam, after passing through the turbines, is condensed back into water in condensers and the same is re-used as a boiler feed water for making steam. The reasons for condensing and reusing the steam are following:

- The cost of boiler feed water is very high as it is very pure demineralized water hence reuse is economical.
- The use of condenser lowers the temperature at the exit end and hence increases the efficiency of the turbine.
- As a part water conservation measure Air Cooled Condensers (ACC) have been envisaged which will reduce the water requirement from 7,200 m^3/hr (in case of Water Cooled Condenser) to 3,000 m^3/hr (ACC).
- The Cycle of Concentration in the Aux. Cooling Water (ACW) System to conserve clarified water consumption shall be minimum 5.
- In Air Cooled Condensers (ACC) wherein the finned cooling tubes shall be arranged in the form of an inclined roof. Circulating air fans shall be installed below the roof for forced air circulation. The combination of roof and one fan forms one module. The whole condenser shall consist of several modules based on required surface area.

2.5.1. Steam Generators and Auxiliaries

The Steam Generators (SG) shall be ultra-supercritical once through type, water tube, direct pulverised coal fired, top supported balanced draft furnace, single reheat, radiant, dry bottom type, suitable for outdoor installation. The gas path arrangement shall be single pass (tower type) or two pass type having 281 Kg/cm^2 (abs) pressure at super heater outlet and SH/RH outlet temperature of 603 to 613°C. It is envisaged to co-fire biomass along with coal in the steam generator as per regulation of Ministry of Power.

The Steam generator and its auxiliaries shall be designed for firing of Indian Coal, identified for the project and also capable of firing imported coal (blended with domestic coal upto 30%).

The parameter envisaged for each unit at 100% BMCR is as given hereunder.

S. No	Parameters	Values
1	Steaming Capacity (Main steam flow at Superheater Outlet)	2580 TPH at BMCR
2	Steam Pressure at Superheater Outlet	281 Kg/cm^2 (a)
3	Steam Temperature at Superheater Outlet	603 deg C

S. No	Parameters	Values
4	Steam flow to re-heater (CRH)	1995 TPH
5	Steam Temperature at Reheater Outlet	603-613 deg C
6	Feed water temperature at Economizer Inlet	307.6 deg C

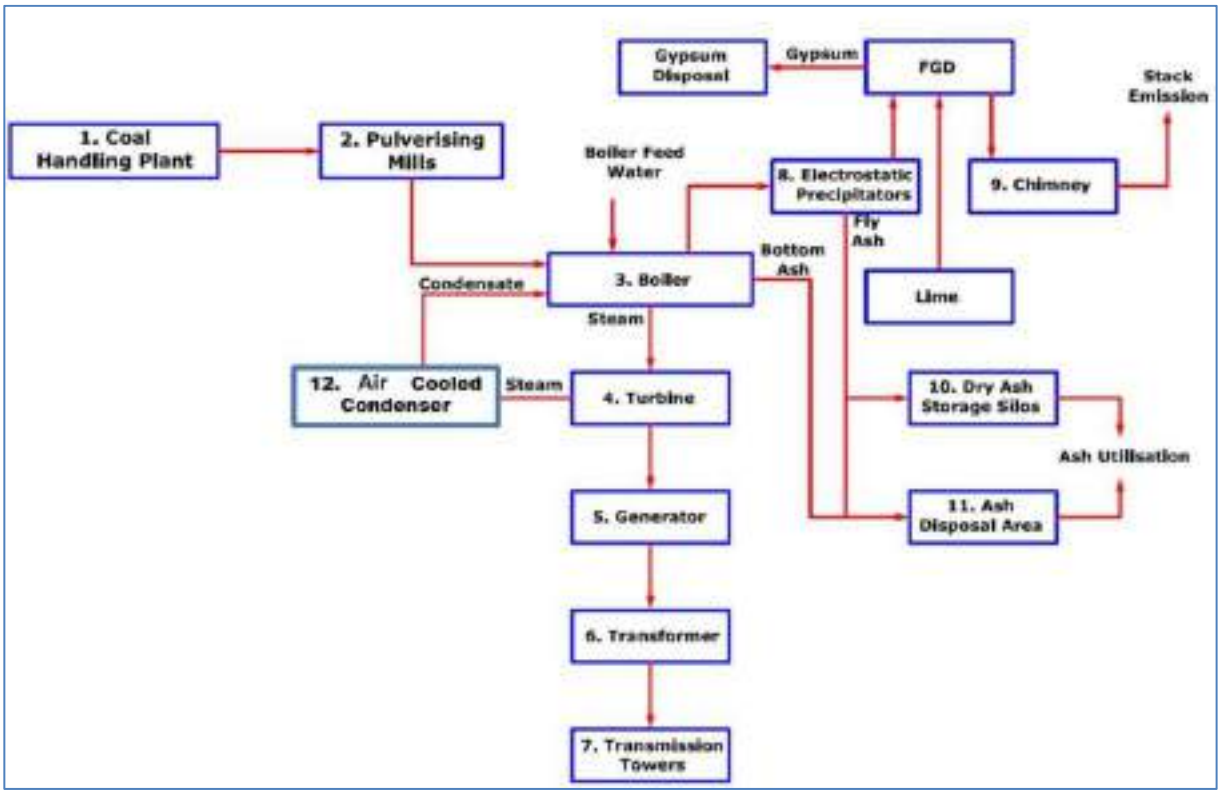


Figure 2.2 : Process Flow Diagram

2.5.2. Condensing Equipment

Two pass surface condenser capable of maintaining the required vacuum while condensing steam at the maximum rating of the turbine will be provided. The condenser arrangement will be such that on-load maintenance of one half of the condenser at a time is possible by isolating the same from cooling water inlet and outlet sides. The condenser will be of two pass divided water box design with horizontal straight tubes. The condensers will have integrated air cooling zone and it should be designed so as to accept full quantity of steam during turbine HP and LP bypass operation without any undue vibration, thermal stress etc. The condenser axis will be at a right angle to the turbo-generator axis. The condenser would also be provided with on-line tube cleaning system.

The condensate temperature under any circumstances will not be less than the saturation temperature corresponding to condenser backpressure. The maximum heat load of the condenser will correspond to turbine operating with valves wide open condition at 105% TMCR, 3% make-up, 85% cleanliness factor and maximum cooling water inlet temperature of 36°C for maintaining an absolute pressure of 0.109 bar(a). The condenser will be sized so as to

meet 8°C temperature rise in the cooling water. The design will satisfy the requirements of Heat Exchanger Institute (HEI) Standards. Hot well storage capacity of five (5) minutes will be considered between the operating levels. The condenser will be designed to maintain MCR load with 10% tube plugging.

Two (2) nos. x 100% capacity vacuum pumps will be provided to maintain the vacuum in the condenser by expelling the non-condensable gases. One vacuum pump will operate during normal plant operation and during start-up, both the units may be operated such that the desired vacuum can be achieved within a short time. The capacity of these vacuum pumps will be as per HEI standards.

2.5.3. Boiler Feed Pumps & Drives

Three (3) nos. x 50%, horizontal, multistage, centrifugal type boiler feed pumps will be provided. The pumps will be sized considering a feed flow of 110% of MCR feed flow, spray water quantity and other system requirements. Two of the boiler feed pumps will be normally in operation and the third boiler feed pump would act as standby. Each boiler feed pump will have one (1) matching capacity single stage booster pump. The booster pump will take suction from feed water storage tank and discharge into the suction of corresponding main boiler feed pump which in turn, will supply feed water to boiler through the high-pressure heaters and feed control station. A design margin of 5% in the capacity and head will be provided over and above the following requirement.

a) Boiler MCR Steam flow
b) 3% makeup
c) Emergency reheater spray
d) Spray water requirement of HP bypass system.
e) Leakage through recirculation valves of BFP
f) Unit capability in case the condenser cooling water temperature at corresponding to worst ambient conditions.

All the feed pumps will be provided with minimum flow automatic recirculation control arrangement to protect the pump under low load operation. The recirculation will be discharged back to the deaerator. Each pump will be provided with mechanical seals with proper seal cooling arrangement, self-contained forced lubricating oil system for supplying oil to the bearings, couplings etc. The lubricating oil and sealing arrangement of the feed pumps will be cooled by closed cooling water system utilizing DM water as cooling medium. All necessary protective and supervisory system will be provided to ensure safe and trouble-free operation of the feed pumps.

2.5.4. Deaerating Heaters & Closed Heaters

The unit will be provided with a variable pressure type deaerating heater with a feed water storage tank of 10 minutes capacity of boiler MCR condition. The deaerator will be designed for working pressure from full vacuum to maximum pressure available at extraction steam to deaerator. Vent condenser will be provided with the deaerator to minimize wastage of steam. The deaerator will be of spray-cum-tray type with a separate horizontal storage tank for feed water storage and will be capable of deaerating all the incoming condensate from LP feed water

heaters and drains from HP feed water heaters to provide boiler feed to match the boiler MCR requirements continuously. The deaerator will be designed to keep the oxygen content of the condensate below 0.005 cc\litre with zero free carbon dioxide.

Deaerator will normally operate by taking extraction steam from IP turbine casing. However, during low load operation and start-up, the deaerator will be pegged with steam drawn from auxiliary header. The deaerator will be placed at a suitable elevation to provide sufficient NPSH for the boiler feed booster pumps and considering the head available for the drain of the preceding HP heater condensate flow to the deaerator.

The feed water heaters will be of closed U-tube horizontal type. The feed water heaters will have both desuperheating and drain cooling zones in addition to the normal condensing zone as necessary. High pressure heaters and low pressure heaters will be provided with bypassing arrangement in order to allow isolation for maintenance. The recommendations of ASME standard TDPS-I will be followed for prevention of water ingress into the turbine by providing adequately sized draining facility.

2.5.5. Compressed Air

The compressed air system will provide supply of compressed air having suitable pressure and quality for instrument & control purpose use (Instrument Air) and for General Station use (Plant Air). The system includes the filter, silencer at the compressor inlet, the compressors, intercoolers, after coolers, moisture separators, Common air receivers, air drying plant, instrument air receiver, instrument air piping, plant air piping, valves, fittings, instrumentation and controls as required for the system. Details of the compressor system is given in **Table 2.10.**

Table 2.10 : Details of Air compressors

S. No	Component ACS	Quantity	Unit	Technical parameter
1	Air compressors with control panels, instrumentation & all accessories like piping, valves, etc.	9	No.	Screw/Centrifugal type oil free compressors each of capacity 60 NM^3/min & discharge Pressure of 8 $kg/cm^2(g)$
2	ADP with panels, instrumentation, all accessories like piping, valves & electronic dew point meters	5	Set	Each of capacity 60 NM_3/min & design outlet dew point of (-) 40^0C (atmospheric).
3	Air receivers	16	No.	Nominal Capacity: 10 m^3
4	Air receiver for WT plant	1	No.	Nominal Capacity: 2 m^3
5	EOT crane	1	No.	8 Ton

2.5.6. Cooling System

Cooling System for Meja, Stage-II, Air Cooled Condenser (ACC) system would be adopted for condenser water cooling. Water is an invaluable resource, and the world is confronting significant challenges related to water scarcity. For thermal power generation water is an important raw material. Consumptive use of water in a thermal generating unit mainly includes requirements of condenser cooling, ash disposal system, cycle make up water, FGD (Flue Gas Desulphurization) system, and Auxiliary cooling systems besides other miscellaneous requirements. Quantum of makeup water required for condenser cooling water system with Water Cooled Condenser (WCC) is the highest among all the consumptive requirements of any thermal generating power plant.

Air-Cooled Condensers is an alternate technology using dry cooling instead of conventional wet cooling to save water. ACC uses ambient air to cool and condense steam back into condensate cycle. The process involves passing steam through a series of finned tubes, where it is cooled by ambient air, driven by fans. By eliminating the need for water sources and minimizing thermal pollution, ACC offer a more sustainable solution.

Specific Water consumption with ACC reduces about 60%. (Roughly specific water consumption with ACC will be in the range of 0.90 to 1.24 litre/kWhr with FGD, depending on type of ash handling system whether Bottom & Fly ash handling is of HCSD type or Dry type). Due to poor heat carrying capacity of air compared to water, the condenser back pressure is more in case of ACC that results in deterioration in heat rate ie increase in specific fuel consumption. However, land requirement and maintenance are less with ACC compared to wet cooling system.

ACC has advantage over WCC in terms of relief of vapor plumes, displacement of habitat, salt or mineral drift, water consumption through evaporation, and increased solid waste generation due to wastewater treatment.

2.5.7. Water Treatment Systems

The project's water treatment system includes several components designed to ensure water quality throughout various stages of the process. These components consist of a Water Pre-treatment Plant, Water Demineralization Plant, Chlorine Dioxide Plant, Condensate Polishing Plant, Air Cooled Water (ACW) Treatment Plant, and Effluent Treatment Plant (ETP). Each of these plants serves a specific function within the overall water treatment process to maintain optimal operational conditions and environmental compliance.

2.5.7.1 *Water Pre-Treatment Plant*

The pre-treatment plant will be designed to eliminate suspended and colloidal matter from the raw water supply. Separate pre-treatment facilities will be dedicated to meeting the needs of the ACW (Auxiliary Cooling Water) system and the Demineralization (DM) Plant. A centralized chemical house will store necessary chemicals like chlorine, lime, alum, and coagulant aid, with individual chemical preparation tanks and dosing pumps allocated for each pre-treatment system.

For the ACW system, the pre-treatment setup will include an aerator cum stilling chamber, two reactor-type clarifiers, and two 100% gravity filters. Meanwhile, the DM Plant's pre-treatment configuration will feature an aerator cum stilling chamber, a reactor-type clarifier, and two 100% gravity filters. Both systems will be equipped for dosing alum, lime, coagulant aid, chlorine dioxide, etc.

After clarification, water will be directed to storage tanks or filters based on requirements. Clarified water will be pumped to various systems including HVAC makeup, FGD (Flue Gas Desulfurization) process water, FGD Gypsum wash, and Service water. Additionally, the ACW system's makeup water will be supplied either by pumps or gravity.

Filtered water from the gravity filters will flow into respective reservoirs and then be pumped to the DM plant and potable water system. The installation will include necessary hoists, cranes, and weighing scales for handling equipment and chemicals. Comprehensive instrumentation, interlocks, controls, and panels will ensure safe and reliable operation of the water pre-treatment plant.

2.5.7.2 *Water Demineralization Plant*

The Demineralization (DM) plant will be configured to fulfil the water needs of the steam cycle, closed circuit auxiliary systems, and stator water cooling system. The DM plant will consist of three (3) streams and each stream shall comprise of Activated carbon filter, Cation exchangers, degasser system (comprising of degasser tower, degassed water tank, degassed water pumps and degasser blowers etc.,), anion exchangers and mixed bed exchanger., micron cartridge filters, RO systems, degassers, and MB units.

Cation resins will be regenerated using hydrochloric acid, while anion resins will use sodium hydroxide. Regeneration facilities will feature bulk acid and alkali storage tanks, alkali solution preparation systems, acid and alkali measuring tanks, and dosing ejectors. The plant will operate semi-automatically with PLC-based controls.

Three DM water storage tanks will store the demineralized water, and one neutralization pit will be available to adjust pH levels and discharge effluent water from the DM plant. The system will allow interconnection between Stage-I and Stage-II DM water storage tanks with requisite pumps, piping, valves, and fittings for seamless operation.

2.5.7.3 *Chlorine Di-Oxide Plant*

Two separate Chlorine Dioxide (ClO_2) plants will be installed for the Auxiliary Cooling Water (ACW) system and pretreatment system to avoid the growth of algae and bacteria. Each system will be equipped with chemical storage tanks, unloading systems, instrumentation, panels, chlorine dioxide leak sensors, and other necessary components for efficient operation and safety.

2.5.8. Ventilation

A ventilation system would be designed to supply fresh outdoor air and shall be selected for maintaining inside conditions for those areas where close control of temperature is not

necessitated, but nevertheless have a stipulated maximum temperature. The ventilation system envisaged for the proposed plant will achieve the following criteria:

- Scavenging out structural heat gain and heat load from various equipment, hot pipes, lighting etc.
- Dilution of polluted air due to generation of obnoxious gases/aerosol contaminants like acid fumes, dust, etc.

The areas entitled for ventilation system shall be as follows:

- Turbine building
- Coal mill building
- ESP building (Equipment Room)
- Air compressor room
- AC plant room
- DM plant MCC room
- Raw water pump-house

2.5.9. Mill Reject System

To efficiently manage Mill Rejects continuously, a Mill Reject system will be implemented with a capacity of at least 1% of the mill design capacity or based on the worst coal scenario, whichever is higher, considering the maximum number of working mills. Each mill will be equipped with a mill reject pyrite hopper. Mechanical conveying via a mill reject conveyor system will transport the rejects from the mill area to a storage silo. The storage silo will have a capacity of storing rejects for 16 hours for all units. Finally, the stored Mill Rejects will be disposed of into trucks from the storage silo.

2.5.10. Electrostatic Precipitator (ESP)

It is proposed to install high efficiency Electrostatic Precipitator having an efficiency that limits the outlet emission of particulate matter to 30 mg/Nm^3 while the boiler is operating at its MCR, firing worst coal having maximum ash content.

The electrostatic precipitators will have six (6) parallel gas streams, isolated from each other on the electrical as well as gas side and will be provided with gas tight dampers at inlets and outlets of each stream, to allow maintenance to be carried out safely on the faulty stream, while the unit is working. ESP specific collection area shall not be less than 250 m^2/m^3/sec at 100% TMCR. Electrostatic precipitator will be provided with microprocessor based programmable type rapper control system and ESP management system to ensure safe and optimum operation of ESP.

ESP transformer rectifier sets will use high flash point oil as the cooling medium. The dust collection hoppers at all strategic locations will have a minimum storage capacity of eight (8) hours. The hoppers will have heating arrangements to prevent ash sticking to the sloping sides

and down pipes. Level indicators to indicate ash levels in the hoppers and trip the ESP in case of high ash levels in the ash hoppers are also envisaged to ensure safety of ESP.

Environmental and Efficiency Considerations: In order to meet the environment norms and maintain the sustained efficiency of ESP, it shall be adequately designed with sufficient margins for all operating conditions. The Electrostatic Precipitator Management System (EPMS) in conjunction with opacity monitor shall continuously monitor and maintain the optimum energy level to achieve higher efficiency of ESP. The steam generator shall be designed for low NOx formation by adopting the appropriate burners. The steam generator shall meet the requirement of sustained high efficiency and availability, high efficiency at part load, flexibility to burn coal within the range specified, quick startup and two shift operation. Furnace shall be sized for burning high ash coal and low flue gas velocities to minimize erosion.

2.5.11. NOx Control

Low NOx burners shall be adopted to reduce nitrogen oxide (NOx) emissions in industrial and commercial combustion processes. NOx gases, which include nitrogen monoxide (NO) and nitrogen dioxide (NO_2), are pollutants that contribute to smog, acid rain, and other environmental and health issues. Low NOx burners help mitigate these effects by optimizing the combustion process to produce fewer NOx emissions.

2.5.12. Flue Gas De-sulphurising system (FGD)

A wet limestone-based Flue Gas Desulphurization (FGD) system will be installed behind ESP, at the tail end of the steam generator downstream with an efficiency of reducing SO_2 emission to 100 mg/Nm^3. FGD System will be provided with limestone slurry preparation system for grinding of limestone to desired fitness. The estimated limestone requirement for Stage-II is around 30.6 T/Hr. The system will have scrubber as the main reaction vessel in which SO_2 gas shall be captured in limestone slurry to produce gypsum. The estimated gypsum generated is around 49.6 T/Hr. The scrubber will be provided with a bypass system. The FGD System shall also include auxiliary Equipments and systems like mills, cyclones, vacuum filters, belt conveyors, pumps, storage vessels, pipping's and fittings, etc. The FGD System shall also be provided with four nos. of elevators for easy access & movement of man and materials, three nos. Passenger cum Goods Elevators of minimum capacity of 1000 kg for each absorber, Limestone Grinding System Building and Gypsum Dewatering Building and one nos. Passenger Elevator of minimum capacity of 680 kg in MCC cum Control Room Building of FGD Plant.

2.5.13. Infrastructure Facilities for Work Force

The proposed expansion power plant will require skilled, semi-skilled and unskilled personnel during construction and operational phase. Many of the people from neighbouring villages, as found suitable will get opportunity for indirect employment through contractors during construction and operational phase. The total manpower from various agencies during construction of Stage-II would be about 5046 (60 permanent and 4986 temporary) during peak deployment and during operation period is estimated to be about 5250 (210 permanent and 5040 temporary). However, most of the workers will be from local area and don't require

accommodation. But some of the workers need accommodation and will be housed in workers colony, which will be located near the project site. The workers colony which will be temporary in nature will have the following amenities:

- Drinking water facility– Drinking water will be supplied through water tankers/community taps in workers colony;
- Community kitchen will be provided for the workers in Workers colony;
- Sanitation facilities will be constructed which will include the adequate number of separate toilets for men and women. The makeshift treatment plant will be installed and treated wastewater will be utilized in greenbelt development.
- Bins will be installed to collect municipal waste from the Workers colony;

2.5.14. Roads and Sewerage

All roads shall be of rigid pavement made up of concrete.

Single Lane Roads: Roads to all buildings/ facilities/structures, road approaches/connections, access roads to liquid fuel storage areas and other equipment areas where access is necessary from inspection, operation and maintenance point of view and all roads inside switchyard.

Double Lane Roads: Roads shall be 12 m wide with 7.5 m wide concrete pavement and 2.25 m wide raised shoulders on both sides of the road.

Intermediate Roads: Roads shall be 8 m wide with 5.5 m wide concrete pavement and 1.25 m wide raised shoulders on both sides of the road. It will help in cost saving and fulfilling of requirement.

Drains: Drains shall be constructed on both sides of roads and shall be connected to the main trunk drain and then finally to the nearby natural drainage system. Existing drainage channel passing through the plant site shall be suitably diverted. Drains along the periphery of the main plant and other major structures shall be of RCC with rectangular section and others will be of brick masonry with rectangular section.

Sewerage: A network of underground sewerage system shall be provided in the plant area. Packaged type STP (Sewage Treatment Plant) shall be provided with sufficient capacity for discharge. CI pipes shall be used for catch pipes (and also for disposal under pressure) and RCC concrete pipes shall be used for trunk sewage disposal pipes. All the sewerage collected in STP. For treatment of domestic sewage existing STP (2200 KLD) shall be utilized.

2.6. General Layout

Some of the existing facilities shall be used for the proposed expansion. In laying out various facilities, consideration has been given to the following general aspects:

- Provision for 3x800 MW units including cooling towers.
- Coal storage yard for 15 days requirement at site
- Ash silos for fly ash and ash pond area.

- FGD system
- Water treatment facilities
- Availability of adequate space for fabrication / storage of construction equipment and materials.

All facilities of the plant area are laid out in close proximity to each other to the extent practicable so as to minimize the extent of land required. The layout also facilitates movement of men and materials between the various facilities both during construction and also during subsequent operation and maintenance. The plant layout is presented in **Figure 2.3**

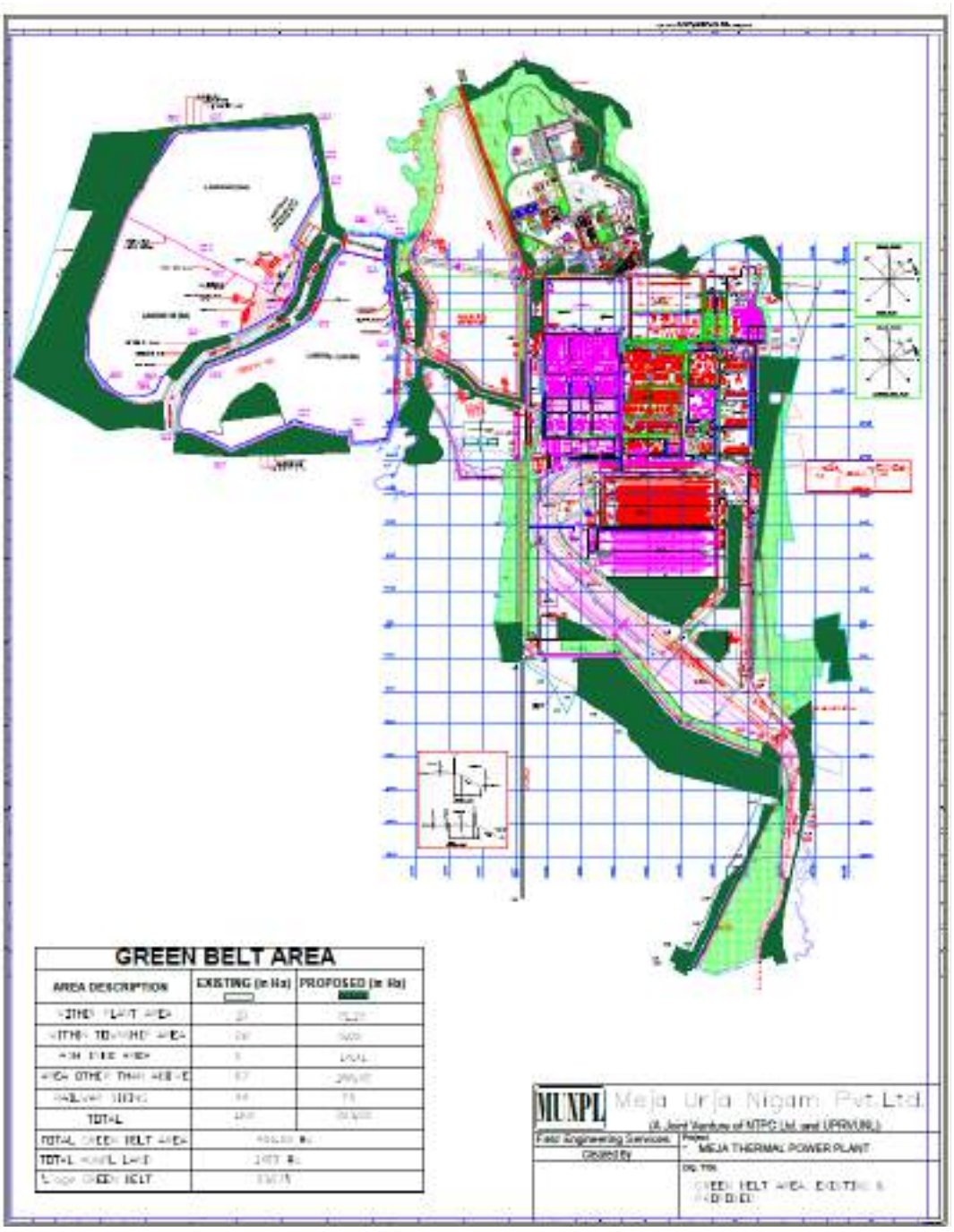


Figure 2.3 : Plant Layout

2.7. Coal Handling Plant

It is proposed to have one coal handling plant of 3300 MTPH rated capacity with parallel double stream (one working and one standby) of belt conveyors along with facilities for receiving, unloading, crushing and conveying the crushed coal to boiler bunkers and stacking/ reclaiming the coal to/from crushed coal stockyards. Two (2) numbers of uni-directional, rail mounted, travelling stacker re-claimers, bucket wheel type is proposed for coal stockyard management. The coal handling plant have a dedicated coal unloading terminal comprising five (5) numbers of wagon tipplers for unloading BOX-N wagon rakes. BOBR wagon rakes will be unloaded in track hopper provided in Stage – I of the project.

The overall operating hours of the coal handling plant shall be 16 hours spread over two shifts per day leaving third shift exclusively for routine inspection and maintenance. The proposed CHP shall cater to the peak daily requirement of coal for all units in two bunker filling cycles in 12 hrs. effective operation. Coal received in underground RCC hoppers by wagon tipplers shall be conveyed to the crusher house, for sizing of coal to (-) 20mm. From crusher house, the crushed coal can either be conveyed directly to the coal bunkers through a series of conveyors or stacked on to the crushed coal stockpiles by means of stacker reclaimers. Motorized travelling trippers shall be provided to feed crushed coal into the raw coal bunkers of the boilers. Provision of blending imported coal with indigenous coal has been envisaged through stacker reclaimers for the project. Dust suppression and service water systems shall be provided throughout the coal handling plant. Ventilation systems shall be provided for underground buildings/tunnels, MCC rooms and bunker buildings. A centralized main CHP control room (DDCMIS based) shall be provided to facilitate control and monitoring of the operations of the entire coal handling plant. Receiving and unloading of BOX-N rakes shall be controlled and monitored from wagon tippler control room located adjacent to the wagon tippler. Inter connection between Stage–II CHP and Stage–I CHP is also provided.

2.8. Proposed Schedule for Approval and Implementation

For Stage-II (3x800 MW) the commercial operation date (COD) of first unit of the project is proposed to be completed in 60 months from the date of award. Subsequent units shall be commissioned at intervals of 09 months each.

2.9. Power Evacuation system

It is proposed to consider step up voltage for the project as 765 kV. Four (4) numbers 765 kV line bays are envisaged for power evacuation. The connectivity of these lines will be finalized based on the % share of power allocation by MOP and power flow system studies. The final connectivity proposal of Stage-II generation switchyard will be finalized by CTU based on system studies. The issue of power evacuation of the proposed project shall be taken up with appropriate Transmission Utility (STU and CTU) as per regulatory provision.

2.10. Ash Handling System

Total 3.78 MTPA Ash shall be generated from proposed project (Stage II: 3X 800 MW). Ash Handling Control System consisting of binary and modulating controls of dry and wet ash handling system, bottom ash handling system and ash slurry pumps, etc.

The bottom ash, economizer ash and pre-heater ash shall be disposed in wet form. Fly ash from the ESP hoppers shall be transported in dry form to storage silos near plant boundary through buffer hoppers for utilization. In case of non-utilization, bottom ash and fly ash shall be disposed-off as HCSD (High Concentration Slurry Disposal) in ash disposal area.

Prayagraj is a religious city and the entry of heavy vehicles is completely closed for about 120 days in a year in addition to the monsoon season, which affects the movement of ash bulkers. The movement of ash balkar is also affected during Ardh Kumbh, Maha Kumbh and Kavad Yatra. The acquired land for Stage-I is hilly and extremely sloping, resulting in less usable land. Hence, MUNPL proposes additional area for ash pond of 110 Ha, near to the exiting ash pond to run the power plant without interruption throughout the year.

2.10.1. *Ash Handling and water circulation system*

HCSD Pump house, compressor house, ash slurry pump house shall be steel shed with metal sheet cladding and profile roof, Ash water pump house shall be open type with grade slab. Other buildings shall have RCC framed structural arrangement with brick cladding and RCC roof. Overhead bridge/ culvert by thrust boring shall be provided for the railway crossing for the ash slurry pipes. For routing of the ash pipes at road crossing local hump / culvert or bridges shall be provided.

A. Fly Ash Handling System

About 3.024 MTPA fly ash per unit shall be generated. In the Fly Ash System, the fine-textured ash is extracted in a dry state from the ESP hopper using a pneumatic conveying system (either vacuum or pressure system). The dry ash buffer hoppers present adjacent to the ESP in each unit shall transport the dry ash either to HCSD ash silos or main storage silos with rail loading facilities.

5 nos. of screw type transport air compressors, refrigerant type air-dryer and air receivers shall be provided for each unit. 6 nos. of MS pipes (cast iron) for conveying coarse fly ash from hoppers to 6 nos. of HCSD cum fly ash storage silos located in the fly ash silo complex. The dry fly ash will then be transported from the main storage silos to the user industries either in closed tankers or open tankers. In case of non-utilization, dry fly ash shall be disposed in HCSD Dyke in combined high concentration form.

Fly Ash Slurry Disposal:

The fly ash collected in HCSD silos shall be mixed with water in an agitator tank at a controlled rate to obtain the slurry with desired high concentration, which will further be pumped to ash disposal area, at a distance of approximately 1.5 Km from the plant. There will be 6 working and 4 standby HCSD streams for all units. Each stream will consist of one HCSD pump and individual disposal pipes. HCSD pump house will include all HCSD pumps & HCSD silo aeration blowers.

2.10.2. Bottom Ash Handling and Disposal system

2.10.2.1 *Bottom Ash/ Economizer Ash/ Air Pre-heater Ash Handling System:*

Bottom Ash is extracted either through continuously operating SSC (Submerged Scraper Chain Conveyor) System with dry ash hopper or through intermittently operating jet pumps in conjunction with water impounded hoppers. In case of continuous BA extraction, bottom ash collected from all the units will be pumped to the common Bottom Ash Slurry Disposal Pump House either through BA Slurry transportation pump in case of SSC system or to the slurry sump of the common Bottom Ash Slurry Disposal Pump house through water impounded bottom ash hopper in case of jet pump system.

Economizer Ash shall be handled in wet form. Coarse Ash Slurry from economizer hopper shall be led either to water impounded hopper or to Slurry Sump of the SSC system.

Air Pre-heater Ash shall be handled in wet form. Coarse Ash Slurry from Air Pre-heater Hopper shall be led to Ash Slurry Sump of Bottom Ash Slurry Disposal Pump house.

Bottom Ash and Coarse Ash will be transported from the Bottom Ash Slurry Disposal Pump house to the dewatering bins through bottom ash slurry duty pumps. In case of non-utilization of bottom ash, the slurry will be pumped to existing ash dyke through dewatering bins. No pits will be permitted in the bottom area of the boiler to accommodate water impound hoppers.

2.10.2.2 *Bottom Ash Slurry Disposal*

The bottom ash and coarse ash slurry from all the units shall be transported from bottom ash slurry pump house through slurry duty pumps to dewatering pumps approximately 1 km away from the plant. There will be one working stream and two standby streams, all are provided with individual disposal pipes (no cross-over in disposal piping).

2.10.2.3 *Lining of Ash Dykes:*

The scheme for ash disposal envisages two lagoons for bottom ash (BA) with one common Overflow Lagoon (OFL) and one lagoon for Fly Ash (FA). Construction of two well type water escape structure with flexible opening is also envisaged for evacuating decanting water from storage lagoon to overflow lagoon for recirculation through ash water recirculation system (AWRS). Decanted water from each BA lagoon is directly connected by water escape structure to OFL. Construction of spillways is also envisaged for discharging excess rainwater from storage lagoons/ OFL.

The supernatant from the ash dykes shall be recycled back to the plant through dedicated ash water re-circulation system. The water entrapped in deposited ash is further collected through dyke embankment by intercepting through sand chimney/ sand blanket, into a toe-drain all around the dyke and recirculated back to the plant.

Due care shall be taken for the design and construction of the ash dyke as per relevant IS Codes and under the guidance of panel of experts. Compliance with the design and operation guidelines shall ensure that the risk of the failure of the dyke is minimum. Leachate collection system shall be provided all along the ash pond. Proper protection measures like HDPE lining, appropriate height of bund shall be planned.

The Stage-II ash dyke will be positioned adjacent to the existing Stage-I ash dyke, covering a total proposed area of approximately 110 Ha. For the disposal of fly ash (FA) from Stage-II, a high concentration slurry disposal (HCSD) system will be used, while bottom ash (BA) will be handled via lean slurry. The project, operating at an average Plant Load Factor (PLF) of 85%, is expected to generate about 5.3 million cubic meters of coal ash annually. According to the latest MoEF&CC guidelines, 100% utilization of fly ash is required within three years of the plant's commissioning.

As per the MoEF&CC notification dated December 30, 2022, new or expanded thermal power plants are permitted to use 0.1 hectares per megawatt for ash dykes. For Stage-II, the identified 110 Ha of land, adjacent to Stage-I, complies with this regulation. The ash disposal plan typically includes two lagoons for bottom ash with a shared overflow lagoon and one lagoon for fly ash with a sedimentation basin. To optimize land use, the plan will feature one FA lagoon and two BA lagoons, along with a common overflow lagoon.

Considering the current design and expected storage needs, a starter dyke of 9 meters in height with one additional raising will be used for the HCSD lagoon, while the BA lagoons will have a starter dyke of 12 meters in height with two additional 3-meter raises using the upstream method. In compliance with environmental regulations, all coal ash storage lagoons (BA and FA) and the overflow lagoon will be lined with HDPE.

2.10.2.4 *Ash Classification and Bagging System*

The ash handling system will segregate fine and coarse ash based on their source fields. Fine ash (less than 45 microns, 95% size) will originate from the 4th field onwards, while coarse ash will be from the initial three fields in service. The fly ash from ESP hoppers or buffer hoppers of all units will be directed to a 250 Tons classifier silo. From there, the ash will undergo further classification and storage in separate silos, each with a capacity of 500 tons for fine and coarse ash respectively.

For efficient loading into closed tankers, each silo will feature outlets equipped with telescopic chutes and rotary feeders. To mitigate dust and maintain air quality, the silos and hoppers will be equipped with target boxes, bag filter assemblies, pulse jetting mechanisms, and fan units. Aeration blowers will ensure proper air circulation.

The bagging plant will handle 50% of the fine ash production, including classified fine ash and direct fine ash from the 4th field onwards. This plant will be equipped for mechanized bagging, packaging the fine ash into 1-ton and 50-kg bags. A closed storage area will accommodate these bags, ensuring storage flexibility for both bag sizes produced daily.

2.11. Ash Utilization Plan

Ash utilization shall be done as per MoEF&CC notification dated 31-12-2021 and its amendments. To utilize ash and also to comply the condition stipulated in above notification MUNPL has taken many action. The current Ash utilization in existing project (Stage-I) of MUNPL

for FY 2024-25 is around 84% till December 24. The ash utilization status of existing unit for last few years is given below:

Table 2.11 : Ash Utilization in Existing Stage-I

Fin Year	Ash Production (LMT)	Total AU (LMT)	Total AU (%)
FY 2019-20	2.74	0.00	0.00
FY 2020-21	10.20	5.72	56.08
FY 2021-22	18.23	13.21	72.46
FY 2022-23	15.73	9.82	62.39
FY 2023-24	17.85	12.63	70.78
FY 2024-25 (till Dec'24)	15.31	12.86	84.00

Proposed year wise Ash Utilization for proposed Stage-II

- As per MoEF&CC Fly Ash Notification on dated 31.12.2021, starting w.e.f. April 2022, all TPPs to utilise 100% current ash (fly ash and bottom ash) generated during that year with minimum utilization of 80% every year in 03-year cycle while achieving average 100% AU in each 03-year cycle. However, there is relaxation of one years for Plants with Ash utilization between 60-80% in FY 2021-2022.
- Since Ash utilization for Meja in Financial Year 2021-2022 was 72.46 %, 03-year cycle shall start from April 2023 with minimum utilization of 80% every year. So accordingly, Ash Utilization compliance for MoEF&CC first 4-year Compliance Cycle (from FY 2023-2024 to FY 2025-2026) is given in Table 2.12 as follows:

Table 2.12 : Ash Utilization Compliance

MoEF&CC Compliance Cycle	Fin Year	Target for Total AU (%) as per MoEF&CC Notification	Actual / Planned Total AU (%)	Compliance as per MoEF&CC Notification
First	FY2022-23	No Minimum Target	62.39 (Actual)	Yes
	FY2023-24	Minimum 80 %	70.78 (Actual)	No
	FY2024-25	Minimum 80 %	83.83 (Planned)	Yes
	FY2025-26	Minimum 80 %	155.85 (Planned)	Yes
Second	FY2026-27	Minimum 80 %	80.0 (Planned)	Yes
	FY2027-28	Minimum 80 %	80.0 (Planned)	Yes
	FY2028-29	Minimum 80 %	140 (Planned)	Yes

Note: Non-compliance of same shall attract Environmental Compensation @ Rs. 1000 per metric ton on unutilized ash

Proposed year wise Ash utilization plan for Stage-I and Stage-II is given in **Table 2.13.**

Table 2.13 : Proposed year wise Ash Utilization for Existing Stage-I & Proposed Stage-II

MoEF&CC Compliance Cycle	F. Year	Ash Generation (LMT)	Area Development (LMT)	Outside Bricks (in MT)	Own Brick plant (LMT)	Cement & Other Industries	Roads Construction (LMT)	Ash based Product / Others (LMT)	Mines Filling (LMT)	Total Ash Utilized (LMT)	Ash Utilization (%)
First	**Operation from existing 2x660 MW(St-1)**										
	FY 22-23	15.73	0.04	0.00	0.00	8.34	1.43	0.00	0.00	9.82	62.39%
	FY 23-24	17.85	0	0	0	10.88	1.76	0	0	12.63	70.78%
	FY 24-25	19.05	0	0.4	0.1	8.17	7.24	0	0	15.91	83.83%
	FY 25-26	25.55	0	4.04	0	16.35	19.43	0	0	39.82	155.85%
Second	FY 26-27	25.55	0	3.07	0.2	13.08	4.09	0	0	20.44	80.00%
	FY 27-28	25.55	0	3.07	0.2	13.08	4.09	0	0	20.44	80.00%
	FY 28-29	25.55	0	3.888	0.2	16.352	15.33	0	0	35.77	140.00%
Third	**With Commissioning of St-2 1st Unit & Operation from 2x660 MW(St-1) + 1x800 (St-2)**										
	FY 29-30	25.55	0	3.07	0.2	13.08	4.09	0	0	20.44	80.00%
	With Commissioning of St-2 2nd and 3rd Units & Operation from 2x800 MW(St-1) + 3x800(St-2)										

MoEF&CC Compliance Cycle	F. Year	Ash Generation (LMT)	Area Development (LMT)	Outside Bricks (in MT)	Own Brick plant (LMT)	Cement & Other Industries	Roads Construction (LMT)	Ash based Product / Others (LMT)	Mines Filling (LMT)	Total Ash Utilized (LMT)	Ash Utilization (%)
	FY 30-31	41.04	0	5.052	0.2	21.008	6.57	0	0	32.83	80.00%
	FY 31-32	72.02	0	6.052	0.2	31.008	48.07	0	0	85.33	118.48%
Fourth	FY 32-33	72.02	0.04	6.052	0.4	31.008	19.156	0.9	0	57.556	79.92%
	FY 33-34	72.02	0.04	6.052	0.4	31.008	19.156	0.9	0	57.556	79.92%
	FY 34-35	72.02	0.04	6.052	0.4	31.008	62.098	1.35	0	100.948	140.17%

Source: MUNPL

- Above Ash Generation is calculated at 85% PLF and with Commissioning of St-II 800 MW Units in FY 2029-30 and FY 2030-31.
- The above data is tentative only and the actual ash generation as well as utilization, shall depend upon a number of factors such as PLF, ash content of coal, demand of ash, etc
- At present details and data with respect to number of HCSD pumps, number of HCSD silos number and capacity of external silos, rail route and ash brick plant are not available.
- It is assumed Dry Fly Ash (DFA) transport through rail route and 01 brick plant will be provided with Stage II.

2.12. Limestone & Gypsum Handling System

2.12.1. Limestone Handling System

The transportation and handling of limestone to the power plant will be managed through both road transport by trucks and Indian railway wagons. Limestone delivered via rail will be unloaded at the wharf wall and stored in sheds. For limestone delivered by road, two Truck Tipplers with a minimum capacity of 40 tons (Gross vehicle weight 60 tons minimum) will be used to discharge limestone onto Box Feeders, Surface Feeders, or Truck Unloading Hoppers.

To facilitate unloading from trucks, two nos. of Box Feeders/Bulk-material Receiving Units/Surface Feeders will be installed. Limestone will then be conveyed to the Crusher House using a double stream conveyor with a capacity of 150 TPH for crushing and further conveying. One (01) nos. of bucket elevator will transport the crushed limestone to storage silos, of which there will be two covered silos provided.

These storage silos will have the capacity to store limestone equivalent to the consumption of at least 7 days at the Design Point (considering the generation of all units). Belt feeders with regulating mechanisms will be installed below the main storage silos to control the feed of crushed limestone. A single stream conveyor will further transfer limestone to day storage silos. For the limestone crusher house, storage silos, conveyors, and other associated equipment, a comprehensive infrastructure will be established, including dry type dust extraction systems, ventilation systems, drinking water systems, drainage systems, and motorized travelling tripper/flow diverter ploughs on feeding conveyors.

A limestone sampling unit will be provided along with sump pumps in limestone storage silos and ventilation equipment for switchgear rooms, MCC rooms, battery rooms, and toilets. Additionally, conventional enclosure type passenger cum goods elevators, suspended magnets, metal detectors, and electronic belt scales for continuous weighing will be installed.

The plant will feature a service water and potable water system, as well as dust extraction systems for the entire limestone handling plant.

2.12.2. Gypsum Handling System

The gypsum handling system entails conveying gypsum from the vacuum belt filter to a storage shed using double stream conveyors and transfer points/junction towers. A flap gate beneath the filter facilitates gypsum feeding into the conveyor. A covered storage shed, capable of storing a minimum of 7 days' gypsum generation, will be constructed, featuring a 2.0 m wide corridor for equipment movement and emergency access. The shed will enable gypsum transfer to trucks through a telescopic chute system within the shed. Dust suppression measures with water fogging, service water, and potable water systems will be installed to manage dust emissions. Motorized travelling trippers or flow diverters will facilitate gypsum distribution within the shed. Truck bays will allow for efficient loading, with entry and exit points designed for smooth truck traffic flow. Additionally, exhaust fans will maintain optimal conditions inside the storage shed. The entire gypsum handling system will be centrally controlled using PLC-based controls,

ensuring efficient operation and auxiliary facilities such as equipment handling arrangements and service water systems will be integrated as needed.

2.13. Fire Detection &Protection System

A comprehensive fire detection and protection system is envisaged for the complete power station. This system shall generally be as per the recommendations of TAC (India)/ IS: 3034 & NFPA- 850/equivalent standard. The following protection systems are envisaged:

i. **Fire water pumping system** as provided in Stage-I (existing) shall be used for fire water requirement of Stage-II also. The system shall cater to the both Hydrant & Spray water requirement of Stage-II. However, hydrant booster pumps & drives, spray booster pumps & drives, Batteries and Battery Chargers for the diesel engines drives, required instruments, controls and panels are envisaged. The water for foam system shall be tapped off from the hydrant system network.

ii. **Hydrant system** for complete power plant covering main plant building, boiler area, turbine and its auxiliaries, coal handling plant, biomass handling plant, all pump houses and miscellaneous buildings of the plant. The system shall be complete with piping, valves, instrumentation, hoses, nozzles, hose boxes/stations etc.

iii. **Automatic high velocity water spray system** for all transformers located in transformer yard and transformers having oil capacity of 2000 liters and above located within the boundary limits of plant, Main and unit turbine oil tanks and purifier, oil canal, generator seal oil system, lube oil system for turbine driven boiler feed pumps/lube oil console, boiler burner fronts, fuel oil station rack in boiler, etc. This system shall consist of QB detectors, deluge valves, projectors, valves, piping & instrumentation.

iv. **Automatic Nitrogen Injection system** shall be provided for Transformers 10 MVA and above rating or in case of oil filled transformers with oil capacity of more than 2000 liters located outside plant boundary.

v. **Automatic medium velocity water spray system** for cable vaults and cable galleries of main plant, switchyard control room and ESP control room, FGD building, all cable trestles of main plant area (from transformer yard to chimney) consisting of smoke detectors (as applicable), linear heat sensing cable detectors, deluge valves, isolation valves, piping, instrumentation, etc.

vi. **Automatic medium velocity water spray system** for coal conveyors, biomass conveyors, crusher house, transfer points, Stacker reclaimers consisting of QB detectors, linear heat sensing cables, deluge valves, nozzles, piping, instrumentation, etc.

vii. **Automatic medium velocity water spray system** for un-insulated fuel oil tanks storing fuel oil having flash point 65 degree Celsius and below consisting of QB detectors, deluge valves, nozzles, piping, instrumentation, etc.

viii. **Fixed foam system of bladder tank foam** proportioning tank type, consisting of skid mounted foam bladder tank assembly, foam makers, discharge outlets, interconnection piping, valves, fitting and instrumentation etc., shall be provided for fuel oil tanks.

ix. **Gaseous** based **fire detection and protection system** for biomass silos

x. For protection of Central control room, Control equipment room, Programmer room, UPS room, etc. Inert Gas extinguishing system as per NFPA-2001 would be opted.

xi. **Fire detection and alarm system**- Microprocessor based analogue, addressable type fire detection and alarm system shall be provided to cover the complete power plant. The following types of fire detection shall be employed.
   1. Multi sensor type smoke detection system
   2. Linear heat sensing cable detector.
   3. Quartzoid bulb heat detection system.
   4. Infra-red type heat detectors for all coal conveyors

xii. Portable and mobile extinguishers, such as pressurized water type, carbon-dioxide type, foam type, dry chemical powder type, shall be provided at strategic locations throughout the plant.

xiii. Complete instrumentation and control system for the entire fire detection and protection system shall be provided for safe operation of the complete system.

xiv. **Control System for Fire Detection & Protection**
Fire detection & protection control system shall consist of PLC based control system, Analogue addressable fire alarm system consisting of fire alarm panels, repeater panel, various types of fire detectors, linear heat sensing cable, infra-red detector, control cabling, centralized monitoring station, etc.

2.14. Pollution Control Measures

Coal combustion in boiler generates particulate matter, sulphur dioxide (SO_2) and oxides of nitrogen (NOx) as main air pollutants. The various environmental measures, pollution control systems and mitigative measures proposed to be adopted are as follows:

2.14.1. Air Emission control & Management

The Stage-II units (3x800 MW) will be designed to comply with the emission standards mandated by the Ministry of Environment, Forest and Climate Change (MoEF&CC) as specified in the notifications dated 07.12.2015 and its subsequent amendment on 26.06.2018. The design will incorporate the necessary systems to achieve these standards.

ESP (Electrostatic Precipitator): To control the ash particles emission, high efficiency ESPs would be installed that would limit the particulate emission to 30 mg/Nm^3. A chimney of suitable height, as per MoEF&CC Notification dated 28.06.2018, will be constructed to facilitate wider emissions, equipped with personal access for regular stack emission monitoring. One Twin Flue Chimney (220 m height) and one Single Flue Chimney (150 m height) is envisaged.

Flue Gas Desulphurization (FGD): A wet limestone-based Flue Gas Desulphurization (FGD) system will be installed behind ESP, at the tail end of the steam generator downstream in which SO_2 gas shall be captured in limestone slurry (to limit SO_2 emission below 100 mg/Nm^3) to produce gypsum. The scrubber will be provided with a bypass system. The FGD System shall also include auxiliary equipment and systems like mills, cyclones, vacuum filters, belt conveyors, pumps, storage vessels, piping and fittings, etc.

NO_x Control System: NO_x emission from the steam generator shall be controlled by low NO_x Burners/System and combustion staging.

Chimney: To enhance the dispersion of emissions over a broader area, the project proposes the installation of One Twin Flue Chimney (220 m height) and one Single Flue Chimney (150 m height) is envisaged. These chimneys will be designed to include personal access points for routine monitoring of stack emissions. This setup aims to promote effective and efficient management of emissions by ensuring proper monitoring and dispersal of pollutants into the atmosphere

Fugitive Dust control: For the control of Fugitive dust emission in and around the coal handling plant, coal dust extraction and suppression systems would be provided. Dust Suppression System would be installed at all requisite points in CHP and coal stock yard and ash dykes.

2.14.2. Water pollution control & Management

Water Pollution Control System: An Effluent Management Scheme would be implemented to reduce the intake water requirement resulting in zero liquid discharge and would essentially include collection, treatment and recirculation/disposal of various effluents. The make-up water requirement for the Stage-II Project would be about 3000 m^3/Hr (approx. 30 cusecs). About 2056 m^3/Hr effluent shall be generated from the proposed project. The effluent shall be treated in Effluent Treatment Plant.

Adequate treatment facilities would be provided to all the waste streams emanating from the plant to control water pollution including physico-chemical and biological treatment for other effluents as well:

- The filter backwash water of PT plant shall be collected and recycled back to the respective System Clarifier.
- The sludge from the clarifiers of PT plant shall be collected in a sump/pit and shall be pumped to Bottom Ash Slurry tank for disposal to ash dyke.
- The waste effluents from neutralization of DM plant and Condensate Polishing Plant shall be collected in the respective neutralization pit and neutralized before Bottom Ash Slurry Tank before final disposal.
- ACW system blow-down will be reused in various plant systems; excess blow-down will undergo further treatment.
- Coal Settling System and Clarifier System for coal settling area shall be provided for removal of coal particles from coal handling plant waste. Decanted water shall be pumped back to the coal dust suppression system. To receive and treat excess storm water (considering rainstorm condition), Clarifier feed pumps, Reactor Clarifiers, Belt filter press, Clarified Water Transfer Pumps and required chemical storage and dosing system shall also be provided.
- Service water effluents will be treated in clarifiers and sent back for reuse; excess water will undergo further treatment
- A wastewater treatment plant will be provided for treating wastewater and reusing it in the plant
- The treated effluents conforming to the prescribed standards only shall be re-circulated and reused within the plant. Arrangements shall be made that plant effluents and storm water do not get mixed.

2.14.3. Solid & Hazardous Waste Management

Solid waste generated during construction will be managed as per Construction and Demolition Waste Management Rules, 2016.

Operation Phase:

Used oil, Empty/ contaminated drums and ETP Sludge will be generated and same shall be disposed as the Hazardous & Other Waste (Management and Transboundary Movement) Amendment Rules, 2022. From Stage-II Project, Ash and Gypsum will be the major solid waste generated. Details of the waste generated from the proposed Ash shall be generated due to combustion of coal. About 80% of the ash shall be generated as Fly Ash, while 20% of the ash shall be generated as Bottom Ash. The Ash Management Scheme would involve collection of fly ash and bottom ash through dewatering bins, supply of ash to entrepreneurs for utilization and safe disposal of unused ash (if any). MUNPL shall make maximum efforts to utilize ash for various purposes. Unused fly and bottom ash shall be disposed-off through HCSD system, in case of emergency. A blanket of water shall be maintained over the entire bottom ash pond to control fugitive dust emission.

Gypsum generated from the FGD (Flue Gas Desulphurisation) system shall be utilized/ disposed-off in an environmentally suitable manner.

Anticipated waste generation and their disposal methodology is mentioned in table below 2.14

Table 2.14 : Anticipated Waste and its Management

Name of the waste	Source	Qty (TPA)	Mode of disposal	Mode of Transport
Empty barrels/container / liners contaminated	Operation and Maintenance works (O&M works)	60	Sale/disposal to authorized recyclers / TSDF.	Road
Spent Ion exchange resin containing toxic metals	Water treatment	2	Sale/disposal to authorized recyclers / TSDF.	Road
Used or spent Oil	O&M works	100	Sale/disposal to authorized recyclers / TSDF.	Road
Asbestos	O&M works	0.1	Disposal through TSDF	Road
Waste residue containing oil	O&M works	10	Sale/disposal to authorized recyclers / TSDF.	Road
Insulation waste	(O&M works)	10	Disposal through TSDF	Road

Other Waste generated:

S. No	Type	Quantity After Expansion	Disposal Plan
1.	Fly Ash	3.024 MTPA	It shall be sent to all users as per list of avenues mentioned in MOEF&CC Notification
2.	Bottom Ash	0.756 MTPA	It shall be sent to all users as per list of avenues mentioned in MOEF&CC Notification
3.	Gypsum	4,34,250 TPA	MUNPL/ NTPC has an approved policy for management and sale of gypsum generated from its power projects. The policy includes the following options for 100% utilisation of gypsum ➢ Installation of POP/Gypsum Plaster Plant at NTPC Stations ➢ Sodic soil reclamation: as an initiative for community development ➢ Sale of Raw Gypsum on as where basis

2.14.4. Noise Pollution Control

The major noise generating sources are turbines, generators, compressors, pumps, fans, coal handling plant, etc. Acoustic enclosure shall be provided to control the noise level below 90 dB(A). Personal Protective Equipments (PPEs) shall be provided to the people working in high noise area.

2.15. Clean Development Mechanism (CDM)

Kyoto Protocol of United Nations Framework Convention on Climate Change (UNFCCC) has come into force from February 2005. Clean Development Mechanism (CDM) contained in Article 12 of the protocol allows governments or private entities in the industrialized countries to implement and / or purchase emission reduction from projects in developing countries and receive credit in the form of “Certified Emission Reductions” (CERs). With the completion of tenure for second commitment period on 31 December 2020, Kyoto Protocol/CDM is no more valid at present. Sustainable Development Mechanism (SDM) under article 6.4 or Bilateral/ Multilateral crediting mechanisms under article 6.2 provides an opportunity to earn revenue through the reduction of greenhouse gas emissions (GHG). The revenue will play an important role as it will further ameliorate the project IRR. Accordingly, SDM benefits under article 6.4 or Bilateral/ Multilateral crediting mechanisms under article 6.2 are proposed to be availed in this project to improve the Project IRR, whenever these will be operationalized.

Chapter 3. DESCRIPTION OF THE ENVIRONMENT

This Chapter describes the baseline environmental conditions around the project site for various environmental attributes, i.e., physical, biological, and socio-economic conditions, within the 10 Km radial zone of the proposed project site, which is termed as the study area. Topography, drainage, meteorology, air, noise, water, soil and land constitute the physical environment, whereas flora and fauna constitute the biological environment. Demographic details and occupational pattern in the study area constitute socio-economic environment.

3.1. Background and Salient Environmental Features of the Study Area

Generation of environmental baseline of a project area is an important phase of any Environmental Assessment process. Baseline data provide vital information on the existing environmental quality in which a development is planned. It is also useful for delineating environmental sensitive areas and for preparing an Environmental Sensitivity Map for contingency planning. In this study, the environmental characteristics of the project area (10 Km radial zone Study Area) are established through extensive literature search, field sampling/measurements, laboratory analysis, consultation and data interpretation.

3.2. Study Area and Period of Monitoring

As per the ToR prescribed by MoEF&CC for proposed project 10 Km radial zone area around the proposed site has been considered as the Study Area. Study Area map provided in **Figure 3.4.** Primary and Secondary data has been collected for Study Area of the proposed project. Secondary data from literature search were also obtained from the Govt. sources i.e. Meteorological Department, CPCB publication, Forest Department and other Govt. Sources. The baseline environmental data generation has been done for the period of 1st October 2023 to 31st December 2023. Baseline data for the period from January 2024 to June 2024 has been generated and is compiled in **Annexure-9.**

3.2.1. *Primary Data Collection: Monitoring Plan and Quality Assurance Procedures*

Primary baseline data has been collected as per the ToR prescribed by MoEF&CC. Baseline data has been generated during 1st October 2023 to 31st December 2023 for one complete season. The study period and methodology for primary data collection is summarized in **Table 3.1.**

Table 3.1 : Summary of Methodology for Primary/Secondary Data Collection

Parameters	No. of Sampling Stations	Frequency	Remark
Meteorology			

Parameters	No. of Sampling Stations	Frequency	Remark
Temperature, Humidity, Wind speed, Direction, storm, barometric pressure, Rainfall etc.	One Season Data	Hourly Data for Day & Night	Hourly Meteorological data was collected for one season.
Ambient Air Quality			
PM_{10}, $PM_{2.5}$, SO_2, NOx, O_3, CO, NH_3, (C_6H_6, Ba, P, As, Ni and Pb)	10 locations	Twice a Week	AAQ monitoring was carried out at 10 locations within the study area. 24 hours sampling at each location was carried out as per CPCB guidelines (CPCB Gazette notification dated 18.11.2009 on AAQ).
Noise Quality			
Noise profiling for 24 hrs	10 Locations	Once in season	Noise monitoring was conducted within the study area. For noise profiling 24 hrs monitoring were conducted using integrated sound level meter, as per CPCB guidelines.
Ground Water Quality			
pH, Temperature, Conductivity, Turbidity, TDS, Aluminium, Calcium, Chlorides, Copper, Fluoride, Free residual chlorine, Iron, Magnesium, Manganese, Nitrate, Phenolic compounds, Sulphate, Sulphide, Total Alkalinity, Total Hardness, Zinc, Cadmium, Cyanide, Lead, Mercury, Nickel, Total Arsenic, Total Chromium **Biological Parameter:** Total coliform (MPN/100 ml)	12 locations	Once in a season	Ground water sampling was conducted at 12 locations within study area (10 km area) as they will be impacted most if any pollution occurs due to project development. Samples were preserved, transported and analyzed for different parameters based on APHA/IS methods. Temp, conductivity and pH were measured at site itself.
Surface Water Quality			
pH, Temp., Conductivity, Turbidity, TSS, TDS, DO, BOD, COD, metals, oil & grease, Faecal, coliform and total	6 Locations	Once in a season	Surface water sampling was conducted at six locations within the study area. Samples were preserved and transported for analysis for different

Parameters	No. of Sampling Stations	Frequency	Remark
coliform etc. as per surface water criteria.			parameters based on APHA/IS methods.
Soil			
Texture, bulk density, pH, conductivity, cation exchange capacity, organic matter, Total N,P,K, and Heavy metals	10 Locations	Once in a season	Soil samples were collected at 10 locations and analyzed as per IARI Manual.
Ecology			
Flora & Fauna		Once in a season	Primary survey and Secondary sources
Socio-economics			
Demography & Socioeconomic	-	Once in a season	Primary survey/ Secondary sources

Standard methods and procedures have been strictly adhered to in the course of this study. QA/QC procedures were strictly followed which covers all aspects of the study, and includes sample collection, handling, laboratory analyses, data coding, statistical analyses, presentation and communication of results. All analysis was carried out in NABL/MoEF&CC accredited/recognized laboratory.

3.2.2. *Environmental Setting and Salient Environmental Features of the Project Area*

Proposed 3x800 MW Coal based thermal power plant of **M/s Meja Urja Nigam Private Limited (MUNPL),** is located near Villages- Kohdar, Mai Khurd and Patai Dandi, Tehsil: Meja, Prayagraj, Uttar Pradesh. The total plot area of site is 1295 Ha, out of which 535 Ha land is government land, 760 Ha is private land. An additional land of 114 Ha, shall be required for proposed ashpond and railway siding. No forest land is involved. Corner cordinates of the proposed site are presented in **Figure 3.1.**

Proposed site is well connected through the rail and road. Nearest rail station is Meja Road Railway Station on Prayagraj-Mughalsarai section of North Central Railway is about 14.23 km from the project site, NE. The site is in south-west of Prayagraj-Mirzapur Highway. National Highway-135 C is passing about 0.7 km, east of the site. The nearest commercial airport is Prayagraj Airport approximately at an aerial distance of 36.76 Km, NNW. Varanasi Airport is at a distance of about 95 Km, ENE and Lucknow (Chaudhary Charan Singh International Airport) is at a distance of about 207.94 Km. Site connectivity Map showing coordinates of the study area is presented in **Figure 3.2.**

Nearest settlement is Mai Khurd Village abutting the project site. Other villages located within 1 km area of the proposed site are Korhar (0.37 Km, NNE), Jhadiyahi (0.40 Km, WNW). Tons River is located at about 0.95 km, WNW of the project site. River Ganga is located at a distance of

about 23.24 Km, NNW from the project site. No National Park, wildlife sanctuary, biosphere reserve is present within the 10 Km area of the proposed site. Few reserved and protected forests are present in the study area. The locational environment features presented in **Table 3.2.** Location map provided in **Figure 3.3.** Topo map of 10 Km radius map is given in **Figure 3.4.** The Google satellite image of the 10 km area of the site is given in **Figure 3.5.**

Table 3.2 : Salient Environmental Features of Proposed Site

S. No	Parameter	Description
1.	Presence of Wildlife Sanctuary/National Park/Biosphere Reserves	None within 10 km study area.
2.	Reserved /Protected Forests (refer Figure 1.5)	• Badiha Reserved Forest (7.00 Km, SW) • Gadaria Reserved Forest (5.00 Km, SW) • Singhpur Khurd Reserved forest (0.90 Km, SW) • Salaiya Kalan Reserved Forest (Along Southern Boundary) • Salaiya Khurd Reserved Forest (Along Southern Boundary) • Kohdar Reserved Forest (Along Eastern Boundary) • Murpela Reserved Forest (2.70 Km, E) • East Chandhs Reserved Forest (8.00 Km, E) • Sukh Protected Forest (8.50 Km, E)
3.	Wetland of State and National Interest	None within study area
4.	Presence of Schedule-I Fauna	Peafowl, Jungle Cat, Porcupine, Black buck, Hyaena, Rat snake and Russel's Viper
5.	Critically Polluted Area	None within study area
6	Site connectivity	The site is connected to NH-135 C through NTPC Meja Road which passes close to the site. NH-135 C, 0.7 km, east
7	Nearest Rail Station	Meja Road Railway Station, 14.23 km, SE.
8	Nearest Airport	Prayagraj Airport – 36.76 km, NNW
	Nearest Habitat	Mai Khurd Village abutting the project site.
9	Archaeologically important places	None
10	Water Bodies	➢ Tons River (0.95 Km, WNW) ➢ River Ganga (23.24 Km, NNW)
11	Seismic zone	Seismic Zone-III (Moderate Risk Zone)
12	Physical Sensitive Receptors	School: Vijay Degree College, Salaiya, Meja, Prayagraj (0.68 Km, SSW) Hospitals: Ma Isaraja Devi Charitable Hospital, Sirihir, Meja, Prayagraj (3.05 Km, SSW)
13	Archaeological Monuments	None

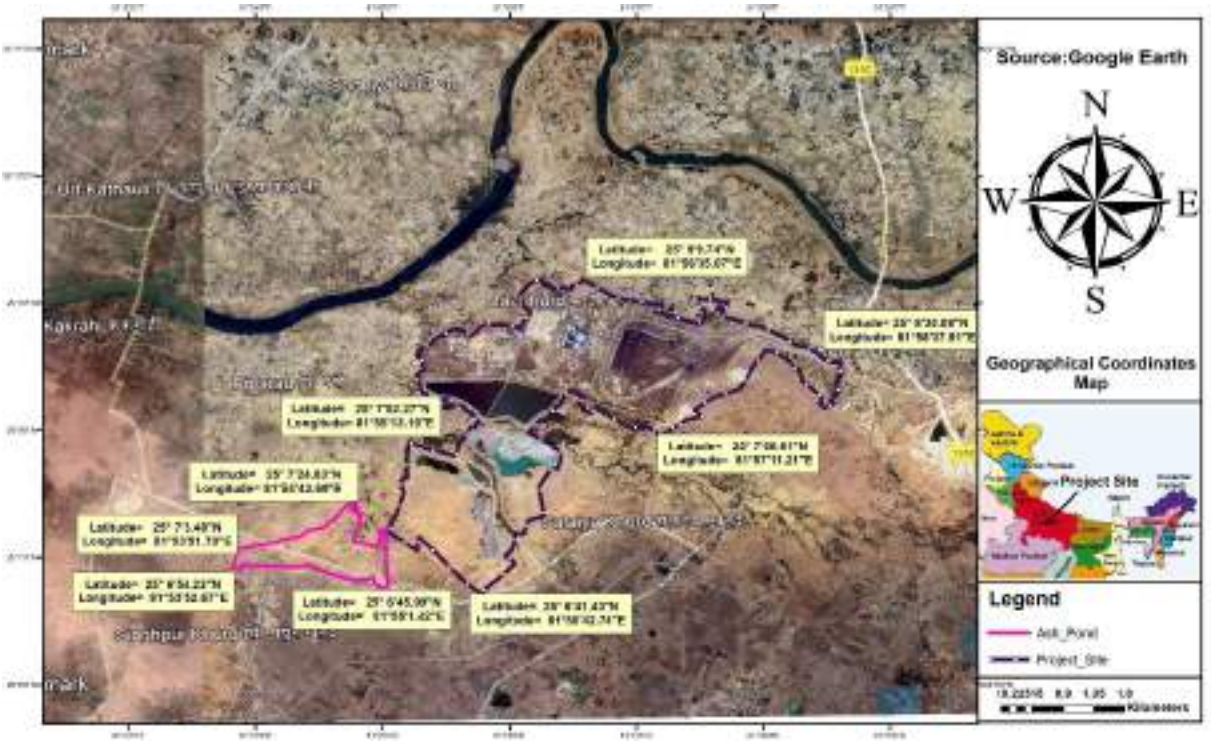


Figure 3.1 : Close View of the Site along with Corner Coordinates

Figure 3.2 : Road Connectivity Map

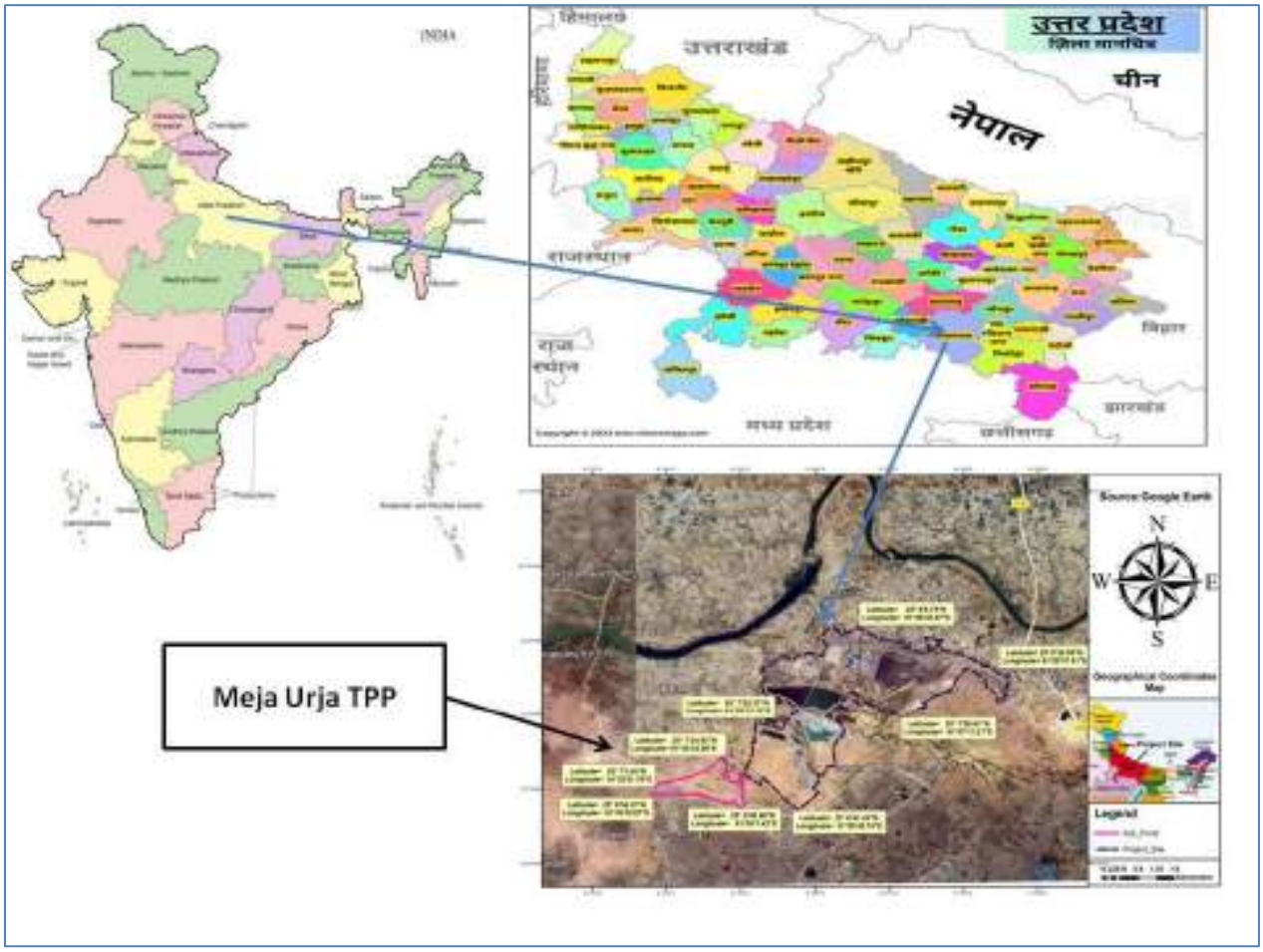


Figure 3.3 : Location Map

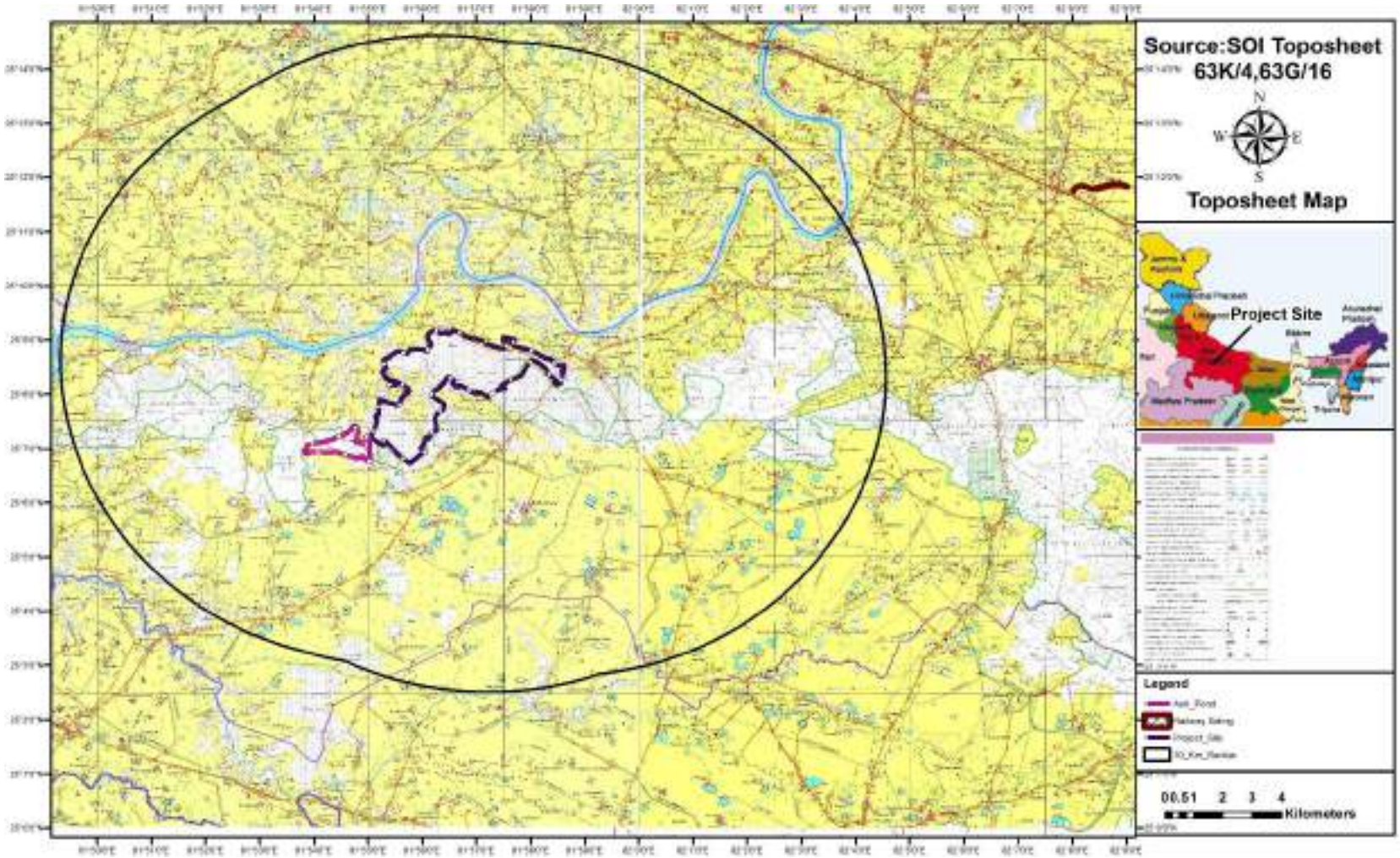


Figure 3.4 : Topo Map of Study Area

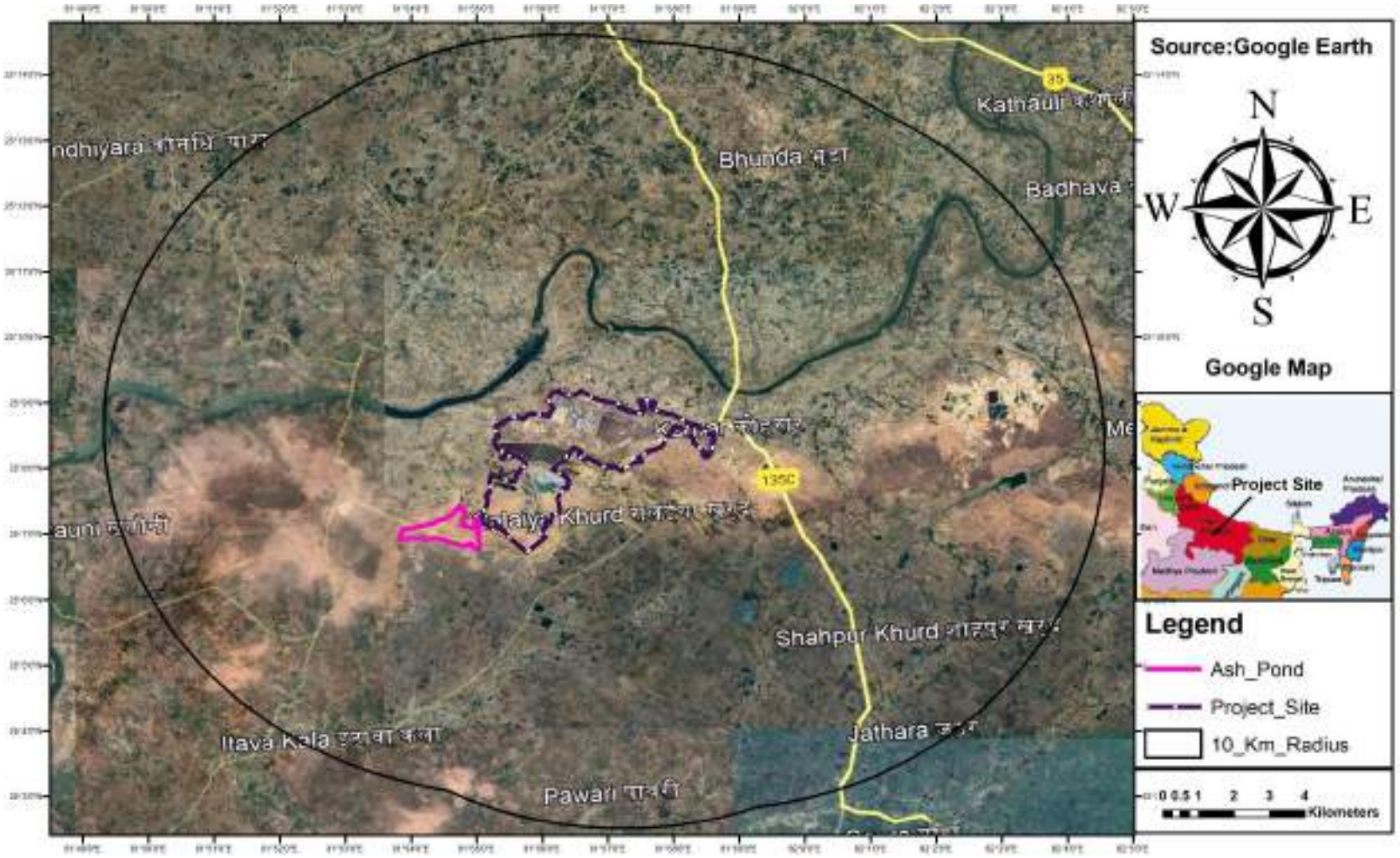


Figure 3.5 : Google Map of the study area

3.3. Physical Environment

3.3.1. *Topography*

The Uttar Pradesh State is broadly classified into two (categories) physiographic units- the Central Ganga Plain (85%) and Bundelkhand and Vindhyan Plateau (Southern part). The Ganga Plain is a vast, flat expanse of alluvium with a gentle south-easterly regional slope. The plain is further sub-divided into Terai (Northwest), Central Ganga Plain (Centre) and Marginal Alluvial Plain (South). The study area and Prayagraj district belongs to Central Ganga plain. The elevation ranges from 350 m amsl in the north-western parts to 60 m amsl in the extreme south-eastern part with slope ranging from 1m/km to 5m/km.Bundelkhand and Vindhyan Plateau, south of the Marginal Alluvial Plain is an undulating hilly terrain with a northerly regional slope. The elevation ranges from 550-130 m amsl in the western part and 650-100 m amsl in the eastern part, steeper as compared to northern Ganga plain.

Topography within Project Site: The topography of the proposed site is slightly undulating. The site is already developed, and expansion is to be done within the existing premises. The elevation of the project area including ash pond ranges between 81 to 128 amsl. The project site is sloping slightly towards west and southwest direction. The tons river[2] is located about 950 m away from the site. HFL of the Tons River is 87.18 m at Meja Road CWC Gauge near project site. (HFL at CWC Gauge station Meja Road CWC Gauge and Tons Aqueduct/Tons has already been established by the CWC department and HFL for the waterway was derived as per change in the ground profile of the river.) The elevation of the site towards river side is more than 90 amsl, hence no chance of flooding is anticipated. Certificate received from Chief Engineer (Water Resources) Irrigation and Water Resources Department, Govt of UP, regarding HFL level of River Tons dt.10.01.2025 has been received and attached as **Annexure-26**. Digital elevation map of project site is presented in **Figure 3.6.**

Topography of Site and Surrounding 10 Km Area: The topography of the project site and the surrounding 10 km radial zone is undulating. The elevation of Study area ranging between 66 to 148 amsl. The study area is sloping towards south to north direction. Digital Elevation Map (DEM) of study area is presented in **Figure 3.7.**

[2] FINAL FEASIBILITY REPORT ON DETAILED HYDROGRAPHIC SURVEY TONS RIVER by IWAI

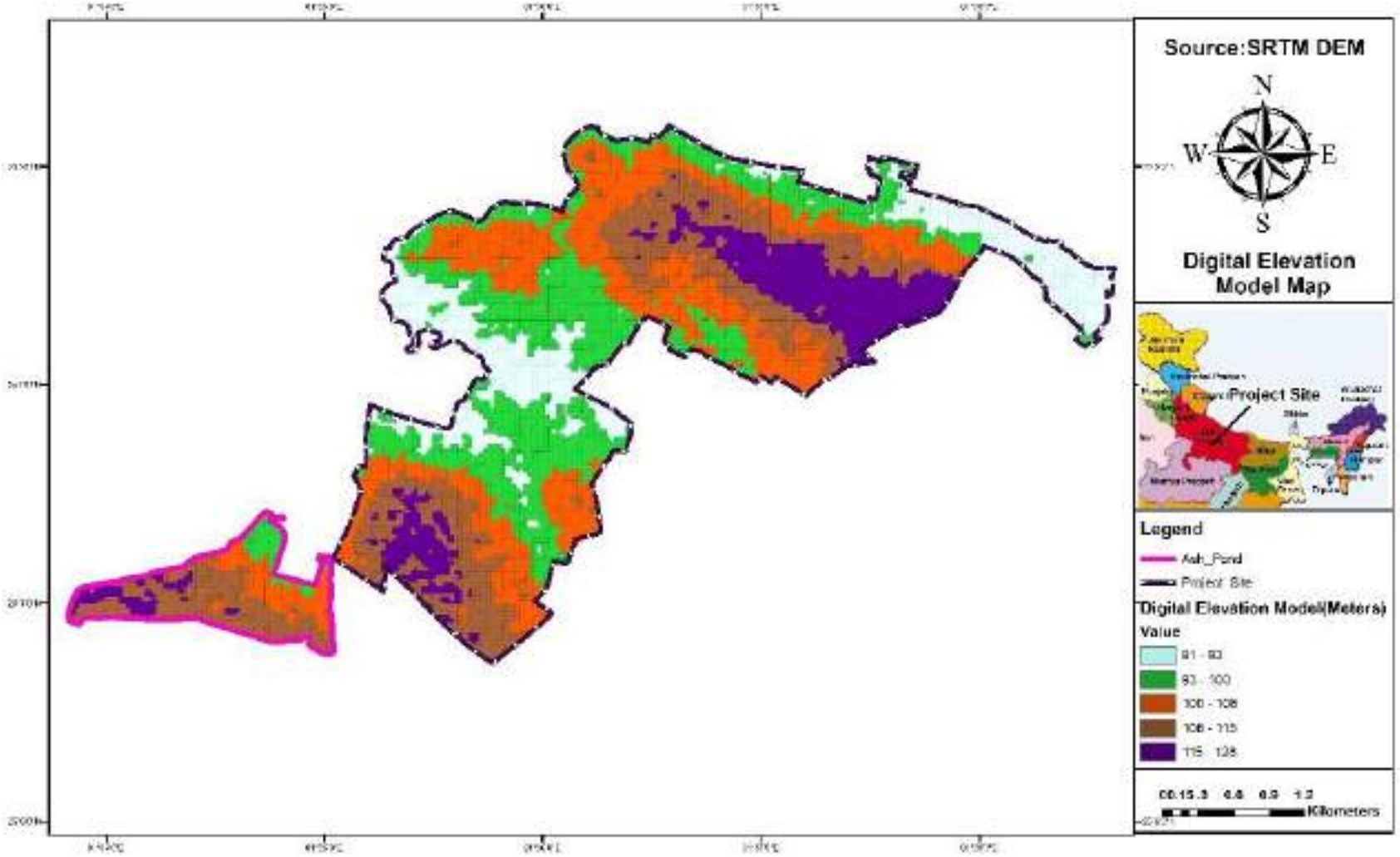


Figure 3.6 : DEM of Project Site

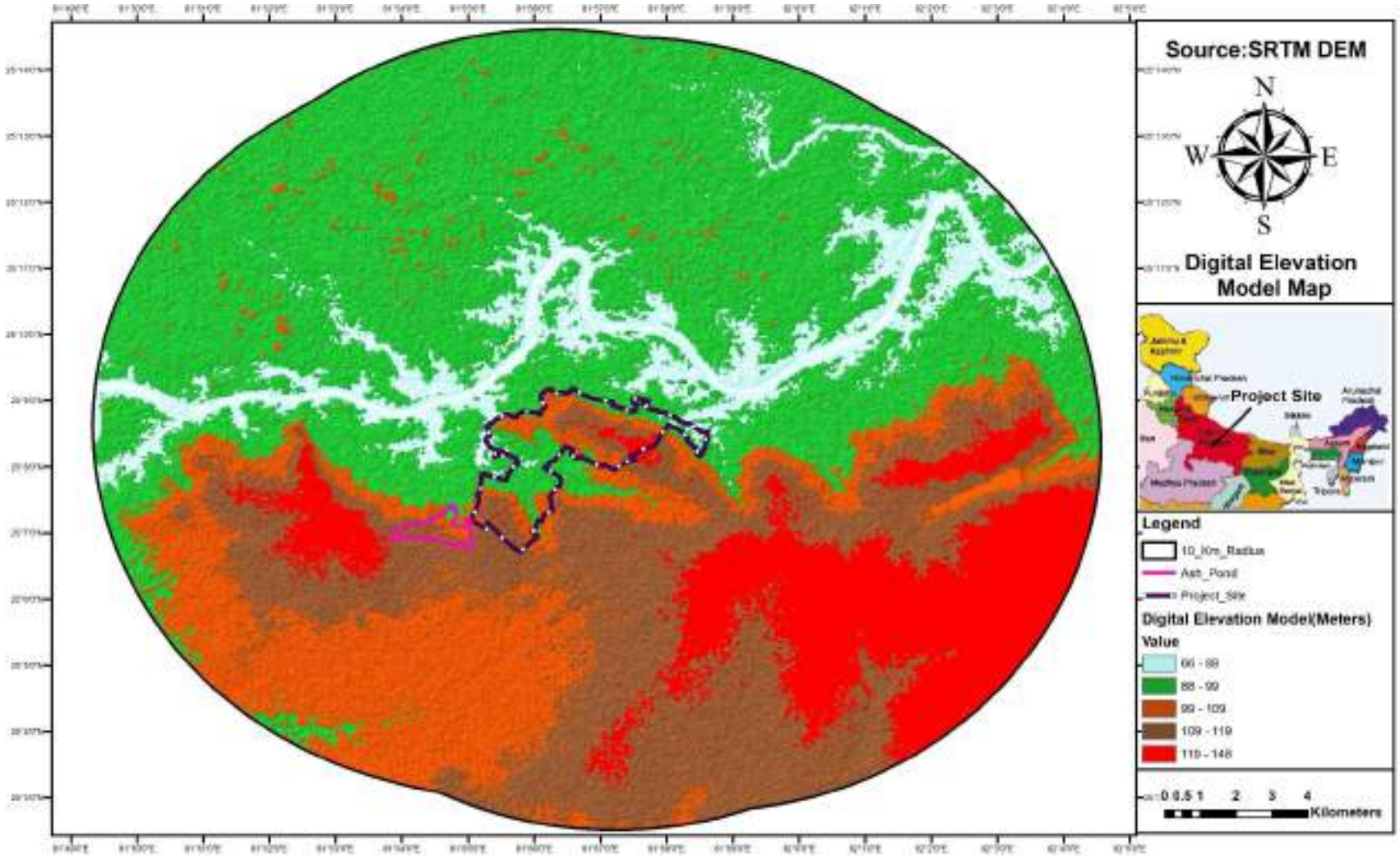


Figure 3.7 : DEM of Study Area

3.3.2. *Drainage*

Prayagraj district falls in Ganga basin and Yamuna Basin. The Northern half of the Prayag Raj district occupies part of Ganga basin and Sothern part of the district occupies the part of Yamuna and Tons Sub- basin. The district belongs to Ganga Drainage system. The important tributaries of the Ganga are Yamuna and Tons.

The study area falls in southern part of the district and occupies the part of Yamuna and Tons basin. Yamuna has more constant channel and steeper banks. The drainage pattern of the study area is mainly controlled by the Tons River and its tributaries. The drainage pattern of the study area is mainly dendritic to sub dendritic type. There is no stream/ nalla is passing through the project site. Drainage map of the study area is presented in **Figure 3.8.**

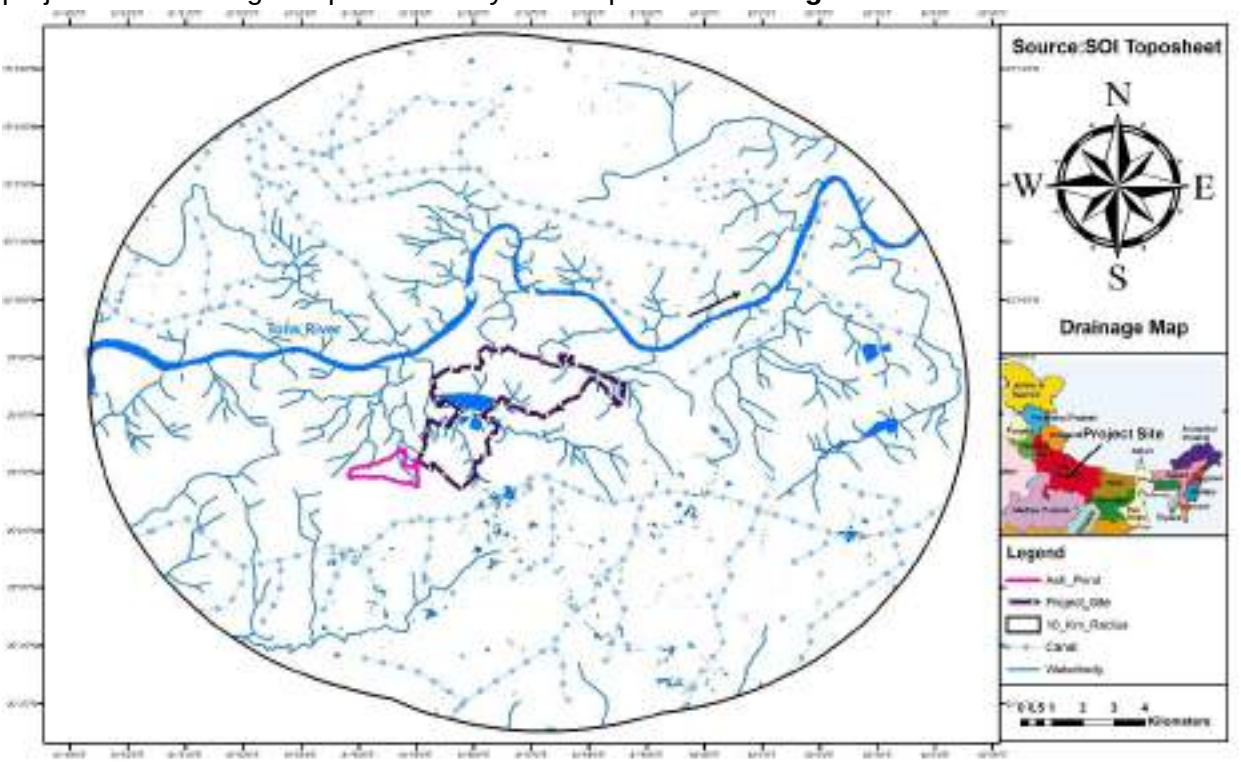


Figure 3.8 : Drainage Map of the Study Area

3.3.3. *Hydrogeology of 10 km study area (Findings)*

Detailed hydrogeological study of the project site and surrounding 10 Km study was conducted by National Institute of Hydrology (NIH), Roorkee, Uttarakhand. Detailed report is attached as **Annexure-17.** The summery of the report is as below:

The study area is characterized by Active Flood Plains, Older Alluvial Plain and Rocky Surface (Denudational hills). The active flood plain is quite localized and confined only to the river system, whereas the older alluvial plain is characterized by depositional and erosional terraces found in patches along the active plain. The denudational hills found prominent in trans Yamuna area formed mainly of quartzite and the core area of the Meja Power Plant is situated on the denudational hills. The MUNPL area is occupying part of Ganga basin and another part of Tons

Sub- basin. The seasonal rivers as well as tributaries are ephemeral and flow only in response to heavy precipitation.

The district represents a complex geology with the formation belonging to Quaternary (Alluvium – Sand, silt, clay and Kankar, Laterite.) period covering major part in the northern side of the district overlying the Vindhyan formations (Sand stone and shale Kaimur sandstone and Bijaigarh Shale) in the southern plateau. The oldest formations exposed are Bijaigarh Shale in the edge of the district around Hanumangunj in Koraon block. Further to the north the sandstone and quartzites, representing the uppermost part of the Kaimur series, are seen as isolated part of the district covering the blocks of Meja,Manda, Koraon and Shankargarh, The Vindhyans forms the floor of the younger sediments in the Cis-Yamuna area. The Laterite normally overlies Vindhyans at certain places. It is reddish brown to chocolate in color, highly ferruginous, and perforated mass. Alluvium found in the whole of Trans-Ganga, Doab and Part of Trans – Yauna tract of Quaternary age. The alluvium detritus of Vindhyan is found at some places in the southern part of the Doab. In Trans – Yamuna tract, The Vindhyan detritus merges with the Yamuna sand and silt. The thickness of the alluvial sediments gradually increases in the north and maximum thickness is encountered within the flood plain area of river Ganga and Yamuna. Greater thickness is encountered within the Trans – Ganga area where it exceeds 300 meters followed by doab region where it is less than 250 meters and ultimately less than 50 meters in the Trans-Yamuna region. The alluvial sediments essentially composed sands of various grades, clay and silts within the unconsolidated granular mass assemblage of nodular concretions of Calcium Carbonate have been recorded at different depths (CGWB, 2019).

Groundwater occurs in alluvium and in the weathered and joint sandstones in areas which are underlain by the hard rocks. Two broad hydrogeological units, namely, unconsolidated (Alluvium) and consolidated (hard rock) are the major components. The Alluvial formations occur in the Trans-Ganga and Doab region. Occurrence of consolidated formations is restricted primarily to Trans Yamuna tract. In the study area, the thickness of alluvium is more than 300 m with the discharge rates of 2000-3000 lpm.

In the study area wells and tube wells are the main ground water abstraction structures. Ground water is being developed in the area by medium to deep tube wells, dug wells, dug-cum bored wells. Based on 3 exploratory wells data in the area CGWB observed yield at Pipraon village was about 770 lpm (good to excellent on groundwater prospective) whereas yield of 107 lpm encountered at Saliya Khurd village belongs to very poor prospective area.

Depth to water level ranges from 2.4 to 8.6 mbgl, during the survey period in September 2023. In Monsoon 23-24, it was observed that water levels are higher which are going down by about 5-10 m down in the pre-monsoon period.

Analysis of long series daily rainfall data of 36 years (1985-2021) of the study area showed that annual rainfall varied from year to year ranging between 379. mm to 1300 mm with an average of 858 mm. About 921 mm (89.07 % of the annual rainfall) is received during the monsoon months, June through September. Probability analysis of the annual rainfall data carried out at various dependability levels showed that the quantity of rainfall at 20%, 50%, and 90% probability of exceedance is 370, 250, and 130 mm, respectively.

In the pump test, Thesis's Time-drawdown curve matching method show Transmissivity value of the piezometer around 0.40 m^2/day, whereas Theis's recovery method the Transmissivity of the aquifer is coming approx. to 0.37 m^2/day. Indicating very low value of transmissivity and that can result to low yield.

The bore hole drilling data reveals that the lithology of the region is basically, Sandstone of various grade and composition. The water bearing zone in the area is comprises of fractured sandstone basically between 200-240, 260-280 ft bgl.

Ambient groundwater and surface water from various locations of the buffer zone have been analysed based on the samples collected from the field. The sampling locations were widespread in and around the study area. In general, mostly the water quality parameters were found within the permissible limits and some exceeding the limits.

In monsoon 2022, iron in 60% of the groundwater samples and 20% of surface water samples are found within the acceptable and permissible limits, respectively. There is no relaxation for the permissible limit. Zinc is found within the acceptable limits for all locations. For copper, 97% samples are found within acceptable limits and all samples are found within permissible limits.

No impact of MUNPL effluents is found on the surface and ground water regime because no effluents are discharged out by the MUNPL and the effluents from the ash dyke also do not indicate any harmful parameter.

3.3.4. *Geology/Hydrogeology of Prayagraj and study area*

The Prayag Raj district represents a complex geology. The geological formation of the district belongs to Ganga alluvium of Quaternary age. The larger part of the district directly overlies the alluviums. The thickness of the alluvial sediments gradually increases in the north and maximum thickness is encountered within the flood plain area of river Ganga and Yamuna. The southern plateau area constitutes the upper Vindhyan sediments whereas the Quaternary covers the northern part of the district. The geological sequence of the district is s below:

S. No	Age	Group	Sub-group
1	Quaternary	Alluvium	Sand, silt, clay and Kankar, Laterite.
2	Pre Cambrian	Vindhyan sediments	Sandstone and shale (Kaimur sandstone and Bijaigarh Shale)

Geologically the study area belongs to Vindhyan sediments comprised of Sandstone and shale (Kaimur sandstone and Bijaigarh Shale). This is also called hard rock area. The Ground water in the widely covered Vindhyan Plateau region primarily occurs under unconfined condition within the secondary porosity of the formation. However, exploration data indicates that Kaimur sandstone found at depths does have enough potentiality. These sandstones after leaching of cementing material get disintegrated and reduce to silica sand which are loose and act as promising repository of ground water. Below the sandstone particularly in the western part of the plateau region shales have been encountered which possess reasonable development of secondary porosity and projects moderate prospect of occurrence of ground water.

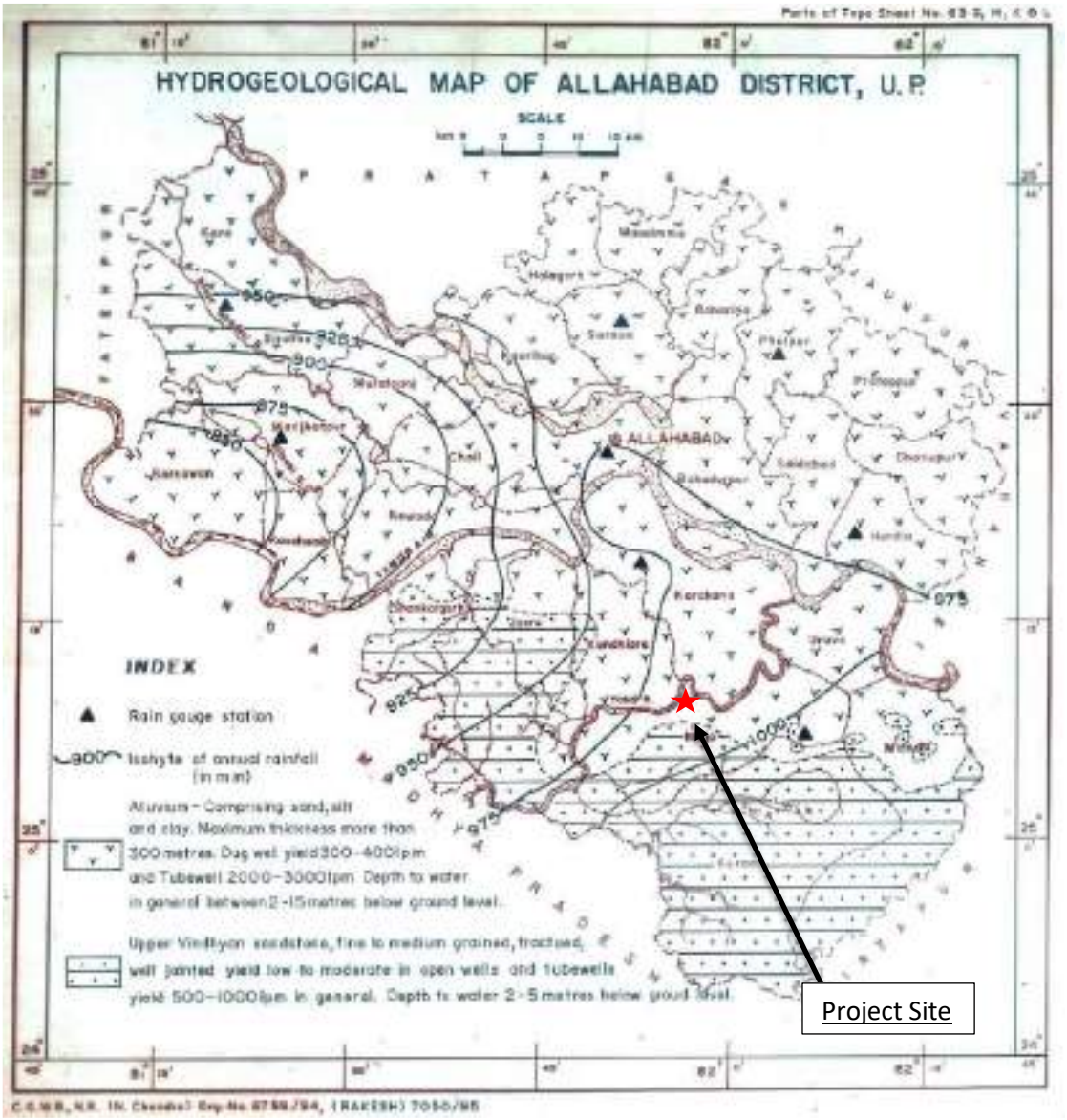


Figure 3.9 : Hydrogeological Map of Prayagraj District

(Source: Aquifer Mapping And Management of Ground Water Resources of Prayagraj by CGWB)

3.3.5. *Mineral Map of the study area*

There is no minerals reported at the project site. The mineral map of the study area is presented in **Figure 3.10.**

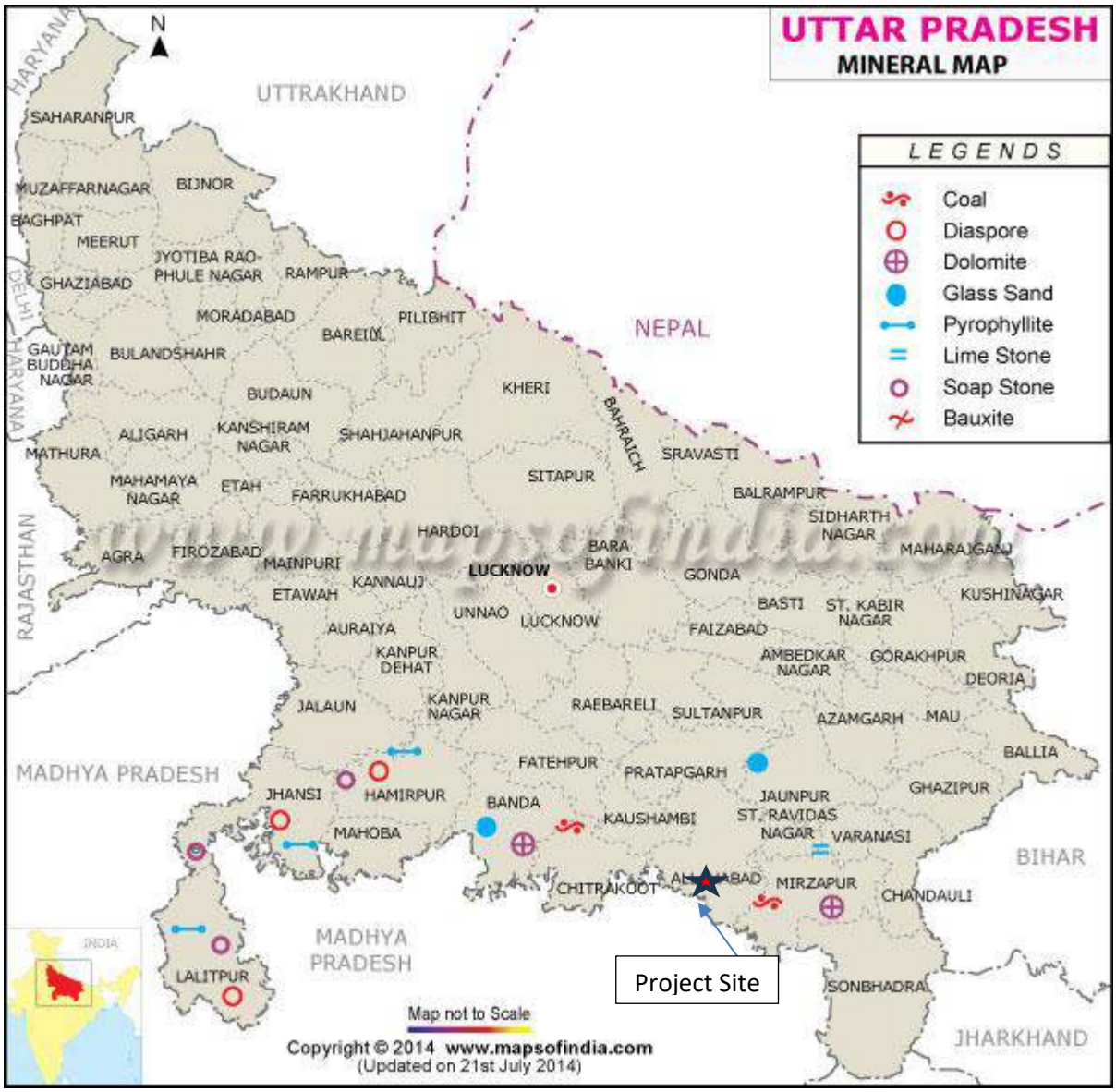


Figure 3.10 : Mineral Map of Uttar Pradesh

3.3.6. *Depth to Ground Water Table:*

Study area falls in Meja block of Pyrayagraj district. With respect to depth of ground water druing pre-monsoon the depth to ground water table in study area varying between 5 to 10 mbgl. Similarly, during post monsoon season the depth to ground water table in study area 2 to 5 mbgl. During the study period the ground water table were checked at few locations the water table were observed is found between 7 to 14 m bgl. The depth to ground water level map of the district of pre-monsoon and winter season presented in **Figure 3.11** and **3.12**.

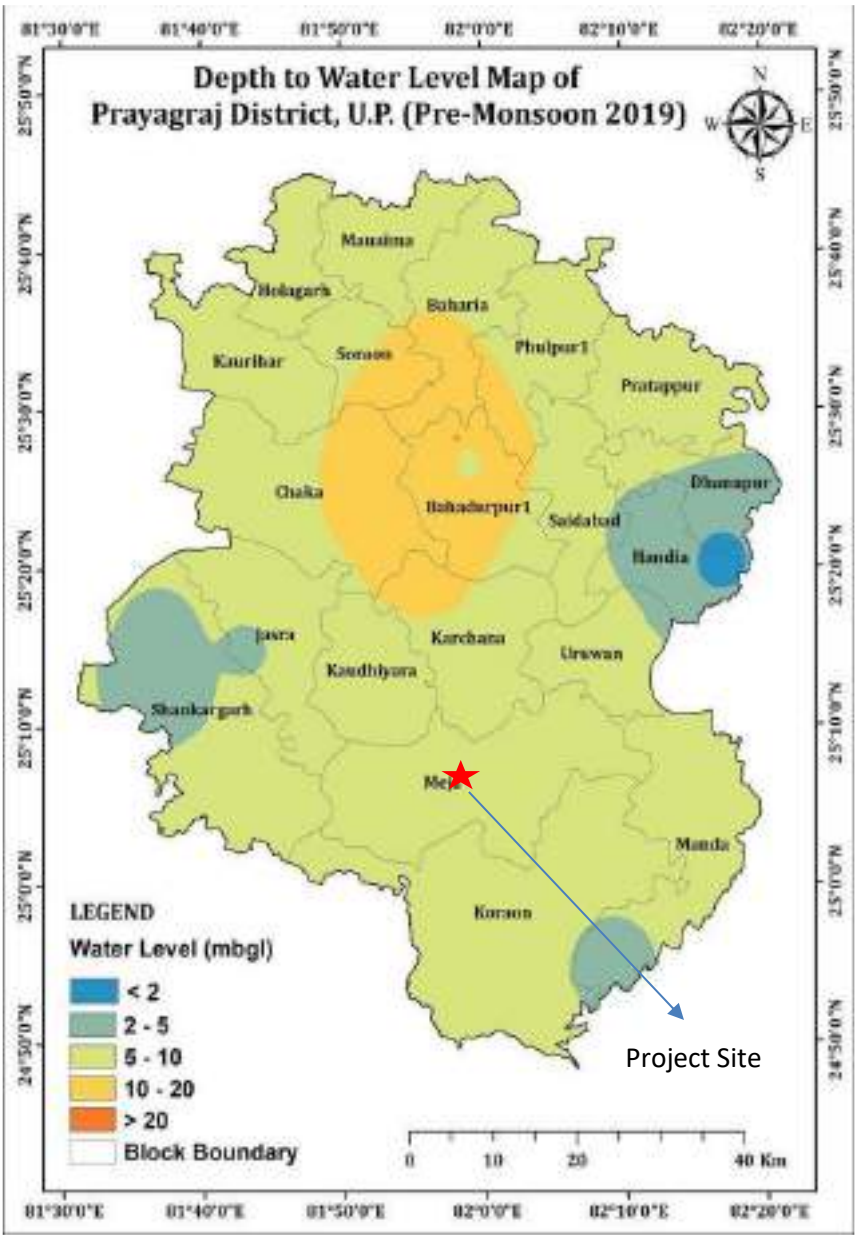


Figure 3.11 : Depth to ground water in Pre-monsoon season (2019)

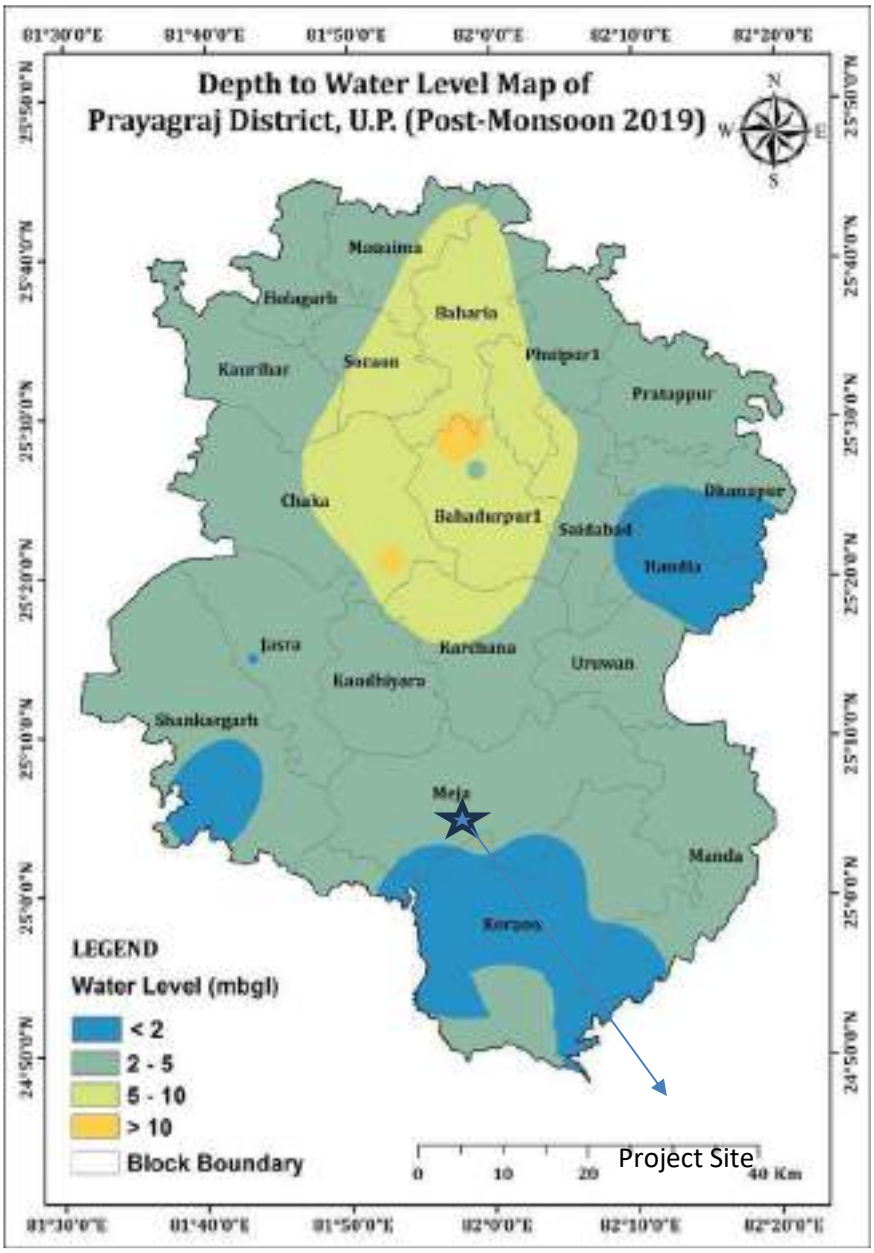


Figure 3.12 : Depth to ground water in post-monsoon season (2019)

3.3.7. *Ground Water Resources*

The study area falls in Meja block of Prayagraj District. The stage of ground water development in Meja block block is 51.25% and is in safe category. The ground water potential of the Meja block is presented in **Table 3.3.** dynamic ground water resources of the district is presented in **Figure 3.13**.

Table 3.3 : Groundwater Resources Potential of the Prayagraj District

S. No	Assessment Unit Name	Annual GW Allocation for for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Category
1	Bahadurpur	962.23	1177.13	84.10	Semi- critical
2	Baharia	790.97	105.38	97.75	critical
3	Chaka	591.99	283.88	93.29	critical
4	Dhanupur	691.66	802.3	85.78	Semi- critical
5	Handia	712.28	1428.95	67.46	safe
6	Holagarh	518.76	1291.77	77.86	Semi- critical
7	Jasra	513.5	2243.46	69.69	safe
8	Karchana	679.03	2659.09	65.63	safe
9	Kaudhiyara	514.57	2642.18	60.22	safe
10	Kaurihar	1067.83	2780.7	66.28	safe
11	Koraon	685.68	3973.23	57.79	safe
12	Manda	634.96	1743.76	64.31	safe
13	Mauaima	607.23	931.95	81.83	Semi- critical
14	**Meja**	**775.07**	**3580.18**	**51.25**	**Safe**
15	Phulpur	631.63	2077.97	66.75	safe

(Source: Aquifer Mapping And Management of Ground Water Resources of Prayagraj by CGWB)

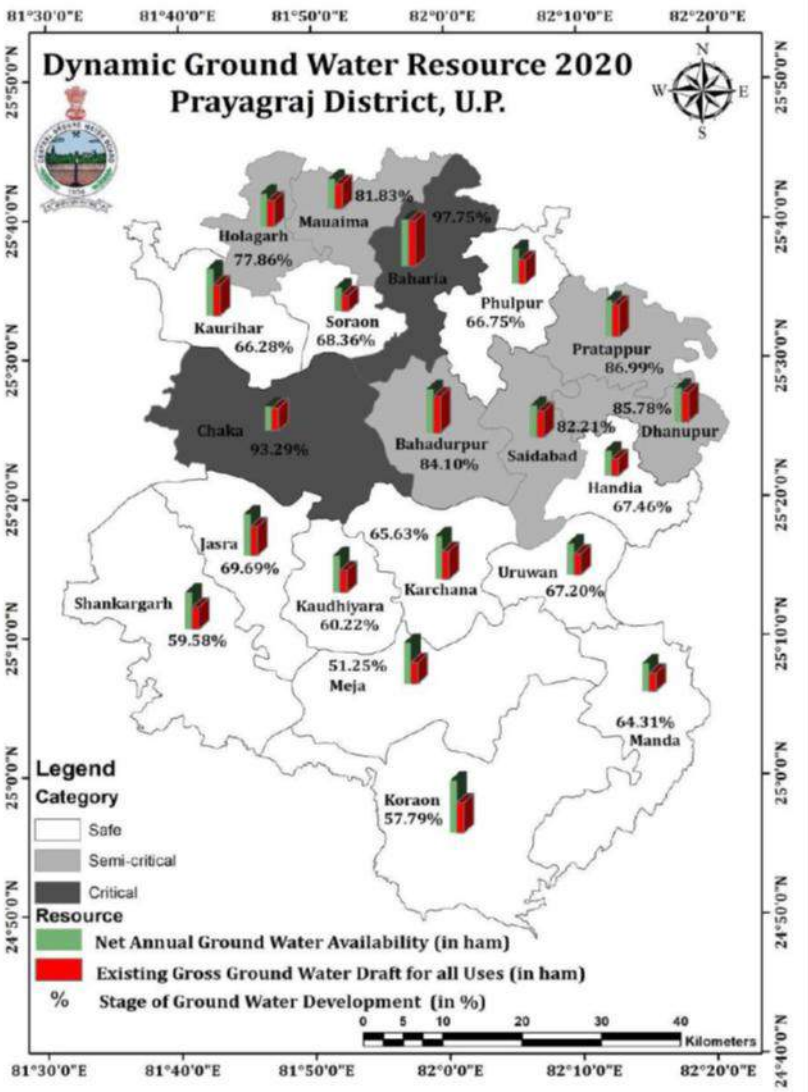


Figure 3.13 : Ground water resources of Prayagraj district

3.3.8. *Seismicity of the Study Area*

Earthquake is a natural disaster so necessary safety measures may be adopted considering the vulnerability to avoid enhanced risk. According to Vulnerability Atlas of India, Third Edition 2019, the state of Uttar Pradesh falls in a region of low damage risk zone to very high damage risk zone. The Proposed Power Plant site falls under the Seismic Zone III (MSK VII) as defined in seismic zoning classification system, i.e. moderate damage risk zone with MSK intensity VII. Seismic m ap showing location of the project site is presented in **Figure 3.14.**

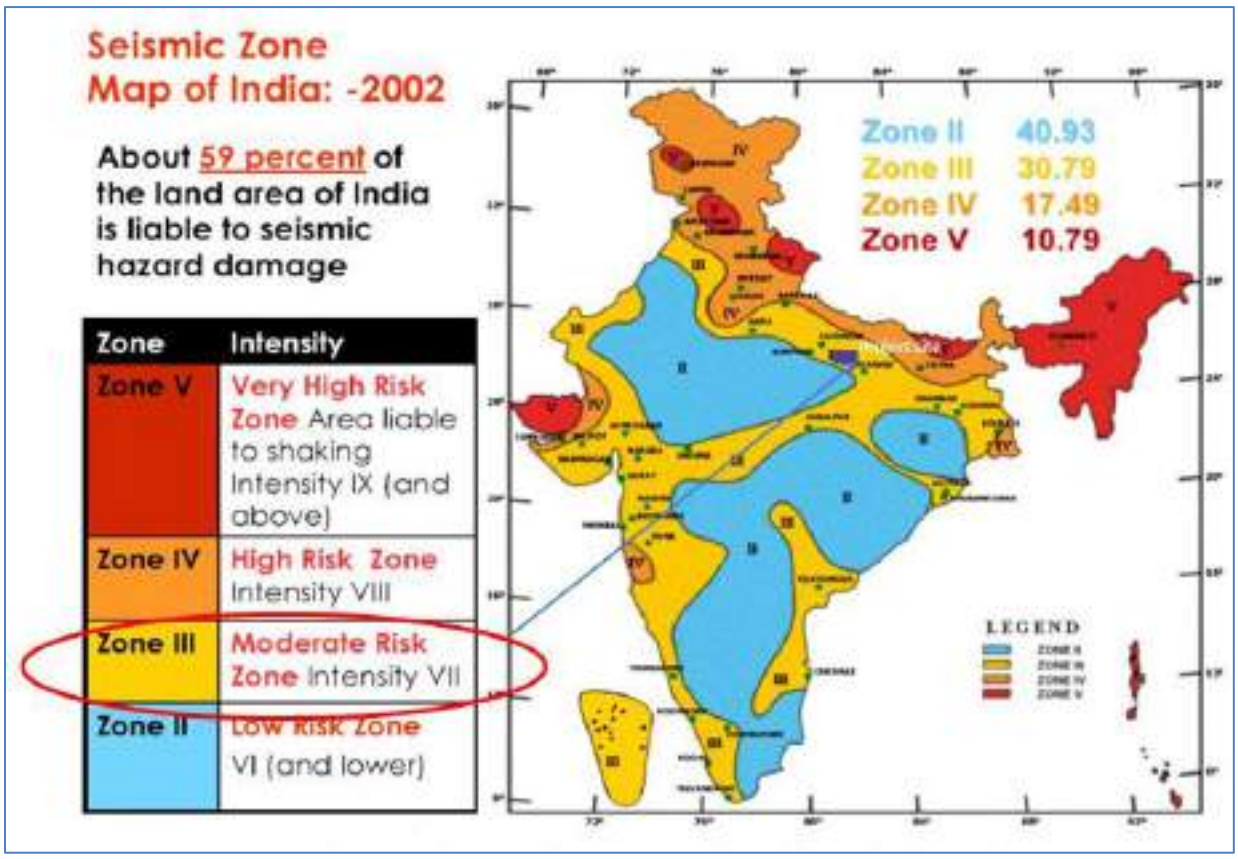


Figure 3.14 : Seismic Zone Map

3.4. Land use

Land use analysis was carried out using remote sensing data. Interpretation approach based on systematic digital imaging was used for delineating the land use classes. The demarcation of boundaries falling under different land use/land cover units is done using different colours assigned to different land use/land cover units of satellite imagery.

Land use of project site: It is an existing plant, and the land use of the site is industrial. No further change in land use is anticipated. The additional land 114 Ha land shall be required for ash pond and railway siding. The proposed expansion shall be done within the existing plant boundary. For development of ash pond for the Stage-II additional land of 110 Ha. (Govt, waste land) and 4 Ha (Pvt. agriculture land) for Railway siding shall be required for acquisition. The current land use of this land shall change to industrial uses.

Land use within 10 km study Area: As per the satellite image of year (Oct 2023) analysis the predominant land use of study area is under agriculture. As per the land use based on satellite image, about 59.20% of the land is under agriculture. About 18.19% land is under open scrubs, 11.57% area is covered under settlement, 2.54% land area is found under waterbodies and 8.50% of the land is under open vegetation (Refer **Table 3.4).** Geographical representation of land use in 10 km area is presented in **Figure 3.15.** Land use and land cover map is provided in **Figure 3.16.** FCC Image provided in **Figure 3.17.**

Table 3.4 : Land Use of the Study Area (10 Km area)

S. No.	Land use distribution	Area (ha)	Percentage
1	Agricultural Land	267.15	59.20
2	Open Shrub Land	82.1	18.19
3	Settlement	52.22	11.57
4	Waterbody	11.47	2.54
5	Vegetation	38.34	8.50
Total		**451.28**	**100**

Source: Analysis of Satellite Image

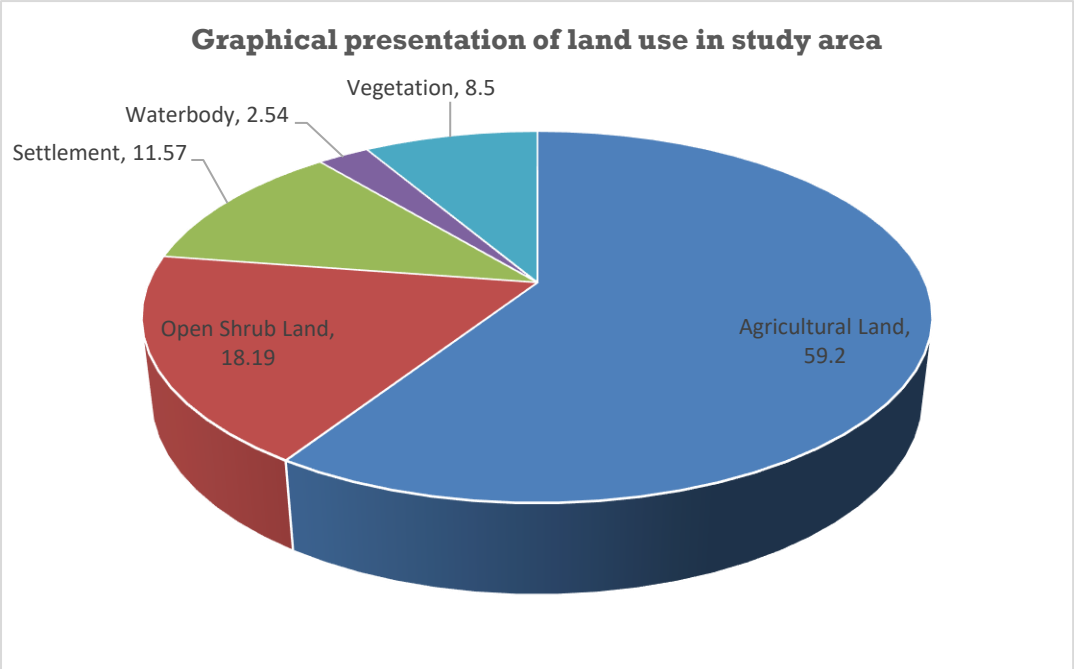


Figure 3.15 : Graphical presentation of land use in study area

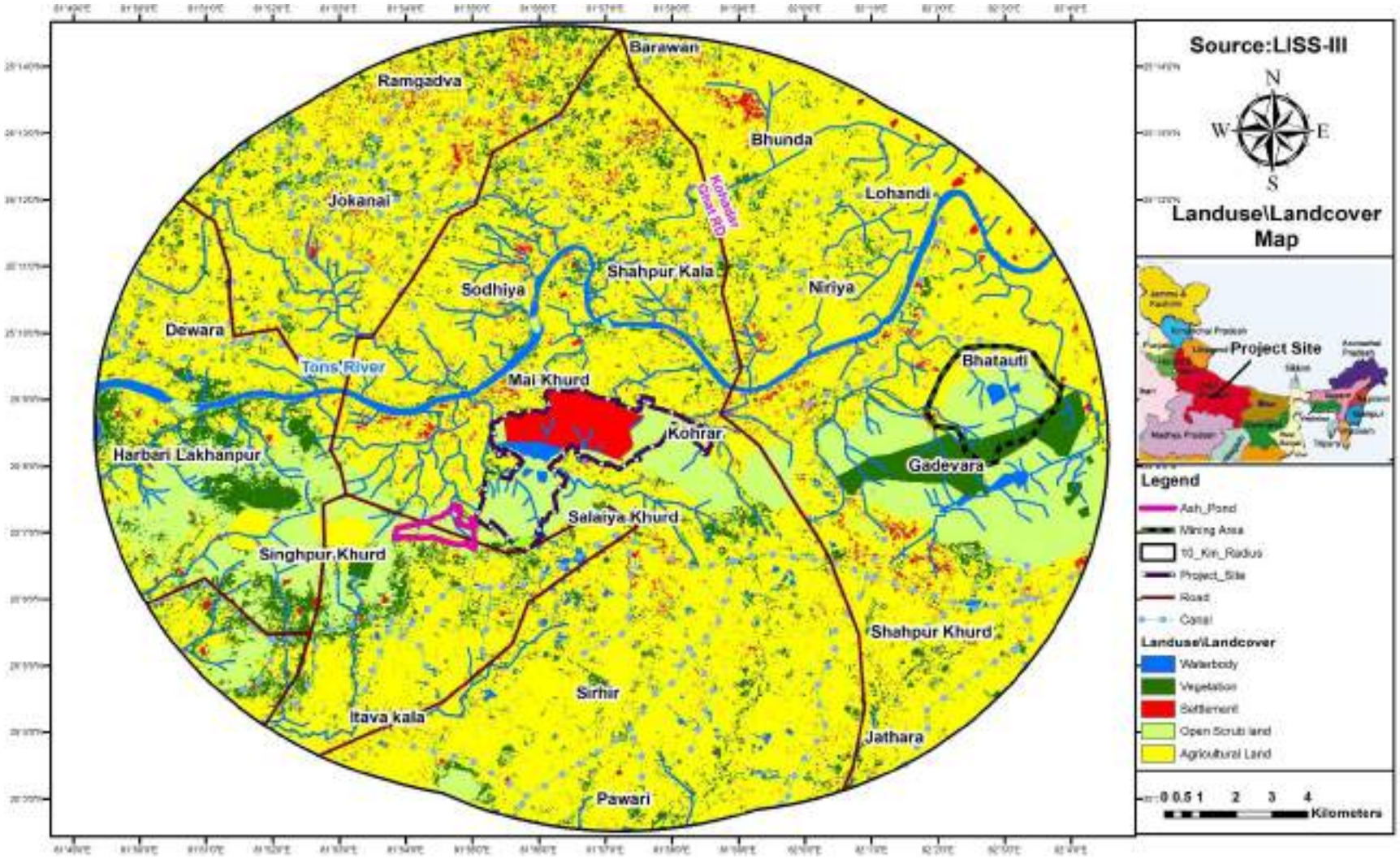


Figure 3.16 : Land Use Map of the Study Area (10 km Radial Zone)

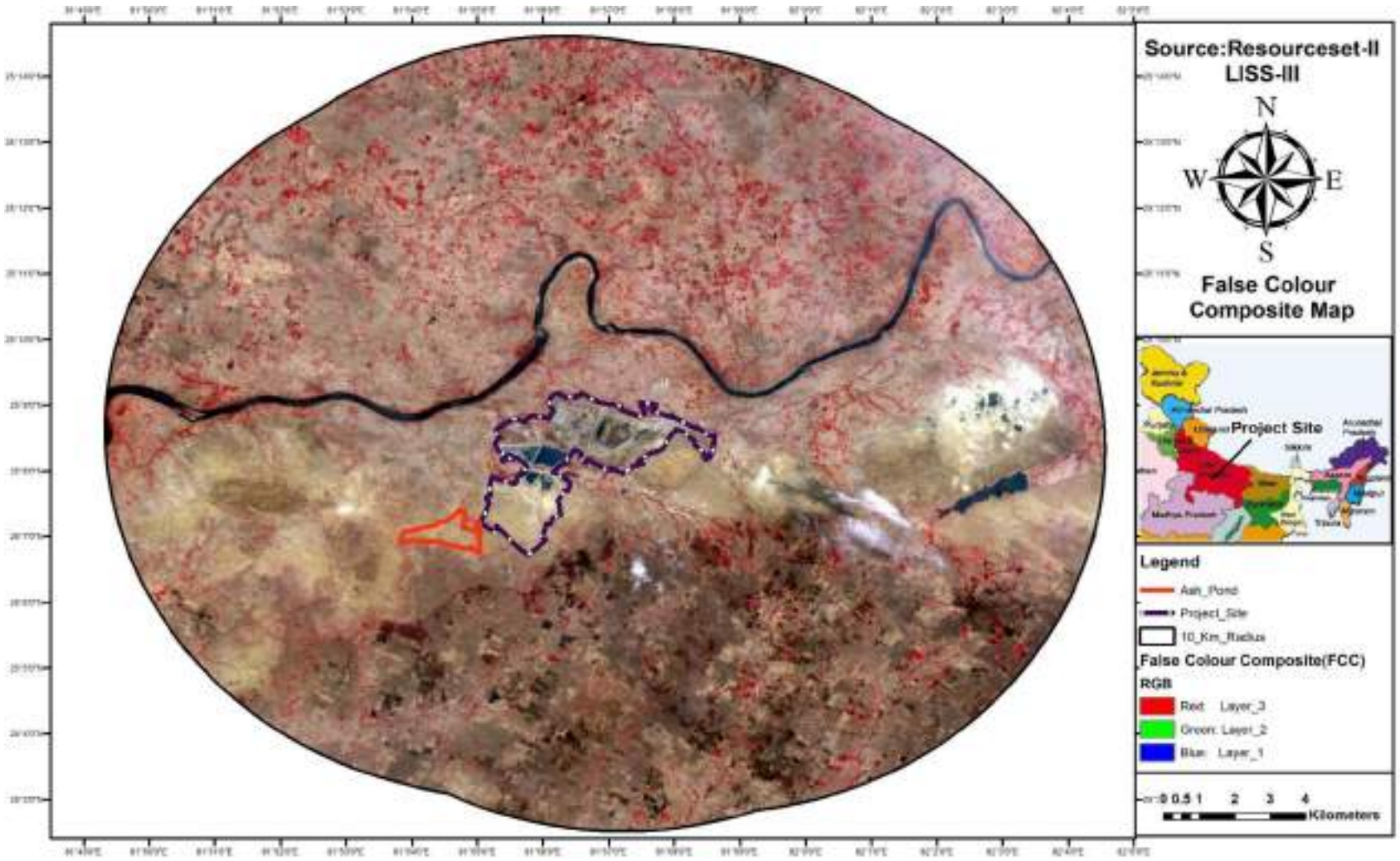


Figure 3.17 : False Colour Composite Map of the Study Area (10 km Radial Zone)

3.4.2. *Land use Change detection in Project site and Study area*

Land use change detection has been conducted over the past 10 years (as per the data available from NRSA) using data from Bhuvan NRSA for the years 2015, 2018, and the most recent data from 2023. Land use analysis was carried out for project site as well as for the study area by using remote sensing data. Interpretation approach based on systematic digital imaging was used for delineating the land use classes. The demarcation of boundaries falling under different land use/land cover units is done using different colours assigned to different land use/land cover units of satellite imagery.

A. Land use change detection (Project site)

Satellite imagery from different years shows the gradual change in the existing land use where the open scrub land gradually converted in the industrial, greenbelt township and other land use classes. The vegetation in year 2015 was remarkably increase from 26 ha to 163 ha due to greenbelt development done by MUNPL in the project area. Land use and land cover map of project site for year 2015, 2018 and 2023 is provided in **is provided in Fig 3.18 & 3.20**

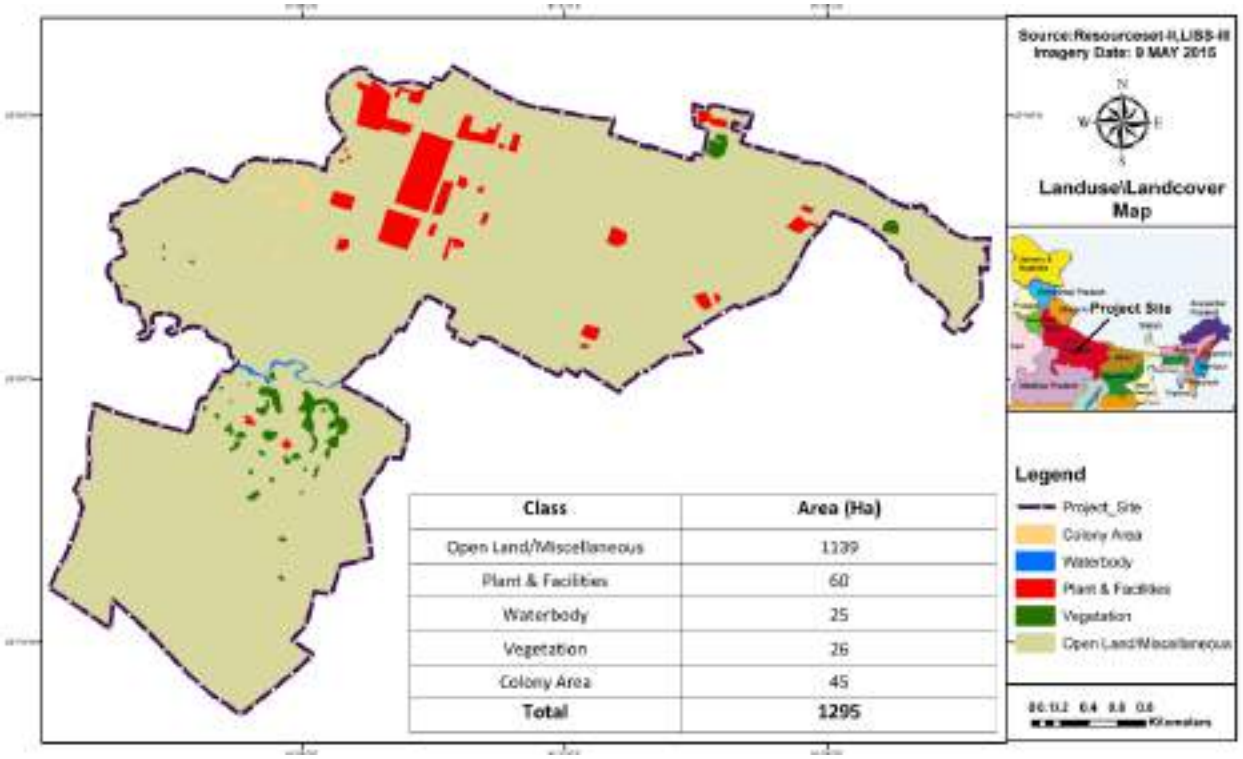
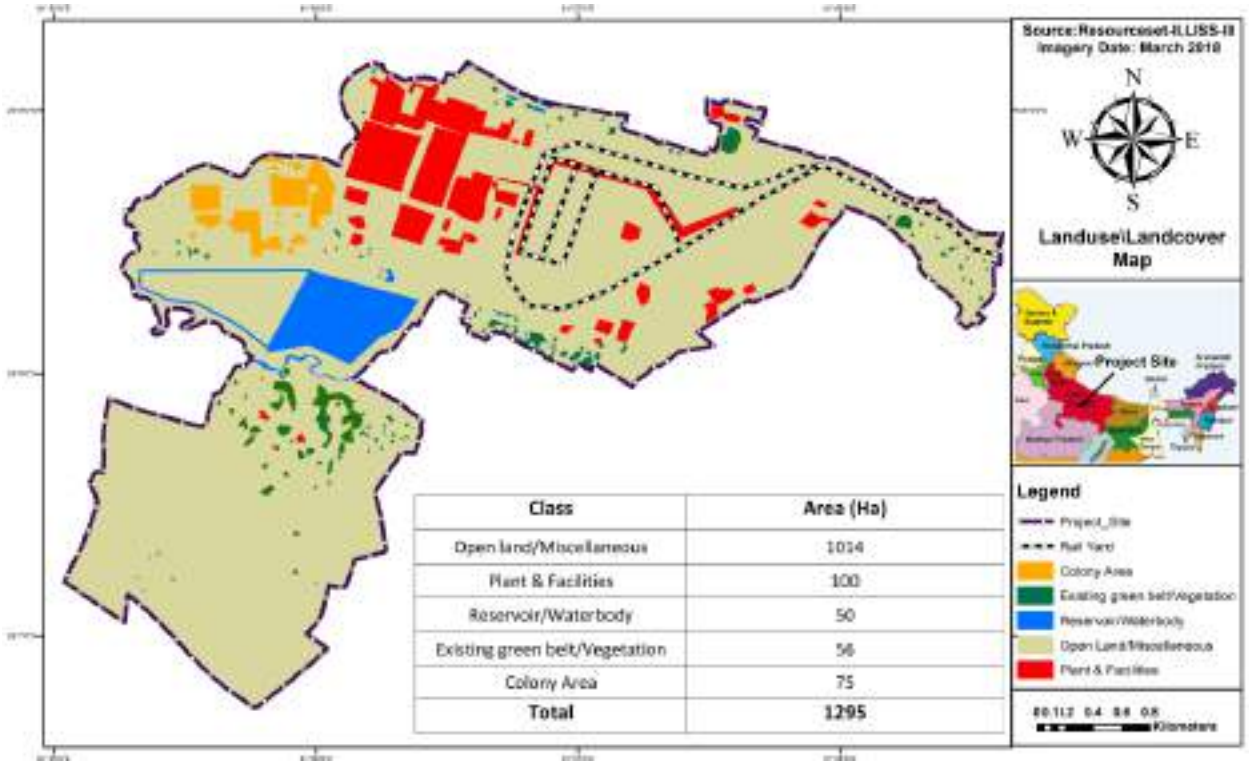
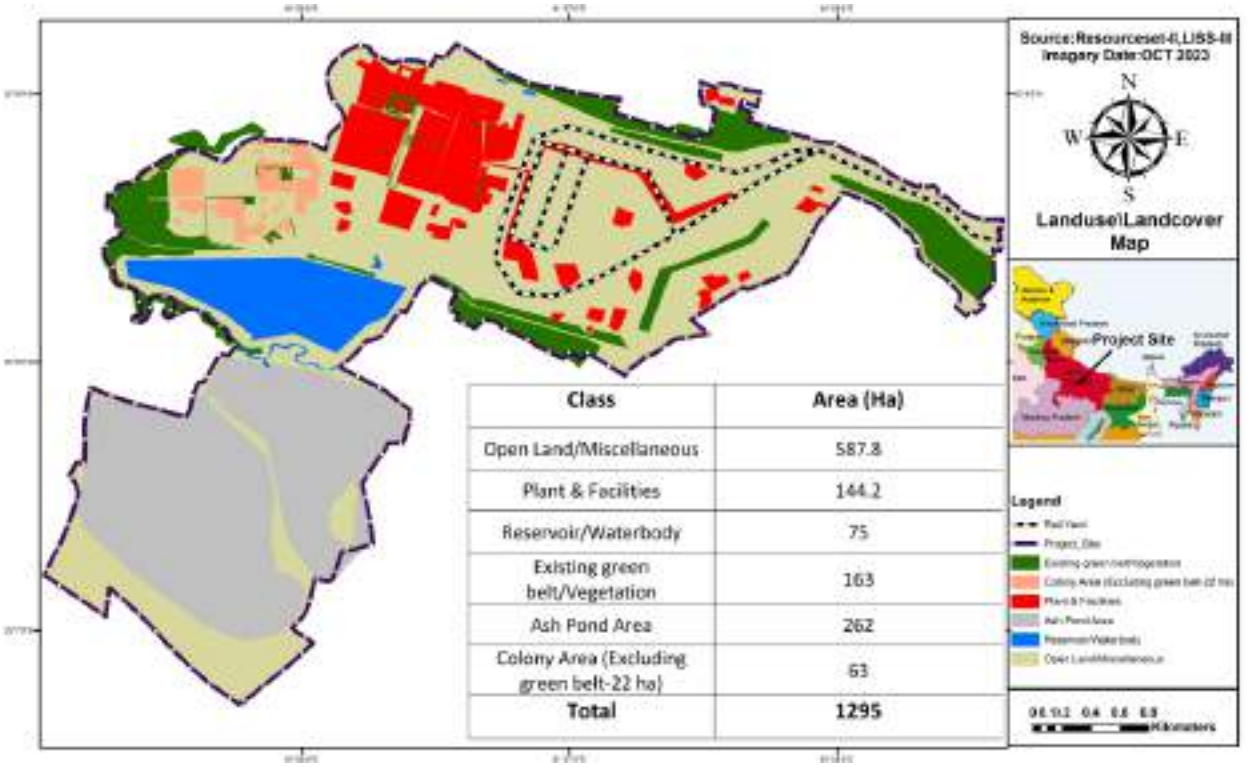


Figure 3.18 Land Use Map of the project Area (year 2015)



Class	Area (Ha)
Open land/Miscellaneous	1014
Plant & Facilities	100
Reservoir/Waterbody	50
Existing green belt/Vegetation	56
Colony Area	75
Total	**1295**

Figure 3.19 Land Use Map of the project Area (year 2018)



Class	Area (Ha)
Open Land/Miscellaneous	587.8
Plant & Facilities	144.2
Reservoir/Waterbody	75
Existing green belt/Vegetation	163
Ash Pond Area	262
Colony Area (Excluding green belt-22 ha)	63
Total	**1295**

Figure 3.20 Land Use Map of the project Area (year 2023)

B. Land use change detection (10 km study Area)

Land use within 10 km study Area: Satellite imagery from different years shows that the dominant land use in the study area has consistently been agricultural. There has been no significant change in land use overall. However, a slight increase in settlement area from 7.57% in 2015 to 11.57% in 2023 has been observed, while other land use categories have remained largely unchanged. (Refer **Table 3.5).** Land use and land cover map of year 2015, 2018 and 2023 is provided in **is provided in Fig 3.21 & 3.22**

Table 3.5 Land change detection in Study Area (10 Km area)

Land use Class	Year 2015		Year 2018		Year 2023 (refer Fig 3.16)	
	Area (Sq. km)	Percentage (%)	Area (Sq. km)	Percentage (%)	Area (Sq. km)	Percentage (%)
Agricultural Land	274.5	60.83	272.15	60.31	267.15	59.20
Open Shrub Land	89.29	19.79	81.2	17.99	82.1	18.19
Settlement	34.17	7.57	48.22	10.69	52.22	11.57
Waterbody	12.23	2.71	12.37	2.74	11.47	2.54
Vegetation	41.09	9.11	37.34	8.27	38.34	8.50
Total	451.28	100	451.28	100.00	451.28	100.00

Source: Primary Analysis satellite imagery

Figure 3.21 Land Use Map of the Study Area (year 2015)

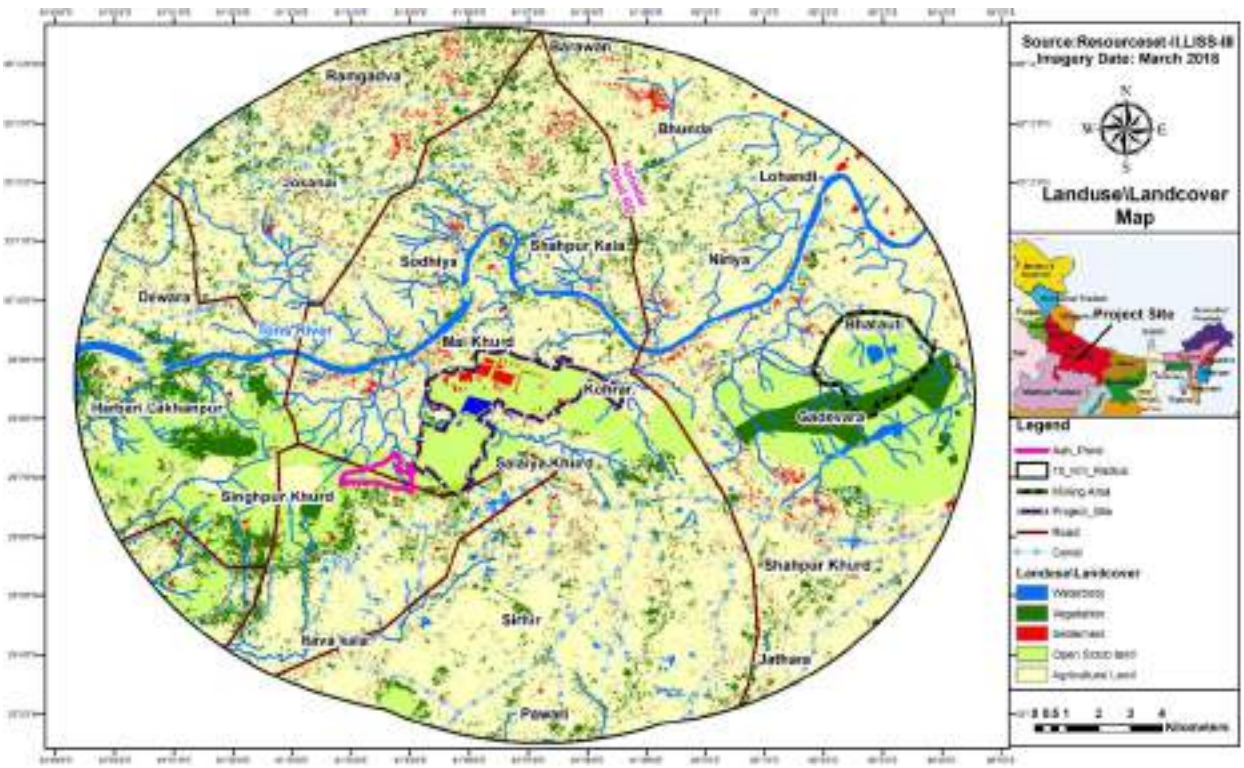


Figure 3.22 Land Use Map of the Study Area (year 2018)

3.5. Meteorology

3.5.1. *Meteorology (Historical Met Data):*

Historical meteorological data were obtained from climatologically tables pertaining to nearest representative IMD station located at Prayagraj and is presented in **Table 3.6.** As per the IMD Prayagraj station, the summer begins in early March and lasts until June. April and May are the hottest months. Monsoon begins in late June. October and November see the retreat of the monsoon and a return of high temperatures until late November. Winter starts in December and ends in late February.

Table 3.6 : Meteorological Data of Prayagraj, 1991-2020

Month	Temperature (°C) Daily		Relative Humidity (%)		Rainfall (mm)	Rainy Days	Predominant Wind Direction		Cloud Amounts (all cloud)		Wind Speed (Km/hr)
	Max	Min	8:30	17:30			8.30	17.30	8:30	17:30	
January	28.7	4.8	84	64	17.0	1.6	W, E	W, NW	3.2	2.2	1.8
February	33.0	8.2	75	53	17.6	1.5	W, E	W, NW	1.9	1.9	2.2
March	39.4	12.4	57	37	8.8	1.0	W, SW	NW, W	1.7	2.0	2.7
April	44.1	18.2	40	24	7.0	0.7	W, E	NW, W	1.6	2.0	3.0
May	45.9	21.8	46	29	13.9	1.2	E, W	NW, W	1.7	1.8	3.4
June	45.1	24.3	61	48	113.5	5.5	E, W	NW, W	4.0	4.5	3.6
July	39.7	24.4	80	72	268.0	12.0	E, W	E, W	6.3	6.7	3.4
August	36.7	24.5	84	76	238.5	11.8	E, W	E, W	6.3	6.6	2.9
September	36.6	23.2	81	73	184.9	8.4	E, W	E, W	4.4	5.0	2.5
October	36.7	16.7	74	63	34.7	1.5	E, W	NW, E	1.8	2.1	1.4
November	33.6	11.0	74	60	4.6	0.4	W, SW	W, NW	1.0	1.2	1.1
December	29.5	6.3	82	65	6.8	0.5	W, NW	W, NW	2.0	1.5	1.4

Source-IMD Prayagraj

Observation on Meteorology: The meteorological parameters play a vital role in transport and dispersion of pollutants in the atmosphere.

Temperature– The Annual mean minimum temperature of around 4.8^{0}C (Jan) and annual mean maximum temperature of around 45.9^{0}C. May is the hottest month with daily mean maximum temperature at 45.9^{0}C and January is the coldest month with daily mean minimum temperature of 4.8^{0}C.

Relative Humidity– Most humid conditions are found maximum in the monsoon's months, followed by summer, post-monsoons, and winter in that order. Mornings are more humidity than evenings; the highest relative humidity is recorded as 84% in the Months of August.

Rainfall– Total annual mean rainfall was observed to be 915.4 mm. Around 86% of total rainfall occurs in the months of June to Sep. The maximum total monthly rainfall is 268 mm and minimum monthly rainfall during monsoon is 4.6 mm.

Wind Direction– The wind pattern of the region shows that the predominant wind direction is W, and NW. Mean wind speed ranges 1.1 to 3.6 km/hr. Annual Windrose of Prayagraj is presented in **Figure 3.23** and monthly Windrose provided in **Figure 3.24.**

Calm Periods – The calm period constitutes an important factor in the dispersion of air pollution. The maximum calm period occurs during Oct to Feb months. Monthly calm conditions are shown in **Table 3.7**.

Table 3.7 : Monthly Percentages of Calm Periods (IMD Prayagraj)

Calm, %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
08:30 am	62	56	50	44	36	33	37	40	47	74	77	72
05:30 pm	66	55	35	25	22	24	40	44	56	81	93	87

(Source-IMD Prayagraj)

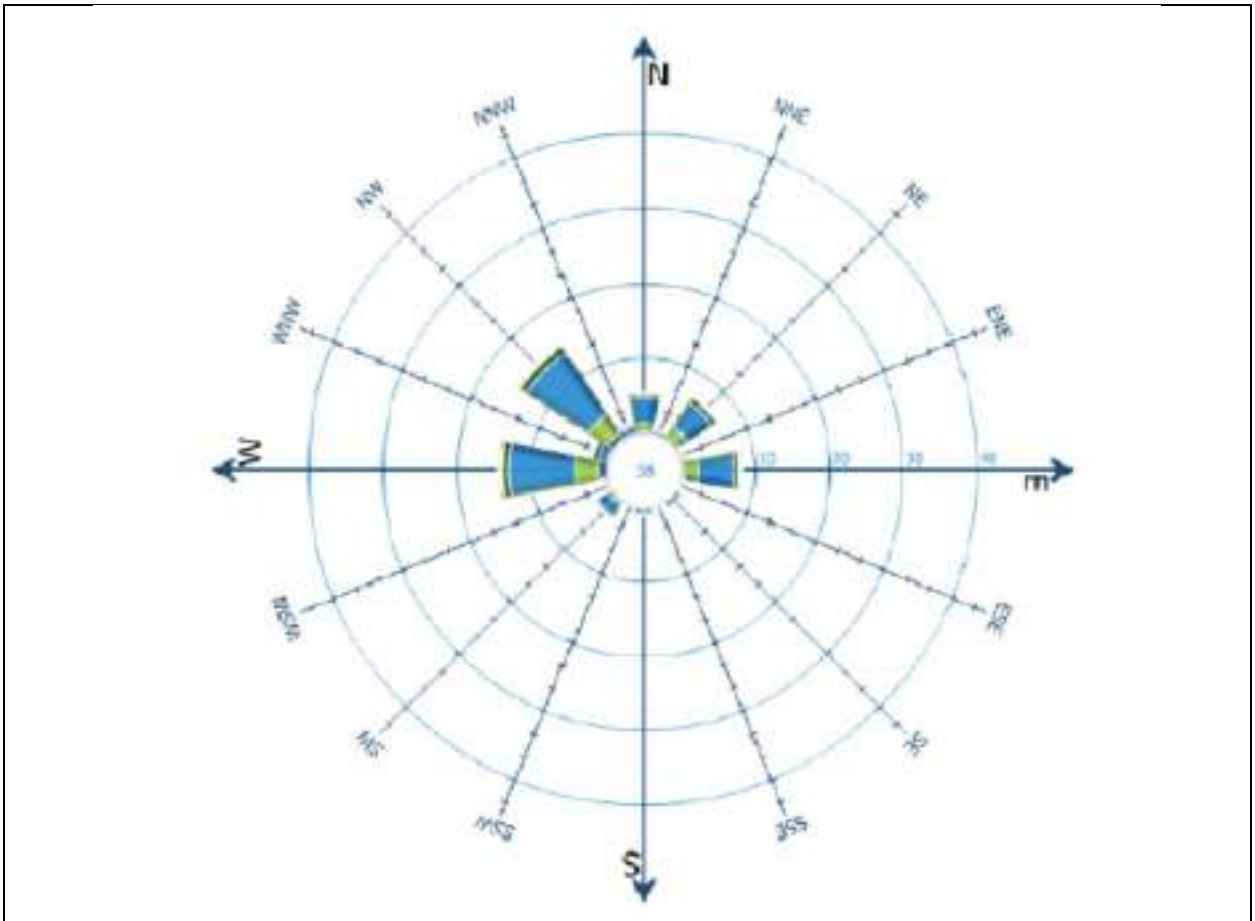
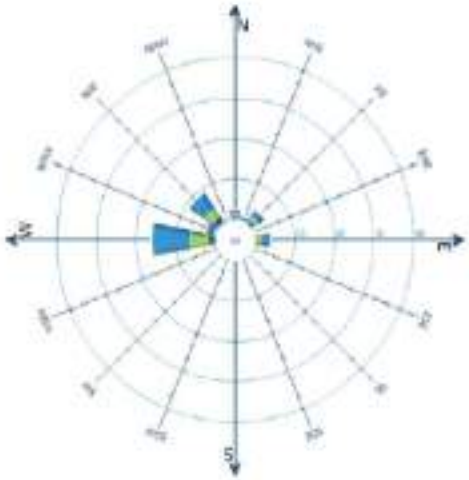
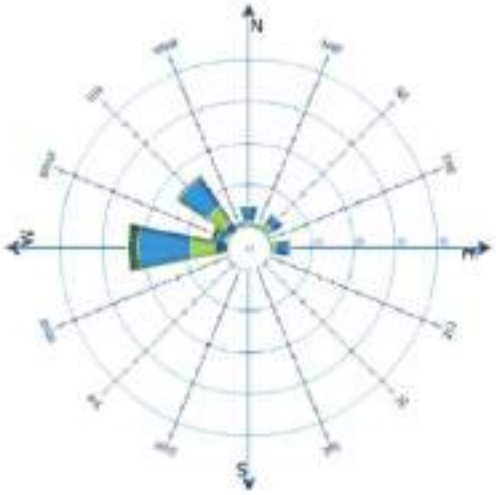
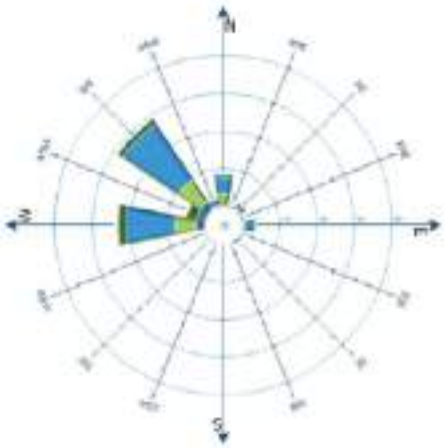
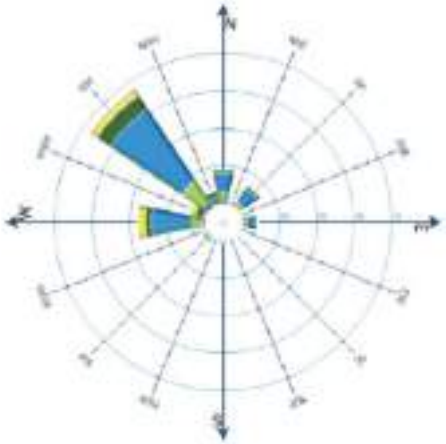
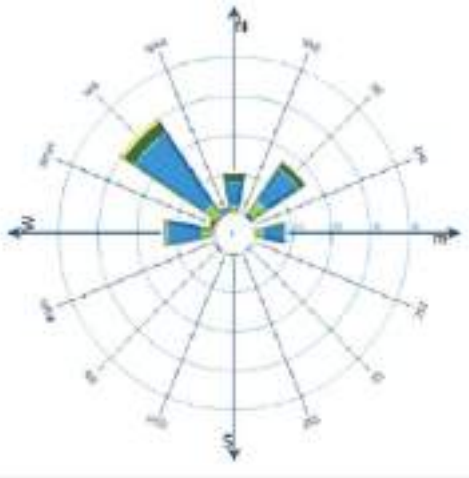
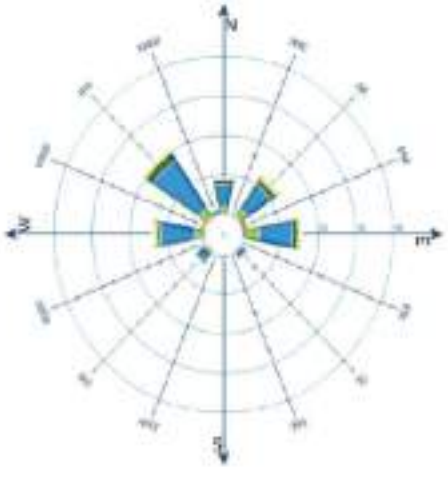
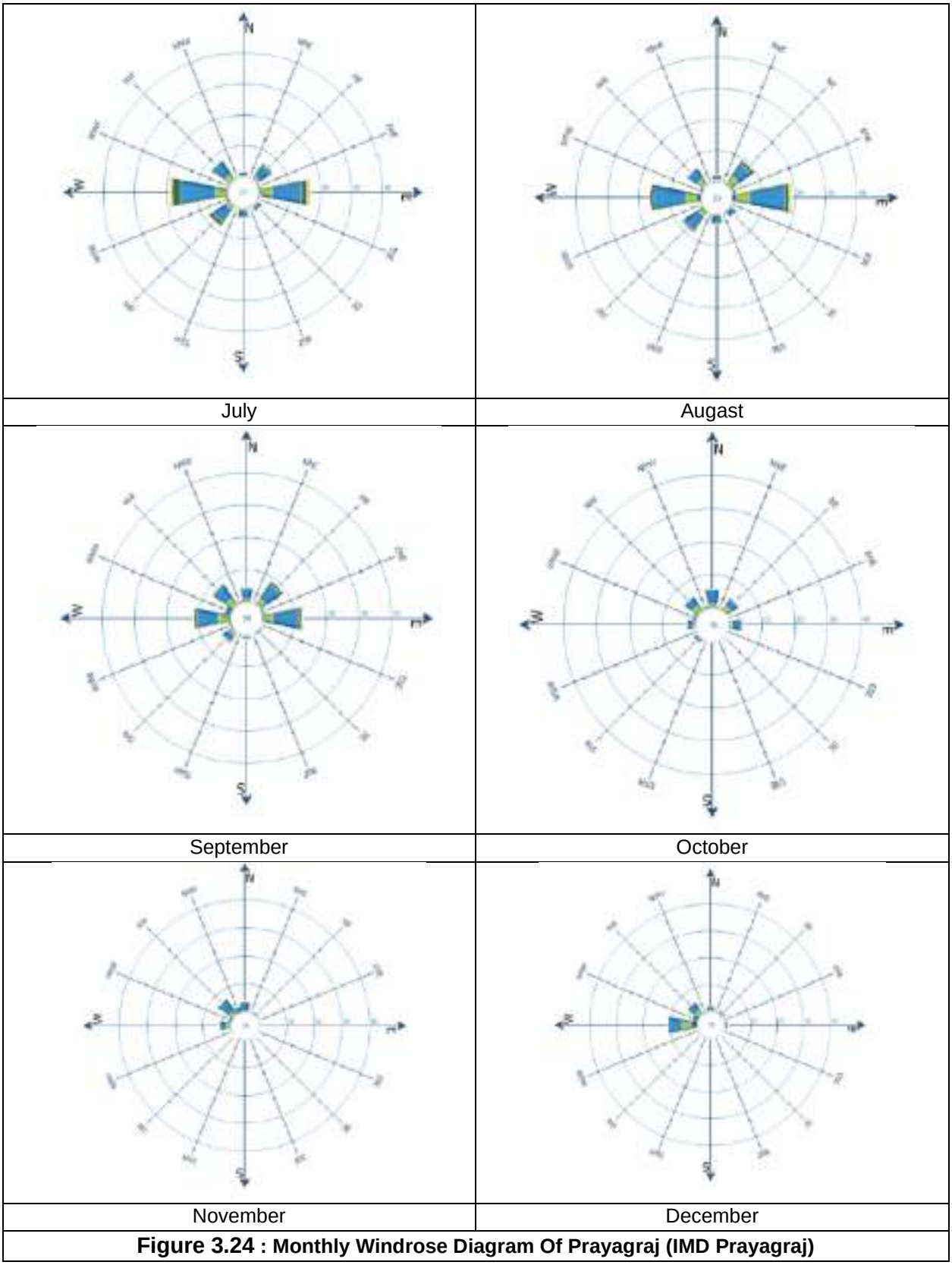


Figure 3.23 : Windrose Diagram Of Prayagraj (Annual) IMD Prayagrajn (1991 – 2020)

	
January	February
	
March	April
	
May	June



July	Augast
September	October
November	December

Figure 3.24 : Monthly Windrose Diagram Of Prayagraj (IMD Prayagraj)

3.5.2. *Meteorological Data Generated at Site*

Meteorological data for post monsoon 2023 was generated near site. An automatic weather monitoring station was installed near Project site, keeping the sensors free exposed to the atmosphere and with minimum interference with the nearby structures. The micro-meteorological data like wind speed, wind direction, temperature, relative humidity and atmospheric pressure were collected using the weather stationed cloud cover was recorded manually for the study period. Summary of the site-specific met data is given in **Table 3.8.** Wind frequency and wind rose provided as **Figure 3.25** and **3.26** respectively**.**

Table 3.8 : Site Specific Meteorological Data

Parameter		Oct- 2023	Nov-2023	Dec-2023
Temperature (ºC)	**Max**	37	32	31
	Min	22	14	11
	Avg	29.84	24.86	21.07
Relative Humidity (%)	**Max**	80	71	70
	Min	18	15	19
	Avg	44.80	31.44	35.94
Rainfall (mm)	**Avg.**	18.7	2.3	4.3
Wind Speed (m/s)	**Avg**	1.21		
Predominant Wind Direction	**(from)**	W, SW		
Calm Period	**%**	30.34%		

(Source: Primary data generated at site)

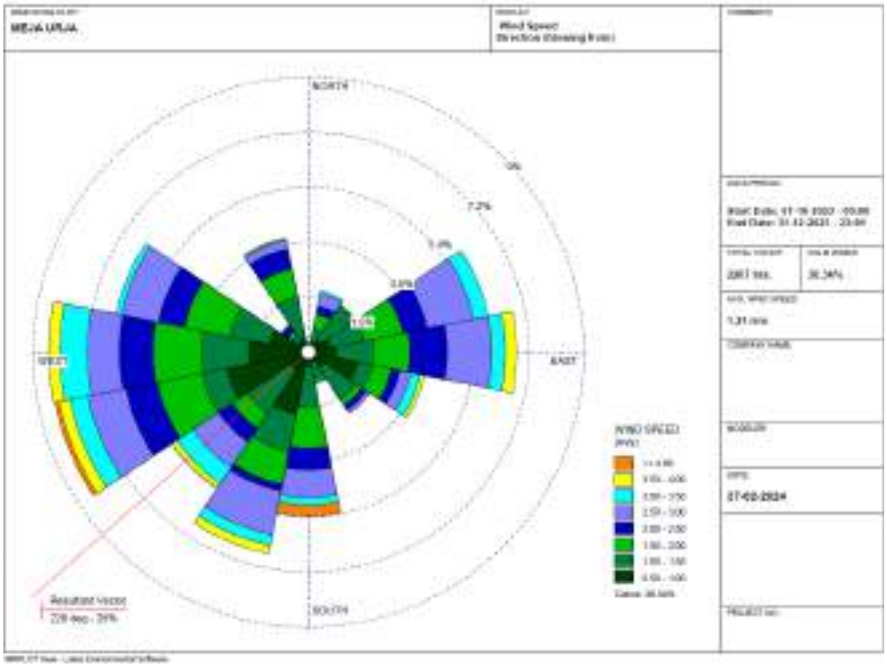


Figure 3.25 : Wind Rose Diagram (1st Oct 2023 – 31st Dec 2023)

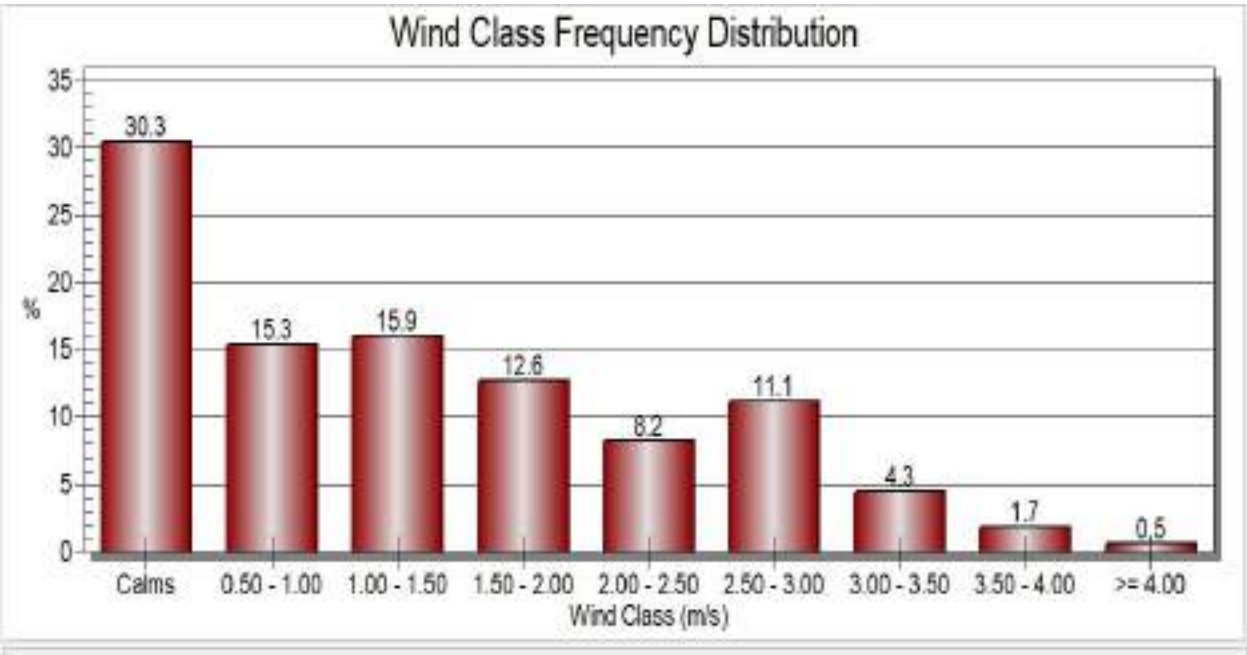


Figure 3.26 : Wind Frequency Distribution Graph (1st Oct 2023 – 31st Dec 2023)

3.6. Ambient Air Quality

Air pollution can cause significant effects on the environment and subsequently on human, animals, vegetation and materials. In most cases, air pollution aggravates pre-existing diseases or degrades health status, making people easily susceptible to other infections and development of chronic respiratory and cardiovascular diseases. Further, environmental impacts from air pollution can include acidic deposition and reduction in visibility. The objective of the study is to analyse the existing ambient air quality within the study area and compare it with the NAAQ standards specified by CPCB to know about the pollution status of air in and around the project area. To quantify the impact of the construction and operational manufacturing activities on the ambient air quality at the project site and its surrounding area during construction phase and operational phase, it is necessary to evaluate the existing ambient air quality in those areas.

3.6.1. *Causes Attributing to Air Pollution in and Around Project Area*

It is an existing plant where expansion is proposed. The 10 km of the study area consists majorly of rural residential areas. There is no industry located within the 10 km radius area. The only source of air pollution in and around project area are vehicular movement, dust arising from unpaved village roads and domestic fuel burning. Increase in air pollution is envisaged during construction and operation phase of the proposed project.

3.6.2. *Rationale for Selecting Monitoring Station*

The baseline status of the ambient air quality has been established through a scientifically designed ambient air quality monitoring network and was based on the following considerations:

- Meteorological conditions.
- Topography of the study area.
- Representatives of regional background air quality.
- Representatives of likely impact areas within the study area; and
- Location of residential areas representing different activities.

The monitoring station were selected keeping in view the sites like High density Residential area, near mixed use zone if any in upwind of the site and downwind of the site to understand the impact of the proposed project in the downwind direction compared to upwind polluting load from the vehicular traffic emission, community activities, and other sources. Details of monitoring locations are shown in **Table 3.9.** Monitoring Location map is shown in **Figure 3.27.**

Table 3.9 : Ambient Air Quality Monitoring Locations

S. No	Location	Direction wrt project site with approx. distance	Zone	Tentative Geo-coordinates
AAQ-1	Project Site (Meja TPP Main Entry Gate)	Plant site	Industrial	25° 8'17.25"N 81°56'26.30"E
AAQ-2	Salaya Kala near Ash Pond	0.7 km, SW (Located in upwind direction)	Industrial	25° 6'42.13"N 81°55'13.85"E
AAQ-3	Patai Dandi Village	1.5 km. NE (Located in downwind direction)	Residential/Rural	25° 9'43.77"N 81°57'34.34"E
AAQ-4	Rithaiya Village	5.25 km NE (Located in crosswind direction)	Residential/Rural	25°10'55.63"N 81°59'55.12"E
AAQ-5	Sukath near meja tehsil	9.42 km. E (Located in upwind direction)	Residential/Rural	25° 8'42.85"N 82° 4'9.53"E
AAQ-6	Son Barsi	2.00 km. S, (Located in downwind direction)	Residential/Rural	25° 7'3.16"N 81°58'35.27"E
AAQ-7	Gadeva Village	3.51 km ENE (Located in downwind direction)	Residential/Rural	25° 8'48.47"N 82° 0'42.56"E
AAQ-8	Piprau Village	2.11 km W (Located in downwind direction)	Residential/Rural	25° 8'31.66"N 81°54'2.86"E
AAQ-9	Korhar Village	0.9 km East (nearest settlement and located in downwind)	Residential/Rural	25° 8'29.61"N 81°59'13.47"E
AAQ-10	Bhendewara Village	7.0 km NE (located in downwind direction)	Residential/Rural	25°12'11.69"N 81°59'5.81"E

Source: Monitoring Plan

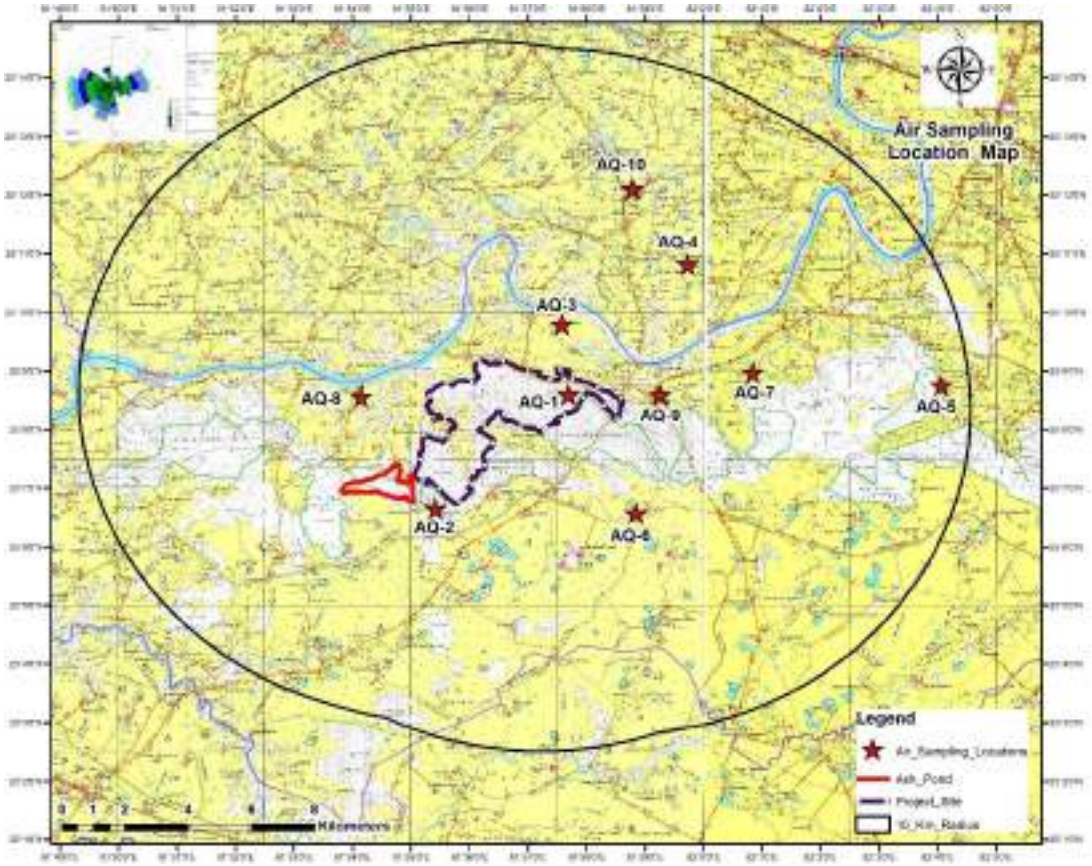


Figure 3.27 : AAQ Location Map

3.6.3. *Protocol for Ambient Air Monitoring*

The ambient air quality monitoring for pollutants was done by following Guidelines for Manual Sampling and Analyses (Volume-1) issued by CPCB in May 2011. Sampling methodology is as mentioned in **Table 3.10**.

Table 3.10 : Sampling methodology

Sampling Parameters	Standard referred	Sample Collection	Sample Analysis	Methodology
		Sampling Equipment	***Analytical Equipment***	
PM_{10}	IS 5182-Part 23	Respirable Dust Sampler	Electronic Balance	Gravimetric method
$PM_{2.5}$	IS 5182-Part IV	Fine Dust Sampler	Electronic Balance	Gravimetric method
SO_2	IS 5182 - Part 2	RDS with impinger	Spectrophotometer	EPA assessment modified West and Gaeke Method

Sampling Parameters	Standard referred	Sample Collection	Sample Analysis	Methodology
		Sampling Equipment	*Analytical Equipment*	
NOx	IS 5182-Part 23	RDS with impinger	Spectrophotometer	Arsenate modified Jacob and Hocchheiser Method
CO	IS 5182 - Part 24	Tadler bag	GC-FID	Gas Chromatography
NH_3	IS 5182 (Part-25)	RDS with impinger	Spectrophotometer	Indophenol Blue method/ Spectrophotometry
C6H6	IS 5182 - Part 11	Filter Paper	Gas Chromatography	Gas Chromatography (GC) based continuous analyzer – Adsorption and desorption followed by GC analysis
Benzo (a) Pyrene (BaP) Particulate phase only	NAAQMS/ IS 5182 (Part-12)	Filter paper	HPLC/GC	Solvent extraction followed by HPLC/GC analysis
Metals	NAAQ standard methods	Filter Paper	AAS/ICP	AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper

Table 3.9 continued….: Monitored Parameters and frequency of Sampling

Parameter	Sampling Frequency
Particulate matter PM_{10}	24 hourly sample twice a week for three months
Particulate matter $PM_{2.5}$	24 hourly sample twice a week for three months
SO_2	24 hourly sample twice a week for three months
NOx	24 hourly sample twice a week for three months
CO	08 hourly samplefor 24 hr twice a week for three months
NH_3	24 hourly sample twice a week for three months
C6H6	24 hourly sample once a week for three months
Benzo (a) Pyrene (BaP) Particulate phase only	24 hourly sample once a week for three months
Metals	24 hourly sample once a week for three months

3.6.4. *Monitoring result*

The ambient air quality monitoring during study period was conducted, on 24- hourly twice a week basis for PM_{10}, $PM_{2.5}$, SO_2, NOx, NH_3 and CO for a season, through NABL accredited Laboratory. Metals, BAP and C_6H_6 were monitored weekly once. Details of the air pollutants, its sources and their effect on humans is as shown in **Table 3.11**. Summary results of ambient air quality monitoring data are shown in **Table 3.12.**

Table 3.11 : Air Pollutants, Their Sources and Their Effects on Humans

Pollutant	Sources	Effects
Particulate Matter (PM_{10}& $PM_{2.5}$)	Road dust re-suspension, Vehicles, industrial emissions, domestic fuel burning etc.	• Cardiovascular and respiratory diseases • Acute Lower Respiratory Infection
Sulphur-dioxide (SO_2)	• Burning of sulphur containing fuel like coal, diesel, etc • Extraction of metals from sulphide ores. • Paper industries;	• Affects respiratory system and lung function, cough, mucus secretion, asthma and chronic bronchitis • Causes acid rain
Oxides of Nitrogen (NOx)	• Combustion processes (heating, power generation, and vehicles) • Paper Industries. • Smelting of metals. • Petroleum refineries	• Inflammation of the respiratory airway • Decrease lung function, increase the risk of respiratory conditions and increases the response to allergens. • Ground level ozone formation, • Causes acid rain
Carbon Monoxide (CO)	Incomplete fuel combustion (as in motor vehicles)	• Reduces the oxygen carrying capacity of blood, • Causes headaches, nausea, and dizziness
Ammonia (NH3)	• Agriculture (animal husbandry & fertilizer application) • Volatilization from land and oceans • Industrial processes (including fugitive emissions) • Vehicular emission	• Nasal and eye irritation; respiratory tract irritation; and increased respiratory depth. • Add to the level of $PM_{2.5}$ [*conversion to $NH4^+$ aerosol) which has longer atmospheric residence times (days) than the gaseous (hours]* especially affecting human health
C6H6	• Gasoline, motor vehicle exhaust, cigarette smoke and wood smoke.	• Causes harmful effects on the bone marrow and can cause a decrease in red blood cells, leading to anaemia.
Benzo (a) Pyrene (BaP) Particulate phase only	• Combination of vehicular emissions and biomass/coal combustion.	• Causes skin, lung, and bladder cancer in humans and in animals
Metals	• Industrial process and vehicle exhaust	• Gastrointestinal and kidney dysfunction, nervous system disorders, skin lesions, vascular

Pollutant	Sources	Effects
		damage, immune system dysfunction, birth defects, and cancer

Table 3.12 : Ambient Air Quality Monitoring Results (24-hour average)

Period: (1st Oct 2023 – 31 Dec 2023)

Location Code	Location	PM_{10} (µg/m³)				$PM_{2.5}$ (µg/m³)			
		Max	Min	Mean	98 %tile	Max	Min	Mean	98 %tile
AAQ-1	Project Site (Meja TPP Main Entry Gate)	94	51	75	93	54	23	42	54
AAQ-2	Salaya Kala near Ash Pond	88	46	70	88	51	20	39	51
AAQ-3	Patai Dandi Village	82	44	67	81	50	18	37	49
AAQ-4	Rithaiya Village	84	42	69	83	49	17	36	48
AAQ-5	Sukath near meja tehsil	90	45	72	90	52	21	40	52
AAQ-6	Son Barsi	80	42	65	79	48	17	35	47
AAQ-7	Gadeva Village	81	44	67	81	47	18	35	47
AAQ-8	Piprau Village	83	42	65	81	50	17	36	49
AAQ-9	Korhar Village	85	46	70	84	51	20	38	50
AAQ-10	Bhendewara Village	82	43	67	81	44	18	34	44
NAAQ Standard		**100**				**60**			

Source: Primary Data Collection and analysis

Table 3.11 : continued……

Location Code	Location	SO_2 (µg/m³)				NOx (µg/m³)			
		Max	Min	Mean	98 %tile	Max	Min	Mean	98 %tile
AAQ-1	Project Site (Meja TPP Main Entry Gate)	13.9	7.7	11	13.9	17.3	10.8	14.5	17.2
AAQ-2	Salaya Kala near Ash Pond	12.2	6.9	9.9	12.2	15.5	9.7	12.9	15.3
AAQ-3	Patai Dandi Village	9.6	6.0	8.2	9.4	13.2	9.2	11.1	13.2
AAQ-4	Rithaiya Village	10.3	6.4	8.6	9.9	12.8	9.0	10.9	12.8
AAQ-5	Sukath near meja tehsil	11.9	6.2	9.2	11.7	14.5	9.4	12.0	14.3
AAQ-6	Son Barsi	8.8	6.0	8.4	9.6	13.4	9.0	11.3	13.4
AAQ-7	Gadeva Village	9.6	5.8	8.2	9.4	13.2	9.3	11.1	13.2

Location Code	Location	SO_2 (µg/m³)				NOx (µg/m³)			
		Max	Min	Mean	98 %tile	Max	Min	Mean	98 %tile
AAQ-8	Piprau Village	9.3	5.4	7.9	9.1	12.8	9.1	10.8	12.8
AAQ-9	Korhar Village	10.5	6.0	8.8	10.1	13.5	9.8	11.6	13.5
AAQ-10	Bhendewara Village	9.9	5.9	8.2	9.5	12.7	9.9	11	12.7
NAAQ Standard		**80**				**80**			

Source: Primary Data Collection and analysis

Table 3.11 : continued .....

		8 hrs.		24 hrs.	24 hrs.	24 hrs.
S.No.	Location	Ozone (O_3) (µg/m³)	Carbon monoxide (CO) (mg/m³)	Ammonia (µg/m³)	Benzene (µg/m³)	Benzo(a) Pyrene (ng/m³)
1	Project Site (Meja TPP Main Entry Gate)	19.6	0.29	<20	ND (<1.0)	ND (< 1.0)
2	Salaya Kala near Ash Pond	17.6	0.22	<20	ND (<1.0)	ND (< 1.0)
3	Patai Dandi Village	15.2	0.16	<20	ND (<1.0)	ND (< 1.0)
4	Rithaiya Village	14.5	0.15	<20	ND (<1.0)	ND (< 1.0)
5	Sukath near meja tehsil	13.7	0.17	<20	ND (<1.0)	ND (< 1.0)
6	Son Barsi	11.2	0.12	<20	ND (<1.0)	ND (< 1.0)
7	Gadeva Village	12.6	0.15	<20	ND (<1.0)	ND (< 1.0)
8	Piprau Village	13.3	0.14	<20	ND (< 1.0)	ND (< 1.0)
9	Korhar Village	14.2	0.12	<20	ND (<1.0)	ND (< 1.0)
10	Bhendewara Village	13.2	0.14	<20	ND (< 1.0)	ND (< 1.0)
NAAQ Standard		**100**	**2**	**400**	**5**	**1**

Source: Primary Data Collection and analysis

Table 3.11 : continued……

S.No.	Location	24 hrs.			
		Lead (µg/m³)	Nickel (ng/m³)	Arsenic (ng/m³)	Mercury (µg/m3)
1	Project Site (Meja TPP Main Entry Gate)	ND (<0.5)	ND (<15)	ND (<5.0)	<0.001
2	Salaya Kala near Ash Pond	ND (<0.5)	ND (<15)	ND (<5.0)	<0.001
3	Patai Dandi Village	ND (<0.5)	ND (<15)	ND (<5.0)	<0.001
4	Rithaiya Village	ND (<0.5)	ND (<15)	ND (<5.0)	<0.001
5	Sukath near meja tehsil	ND (<0.5)	ND (<15)	ND (<5.0)	<0.001
6	Son Barsi	ND (<0.5)	ND (<15)	ND (<5.0)	<0.001

S.No.	Location	24 hrs.			
		Lead (µg/m³)	Nickel (ng/m³)	Arsenic (ng/m³)	Mercury (µg/m3)
7	Gadeva Village	ND (<0.5)	ND (<15)	ND (<5.0)	<0.001
8	Piprau Village	ND (<0.5)	ND (<15)	ND (<5.0)	<0.001
9	Korhar Village	ND (<0.5)	ND (<15)	ND (<5.0)	<0.001
10	Bhendewara Village	ND (<0.5)	ND (<15)	ND (<5.0)	<0.001
NAAQ Standard		**1.0**	**20**	**6.0**	**-**

Source: Primary Data Collection and analysis

3.6.5. *Observations on Ambient Air Quality:*

Particulate Matter (PM_{10}): The maximum PM_{10} level were found at Project Site (Meja TPP Main Entry Gate) (94 µg/m^3) and lowest PM_{10} level (42 µg/m^3) were observed at Sonbarsi, Piprau and Rithaiya Village, while the mean conc. of all location ranges between 65-75 µg/m^3. The PM_{10} level in all the monitoring locations is within the standard i.e. NAAQMS level 100 µg/m^3.

Particulate Matter ($PM_{2.5}$): The maximum $PM_{2.5}$ level were found at Project Site (54 µg/m^3) and lowest $PM_{2.5}$ level were observed at Sonbarsi, Piprau and Rithaiya Village (17 µg/m^3) while the mean conc. of all location ranges between 34-42 µg/m^3. The $PM_{2.5}$ level in all the monitoring locations is within the standard i.e. NAAQMS level 60 µg/m^3.

Sulphur Dioxide (SO_2): The maximum SO_2 level were found at Project Site (13.9 µg/m^3) and lowest SO_2 level were observed at Piprau Village, (5.4 µg/m^3) while the mean conc. of all location ranges between 7.8 to 11.0 µg/m^3. The SO_2 level in all the monitoring locations is found quite below the standard i.e. NAAQMS level 80 µg/m^3.

Oxides of Nitrogen (NO_2): The maximum NO_2 level were found at Project Site (17.3 µg/m^3) and lowest NO_2 level were observed Son Barsi and Rithaiya Village (9.0 µg/m^3) while the mean conc. of all location ranges between 10.9 – 14.5 µg/m^3. The NO_2 level in all monitoring location are quite below the standard i.e. NAAQMS level 80µg/m^3.

Other Parameters: NH_3 were found <20 µg/m^3 which is found far below the standard i.e. NAAQMS level 400µg/m^3. CO conc. was found between 0.12 to 0.29 mg/m^3 which is found within the standard i.e. NAAQMS level 2 mg/m^{3,} Ozone conc. was found between 11.2 to 19.6 mg/m^3 which is found within the standard i.e. NAAQMS level 100 mg/m^{3,} Metals were also not detected from the study area.

3.6.6. *Category of Air Quality Index*

An air quality index is defined as an overall scheme that transforms the weighed values of individual air pollution related parameters (for example, pollutant concentrations) into a single number or set of numbers (Ott, 1978). The objective of an AQI is to quickly disseminate air quality information (almost in real-time) that entails the system to account for pollutants which have short-term impacts. It is equally important that most of these pollutants are measured continuously through an online monitoring network. Since in present case air quality has been monitored manually on 24-hourly twice a week basis for one season, real- time air quality information is not possible. However, the data collected over a season can significantly describe the category of air quality in corresponding period. The AQI Category for each of monitoring station has been found to be satisfactory **(Table 3.13)**.

Table 3.13 : AQI Category for Monitoring Station

Monitoring Station	Post-monsoon (2023)	
	AQI	AQI Category
AAQ-1	75	Satisfactory
AAQ-2	70	Satisfactory
AAQ-3	67	Satisfactory
AAQ-4	69	Satisfactory
AAQ-5	72	Satisfactory
AAQ-6	65	Satisfactory
AAQ-7	67	Satisfactory
AAQ-8	65	Satisfactory
AAQ-9	70	Satisfactory
AAQ-10	67	Satisfactory

Table 3.14 : AQI Category Index, CPCB

Good (0–50)	Minimal Impact	**Poor (201–300)**	Breathing discomfort to people on prolonged exposure
Satisfactory (51–100)	Minor breathing discomfort to sensitive people	**Very Poor (301–400)**	Respiratory illness to the people on prolonged exposure
Moderate (101–200)	Breathing discomfort to the people with lung, heart disease, children, and older adults	**Severe (>401)**	Respiratory effects even on healthy people

(Source : app.cpcbccr.com › ccrdocs › AQI -Calculator)

3.7. Noise Environment

Ambient Noise Level monitoring is one of the essential components of EIA study. Such assessment helps in evaluating the existing noise levels and suggesting appropriate mitigation measures to minimize the potential impact from proposed development in the projects.

3.7.1. *Attributing to Noise Pollution in and Around Project Area*

Noise after a certain level can have a very disturbing effect on the people and animals exposed to it. Hence, it is important to assess the present noise quality of the area to predict the potential impact of future noise levels due to the proposed project**.**

The existing causes of ambient noise in and around project area are majorly due to community sources and vehicular movement. Noise due to proposed project is envisaged during construction activities, heavy construction vehicles during construction phase and during operation phase it shall be due to operation of machineries like pumps, motors, DG set etc. and vehicular movement.

3.7.2. *Methodology:*

The noise monitoring shall be done following CPCB protocol of Noise Monitoring, July 2015, which inter alia include the following cardinal principles:

- The Noise measurements shall be made with a Type 1 integrating sound level meter. The station should be located at the ambient level i.e. away from the direct source, away from any vibration and any obstruction.
- Microphone must be placed 1.2 -1.5m above the ground level.
- The instrument should be isolated from strong vibration and shock.
- The monitoring should be carried out minimum 75% of the prescribed Day time (06.00 am to 22.00 pm) and Night time (22.00 pm to 06.00 am).
- During ambient noise monitoring sound comes from more than one direction, it is important to choose a microphone and mounting which gives the best possible omni directional characteristics.
- Noise measurements should not be made in fog and rain.
- A wind shield will be used at all times to prevent interference of reflecting noise.

3.7.3. *Selection criteria for noise Monitoring Location*

An assessment of baseline noise quality was undertaken

a) To establish the status of exposure of the major sensitive receptors, and
b) To identify the noise pollution levels in and around the site.

The baseline study for noise levels in the study area has been carried out by selecting a noise monitoring station based on the following criteria.

- Environmental setting of the area.
- Source of the noise.
- Proximity of the noise generating source to the human settlements.

Based on the above, noise monitoring was carried out at eight monitoring location. Details of the Monitoring location is as shown in **Table 3.15** and **Figure 3.28**

3.7.4. *Monitoring Frequency*

24 hr Ambient noise monitoring was carried out once during winter season at ten locations using noise level meter.

Table 3.15 : Ambient Noise Quality Monitoring Locations

Location Code	Location	Direction w.r.t Plant site with approx. distance	Zone	Tentative Geo-coordinates
N-1	Project Site	Plant site	Industrial	25° 8'37.86"N 81°58'17.45"E
N-2	Salaya Kala near Ash pond	0.44 km SW	Industrial	25° 6'42.13"N 81°55'13.85"E
N-3	Patai Dandi village	1.5 km N	Residential	25° 9'43.77"N 81°57'34.34"E
N-4	NTPC Meja Road	Along eastern boundary of plant	Commercial	25° 8'26.59"N 81°58'36.82"E
N-5	Pura Salaiya	Along South boundary of plant	Industrial	25° 7'52.29"N 81°57'2.15"E
N-6	Son Barsi	2.7 km SE	Residential	25° 7'2.13"N 81°58'32.26"E
N-7	SH-135 C Kohdarghat Road	0.7 km, NE	Commercial	25° 8'46.12"N 81°58'42.34"E
N-8	Piprau village	1.8 km W	Residential	25° 8'31.66"N 81°54'2.86"E
N-9	Kohdar village	0.9 km East (nearest settlement)	Residential	25°8'29.61"N 81°59'13.47"E
N-10	Maikhurd Village	0.86 km NW (nearest settlement)	Residential	25° 9'20.57"N 81°55'40.29"E

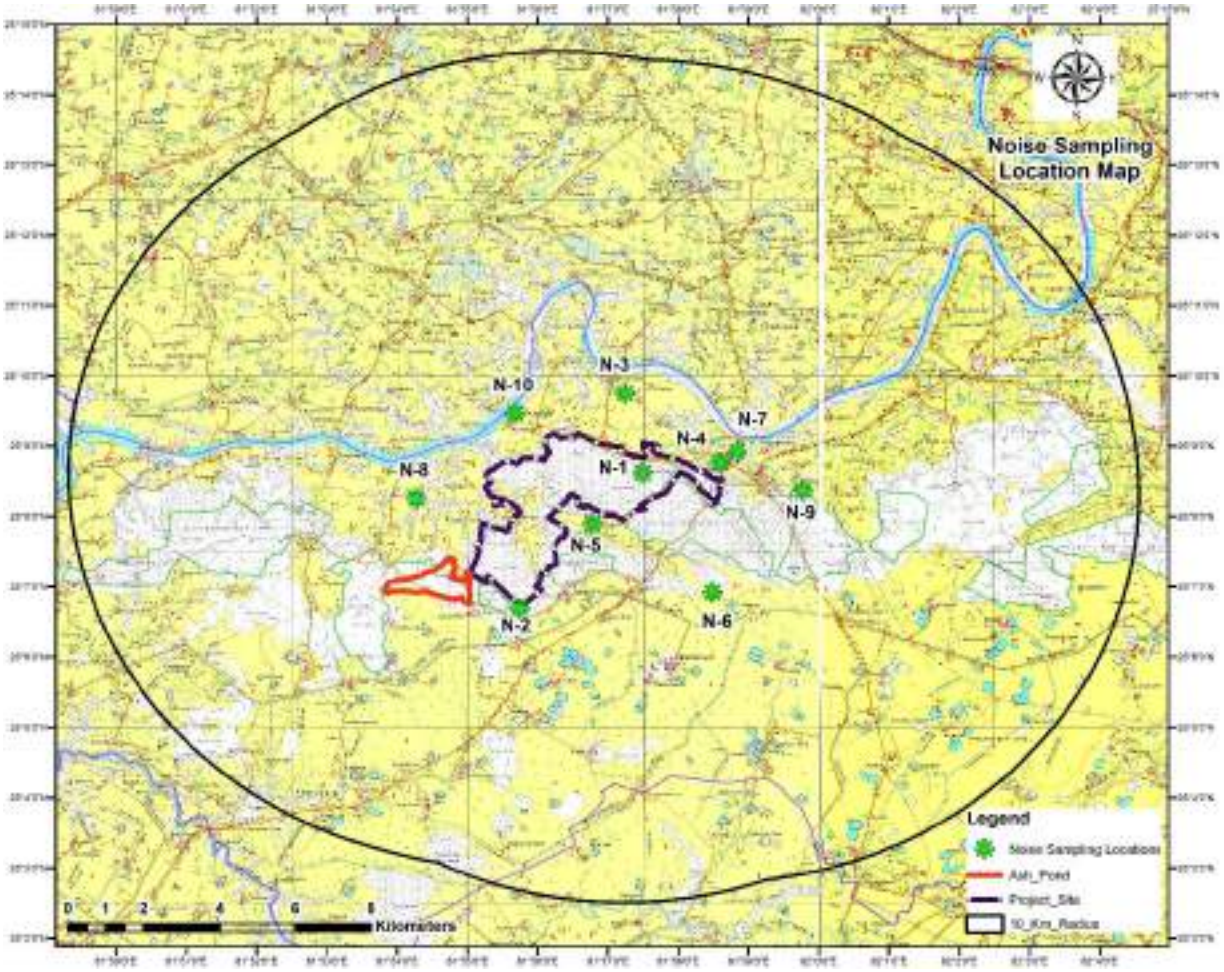


Figure 3.28 : Noise Location Map

Ministry of Environment, Forests & Climate Change (MoEFCC) has notified the noise standards vide gazette notification dated December 14, 2000 for different zones under the Environment Protection Act (1986). These standards are given in **Table 3.16**.

Table 3.16 : Ambient Noise Quality Standards

Area Code	Category of Area	Noise dB(A) Leq	
		Day time*	Night time*
A	Residential Zone	55	45
B	Silence Zone*	50	40
C	Industrial Zone	75	70
D	Commercial Zone	65	55

*Note:*Daytime is from 6.00am to 10.00 pm and Night time is from 10.00 pm to 6.00 am.*
**Silence zone is defined as area up to 100 meters around premises of hospitals, educational institutions and courts. Use of vehicle hours, loudspeakers and bursting of crackers are banned in these zones.*

3.7.5. *Result and Conclusion:*

Location wise result for daytime and night-time Leq is presented in **Table 3.17**.

Table 3.17 : Ambient Noise Quality in the Study Area

Location Code	Location Name	Category	Day time Leq dB(A)	Standard Day time Leq; dB(A)	Nighttime Leq; dB(A)	Standard Nighttime Leq; dB(A)
N-1	Project Site	Industrial	59.8	75	52.1	70
N-2	Salaya Kala near Ash pond	Industrial	54.5	75	43.8	70
N-3	Patai Dandi village	Residential	52.8	55	41.6	45
N-4	NTPC Meja Road	Commercial	58.3	65	50.4	55
N-5	Pura Salaiya	Residential	52.2	55	41.8	45
N-6	Son Barsi	Residential	50.2	55	40.3	45
N-7	SH-135 C Kohdarghat Road	Commercial	60.4	65	53.9	55
N-8	Piprau village	Residential	51.4	55	41.2	45
N-9	Kohdar village	Residential	52.0	55	41.7	45
N-10	Maikhurd Village	Residential	50.9	55	40.8	45

Source: Primary Data Collection

3.7.6. *Interpretation and inference*

The noise level is within the prescribed limit in all the monitoring stations. The noise monitoring shows that day and night-time noise levels are found well within the respective category standards. The noise level was found slightly higher compared to other location at identified commercial/mixed used area due to its proximity to road leading to vehicular traffic noise and commercial activities in the area. The major source of the noise in the study area is the community noise and vehicular movement.

3.7.7. *Additional Noise Monitoring at Sensitive Locations*

Addition noise monitoring was also conducted at sensitive locations like school, college and hospital present in the study area. Details of the monitoring results is presented in following table:

Table 3.18 Ambient Noise Quality in Sensitive locations

Location Code	Location Name	Category	Day time Leq dB(A)	Standard Day time Leq; dB(A)	Nighttime Leq; dB(A)	Standard Nighttime Leq; dB(A)

N-1	ST. Joseph's School in NTPC colony	Sensitive	45.4	50	37.4	40
N-2	Vijay Degree Colloege Salaiya Khurd	Sensitive	43.2	50	38.9	40
N-3	Arogyam Hospital NTPC Colony	Sensitive	44.3	50	39.6	40

Source: Primary Data Collection

The noise level in the sensitive locations was found is within the prescribed limit in all the monitoring stations. The noise monitoring shows that day and night-time noise levels are found well within the sensitive category standards.

3.8. Water Quality

Selected water quality parameters for ground water and surface water in the study area have been sampled and monitored for assessing the water quality and evaluating the impact on quality by plant.

The purpose of evaluating the water quality are:

- Assessing the ground water and surface water quality characteristics of critical parameters
- Predict the impact on water quality by the project and its activities

3.8.1. *Ground Water Quality*

Twelve ground water samples were collected from different locations around the site during study period (October to December 2023). Sample were collected from different hotspots like nearby schools, village and near ash pond etc. The water samples were examined for physico-chemical parameters and bacteriological parameters. The samples were collected and analysed as per the procedures specified in Standard Methods. Samples for chemical analyses were collected in polyethylene carboys. Samples for bacteriological analyses were collected in sterilized bottles. Temperature, pH, conductivity were measured at site itself. Ground water sample were analyzed for various parameters and assessed using the IS 10500:2012.

The name of ground water sampling locations is presented in **Table 3.19 and Figure 3.29.** The analysis results of groundwater for October, November and December 2023 months are presented in **Table 3.20 to Table 3.22.**

Table 3.19 : Ground Water Sampling Locations

S. No	Location	Distance & Direction	Geographical Coordinates of	Source

			Monitoring Location	
GW1	Project Site (Outside plant boundary)	Plant site	25° 8'17.30"N 81°56'27.29"E	Borewell
GW2	Salaya Kala near Ash pond	0.70 km SW	25° 6'42.13"N 81°55'13.85"E	Handpump
GW3	Patai Dandi village Near Primary school Sulamai	1.5 km NE	25°10'24.78"N 81°57'12.77"E	Borewell
GW4	Primary School Mai Khurd	0.5 km NW	25° 8'45.16"N 81°55'7.25"E	Handpump
GW5	Kohdar near st Joseph school	1.5 km East	25° 8'33.93"N 81°59'2.59"E	Handpump
GW6	Son Barsi	2.7 km SE	25° 7'2.13.00"N 81°58'32.26"E	Handpump
GW7	Piprau Village	1.9 km W	25° 8'39.17"N 81°54'8.62"E	Handpump
GW8	Piprau village elementary school	1.8 km W	25° 8'31.66"N 81°54'2.86"E	Borewell
GW9	Son Barsi village near school	1.9 km SE	25° 7'4.71"N 81°58'35.99"E	Handpump
GW10	Dasauti village near Primary School Panasi	2.0 km S	25° 5'56.88"N 81°55'49.23"E	Borewell
GW11	Rithaiya village	5.6 km NE	25°10'55.63"N 81°59'55.12"E	Borewell
GW12	Gadeva Village	3.5 km East	25° 8'48.47"N 82° 0'42.56"E	Borewell
Source: Monitoring Plan				

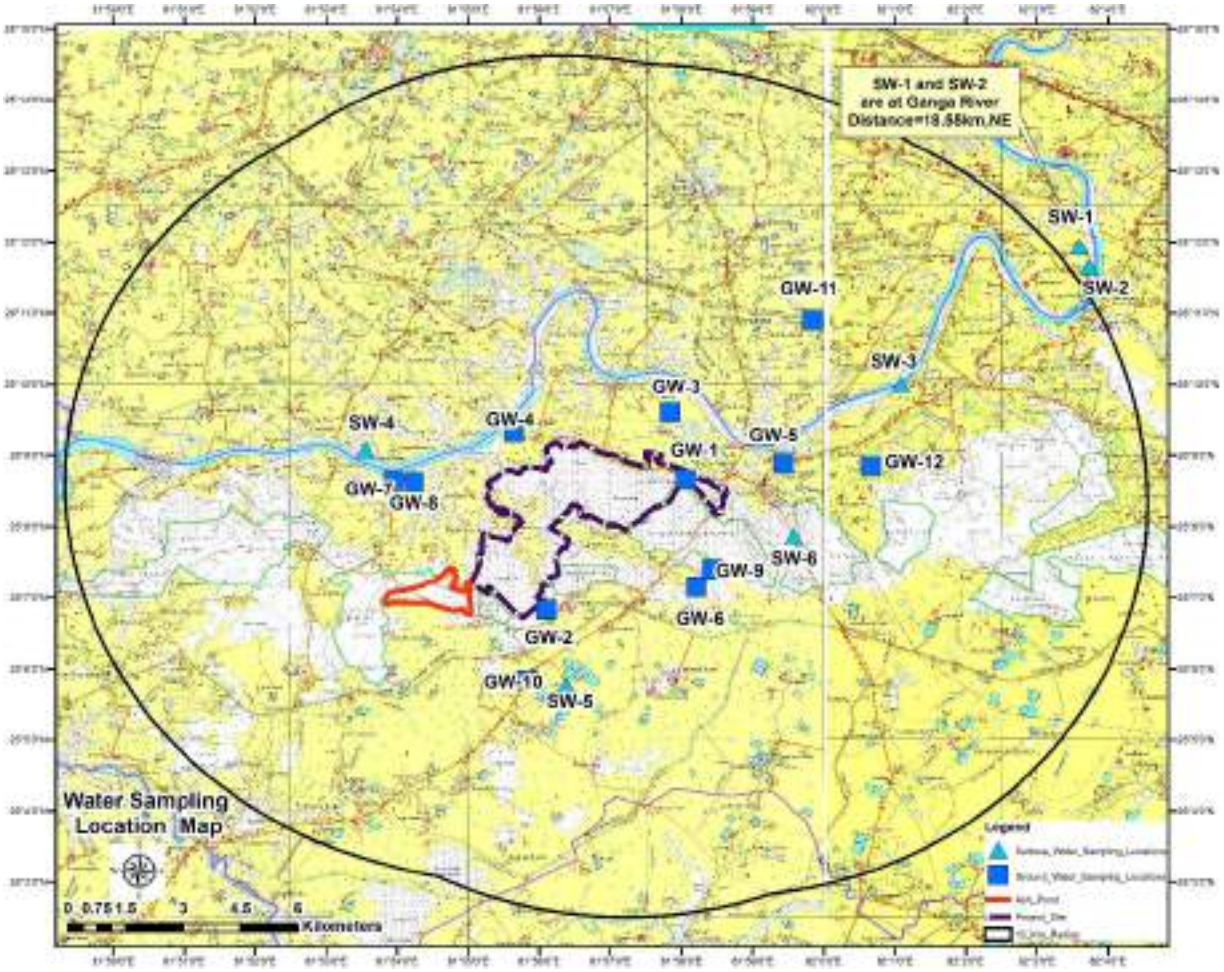


Figure 3.29 : Water Location Map

Table 3.20 : Ground Water Quality in the Study Area (Oct 2023)

S.No	Parameter	Unit	Requirement IS: 10500		GW-1	GW-2	GW-3	GW-4	GW-5	GW-6
			Acceptable Limit	Permissible Limit						
1	pH value	-	6.5-8.5	-	6.89	7.43	7.52	7.26	7.58	7.76
2	Temperature	° C	-	-	25.2	24.8	24.6	24.1	23.8	26.2
3	Conductivity	µmhos/cm	-	-	483	388	1298	952	555	874
4	Total dissolve solid (TDS)	mg/l	500	2000	324	260	870	638	372	586
5	Total Suspended solids (TSS)	mg/l	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
6	Total Hardness (as $CaCO_3$)	mg/l	200	600	192	152	540	416	170	275
7	Alkalinity (as$CaCO_3$)	mg/l	200	600	56	138	252	225	245	254
8	Chloride (as Cl)	mg/l	250	1000	66	52	63	270	130	155
9	Calcium (as Ca)	mg/l	75	200	47	36	130	77	43	41
10	Magnesium (as Mg)	mg/l	30	100	19	15	52	31	17	16
11	Fluoride (as F)	mg/l	1	1.5	0.56	0.61	0.68	0.66	0.51	0.48
12	Sulphate (as SO_4)	mg/l	200	400	21	18	44	38	34	36
13	Iron (as Fe)	mg/l	1	NR	0.15	0.13	0.1	0.14	0.48	0.12
14	Phosphate (as PO_4)	mg/l	0.03	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Silica (Sio_2)	mg/l	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
16	Chemical Oxygen Demand	mg/l	-	-	NA	NA	NA	NA	NA	NA
17	Bio- Chemical Oxygen Demands(for3Days27˚C)	mg/l	-	-	NA	NA	NA	NA	NA	NA
18	Dissolve Oxygen	mg/l	-	-	NA	NA	NA	NA	NA	NA
19	Oil & Grease	mg/l	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
20	Sodium (as Na)	mg/l	-	-	38.1	25	50.1	26.6	50.2	150.2
21	Potassium (as K)	mg/l	-	-	3.2	11	0.38	3.1	1.68	0.62
22	Nitrate (as NO_3)	mg/l	45	NR	5.8	8.9	4.4	7.9	6.8	5.1
23	Selenium (as Se)	mg/l	0.01	NR	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Copper (as Cu)				<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

S.No	Parameter	Unit	Requirement IS: 10500		GW-1	GW-2	GW-3	GW-4	GW-5	GW-6
			Acceptable Limit	Permissible Limit						
25	Zinc (as Zn)	mg/l	5.0	15	0.15	0.47	0.09	0.08	0.17	0.11
26	Phenolic Compound as (C_6H_5OH)	mg/l	0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27	Cadmium (as Cd)	mg/l	0.003	NR	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
28	Lead (as Pb)	mg/l	0.01	NR	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
29	Mercury (as Hg)	mg/l	0.001	NR	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
30	Arsenic (as As)	mg/l	0.01	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
31	Total Chromium (as Cr)	mg/l	0.05	NR	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
32	Total Coliform	MPN	Absent/100 ml	-	Absent	Absent	Absent	Absent	Absent	Absent
33	Fecal Coliform	MPN	Absent/100 ml	-	Absent	Absent	Absent	Absent	Absent	Absent

NA: Not

Table 3.20 : continued……Ground Water Quality in the Study Area (Oct 2023)

S.No	Parameter	Unit	Requirement IS: 10500		GW-7	GW-8	GW-9	GW-10	GW-11	GW-12
			Acceptable Limit	Permissible Limit						
1	pH value	-	6.5-8.5	-	7.13	7.38	6.91	7.48	7.29	7.11
2	Temperature	^{o} C	-	-	24.6	24.8	24.2	24.6	24.0	24.7
3	Conductivity	µmhos/cm	-	-	1056	385	477	564	803	501
4	Total dissolve solid (TDS)	mg/l	500	2000	708	258	320	378	538	336
5	Total Suspended solids (TSS)	mg/l	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
6	Total Hardness (as $CaCO_3$)	mg/l	200	600	344	148	192	176	316	184
7	Alkalinity (as$CaCO_3$)	mg/l	200	600	284	142	62	248	245	155
8	Chloride (as Cl)	mg/l	250	1000	309	40	68	132	170	72
9	Calcium (as Ca)	mg/l	75	200	50	35	46	43	75	44

S.No	Parameter	Unit	Requirement IS: 10500		GW-7	GW-8	GW-9	GW-10	GW-11	GW-12
			Acceptable Limit	Permissible Limit						
10	Magnesium (as Mg)	mg/l	30	100	20	14	19	16.8	30	18
11	Fluoride (as F)	mg/l	1	1.5	0.56	0.32	0.56	0.51	0.61	0.56
12	Sulphate (as SO_4)	mg/l	200	400	46	15	20.5	36	35	28
13	Iron (as Fe)	mg/l	1	NR	0.12	0.12	0.15	0.49	0.14	0.14
14	Phosphate (as PO_4)	mg/l	0.03	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Silica (Sio_2)	mg/l	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
16	Chemical Oxygen Demand	mg/l	-	-	NA	NA	NA	NA	NA	NA
17	Bio- Chemical Oxygen Demands(for3Days27˚C)	mg/l	-	-	NA	NA	NA	NA	NA	NA
18	Dissolve Oxygen	mg/l	-	-	NA	NA	NA	NA	NA	NA
19	Oil & Grease	mg/l	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
20	Sodium (as Na)	mg/l	-	-	130.1	20.1	37.5	52.1	138.1	34.2
21	Potassium (as K)	mg/l	-	-	0.57	9.52	3.1	1.58	1.12	2.8
22	Nitrate (as NO_3)	mg/l	45	NR	5.1	5.2	5.2	6.8	7.1	6.6
23	Selenium (as Se)	mg/l	0.01	NR	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Copper (as Cu)				<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Zinc (as Zn)	mg/l	5.0	15	0.15	0.47	0.09	0.08	0.17	0.11
26	Phenolic Compound as (C_6H_5OH)	mg/l	0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27	Cadmium (as Cd)	mg/l	0.003	NR	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
28	Lead (as Pb)	mg/l	0.01	NR	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
29	Mercury (as Hg)	mg/l	0.001	NR	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
30	Arsenic (as As)	mg/l	0.01	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
31	Total Chromium (as Cr)	mg/l	0.05	NR	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
32	Total Coliform	MPN	Absent/100 ml	-	Absent	Absent	Absent	Absent	Absent	Absent
33	Fecal Coliform	MPN	Absent/100 ml	-	Absent	Absent	Absent	Absent	Absent	Absent

Table 3.21 : Ground Water Quality in the Study Area (Nov 2023)

S.No	Parameter	Unit	Requirement IS: 10500		GW-1	GW-2	GW-3	GW-4	GW-5	GW-6
			Acceptable Limit	Permissible Limit						
1	pH value	-	6.5-8.5	-	6.91	7.44	7.53	7.28	7.58	7.77
2	Temperature	^{o} C			22.5	21.8	22.5	22.4	23.5	22.4
3	Conductivity	µmhos/cm			486	391	1300	955	562	877
4	Total dissolve solid (TDS)	mg/l	500	2000	326	262	871	640	376	588
5	Total Suspended solids (TSS)	mg/l			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
6	Total Hardness (as $CaCO_3$)	mg/l	200	600	198	154	542	417	172	276
7	Alkalinity (as$CaCO_3$)	mg/l	200	600	57	138	254	226	244	256
8	Chloride (as Cl)	mg/l	250	1000	66.5	52.5	64	272	132	156
9	Calcium (as Ca)	mg/l	75	200	47	36.5	13.5	77.1	43.8	42
10	Magnesium (as Mg)	mg/l	30	100	19.1	15.3	52.5	31.5	17.8	16.4
11	Fluoride (as F)	mg/l	1	1.5	0.58	0.62	0.67	0.65	0.52	0.49
12	Sulphate (as SO_4)	mg/l	200	400	21.2	18.5	44.1	39.1	35.5	36.4
13	Iron (as Fe)	mg/l	1	NR	0.16	0.14	0.11	0.14	0.29	0.13
14	Phosphate (as PO_4)	mg/l	0.03	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Silica (Sio_2)	mg/l	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
16	Chemical Oxygen Demand	mg/l	-	-	NA	NA	NA	NA	NA	NA
17	Bio- Chemical Oxygen Demands(for3Days27˚C)	mg/l	-	-	NA	NA	NA	NA	NA	NA
18	Dissolve Oxygen	mg/l	-	-	NA	NA	NA	NA	NA	NA
19	Oil & Grease	mg/l	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
20	Sodium (as Na)	mg/l	-	-	39.1	26.1	50.8	27.1	51.5	151.2
21	Potassium (as K)	mg/l	-	-	3.5	11.2	0.38	3.4	1.69	0.64
22	Nitrate (as NO_3)	mg/l	45	NR	5.9	8.9	4.4	7.9	6.9	5.1
23	Selenium (as Se)	mg/l	0.01	NR	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Copper (as Cu)				<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Zinc (as Zn)	mg/l	5.0	15	0.15	0.47	0.09	0.08	0.17	0.11

S.No	Parameter	Unit	Requirement IS: 10500		GW-1	GW-2	GW-3	GW-4	GW-5	GW-6
			Acceptable Limit	Permissible Limit						
26	Phenolic Compound as (C_6H_5OH)	mg/l	0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27	Cadmium (as Cd)	mg/l	0.003	NR	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
28	Lead (as Pb)	mg/l	0.01	NR	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
29	Mercury (as Hg)	mg/l	0.001	NR	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
30	Arsenic (as As)	mg/l	0.01	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
31	Total Chromium (as Cr)	mg/l	0.05	NR	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
32	Total Coliform	MPN	Absent/100 ml	-	Absent	Absent	Absent	Absent	Absent	Absent
33	Fecal Coliform	MPN	Absent/100 ml	-	Absent	Absent	Absent	Absent	Absent	Absent

NR denotes no relaxations.

Table 3.21 : continued……Ground Water Quality in the Study Area (Novovember 2023)

S.No	Parameter	Unit	Requirement IS: 10500		GW-7	GW-8	GW-9	GW-10	GW-11	GW-12
			Acceptable Limit	Permissible Limit						
1	pH value	-	6.5-8.5	-	7.14	7.39	6.92	7.49	7.3	7.12
2	Temperature	^{o} C			22.2	23.1	22.8	22.5	23.1	22.2
3	Conductivity	µmhos/cm			1062	388	481	565	809	503
4	Total dissolve solid (TDS)	mg/l	500	2000	712	260	322	379	540	337
5	Total Suspended solids (TSS)	mg/l			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
6	Total Hardness (as $CaCO_3$)	mg/l	200	600	346	149	193	177	317	185
7	Alkalinity (as$CaCO_3$)	mg/l	200	600	285	143	62.5	245	246	156
8	Chloride (as Cl)	mg/l	250	1000	310	41	68.4	133	171	72.4
9	Calcium (as Ca)	mg/l	75	200	51	35.6	46.2	43.5	75.2	44.2
10	Magnesium (as Mg)	mg/l	30	100	20.5	14.2	19.2	16.8	30.5	18.4

S.No	Parameter	Unit	Requirement IS: 10500		GW-7	GW-8	GW-9	GW-10	GW-11	GW-12
			Acceptable Limit	Permissible Limit						
11	Fluoride (as F)	mg/l	1	1.5	0.57	0.33	0.57	0.52	0.62	0.56
12	Sulphate (as SO_4)	mg/l	200	400	46.1	15.5	20.8	36.2	37.5	28.4
13	Iron (as Fe)	mg/l	1	NR	0.12	0.13	0.15	0.49	0.14	0.15
14	Phosphate (as PO_4)	mg/l	0.03	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Silica (Sio_2)	mg/l	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
16	Chemical Oxygen Demand	mg/l	-	-	NA	NA	NA	NA	NA	NA
17	Bio- Chemical Oxygen Demands(for3Days27˚C)	mg/l	-	-	NA	NA	NA	NA	NA	NA
18	Dissolve Oxygen	mg/l	-	-	NA	NA	NA	NA	NA	NA
19	Oil & Grease	mg/l	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
20	Sodium (as Na)	mg/l	-	-	130.9	20.8	37.9	52.8	138.4	34.8
21	Potassium (as K)	mg/l	-	-	0.58	9.53	3.4	1.61	1.13	2.8
22	Nitrate (as NO_3)	mg/l	45	NR	5.1	5.1	5.3	6.7	7.2	6.7
23	Selenium (as Se)	mg/l	0.01	NR	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Copper (as Cu)				<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Zinc (as Zn)	mg/l	5.0	15	0.15	0.47	0.09	0.08	0.17	0.11
26	Phenolic Compound as (C_6H_5OH)	mg/l	0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27	Cadmium (as Cd)	mg/l	0.003	NR	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
28	Lead (as Pb)	mg/l	0.01	NR	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
29	Mercury (as Hg)	mg/l	0.001	NR	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
30	Arsenic (as As)	mg/l	0.01	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
31	Total Chromium (as Cr)	mg/l	0.05	NR	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
32	Total Coliform	MPN	Absent/100 ml	-	Absent	Absent	Absent	Absent	Absent	Absent
33	Fecal Coliform	MPN	Absent/100 ml	-	Absent	Absent	Absent	Absent	Absent	Absent

NR denotes no relaxations

Table 3.22 : Ground Water Quality in the Study Area (December 2023)

S.No	Parameter	Unit	Requirement IS: 10500		GW-1	GW-2	GW-3	GW-4	GW-5	GW-6
			Acceptable Limit	Permissible Limit						
1	pH value	-	6.5-8.5	-	6.92	7.43	7.54	7.29	7.57	7.78
2	Temperature	^{o} C			21.1	21.5	22.2	21.4	22.4	20.5
3	Conductivity	µmhos/cm			490	543	1305	958	564	881
4	Total dissolve solid (TDS)	mg/l	500	2000	328	364	874	642	378	590
5	Total Suspended solids (TSS)	mg/l			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
6	Total Hardness (as $CaCO_3$)	mg/l	200	600	198	156	544	418	173	277
7	Alkalinity (as$CaCO_3$)	mg/l	200	600	56	137	255	228	245	257
8	Chloride (as Cl)	mg/l	250	1000	67	53	64	273	133	157
9	Calcium (as Ca)	mg/l	75	200	47.5	37	14	77.5	44	42.6
10	Magnesium (as Mg)	mg/l	30	100	19.1	16	53	32	18	16.8
11	Fluoride (as F)	mg/l	1	1.5	0.58	0.64	0.67	0.65	0.53	0.49
12	Sulphate (as SO_4)	mg/l	200	400	21.5	18.9	45	40	35.6	36.4
13	Iron (as Fe)	mg/l	1	NR	0.16	0.14	0.11	0.14	0.29	0.13
14	Phosphate (as PO_4)	mg/l	0.03	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Silica (Sio_2)	mg/l	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
16	Chemical Oxygen Demand	mg/l	-	-	NA	NA	NA	NA	NA	NA
17	Bio- Chemical Oxygen Demands(for3Days27˚C)	mg/l	-	-	NA	NA	NA	NA	NA	NA
18	Dissolve Oxygen	mg/l	-	-	NA	NA	NA	NA	NA	NA
19	Oil & Grease	mg/l	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
20	Sodium (as Na)	mg/l	-	-	39.8	27.3	51.2	27.9	52.1	152.1
21	Potassium (as K)	mg/l	-	-	3.8	11.4	0.39	3.8	1.71	0.66
22	Nitrate (as NO_3)	mg/l	45	NR	5.9	8.9	4.4	7.9	6.9	5.1
23	Selenium (as Se)	mg/l	0.01	NR	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Copper (as Cu)				<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Zinc (as Zn)	mg/l	5.0	15	0.15	0.47	0.09	0.08	0.17	0.11

S.No	Parameter	Unit	Requirement IS: 10500		GW-1	GW-2	GW-3	GW-4	GW-5	GW-6
			Acceptable Limit	Permissible Limit						
26	Phenolic Compound as (C_6H_5OH)	mg/l	0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27	Cadmium (as Cd)	mg/l	0.003	NR	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
28	Lead (as Pb)	mg/l	0.01	NR	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
29	Mercury (as Hg)	mg/l	0.001	NR	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
30	Arsenic (as As)	mg/l	0.01	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
31	Total Chromium (as Cr)	mg/l	0.05	NR	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
32	Total Coliform	MPN	Absent/100 ml	-	Absent	Absent	Absent	Absent	Absent	Absent
33	Fecal Coliform	MPN	Absent/100 ml	-	Absent	Absent	Absent	Absent	Absent	Absent

NR denotes no relaxations.

Table 3.22 : continued……Ground Water Quality in the Study Area (December 2023)

S.No	Parameter	Unit	Requirement IS: 10500		GW-7	GW-8	GW-9	GW-10	GW-11	GW-12
			Acceptable Limit	Permissible Limit						
1	pH value	-	6.5-8.5	-	7.15	7.38	6.95	7.5	7.31	7.13
2	Temperature	^{o} C			22.1	22.4	21.4	21.6	22.5	21.8
3	Conductivity	µmhos/cm			1066	391	484	567	807	504
4	Total dissolve solid (TDS)	mg/l	500	2000	714	262	324	380	541	338
5	Total Suspended solids (TSS)	mg/l			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
6	Total Hardness (as $CaCO_3$)	mg/l	200	600	348	149	194	178	318	186
7	Alkalinity (as$CaCO_3$)	mg/l	200	600	284	144	63	246	247	157
8	Chloride (as Cl)	mg/l	250	1000	311	42	69	133	172	73
9	Calcium (as Ca)	mg/l	75	200	51.2	36	46.8	43.8	75.6	44.6
10	Magnesium (as Mg)	mg/l	30	100	21	14.6	19.7	16.8	30.8	18.7

S.No	Parameter	Unit	Requirement IS: 10500		GW-7	GW-8	GW-9	GW-10	GW-11	GW-12
			Acceptable Limit	Permissible Limit						
11	Fluoride (as F)	mg/l	1.0	1.5	0.57	0.33	0.58	0.53	0.63	0.56
12	Sulphate (as SO_4)	mg/l	200	400	47	16	20.8	36.4	37.5	28.6
13	Iron (as Fe)	mg/l	1	NR	0.12	0.13	0.15	0.49	0.14	0.15
14	Phosphate (as PO_4)	mg/l	0.03	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Silica (Sio_2)	mg/l	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
16	Chemical Oxygen Demand	mg/l	-	-	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
17	Bio- Chemical Oxygen Demands(for3Days27˚C)	mg/l	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
18	Dissolve Oxygen	mg/l	-	-	6.5	6.7	6.4	6.6		
19	Oil & Grease	mg/l	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
20	Sodium (as Na)	mg/l	-	-	131.6	22.4	38.1	52.9	138.8	35.1
21	Potassium (as K)	mg/l	-	-	0.59	9.69	3.6	1.63	1.14	2.9
22	Nitrate (as NO_3)	mg/l	45	NR	5.1	5.1	5.4	6.7	7.2	6.8
23	Selenium (as Se)	mg/l	0.01	NR	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Copper (as Cu)				<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Zinc (as Zn)	mg/l	5.0	15	0.15	0.47	0.09	0.08	0.17	0.11
26	Phenolic Compound as (C_6H_5OH)	mg/l	0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27	Cadmium (as Cd)	mg/l	0.003	NR	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
28	Lead (as Pb)	mg/l	0.01	NR	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
29	Mercury (as Hg)	mg/l	0.001	NR	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
30	Arsenic (as As)	mg/l	0.01	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
31	Total Chromium (as Cr)	mg/l	0.05	NR	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
32	Total Coliform	MPN	Absent/100 ml	-	Absent	Absent	Absent	Absent	Absent	Absent
33	Fecal Coliform	MPN	Absent/100 ml	-	Absent	Absent	Absent	Absent	Absent	Absent

NR denotes no relaxations. *Source: Water Analysis during study period*

3.2.1.1 *Observation on Ground Water Quality*

- The pH value of drinking water is an important index of acidity or alkalinity. pH value of the sample varies from 6.89 to 7.78 in all locations, which is well within the specified standard of 6.5 to 8.5.
- Electric Conductivity levels vary from 385 to 1305 µmhos/cm. Total dissolved solids range from 258 to 874 mg/l which is found within the permissible limit as per IS:10500.
- The total hardness is an important parameter of water quality. The hardness values in ground water of the study area ranges between 148 to 544 mg/l which is well within the permissible limit at all locations. The Calcium values in ground water of the study area are well within the specified permissible limit. Magnesium values in ground water of the study area are also well within the specified permissible limit of Indian drinking water standard.
- The Chloride values in ground water of the study area ranges between 40 to 311 mg/l which is also well within the permissible limit.
- No biological and metallic contamination has been found in any of the ground water sample of the study area.
- Overall, the parameters in ground water sample were well within the permissible limit of Indian Standard IS: 10500-2012 at all locations.

3.8.2. *Surface Water Quality*

The Tons River flows approximately 1 km from the project site. Other surface water sources in the study area include a village pond and the NTPC water reservoir.

Surface water Sampling: Six surface water samples were collected from the study area. Sample were collected from Ganga River, Tons River and village ponds. The samples were collected and analysed as per the procedures specified in Standard Methods. Samples for chemical analyses were collected in polyethylene carboys. Samples for bacteriological analyses were collected in sterilized bottles. Temperature, pH, conductivity and dissolved oxygen were measured at site itself. Pond water sample were analyzed for various parameters and assessed using the CPCB's BDU Criteria. Surface water sampling location is presented in **Table 3.23 and Figure 3.29** and analysis results are presented in **Table 3.24 to 3.26**.

Table 3.23 : Surface Water Sampling Locations

Sample code	Location	Geographical Coordinates of Monitoring Location	Distance & Direction
SW-1	Ganga river near Intake Point (outside the study area)	25°16'19.11"N 82° 6'32.29"E	Out of study area (water source for the project)
SW-2	Ganga river d/s of Intake Point Bijora (outside the study area)	25°16'4.14"N 82° 5'36.20"E	Out of study area (water source for the project)
SW-3	Tons River d/s of site near Madaraha Village	25°10'1.00"N 82° 1'6.90"E	5.0 km NE
SW-4	Tons/ River u/s of site near Dhadhuva Village	25° 8'54.97"N 81°53'22.90"E	3.5 km West
SW-5	Pond Dasuati Village	25° 5'37.15"N 81°56'13.50"E	4.7 km S
SW-6	Pond near Khodar Pahari	25° 7'58.47"N 81°59'21.22"E	1.3 km SE

Source: Monitoring Plan

Table 3.24 : Surface Water Quality (October 2023)

Sl. No	Parameters	Unit	CPCB BDU Water Quality Criteria Class-C	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6
1	pH	-	6.0 -9.0	7.89	7.80	7.58	7.3	7.5	7.4
2	Temperature	ºC	-	24.8	24.1	24.3	23.4	25.4	23.9

Sl. No	Parameters	Unit	CPCB BDU Water Quality Criteria Class-C	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6
3	Conductivity	µmhos/cm	-	380	388	323	388	540	225
4	Chloride(as Cl)	mg/l	-	18	19	58	62	78	22
5	Total Alkalinity (as $CaCO_3$)	mg/l	-	144	148	104	116	64	48
6	Total Hardness(as CaCO3)	mg/l	-	120	124	108	124	80	56
7	Calcium (as Ca)	mg/l	-	28.9	29.1	26	30	19	13.4
8	Magnesium (as Mg)	mg/l	-	11.6	12.4	10	12	7.8	5.4
9	COD (as O2)	mg/l	-	13	15	13	12	48	42
10	BOD (3 days at 27^0C)	mg/l	3.0	3.0	2.9	2.9	2.7	8.1	7.2
11	Dissolve Oxygen	mg/l	4.0/ or more	6.4	6.6	6.3	6.4	4.4	4.6
12	Total Dissolved Solid	mg/l	-	240	247	170	186	357	124
13	Total Suspended Solid	mg/l	-	4.5	4.6	4	6	11	8
14	Nitrite (as NO_2)	mg/l	-	3.1	3.3	2.8	2.9	2.4	2.1
15	Phosphate (as P)	mg/l	-	0.21	0.22	0.35	0.39	0.28	0.19
16	Fluoride (as F)	mg/l	-	0.38	0.36	0.66	0.68	0.51	0.41
17	Sulphate (SO4)	mg/l	-	16.2	17.3	28	34	29	18
18	Iron (as Fe)	mg/l	-	0.28	0.24	0.23	0.35	0.14	0.19
19	Nitrate (as NO_3)	mg/l	-	3.2	3.5	4.1	4.5	3.9	3.5
20	Total Chromium (as Cr)	mg/l	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Sodium (as Na)	mg/l	-	13,6	14.3	10	14	36	8
22	Potassium (as K)	mg/l	-	1.6	1.7	1.9	1.9	8	7.2
23	Arsenic (as As)	mg/l	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Lead (as Pb)	mg/l	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
25	Copper (as Cu)	mg/l	-	<0.05	<0.05	0.06	<0.05	<0.05	0.08
26	Zinc (as Zn)	mg/l	-	0.22	0.28	0.11	0.13	0.19	0.35
27	Total Coliform	MPN	<5000	4220	4170	1460	1540	3450	3780

BDU: Designated Best Use

Table 3.25 : Surface Water Quality (Nov-2023)

S.No	Parameters	Unit	CPCB BDU Water Quality Criteria Class-C	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6
1	pH	-	6.0 -9.0	7.70	7.74	7.59	7.32	7.54	7.42
2	Temperature	ºC	-	23.8	23.7	23.1	22.7	22.1	23.1
3	Conductivity	µmhos/cm	-	367	374	328	392	548	229
4	Chloride(as Cl)	mg/l	-	16	17	59.2	63.1	78.1	22.5
5	Total Alkalinity (as $CaCO_3$)	mg/l	-	138	142	105	117	64.8	49.2
6	Total Hardness(as CaCO3)	mg/l	-	119	117	108.5	125	80.4	57.1
7	Calcium (as Ca)	mg/l	-	27.4	26.8	26.4	31.1	19.4	14.1
8	Magnesium (as Mg)	mg/l	-	12.4	12.1	11.1	12.4	7.9	5.9
9	COD (as O2)	mg/l	-	12	14	12	11	46	44
10	BOD (3 days at 27^0C)	mg/l	3.0	2.7	3.0	2.8	2.6	8.0	7.6
11	Dissolve Oxygen	mg/l	4.0/ or more	6.2	6.4	6.2	6.1	4.5	4.5
12	Total Dissolved Solid	mg/l	-	240	247	174	189	360	129
13	Total Suspended Solid	mg/l	-	4.6	4.7	4	6	11	8
14	Nitrite (as NO_2)	mg/l	-	3.4	3.2	2.7	2.8	2.5	2.2
15	Phosphate (as P)	mg/l	-	0.24	0.20	0.36	0.4	0.29	0.2
16	Fluoride (as F)	mg/l	-	0.34	0.36	0.67	0.69	0.5	0.42
17	Sulphate (SO4)	mg/l	-	15.6	16.1	28.1	34.6	30.1	18.4
18	Iron (as Fe)	mg/l	-	0.26	0.27	0.23	0.35	0.14	0.19
19	Nitrate (as NO_3)	mg/l	-	3.0	3.2	4.3	4.9	3.4	3.7
20	Total Chromium (as Cr)	mg/l	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Sodium (as Na)	mg/l	-	13,7	13.8	10	14	36	8
22	Potassium (as K)	mg/l	-	1.4	1.5	1.9	1.9	8	7.2
23	Arsenic (as As)	mg/l	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Lead (as Pb)	mg/l	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
25	Copper (as Cu)	mg/l	-	<0.05	<0.05	0.06	<0.05	<0.05	0.08

S.No	Parameters	Unit	CPCB BDU Water Quality Criteria Class-C	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6
26	Zinc (as Zn)	mg/l	-	0.26	0.25	0.11	0.13	0.19	0.35
27	Total Coliform	MPN	<5000	4450	4320	1420	1480	3510	3660

BDU: Designated Best Use, NS denote no Standard

Table 3.26 Surface Water Quality (December 2023)

S.No	Parameters	Unit	CPCB BDU Water Quality Criteria Class-C	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6
1	pH	-	6.0 -9.0	7.92	7.88	7.6	7.38	7.55	7.48
2	Temperature	ºC	-	23.0	22.9	21.7	22.2	21.1	21.2
3	Conductivity	µmhos/cm	-	384	385	330	396	552	231
4	Chloride(as Cl)	mg/l	-	19	20	60.2	64.2	79.1	23.5
5	Total Alkalinity (as $CaCO_3$)	mg/l	-	146	149	106	115	65.2	50.2
6	Total Hardness(as CaCO3)	mg/l	-	124	125	109	126	81	58.2
7	Calcium (as Ca)	mg/l	-	28.1	28.9	27.1	31.9	20.2	15.2
8	Magnesium (as Mg)	mg/l	-	13.0	12.8	11.5	12.6	7.9	5.9
9	COD (as O2)	mg/l	-	14	16	14	13	47	44
10	BOD (3 days at 27^0C)	mg/l	3.0	2.7	3.1	2.8	2.9	8.2	7.6
11	Dissolve Oxygen	mg/l	4.0/ or more	6.1	6.3	6.1	6.2	4.5	4.4
12	Total Dissolved Solid	mg/l	-	244	248	178	192	364	130
13	Total Suspended Solid	mg/l	-	4.2	4.4	4	6	11	8
14	Nitrite (as NO_2)	mg/l	-	3.3	3.2	2.9	2.8	2.8	2.5
15	Phosphate (as P)	mg/l	-	0.23	0.20	0.38	0.42	0.31	0.22

16	Fluoride (as F)	mg/l	-	0.33	0.38	0.67	0.7	0.52	0.43
17	Sulphate (SO4)	mg/l	-	17.0	16.9	28.1	34.6	30.1	18.4
18	Iron (as Fe)	mg/l	-	0.25	0.26	0.23	0.35	0.14	0.19
19	Nitrate (as NO_3)	mg/l	-	3.3	3.1	4.4	4.8	3.6	3.9
20	Total Chromium (as Cr)	mg/l	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Sodium (as Na)	mg/l	-	13.4	14.1	10.6	14.9	37	8.8
22	Potassium (as K)	mg/l	-	1.7	1.8	1.9	1.9	8	7.3
23	Arsenic (as As)	mg/l	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Lead (as Pb)	mg/l	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
25	Copper (as Cu)	mg/l	-	<0.05	<0.05	0.06	<0.05	<0.05	0.08
26	Zinc (as Zn)	mg/l	-	0.24	0.26	0.11	0.13	0.19	0.35
27	Total Coliform	MPN	<5000	4380	4360	1380	1610	3510	3740

BDU: Designated Best Use, NS denote no Standard

Observation on Surface water Quality:

Bacterial contamination was observed in the surface water sample. However, the river water quality was found to meet the Best Designated Use – 'C' Criteria of CPCB (i.e., Drinking water source after conventional treatment and disinfection). The pond water quality is not meeting the BDU criteria class C.

3.8.3. *Ground Water Quality Index*

WQI is defined as a rating reflecting the composite influence of different water quality parameters. WQI is calculated from the point of view of the suitability of water for human consumption. A quality rating scale (qi) for each parameter is assigned by dividing its concentration in each water sample by its respective standard according to the guidelines laid down in the BIS and the result multiply by 100.

$$qi = (Ci/Si) \times 100$$

Where qi is the quality rating, Ci is the concentration of each chemical parameter in each water sample in mg/l, and Si is the Indian drinking water standard for each chemical parameter in mg/l according to the guidelines. For computing the WQI, the SI is first determined for each chemical parameter, which is then used to determine the WQI as per the following equation.

$$SIi = Wi \times qi$$

$$WQI = \sum SIi$$

SIi is the sub-index of the ith parameter; qi is the rating based on concentration of ith parameter and n is the number of parameters. The computed WQI values are classified in to five types, "excellent water" to "water not suitable for drinking".

Table 3.27 : Water Quality Classification based on WQI Value

WQI value	Water quality
<50	Excellent
50-100	Good water
100-200	Poor water
200-300	Very Poor water
>300	Water not suitable for drinking

The Water Quality Index based on weighted average of 11 parameters (Total Hardness as $CaCO_3$, Calcium, Alkalinity, Chloride, Magnesium, TDS, Sulphate, Fluoride, pH, Iron, Nitrates) has been found to range between **Excellent to Good** as is evident from table 3.28 below:

Table 3.28 : Ground Water Quality Index

Season	Oct-2023	Classification	Nov-2023	Classification	Dec-2023	Classification
GW1	**43**	Excellent	44	Excellent	44	Excellent
GW2	**43**	Excellent	44	Excellent	46	Excellent
GW3	**81**	Good water	74	Good water	74	Good water
GW4	**73**	Good water	73	Good water	74	Good water
GW5	**64**	Good water	58	Good water	58	Good water
GW6	**59**	Good water	60	Good water	60	Good water
GW7	**70**	Good water	71	Good water	71	Good water
GW8	**38**	Excellent	39	Excellent	39	Excellent
GW9	**43**	Excellent	43	Excellent	44	Excellent
GW10	**64**	Good water	64	Good water	65	Good water
GW11	**66**	Good water	66	Good water	66	Good water
GW12	**47**	Excellent	48	Excellent	48	Excellent

3.2.1.2 *Surface Water Quality Index*

The Water Quality Index based on weighted average of 13 parameters (Total Hardness as $CaCO_3$, Calcium, Alkalinity, Chloride, Magnesium, TDS, DO, Sulphate, Fluoride, pH, BOD, Iron, Nitrates) has been found Good is evident from **Table 3.29.**

Table 3.29 : Surface Water Quality Index

Season	Oct-2023	Classification	Nov-2023	Classification	Dec-2023	Classification

SW1	67.8	Good Water	68.3	Good Water	66.3	Good Water
SW2	68.1	Good Water	68.8	Good Water	67.1	Good Water
SW3	70.4	Good Water	69.9	Good Water	69.3	Good Water
SW4	73.6	Good Water	71.4	Good Water	71.1	Good Water
SW5	52.6	Good Water	53.0	Good Water	53.0	Good Water
SW6	55.5	Good Water	54.3	Good Water	54.3	Good Water

3.9. Soil Quality

3.9.1. *Soil*

Soils may be defined as a thin layer of earth's crust that serves as a natural medium for the growth of plants. It is the unconsolidated mineral matter that has been subjected to and influenced by genetic and environmental factors. Soils serve as a reservoir of nutrients for plants and crops and provide mechanical anchorage and favorable tilts. Soil is our most important natural resource, and a natural resource is anything that comes from the earth and is used by us. We depend on the soil for food, clothing, shelter, minerals, clay & water. Soil is the seat of many macro & micro flora like algae, fungi, earthworms, bacteria etc. These are greatly beneficial in promoting soil reactions and decomposing the organic matter by which essential nutrients for plants are liberated. Most of the soils are made-up of two main parts:

- Tiny bits of mineral particles which come from larger rocks, and humus, which is dark brown in color and consists of decaying remains of plants and animals.
- Soil also contains water, air and living organisms, such as fungi, bacteria, earthworms, roundworms, insects, etc. Actually, more living organisms live in the soil than above it.

For general characterization of soil a few random samples from the study area to the depth of about 15-cm may be sufficient. Deeper soil samples may be needed only for the study of soil profile.

3.9.2. *Methodology*

The soil samples were collected from 10 selected locations during the study period of post monsoon season**.** The samples collected from all the locations were homogeneous representatives of each location. At random five sub-locations were identified at each location and soil samples were collected from 5 to 15 cm below the surface. It was uniformly mixed before homogenizing the soil samples. The samples about 500gms were packed in polythene bags labelled in the field with location & number and sent to the laboratory for the analysis of physicochemical parameters. The samples were dried and passed through a 2.0 mm sieve to prepare them for testing.

3.9.3. *Selection of Sampling Locations*

Ten Soil sampling locations were selected based on various land use conditions& agricultural practices.

3.9.4. *Soil Sampling Locations*

For studying soil quality in the study area, ten (10) sampling locations were selected to assess the existing soil conditions in and around the project site area representing various land use conditions. Soil sampling locations with their distance & directions w.r.t., the proposed project site is presented in **Table 3.30 and Figure 3.30.**

Table 3.30 : Soil Sampling Locations

Sampling Code	Sampling Locations	Geo-Coordinates	Source	Distance & Direction w.r.t. site
S-1	Project Site (Meja TPP Main Entry Gate)	25° 8'17.25"N 81°56'26.30"E	Open area/ site	Plant site
S-2	Salaya Kala near Ash Pond	25° 6'42.13"N 81°55'13.85"E	Agriculture field	0.52 km SW
S-3	Patai Dandi village	25° 9'43.77"N 81°57'34.34"E	Agriculture field	1.5 km NE
S-4	Rithaiya village	25°10'55.63"N 81°59'55.12"E	Agriculture field	5.6 km NE
S-5	Sukath near meja tehsil	25° 8'42.86"N 82° 4'9.52"E	Agriculture field	9.43 km East
S-6	Son Barsi	25° 7'2.13"N 81°58'32.26"E	Agriculture field	2.7 km SE
S-7	Gadeva Village	25° 8'48.47"N 82° 0'42.56"E	Agriculture field	3.5 km East
S-8	Piprau village	25° 8'31.66"N 81°54'2.86"E	Agriculture field	1.8 km NW
S-9	Kohdar village	25°8'29.61"N 81°59'13.47"E	Agriculture field	0.9 km East (nearest settlement)
S-10	Maikhurd Village	25° 9'20.57"N 81°55'40.29"E	Agriculture field	0.86 km NW (nearest settlement)

Source: Monitoring Plan

Figure 3.30 : Soil Location Map

3.9.5. *Analysis of Soil Samples*

The soil samples were examined for various physicochemical parameters, to determine the existing soil characteristics of the study area. Soil samples were collected from the vicinity of proposed project site. Physicochemical characteristics of soil are presented in **Table 3.31 to 3.32.**

Table 3.31 : Physiochemical Characteristics of Soil

S.No	Parameter	Unit	S-1	S-2	S-3	S-4	S-5
1	pH	-	7.59	7.87	7.78	7.61	7.64
2	Electrical Conductivity at 25^{o} C (1:5suspension.)	µmhos/cm	340	389	440	472	360
3	Sodium (as Na)	(mg/kg)	126	117	155	145	123
4	Water holding capacity	(%) by mass	29.8	27.9	30.2	28.28	29
5	Potassium (as K)	(kg/ha)	178	165	176	180	165

S.No	Parameter		Unit	S-1	S-2	S-3	S-4	S-5
	Texture			Sandy clay loam	Sandy clay loam	Sandy clay loam	Sandy clay loam	Sandy clay loam
6	Grain Size	Sand	(%) by mass)	57.5	56.5	56.9	55.2	56.2
		Clay	(%) by mass)	27.1	28.1	28.5	27.1	29.8
		Silt	(%) by mass)	15.4	15.4	14.6	17.7	14
7	Calcium (as Ca)		(mg/kg)	1451	1477	1877	1426.9	1086
8	Magnesium (as Mg)		(mg/kg)	154.1	398	521	502.2	420.1
9	Sodium Absorption Ration (SAR)		-	0.59	0.49	0.58	0.59	0.57
10	Cation Exchange Capacity (CEC)		(meq/100gm)	9.5	11.6	14.9	12.4	9.9
11	Available Phosphorus (as P)		Kg/ha	19.2	14.0	14.7	18.2	20.8
12	Organic carbon		(%) by mass)	0.75	0.79	0.81	0.69	0.78
13	Porosity		(% by mass)	35.2	34.1	38.1	32.6	38.2
14	Bulk Density		(g/cm^3)	1.25	1.26	1.28	1.29	1.22
15	Nitrogen		Kg/ha	230	174	222	166	198
17	Zinc (as Zn)		mg/kg	8.1	7.2	9.87	8.42	8.8
18	Manganese (as Mn)		mg/kg	15	16.2	72.96	22.45	20.2
19	Chromium (Cr+6)		mg/kg	<0.1	<0.1	<0.5	<0.1	<0.1
20	Lead (as Pb)		mg/kg	3.2	1.47	1.28	1.26	1.27
21	Cadmium (as Cd)		mg/kg	<0.1	<0.05	<0.1	<0.1	<0.05
22	Cupper (as Cu)		mg/kg	30.2	18.2	18.23	33.82	23.8
23	Mercury (Hg)		mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

Source: Lab Testing Report

Table 3.32 : Physiochemical Characteristics of Soil

S. No	Parameters	Unit	S-6	S-7	S-8	S-9	S-10
1	pH	-	7.74	7.89	7.56	7.38	7.85
2	Electrical Conductivity at 25^o C (1:5suspension.)	µmhos/cm	480	355	380	390	412
3	Sodium (as Na)	(mg/kg)	119	124	129	131	139
4	Water holding capacity	(%) by mass	30.8	32.8	28.9	30.2	31.5
5	Potassium (as K)	(kg/ha)	132	190	170	185	165

S. No	Parameters		Unit	S-6	S-7	S-8	S-9	S-10
	Texture			Sandy clay loam	Sandy clay loam	Sandy clay loam	Sandy clay loam	Sandy clay loam
6	Grain Size	Sand	(%) by mass)	55.4	56.5	55.2	54.1	54.5
		Clay	(%) by mass)	27.8	27.9	29.5	28.1	29.4
		Silt	(%) by mass)	16.8	15.6	15.3	17.8	16.1
7	Calcium (as Ca)		(mg/kg)	1023	2085	2155	2085	2045
8	Magnesium (as Mg)		(mg/kg)	502	554.6	580	514	531
9	Sodium Absorption Ration (SAR)		-	0.54	0.44	0.45	0.47	0.50
10	Cation Exchange Capacity (CEC)		(meq/100gm)	10.2	16.1	17.1	14.2	15.2
11	Available Phosphorus (as P)		Kg/ha	18.8	20.1	18.6	19.5	17.8
12	Organic carbon		(%) by mass)	0.82	0.79	0.81	0.72	0.75
13	Porosity		(% by mass)	34.6	36	38	31.2	34.5
14	Bulk Density		(g/cm^3)	1.2	1.19	1.18	1.21	1.22
15	Nitrogen		Kg/ha	155	205	185	220	190
17	Zinc (as Zn)		mg/kg	8.5	3.5	8.6	7.9	8.4
18	Manganese (as Mn)		mg/kg	23.15	18.5	21	20.3	22.3
19	Chromium (Cr+6)		mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
20	Lead (as Pb)		mg/kg	1.28	1.11	2.1	2.2	2.5
21	Cadmium (as Cd)		mg/kg	<0.1	<0.05	<0.05	<0.05	<0.05
22	Cupper (as Cu)		mg/kg	36.08	21.4	14.8	16.5	17.2
23	Mercury (Hg)		mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

Source: Lab Testing Report

3.9.6. *Interpretation of Soil Characteristics*

Interpretation of Soil Characteristic has been dwelled in following Sub-sections.

Physical Characteristics: The physical characteristics examined includes colour, texture, porosity, bulk density, and water holding capacity. Colour of soil was observed generally as brown and yellowish brown. As the Texture as per 'USDA' Triangular Classification System, soils of all sampled soil can be described as sandy clay loam.

Soils having larger particles usually have higher bulk density than those of smaller particles. Bulk density of sampled soil in the study area during the sampling period varied between 1.18 to 1.29

gm/cm^3. Water holding capacity of the sampled soil from the study area during the sampling period was observed between 27.9 & 32.8%.

Chemical Characteristics: The soils were generally observed as alkaline to slightly alkaline with pH range from 7.38 to 7.89 during the sampling period. Soil pH is an important soil property, which affects the availability of several plant nutrients. The measure of soil acidity and alkalinity reflects the status of base saturation. Electrical conductivity (EC) was found varying between 340 to 480 µmhos/cm during the sampling period.

Nitrogen is an integral component of many compounds including chlorophyll and enzyme essential for plant growth. Available nitrogen content in the surface soils ranges between 155 to 230 kg/ha during the study season which indicates that the major characteristics of soil found in the low fertility range of available nitrogen.

Phosphorus is an important component of adenosine di-phosphate (ADP) and adenosine tri-phosphate (ATP), which involves in energy transformation in plant. It is essential component of deoxyribonucleic acid (DNA), the seat of genetic inheritance in plant and animal. Phosphorous take part in important functions like photosynthesis, nitrogen fixation, crop maturation, root development, strengthening straw in cereal crops etc. The availability of phosphorous is restricted under acidic and alkaline soil reaction mainly due to Phosphorus fixation. In acidic condition it gets fixed with aluminium and iron and in alkaline condition with calcium. Available phosphorus content ranges between 14.0 to 20.8 kg/ha, thereby indicating that soils are moderate in available phosphorus content.

Potassium is an activator of various enzymes responsible for plant processes like energy metabolism, starch synthesis, nitrate reduction and sugar degradation. It is also important in grain formation and tuber development and encourages crop resistance for certain fungal and bacterial diseases. Available potassium content in these soils ranges between 132 to 190 kg/ha thereby is indicating that the soils are with medium level of available potassium content.

The status of all these soil test parameters reflect that the soil of the study area is observed as **low to high fertile** with normal ranges of rating values for soil.

Table 3.33 : Soil Class Interpretation

Parameter	Interpretation			
	Core Zone		Buffer Zone	
	Value	Category	Value	Category
Soil Reaction Classes (pH)	7.59	Slightly Alkaline	7.38-7.89	Alkaline to Slightly Alkaline
Organic Carbon (OC), %	0.75	Medium	0.69-0.82	Medium to High
Available Primary Nutrients (Fertility Status)				
Available Nitrogen as N (kg/ha)	230	Low	155-230	Low

Available Phosphorous as P (kg/ha)	19.2	Medium	14.0-20.8	Medium
Available Potassium as K, (kg/ha)	178	Medium	132-190	Medium
Micronutrients	**Nature and Category**			
Manganese as Mn	15	Adequate	15-72.96	Adequate
Zinc as Zn	8.1	Adequate	3.5-9.87	Adequate
Copper as Cu	30.2	Adequate	14.8-36.08	Adequate
Soil Survey Manual (IARI, 1970): Singh et. al. 2004, Mehta et. al.1988, Follet & Lindsay 1970 and Berger & Truog, 1940				

3.9.7. *Soil Nutrient Index*

Soil nutrient status for N, P & K is better explained by working out Nutrient Index Value for each. Parker had classified the 'Nutrient Index' values less than 1.5 as the indicative of low nutrient status and between 1.5 to 2.5 as medium while higher than 2.5 as high nutrient status.

The following equation is used to calculate Nutrient Index Value

Nutrient Index = {(Nlx 1) + (Nm x 2) + (Nh x 3)} / Nt

Nt = Total number of samples analyzed for a nutrient in any given area.
Nl = Number of samples falling in low category of nutrient status.
Nm = Number of samples falling in medium category of nutrient status.
Nh = Number of samples falling in high category of nutrient status

Nutrient Index Value for, N = {(10 x 1) + (0 x 2) + (0 x 3)}/10 =1.0 (Low)
Nutrient Index Value for, P = {(0 x 1) + (10 x 2) + (0 x 3)}/10 = 2.0 (Medium)
Nutrient Index Value for, K = {(0 x 1) + (10 x 2) + (0 x 3)}/10 = 2.0 (Medium)

Thus, based on Nutrient Index Value for N, P & K, the soils of study area fall into low (for nitrogen) and medium (for phosphorous & potassium) fertility status. Soils have medium to high organic carbon and are capable of moderately supporting for agriculture. The soils of study area are alkaline to slightly alkaline in nature as pH value of sampled soils observed less than 8.5 and simultaneously the value of EC is less than 1 dS/m (1000 µmhos/cm) and Exchangeable Sodium Percentage (ESP) values are observed less than 15% in all ten sampled soil during the study season. Based on above interpretation of study area, soil analysis report reveals that the soils are "**Low to Moderately Fertile"** in the study area.

3.10. Comparative Baseline Study

Baseline data for Stage I was collected from April 2008 to July 2008, while baseline data for the proposed expansion was gathered from October 2023 to December 2023.

3.10.1. *Comparison of Ambient Air Quality*

For the comparative analysis of ambient air quality, 10 locations were considered in the year 2023-24, while only 4 locations were assessed by the consultant in 2008. Out of these, 2 locations (Kohdar Village, Sonbarsi village) are matching with the earlier study. Hence comparative analysis of both the season were done for these two locations only. Ozone and mercury were not detected during the study period. Only PM_{10}, SO_2, and NOx were generated during 2008 hence only these three parameters were considered for the comparison. Data from both years, and the results for these locations are provided in **Table 3.34**

Table 3.34 : Comparative Ambient Air Quality Analysis

Location	PM_{10} (µg/m³) Period:2023 EIA Study				PM_{10} (µg/m³) : Period: 2008 EIA study			
	Max	Min	Mean	98 %tile	Max	Min	Mean	98 %tile
Son Barsi	80	42	65	79	51	11	23.6	-
Kohdar Village	85	46	70	84	90	14	27.8	-

Table 3.34 : continued….

Location	SO2 (µg/m³) Period: 2023 EIA Study				SO2 (µg/m³) Period: 2008 EIA study			
	Max	Min	Mean	98 %tile	Max	Min	Mean	98 %tile
Son Barsi	8.8	6.0	8.4	9.6	19	BDL	7.4	-
Kohdar Village	10.5	6.0	8.8	10.1	22	BDL	8.2	-

Table 3.34 : continued….

Location	NOx (µg/m³) Period: 2023 EIA Study				NOx (µg/m³) Period: 2008 EIA study			
	Max	Min	Mean	98 %tile	Max	Min	Mean	98 %tile
Son Barsi	8.8	6.0	8.4	9.6	27	5.0	11.7	-
Kohdar Village	13.5	9.8	11.6	13.5	32	6	14.5	-

Interpretation –

The concentration of PM10 in the air has slightly increase in current study that might be due to increase in traffic and operation of the plant. The mean NOX and SOx level is meeting the current ambient air quality while the maximum values were found slightly higher during the earlier study

3.10.2. *Comparison of Ambient Noise Quality*

For the comparative analysis of ambient noise quality, 10 locations were considered in the year 2023-24, while 10 locations were assessed by the consultant in 2008. Out of these only 2 locations

(Project Site, Kohdar village) are matching hence the comparative noise analysis were done for these two locations only. Comparative analysis is presented in **Table 3.35** below:

Table 3.35 : Comparative Ambient Noise Quality Analysis

Location	Category	Day (dB(A) Leq)		Night (dB(A) Leq)	
		Result EIA Study 2023-24	Result EIA Study 2008	Result EIA Study 2023-24	Result EIA Study 2008
Project Site	Industrial	59.8	45.4	52.1	35.1
Kohdar village	Residential	52.0	51.1	41.7	42.5

Interpretation:
Compared to the data collected in 2008, the values for both day and nighttime are slightly high in 2023-24 due to plant operation. Overall, the noise monitoring shows that day and night-time noise levels are found well within the respective category standards.

3.10.3. ***Comparative Water Quality***

To evaluate the water quality in the study area, six surface water samples and twelve groundwater samples were collected during 2023-24. In contrast, the 2008 EIA study by the consultant monitored only three surface water locations and three groundwater locations. Of the surface water sites, three locations align with those in the current study, while only one groundwater location matches. The results for both surface and groundwater are presented in Table3.30 and Table 3.36, respectively.

Table 3.36 : Surface Water Quality

S.No	Parameters	Unit	Tons U/s		Tons D/s		Ganga River	
			Analysis result EIA Study 2008	Analysis result EIA Study 2023-24	Analysis result EIA Study 2008	Analysis result EIA Study 2023-24	Analysis result EIA Study 2008	Analysis result EIA Study 2023-24
1	pH	-	7.5	7.58	7.7	7.3	7.7	7.89
2	Temperature	ºC	26.2	24.3	26.3	23.4	26.2	24.8
3	Conductivity	µmhos/cm	234	323	276	388	276	380
4	Chloride(as Cl)	mg/l	8	58	18	62	26	18
5	Total Alkalinity (as $CaCO_3$)	mg/l	89	104	62	116	119	144
6	Total Hardness(as CaCO3)	mg/l	96	108	101	124	151	120

S.No	Parameters	Unit	Tons U/s		Tons D/s		Ganga River	
			Analysis result EIA Study 2008	Analysis result EIA Study 2023-24	Analysis result EIA Study 2008	Analysis result EIA Study 2023-24	Analysis result EIA Study 2008	Analysis result EIA Study 2023-24
7	Calcium (as Ca)	mg/l	25	26	29	30	39	28.9
8	Magnesium (as Mg)	mg/l	8	10	9	12	13	11.6
9	COD (as O2)	mg/l	13	13	14	12	6	13
10	BOD (3 days at 27^0C)	mg/l	4	2.9	5	2.7	2	3.0
11	Dissolve Oxygen	mg/l	7.2	6.3	8.6	6.4	8.8	6.4
12	Total Dissolved Solid	mg/l	137	170	163	186	171	240
13	Nitrite (as NO_2)	mg/l	0.8	2.8	1.1	2.9	1.1	3.1
14	Sulphate (SO4)	mg/l	12	28	14	34	12	16.2
15	Iron (as Fe)	mg/l	0.21	0.23	0.23	0.35	0.21	0.28
16	Nitrate (as NO_3)	mg/l	0.8	4.1	1.1	4.5	1.1	3.2
17	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18	Sodium (as Na)	mg/l	7.8	10	8.8	14	9.2	13,6
19	Potassium (as K)	mg/l	0.8	1.9	1.5	1.9	0.9	1.6
20	Arsenic (as As)	mg/l	<0.002	<0.01	<0.002	<0.01	<0.002	<0.01
21	Lead (as Pb)	mg/l	<0.05	<0.1	<0.05	<0.1	<0.05	<0.1
22	Copper (as Cu)	mg/l	<0.05	0.06	<0.05	<0.05	<0.05	<0.05
23	Zinc (as Zn)	mg/l	0.13	0.11	0.14	0.13	0.13	0.22

Interpretation – The comparative analysis results shows that there is marginal changes observed in the surface water with respect to previous results. No metallic contamination was observed in the surface water samples.

Table 3.37 : Ground Water Quality

S.No.	Parameter	Unit	Requirement (Acceptable Limit)	Permissible Limit	Result EIA Study 2008	Result EIA Study 2023-24
1	pH value	-	6.5-8.5	-	7.3	6.91
2	Temperature	^{o} C	-		26.6	24.2
3	Conductivity	µmhos/cm	-		387	477
4	Total dissolve solid (TDS)	mg/l	500	2000	223	320
5	Total Suspended solids (TSS)	mg/l	-		7	<1.0
6	Total Hardness (as $CaCO_3$)	mg/l	200	600	151	192
7	Alkalinity (as$CaCO_3$)	mg/l	200	600	160	62
8	Chloride (as Cl)	mg/l	250	1000	32	68
9	Calcium (as Ca)	mg/l	75	200	43	46
10	Magnesium (as Mg)	mg/l	30	100	13	19
11	Fluoride (as F)	mg/l	1	1.5		0.56
12	Sulphate (as SO_4)	mg/l	200	400	13	20.5
13	Iron (as Fe)	mg/l	1	NR	0.24	0.15
14	Phosphate (as PO_4)	mg/l	0.03	0.2		<0.5
15	Silica (Sio_2)	mg/l	-	-	<0.05	<0.1
16	Chemical Oxygen Demand	mg/l	-	-	<4	NA
17	Bio- Chemical Oxygen Demands(for3Days27˚C)	mg/l	-	-	<1	NA
18	Dissolve Oxygen	mg/l	-	-	7.0	NA
19	Oil & Grease	mg/l	-	-	<0.01	<0.5
20	Sodium (as Na)	mg/l	-	-	12.0	37.5
21	Potassium (as K)	mg/l	-	-	2.0	3.1
22	Nitrate (as NO_3)	mg/l	45	NR	1.6	5.2
23	Selenium (as Se)	mg/l	0.01	NR	<0.05	<0.01
24	Copper (as Cu)		-		<0.05	<0.01
25	Zinc (as Zn)	mg/l	5.0	15	0.13	0.09
26	Phenolic Compound as (C_6H_5OH)	mg/l	0.001	0.002	<0.001	<0.001
27	Cadmium (as Cd)	mg/l	0.003	NR	<0.05	<0.01
28	Lead (as Pb)	mg/l	0.01	NR	<0.05	<0.1
29	Mercury (as Hg)	mg/l	0.001	NR	<0.001	<0.1
30	Arsenic (as As)	mg/l	0.01	0.05	<0.002	<0.1
31	Total Chromium (as Cr)	mg/l	0.05	NR	**<0.05**	<0.05
32	Total Coliform	MPN	Absent/100 ml	-	Absent	Absent

S.No.	Parameter	Unit	Requirement (Acceptable Limit)	Permissible Limit	Result EIA Study 2008	Result EIA Study 2023-24
33	Fecal Coliform	MPN	Absent/100 ml	-	Absent	Absent

Interpretation–The pH of the drinking water is meeting the acceptable range. No major variation in electrical conductivity is observed. No biological and metallic contamination has been found in any of the ground water sample of the study area. Overall, the parameters in ground water sample were well within the permissible limit of Indian Standard IS: 10500-2012 at all locations.

3.11. Biological Environment

3.11.1. *Introduction*

A phased and consultative approach was followed to carry out baseline ecological assessment. Successive phases of the assessment include (i) Reconnaissance survey (ii)Secondary data collection through desktop review of available literature and (iii) Onsite data collection for determining vegetation and wildlife in the study area Methodology

The baseline study for existing ecological environment was carried out during study period. Field sampling efforts covered the proposed project site and its area of influence. Field surveys were conducted for vegetation, and wildlife. In addition, public consultations were also done in the communities around the site. A phased and consultative approach was followed to carry out ecological assessment. Successive phases of the assessment include (i) Secondary data collection through desktop review of available literature and (ii) Onsite data collection for determining vegetation and wildlife in the study area & Reconnaissance survey (iii) Public consultation.

Primary Data Collection & Reconnaissance survey: There are few patches of forest are present within the study area (10 km area around project site) hence, phytosocial study was conducted for tree, shrub and herb vegetation present in nearby forest areas. To know the vegetation pattern in study area primary survey was conducted to calculate the density, frequency and IVI of the vegetation. Sampling points were randomly selected at 10 different locations in the study area. Samples of plants that could not be identified in the field were collected, pressed and carried to the herbarium for further identification. The health status of the vegetation was visually determined. Wildlife observations were conducted during the day and at night to cover for diurnal and nocturnal animals. Binoculars were used to enable the study of birds and other far distant animals.

Secondary Data Collection: An extensive desktop review of available published literature (books, websites, scientific papers, articles etc.) was conducted. The Forest Working Plans of Forest Divisions was also referred for secondary information. Additional information was sourced from the project proponent, Divisional Forest Office, Forest range office, governmental institutions and local residents of the survey-area. Literature was sourced from the govt. sources like Forest

department, MoEF&CC, IUCN and other related departments. Additional data sources include published articles in journals, gazettes, and technical reports, maps, internet, amongst others. The secondary data was appropriately supplemented by a field survey for primary data collection.

Public consultation: Beside above local people were also consulted during the site survey. Literature review and gathering publicly available data: The literature review encompassed background information on the Flora and fauna of the area including recent environmental studies.

3.11.2. *Forest Cover Type and Biodiversity in Uttar Pradesh*

Recorded Forest Area (RFA) in the State is 16,582 Sq.Km of which 12,070 Sq.Km is Reserved Forest, 1,157 Sq.Km is Protected Forest and 3,355 Sq.Km is Unclassed Forests. Uttar Pradesh, during the period 1st January 2015 to 5th February 2019, a total of 163.76 Hectares of forest land was diverted for non-forestry purposes under the Forest Conservation Act, 1980 (MoEF&CC, 2019).

Based on the interpretation of IRS Resource Sat-2 LISS III satellite data of the period Oct 2017 to Jan 2018, the Forest Cover in the State is 14,805.65 Sq.Km which is 6.15 % of the State's geographical area. In terms of forest canopy density classes, the State has 2,616.43 Sq.Km under Very Dense Forest (VDF), 4,080.04 Sq.Km under Moderately Dense Forest (MDF) and 8,109.18 Sq.Km under Open Forest (OF). Forest Cover in the State has increased by 126.65 Sq.Km as compared to the previous assessment reported in ISFR 2017.

Forest Type Maps of 2011 have been refined in the recently completed exercise by FSI. Percentage area under different forest types of Uttar Pradesh as per the Champion & Seth classification (1968), according to the latest exercise are presented in the **Table 3.38**. Forest cover Map and Forest Type Map of Uttar Pradesh is presented in **Figure 3.31**.

Table 3.38 : Percentage Wise Distribution of Forest Cover in Uttar Pradesh

S. No	Forest Type	Forest Cover (%)
1	2/E1 (Cane Brakes)	0.14
2	3C/1S1 Low Alluvial Savannah Woodland (Salmalia Albizzia)	0.03
3	3C/C2d (i) Western Light Alluvium Plains Sal	10.06
4	3C/C2d (iii) Eastern Heavy Alluvium Plains Sal	4.11
5	3C/C3a West Gangatic Moist Mixed Deciduous Forest	2.56
6	3C/2S1 Northern Secondary Moist Mixed Deciduous Forest	2.25
7	4D/SS2 Barringtonia Swamp Forest	0.01
8	4D/2S2 Eastern Wet Alluvial Grassland	0.63
9	4D/SS3 Syzygium cumini Swamp Low Forest	1.33
10	5B/C2 Northern Dry Mixed Deciduous Forest	34.90
11	5/E1 Anogeissus Pendula Forest	2.81
12	5B/DS1 Dry Deciduous Scrub	2.75

S. No	Forest Type	Forest Cover (%)
13	5B/C1c Dry Peninsular Sal Forest	2.39
14	5E1/DS1 Anogeissus Pendula Scrub	1.08
15	5/1S2 Khair-Sissu Forest	1.08
16	5A/C1b Dry Teak Forest	0.91
17	5/E2 Boswellia Forest	0.80
18	5B/C1a Dry Siwalik Sal Forest	0.71
19	5/E9 Dry Bamboo Brake	0.52
20	5B/C1b Dry Plains Sal Forest	0.52
21	5/E3 Babul Forest	0.25
22	5/E8b Babul Savannah Forest	0.10
23	5/E5 Butea Forest	0.05
24	5/E8a Phoenix Savannah Forest	0.02
25	5/DS2 Dry Savannah Forest	0.01
26	5/DS3 (Euphorbia Scrub)	0.01
27	5/1S1 Dry Tropical Riverain Forest	0.00
28	6B/C2 Ravine Thorn Forest	5.11
29	Plantation/ TOF	24.97
Total		**100.00**

Source: India State of Forest Report, Uttar Pradesh, 2019

3.11.3. *Forests in Prayagraj District*

Proposed project site site is located in Tahsil Meja and falls in Prayagraj Forest Division, Uttar Pradesh. There is very less i.e. 6.0 Sq. Km. dense forest present in Prayagraj district. About 26 sq. km area is under moderately dense forest and about 97.21 sq. km area is open forest. The analysis of forest cover in Prayagraj district and UP state is presented in **Table 3.39.** Forest Cover Map of Uttar Pradesh is presented in **Figure 3.31.**

Table 3.39 : Type of Forest present in Prayagraj District

District/State	Total Geographical area (Sq.km)	Very Dense Forests Area (Sq.km)	Moderately dense Forests (Sq.km)	Open Forests (Sq.km)	Total Forest Area (Sq.km)
Prayagraj Forest Division	5,482	6.00	26.00	97.21	129.21
Uttar Pradesh	2,40,928	2,616.43	4,080.04	8,109.18	14,805.65

Source: India State of Forest Report, Uttar Pradesh 2019

Figure 3.31 : Forest Cover Map of Uttar Pradesh

3.11.4. *Composition of Crops in Forest of the Study area*

The Ganga-Jamuna Doab, of which Prayagraj is a part, is on the western Indus-Gangetic Plain region and most of the land is under cultivation. There is very less forest left in the district. Mostly the forest of the district is open forest. There are few forest patches present in the study area (10 km radius) but due to presence of hard rock the forest patches present in the study area are scattered and crooked growth of the vegetation has been observed. The forest present in the study is deciduous forest. The plains of the Ganga, Yamuna, Tons and their tributaries are the primary habitats of these forest. Most of these trees are deciduous. These forest vast areas have been destroyed to make way for agriculture. The forests in these areas contain valuable trees including Sal, Palash, Amaltas, Bel, and Anjeer. Neem, Peepal, Sheesham, Mango and Jam.

3.11.5. *Forest Type in Study Area*

The study area falls in Meja Tehsil of Prayagraj Forest division. There is no very dense, moderately dense forest present in the study area. There are few reserved and protected forest present in the study area. The forest present in the study area is open and degraded forest. The list of the forest present present in 10 km radius of the project site is presented below:

- Badiha Reserved Forest (7.00 Km, SW)

- Gadaria Reserved Forest (5.00 Km, SW)
- Singhpur Khurd Reserved forest (0.90 Km, SW)
- Salaiya Kalan Reserved forest (Along Southern Boundary)
- Salaiya Khurd Reserved forest (Along Southern Boundary)
- Kohdar Reserved forest (Along Eastern Boundary)
- Murpela Reserved forest (2.70 Km, E)
- East Chandhs Reserved Forest (8.00 Km, E)
- Sukh Protected Forest (8.50 Km, E)

3.11.6. *Floristic Studies*

The main objectives of the floristic studies are as follows:

- To prepare inventory of plants belonging to different groups occurring in the study area;
- To assess the vegetation community structure in the study area;
- To identify the dominant plant species occurring in the study area by calculating Importance Value Index;
- To assess the diversity of different tree, shrubs and herbaceous species by calculating the Shannon Wiener Diversity.

In order to understand the composition of the vegetation, most of the plant species could be identified in the field itself whereas in case of the species that could not be identified an herbarium specimen of some flowers were collected without uprooting the plant itself and in addition their photographs were also taken for identification, later with the help of available published literature and floras of the region.

3.11.7. *Floristic Composition*

During primary and secondary study carried out under present project, 53 tree species, 26 shrub species, 21 herbs and 26 grasses, climber and weeds were recorded from the study area. The comprehensive list of the plant species for 10 km study area (tree, shrubs, herbs, climbers and grasses) observed in the study area is given **Table 3.40.**

Table 3.40 : Plant Species Recorded in Study Area

S.No	Botanical Name	Local Name	Family	IUCN Status
Trees				
1	*Acacia auriculiformis*	Australian babul	Mimosaceae	LC
2	*Acacia catechu*	Khair	Mimosaceae	LC
3	*Acacia leucopholea*	Guhira	Mimosaceae	NL
4	*Alangium salviifolium*	Akol	Alangiaceae	LC
5	*Aegle marmelos*	Bael	Rutaceae	NT
6	*Ailanthus excelsa*	Mahanimba	Simaroubaceae	DD

7	*Anthocephalus kadamba*	kadamb	Rubiaceae	NL
8	*Albizia lebbeck*	Shirish	Mimosaceae	LC
9	*Albizia procera*	Dhala sirish	Mimosaceae	LC
10	*Artocarpus heterophyllus*	Kathal	Moraceae	NL
11	*Azadiracta indica*	Neem	Meliaceae	NL
12	*Annona squamosa*	Sharifa	Annonaceae	LC
13	*Alstonia scholaris*	Devil tree	Apocynaceae	LC
14	*Bauhinia racemosa*	Mehuli	Caesalpiniaceae	LC
15	*Bauhinia variegate*	Kachnar	Caesalpiniaceae	NL
16	*Bombax cebia*	Semel	Bombacaceae	NL
17	*Butea Monosperma*	Palash	Fabaceae	LC
18	*Cassia siamea*	Minjri	Caesalpiniaceae	LC
19	*Citrus aurantifolia*	Limbu	Rutaceae	NL
20	*Casearia tomentosa*	Chilla	Flacourtiaceae	LC
21	*Cassia fistula*	Sunari	Caesalpiniaceae	LC
22	*Delonix regia*	Gulmohar	Fabeceae	LC
23	*Dalbergia sissoo*	Sishoo	Fabaceae	LC
24	*Diospyros melanoxylon*	Kendu	Ebenaeceae	NL
25	*Emblica officinalis*	Aamla	Euphorbiaceae	LC
26	*Elaeodendron glacum*	Mamri	Celastraceae	NL
27	*Ficus benghalensis*	Bar	Moraceae	LC
28	*Ficus carica*	Anjir	Moraceae	NL
29	*Ficus religiosa*	Pipal	Moraceae	LC
30	*Feronia limonia*	Kaintha	Rutaceae	NL
31	*Gmelina arborea*	Gumhar	Verbenaceae	LC
32	*Grewia tiliaefolia*	Dhamina	Tiliaceae	NL
33	*Grewia elastica*	Dhamna	Tiliaceae	NL
34	*Lagerstoremia parviflora*	Senha	Luthraceae	NL
35	*Morinda tinctoria*	Aal	Rubiaceae	LC
36	*Moringa oleifera*	Sahjan	Moringaceae	NL
37	*Mangifera indica*	Aamba	Anacardiaceae	DD
38	*Mitragyna parviflora*.	Kei kadamba	Rubiaceae	NL
39	*Madhuca indica*	Mahua	Sapotaceae	NL
40	*Pongamia pennata*	Karanj	Fabaceae	NL
41	*Prosopis julifera*	Bilieti Babul	Fabaceae	NL
42	*Pithecollobium dulce*	Jungle jalebi	Fabaceae	NL
43	*Polyalthia longofolia*	Ashok	Annonaceae	LC
44	*Syzygium ciimini*	Jamun	Myrtaceae	NL

45	*Sapindus emarginatus*	Reetha	Sapindeae	NL
46	*Shorea robusta*	Rengal	Dipterocarpaceae	LC
47	*Tamarandus indica*	Imli	Caesalpiniaceae	NL
48	Terminalia arjuna	Kaha	Combretaceae	NL
49	*Terminalia beliirica*	Bahada	Combretaceae	NL
50	*Terminalia chebula*	Harida	Combretaceae	LC
51	*Terminalia tomentosa*	Sahaj	Combretaceae	NL
52	*Tamarix aphylla*	Farash	Caricaceae	LC
53	*Ziziphus jujube* Lam.	Ber	Rhamnaceae	NL
		Shrubs		
1	*Arbus precatatorius*	-	Acanthaceae	NL
2	*Barleria cuspidata*	Satabari	Liliaceae	NL
3	*Adhaloda vasica*	Arusa	Acanthaceae	NL
4	*Bahuinia vahlii*	-	Caesalpiniaceae	NL
5	*Calotropis procera*	Madar	Asclepiadaceae	LC
6	*Combretum decandrum*	Aatundi	Combretaceae	NL
7	*Cryptolepis buchanani*	Gopkanhu	Asclepiadaceae	NL
8	*Ipomea cornea*	Besaram	Convolvulaceae	LC
9	*Narium indicum*	Kaner	Apocynaceae	NL
10	*Hemidesmus indicus*	Annantamula	Asclepiadaceae	NL
11	*Holarrhena antidysentirca*	Kure	Apocynaceae	NL
12	*Ichnocarpus frutescens*	Thapa	Lamiaceae	NL
13	*Ixora arborea*	Tel keruan	Rubiaceae	NL
14	*Phoenix acaulis*	Khajur	Palmae	NL
15	Ricinus communis	Arandi	Euphorbiaceae	NL
16	*Smilex zeylanica*	Mucher	Liliaceae	NL
17	*Sida cardifolia,*	Satyanashi	Papaveraceae	NL
18	*Tinospora cordifolia*	Kharshna	Papaveraceae	NL
19	*Lantana camara*	Lantana	Verbenaceae	NL
20	*Cassia occidentalis*	Chakunda	Fabaceae	LC
21	*Cassia tora*	-	Fabaceae	NL
22	*Desmodium gangeticum*	-	Fabaceae	NL
23	*Desmodium pulchellum*	-	Fabaceae	LC
24	*Solanum nigram*	-	Solanaceae	NL
25	*Vitex negundo*	Manju	Verbenaceae	LC
26	*Zizyphus nummularia*	Jhad ber	Rhamnaceae.	NL
		Herbs		
1	*Gisekia pharnaceoides.*	Baloo-ka-Saag.	Aizoaceae	NL
2	*Aerva lanata*	--	Amaranthaceae	NL

3	*Cannabis sativa*	Bhaang.	Cannabaceae	NL
4	*Cleome gynandra*	Bagroo.	"	NL
5	*Chenopodium album*	Bathua.	Chenopodiaceae	NL
6	*Beta vulgaris*	Palak	"	LC
7	*Brassica nigra*	--	Cruciferae	LC
8	*Raphanus sativus*	---	Cruciferae	LC
9	*Diescorea bulbifera*	Ratalu	Discoreaceae	NL
10	*Euphorbia hirta*	--	Euphorbiaceae	NL
11	*Phyllanthus asperulatus.*	Bhui/ anwala	"	NL
12	*Leucas cephalotes*	Gooma	Lamiaceae	NL
13	*Leucas aspera*	Ban Tulsi	"	NL
14	*Ocimum Sanctum.*	Tulsi	"	NL
15	*Aloo barbadensis*	Gw-arpatha	Liliaceae	NL
16	*Boerhavia diffusa.*	Sathan	Nyctaginaceae	NL
17	*Argemone mexicana*	Satyanashi	Papaveraceae	NL
18	*Tinospora cordifolia*	Nim-Ciloy	"	NL
19	*Phaseolus trilobus*	Mungvana	"	NL
20	*Parthenium hysterophorus*	Congres grass	Asteraceae	NL
21	*Solanum surattense*	Sans	Solanaceae	NL
Climbers, weeds & Grasses				
1	*Bauhinia vahlii*	-	Fabaceae	NL
2	*Butea superba*	-	Fabaceae	NL
3	*Butea parviflora*	-	Fabaceae	LC
4	*Combretum decandrum*	-	Combretaceae	LC
5	*Acacia pinnata*	-	Fabaceae	NL
6	*Diascorea bulbifera*	-	Dioscoreaceae	NL
7	*Apluda mutica.*	-	Poaceae	NL
8	*Aristida funiculata*	-	"	NL
9	*Brachiaria reptans,*	Dhaman	"	LC
10	*Brachiaria ramosa*	--	"	LC
11	*Cenchrus ciliaris*	-	"	LC
12	*Cenchrus setigerus*	Motiagrass	"	NL
13	*Cynodon dactylon*	Dub	"	NL
14	*Cymbopogon martinii*	-	"	NL
15	*Dactyloctemium aebgyptium*	Daabh	"	NL
16	*Dactyloctemium aristatium*	-	"	NL
17	*Desmostachya bipinnata*	-	"	LC
18	*Dichanthium annulatum*	-	"	NL
19	*Eragrostiella bifaria*	-	"	NL
20	*Eragrostis ciliaris*	Buharu	"	NL

21	*Eragrostis gangetica*	Sonwala	"	NL
22	*Heteropogon contortus*	Narkat	"	NL
23	*Panicum maximum*	-	"	NL
24	*Phragmites Karka*	Moonj	"	LC
25	*Polypogon monspeiiensis*	Kaans	"	NL
26	*Saccharum spontaneum*	-	"	LC

LC: Least Concern, NL: Not listed, NT: Near Threatened
Source: Primary and secondary Data Analysis.

3.11.8. *Rare Threatened and Endangered Species of Study Area*

Recorded floral species from the study area were assessed for their conservation status by cross-checking with red data book of Indian plants (Nayar& Sastri, 1987-90). There is only one "Near Threatened" species i.e. *Aegle marmelos* (*Common name: Bael*) present in the study area.

3.11.9. *Phyto-sociological (PS) characters of plant species*

The study area is characterized by Active Flood Plains, Older Alluvial Plain and Rocky Surface (Denudational hills). There are few forest patches present in the study area (10 km radius) but due to presence of hard rock the forest patches present in the study area are scattered and crooked growth of the vegetation has been observed. The forest present in the study is deciduous forest. The plains of the Ganga, Yamuna, Tons and their tributaries are the primary habitats of these forest. Most of these trees are deciduous. These forest vast areas have been destroyed to make way for agriculture. The forests in these areas contain valuable trees including Karanj, sagon, Pakad, Imli, khair, tendu, Mahua, Palash, Amaltas, Bel, and Anjeer. Neem, Peepal, Sheesham and Jam.

To understand the vegetation composition and ecological importance of vegetation of the study area quadrat sampling was done in forest area for tree, shrubs and herb vegetation in the study area. The vegetation sampling was carried out at three different sampling locations covering the study area. Details of the sampling locations are present in **Table 3.41.**

Table 3.41 Sampling Locations for Floristic Survey

Site	Sampling Location
PS-1	Singhpur Khurd Reserved forest (0.90 Km, SW)
PS-2	Murpela Reserved forest (2.70 Km, E)
PS-3	Salaiya Kalan Reserved Forest along the south boundary of the MUNPL

Phyto-sociological characters of plant species

Sampling Site PS-1 (Singhpur Khurd Reserved forest): The vegetation present at Singhpur Khurd Reserved forest is mainly degraded mixed forest. The tree species present at this site are

Butea monosperma, Madhuca longifolia, Terminalia tomentosa etc. Among shrubs *Lantana camara* is the dominant species while *Cynodon dactylon* is the dominant species among herbs. The frequency, density, and Importance Value Index of tree species is presented in **Table 3.42** and for shrubs and herbs species frequency, density, and abundance is presented in **Table 3.43**.

Table 3.42 : Phyto-sociological (PS) Indices of Tree Species at Singhpur Khurd Reserved forest (PS-1)

Scientific Name	Density /ha	Relative Density %	Frequency %	Relative Frequency %	Dominance	Relative Dominance %	IVI
Tamarindus indica	70	14.58	60.00	16.67	0.41	40.99	72.24
Azadirachta indica	110	22.92	70.00	19.44	0.42	42.41	84.77
Acacia nilotica	100	20.83	60.00	16.67	0.17	16.60	54.10
Acacia catechu	60	12.50	40.00	11.11	0.14	14.15	37.76
Madhuca longifolia	50	10.42	40.00	11.11	0.07	7.48	29.01
Albizia procera	20	4.17	20.00	5.56	0.08	7.91	17.63
Butea monosperma	30	6.25	30.00	8.33	0.20	20.37	34.95
SDI	**0.86**						

Source: Primary Survey

Table 3.43 : Phyto-sociological Indices of Shrubs & Herbs Species Near Upper reservoir area (PS-1)

S.N.	Species Name	Frequency (%)	Density/sq.m.	Dominance	SDI
Shrub Species					
1	*Calotropis procera*	60	0.8	1.33	0.73
2	*Ipomea Cornea*	70	1.2	1.71	
3	*Acacia nilotica*	30	0.5	1.67	
4	*Vitex negundo*	90	1.6	1.78	
5	*Lantana camara*	100	4.2	4.20	
6	*Zizyphus mauritiana*	40	0.4	1.00	
7	*Prosopis juliflora*	30	0.3	1.00	
Herb Species					
1	*Parthenium hysterophorus*	60	0.8	1.33	0.78
2	*Solanum surattense*	40	0.4	1.00	
3	*Sida cordifolia*	100	2	2.00	
4	*Canabis Sativa*	70	1.1	1.57	
5	*Chenopodium Album*	50	0.9	1.80	
6	*Euphorbia hirta*	50	0.7	1.40	
7	*Argemone maxicana*	70	1.1	1.57	
8	*Cynodon dactylon*	100	4.5	5.50	

Source: Primary Survey

Sampling Site PS-2 (Murpela Reserved forest): The vegetation present at Kumeria Protected Forest near command area is also dominated with teak having maximum density and IVI. The other associated tree species present at this site are *Tectona grandis, Butea monosperma, Madhuca longifolia, Terminalia tomentosa etc.* Among shrubs *Lantana camara* followed by *Vitex negundo* are the dominant species. Among the shrub species *Cynodon dactylon* followed by *Casia tora* are the dominant species among herbs. The frequency, density, and Importance Value Index of tree species is presented in **Table 3.44** and for shrubs and herbs species frequency, density, and abundance is presented in **Table 3.45**.

Table 3.44 : Phyto-sociological Indices of Tree Species at Murpela Reserved forest (PS-2)

Scientific Name	Density /ha	Relative Density %	Frequency %	Relative Frequency %	Dominance	Relative Dominance %	IVI
Beautia monosperma	80	21.62	50.00	19.23	0.12	12.02	52.87
Tectona grandis	40	10.81	40.00	15.38	0.61	60.55	86.75
Madhuca longifolia	40	10.81	30.00	11.54	0.11	11.50	33.85
Terminalia tomentosa	20	5.41	20.00	7.69	0.03	2.50	15.60
Albizia procera	40	10.81	30.00	11.54	0.01	1.06	23.41
Azdiracta indica	50	13.51	30.00	11.54	0.06	6.10	31.15
Acacia nilotica	100	27.03	60.00	23.08	0.06	6.26	56.36
Total	370	100.00	260.00	100.00	1.00	99.99	299.99
SDI	**0.84**						

Source: Primary Survey

Table 3.45 : Phyto-sociological Indices of Shrubs & Herbs Species at Murpela Reserved forest (PS-2)

S.N.	Species Name	Frequency (%)	Density/sq.m.	Dominance	SDI
Shrub Species					
1	*Calotropis procera*	70	1.00	1.43	0.76
2	*Ipomea Cornea*	60	1.20	2.00	
3	*vitex negundo*	90	2.10	2.33	
4	*Lantana camara*	100	3.50	3.50	
5	*Carissa carandas*	30	0.30	1.00	
6	*zizyphus mauritiana*	40	0.40	1.00	
7	*Prosopis juliflora*	50	0.50	1.00	
Herb Species					
1	*Casia tora*	90	1.8	2.00	0.84
2	*Parthenium hysterophorus*	80	1.4	1.75	
3	*Solanum surattense*	20	0.4	2.00	

4	*Boerhavia diffusa*	30	0.4	1.33	
5	*Sida cordifolia*	100	2.1	2.10	
6	*Canabis Sativa*	40	0.8	2.00	
7	*Chenopodium Album*	50	0.7	1.40	
8	*Euphorbia hirta*	80	1.4	1.75	
9	*Argemone maxicana*	40	0.7	1.75	
10	*Cynodon dactylon*	100	4.1	4.88	

Source: Primary Survey

Sampling Site PS-3 (at Salaiya Kalan Reserved Forest): The vegetation present at proposed this site is very scattered and mixed type of vegetation. *Butea monosperma and Tectona grandis are the main species frequently* observed *in most of the quadrats followed by Acacia catechu, Diospyros melonoxylon, Madhuca longifolia etc.*

Among shrubs *Lantana camara* followed by *Vitex negundo* are the dominant species. Among the shrub species *Cassia tora* is the dominant species among herbs. The frequency, density, and Importance Value Index of tree species is presented in **Table 3.46** and for shrubs and herbs species frequency, density, and abundance is presented in **Table 3.47**.

Table 3.46 : Phyto-sociological Indices of Tree Species at Salaiya Kalan Reserved Forest (PS-3)

Scientific Name	Density /ha	Relative Density, %	Frequency %	Relative Frequency %	Dominance	Relative Dominance %	IVI
Butea monosperma	60.00	15.38	60.00	20.69	0.73	72.90	108.98
Tectona grandis	80.00	20.51	60.00	20.69	0.08	8.24	49.44
Madhuca longifolia	40.00	10.26	40.00	13.79	0.07	7.21	31.26
Terminalia tomentosa	40.00	10.26	40.00	13.79	0.05	4.70	28.75
Pongamia pinnata	60.00	15.38	40.00	13.79	0.05	4.58	33.76
Acacia catechu	110.00	28.21	50.00	17.24	0.02	2.35	47.79
Total	**-**	**100.00**	**-**	**100.00**	**-**	**100.00**	**300**
SDI	**0.82**						

Source: Primary Survey

Table 3.47 : Phyto-sociological Indices of Shrubs & Herbs Species at Salaiya Kalan Reserved Forest (PS-3)

S.N.	Species Name	Frequency (%)	Density/sq.m.	Dominance	SDI
Shrub Species					
1	*Calotropis procera*	70	1.00	1.43	0.70
2	*Ipomea Cornea*	60	1.00	1.67	
3	*Vitex negundo*	90	2.10	2.33	

4	*Carissa carandas*	30	0.30	1.00	
5	*Xanthium indicum*	30	0.40	1.33	
6	*Lantana camara*	100	4.10	4.10	
Herb Species					
1	*Casia tora*	100	2.8	2.80	0.85
2	*Parthenium hysterophorus*	60	0.9	1.50	
3	*Solanum surattense*	60	1	1.67	
4	*Sida cordifolia*	60	0.9	1.50	
5	*Canabis Sativa*	70	1.2	1.71	
6	*Cynodon dactylon*	90	1.4	1.56	
7	*Euphorbia hirta*	80	1.4	1.75	
8	*Argemone maxicana*	50	0.9	1.80	

Source: Primary Survey

Observation on tree vegetation: A total of 10 tree species has been recorded in all quadrates sampled in above three locations. At PS-1 *Azadiracta indica* has maximum IVI, at PS-2 Tectona grandis has maximum IVI and PS-3 *Beautea monosperma* has maximum IVI. *Beautea monosperma*, Tectona grandis and *Madhuca longifolia* is frequent in all quadrates.

Simpson diversity index- The Simpson diversity index in the above sites selected for the study ranges from 0.82 to 0.82 in the study area. The number of species per sample is a measure of richness. The more species present in a sample, the 'richer' the sample. It indicates that the area is less rich in terms of tree vegetation diversity. The diversity index of the proposed sampled area is moderate.

Observations on Shrub and herb vegetation: Among the shrubs the *Lantana camara followed by Vitex Negundo* are the most frequent and dominant species having maximum density and abundance. The vegetation in all the location is almost heterogeneous. The diversity index of the shrub species ranges between 0.70 to 0.76. Among the herbs species *Casia tora*, *Sida cordifolia are most frequent and dominant species.* The vegetation in all the location is almost heterogeneous. The diversity index of the herb species ranges between 0.78 to 0.85. It indicates that diversity is moderate in sampled area.

3.11.10. *Plant of Ehno-botanical/medicinal Importance in Study Area*

Nature has nourished life since its existence and from the very beginning, life sustained itself on the available resources. However, human beings have always utilized major part of these natural resources than any other organism on this planet. Ethnobotany includes all sorts of relationships between people and plants. The definition of ethnobotany can be summed up in four words i.e. People, Plants, Interactions and Uses. Plants provide us readymade food, medicines for ailment, fodder and forage for our domestic animals, fuel wood for burning, flowers for aesthetics and celebration, raw materials for many industries, timber for construction and many more useful items. During the survey, ethno-botanical information on 20 plant species was documented (**Table**

3.46). It was found that these plant species are used for medicinal, timber, fuel wood, fodder, ornamental, agricultural tools, thatching, fencing, etc.

Table 3.48 : List of ethno-botanically important plant species in Study Area

S.No	Name	Family	Medicinal Use
Trees			
1	*Aegle marmelos*	Rutaceae	Antidiuratic, antithetmintic, antipyretic, carminative tonic Fruit used in chronic diarrhoea & dysentery
2	*Anona squamosa*	Anonaceae	Fruit as appetizer Seed oil used to kill lice
3	*Artocarpus heterophyllus*	Moracceae	Latex as bacteriolytic Leaf as estrogenic
4	*Azadirachta indica*	Meliaceae	Oil extracted from seed as local stimulant, insecticide and antiseptic
5	*Bombax ceiba*	Bombacaceae	Hot aquous extract of seed as moderate oxytoic
6	*Emblica offcinalis*	Euphorbiaceae	Fruit powder coolent and laxative Rich source of vitamin C
7	*Ficus religiosa*	Moraceae	Quenches thirst
8	*Ficus benghalensis*	Moraceae	Medicine for diabetes
9	*Mangifera indica*	Anacardiaceae	Controls stomach pain, diarrhoea, urine sugar
10	*Pongamia pinnata*	Fabaceae	Seeds are externally used for skin diseases, leucoderma, rheumatism Powdered seeds are expectorant in bronchitis and whooping cough
11	*Syzygium cumini*	Mystaceae	Stem bark is used to treat sore throat, bronchitis, ulcer, dysentery Seed powder for diabetes
12	*Tamarindus indica*	Caesalpiniaceae	Leaves are used to reduce inflammatory swellings & ringworm Fruit is tonic to heart and antithelmintic
13	*Terminalia bellerica*	Combretaceae	Fruit powder is used as tonic and laxative
14	*Acacia nilotica*	Mimosaceae	In pharmacy, used in preparing emulsions, tablets, pills etc.
15	*Tectona grandis*	Oil, flower, bark.	Oil obtained from the distillation of wood chips is applied to eczema. Kernel oil used in scabies and to promote growth of hair. Flowers used in biliousness, bronchitis and

S.No	Name	Family	Medicinal Use
			urinary discharges. Flowers and seeds diuretic. Bark astringent and is used in the treatment of bronchitis.
Shrubs			
15	*Calatropis procera*	Asclepiadaceae	Root bark used for leprosy
16	*Lantana camara*	Verbenaceae	Useful as an antiseptic for wounds
17	*Vitex negundo*	Verbenaceae	Leaves are used in rheumatism Dried leaves smoked for relief from headache
18	*Ricinus communis*	Euphorbiaceae	Castor oil used in skin diseases, inflammation of intestine and dysentery and as tonic Root and leaf oil used as ailment
Herbs			
19	*Argemone Mexicana*	Papaveraceae	Latex is laxative and used in cataract Seed oil used in asthma
21	*Cynodon dactylon*	Poaceae	plant used as antifungal, diuretic, hypoglycemic. Rhizome is useful in gastro urinary disorders Pollen extract is beneficial in asthma
22	*Euphorbia hirta*	Euphorbiaceae	Plant used to treat dysentery, cough, asthma, vomiting
23	*Ocimum sanctum*	Lamiaceae	Leaf juice used in curing cold, bronchitis Flower decoction in dyspepsia

Source: Primary Survey EQMS India

3.11.11. *Agriculture Crops:*

Main agricultural crop grown in study area is wheat. Other crops grown in the area are maize, Jowar, bajara, Paddy, pulses and different types of vegetables and fruits. Different type of crops grown in the study area is provided in **Table 3.49.**

Table 3.49 : List of Cultivated Plant

S.No	Local Name	English Name	Botanical Name
Cereals			
1.	Jowar	Sorghum	*Sorghum vulgare*
2.	Makka	Maize	*Zea mays*
3.	Gehu	Wheat	*Triticum sp.*
4.	Bajara	Millet	*Panicum miliaceum*
5	Paddy	Paddy	*Oryza sativa*
Pulses and Oil			
1.	Til	Sesamum	*Sesamum inicum*

S.No	Local Name	English Name	Botanical Name
2.	Urd	Black gram	*Phaeolus mungo*
3.	Surajmukhi	Sunflower	*Helianthus annus*
4.	Sarson	Mustard	*Brassica campestris*
5.	Matar	Pea	*Pisum sativum*
6.	Mungphali	Ground Nut	*Arachis hypogeal*
Fruit crops			
1.	Kela	Banana	*Musa Paradisiaca*
2.	Aam	Mango	*Mangifera indica*
3.	Nibbu	Lime	*Citrus aurantifolia*
4.	Amrud	Guava	*Psidium guajava*
5.	Papita	Papaya	*Carica papaya*
6.	Kathal	Jack-fruit	*Artocarpus heterophyllus*
7.	Seetalphal	Custered-apple	*Annona squamosa*
8.	Ber	Jujube	*Ziziphus mauritiana*
Vegetables			
1.	Tamatar	Tomato	*Lycopersicum esculantum*
2.	Baigan	Brinjal	*Solanum melongena*
3.	Pattagovi	Cabbage	*Brassica oleracea*
4.	Phulgovi	Cauliflower	*Brassica oleracea*
5.	Bhindi	Lady’s Finger	*Abelmoschus esculentus*
6.	Aloo	Potato	*Solanum tuberosum*
7.	Muli	Radish	*Raphanus sativas*
8.	Karela	Bitter gourd	*Momordica charantia*
9.	Torai	Ridge gourd	*Luffa acutangula*
10.	Kaddu	Pumpkin	*Cucurbita moschata*
11.	Palak	Beet	*Beta vulgaris*
12.	Lalbhaji	Amaranth	*Amaranthus spp.*
13.	Khira	Cucumber	*Cucumis sativus*
14.	Lauki	Bottle gourd	*Lagenaria siceraria*
15.	Chichinda	Snake gourd	*Trichosanthes anguina*
16.	Lahsun	Garlic	*Allium sativum*
17.	Dhaniya	Coriander	*Coriander sativum*
18.	Mircha	Chilli	*Capcicum anum*

Source: Primary & secondary Data Analysis

3.11.12. *Eco-sensitive Area in Study Area*

There is no national park, biosphere reserve, wildlife sanctuary, Important bird area, wetland is present in the study area.

3.11.13. *Faunal Diversity*

Faunal survey was carried out for the species of Mammals, Birds and Herpetofauna. The study of mammals and birds were conducted by placing systematic transects at different sampling locations. The study area lies in Meja tehsil of Prayagraj Forest division. The forests, water bodies, agriculture fields, orchrds present in the study area having different habitats for different kind of wild fauna. Based on vegetation and topography, the study area was divided into various transects and sampling for the wild fauna or their habitats has been carried out in different strata of transect. Most of transects were surveyed systematically and primary survey for mammals and birds include direct and indirect sightings of animals in trails and path they were using. The presence of wildlife was also confirmed from the local inhabitants depending on the animal sightings and the frequency of their visits in the study area. In addition to these, secondary sources were also referred for preparing checklist of animals and wildlife in the study area. Under this survey, direct sighting includes calls, signs and trophies of mammals (Prater, 1980). Forest Working Plan of Prayagraj Forest Division, reports of state biodiversity board were followed and interviews conducted in the study area for the presence and abundance of animals.

3.11.13.1 *Mammals*

To study the probable occurrence of mammals in the area, 2 -3 km long transects and trails were walked at each sampling site for any sighting and also by collecting indirect evidence gathered by talking to locals during interaction with local people. Forest Working Plans was also concerned for getting the reliable information. Blackbuck was reported in Chandkhamharia located about 5 km from the proposed site. This place (Chandkhamharia) is a conservation reserve for the Blackbuck. It is maintained by the village panchayat and forest department. Fourteen species of mammals were found/reported from secondary sources as well as from the primary survey and consultations. Species recorded /reported are presented in **Table 3.50**.

Table 3.50 : Mammalian Species Recorded/Reported from Study Area

S. No	Common Name	Scientific Name	Family	WPA	CS (IUCN)
1	Common House rat	*Rattus rattus*	Muridaea	V	LC
2	Indian Fox	*Vulpes bengalensis (India)*	Canidae	IV	LC
3	Jungle cat	*Felis chaus*	Felidae	I	NL
4	Mongoose	*Herpestes edwardsi*	Herpestidae	IV	LC
5	Common Langur	*Semnopithecus entellus*	Cercopithecidae	II	LC
6	Wild Boar	*Sus scrofa*	Suidae	II	LC
7	Indian Hare	*Lepus nigricollis*	Leporidae	II	LC
8	Spotted deer	*Axix axis*	Cervidae	II	LC
9	Fruit bat	*Cynopterus sphinx*	Pteropodida	IV	LC
10	Porcupine	*Hystrix indica*	Hystricidae	I	LC
11	Blackbuck	*Antilope cervicapra*	Bovidae	I	LC
12	Monkey	*Macaca mulatta*	Cercopithecidae	IV	LC

13	Hyena	*Hyena hyena*	Hyaenidae	I	NT
14	Blue Bull	*Boselaphus tragocamelus*	Bovidae	II	LC

Primary & Secondary data analysis

CS (IUCN)-Conservation Status (IUCN), LC-Least Concerned, LR-Low Risk, NL-Not Listed, VU-Vulnerable, NT-Near Threatened, WPA (S)-Schedule as per WPA, 1972

3.11.13.2 *RET Mammals*

The listed animals were also cross checked with WPA/IUCN red data book and found that out of the reported species, Hyena, Jangle cat, Porcupine and Blackbuck are Schedule-I species. As per IUCN criteria (2010), the study area harbors one “Near Threatened” species (Hyena).

3.11.13.3 *Barriers and Corridors*

These do not exist around the project area and study area villages.

3.11.13.4 *Amphibians and Reptiles*

The amphibian and reptiles were sampled with the same transect marked for mammals/birds. The sampling was also carried out in Forest areas, near water bodies, and other probable habitats. There were 2 species of amphibians, 4 species of snakes and 4 species of lizards recorded/confirmed in the study area of which Russell’s Viper and Rat snake belong to Schedule-I of WPA,1972 **(Table 3.51).**

Table 3.51 : Herpetofauna Recorded /Reported from Study Area

S. No	Common Name	Scientific Name	Vernacular Name	Family	Feeding Status	WPA Schedule
Amphibians						
1	Frog	*Rana tigrina*	-	-	C	IV
2	Indian bull frog	*Hoplobatrachus tigerinus*	-	-	C	II
Reptiles						
3	Binocellate cobra	*Naja naja*	Nag	Elapidae	C	II
4	Bandet Krait	*Bungarus fasciatus*	-	Elapidae	C	II
5	Russell’s Viper	*Vipera russellis*	-	Crotalidae	C	I
6	Rat snake	*Ptyas mucosus*	Dhaman	Colubridae	C	I
7	Forest Lizard	*Calotes versicolor*	-	Agamidae	C	II
8	House geeko	*Hemidactylis brukaii*	-	Gekkonidae	C	II

9	Monitor lizard	*Varanus bengalensis*	Ghorpad	Varanidae	C	III
10	Chamaeleon	*Chaemeleon vulgatis*	-	Chamaeleonidae	C	II

Source: Primary Survey and secondary data

3.11.13.5 *Avifauna*

An on-spot identification of birds has been carried out with the help of pictorial guides/literature published by Grimmett et al. (2011). There are many avifaunal habitats like pond, river, agriculture fields where avifaunal survey was conducted during the field visits. A total of 48 avifaunal species were recorded during this survey (**Table 3.52**). Among birds three species viz., Common peafowl, belong to Schedule-1 as amended December 2022, while rest of the species belong to other Schedules.

Table 3.52 : Avifauna Recorded /Reported from Study Area

S. No	Name	Scientific Name	IUCN 3.1	WPA Status
1	Black drongo	*Dicrurus adsimilis*	LC	II
2	Black winged kite	*Elanus caerulus*	LC	II
3	Blossom headed parakeet	*Psittacula cyanocephala*	LC	II
4	Blue pigeon	*Columba livia*	LC	IV
5	Blue jay	*Coracias benghalensis*	LC	II
6	Black headed oriole	*Oriolus xanthornus*	LC	IV
7	Common weaver bird	Crow pheasant	LC	V
8	Chestnut bellied nut-hatch	*Sitta castanea*	LC	II
9	Common myna	*Acridotheres tristis*	LC	II
10	Common hawk	*Cuculus varins*	LC	IV
11	Cattle egret	*Babulus ibis*	LC	II
12	Common peafowl	*Pavo cristatus*	LC	I
13	Common kingfisher	*Alcedo atthis*	LC	II
14	Grey babbler	*Turdoides malcolmi*	LC	IV
15	Grey wagtail	*Motacilla capsica*	LC	II
16	Swallow	*Hirundo rustica*	LC	II
17	Great horned owl	*Bubo bubo*	LC	IV
18	Grey partridge	*Francolinus pondicerianus*	LC	IV
19	Golden backed woodpecker	*Francolinus pondicerianus*	CR	IV
20	House sparrow	*Passer domesticus*	LC	II
21	Indian robin	*Saxicoloides fulicata*	LC	II
22	Jungle myna	*Acridotheres fusens*	LC	II
23	Jungle crow	*Corvus macroshynchos*	LC	IV

S. No	Name	Scientific Name	IUCN 3.1	WPA Status
24	Koel	*Eudynamys scolopacea*	LC	II
25	House Crow	*Corvus splendens*	LC	II
26	Rufous Woodpecker	*Celeus brachyurus*	LC	II
27	Munia	*Lonchura Spp.*	LC	II
28	Pied wagtail	*Motacilla maderaspatensis*	LC	IV
29	Pariah kite	*Milnus migrans*	LC	IV
30	Red vented bulbul	*Pycnonotus eafer*	LC	II
31	Red turtle dove	*Streptopelia Spp.*	LC	IV
32	Rose ringed parakeet	*Psittaculla krameri*	LC	II
33	Whistling thrush	*Myiophoneus horsfieldii*	LC	II
34	Pied Kingfisher	*Ceryle rudis*	LC	II
35	Lesser Whistling-duck	*Dendrocygna javanica*	LC	II
36	Mallard	*Anas platyrhynchos*	LC	II
37	Northern Pintail	*Anas acuta*	LC	II
38	Black-crowned Heron	*Nycticorax nycticorax*	LC	II
39	Great Egret	*Ardea alba*	LC	II
40	Indian Ring Dove	*Streptopelia decaocto*	LC	II
41	Little Brown Dove	*Streptopelia senegalensis*	LC	II
42	Spotted dove	*Streptopelia chinensis*	LC	II
43	Bank myna	*Acridotheres glnginianus*	LC	II
44	*Weaver bird*	*Plceaus philippinus*	LC	II
45	*Bulbul*	*Pycnonotus jocosus*	LC	II
46	Hoopae	*Upupa epops*	LC	II
47	*Jungle babler*	*Turdoides caudatus*	LC	II

Primary & Secondary data analysis

3.11.13.6 *RET Faunal Species*

The listed animals were also cross checked with WPA/IUCN red data book and found that out of the reported species, Hyena, Jangle cat, Porcupine and Blackbuck are Schedule-I species. As per IUCN criteria (2010), the study area harbors one “Near Threatened” species (Hyena). Among the reptiles Russell’s Viper and Rat snake belong to Schedule-I of WPA,1972. While among the aviafauna the Common peafowl, belong to Schedule-I. List of the Schedule I species reported from the study area is given in **Table 3.53**

Table 3.53 : Schedule-I fauna Reported from Study Area

S. No	Common Name	Scientific Name	Family	WPA	CS (IUCN)
1	Jungle cat	*Felis chaus*	Felidae	I	NL

2	Porcupine	*Hystrix indica*	Hystricidae	I	LC
3	Black Buck	*Antilope cervicapra*	Bovidae	I	LC
4	Hyena	*Hyaena hyaena*	Hyaenidae	I	NT
5	Russell's Viper	*Vipera russellis*	Crotalidae	I	LC
6	Rat snake	*Ptyas mucosus*	Colubridae	I	LC
7	Common peafowl	*Pavo cristatus*	Phasianidae	I	LC

Primary & Secondary data analysis

3.11.14. *Aquatic Ecology*

Tons river is the only source of surface water within the study area. Water for the project is proposed to be sourced from Ganga River through intake well. Hence the aquatic sampling were taken from upstream and downstream near the intake point on Ganga River and upstream and downstream of Tons River near Project site.

3.11.14.1 *Methodology of Aquatic Study*

Collection and preservation of Phytoplankton sample: The plankton samples were collected from sub surface water. In the case of phytoplankton, 500 ml sample water was collected in polyethylene bottles and 1ml of Lugol's solution was added for fixation and preservation. The samples were centrifuged and decanted. A volume of 10 ml was collected in double stoppered polyethylene bottles for further qualitative analysis of phytoplankton. Identification of phytoplankton was done with the help of standard books and monographs (Turner, 1892; smith, 1924, Ward and Whipple 1959).

Collection and preservation of Zooplankton sample: The zooplankton samples were collected by filtering 100 liters of sub-surface water through plankton net made up of bolting silk cloth no 20. A sub sample of 30 ml was collected again, in polyethylene double stoppered bottles and 4-5 drops of formalin and glycerin were added. The samples were stored for further qualitative and quantitative study of zooplanktonic organism. The identification of zooplankton was done up to species in most cases, according to the reference books including that of Ward and Wipples (1959), Koste (1978), Battish (1992) and Dhanapathi (2000).

3.11.14.2 *Sampling Locations*

Surface water samples for conducting aquatic study were collected from Ganga River and Tons River (**Table 3.54**).

Table 3.54 : Locations of Aquatic Studies

S.No	Location	Location	Description of Water body
1	AS -1	Ganga river near water Intake Point (outside the study area)	River
2	AS -2	Ganga river d/s of water Intake Point Bijora (outside the study area)	River

S.No	Location	Location	Description of Water body
3	AS-3	Tons/Tamas River u/s of site near Madaraha Village	River
4	AS -4	Tons/Tamas River d/s of site near Dhadhuva Village	River

Source: Monitoring plan

3.11.14.3 *Phytoplankton*

The phytoplanktonic community in the study area comprised of five classes namely Bacillariophyceae, Chlorophyceae, Zygnematophyceae, Dinophyceae and Cyanophyceae. Total 18 species were recorded at different sites during primary study. Out of 18 species recorded 5 species of Bacillariophyceae, 7 species of Chlorophyceae, 4 species of Cyanophyceae and 1 species each of Zygnematophyceae and Dinophyceae were recorded. (**Table 3.55**).

Table 3.55 : Phytoplankton Recorded in Study Area at Different Locations

S. No	Class	Species	Location Code			
			AS-1	AS-2	AS3	AS-4
1	*Cyanophyceae*	*Anabena sp.*	+	+	-	+
		Nostoc sp.	+	+	+	-
		Oscillatoria sp.	+	+	-	+
		Lemma sps.	-	+	-	-
2	Chlorophyceae	*Chlorella sp.*	-	+	+	-
		Volvox sp.	+	+	+	+
		Chlamydomonas sps.	+	+	+	-
		Gnittela sp.	-	+	-	-
		Oedogonium sp.	+	-	-	+
		Ceratium sp.	+	-	-	-
		Tetraedoron sp.	+	+	-	+
3	Bacillariophyceae	*Cymbella sp.*	+	-	+	-
		Flagillaria sp.	-	+	-	+
		Nitzschia sp.	+	-	-	+
		Diatoms sp.	+	+	+	-
		Cyclotella sp.	-	+	+	+
4	Zygnematophyceae	*Spirogyra sp.*	-	+	-	+
5	Dinophyceae	*Ceratium sp.*	+	-	+	-

Source: Primary data

Note: + denotes present and - denotes absent

3.11.14.4 *Zooplankton*

Sixteen species of Zooplankton were recorded from the study area of which 6 species belonged to Rotifera, 4 species belonged to Protozoa, 4 species to Cladocera and 2 species of Copepoda of zooplankton group. A zooplanktons distribution of all the four groups showed that Rotifera species highest in number and in percentage while copepoda is the smallest amongst the zooplanktons. Details of the species is presented in **Table 3.56**.

Table 3.56 : Zooplanktons Recorded in Study Area at Different Locations

S. No	Zooplankton Group	Taxa	Location Code			
			AS-1	AS-2	AS-3	AS-4
1	*Rotifera*	*Brachionus spp*	+	-	+	+
		Cephlodella spp	-	+	+	+
		Keratella spp.	+	+	+	+
		Cathypna spp.	-	-	-	+
		Dinobryon spp	+	-	-	-
		Lecane spp.	-	+	-	-
2	*Protozoa*	*Paramecium spp.*	+	+	+	+
		Vorticella spp	-	+	+	+
		Arcella spp	-	-	+	-
		Amoeba spp.	+	+	+	+
3	*Cladocera*	*Bosmina spp.*	-	+	-	-
		Diaptomus spp.	+	+	+	-
		Daphnia spp.	+	-	-	+
		Monia spp.	+	+	+	-
4	*Copepoda*	*Heliodiaptomous spp.*	-	+	-	-
		Nauplius spp.	+	-	-	-

Source: Primary data

Note: + denotes present and - denotes absent

3.11.14.5 *Fish Fauna*

Tons River is the only surface water bodies in the study area. Tons River harbor diverse aquatic flora and fauna. There are varieties of phyto-plankton and zoo- plankton. The variety of fish present in Tons River is presented in **Table 3.57**. Among fish population Cyprinidae is the dominant family comprises of 8 species.

Table 3.57 : Fishes of Study Area

S.No	Order	Family	Common Name	Scientific Name
1	Synbranchiformes	Amphipnoidae	Kuchia	*Amphipnous cuchia*
2	Siluriformes	Bagridae	Tangra	*Mystus singhala*
3		clarideae	Magur	*Clarius batrachus*

S.No	Order	Family	Common Name	Scientific Name
4		Heteropneustidae	Singhi	*Heteropneustes fossilis*
5	Cypriniformes	Cyprinidae	Kalbasu	*Labeo calbasu*
6			Katla	*Catla catla*
7			Chilwa	*Barilius modestus*
8			Mirgal	*Cirrhinus mrigala*
9			Silver carp	*Hypopthalmicthys molitrix*
10			Common carp	*Cyprinus carpio*
11			Grass carp	*Ctenopharyngodon idella*
12			Rohu	*Labeo rohita*

Source: Secondary data

3.11.1. *Conservation efforts made by MUNPL*

Chandkhamharia located about 5 Km from the proposed site and this site is developed as a conservation reserve for Blackbuck by Forest Department, local village panchayat and Meja Urja. This place (Chandkhamharia) is a conservation reserve for the Blackbuck. It is maintained by the village panchayat and Forest Department. For conservation of the Blackbuck, MUNPL has given a fund of Rs. 1.75 Cr to Forest Department. This amount was given for 2010 to 2015 period. In this period under the conservation of species pond construction along with pump house, plantation in the area, water tower, beautification of area, construction of lavatory etc. work has been done. Due to the conservation efforts the Blackbuck population has increased from 250 in 2009 to 508 in 2022.

कार्यालय प्रभागीय निदेशक सामाजिक वानिकी प्रभाग, इलाहाबाद
पत्रांक 1763/ 5-2 दिनांक, इलाहाबाद, अक्टूबर, 13 2009।
सेवा में,

उप महा प्रबन्धक
इनविरानमेंटल इंजिनियरिंग
एन०टी०पी०सी० लिमिटेड

विषय:— मेजा थरमल पावर प्रोजेक्ट के लिए इनविरानमेंटल क्लीयरेन्स।
सन्दर्भ:— आपका पत्रांक सी०सी०: ई०एस०ई० 9567: 2009 जी०ई०एन०: 11 ए दिनांक 02.06.2009।

संदर्भित पत्र के क्रम में जाँचोपरान्त मौके की स्थिति निम्न प्रकार पायी गयी है।

(1) कोहड़ार में मेजा थरमल पावर प्रोजेक्ट के लिए प्रस्तावित स्थल स० 10 किमी० की परिधि में कोई राष्ट्रीय पार्क, वन्य जीव विहार या हाथी /टाइगर रिजर्व नहीं है।

(2) प्रस्तावित स्थल की 10 किमी० की परिधि चाँदपुर खम्हरिया, महुली, मोजरा, पुराकटरा, बहरइया, इटवां कला तथा लपरी नदी के आस पास लगभग 250 काले हिरनों का झुंड निवास कर रहा है। काला हिरन अनुसूची-I का दुर्लभ प्रजाति का वन्य जीव है। प्रोजेक्ट स्थल से वास क्षेत्र की दूरी कम होने के कारण काले हिरनों के संरक्षण की विशेष आवश्यकता होगी।

(एस०एन० मिश्रा)
प्रभागीय निदेशक
सामाजिक वानिकी प्रभाग
इलाहाबाद।

Forest Dept Letter - 2009

चाँद खम्हरिया कृष्ण मृग संरक्षण आरक्षित क्षेत्र का परिचय

चाँद खम्हरिया कृष्ण मृग आरक्षित संरक्षण क्षेत्र की स्थापना उ०प्र० उ०प्र० शासन की विज्ञप्ति संख्या 3050/14-4-2017-821/2013 दिनांक 14.11.2017 के द्वारा की गयी थी। इसमें मेजा तहसील के चाँद खम्हरिया एवं महुली कला ग्राम की भूमि सम्मिलित है जिसका कुल क्षेत्रफल 126.1230 हैक्टेयर है।

- प्रयागराज जिले की मेजा तहसील के दक्षिण में चाँद खम्हरिया, महुली कला, गड़ेरिया, ककराही, किहुनी ग्राम पंचायतों की पठारी भूमि जो मुख्य रूप से ग्राम समाज व वन विभाग के नियन्त्रण में है, में कृष्ण मृग पाया जाता है। उक्त क्षेत्र में वर्ष 2011 की गणना के अनुसार 404, वर्ष 2013 की गणना के अनुसार 413 एवं वर्ष 2016 की गणना के अनुसार 465, वर्ष 2019 की गणना के अनुसार 506, वर्ष 2022 की गणना के अनुसार 508 कृष्ण मृग पाये गये।

- कृष्ण मृगों के अतिरिक्त यह क्षेत्र में वन रोज, सियार, लोमड़ी, लकड़बग्घा, खरगोश, भेड़िया, नेवला, सेही, जंगली बिल्ली एवं विभिन्न प्रकार की चिड़ियाँ आदि का भी प्राकृतिक वास स्थल है। इस क्षेत्र में मुख्यतः पलास, दुदधी कटबेर, घोटहर, सिद्ध आदि प्रजातियों के झाड़ी नुमा पौधे प्राकृतिक रूप से पाये जाते हैं। उक्त क्षेत्र में खाली जगहों में नीम, जंगल जलेबी, बाँस, खैर, अरू, इमली, बेल, कठसागौन, सागौन, आंवला, अकेशिया अरिकुलीफार्मिस आदि प्रजातियों का रोपण व बीज बुआई द्वारा वृक्षारोपण भी किया गया है। क्षेत्र पथरीला होनें के कारण भूमि कृषि हेतु उपयुक्त नहीं है। ग्राम समाज भूमि में वृक्षादन कम है। यहाँ प्राकृतिक व भौगोलिक स्थिति कृष्ण मृगों के लिए उपयुक्त है। इनकी जनसंख्या में उल्लेखनीय वृद्धि के आँकड़े इसकी पुष्टि करते है।

Forest Dept communication - 2022

Chand Khumeria — **Total Area = 38 Hac**

BoQ Sl.	Description	Unit	QTY As per MOU	Unit Rate	QTY executed this Yr	QTY executed till date	Amount Payable	Amount Payable Cumm.	Amount Paid Earlier	Net Amount Payable	Remarks
1	Plantation for year 2012-13	Hac	20	13985.58		20	0	279712	279712	0	
	Plantation for year 2013-14	Hac	20	3526.27		20	0	70525	70525	0	
	Plantation for year 2014-15	Hac	20	4712.66		20	0	94253	94253	0	
	Plantation for year 2015-16	Hac	20	4712.66	20	20	94253	94253		94253	
3	Watch Tower	No	1	485477		1	0	400477	485477	[illegible]	Rs 85000 has been held up for shortfall of sofa,chair & tables
6	Signage board	No.	17	12000		0	0	0	204000	[illegible]	yet to be provided
7	Pump House including purchase of DG set, pump set and boring	Set	1	305932		1	0	305932	305932	0	
9	Cattle guard shed	No	1	201181		1	0	201181	201181	0	
11	Lavoratory for ladies & gents	No.	1	114081		1 no. for gents & 1 no. for ladies	0	114081	114081	0	
12	Earthern pond	No	3	61920		3	0	185760	185760	0	
13	Salt Lick	Yrs (L.S.)	5	100000	1	4	100000	400000	300000	100000	
14	Water hole	No	8	100000		8	0	800000	800000	0	
15	Pasture Dev. for year 2012-13	Hac	10	32973		10	0	329730	329730	0	
	Pasture Dev. for year 2013-14	Hac	10	10556.77		10	0	105568	105568	0	
	Pasture Dev. for year 2014-15	Hac	10	10556.77		10	0	105568	105568	0	
	Pasture Dev. for year 2015-16	Hac	10	10556.77	10	10	105568	105568	0	105568	

Gaderia — **Total Area = 570 Hac**

BoQ Sl.	Description	Unit	QTY As per MOU	Unit Rate	QTY executed this Yr	QTY executed till date	Amount Payable	Amount Payable Cumm.	Amount Paid Earlier		Remarks
1	Plantation for year 2012-13	Hac	180	13985.58		180	0	2517404	2517404	0	
	Plantation for year 2013-14	Hac	180	3526.27		180	0	634728	634728	0	
	Plantation for year 2014-15	Hac	180	4712.66		180	0	848279	848279	0	
	Plantation for year 2015-16	Hac	180	4712.66	180	180	848279	848279		848279	
6	Signage board	No	3	12000		0	0	0	36000	[illegible]	yet to be provided
7	Pump House including purchase of DG set, pump set and boring	No.	1	305932		1	0	305932	305932	0	
12	Earthern pond	No	2	61920		2	0	123840	123840	0	
15	Pasture Dev. for year 2012-13	Hac	90	32973		90	0	2967570	2967570	0	
	Pasture Dev. for year 2013-14	Hac	90	10556.77		90	0	950109	950109	0	
	Pasture Dev. for year 2014-15	Hac	90	10556.77		90	0	950109	950109	0	
	Pasture Dev. for year 2015-16	Hac	90	10556.77	90	90	950109	950109		950109	

TOTAL	2098209	14688967	12915758	1773209

ACTUAL AMOUNT PAID TILL DATE 12915758

AMOUNT TO BE HELD BACK 325000

Conservation of Blackbuck - Budget utilization


Watch Tower

Blackbuck at Chandkhamharia conservation site

3.12. Description of Socio-economic

3.12.1. *Methodology*

The methodology adopted for the social study mainly includes review of published secondary data (District Census Statistical Handbooks- 2011 and Primary Census Abstract of Census-2001 and 2011) with respect to population, density, household size, sex ratio, social stratification, literacy rate, occupational structure and other basic amenities in the 10 km radius of study area. Beside that primary data has also been collected for the study area by conducting field survey and public consultation.

3.12.2. *Population Distribution within 2.0-km radial Zone of the Study Area*

There are 11 villages which fall in core zone. Details of Demography and Amenities are given below. Male-female wise population breakup of the entire study area is shown in **Table 3.58** and literacy, work population is provided in **Table 3.59 and 3.60** as follows;

Table 3.58 : Caste-wise Population Distribution of 2-km radial Study Area

Name of Village/Town	No of Households	Total Population			Sex Ratio	Scheduled Castes		Scheduled Tribes	
		Persons	Male	Female		Male	Female	Male	Female
Kolhuwa	82	671	356	315	884	81	64	0	0
Kohdar	956	5904	3101	2803	903	426	388	0	0
Mai Kala	157	862	438	424	968	54	57	0	0
Patai Dandi	182	1423	731	692	946	155	128	0	0
Piparau	314	1935	1066	869	815	376	311	0	0
Jhadiyahi	315	2063	1085	978	901	13	15	0	0
Salaiya Kala	257	1677	877	800	912	30	33	0	0
Mai Khurd	86	491	249	242	971	4	1	0	0
Salaiya Khurd	459	2511	1285	1226	954	548	514	66	64
Dasauti	189	1154	628	526	837	186	172	0	0
Marar	26	132	72	60	833	46	42	0	0
Total	**3023**	**18823**	**9888**	**8935**	**903**	**1919**	**1725**	**66**	**64**

Source: Secondary data Census 2011

Table 3.59 : Literacy Distribution of 2-km radial Study Area

Name of Village/Town	Total Literate Population	Total Male Literate Population	Total Female Literate Population	Total Illiterate Population	Total Illiterate Male Population	Total Illiterate Female Population
Kolhuwa	436	261	175	235	95	140
Kohdar	3330	2005	1325	2574	1096	1478
Mai Kala	512	289	223	350	149	201
Patai Dandi	898	533	365	525	198	327
Piparau	915	599	316	1020	467	553
Jhadiyahi	996	635	361	1067	450	617
Salaiya Kala	802	524	278	875	353	522
Mai Khurd	307	172	135	184	77	107
Salaiya Khurd	1312	794	518	1199	491	708
Dasauti	614	381	233	540	247	293
Marar	65	46	19	67	26	41
Total	**10187**	**6239**	**3948**	**8636**	**3649**	**4987**

Source: Secondary data Census 2011

Table 3.60 Workers Participation

Name of Village/Town	Total Main workers	Total Male Main workers	Total Female Main workers	Total Marginal workers	Total Male Marginal workers	Total Female Marginal workers	Total Non workers	Total Male Non workers	Total Female Non workers
Kolhuwa	90	85	5	93	93	0	488	178	310
Kohdar	1800	1085	715	567	324	243	3537	1692	1845
Mai Kala	60	58	2	120	103	17	682	277	405
Patai Dandi	89	65	24	494	241	253	840	425	415
Piparau	377	294	83	324	150	174	1234	622	612
Jhadiyahi	93	78	15	384	340	44	1586	667	919
Salaiya Kala	155	111	44	342	262	80	1180	504	676

Name of Village/Town	Total Main workers	Total Male Main workers	Total Female Main workers	Total Marginal workers	Total Male Marginal workers	Total Female Marginal workers	Total Non workers	Total Male Non workers	Total Female Non workers
Mai Khurd	43	26	17	176	85	91	272	138	134
Salaiya Khurd	444	290	154	306	190	116	1761	805	956
Dasauti	291	191	100	199	94	105	664	343	321
Marar	58	36	22	5	3	2	69	33	36
Total	**3500**	**2319**	**1181**	**3010**	**1885**	**1125**	**12313**	**5684**	**6629**

Source: Secondary data Census 2011

3.12.3. *Basic Amenities Details in core zone/ project influence area*

As per public consultation and analysis of census data below mentioned gaps were identified in core zone/project influence areas/ villages. Basic aminities available in 2 km area is presented in **Table 3.61.**

Table 3.61 : Basic Amenities Availability

Village Name	Status	Remarks
Education		
Primary school	✓	There are 5 govt primary school in the core zone villages there are 3 middle, 2 secondary and 1 higher secondary school available in the study area. Beside that there are following private school present in the core zone (2 km area) 1. Composite school Kolhua 2. Prathmik vidalaya Beri 3. Isawata primary school 4. Vijay Degree College, Salaiya 5. St.Joseph School – MUNPL-MEJA
Middle School	✓	
Secondary school	✓	
Sen. Secondary school	✓	
College	✓	
Health Facilities		
Hospital	✓	In the Core zone there are 3 hospitals. Ma Isaraja Devi Charitable Hospital, Sirihir, Meja, Prayagraj (3.05 Km, SSW), Yashlok Hospital (0.5 Km ENE) and Aarogyam Hospital – MUNPL-MEJA. Beside that there are many private and Govt hospitals like Tej Bahadur Saru Hospital, Motilal Nehru Divisional Hospital, Swarup
Dispensary	✓	
Primary health centre	✓	
Primary health sub centre	✓	

Village Name	Status	Remarks
Family welfare centre	✓	Rani Hospital etc. in the Prayagraja and Meja tehsil to catter basic medical requirement of the population in the study area.
MCWC-Maternity and Child Welfare Centre	✓	
Drinking water facilities		
Hand pump	✓	Hand pump are the main source of water for drinking and other domestic use. There are no well facilities available in core zone villages. MUNPL under CSR/CD has carried the following • Installation of 18 Solar Powered mini water schemes in the affected villages. • Construction of 04 Check dams in Esauta, Patai Dandi, Jhariyahi and Kohdar. • Rejuvenation of ponds in village-Salaiya Kala and Mai Khurd • Installation of 130 Handpumps in the neighbouring villages. • Construction of 02 Overhead Tanks in Resettlement Colonies. • Construction of 01 Blast Well in Village-Salaiya Kala. • Construction of 09 Mini Water RO Scheme in Govt. Schools. • Distribution of water filters to villagers incl. Home Stead Oustees. • Installation of 02 Water Coolers with RO in Atal Awasiye Vidyalaya. • Installation of 23 Water Coolers with RO in the neighboring villages. • Installation of 01 Water Cooler with RO in Govt. Polytechnic, Meja.
Tube well	✓	
Well	✗	
Tank	✓	
Pond	✓	
River	✓	
Approach to Village		
Kuchha road	✓	Majority of the villages have pucca road access except Marar and Patai danda villages where there is no proper road access.
Pucca Road	✓	

Source: Primary data obtained during survey

3.12.4. *Need Based Assessment*

A need-based assessment in a Social Impact Assessment (SIA) report identifies the needs and concerns of affected communities and stakeholders. It involves:

- Identifying affected populations and their demographics.
- Assessing their social, economic, and cultural context.

- Determining potential impacts on their livelihoods, health, and well-being.
- Analyzing their needs and concerns, including their perceptions and expectations.
- Developing strategies to address these needs and concerns.

A need-based assessment helps to:

- Understand the social and economic vulnerabilities of affected communities.
- Design targeted mitigation measures and community development programs.
- Ensure that the needs and concerns of affected communities are addressed.
- Enhance the overall effectiveness and sustainability of projects or programs.

The assessment is conducted through participatory methods, involving stakeholders and affected communities, to ensure that their needs and concerns are accurately captured and addressed.

3.12.4.1 *Outcome of the need-based assessment*

There are no Govt. hospital services in the core zone villages. Nearby hospitals or medical facilities are around 10 km away from these villages. Beside there is only one private hospital called Yashlok hospital and Aarogyam Hospital of Meja Urja Nigam Pvt. Ltd available in core zone villages to take care of medical concerns of their employee as well as surrounding villages. For an emergency situation ambulance service could be provided by MUNPL to the local people. The other medical facilities present in the surrounding area is given in **Table 3.62** below.

Table 3.62 : Medical Facilities available

S.No	Medical Facility Name	Latitude	Longitude	Distance & Direction
1	Yashlok hospital	25° 8'39.04"N	81°58'55.04"E	0.55 Km, ENE
2	R. B. Hospital	25° 3'19.79"N	81°50'57.17"E	10 Km, SW
3	Raj Clinic	25°15'6.79"N	81°57'16.86"E	11.45 Km, N
4	Center Of Medical and Health Awareness	25° 8'28.13"N	82° 6'15.07"E	12.85 Km, E
5	Prakash Hospital	25°16'9.66"N	81°56'17.20"E	12.89 Km, N
6	Ashok Medical Hall	25° 8'32.12"N	82° 6'18.88"E	12.92 Km, E
7	Dr. Ashfak Clinic	25° 8'27.20"N	82° 6'18.24"E	12.93 Km, E
8	R.N Medicare Centre Meja Public School Ke Samane Mirzapur Road Lakhan Pur Mejaroad Prayagraj	25°12'9.31"N	82° 5'16.94"E	13.09 Km, ENE
9	Community Health Centre MEJA	25° 8'27.66"N	82° 6'38.72"E	13.52 Km, E
10	Jivan Rakksha Hospital	25°12'52.34"N	82° 5'5.23"E	13.50 Km, ENE
11	Satya Hospital	25°12'59.49"N	82° 5'6.37"E	13.65 Km, NE
12	SK Memorial Hospital	25°13'13.04"N	82° 5'3.77"E	13.86 Km, NE
13	Jyoti Hospital Meja Road	25°13'29.21"N	82° 5'4.27"E	14.20 Km, NE
14	Lakxmi Hospital	25°11'31.73"N	82° 8'16.96"E	17.14 Km, ENE

S.No	Medical Facility Name	Latitude	Longitude	Distance & Direction
15	Jeevan Raksha hospital	25° 0'15.10"N	82° 4'11.74"E	17.50 Km, SSE
16	Raj hospital	25°14'55.42"N	82° 6'52.34"E	18.22 Km, NE
17	Janhit Hospital	25°19'4.15"N	81°55'8.11"E	18.35 Km, NNW
18	Prayag Hospital	25°13'46.63"N	82° 9'1.14"E	19.98 Km, ENE
19	Suraj Hospital	25°10'59.25"N	82° 9'49.09"E	19.37 Km, ENE
20	Dr Devraj Singh Hospital	25°21'46.44"N	82°11'25.41"E	32.56 Km, NNE
21	Vidyawati Hospital	25°31'26.66"N	81°51'49.00"E	42.50 Km, NNW

Source: Proimary & Secondary data analysis

- Literacy level is quantifiable indicator to assess the development status of an area or region. Total literate's population was recorded as 10187 persons (54.11%) in the study area. Male-Female wise literates are observed as 6239 & 3948 persons respectively, implies that the 'Literacy Rate' is recorded as (54.11%) with male-female wise percentages being 33.14% & 20.97% respectively with creating a gender gap of 12.17 %. There is a requirement of providing more awareness in the core project region. Education awareness programs could be provided in core zone villages
- Hand pump are the main source of water for drinking and other domestic use. There are no well facilities available in all the villages. Drinking Water supply units/ Repairement / Maintenance / Cleaning of Wells / handpums /Ponds and water tank services could be provided to local people.
- Marar and Patai danda villages where there is no proper road access. Puuca road services could be provided for these villages.
- Livelihood of most of the people of the study area depends on employment in the agriculture activities, labour, private jobs, and business. As there are many people dependent on casual jobs and agricultural activities for their livelihood. Jobs should be provided to local people according to their skills and help in agricultural growth through Training programs on Best and Modern Agriculture Practices could be provided to local people.
- The composition of Schedule Caste (SC) in total population is 19.35% and Schedule Tribe (ST) is 0.69%. However, there is no direct impact on the SC & ST population. Further, the project will also provide more benefit and employment opportunities to the people belongs to SC & ST community majorly in study area of the project.
- Work Participation Rate of the study area is 34.58% in which males are 22.33% and females are 12.24%, creating a gender gap of 10.09%. Among the total workers 18.59% are main workers and rest 15.99% are marginal worker. Considering the project activities it will generate employment during the construction/operation phase in the study area.

3.12.5. *Population Distribution within 10.0-km radial Zone of the Study Area*

As per the census records 2011, the total population of 10-km radius study area was recorded as 176658 persons of 122 revenue villages of Pryagraj District in Uttar Pardesh state. All the villages falls under Tehsil Karchhana (59) & Meja(63) of Pryagraj District in Uttar Pardesh. Total number of 'Households' was observed as 27055 in the study area. Male-female wise total population was recorded as 92717 males and 83941 females respectively.

There are no towns in the study area. As per the census record 2011 there is only 0.24% tribal population present in the study area. Settlement Map of the study area is presented in **Figure 3.32**. Caste-wise and male-female population breakup of the entire study area villages falling in districts is shown in **Table 3.63** as follows;

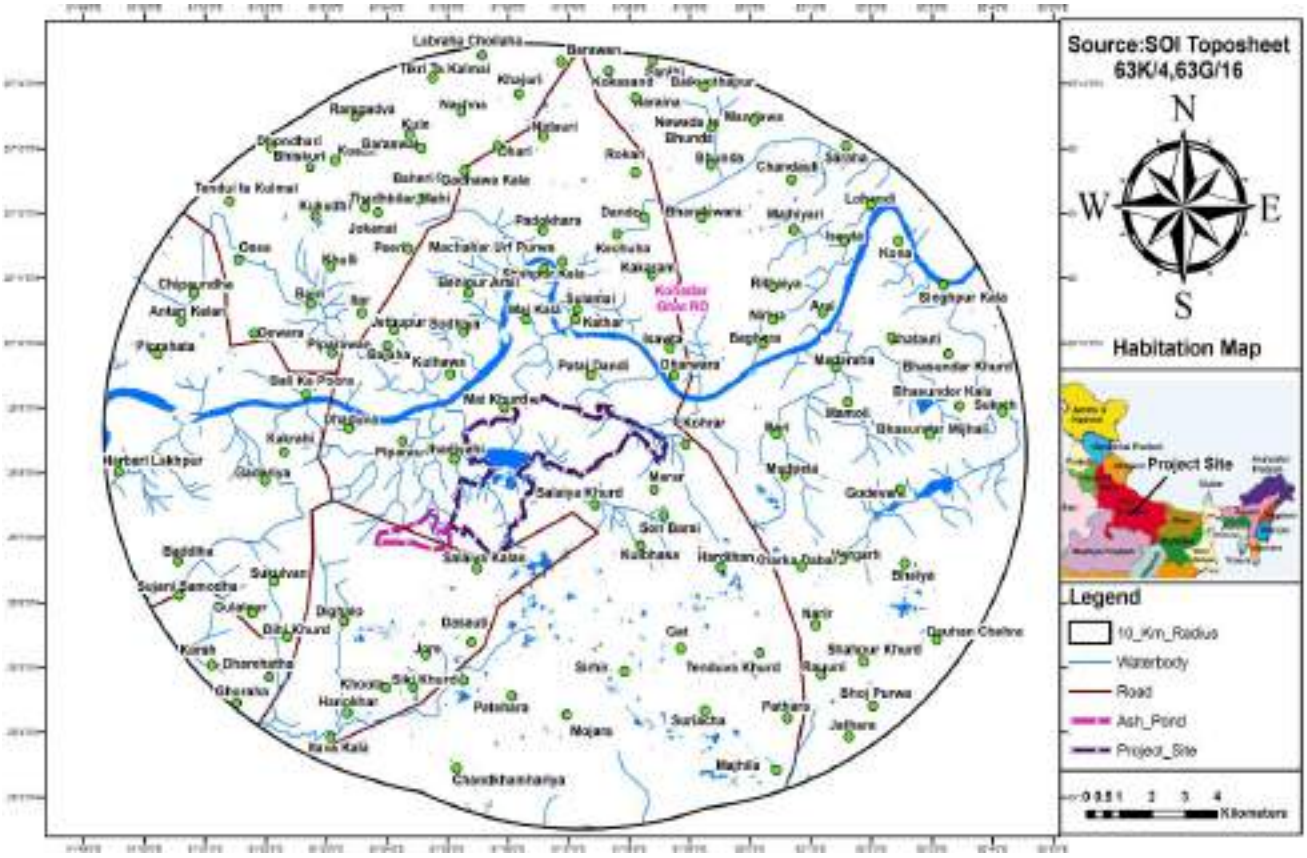


Figure 3.32 : Habitation Map of Study Area

Table 3.63 : Caste-wise Population Distribution of 10-km radial Study Area

Name of the Village/Town	No of Households	Total Population	Male	Female	SC Male	SC Female	ST Male	ST Female
Rithaiya	151	1218	627	591	0	0	0	0
Niriya	298	2075	1108	967	263	232	0	0
Isauta	180	1202	631	571	318	279	0	0
Arai	581	4648	2363	2285	199	195	0	0
Kokasand	110	773	409	364	91	88	0	0
Baghera	309	2102	1055	1047	87	74	0	0
Sanjhi	171	907	466	441	54	49	0	0
Baikunthpur	17	212	106	106	0	0	0	0
Mandawa	284	1917	1009	908	272	245	0	0
Naraina	193	1654	883	771	249	217	2	2
Newada Ta. Bhunda	93	748	401	347	0	0	0	0
Saraha	104	541	281	260	10	11	0	0
Chandauli	323	2143	1128	1015	244	235	8	7
Majhiyari	96	799	437	362	84	52	0	0
Lohandi	360	2622	1389	1233	66	51	0	0
Rokari	307	1946	1048	898	0	0	0	0
Bhandewara	269	1844	969	875	105	118	0	0
Bhatauli	115	785	405	380	85	95	0	0
Sodhiya	525	3586	1887	1699	506	433	0	0
Jethupur	188	1199	617	582	15	12	0	0
Kolhuwa	82	671	356	315	81	64	0	0
Piparawan Urf Kathauli	260	1762	970	792	319	259	0	0
Itar	64	462	241	221	43	47	0	0
Jokanai	409	2822	1484	1338	216	207	0	0

Name of the Village/Town	No of Households	Total Population	Male	Female	SC Male	SC Female	ST Male	ST Female
Peeri	369	2457	1270	1187	411	346	0	0
Kukudhi	507	3260	1722	1538	700	662	0	0
Khulli	80	515	265	250	103	93	0	0
Chipaundha	85	639	339	300	279	243	0	0
Ossa	170	1160	632	528	157	123	0	0
Antari Kalan	28	206	107	99	15	11	0	0
Dewara	733	4836	2528	2308	768	711	0	0
Piparhatta	313	2172	1104	1068	302	276	1	1
Dhondhari	291	1671	892	779	120	87	0	0
Tendui Ta. Kulmai	190	1166	643	523	243	183	0	0
Bairi	84	530	305	225	102	71	0	0
Bhiskuri	69	432	229	203	81	73	0	0
Thadhbilar	61	402	227	175	2	0	0	0
Kuaan	216	1393	748	645	140	125	0	0
Mahi	395	2019	1028	991	486	486	0	0
Baraswal	222	1263	690	573	124	106	0	0
Kuin	115	781	416	365	133	112	0	0
Tikri Ta.Kalmai	394	2545	1336	1209	487	437	0	0
Nachna	202	1222	652	570	294	252	0	0
Khajuri	390	2472	1310	1162	414	384	0	0
Barawan	725	5162	2726	2436	562	509	5	1
Dhari	302	1889	1019	870	538	461	0	0
Nidauri	138	1085	570	515	37	25	0	0
Kechuha	224	1872	1001	871	45	35	12	9
Dando	340	2368	1234	1134	193	176	0	0
Kakaram	410	2711	1464	1247	604	505	0	0

Name of the Village/Town	No of Households	Total Population	Male	Female	SC Male	SC Female	ST Male	ST Female
Baheri	98	605	315	290	150	149	0	0
Gadhawa Kala	168	1229	664	565	122	94	0	0
Labraha Choilaha	462	2564	1330	1234	498	462	0	0
Machahar Urf Purwa	355	2312	1245	1067	619	526	0	0
Sulamai	435	2733	1478	1255	109	89	0	0
Ramgadva	52	323	184	139	42	26	0	0
Padhokhara	212	1464	752	712	114	119	0	0
Benipur Arail	358	2542	1354	1188	370	327	0	0
Bajaha	161	1081	593	488	307	238	0	0
Kona	279	1980	1056	924	272	229	0	0
Singhpur Kala	230	1495	667	828	53	60	0	0
Bhasunder Kala	122	780	390	390	3	2	0	0
Bhasunder Mijhali	100	586	312	274	62	57	0	0
Sukath	146	957	503	454	43	43	0	0
Beri	125	719	398	321	139	106	57	54
Mamoli	287	2027	1028	999	134	134	15	11
Mudpela	202	1254	615	639	112	92	0	0
Madaraha	327	1674	885	789	188	176	0	0
Gadevara	199	1303	655	648	285	273	0	0
Kohdar	956	5904	3101	2803	426	388	0	0
Bhasundar Khurd	200	1253	642	611	123	128	51	42
Bhaiya	232	1551	796	755	285	259	0	0
Hargarh	254	1760	944	816	367	301	0	0
Kharka Dabar	73	484	251	233	23	22	0	0
Rauuni	57	367	175	192	70	74	0	0
Shahpur Khurd	90	633	342	291	214	184	0	0

Name of the Village/Town	No of Households	Total Population	Male	Female	SC Male	SC Female	ST Male	ST Female
Narir	79	636	327	309	110	106	0	0
Dhauhan Chehra	18	108	55	53	0	0	0	0
Bhoj Purva	238	1636	843	793	274	245	0	0
Pathara	227	1493	757	736	362	341	3	3
Majhila	34	174	92	82	0	0	0	0
Jathara	75	448	233	215	97	81	0	0
Gulalpur	43	196	102	94	0	0	0	0
Kakrahi	118	840	478	362	0	0	0	0
Ghoraha	72	400	220	180	112	77	0	0
Karah	54	322	165	157	107	102	0	0
Sukulvan	1	1	1	0	0	0	0	0
Dihi Khurd	104	565	287	278	15	11	0	0
Sujani Samodha	377	2381	1288	1093	352	284	0	0
Dharehatha	111	732	364	368	52	68	0	0
Baddiha	283	1582	852	730	206	177	0	0
Gaderiya	97	559	288	271	70	63	0	0
Shahpur Kala	404	2374	1218	1156	7	12	0	0
Mai Kala	157	862	438	424	54	57	0	0
Patai Dandi	182	1423	731	692	155	128	0	0
Isawta	383	2303	1191	1112	11	11	0	0
Dhadhuva	228	1592	851	741	235	219	6	3
Piparau	314	1935	1066	869	376	311	0	0
Jhadiyahi	315	2063	1085	978	13	15	0	0
Salaiya Kala	257	1677	877	800	30	33	0	0
Mai Khurd	86	491	249	242	4	1	0	0
Salaiya Khurd	459	2511	1285	1226	548	514	66	64

Name of the Village/Town	No of Households	Total Population	Male	Female	SC Male	SC Female	ST Male	ST Female
Dasauti	189	1154	628	526	186	172	0	0
Siki Khurd	77	233	120	113	20	21	0	0
Khoota	228	1402	701	701	244	232	0	0
Son Barsi	70	365	202	163	110	83	0	0
Marar	26	132	72	60	46	42	0	0
Dighalo	198	1306	670	636	177	187	0	0
Hanokhar	37	243	134	109	0	0	0	0
Itava Kala	443	2981	1600	1381	364	335	0	0
Jore	64	248	120	128	30	36	0	0
Chandkhamarihia	544	3781	1963	1818	558	509	0	0
Patehara	233	1315	635	680	382	404	0	0
Kulbhasa	181	1373	728	645	257	206	0	0
Sirhir	404	2316	1153	1163	317	327	0	0
Gat	38	266	143	123	91	80	0	0
Tenduva Khurd	144	978	497	481	151	151	0	0
Hardihan	414	2516	1415	1101	606	399	0	0
Suraicha	69	567	291	276	99	89	0	0
Mojara	131	891	468	423	0	0	0	0
Harbari Lakhapur	115	779	400	379	46	54	1	0
Kathar	12	62	32	30	0	0	0	0
Total	**27055**	**176658**	**92717**	**83941**	**22651**	**20196**	**227**	**197**

Source: Secondary data Census 2011

3.12.6. *Sex Ratio*

The 'Sex Ratio' is a numeric relationship between females and males of an area and bears paramount importance in the present-day scenario where the un-ethnic pre-determination of sex and killing of female foetus during pregnancy is practiced by unscrupulous medical practitioners against the rule of the law of the country. It is evident that by contrast the practice of female foeticide is not prevalent in the study area.

As per the census records 2011, the data reveals the sex ratio as 905 females for every 1000 males in the study area. The male-female wise population distribution of the study area is shown by graphical representation in **Figure 3.33.** as follows;

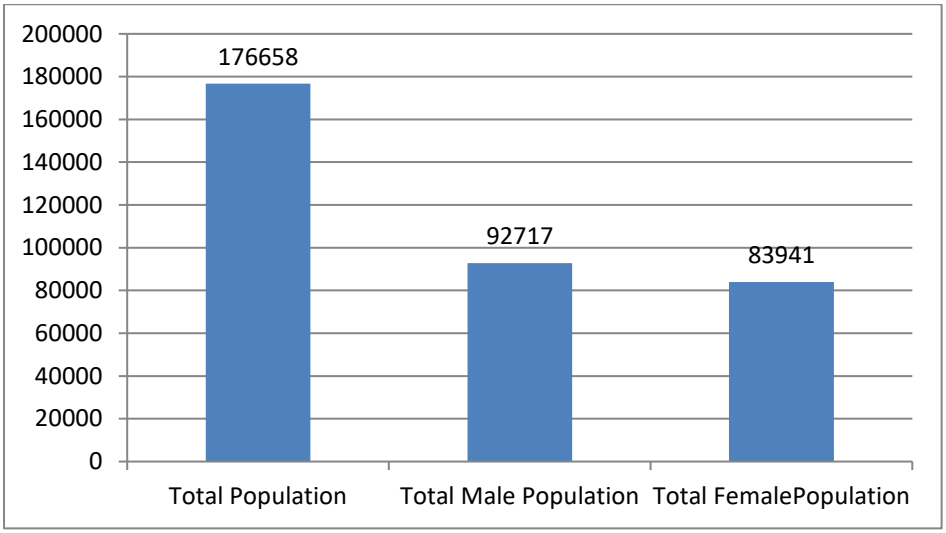


Figure 3.33 : Male-Female wise Population Distribution in the Study Area

3.12.7. *Scheduled Caste & Scheduled Tribe Population*

On the basis of the village/town wise SC & ST population distribution for the study area during 2011, the 'Scheduled Castes' population was observed as 42847 consisting of 22651 males and 20196 females respectively which accounts as 24.25% to the total population in the study area. 'Scheduled Tribes' population was observed as 424 accounting as 0.24 % to the total population of the study area consisting of 227 males and 197 females. It implies that the rest of the total population belongs to the General category. Male-female wise SC & ST population distribution of the study area is graphically shown in **Figure 3.34 & 3.35** as follows.

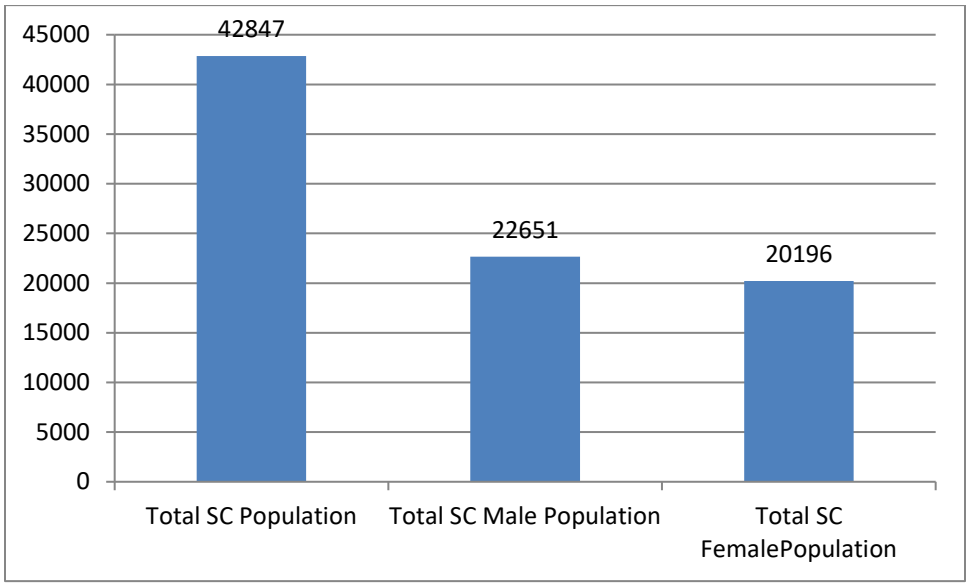


Figure 3.34 : Scheduled Caste Population in the Study Area

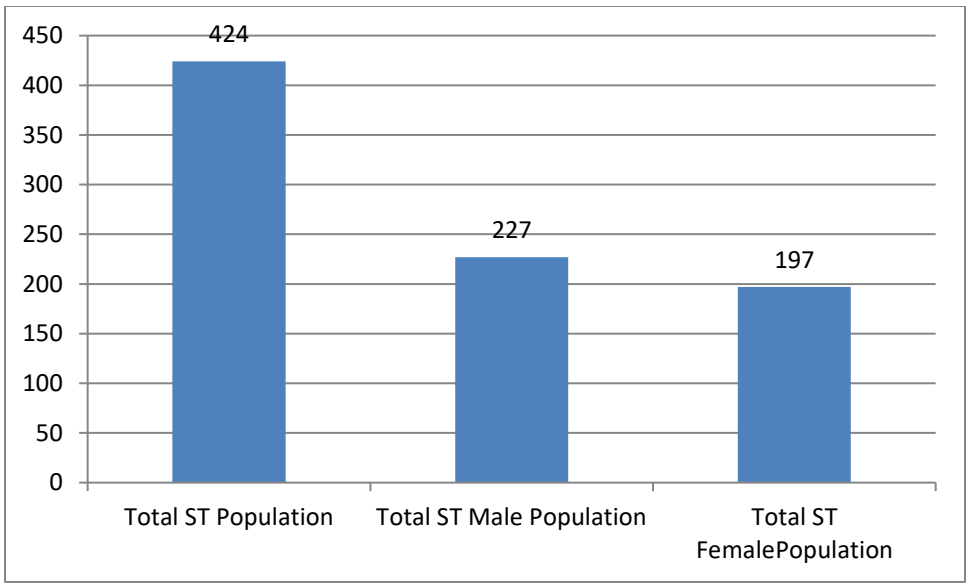


Figure 3.35 : Scheduled Tribes Population in the Study Area

3.12.8. *Literacy Rate*

Literacy level is quantifiable indicator to assess the development status of an area or region. Total literate's population was recorded as 98997 (56.03%) in the study area. It reveals that Male-Female wise literates are observed as 61342 & 37655 respectively, implies that the 'Literacy Rate' is recorded with male-female wise percentages being 34.72% & 21.30% respectively. The total illiterate's population was recorded as 77661 (43.96%) in the study area. Male-Female wise illiterates were observed as 31375 (17.76%) and 46286 (26.19%) respectively. The Male-Female

wise graphical representation of literates & illiterates population in study area villages/town is shown in **Figure 3.36.**

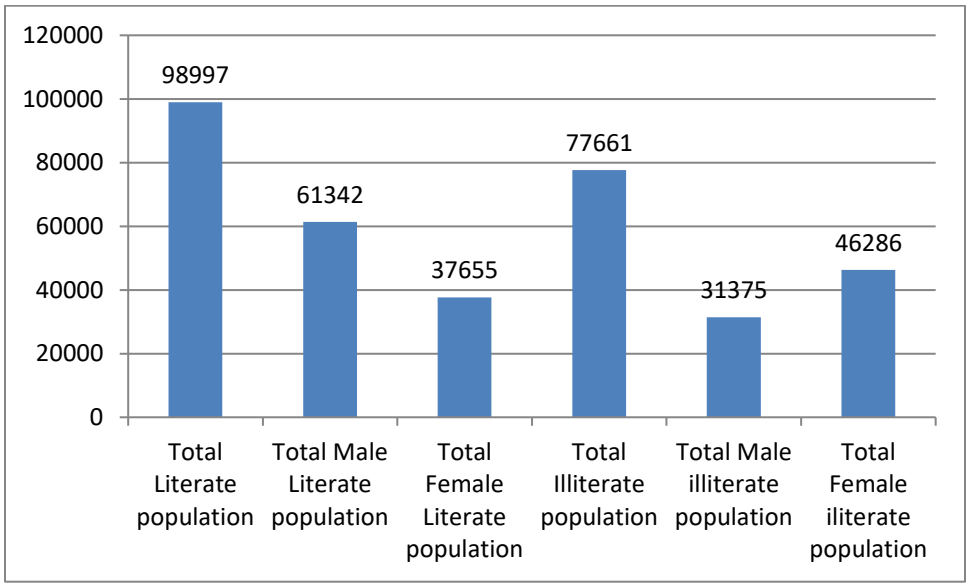


Figure 3.36 : Male-Female wise Distribution of Literates & Illiterates

3.12.9. *Workers Scenario (Occupation Pattern)*

Occupational pattern was studied to assess the skills of people in the study area. Occupational pattern helps in identifying major economic activities of the area. The main and marginal workers population with further classification as casual, agricultural, households and other workers is shown in **Table 3.62.**

Occupation Pattern wise distribution of Population and Graphical representation of 'Workers Scenario' of the study area are shown as **Table 3.64 & Figure 3.37** respectively as follows;

Table 3.64 : Distribution of Work Participation Rate

Occupation Class	As per Census 2011
Main Workers	**37798 (21.39%)**
Male	28268(74.78 %)
Female	9530(25.21 %)
Marginal Workers	**22570 (12.77 %)**
Male	12509(55.42%)
Female	10061(44.57 %)
Non-Workers	**116290(65.82%)**
Male	51940(44.66 %)
Female	64350(55.33 %)
Total Population	**176658**
Source: Census of India Records, 2011	

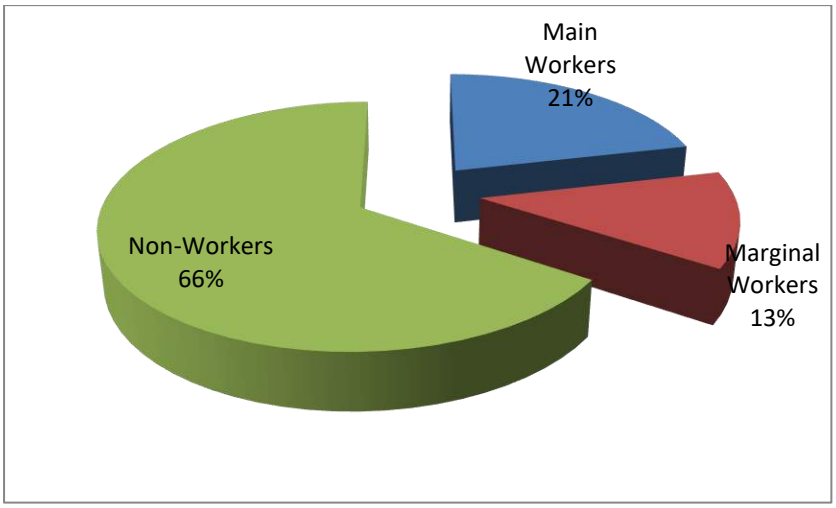


Figure 3.37 : Workers Scenario of the Study Area

Composition of Main Workers: The 'Main Workers' were observed as **37798 (21.39%)** persons to the total population of the study area and its composition is made-up of Casual laborers as 14696 (39%), Agricultural laborers as 12621 (33%), Household workers 2343(6%) and other workers as 8138 (22%) respectively. Composition of Main workers is shown below as **Figure 3.38.**

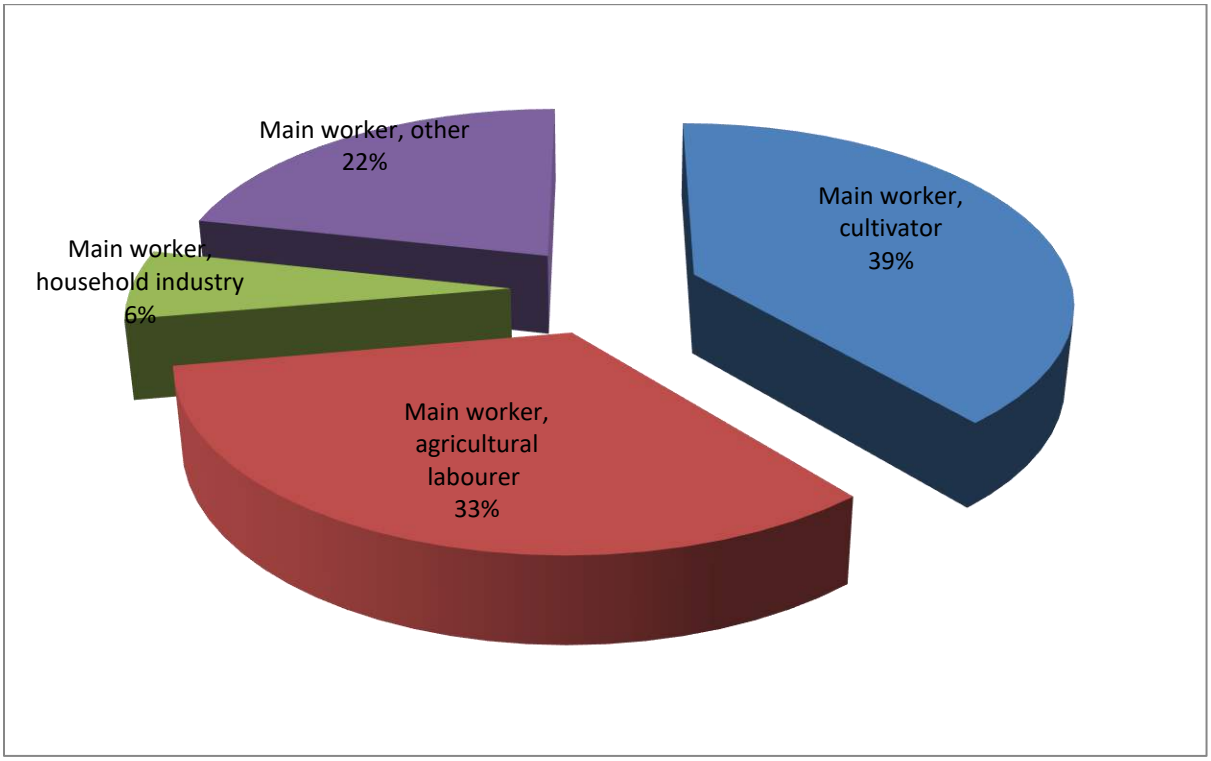


Figure 3.38 : Composition of Main Workers Population

Composition of Marginal Workers

The total marginal workers are observed as **22570 (12.77 %)**of the total population comprise of Marginal Casual Laborers as 5044 (22%), Marginal Agricultural Laborers as 11254 (50%), Marginal Household laborers as 1706 (8%) and marginal other workers were also observed as 4566 (20%) of the total marginal workers respectively. Details about marginal workers in the study area are tabulated in **Table 3.64.** Composition of Marginal workers is shown in **Figure 3.39** as follows;

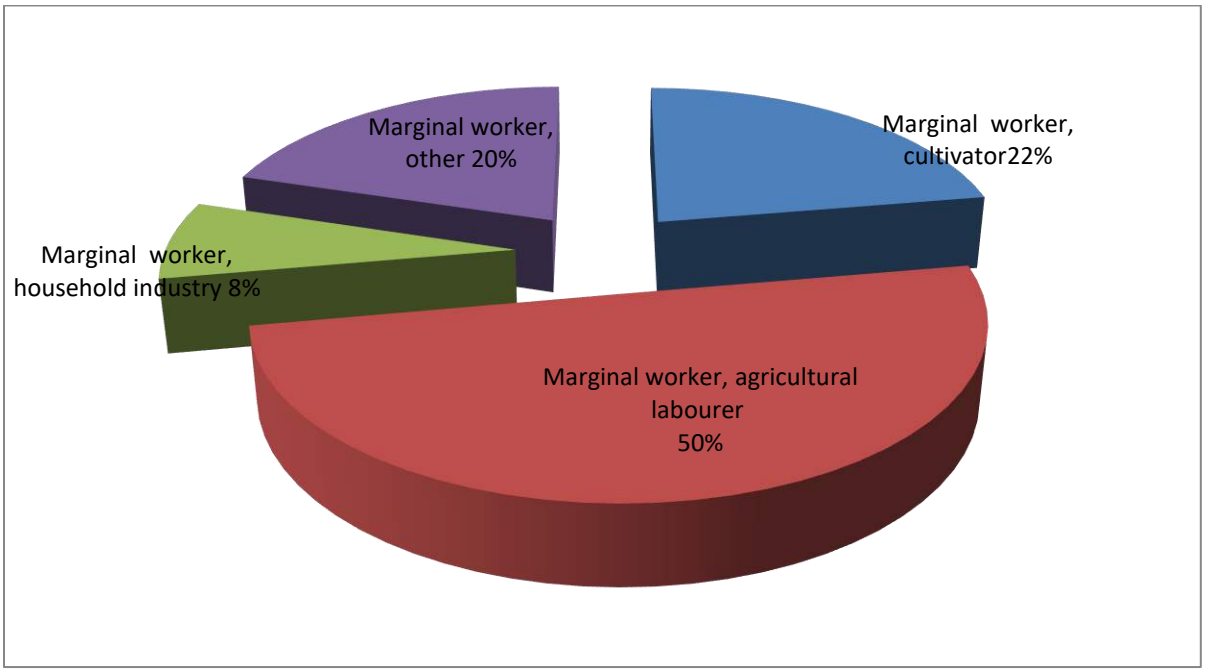


Figure 3.39 : Composition of Marginal Workers

Composition of Non-workers: Details about total Non-workers population of the study area with Graphical representation are compiled in **Table 3.65** and shown by **Figure 3.40** as follows;

Table 3.65 : Composition of non-Workers

Non-Workers Population		
Persons	**Males**	**Females**
116290	51940	64350

Source: Secondary data Census 2011

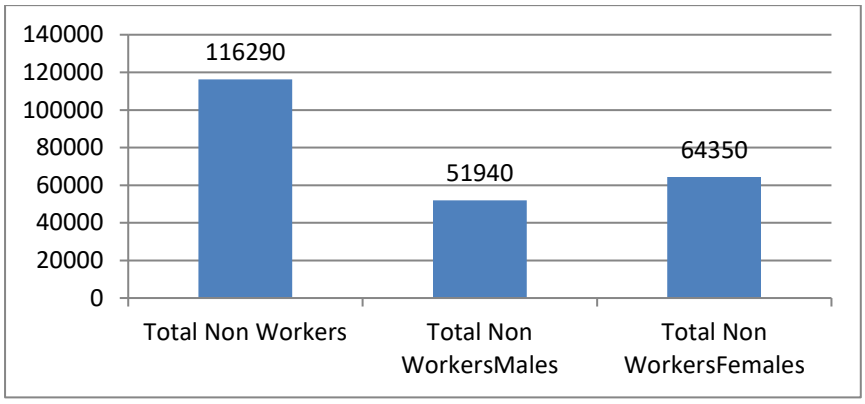


Figure 3.40 : Composition of Non-Workers

3.12.10. *Availability of Basic Infrastructure Facilities & Amenities in the Study Area*

A review of basic infrastructure facility and amenities available in the study area villages has been done on the basis of the field survey and Census Records 2011. The study area has average level of basic infrastructure facilities/amenities like educational, medical, potable water, power supply and transport & communication network etc;

Education Facilities: There are about 78 Primary Schools existing in the rural part of the study area. 38 Middle schools are found in the rural part of the study area. Only 8 Higher Secondary Schools (SS) were observed available in the rural part of the study area. 11 Senior Secondary School facilities were observed in the rural part of study area. The educational facilities have been further strengthening now and a number of private public schools and colleges are also functioning in the surroundings of the study area. Besides, there are Engineering and Medical colleges available in Towns and District headquarters only. Higher education facilities are available in Towns of the area.

Medical Facilities: Medical facility is one of the most important facilities for people. The medical facilities are provided by different agencies like Govt. & Private individuals and voluntary organizations in the study area. As per the census records 2011,only 3 primary health centre (PHC) exists in rural part of the study area 1 primary health sub-center were observed and no community health center(CHC) exists in the rural study area; most of the study area villages depend upon the towns / district HQ of the study area having such facility. 2 Mother &child welfare center, 1 Family welfare center, no Hospital and medical Dispensary facilities were observed in the rural part of the study area; most of the villages are depending upon towns and district HQ having such type of medical facility. Overall rural part of the study area is served by poor medical facilities. Specialized medical facilities are available in towns and District Headquarter (HQ) only.

Potable Water Facilities: Potable water facility is available in most of the villages/towns of the study area. Tube well water facility were observed in the villages of study area. Hand pump facility for drinking water was commonly observed in majority villages of the study area. Out of total 122 revenue villages/towns, 29 villages were served with River/Canal water for drinking purpose in the study area. As per the census records of 2011, 41 of the villages were observed with

Tank/Pond/Lake water facility in the rural part of the study area. Adequate potable water facilities are available in the study area.

Communication, Road, Transport and Banking Facilities: As per the census records 2011, 3 villages has Post Office facility in the rural part of the study area. Almost all the villages are depending upon towns and those villages being served with such facility. As per the compiled information on basic infrastructure facility, around 10 of villages have Public Bus services. It is observed from the district census handbook information of 2011 there are only 3 villages who has ATM, 13 Commercial and 3 co-operative banks facilities available in the study area

Power Supply: It is revealed from the compiled information on amenities availability as per the census record of 2011; 41 villages are electrified for all purpose in the study area. Village/town wise 'Basic Infrastructure and Amenities' availability data for the entire study area is represented in **Table 3.66** as follows

Table 3.66 : Basic Amenities Available in the study area

Village Name	Educational				Medical							Drinking Water						Communication & Transport					Approach to Village				Power Supply			
	P	M	SS	SSS	CHC	PHC	PHSC	MCWC	H	D	FWC	T	W	HP	TW	R	Tk	CT	PO	Telephone	BS	RS	PR	KR	NW	FP	ED	EAg.	EC	EA
Dhondhari	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1
Tendui Ta. Kulmai	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	1	2	2	2	2	2	2	1	1	1	1	1	2	2	2
Piparhatta	1	1	0	0	0	0	0	0	0	0	0	1	2	1	1	1	1	2	2	2	1	2	1	1	1	1	1	1	1	1
Chipaundha	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	1	1	1	1	2	2	2
Antari Kalan	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	1	1	2	1	2	2	2
Ossa	6	1	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	1	1	2	1	2	2	2
Kukudhi	1	1	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	1	1	1	1	2	2	2
Khulli	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	1	1	1	1	2	2	2
Dewara	1	1	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	1	2	2
Piparawan Urf Kathauli	2	1	0	0	0	0	0	0	0	0	0	1	2	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	2	2
Itar	1	0	0	0	0	0	0	0	0	0	0	1		1	1		1	2	2	2	2	2	1	1	1	1	1	2	2	2
Jethupur	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1
Kolhuwa	2	1	0	0	0	0	0	0	0	0	0	1	2	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	2	2
Jokanai	1	0	0	0	0	0	0	0	0	0	0	1	1	1	2	1	1	2	2	2	2	2	1	1	1	1	1	2	2	2
Peeri	1	1	1	1	0	0	0	0	0	0	1	1	2	1	2	2	1	2	2	2	1	2	1	1	2	1	1	1	2	2
Sodhiya	2	1	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1
Sanjhi	1	1	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	1	2	2	1	1	2	2	1	1	1	1
Baikunthpur	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	1	2	2	2	2	2	2	2	2	1	1	1	1	1
Mandawa	1	0	0	0	0	1	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	2	2	2	1	1	2	2
Saraha	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	1	1	2	2	2	2	2	2	2	2	1	1	2	2	2
Chandauli	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	2	2	2	2	1	1	2	2
Majhiyari	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	2	2	2	1	1	2	2
Lohandi	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2		2	2	2	2	1	2	2	2	1	1	2	2

Village Name	Educational				Medical							Drinking Water						Communication & Transport					Approach to Village				Power Supply			
	P	M	SS	SSS	CHC	PHC	PHSC	MCWC	H	D	FWC	T	W	HP	TW	R	Tk	CT	PO	Telephone	BS	RS	PR	KR	NW	FP	ED	EAg.	EC	EA
Kokasand	1	0	0	0	0	0	0	0	0	0	0	1	2	1	2	2	2	2	2	1	2	2	1	2	2	1	1	2	2	2
Naraina	1	0	0	0	0	0	0	0	0	0	0	1	1	1	2	1	1	2	2	1	2	2	2	1	2	2	1	1	1	1
Rokari	1	1	0	0	0	0	0	0	0	0	0	1	2	1	1	1	1	2	2	2	2	2	1	1	2	1	1	1	2	2
Newada Ta. Bhunda	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1		2	2	2	2	2	2	2	1	1	1	1	1
Bhandewara	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	1	1	2	1	1	1	1	1	1	1	1
Rithaiya	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1
Niriya	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	1	2	2	2	2	2	1	2	2	2	1	1	2	2
Isauta	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	2	2	2	1	1	2	2
Arai	1	1	0	0	0	0	0	0	0	0	0	1	2	1	1	2	1	2	2	2	2	2	1	1	1	1	1	1	1	1
Baghera	1	1	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1
Bhatauli	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1
Ramgadva	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	2	2	1	1	1	1	1
Tikri Ta.Kalmai	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1
Labraha Choilaha	1	1	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1
Nachna	1	1	0	0	0	0	0	0	0	0	0	1	2	1	1	1	1	2	2	2	2	2	1	1	2	1	1	1	1	1
Dhari	1	1	1	1	0	0	0	0	0	0	0	1	2	1	1	2	1	2	2	2	2	2	1	1	2	1	1	1	1	1
Baraswal	1	1	1	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1
Kuin	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1
Baheri	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1
Gadhawa Kala	1	1	1	1	0	0	0	0	0	0	0	1	2	1	1	1	1	2	2	2	2	2	1	1	2	1	1	1	1	1
Bairi	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	1	2	2	2	2	2	1	1	1	2	1	2	2	2
Bhiskuri	0	0	0	0	0	0	0	0	0	0	0	1	2	1	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1
Kuaan	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	1	2	2	2	2	2	1	1	2	1	1	1	1	1
Thadhbilar	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	1	2	2	2	2	2	1	1	1	1	1	1	1	1

Village Name	Educational				Medical							Drinking Water						Communication & Transport					Approach to Village				Power Supply			
	P	M	SS	SSS	CHC	PHC	PHSC	MCWC	H	D	FWC	T	W	HP	TW	R	Tk	CT	PO	Telephone	BS	RS	PR	KR	NW	FP	ED	EAg.	EC	EA
Mahi	1	1	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1
Padhokhara	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	2	2	2	2	2	1	1	1	1	1	1	1	1
Benipur Arail	1	2	2	2	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	1	2	2
Bajaha	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	1	2	2	2	1	2	2	1	1	2	1	1	2	2	2
Khajuri	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	1	1	2	2	2	2	2	1	1	2	1	1	1	2	2
Barawan	1	1	1	1	0	0	0	0	0	0	0	1	2	1	1	1	1	2	2	2	2	2	1	1	2	1	1	1	1	1
Nidauri	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	2	2	2	1	2	2	1	1	2	1	1	2	2	2
Machahar Urf Purwa	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	1	2	2	2	2	2	1	1	2	1	1	2	2	2
Dando	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	1	1	2	2	2	2	2	1	1	2	1	1	1	1	2
Kechuha	1	1	0	0	0	0	0	0	0	0	0	1	2	1	1	2	1	2	2	2	2	2	1	1	2	1	1	1	2	2
Kakaram	0	0	0	0	0	0	0	0	0	0	0	1	2	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	2	2
Sulamai	1	1	0	0	0	0	0	0	0	0	0	1	0	1	1	2	2	2	2	2	2	2	2	2	2	1	2	1	2	2
Kohdar	1	1	1	1	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	1	2	2	1	1	1	1	1	2	2	2
Beri	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	1	1	1	1	2	2	2
Mudpela	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2
Mamoli	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	1	1
Madaraha	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1
Gadevara	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	1	1	1	1	2	2	2
Hargarh	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	1	2	2	2	2	2	1	1	2	1	1	2	2	2
Kona	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	1	2	2	2	2	2	1	1	2	1	1	1	2	2
Singhpur Kala	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	1	2	2	2	2	2	2	1	2	1	1	2	2	2
Bhasundar Khurd	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	2	2	1	1	2	2	2
Bhasunder Kala	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	2	2	1	1	2	2	2
Bhasunder Mijhali	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	2	2	1	1	2	2	2

Village Name	Educational				Medical							Drinking Water						Communication & Transport					Approach to Village				Power Supply			
	P	M	SS	SSS	CHC	PHC	PHSC	MCWC	H	D	FWC	T	W	HP	TW	R	Tk	CT	PO	Telephone	BS	RS	PR	KR	NW	FP	ED	EAg.	EC	EA
Sukath	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1
Bhaiya	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1
Baddiha	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	2	2	2	1	2	2	2	2
Sujani Samodha	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	1	2	2	2	2	2	2	2	2	1	1	2	2	2
Sukulvan	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	2	2	2	2	2	2	2	1	2	2	2	2
Gulalpur	1	1	1	1	0	0	0	0	0	0	0	2	2	1	1	2	1	2	2	2	2	2	1	2	2	1	2	2	2	2
Dihi Khurd	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	2	2	2	1	2	2	2	2
Gaderiya	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	2	1	2	2	1	1	1	1	1	2	2	2
Kakrahi	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	1	2	2	1	1	1	1	1	2	2	2
Dhadhuva	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	1	1	2	1	1	1	1	1	2	2	2
Piparau	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	1	1	2	1	1	1	1	1	2	2	2
Jhadiyahi	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	1	2	2	1	2	2	1	1	1	1	1	1	1	1
Salaiya Kala	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	1	2	2	1	1	1	1	1	2	2	2
Mai Khurd	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	1	1	1	1	2	2	2
Mai Kala	1	1	1	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	2	2	2
Shahpur Kala	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	1	2	2	2	2	2	2	2	2	1	1	1	2	2
Salaiya Khurd	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	1	2	2	1	1	1	1	1	2	2	2
Dighalo	1	0	1	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	1	2	2	1	1	1	1	1	2	2	2
Dasauti	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	1	2	2	1	1	2	1	1	1	1	1	2	2	2
Jore	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	1	2	2	2	2	2	1	1	2	1	1	2	2	2
Siki Khurd	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	1	2	2	1	1	1	1	1	1	1	1
Khoota	0	0	0	0	0	0	0	1	0	0	0	2	2	1	2	2	2	2	1	1	1	2	1	1	1	1	2	2	2	2
Hanokhar	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	1	2	1	2	2	2	2
Dharehatha	0	0	0	0	0	1	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	1	1	1	1	1	2	2	2
Ghoraha	1	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	1	2	2	2	2	2	1	1	2	1	2	2	2	2

Village Name	Educational				Medical							Drinking Water						Communication & Transport					Approach to Village				Power Supply			
	P	M	SS	SSS	CHC	PHC	PHSC	MCWC	H	D	FWC	T	W	HP	TW	R	Tk	CT	PO	Telephone	BS	RS	PR	KR	NW	FP	ED	EAg.	EC	EA
Karah	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	1	2	2	2	2	2	1	1	2	1	2	2	2	2
Chandkhamarihia	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	1	2	2	2	2	2	2	2	2	1	1	2	2	2
Marar	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	2	2	2	2	2	2	2	2	2	1	1	2	2	2
Son Barsi	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	2	2	1	2	2	2	2
Itava Kala	1	1	0	0	0	1	0	0	0	0	0	2	2	1	2	2	2	2	2	1	1	2	1	1	1	1	2	2	2	2
Patai Dandi	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1
Isawta	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	1	1	2	2	1	1	1	1	1	1	1	1
Kharka Dabar	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1
Narir	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1
Rauuni	0	1	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	1	1	2	1	1	2	2	2
Shahpur Khurd	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	1	2	2	2	2	2	2	1	1	1	1	1
Dhauhan Chehra	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	2	2	1	2	1	1	2	2	2
Bhoj Purva	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	1	2	2	1	1	1	1
Pathara	1	1	0	0	0	0	0	0	0	0	0	2	2	2	1	2	2	2	2	2	1	2	1	1	1	1	1	2	2	2
Majhila	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	1	2	1	1	2	2	2
Jathara	1	0	0	0	1	0	1	1	0	0	0	2	2	1	1	2	2	1	2	2	2	2	2	1	1	2	1	1	2	2
Patehara	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2
Sirhir	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	1	2	2	2	2	2	2	2	2	1	1	2	2	2
Kulbhasa	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	1	1	2	2	2	2	2	2	2	2	1	1	2	2	2
Hardihan	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1
Gat	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	1	2	1	1	2	2	2
Suraicha	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	2	1	2	2	2	2	2	1	1	2	1	1	2	2	2
Tenduva Khurd	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	2	2	2	2	2	2	2	2	1	1	2	2	2
Harbari Lakhapur	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	1	2	2	2	2	2	1	1	1	1	1	2	2	2
Mojara	1	1	0	0	0	0	0	0	0	0	0	2	2	1	1	2	1	2	2	2	2	1	1	1	1	1	2	2	2	2

Village Name	Educational				Medical							Drinking Water						Communication & Transport					Approach to Village				Power Supply			
	P	M	SS	SSS	CHC	PHC	PHSC	MCWC	H	D	FWC	T	W	HP	TW	R	Tk	CT	PO	Telephone	BS	RS	PR	KR	NW	FP	ED	EAg.	EC	EA
Kathar	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	2	2	1	2	2	1	2	1	2	2	2	2
Total	78	38	11	8	1	3	1	2	0	0	1	From Column of Drinking water facilities to column of Power supply the 1 no. denote the facility is available and 2 no. denotes that the facility is not available)																			

Abbreviations:
Educational Facilities: P-Primary School, **M-**Middle School**, SS**-Higher Secondary Schools, **SSS-** Senior Secondary School
Medical Facilities: CHC- Community Health Centre, **PHC-**Primary Health Centre, **PHSC**-Primary Health Sub-Centre, **MCWC-**Maternity and Child Welfare Centre, **H-**Hospital, **D-** Dispensary, **FWC**-Family Welfare Centre
Drinking Water Facilities: T-Tap Water, **W**-Well Water, **HP**-Hand Pump, **TW**-Tube Well Water, **R-**River Water, **Tk-**Tank Water, **O-**Other Drinking Water Facility
Communication and Transport Facilities: **PO-**Post Office, **SPO**-Sub-Post Office**, PTO-** Post & Telegraph Office, **BS-**Bus Services, **RS-**Railways Services
Approach to Village: PR- Paved Roads, **KR**-Kuchha Road, **FP-**Foot Path
Power Supply: ED-Power Supply for Domestic use, **E Ag.-** Power Supply for Agricultural use, **EC-** Power supply for Commercial use, **EA-**Electricity for All Purposes

Source: Secondary data Census 2011

3.13. Traffic Study

Proposed site is well connected through the rail and road. Nearest rail station is Meja Road Railway Station on Prayagraj-Mughalsarai section of North Central Railway is about 14.23 km from the project site in NE direction. The site is in south-west of Prayagraj-Mirzapur Highway. National Highway-135 C is passing about 0.7 km, east of the site. All the coal required for the project shall be transported through existing rail network. Fly ash, gypsum, limestone and construction material shall be transported through the road i.e NH 135 C.

National Highway-135 C is a National Highway having the standard PCU capacity. The current condition of NH-135C is satisfactory and a single lane road. The width of the road is around 7 meters. Details of the road condition and Traffic count of the road is given in **Table 3.67 & 3.68.**

Table 3.67 Current Road condition of NH-135 C

S. No.	Road condition	Detail
1	Pavement/ Border width (Left side)	1.0 m
2	Pavement / Border width (Right side)	1.0 m
3	Carriage width	7.0 m
4	Road type/Condition	Pucca
5	Condition	Good
6	Lane	Two way

Table 3.68 Summary of Traffic Volume On NH-135C (Both way)

Time (Hrs.)	Two wheelers	Three wheelers	Four wheelers	Heavy vehicles	Total
6:00 AM-11:00 AM	278	78	220	38	614
11:00 AM-5:00 PM	234	68	270	44	616
5:00 PM-10:00 PM	262	72	169	42	545
10:00 PM-6:00 AM	110	34	64	48	256
Total	**884**	**252**	**723**	**172**	**2031**
PCU count	**442**	**252**	**723**	**602**	**2019**

Observation: Traffic load on NH-135Cis moderate as per the respective road classification. The condition of existing road is good.

Adequacy of Existing Road Network in Study Area

With present level of traffic on NH 135 C (to and fro) the adequacy of road/highway has been estimated by comparison with the recommendations stipulated by Indian Road Congress (IRC). As per Indian Road Congress (IRC: 64 – Guidelines for Capacity of Roads in Rural Area – Code of Practice, 1990) indicates the design service value of two lane (two way) road is 1500 PCU per hour(36000 PCU/day). The current average load on the NH-135 C is 84 PCU per hour (**2019** PCU/day) which is far below the carrying capacity of the road i.e 1500 PCU/hour.

Chapter 4. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

This chapter details the inferences drawn from the environmental impact assessment of the proposed project. It describes the overall impacts of the project activitiesand underscores the areas of concern, which need mitigation measures. Predictions have been done based on the various quantitative and qualitative methods suggested by MoEF&CC.

4.1. Introduction

Environmental Impact Assessment helps in identifying the likely impacts due to the project activities for all stages of the project viz, design, construction and operation stage. Impacts are quantified using established practices, tools and mathematical models followed by identification of mitigation measures to mitigate the impacts to acceptable levels.

The construction and operation of the project Expansion of Coal Based Thermal Power Plant from 2x660 MW by adding 3x800 MW involves various activities which may have impact on the environment. Impact analysis has been carried out for all the activities under project for physical, biological and socio-economic environment. Key issues identified requiring greater attention are related to impact on air, water, noise environment, solid waste management, traffic management and social impacts during construction and operation period of the project. Impacts are identified and evaluated in relation to all the project activities during project implementation (construction) phase and operation phase. Detailed impact assessment is given in sections below.

4.2. Identification of Project Activities and Associated Impact

The natural (physical & biological) and human (social) environmental components that have scientific, economic, social or cultural archaeological, historical, or other significance and are considered in the environmental assessment process. Project activities which may have impact on environmental components includes the following:

- Site clearance before start of construction work
- Construction of plant, Utilities and admin buildings
- Operation of the project (coal handling and storage, Dust and air emission due to production processes and dust and exhaust gas from transportation facilities, wastewater generation and ash generation etc.)

4.3. Impact Assessment and Evaluation

Identification of project activities (project implementation and operation phase) and environmental components which may be impacted due to each of project activities is carried out and is given in **Table 4.1**. Significance of impact on each of the identified environmental components for all the activities is assessed and evaluated using qualitative and quantitative techniques. Thereafter, cost-effective but appropriate mitigation measures are proposed to eliminate or minimise the identified impacts. An EMP has been designed to ensure the effective implementation of proposed mitigation measures (refer Chapter 10). Impact assessment and evaluation along with the mitigation measures are given in sections below.

4.4. Impact Identification during Construction Phase

4.4.1. Identification of Impacts

The probable impacts during construction phase on various sectors of environment (such as air, water, soil, biotic, socio-economic environment etc. have been identified and listed in **Table 4.1**. The mitigation measures for significant impacts are also discussed in respective sections.

Table 4.1 : Identification of Probable Impacts (during Construction Phase)

Construction Activities	Sector	Probable Impact
A) Long Term Impact		
Land acquisition	Land	The acquisition of private land/Govt. land leading to change in land-use pattern / land-cover.
	Socio-Economics	Loss of land may impact the livelihood/socioeconomic condition of the affected people.
B) Short Term Impacts		
Site cleaning and levelling (cutting, stripping, excavation, controlled blasting (if necessary), earth movement, compaction)	Air	• Fugitive dust emissions • Noise / air emissions from construction equipment, vehicles & machinery
	Water	• Run-off from construction site
	Land	• Loss of fertile top soil • Change in drainage pattern
	Ecology	• Loss of vegetation • Topographic alteration
Transportation and storage of construction material/ Equipment	Air	• Noise and air emissions from vehicles • Fugitive dust emissions due to traffic movement • Spillage and fugitive emissions of construction materials
	Water	• Run-off from soil heaps, construction material storage area
	Soil	• Deposition of spilled construction material on soil
	Public utilities	• Increased flow of traffic • Congestion on roads
Civil construction activities	Air	• Noise and air emissions from construction machinery • Fugitive dust emissions due to movement of traffic
	Water	• Run-off from construction areas containing construction material
Mech. & Elec. erection activities	Air	• Noise & air emissions from machines/ activities
	Water	• Run-off from erection areas containing oils, paints
Influx of labour & Construction of temp. houses	Socio economics	• Stress on local infrastructure • Stress on social relations
	Land	• Change in land use pattern of the area in labour colonies

Construction Activities	Sector	Probable Impact
	Water	• Sanitary effluents from labour colonies
	Public Utilities	• Increased consumption of Water and Electricity
Transportation and disposal of construction debris	Air	• Noise and air emissions from transport vehicles • Fugitive dust emissions due to movement of traffic • Spillage and fugitive emissions of debris materials
	Water	• Run-off from disposal areas
	Soil	• Spillage/ spread/ deposition of debris • Conversion of land into waste land
	Public Utilities	• Increased flow of traffic • Congestion on roads

4.4.2. Impact on Land use

The proposed expansion will occur within the current premises of Meja Urja Nigam Pvt. Ltd. (MUNPL), which is already designated as an industrial area, so no major change in land use is anticipated for the existing site. However, an additional land of 114 Ha will be acquired for the project. 110 Ha of government land for the ash dyke and 4 Ha of private land for the railway siding. The current land use of this additional 114 Ha shall permanently changed into industrial land use.

Beside that there are no R&R issues associated with the 110 Ha of government waste land, but R&R issues will arise for the 4 Ha of private land required for the railway siding development.

Mitigation Measures

- Detailed R&R plan, compensatory afforestation will be envisaged to mitigate the land diversion.
- There are about 150 PAP involved with the land. The land identification is in its initial stage and detailed R&R study shall be conducted in latter stages.
- For the implemetation of the R&R issues a tenetative cost of Rs. 36.24 Cr has been earmarked by MUNPL.

4.4.3. Impact due to site clearance

The site is already developed, with all areas except the land designated for the ash dyke and railway siding being levelled and equipped with internal roads, drainage networks, and other infrastructure. For development of ash pond for the Stage-II an additional land of 110 Ha. (Govt waste land) and 4 Ha (private agriculture land) for Railway siding shall be required for acquisition. For site clearance for main plant and ash pond approximately 1,955 trees need to be removed. No significant vegetation removal is needed for the 4 hectares of land designated for the railway siding. Additionally, the operation of construction machinery such as trucks, dumpers, and excavators is expected to result in short-term air emissions and fugitive dust. These impacts can be managed effectively with the proposed mitigation measures outlined below.

Mitigation Measures

- Compensatory Afforestation: Implement a compensatory afforestation plan by planting trees in alternative areas or creating green spaces elsewhere to offset the loss of trees. Compensatory plantation 1:2 shall be done.
- Permission for felling shall be obtained from forest department.
- The excavated material (debris) shall be stacked at safe places for backfill at a later stage of construction .
- To control the fugitive emission during construction phase adequate water sprinkling system will be developed in dust generating area.
- All trucks/machineries used for construction shall have PUC.
- All the loose construction material will be transported in covered trucks/dumpers.
- Regular maintenance of all the construction equipment including dumpers/trucks to prevent leakage and other emissions.
- MUNPL Meja Stage-I was developed on Plateau/rocky land. Plantation and its survival in such land profile is a challenging. At present about 163 Ha with survival percentage of 81.7% is carried. Certificate from Divisional Forest Officer-Prayagraj for the existing plantation carried by MUNPL Meja in STAGE-I is provided in Section 10.10.1 of Chapter 10 of EIA Report.
-
- MUNPL has already established a greenbelt covering 163 Ha within its current facility.
- Following consultations with the Divisional Forest Office, MUNPL plans to expand the additional greenbelt of 303.03 Ha area within the plant.
- This will result in a total of 466.03 Ha i.e 33.08% of 1409 Ha land being dedicated to the greenbelt within the plant premises.
- Over and above the greenbelt, as carbon sink, additional planation shall be done in 271 Ha of degraded forest area. Native species of trees shall be planted in consultation with DFO, Social forestry department.

4.4.4. Impact on Topography

The topography of the proposed site is slightly undulating. The site is already developed and expansion is to be done within the existing premises. The elevation of the project area ranges between 81 to 128 amsl. The project site is sloping slightly towards west and southwest direction. For development of ash pond for the Stage-II an additional land of 110 Ha (Govt waste land) and 4 Ha (Pvt. agriculture land) for railway siding shall be required for acquisition. The current land use of this additional 114 Ha shall permanently changed into industrial land use. The major change in the topographical feature of area would be due to the activities related to levelling of site, construction of main plant and other related structures, erection of boilers, turbines and land diversion for ash dyke. Further, the magnitude of the impacts is envisaged to be low, as the site and infrastructural facilities are fully developed in existing plant.

Mitigation Measures

- Existing drainage network shall be maintained & strengthened for new unit.

- Storm water drainage network along with sedimentation tank shall be developed at the site to minimize soil erosion.

4.4.5. Impact on Drainage Pattern

The study area falls in southern part of the district and occupies the part of Yamuna and Tons basin. Yamuna has more constant channel and steeper banks. The drainage pattern of the study area is mainly controlled by the Tons River and its tributaries. The drainage pattern of the study area is mainly dendritic to sub dendritic type. Tons river is flowing about 0.95 km north of the project site. The site is already developed and expansion is to be done within the existing premises. The elevation of the project area ranges between 81 to 128 amsl. The project site is sloping slightly towards west and southwest direction. The Tons river[3] is located about 950 m away from the site. HFL of the Tons River is 87.18 m at Meja Road CWC Gauge near project site. (HFL at CWC Gauge station Meja Road CWC Gauge and Tons Aqueduct/Tons has already been established by the CWC department and HFL for the waterway was derived as per change in the ground profile of the river.) The elevation of the site towards river side is more than 90 amsl, hence chance of flooding is not anticipated. Further Certificate received from Chief Engineer (Water Resources) Irrigation and Water Resources Department, Govt of UP, regarding HFL level of River Tons dt.10.01.2025 is attached as **Annexure-26**

Mitigation Measures

- Existing drainage network shall be maintained & strengthened.
- Storm water drainage network along with sedimentation tank shall be developed at the site to minimize soil erosion.
- Design perimeter ditches around the ash pond to collect and divert surface runoff away from the pond area. These should be lined or reinforced to prevent erosion.
- Incorporate internal drains within the ash pond to manage seepage and water accumulation and contamination of water bodies.

4.4.6. Impact on Air Environment

As the internal roads, drainage network etc. is already developed. The dust will be the main pollutant affecting the ambient air quality of the area during the construction phase. The main sources of emission during the construction period are the movement of vehicles/equipment at site and dust emitted during the levelling, grading, earthwork, stockpiles and foundation works. Operation of DG sets are the other sources of air emission during construction period. Short term localized and reversible impact is expected due to dust emissions generated during the construction stage. The impact will be confined within the project boundary and is expected to be negligible outside the plant boundaries. Mitigation measures proposed are given below:

Mitigation Measures

[3] FINAL FEASIBILITY REPORT ON DETAILED HYDROGRAPHIC SURVEY TONS RIVER by IWAI

- Water sprinkling shall be done at regular interval in dust generating areas.
- Providing suitable surface treatment to ease the traffic flow and regular sprinkling of water will reduce the dust generation.
- Aggregates and sand will be stockpiled at suitable places (after stabilizing the surface), near the boundary wall so that the wall acts as windshield.
- Necessary water sprinkling arrangement will be provided around the stockpiles and used whenever necessary to make them moist.
- Cement and steel will be stocked inside covered sheds.
- Construction vehicles having 'Pollution Under Control Certificate' will be deployed during the activity to restrict the vehicular emissions.

4.4.7. Impact on Noise Environment

Construction activities involve operation of heavy machinery and equipment for construction purpose, loading & unloading of construction material and pilling & other activities. All these activities will generate the noise. Typical noise generation from these equipment's as per CPCB are given in **Table 4.2**.

Table 4.2 : Typical Noise Levels of Construction Equipment

Construction Equipment for Different Activities	Noise Level in dB(A) at 50 feet
Crane	75-77
Welding generator	71-82
Concrete mixer	74-88
Concrete pump	81-84
Concrete vibrator	76
Air compressor	74-87
Pneumatic rods	81-98
Bulldozer	80
Cement and dump truck	83-94
Front end loader	72-84
Dump truck	83-94
Paver	86-88
Truck	83-94
Tamper	74-77
Backhoe	72-93

Source: CPCB

Due to operation of construction equipment, and construction activities ambient noise levels are likely to increase exceeding the prescribed limit. Workers involved in construction activities will be impacted due to exposure to high noise level at site. Thus, adequate PPE shall be provided to workers to prevent direct exposure to the noise levels. OSHA guidelines shall be followed for exposure to specific noise levels for workers and are listed in **Table 4.3.**

Table 4.3 : OSHA noise exposure limits for the work environment

Noise (dBA)	Permissible Exposure (hours & minutes)
85	16 hrs

90	8 hrs
96	3 hrs 30 minutes
102	1 hr 30 minutes
108	40 min
115	15 min
121	6 min
127	3 min
130	1 min

Source: Marsh, 1991

With increasing distance from the source the noise level decreases due to wave divergence. Additional decrease also occurs due to atmospheric effects and interaction with objects in the transmission paths. For hemispherical sound wave propagation through homogeneous medium, noise levels at various distances can be predicted using a model based on the following principle:

$L_{p2} = L_{p1} – 20 \text{ Log } (r_2/r_1)$, where L_{p1} and L_{p2} are the sound levels at points located at distance r1 and r2 from the source. Combined effect of all the sources (A, B, C… etc) can be determined at various locations by the following equation:

$10 \text{ Log } (10^{lpa/10} + 10^{lpb/10} + 10^{lpc/10})$, where lpa, lpb and lpc are noise pressure levels at a point due to different sources.

Based on the above principal, Noise Model has been developed where noise levels can be predicted at any distance from the source for simple flat terrain. Attenuation factors are not applied hence the modeled results are overestimate.

The maximum noise expected from construction activities will be around 72 to 94 dB(A). **Figure 4.1** shows the noise contours at distance 100 m, 200 m, 300 m, 400 m, 500 m from 94.6 dB(A) source strength. At 200 m distance the predicted noise values are 37.6 dB(A). At 500 m distance the predicted values are 29.6 dB(A).

Baseline ambient daytime and nighttime Noise levels recorded at nearest village (Kohdar) outside the project area (0.9 km, northeast from project boundary) was found to be 52.0 and 41.7 dB(A) respectively which was found within the standard i.e. 55 dB(A) during daytime and less than 45 dB(A) during night time. The predicted noise level at 500 m distance from source is 29.6 dB(A). Therefore, there will not be any significant impact on the ambient noise quality in the surrounding villages.

Mitigation Measures:

- The noise generating equipment, machinery and vehicles shall be maintained properly to avoid generation of high noise due to lack of wear and tear.
- The standards for occupational exposures - tolerable level is 90 dB(A) for 8 hour exposure. This level will be achieved inside work area through use of properly maintained machines, pumps, compressors and vehicles.
- In case of overexposure found inside working area, workers will be provided with ear plugs/ earmuffs for use so that the exposure is minimized / brought to acceptable level.
- Equipment will be maintained so that noise level does not increase due to improper maintenance.

- DG sets will be provided with acoustics enclosures.
- Mufflers, silencers, acoustics treatment of room will be done wherever required.
- It is expected that noise level at the project boundary will be within the prescribed norms of CPCB due to operation of the proposed project and no significant impact on noise environment is expected.
- Greenbelt developed within the project premises will also act as a barrier to the propagation of noise from the industrial area premises. This shall further reduce the noise levels appreciably. Hence, no significant impact is envisaged.

It is, therefore, expected that noise level at the project boundary will be within the prescribed norms of CPCB due to operation of the proposed project and hence no significant adverse impact on noise environment is expected.

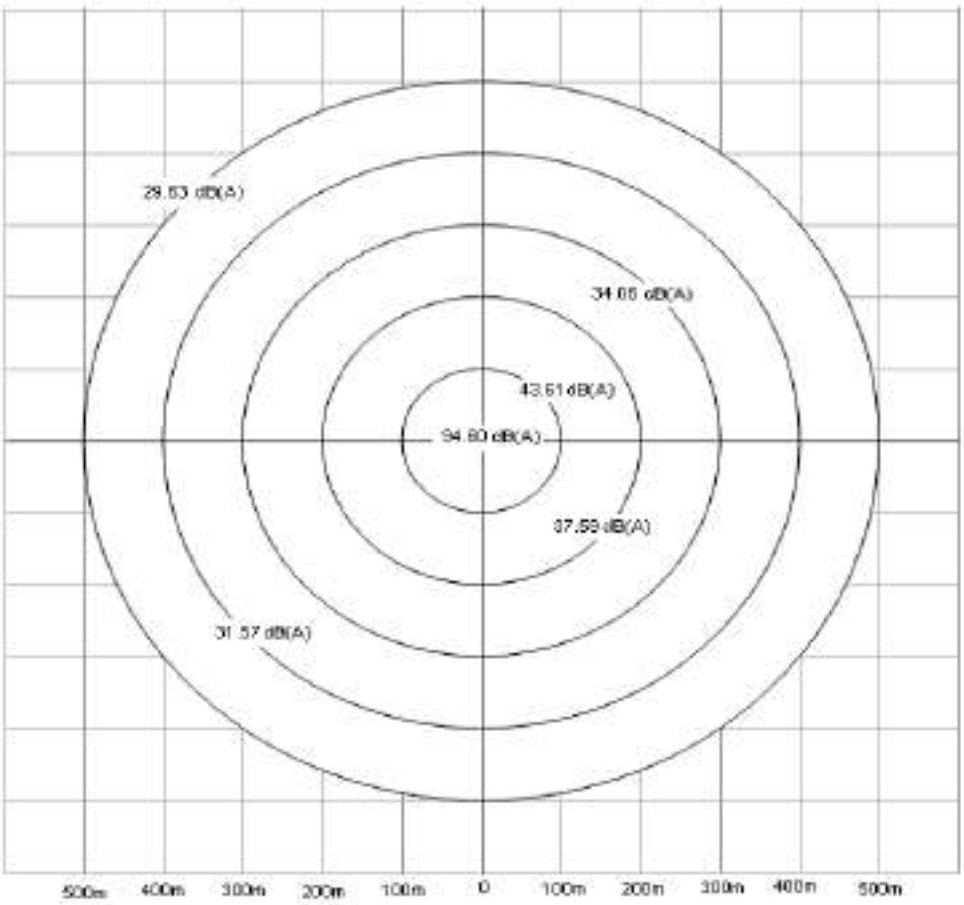


Figure 4.1 : Predicted Noise Level– (source strength 94 dBA)

4.4.8. Impact on Water Quality

Approx. 400 KLD of water shall be required during the construction phase. Water shall be sourced from the existing source of water and however, groundwater is proposed to be utilized for the project during construction as contingent arrangement. Hence, no quantitative impact is envisaged on the ground water resources. Drinking and sanitation facilities shall be provided to workers and staff during construction. Water will also be needed for sprinkling to reduce dust emission. Storm water drains will be made immediately after starting construction activity. Wastewater from site offices, canteens and other washing facilities which may impact the ground water if not managed properly.

Mitigation Measures

- Wastewater arising from site offices, canteens and other washing facilities will be collected and treated in the STP and then reused for Horticulture and green cover development.
- Oil separator / interceptor will be provided near vehicle parking site, workshop and canteen to prevent the release of oil and grease into drainage system.
- The oil and grease separators will be cleaned on regular basis.
- The treated water will be reused for gardening and horticulture purpose. Sedimentation pits will be provided at appropriate location to trap the silt laden runoff water and prevent excessive silt from going outside.

4.4.9. Impact on Hydrology

Construction water will pass through an existing sedimentation tank to arrest sediments and treated water will be reused in water sprinkling. Discharge of this water into reservoir is not expected. As the construction activities will be confined to the existing project site only, no significant impact on the hydrogeology as part of the study area envisaged. As per the Hydrogeological study conducted by NIH Roorkee no impact of MUNPL effluents is found on the surface and ground water regime because no effluents are discharged out by the MUNPL and the effluents from the ash dyke also do not indicate any harmful parameter. However, following mitigation measures has been suggested in the report:

- RCC drains will be provided for carrying effluents to treatment plant.
- Creating plantations and irrigate them.
- Continuous monitoring of the groundwater conditions using piezometers.
- Maximum recycle and reuse of the treated effluents in the plant.
- Public awareness raising programmes are also important for the preventive measures.

4.4.10. Solid Waste Management

Solid waste generated during construction phase comprise of soil, used bags, bricks, concrete, MS rods, tiles, wood etc, Excavation of the soil will make the soil loose thereby making soil prone to wind and water erosion. Development of project will lead to loss of topsoil. Construction & demolition waste (debris, unused iron bars or damaged support structures, quarry dust) may affect soil at the site, if such wastes are disposed in an uncontrolled manner. In case fuel/oil is stored at site then occurrence of accidental fuel spillage or leakage cannot be ruled out which in the process will contaminate the adjoining soil strata. Such soil contamination can be severe in case of voluminous leakage, thus are required to be managed. Movement of construction vehicles and equipment may lead to soil compaction on haulage roads and soil in nearby area, if the vehicle/equipment are parked in nearby areas. Soil may be contaminated due to inappropriate disposal of liquid waste, (lubricating oil and fuel spills, waste oil and lubricant and vehicle/equipment washing effluent) and solid waste (fuel filters, oily rags) likely to be generated from repair and maintenance of transport vehicles, construction equipment and machinery. Soil may also be contaminated due to inappropriate disposal of domestic solid waste and sewage from construction camps. But such a surface soil contamination will be short term and insignificant in nature. But in proposed project, the workers can be tapped from nearby village so there will be no issue of generation of domestic waste and sewage from labour

camps. The impact during construction phase will be temporary till the construction process and will be insignificant as all the waste will be managed as per the guidelines as mentioned below:

Mitigation Measures

- Entire excavated soil will be re-used completely either for filling or for landscaping purpose.
- Recyclable material will be sold to authorized recyclers and remaining will be disposed off at the designated locations by Municipal Authorities as per C & D Waste Management Rules, 2016 and further amendments.
- Excavation and filling operation shall be carried out in parallel so as to minimize the soil erosion. Unusable debris material shall be suitably disposed off at the designated locations by Municipal Authorities as per C & D Waste Management Rules, 2016
- Compaction of soil shall be undertaken by sprinkling the water to minimize the surface runoff and erosion.
- Prohibiting usage of plastic bags and thermocol disposables.
- Construction & demolition waste generated should be segregated at site into recyclable, reusable & rejected fraction. Recyclable should be sold to authorized vendor, reusable waste should be stored at site for usage and rejected fraction should be disposed as per C & D Waste Management rules, 2016.
- Adequate toilets & bathrooms shall be provided to prevent open defecation. Sewage shall be disposed-off on a daily basis at STP.
- Storm water drainage network along with sedimentation tank has been already developed at the site to minimize soil erosion.
- Fuel, hazardous waste like used oil from DG sets shall be stored in HDPE containers and shall be stored on paved surfaces in isolated location to prevent its spillage and contamination of soil. Used oil shall be disposed of through authorized vendors only.
- Movement of construction vehicles shall be restricted to the designated roads only to prevent compaction of soil in other areas.

4.4.11. Impact on Ecology

The initial construction works at the project site involves land clearance. The construction of main plant will be within existing plant premises. Since land is already for industrial purpose, during construction phase, there will be minimal disturbance of vegetation.

For site clearance for main plant and ash pond approximately 1,955 trees need to be removed. No significant vegetation removal is needed for the 4 hectares of land designated for the railway siding.

Deposition of fugitive dust on pubescent leaves of nearby vegetation may lead to temporary reduction of photosynthesis. Such impacts would, however, be confined mostly to the initial periods of the construction phase and would be minimized through adoption of control measures such as paving and surface treatment, water sprinkling and plantation schemes.

The runoff from construction area may lead to a short-term increase in suspended solids and decrease in dissolved oxygen near the discharge point in receiving water body. This may lead to a temporary decrease in the photosynthetic activity of phyto-planktons, rise in anaerobic conditions and food chain modification.

Mitigation Measure

- MUNPL Meja Stage-I was developed on Plateau/rocky land. Plantation and its survival in such land profile is a challenging. At present about 163 Ha with survival percentage of 81.7% is carried.
- MUNPL has already established a greenbelt covering 163 Ha within its current facility.
- Following consultations with the Divisional Forest Office, MUNPL plans to expand the additional greenbelt of 303.03 Ha area within the plant.
- This will result in a total of 466.03 Ha i.e 33.08% of 1409 Ha land being dedicated to the greenbelt within the plant premises.
- Over and above the greenbelt, as carbon sink, additional planation shall be done in 271 Ha of degraded forest area. Native species of trees shall be planted in consultation with DFO, Social forestry department.
- A Comprehensive Action Plan for greenbelt development with a budget of Rs. 38.72 Crores is provided.
- MUNPL approached Divisional Forest Officer-Prayagraj for assistance in plantation within MUNPL premises and in the surrounding degraded forest land under DFO-Prayagraj.
- MUNPL has earmarked a total budget of Rs. 55.42 Cr for greenbelt development. Out of this, Rs. 38.72 Cr has already been approved by DFO Prayagraj.
- Additionally, MUNPL has allocated an extra budget of Rs.16.7 Cr for greenbelt development, which is pending approval from DFO.
- Water sprinkling shall be done at regular interval in dust generating areas.
- Adequate toilets & bathrooms shall be provided to prevent open defecation. Sewage shall be disposed-off on regular basis in STP.
- Storm water drainage network along with sedimentation tank has been already developed to arrest the sedimentation.

4.4.12. Socio-economic environment

The land is already in possession of MUNPL. Proposed expansion shall be done with in the existing premises. For development of ash pond for the Stage-II an additional land of 110 Ha. (Govt waste land) and 4 Ha (Pvt. agriculture land) for Railway siding shall be required for acquisition. No forest land is involved. This will impact land use patterns and may require compensation and relocation efforts for private landowners.

A total of 4 hectares of private land, currently owned by around 150 people, will be acquired for the railway siding. The acquisition of 4 hectares of private land, owned by approximately 150 individuals, will directly affect those landowners. This could lead to loss of livelihood for those who depend on the land for agriculture or other purposes.

The other social impacts associated with project are people, will get subjected to additional pollution stress, noise from heavy vehicles, road accidents, lower aesthetics of natural beauty, etc. There are no cultural and archaeological sites present with in the project influence area as well as study area of the site hence an impact on the archaeological site is not anticipated.

However, some positive impacts are also associated with the project. This expansion project will provide employment opportunities for the local people. In terms of gross economic yield will accrue on account of the project. The gross economic yield will increase through increase in high economic group and subsequent market multiplier effect and indirect employment opportunities will generate due to indirect job opportunities in the area. The proposed expansion power plant will require skilled, semi-skilled and unskilled personal during construction and operational phase. Many of the people from neighbouring villages, as found suitable will get opportunity for indirect employment through contractors during construction and operational phase. The total manpower from various agencies during construction of Stage-II would be about 5046 (60 permanent and 4986 temporary) during peak deployment) and during operation period is estimated to be about 5250 (210 permanent and 5040 temporary). However, the exact numbers may vary during construction and operation phases.

Mitigation Measures

- Detail R&R plan shall be prepared after acquisition of complete land.
- Most of the land shall be acquired from landowner through on one-to-one negotiation/through district administration.
- R&R of project affected families shall be applicable as per the R&R Policy of the UP Govt.
- MUNPL has earmarked a fund of Rs. 36.24 Cr. for addressing the R&R issues involved for acquisition of additional land.
- Short term positive impacts will result in better quality of life. The project proponent/ contractors shall ensure that most of the workforce shall be engaged from the nearby villages/town.
- The total manpower from various agencies during construction of Stage-II would be about 5406 (60 permanent and 4986 temporary) during peak deployment.
- During the construction phase, DG sets should be operated only as a backup power at project site. Adequate provision should be made to mitigate the problem.
- The construction materials, which will be used at the project site shall be sourced from authorized dealer.
- Increase in population density in core zone study area due to workforce involvement during construction phase is only for short term impact.

4.5. Impacts During Operation phase

4.5.1. *Identification of Probable Impacts*

The probable impacts during operation phase on various sectors of environment (such as air, water, soil, biotic, socio-economic environment etc. have been identified and listed in **Table 4.4**. The mitigation measures for significant impacts are also discussed in respective sections.

Table 4.4 : Identification of Probable Impacts (during Operation Phase)

Operation and Maintenance Activities	Sector	Probable Impacts
Transportation of coal/ oil	Air	• Noise and air emissions from vehicles • Fugitive dust emissions due to traffic movement • Spillage and fugitive emissions of coal/ oil
	Water	• Spillage of coal/ oil and flow into streams

	Public utilities	• Increased flow of traffic • Congestion on roads
Unloading, crushing and storage of crushed coal/ unloading and storage of oil	Air	• Noise and air emissions from vehicles • Fugitive dust emissions from coal handling areas
	Water	• Effluents for CHP/ oil storage areas • Effluents from dust extraction/ suppression systems • Run-off from coal stock yard
Burning of fuel	Air	• Stack emissions (PM, SO_2 and NOx)
Withdrawal of water	Water	• Reduced availability to downstream users • Reduced flow in downstream direction/ change in regime
	Ecology	• Entrapment/ Impingement of organisms
Water treatment for various uses	Water	• Generation of effluents and sludge from treatment plant • Clarifier sludge • Filter backwash • DM plant regeneration waste • Tube settler sludge
Power cycle	Water	• Discharge of blow down
Equipment cooling	Water/ Ecology	• Discharge of hot water containing chemicals/ biocide
Transportation, storage & use of chemicals/ Cl_2O	Air/ Water	• Risks of accidental spillage/ waste of chemicals
Operation of transformers and switchyard	Water	• Generation of effluents containing oil
Maintenance (cleaning, over-haul, oil change, lubrication etc.)	Water	• Generation of effluents containing oil/ chemicals
Domestic use of water in plant and township	Water	• Generation of sanitary effluents
Transportation of lime	Air	• Minimal fugitive emissions due to rail transportation
Disposal and storage of gypsum	Water	• Generation of effluents and sludge

4.5.2. *Impact on Air Quality*

4.5.2.1 Sources of emission and Model used

Emissions from point sources at TPP are very important for impact assessment as these sources are comparatively large, continuous in nature and are released at higher elevations above ground level. The impacts on air environment from stacks depend on the quality of Coal used and can extend far distances depending on prevailing meteorological conditions.

The impacts of air pollution from a Coal based thermal power plant (TPP) on air quality depend upon various factors, viz. design capacity, process technology, quality of fuel (coal) used for combustion, operation & maintenance of process units and air pollution control equipment installed. The severities of impacts on air environment from any thermal power project are also governed by terrain conditions around the project site and the prevailing micro-meteorological conditions in the project region. Generally, thermal power project besides the main units like boilers, turbines also have several onsite and offsite facilities, viz. Coal yard, conveyor system, Coal crusher/pulverizes, Coal handling (loading/unloading) etc. which also contribute to air pollution in the form of fugitive emissions.

The major air pollutants from a TPP are Particulate Matter (PM), SO_2, and NOx which are emitted continuously from the stacks (point sources), attached to Coal combustion boilers.

Prediction of impacts on air environment is carried to using mathematical model based on a steady state Gaussian plume dispersion model. In the present case, AERMOD Version 9.8.1 dispersion model based on steady state Gaussian plume dispersion, designed for multiple point sources for short term and developed by United States Environmental Protection Agency [USEPA] has been used for simulations from point sources. The model set-up details are presented in **Table 4.5.**

Table 4.5 : Model Set-Up

S. No.	Parameter	Details
1	Model Name	AERMOD (Version 9.8.1)
2	Model Type	Steady state Gaussian plume air dispersion model
3	Topography	Rural, Flat
4	Averaging Time	24 hours
5	Source Type	Point source
6	Boundary Limits	10 km X 10 km
7	Co-ordinate System	Uniform Cartesian Grid
8	Receptor Height	Ground level
9	Anemometer	10 m
10	Surface meteorological data	Site Specific data processed by AERMET
11	Upper air Data	Upper air Estimator using AERMET processor

4.5.2.2 *Model Input Data*

For modeling purposes, pollutants like PM, SO_2 and NOx are considered. Their net emissions have been calculated for modeling purpose. The details of the emissions considered from the proposed expansion project are presented in **Table 4.6.** Different scenarios for stack emission is given in **Table 4.7.** Incremental GLC is presented in **Table 4.8.**

Table 4.6 : Stack Emissions from MUNPL

S. No	Parameters	Units	MUNPL		
			Stage-I (2x 660 MW)	Stage-II (1x 800 MW)	Stage-II (2x800 MW)
1	Stack Height	m	275	150*	220
2	No. of flue per stack	No.	2	1	2
3	Number of stacks	no	1	1	1
4	Flue internal diameter at top	m	7.65	8.8	8.8
5	Flue Gas velocity (at Exit)	m/sec	22	18.3	18.3
6	Flue Gas temperature (at Exit)	ºC	124	62	62

S. No	Parameters	Units	MUNPL		
			Stage-I (2x 660 MW)	Stage-II (1x 800 MW)	Stage-II (2x800 MW)
7	Flue Gas Flow rate (at Exit)	Nm^3/sec	757.43	868	865 (for each)
8	Rate of coal consumption	TPH	433	446	892
9	Sulphur in coal (maximum)	%wt/wt	0.5	0.5	0.5
	Emission Load				
A	PM	gm/sec	22.72	26.04	51.9
B	SO_2	gm/sec	75.74	86.8	173
C	NOx (100 mg/Nm^3)	gm/sec	75.74	86.8	173
D	NOx (350 mg/Nm^3)	gm/sec	265.10	303.8	605.8

Above data is based on Stage-I Coal and may vary slightly based on actual Coal Source: MUNPL, Meja

Table 4.7 : Different scenarios for stack emissions

	*Scenario:1	Scenario:2
	Stage – I (2x 660 MW) + Stage – II (1x 800 MW) & (2x800 MW)	**Only Stage–II (1x 800 MW) & (2x800 MW)**
Stack Height (mts)	275 150 & 220 (twin flue)	220 & 150
	Emission Load	
PM (gm/sec)	100.7	77.94
SO_2 (gm/sec)	335.5	259.8
NOx (gm/sec) (100 mg/Nm^3)	335.5	259.8
NOx (gm/sec) (350 mg/Nm^3)	1174.4	909.3
	Maximum Incremental GLC	
PM ($\mu g/m^3$)	3.04	2.71
SO_2 ($\mu g/m^3$)	10.12	9.05
NOx ($\mu g/m^3$) (100 mg/Nm^3)	10.12	9.05
NOx ($\mu g/m^3$) (350 mg/Nm^3)	35.43	31.63

**Scenario:1 is considered for the Cumulative Air modelling*

Table 4.8 : Incremental Data (Considering the Scenario:1)

Ambient Air Quality Locations			Max. Baseline (µg/m³)			Incremental Concentration (µg/m³)			Resultant incremental (µg/m³)			NAAQS Standards (µg/m³)		
Monitoring location	Distance (Km)	Direction	PM	SO_2	NO_x	PM	SO_2	NO_x	PM	SO_2	NO_x	PM_{10}	SO_2	NO_x
AAQ1	Project site	--	94	13.9	17.3	2.42	8.06	8.06	96.42	21.96	25.36	100	80	80
AAQ2	0.7	SW	88	12.2	15.5	1.10	3.66	3.66	89.1	15.86	19.16	100	80	80
AAQ3	1.5	NE	82	9.6	13.2	2.01	6.71	6.71	84.01	16.31	19.91	100	80	80
AAQ4	5.2	NE	84	10.3	12.8	1.21	4.02	4.02	85.21	14.32	16.82	100	80	80
AAQ5	9.4	E	90	11.9	14.5	1.44	4.80	4.80	91.44	16.7	19.3	100	80	80
AAQ6	2.0	S	80	8.8	13.4	1.02	3.39	3.39	81.02	12.19	16.79	100	80	80
AAQ7	3.5	NE	81	9.6	13.2	1.80	6.00	6.00	82.8	15.6	19.2	100	80	80
AAQ8	2.1	W	83	9.3	12.8	2.30	7.68	7.68	85.3	16.98	20.48	100	80	80
AAQ9	0.9	E	85	10.5	13.5	1.96	6.55	6.55	86.96	17.05	20.05	100	80	80
AAQ10	7.0	NE	82	9.9	12.7	1.55	5.17	5.17	83.55	15.07	17.87	100	80	80

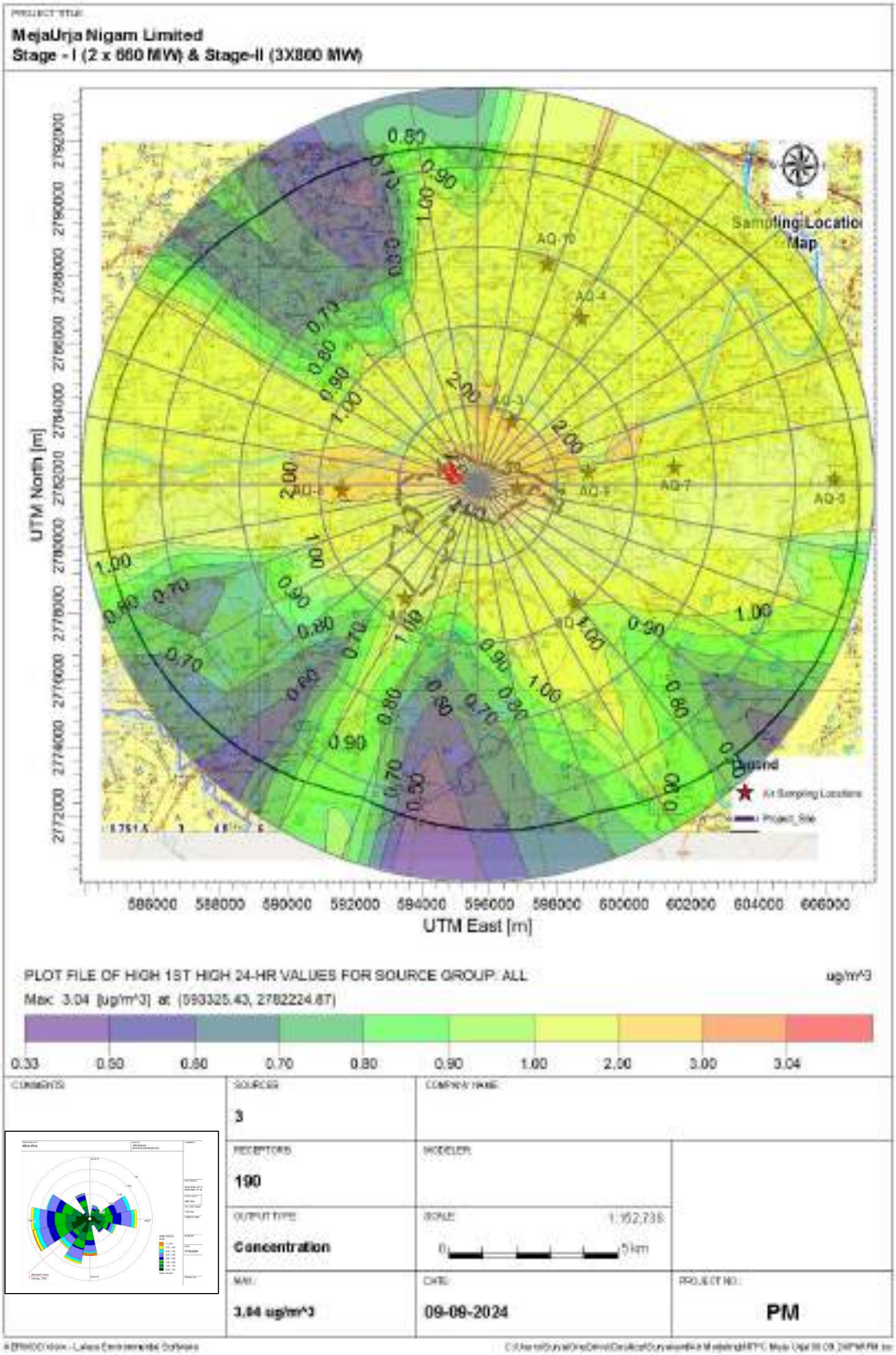


Figure 4.2 : Predicted GLC of PM

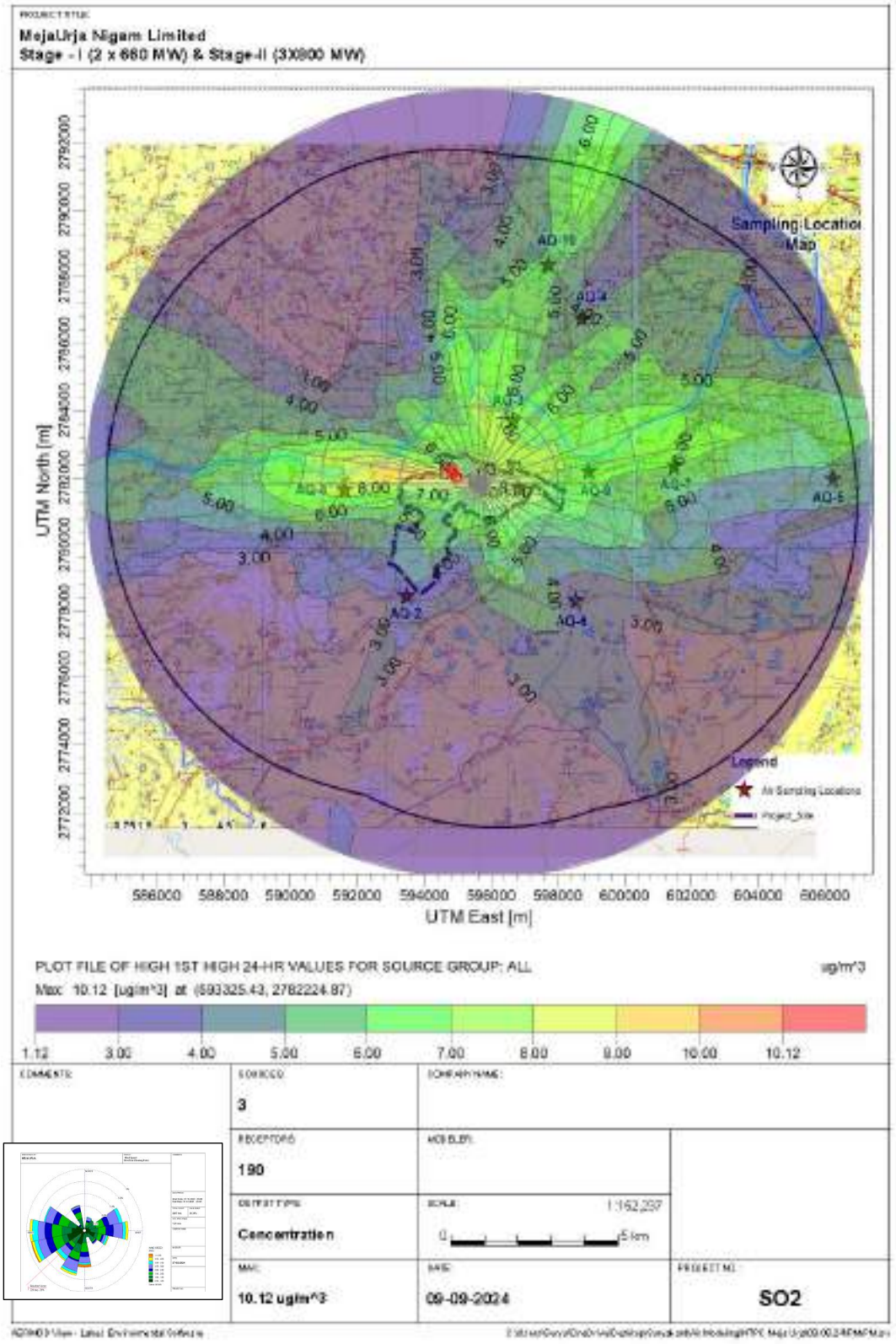


Figure 4.3 : Predicted GLC of SO_2

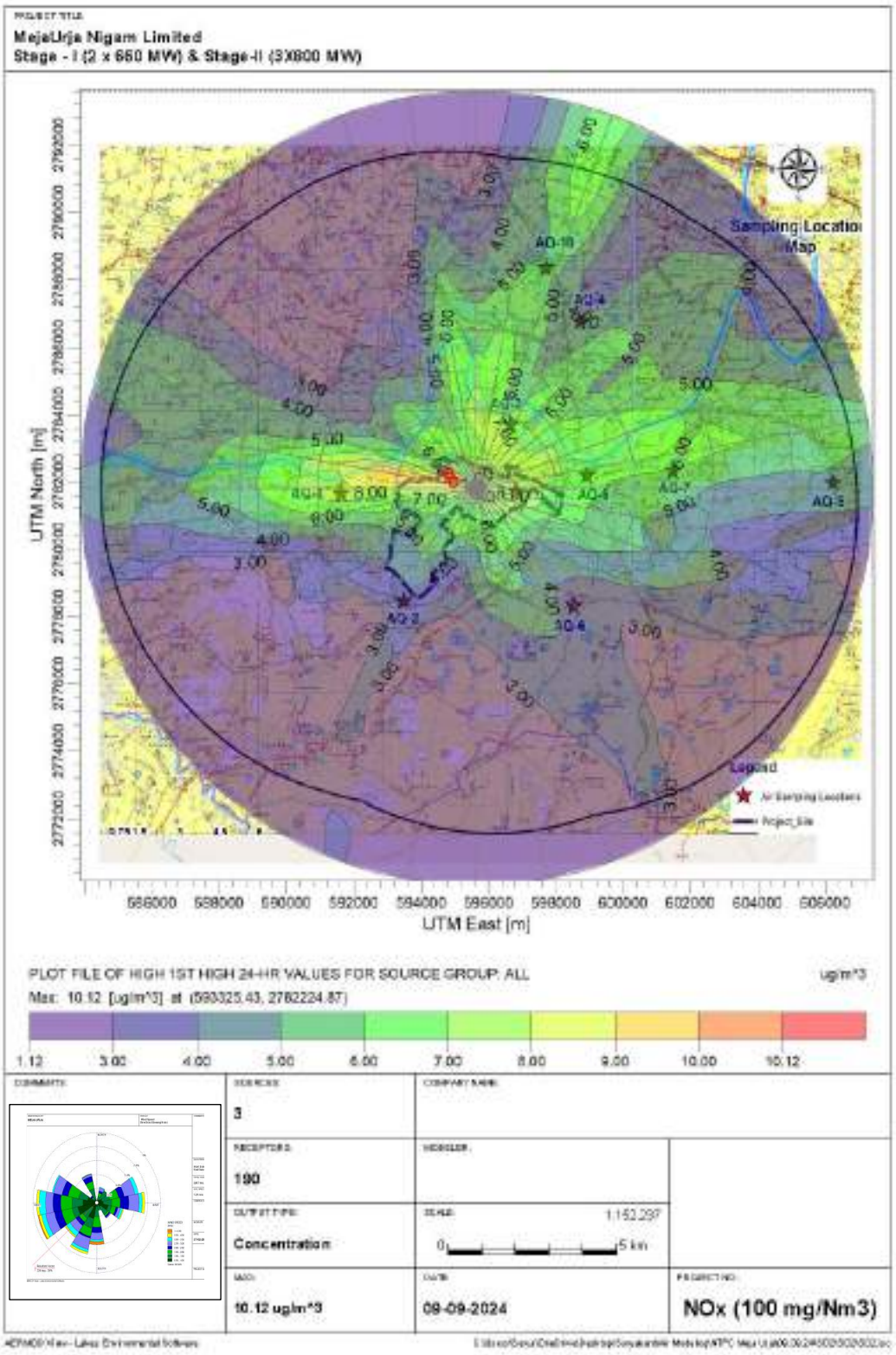


Figure 4.4 : Predicted GLC of NOx

Fugitive Emissions control

The fugitive dust emissions are expected from coal storage yards, coal conveyor belt area, ash dumping areas, transportation of fuel and solid waste. The dust emissions, if any, from the above areas will be fugitive in nature. The dust emissions are likely to be confined to the place of generation only.

Mitigation Measures

- Tall stack, as per MoEF&CC Notification dated 28.06.2018, will be constructed to facilitate wider emissions. One Twin Flue Chimney (220 m height) and one Single Flue Chimney (150 m height) shall be installed.
- To control the PM emission, high efficiency ESPs will be installed
- NO_x emission from the steam generator shall be controlled by low NO_x Burners/System and combustion staging.
- A wet limestone-based Flue Gas Desulphurization (FGD) system will be installed behind ESP, for control of SO_2 emission.
- In the proposed project, coal handling plant will be properly operated with control measures such as dust extraction and dust suppression system.
- HCSD system of ash disposal will be practiced and hence, no dust emissions are envisaged from ash dump areas.
- Coal will be received through rail line and the solid waste will be sent to dyke areas in slurry form through pipeline. Hence, very minimal amount dust emissions from transportation are envisaged.
- Dust control system will be provided in the Ash Pond area
- Internal roads are to be asphalted to reduce fugitive dust emissions.
- Regular water sprinkling shall be done in dust generating areas.

4.5.3. Impacts of Installation of FGD Plant on Ambient Air Quality

Reduction in SO_2 (Positive Impacts) in Ambient Air: SO_2 emissions react in the atmosphere with ammonia to form fine particles ($PM_{2.5}$ in the form of ammonium sulphate) and with water to form sulfuric acid (acid rain). Particulate Matter (PM) has been linked to heart and lung disease, but also to impacts on brain development and functioning (Brockmeyer & D'Angiulli, 2016; Landrigan et al., 2017). It also impairs visibility. Acidic deposition can reduce soil quality, impair timber growth and harm freshwater ecosystems (US EPA, 2011). In estimating the benefits of reducing SO_2 emissions, specially focus on health benefits.

The Flue Gas Desulfurization (FGD) plant removes sulphur dioxides (SO_2) from flue gas produced by boilers, furnaces, and other sources. The FGD effectively contributes to the prevention of air pollution due to SO_2, which in turn reduces the impacts on human and plant health.

Impact due to CO_2 emission: The attempt to solve the problem of sulphur dioxide emissions by using the wet scrubbing FGD system may in fact create another long term impact of greenhouse gas as the chemical process replaces SO_2 emissions with CO_2 emissions. Each molecule of SO_2 removed from flue gas leads to emission of a molecule of CO_2 formed during

the reaction. However, as the sulphur content in the Indian Coal is low, the additional CO_2 emitted due to FGD is very small (of the order of 0.4% of total CO_2 emitted from power plants).

Gypsum management and utilisation: Gypsum is a valuable product with the following uses/ users:

- Cement Industries – Set retarder (Estimated annual consumption is 10-12 Million Tons in Cement Industry and which is expected to grow 6-7%).
- Building Industries – Projection plaster/Gypsum Vermiculite Plaster (GVP), self levelling floor screeds, Gypsum plaster boards, Gypsum blocks, bricks, artefacts, pottery etc.
- Agriculture – Sodic soil reclamation, soil conditioning and nutrients. Potential utilisation: 35 to 40 Million Tons.
- Export to neighbour countries: Nepal, Bhutan, Bangladesh etc.
- Import substitution: At present gypsum is imported from Oman, Pakistan, which could be substituted for domestically produced FGD Gypsum.
- NTPC has an approved policy for management and sale of gypsum generated from its power projects. The policy includes the following options for 100% utilisation of gypsum
- Installation of POP/Gypsum Plaster Plant at NTPC Stations
- Sodic soil reclamation: as an initiative for community development
- Sale of Raw Gypsum on as where basis

4.5.4. Impact on nearest settlement

The closest inhabited settlement to the project site is Mai Khurd village, which is situated approximately 0.5 kilometres to the northwest (in the crosswind direction) of the project location. Additionally, an educational institution, Vijay Degree College, is located in Salaiya Kala village, approximately 0.68 kilometres to the south-southwest (in the upwind direction) from the project boundary.

To address environmental concerns and minimize pollution from the existing plant, mitigation measures have already been implemented by MUNPL. Furthermore, for the proposed expansion of the plant, additional mitigation strategies have been planned to ensure effective pollution control and adherence to environmental regulations. These measures aim to minimize the environmental impact and maintain air quality standards in the vicinity of the project site.

Mitigation measures

1. State-of-the-art “Ultra Super Critical Technology” with higher efficiency has lesser emission of CO_2 (12-13 % less with respect to sub critical units).

2. Increase of number of Dry fly ash closed wagon rakes through railways to further reduce the vehicular emission.
3. Use of Low NOx burner will reduce NOx emission.
4. Use of highly efficient ESP will reduce PM emission to less than 30mg/Nm^3 as per MoEF&CC norms.
5. Use of Wet Flue Gas Desulphurization (FGD) will reduce the PM and SO_2 emission as well as low flue gas exit temperature, which shall improve climatic conditions.
6. Additional plantation on 303 Ha land shall be developed on MUNPL land.
7. As a mitigation measure, MUNPL has already undertaken plantation activities in nearby settlements close to the project site. Additionally, as part of the proposed expansion project, a dense greenbelt will be developed within the project area and around the ash dyke. Out of the total 303 ha, approximately 60 ha of land has been identified by MUNPL, prioritizing the nearest settlement, Vijay Degree College, and other sensitive areas.

4.5.5. Cumulative Impact assessment

There are no major industries present within 15 Km radius of the proposed project site hence cumulative impact is not applicable. All the other sources of air pollution in study area is already reflected in baseline condition, the impact of proposed Meja TTP only, which is presented above. The impact and mitigation measures are elaborated.

4.5.6. Impact on Noise Quality

Noise Impact Prediction: Main source of noise in the proposed expansion project are delivery of equipment and raw materials by trucks, Transfer of coal through railway line and conveyor, Operation of generators and turbine inside the powerhouse and Operation of various pumps, fans and motors etc.

With increasing distance from the source the noise level decreases due to wave divergence. Additional decrease also occurs due to atmospheric effects and interaction with objects in the transmission paths. For hemispherical sound wave propagation through homogeneous medium, noise levels at various distances can be predicted using a model based on the following principle:

Lp2 = Lp1 – 20 Log (r2/r1), where Lp1 and Lp2 are the sound levels at points located at distance r1 and r2 from the source. Combined effect of all the sources (A, B, C… etc) can be determined at various locations by the following equation:
10 Log (10lpa/10 +10lpb/10 + 10lpc/10), where lpa, lpb and lpc are noise pressure levels at a point due to different sources.

Based on the above principle, Noise Model has been developed where noise levels can be predicted at any distance from the source for simple flat terrain. Attenuation factors are not applied hence the modelled results are overestimate.

The maximum noise expected from the plant is 94.6 dB(A) (from turbine generator at 1 m distance from source). Other noise levels will be around 85 to 94 dBA. **Figure 4.2** shows the noise contours at distance 100 m, 200 m, 300 m, 400 m, 500 m from 94.6 dBA source strength. At 200 m distance the predicted noise values are 37.6 dB(A). At 500 m distance the predicted values are 29.6 dB(A).

Baseline ambient daytime and nighttime Noise levels recorded at nearest village (Kohdar) outside the project area (0.9 km, northeast from project boundary) was found to be 52.0 and 41.7 dB(A) respectively which was found within the standard i.e. 55 dB(A) during daytime and less than 45 dB(A) during night time. The predicted noise level at 500 m distance from source is 29.6 dB(A). Therefore, there will be insignificant impact on the ambient noise quality of the surrounding villages.

The standards for occupational exposures - tolerable level is 90 dB(A) for 8-hour exposure. This level will be achieved inside work area through use of properly maintained machines, pumps, compressors, and vehicles. In case of overexposure found inside working area, workers will be provided with ear plugs/ earmuffs for use so that the exposure is minimized / brought to acceptable level.

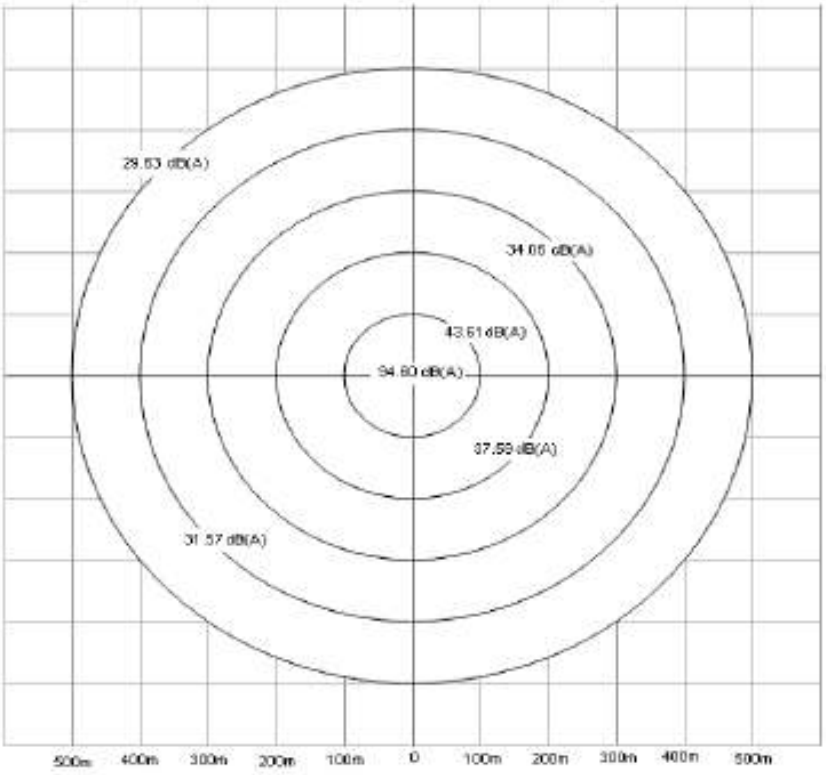


Figure 4.5 : Predicted Noise Level– (source strength 94 dBA)

Mitigation Measure

- Acoustic enclosures shall be provided wherever required to control the noise level below 85 dB(A).
- Wherever it is not possible technically to meet the required noise levels, the personnel protection shall be provided.
- Provision of plantation in available spaces, wherever feasible, will further help in reducing the noise levels.
- To protect the workers within plant area, adequate protective measures in the form of ear-muffs/ ear plugs/ masks shall be provided, which will minimize/eliminate adverse impacts.

Impact on Work Zone: There are, turbine, boilers, pumps and motors are the noise generating. However, impacts on the working personnel are not expected to be significant on account of the high level of automation of the plant, which means that workers will be exposed for short duration only that too intermittently.

Mitigation Measure

- To protect the workers within plant area, adequate protective measures in the form of ear-muffs/ ear plugs/ masks shall be provided, which will minimize/eliminate adverse impacts.

4.5.7. Impact on Water Resources and Water Quality

Impact on Water Resources and Water Quality

Water requirement for existing Stage-I is about 39 Cusec and is presently being drawn from Ganga River. Govt. of UP (GoUP) has allocated 44 Cusec of water for Stage-I. The water requirement for Stage-I is 39 Cusec and Surplus water available is 5 Cusec. The make-up water requirement for stage - II would be about 30 Cusecs with bottom ash as lean slurry and fly ash as HCSD system for ash handling. For meeting the requirement of Stage-II, an additional water allocation of 25 Cusec shall be obtained from GoUP from Ganga River. Additional make-up water pipeline shall be laid for STG-II water drawl from River Ganga.

Air Cooled Condensers (ACC) is envisaged for Stage-II (3x800 MW) units. The consumptive water requirement for Stage-II includes make up water requirement and various evaporation losses. Out of total makeup water requirement (3000 m^3/Hr), approx. 2950 m^3/Hr will be used for industrial purposes and about 50 m^3/Hr for domestic purposes.

The water system for the project has been developed to reduce the quantity of effluents generation from the plant and recycle and reuse of the same to meet various plant usages after proper treatment, as required. The water system of the proposed project has been designed with Zero Liquid Discharge (ZLD) concept. The proposed expansion project is expected to generate 2065 m^3/Hr effluent through different sources and shall be completely recycled/reused within the plant processes with and without treatment. Out of 2065 m^3/hr of wastewater, only 150 m3/hr requires treatment through ETP (300 m^3/Hr) before re-use. The domestic wastewater generated from the plant and township shall be treated in STP and will be utilized in development of green cover and horticulture.
The entire effluent generation from the project shall be adequately treated, meeting to the statutory requirement and thereafter reused for various industrial purpose up to the maximum possible extent. Treatment and disposal of the waste generated from the proposed expansion unit is provided in following **Table 4.9.**

Table 4.9 : Wastewater generation, Treatment and disposal (m^3/hr)

Name of the Effluent Stream	Qty. before Treatment	Treatment Accorded	Qty. after Treatment	Net Qty. Discharged	Remarks
Clarifier Sludge from CW clarifier	60	None	60	Nil	Total quantity shall be utilized in ash slurry disposal system, leading to ash dyke.
Clarifier Sludge from DM clarifier	10	None	10	Nil	
DM Plant regeneration waste	15	Neutralization Pit	15	Nil	Total treated quantity shall be utilized in ash disposal system, leading to ash dyke.
Power Cycle Blowdown	30	None	30	Nil	Total qty shall be used in Aux. Cooling makeup system.
Aux C.T. Blowdown	50	None	50	Nil	Entire quantity shall be used in various plant usages *i.e, blow down shall be used in Fire Fighting, Make up to bottom ash handling, Plant, CHP & Dust Suppression system.*
Plant Service Water Effluent	150	ETP Clarification in Tube settler	140	Nil	Total ETP treated qty shall be recycled in plant service water system and balance quantity shall be utilized in ash slurry disposal system.
Ash Water	1750	Settling Pond & Clarification	1700	Nil	Total treated qty (after evaporation loss) shall be recycled and utilized in Ash Handling Plant.
Total	**2065**	-	**2050**	**Nil**	ZLD complied

About 50 KLD of water shall be used for potable water system. Domestic effluent generated shall be treated in STP. STP treated water shall be used for development of horticulture and development of green cover. Ministry of Power (MoP) vide Office Memorandum (OM) dated 10th January 2023 has exempted from linking and use of Naini Sewage Treated Water by Meja Thermal Power Plant as it is allocated across the river. Copy of MoP OM mentioned above is attached as **Annexure-18**.

4.5.8. Impact on Groundwater Regime

No ground water shall be used for the project during the operation phase. The entire water demand for the project is proposed to be sourced from the Ganga River. Hence, no adverse impact on ground water sources is envisaged. Operation of the proposed thermal power project will not have any long-term impact on water quality as it is proposed to be almost ZLD from plant.

Mitigation Measures

- The filter backwash water of PT Plant shall be collected and recycled back to the DM system clarifier.
- The sludge from clarifiers of Water PT plants shall be taken to a sump/pit and pumped to ash slurry sump for disposal to ash dyke.
- The waste effluents from neutralization pits of DM plant and Condensate Polishing Plant shall be collected in respective neutralization pit and neutralize before pumping to ash slurry sump for final disposal.
- A coal settling pond shall be provided to remove coal particles from coal handling plant waste. Decanted water shall be pumped back to the coal dust suppression system for use. To receive & treat excess storm water (considering rainstorm condition), Clarifier feed pumps (2x50%), reactor clarifier (2x50%), belt filter press (2x50%), Clarified Water Transfer Pumps (2x50%) and required chemical storage & dosing system shall also be provided.
- Service water effluent drains from various areas shall be separately routed to a sump. From the sump, the waste service water shall be pumped up to lamella clarifier / tube settler for treatment. Treated service water shall be sent back to service water tank for possible reuse.
- The treated effluents conforming to the prescribed standards only shall be re-circulated and reused within the plant.
- Drain separation shall be made for plant effluents and storm water.

4.5.9. Impact due to Effluent generation from FGD

Flue Gas Desulphurisation (FGD) system requires water for making limestone slurry. The make-up to the system shall be drawn from clarified water. The effluents generated from FGD System shall be used in bottom ash handling. It shall be discharged into bottom ash dyke which has impervious lining and ash water recirculation system. As there is no effluent discharged from the FGD Plant, no impacts are anticipated on the surface or ground water system.

4.5.10. Impact due to Solid waste generation

Used oil, Empty/ contaminated drums, ETP Sludge, etc will be generated from the proposed project operation. The waste generated shall be disposed as the Hazardous & Other Waste (Management and Transboundary Movement) Amendment Rules, 2022. Details of the waste generated and their disposal mechanism is described in **Table 4.10**.

Table 4.10 : Details of Waste generation and its Management

Name of the waste	Source	Qty (TPA)	Mode of disposal	Mode of Transport
Empty barrels/container / liners contaminated	Operation and Maintenance works (O&M works)	60	Sale/disposal to authorized recyclers / TSDF.	Road
Spent Ion exchange resin containing toxic metals	Water treatment	2		Road
Used or spent Oil	O&M works	100		Road
Waste residue containing oil	O&M works	10		Road
Insulation waste	O&M works	10	Disposal through TSDF	Road
Asbestos	O&M works	0.1		Road

Other Waste

S. No	Type	Quantity After Expansion	Disposal Plan
1.	Fly Ash	3.024 MTPA	It shall be sent to all users as per list of avenues mentioned in MOEF&CC Notification
2.	Bottom Ash	0.756 MTPA	It shall be sent to all users as per list of avenues mentioned in MOEF&CC Notification
3.	Gypsum	434250 TPA	MUNPL/ NTPC has an approved policy for management and sale of gypsum generated from its power projects. The policy includes the following options for 100% utilisation of gypsum ➢ Installation of POP/Gypsum Plaster Plant at NTPC Stations ➢ Sodic soil reclamation: as an initiative for community development ➢ Sale of Raw Gypsum on as where basis

Mitigation Measures

- The fly ash and bottom ash are handled separately. Fly ash is transported by the pneumatic conveying system and delivered to the fly ash silos. Then it is carried by end user through bulker or wagons.
- MUNPL has proposed total area of ash pond 110 Ha, near the project boundary.
- The proposed ash pond is for emergency disposal only.
- Fly ash and bottom ash shall be utilized as per the MoEF&CC notification and given to Cement Industries, Tile and brick manufacturer and other users for 100% utilization.
- Petroleum oil tank sludge shall be sent to TSDF.
- Sewage sludge generated from STP will be used as manure in greenbelt development plantation.
- MUNPL/ NTPC has an approved policy for management and sale of gypsum generated from its power projects. The policy includes the following options for 100% utilisation of gypsum
  - Installation of POP/Gypsum Plaster Plant at NTPC/MUNPL Stations
  - Sodic soil reclamation: as an initiative for community development
  - Sale of Raw Gypsum on as where basis
- Used oil or Spent oil will be generated will be generated as per Schedule I of Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, which will be sold to CPCB authorized recycler.
- Municipal Solid waste generated from plant canteen & colony will be collected, segregated, and disposed off scientifically in compliance of Solid Waste Management Rules, 2016.
- Used Lead acid batteries will be stored in the designated storage area and will be sold to registered vendors as per Battery waste.
- Plastic waste generated will be disposed through authorized recycler.
- E-Waste generated will be disposed to authorised recyclers.

4.5.11. Impacts due to Traffic

Since coal will be transported using rail, no significant traffic movement due to this is envisaged in the proposed project on existing public road network. Water sprinkling on filled rail wagons shall be done at loading point, mid-way and unloading point to minimize fugitive emissions in coal transportation.

Effective implementation of the pollution emission compliance prescribed under Motor Vehicles Act by the transport authorities will minimize the vehicular pollution impact. It will be ensured that the vehicles will be always environmental compliant

Increased use of existing public infrastructure i.e., road due to vehicular traffic involved in transportation of construction material and fly ash during operation phase may cause congestion on roads. The proposed site is connected to Prayagraj-Mirzapur Highway. through NH-135 C. The NH-135 C is passing about 0.7 km from the plant site.

NH-135 C is a national Highway having the standard Passenger Car Unit (PCU) capacity. The current condition of NH-135 C is satisfactory and a single lane road. The width of the road is

around 7 meters. The ccondition of highways is good and capable to bear the additional traffic load due to the construction vehicles. No village road shall be used for the transportation.

The current daily load on NH-135C is 2019 PCU. During construction phase about 10-12 additional truck movement is anticipated which far below the carrying capacity of the of the Highway i.e. 84 PCU per hour (2019 PCU/day).

During operation phase about 59 LMT per year ash shall be generated. For which on its peak transportation about 16-17 truck of 35 Ton capacity shall be required hour.

And about 1,34,028 TPA of Limestone is required & 2,17,125 TPA of Gypsum will be generated from Stage – I, and about 2,68,056 TPA of Lime stone is required & 4,34,250 TPA of Gypsum will be generated from Stage – II. For which on its peak transportation about 3-4 Truck of 35 Ton capacity shall be required per hour.

For transportation of various material like fuel oil, chemicals, spares etc. will be brought periodically by road network due to which vehicular traffic will increase intermittently.

As per Indian Road Congress (IRC: 64 – Guidelines for Capacity of Roads in Rural Area – Code of Practice, 1990) indicates the design service value of two lane (two way) road is 1500 PCU per hour (36000 PCU/day). The current average load on the NH-135 c is 84 PCU per hour (2019 PCU/day) and the additional load will be around 20 Trucks per hour hence the total load will be around 104 Trucks per hour, which is far below the carrying capacity of the road i.e 1500 PCU/hour. The exiting traffic on these roads is quite low compared to PCU hence the existing road is adequate to cater to the additional traffic load due to the project expansion. Effective implementation of the pollution emission compliance prescribed under Motor Vehicles Act by the transport authorities will minimize the vehicular pollution impact.

Mitigation Measures

- Provide adequate traffic signs and signages to notify residents.
- Install safety mirrors to aid visibility in conflict points.
- Prevent on street parking.
- Provide speed humps to regulate speed of vehicles on local streets.
- Provide pedestrian crossings and dedicated footpath to cater to the walking population.
- Assign traffic wardens to regulate flow of project traffic during peak hours
- Vehicle movement will be regulated inside the site with adequate roads and parking lots shall be provided.
- Track Measures: rail grinding, welding to smooth discontinuities, lubrication, use of soft rail pads, and relocation of signals or turnouts
- Rolling Stock Measures: effective muffling of diesel locomotive exhaust noise, wheel truing, on-board wheel lubrication, use of disc brakes, dampening of wheels, and use of resilient wheels, wheel vibration absorbers and low-squeal brake blocks.
- In applying mitigate on measures the principles of 'Best Management Practice' (BMP) and 'Best Available Technology Economically Achievable' (BATEA) will be followed.

4.5.12. Impact on Ecological Environment

During the operation phase, activities that might impact on terrestrial flora include, operation of boiler, turbine and generator, coal conveying, disposal of gypsum, fly ash and bottom ash, hazardous and domestic waste disposal. The major pollutants from the operation of coal based thermal power plants are PM, SO_2 and NO_x. Accidental dispersion of flue gas, fly ash and bottom ash might create impacts of terrestrial flora.

Nitrogen and Sulphur containing air pollutants can affect plants health indirectly, via chemical reactions, or directly after being deposited on plant leaves. The direct impact of airborne nitrogen is due to toxic effects, eutrophication, and acidification. Stack emissions such as sulphur dioxide, nitrogen oxides, carbon monoxide and heavy metals (such as mercury). Coal unloading and conveying will also generate particulate matter. Dust for instance will affect plants growth by interrupting physiological processes like transpiration when lodged on leaf surfaces thereby blocking their stomata.

No national park, wildlife sanctuary, biosphere reserve exists within 10 km area of the project. However, there are some schedule-I species are present in the study area. Fugitive emission from ash pond, ash handling area, coal handling, conveyor belt etc will lead to dust deposition in surrounding vegetation that may affect the photosynthesis process of the plant. The predicted concentration of PM due to the project is within the national standard. However, deposition of small amount of pollutants may also affect the surrounding ecosystem. The project is therefore planned with most efficient air pollution control systems for achieving less than 30 mg/Nm^3 dust emission level from all the stacks so that the impact on nearby ecosystem are minimized. Most of the fugitive dust emission generation points are also fitted with efficient air pollution control systems (Plant dust suppression systems). Water sprinkling / dry fog type sprinkling system will be used at material handling points to suppress the generation of fugitive dust.

4.5.12.1 Impact on Avifauna and other terrestrial fauna

The study area has resident avifaunal and commonly found wild faunal species. The noise produced by turbines, generators, compressors, pumps, fans, coal conveyors, and the coal handling plant will be confined to the plant premises, resulting in minimal noise-related impacts. Dust emissions from vehicle movement and the coal handling system are significant potential threats to avifauna and other wildlife if not properly managed. Suggested mitigation measures are outlined in the following section.

4.5.12.2 Impact on Aquatic Ecology:

Water for the project is proposed to be sourced from the Ganga River. There is a concern about the potential negative impact on aquatic fauna during the water supply process and larger aquatic organisms (e.g., fish, frogs, and toads) and foreign matter, could drawn into the pumps along the water supply pipeline to the reservoir from the intake point.

The plant is based on Zero Liquid Discharge, hence no wastewater shall be discharged outside the plant premises.

Mitigation Measures

- The incremental emission of air pollutants will not be likely to induce any significant changes in the ecology because the national ambient air quality standards will remain within the limits.
- The project is therefore planned with most efficient air pollution control systems for achieving 30 mg/Nm^3 dust emission level from all the stacks.
- Further the modelling study proves that the incremental MGLC of PM, SO_2 and NOx generated from the proposed plant will be very less and overall incremental GLC will remains within the NAAQS. And it will not have any significant impact on ecology in the study area.
- Most of the fugitive dust emission generation points are also fitted with efficient air pollution control systems (Plant dedusting systems).
- Water sprinkling / dry fog type system will be used at material handling points to suppress the generation of fugitive dust.
- Have a standard operating procedure on how to deal with spills;
- Intake Screens: Install intake screens or mesh at the entry point of the water supply pipeline. These screens can help prevent larger aquatic organisms (e.g., fish, frogs etc.) and debris from entering the pipeline while allowing water to pass through.
- Wildlife Conservation Plan for the Schedule -I species has been prepared to conserve the Schedule-I species. A Wildlife Conservation budget of Rs 3.51 Crores has been earmarked by MUNPL for conservation of Schedule-I species.
- All the process wastewater generated from the plant shall be treated and reused in process.
- The domestic wastewater generated from the toilets, washrooms and canteen of the plant shall be treated in STP.
- Acoustic enclosures shall be provided wherever required to control the noise level below 85 dB(A).
- The equipment like turbine, Compressors, blowers, fans, various drums etc will be provided with Acoustic pad insulation / Acoustic enclosures to limit the noise level as per the standard.
- DG sets will be provided with acoustics enclosures. Mufflers, silencers, acoustics treatment of room will be done wherever required. Equipment will be maintained so that noise level does not increase due to improper maintenance.
- MUNPL has already established a greenbelt covering 163 Ha within its current facility.
- Following consultations with the Divisional Forest Office, MUNPL plans to expand the additional greenbelt of 303.03 Ha area within the plant.
- This will result in a total of 466.03 Ha i.e 33.08% of 1409 Ha land being dedicated to the greenbelt within the plant premises.
- Over and above the greenbelt, as carbon sink, additional planation shall be done in 271 Ha of degraded forest area. Native species of trees shall be planted in consultation with DFO, Social forestry department.

4.5.13. Socio–Economic Environment

Due to proposed project operation and emission of dust, wastewater and solid waste generation and Improper management of waste material (Solid waste or liquid effluents) from the proposed activities may affect the aesthetic look of the area. Due to noise generation during the operation phase of the proposed project, there is no significant impact on the local people is anticipated. There will be air emissions in the operation phase of the plant. There will be generation of direct

or indirect employment and efforts will be made to provide unskilled employment to claimants from the project affected families as far as possible in the contract agencies involved in construction and operation of MUNPL. MUNPL will undertake various social development programmes under the banner of Corporate Social & Environment Responsibility (CSR/CER) which will be ultimately improve the infrastructure of surrounding villages.

Mitigation Measures

- All possible air pollutants will be scrubbed properly by various pollution control equipment's before emitting into atmosphere. The norms will be maintained through regular monitoring and analysis of flue gases.
- Domestic sewage is treated in Sewage Treatment Plant and reused in horticulture
- The greenbelt area development and tree plantation will help in enhancing the aesthetics of the plant area.
- All the wastewater generated from the plant shall be treated and reused in process and green cover.
- Demographic profile of the area will undergo significant change. More people will come from other places in search for business and employment. More and more amenities like educational facility, health centres, recreation centres, etc. will come up in the area along with several other infrastructure facilities. Large beneficial impacts in terms of gross economic yield will accrue on account of the project. The gross economic yield will increase through increase in high economic group and subsequent market multiplier effect. The benefits accrued will be tremendous in local as well as in regional context.
- The proposed expansion power plant will require skilled, semi-skilled and unskilled personal during construction and operational phase. Many of the people from neighbouring villages, as found suitable will get opportunity for indirect employment through contractors during construction and operational phase.
- The total manpower from various agencies during construction of Stage-II would be about 5046 (60 permanent and 4986 temporary) during peak deployment and during operation period is estimated to be about 5250 (210 permanent and 5040 temporary). However, the exact numbers may vary during construction and operation phases.
- MUNPL has earmarked a budget of Rs. 34.55 Cr for undertaking CER/CSR activities based on need-based analysis. This budget is for upcoming 5 years. This money will be spent for different CER/CSR activities like agro based livelihood, women empowerment, health and community welfare in surrounding villages.
- With the implementation of the CER/CSR budget, the living conditions will be improved due to the improvement in socio-economic conditions, employment, education, health care and physical infrastructures like roads and other facilities.

Chapter 5. ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITES)

This chapter presents a comparative analysis of various alternatives considered to avoid or minimize impacts that would be inevitable if technically (based on design) best-fit technology and site are followed.

5.1. Site Selection

The proposed expansion project shall be accommodated within the existing plant premises. The total plot area is 1295 Ha acquired for Meja TPP Stage-I. The main plant for the proposed Meja Stage-II will be set up in the available land within the existing premises of Meja TPP Stage-I. This site for Meja TPP Stage-I was selected based on the following considerations:

- Availability of suitable and adequate land
- Reliable source of water
- Road and railway access
- Facility for interconnection with transmission system for evacuation of power
- Availability of infrastructural facilities; and
- Environmental aspects.

Some of the existing infrastructural facilities and auxiliaries facilities of Stage-I can be utilized for the proposed Stage-II project. That will reduce the land requirement and other resources considerably.

5.1.1. Alternate site analysis for Existing Plant

The site for Meja TPP was initially identified based on the following considerations:

i. Availability of suitable and adequate land
ii. Distance from source of coal
iii. Distance from reliable source of water
iv. Road and railway access
v. Availability of infrastructural facilities
vi. Environmental aspects

Subsequent to signing of MOU with NTPC, the following two alternative sites were examined:

1. Alternate Site-I: Site near Village Pratappur
2. Alternate Site-II: Site near Village Kohdar in Meja Tehsil

Relative merits and demerits of Alternate Site-I and Site-II are discussed in the following sections.

1. Site Near Village Pratappur (Alternate Site-1)

Location & Approach: This site is located on right side of Prayagraj Banda highway (when approached from Prayagraj) at a distance of about 1.5 Km from highway. This site is on the right bank of River Yamuna. Distance from Prayagraj would be about 55 Km.

Land: About 445.15 Ha land is available which is not sufficient for locating a large capacity power project. The land is irrigated and agricultural. The land is fairly levelled.

Water: River Yamuna which is located about 2 Km north to the proposed site. At the proposed site, about 2-3 feet of water was observed. An intake river pump house with lift pumps (horizontal centrifugal pumps) of Baghla irrigation canal has been provided.

An independent river pump house needs to be provided on River Yamuna to meet plant make-up water requirement.

Coal: Raw coal is proposed as fuel. Likely coal source for the project is BCCL/NCL/CCL/SLC

Environmental Aspects: There are no metropolitan cities within 25 Km from the proposed site and the site is 500 m away from Highways, Railway Lines and Rivers. There are no national parks or wildlife sanctuaries within 25 Km of the proposed site. The land is mostly wet agricultural irrigated through canal system.

2. Site near Village Kohdar in Meja Tehsil (Alternate Site - II)

Location & approach: The Alternate Site -II is located near villages Kohdar and Laltara of Meja Tehsil in Prayagraj district of Uttar Pradesh, southwest of Prayagraj-Mirzapur road. Nearest railway station is at Meja Road at approx. 20 Km and nearest commercial airport is at Prayagraj is approx. 50 Km from the site.

Land: About 1011 Ha of land (mostly barren, rocky and highly undulating terrain with undulation to the tune of 10 to 15 meters) is available.

Water: River Tons flows adjacent to the proposed site and River Ganga is about 22 Km from site. Water requirement can be sourced from River Ganga.

Coal: Raw coal is proposed as fuel. Likely coal source for the project is BCCL/NCL/CCL/SLC.

Environmental Aspects: There are no metropolitan cities within 25 Km from the proposed site and the site is 500 m away from Highways, Railway Lines and Rivers. There are no national parks or wildlife sanctuaries within 25 Km of the proposed site. As the land is mostly hilly undulating terrain, free from habitation, the acquisition may not involve major Rehabilitation & Resettlement issues.

Conclusion: Keeping in view of basic inputs like availability of sufficient land free from agriculture, availability of water, the site near village Kohdar (Site-II) in Meja tehsil has been found to be techno- economically and environmentally suitable out of the two alternate sites.

5.2. Power Plant Technology & Alternatives

Coal-fired power generation is achieved by coal combustion through a boiler, heating high-pressure water in a heat-transfer pipe by high-temperature combustion gas to produce steam that runs a turbine. The principle of thermodynamics states that power generation efficiency becomes higher as steam temperature and steam pressure increase. High-temperature, high-pressure steam is utilized to generate power is key to higher power-generation efficiency. Once it boils, water changes into steam. As pressure gets higher, the boiling point also increases. Once

pressure reaches a critical point (374^{O}Celsius, 22.1 MPa), water is turned into a supercritical (SC) pressure unit; the later system ensures higher efficiency.

The technological developments in the past decades have primarily involved increasing plant thermal efficiencies by raising the steam pressure and temperature. Based on the differences in temperature and pressure, the technology is categorized into three tiers:

a) Sub-Critical
b) Super Critical (SC)
c) Ultra Super Critical (USC)

a) Sub-Critical Units

Sub-Critical conditions occur when the steam pressure is below 221.2 bar(a) where mixture of steam and water co-exists. Typical steam pressure for sub-critical units will be about 170 kg/cm2 (a). Subcritical power plant units in India operate at steam conditions 170 kg/cm2(a) main steam pressure and at 540 degree Celsius main steam and reheat steam parameters at turbine inlet.

b) Super-Critical Units

Super-critical conditions occur when the boiler steam pressure increases above the critical pressure of 221.2 bar(a). Above this point, two phase mixtures of water and steam cease to exist and are replaced by a single supercritical fluid. This eliminates the need for water/steam separation in drums during operation, and allows a simple separator to be employed during start-up conditions. Supercritical technology operates above steam/water critical pressure of 221.2 bar(a) and 374.15 degree Celsius.

Supercritical steam parameters: Steam pressures up to 250 kg/cm2(a) and steam temperatures ranging from 538 degrees Celsius to 593 degrees Celsius at turbine inlet.

c) Ultra Super Critical

In case of Ultra Super Critical Steam Pressure upto 270 kg/cm2(a) and steam temperature ranging from 600-610 degrees Celsius at turbine inlets are applied, which results into higher efficiency as compared to super-critical plants.

5.3. Advantages of Ultra-Super Critical Technology

The Ultra Super-Critical technology based thermal power plants have following advantages:

- **Higher Efficiency**

Ultra-Supercritical steam conditions improve the turbine cycle heat rate significantly over subcritical steam conditions. The extent of improvement depends on the main steam and reheats steam temperature for the given supercritical pressure.

A typical Ultra-Supercritical cycle having turbine throttle pressure of 270 bar with temperatures for steam 600 degree Celsius respectively, will improve the station heat rate by more than 7.5%. This results in fuel savings to the extent of 7.5%. Overall supercritical power plant efficiency of 42% is achievable with current supercritical parameters.

- **Lower Emissions**

Improved heat rate results in 7.5% reduction in fuel consumption and 7.5% reduction in CO2 emissions per MWh energy output.

- **Operational Flexibility**

Supercritical technology units also offer flexibility of plant operation such as shorter start-up times, faster load change flexibility and better temperature control, better efficiency even at part load due to variable pressure operation and high reliability and availability of power plant. The above steam parameters for ultra supercritical technology are considered in this expansion project.

5.4. Condenser Cooling Technology & Alternatives

As a part water conservation measure Air Cooled Condensers (ACC) is envisaged which will reduce the water requirement from 7200 m^3/hr (in case of wet cooling tower) to 3000 m^3/hr (ACC).

Dry cooling option shall be adopted at MUNPL Meja TPP Stage-II. The condenser shall be a direct air-cooled condenser wherein the finned cooling tubes shall be arranged in the form of an inclined roof. Circulating air fans shall be installed below the roof for forced air circulation. The combination of roof and one fan forms one module. The whole condenser shall consist of several modules based on required surface area. Hence at MUNPL Meja TPP Stage-II, ACC is considered.

Chapter 6. ENVIRONMENT MONITORING PROGRAMME

This chapter presents a monitoring programme for pollution control at source, monitoring pollutants at receiving environment for appropriate notified parameters, specific programme to ensure safe working environment.

6.1 General

Regular monitoring in a systematic manner provides information on operational performance of installed pollution control facilities, checks the extent of environmental degradation taking place and adequacy of mitigation measures applied. The monitoring plan also ensures compliance with the environmental legislation. The objectives of the monitoring plan are as follows:

- To verify the results of the EIA Report.
- Verify effectiveness of planning decisions and measure the effectiveness of the operational procedures.
- To study the trend of various pollution parameters, which are identified as critical.
- To check the efficacy of pollution control equipment.
- To ensure that any additional parameters, other than those identified in the EIA, do not become critical after the commissioning of plant.
- Confirm the statutory and corporate compliance

The effectiveness of monitoring program depends mainly how best the objective of the monitoring is addressed through its core elements, for example.

- Monitoring network
- Manpower and Instruments
- Parameters to be monitored
- Frequency of monitoring
- Method and duration of sampling
- Method of analysis

Environment Monitoring Group (EMG) exist, and it will be strengthened. Following monitoring plan is suggested to verify the safeguards and pollution mitigation measures. The attributes which merit regular monitoring based on the environment setting and nature of project activities are listed below:

- Source emissions and ambient air quality
- Work zone air quality monitoring near ash silo, coal handling plant, loading and unloading points, etc. for PM10.
- Groundwater levels and ground water quality.
- Water and wastewater quality (water quality, effluent & sewage quality etc).
- Solid and hazardous waste characterisation (fly ash, bottom ash, oily wastes, ETP sludge, used and waste oil).
- Soil quality.
- Noise levels (equipment and machinery noise levels, occupational exposures and ambient noise levels)
- Green belt development.

All the above observations shall be compiled and documented by the environment management department to serve the following purposes.

- Identification of any environmental problems that are occurring in the area.
- Initiating or providing solutions to those problems through designated channels and verification of the implementation status.
- Controlling activities inside the plant, until the environmental problem has been corrected.

Table 6.1 : Name of Instruments Required for Environmental Monitoring

S.No	Name of Instruments	Number	Purpose	Budget in Rs.
1	PM_{10} Sampler	2	Air Quality Monitoring	Rs. 2.0 Cr for environment monitoring
2	$PM_{2.5}$ Sampler	2	Air Quality Monitoring	
3	Refrigerator	1	Preserving collected samples	
3	Spectrophotometer	1	Analysis of air and water samples	
4	pH meter	1	pH measurement	
5	Conductivity meter	1	Conductivity measurement	
6	DO Meter	1	DO measurement	
7	Electronic Balance	1	Weighing	
8	Oven	1	Drying	
9	Desiccator	1	Desiccation	
10	Stack Monitoring Kit	1	Stack Monitoring	
11	Online PM Monitor	1	Power Plant stack	

6.2 Proposed Environmental Monitoring programme

6.2.1. Construction Phase

The constructional activities involve clearing of vegetation, mobilization of constructional material and equipment. Moreover, mobilization of constructional material & equipment for excavation of earth etc. will be involved. The construction activities are expected to last for a 5-6 year period. The generic environmental measures that need to be undertaken during project construction stage are given in the following **Table 6.2**.

Table 6.2 : Environmental Monitoring during Constructional Phase

Potential Impact	Detailed actions to be followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
Air Emissions	All equipment are operated within specified design parameters.	Random checks of equipment logs/ manuals	Periodical Monitoring
	Vehicle with PUC certificate to be allowed	Vehicle PUC to be checked	Periodical/ Random Monitoring
	Compaction of soil during various construction activities	Construction logs	Periodical Monitoring

Potential Impact	Detailed actions to be followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
	Ambient air quality within the premises of the proposed Industrial Area to be monitored.	Gaseous emissions Particulate matter, SO_2, NOx and CO	Periodical Monitoring
Noise	List of all noise generating machinery onsite	Equipment logs, noise reading	Regular Monitoring
	Generation of vehicular noise	Maintenance of records of vehicles	Periodical Monitoring
	Implement good working practices (equipment selection and siting) to minimize noise and also reduce its impacts on human health (ear muffs, safe distances, and enclosures).	Site working practices records, noise reading	Periodical Monitoring
	No machinery running when not required.		
	Acoustic mufflers / enclosures to be provided in large engines	Mufflers / enclosures shall be in place	Prior to use of equipment.
	Noise to be monitored within the plant premises	Noise levels will be recorded	As per CPCB/SPCB requirement
	Noise level will not exceed the permissible limit both during day & night times.		
	All equipment's operated within specified design parameters.	Random checks of equipment logs/ manuals	Periodical Monitoring
Wastewater Discharge	No direct discharge of wastewater to be made to surface water, groundwater or soil	No discharge hoses shall be in vicinity of water courses	Periodical Monitoring
	The discharge point would be selected properly and sampling and analysis would be undertaken prior to discharge	Discharge norms for effluents as given in permits	Periodical Monitoring
	Take care in disposal of wastewater generated such that soil and groundwater resources are protected.	Discharge norms for effluents as given in permits	Periodical Monitoring
Soil Erosion	Minimize area extent of site clearance, by staying within the defined boundaries	Site boundaries not extended / breached as per plan document	Periodical Monitoring
	Protect topsoil stockpile	Effective cover in place.	Periodical Monitoring

Potential Impact	Detailed actions to be followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
Drainage and effluent Management	Ensure drainage system and specific design measures are working effectively. The design to incorporate existing drainage pattern and avoid disturbing the same	Visual inspection of drainage and records thereof	Periodical Monitoring
Waste Management	Implement waste management plan that identifies and characterizes every waste arising associated with proposed activities and which identifies the procedures for collection, handling & disposal of each waste arising.	Comprehensive Waste Management Plan should be in place and available for inspection on-site. Compliance with MSW Rules, 2016 and Hazardous Wastes (Management and Handling Rules), 2016	Periodical Monitoring
Non-routine events and accidental releases	Plan will be drawn, considering likely emergencies and steps required to prevent / limit consequences.	Mock drills and records of the same	Periodical Monitoring
Health	Employees and migrant labour health check ups	All relevant parameters	Regular checkups

6.2.2. Environment Monitoring Plan for Operation Phase

A. Noise Quality Monitoring:

24 hrs reading shall be collected for ambient Noise monitoring which includes monitoring during daytime as well as night time. The monitoring shall be carried out as per CPCB guidelines, through Ministry of Environment, Forests and Climate Change (MoEF&CC) recognized laboratory using standard instruments and methodology. The noise monitoring in work zone and at surrounding villages shall be done as follows

Table 6.3 : Equipment and Noise monitoring Plan

Component	Location	Parameter	Monitoring & Analysis Method	Monitoring Frequency
Noise Levels Monitoring	Equipment and Workplace (all units)	Average Leq values and Maximum value of Sound Pressure Level in dB(A)	CPCB method using equipment as per IS-9989 & IS:9779	Quarterly
Ambient Noise Levels	Plant Boundary (4 sides), nearest villages outside the plant (at 9 nearest villages)	Leq values in dB(A)	CPCB method using equipment as per IS-9989 & IS :9779	Quarterly (day & night time)

B. Air Quality Monitoring:

Four continuous ambient air monitoring station to monitor $PM_{2.5}$, PM_{10}, SO_2, NO_2 have already been installed for Stage-I. Continuous Metrological station is also installed at one location in township to monitor Wind Speed, Wind direction, Temperature, Relative Humidity, Rainfall and Solar Radiation. Ambient air of the premises (upwind and downwind of fugitive dust generating point like unloading point /coal handling plant/ stock yard /silo/ near ash pond, etc.) shall be manually monitored quarterly using High Volume Sampler as per method prescribed by CPCB. Continuous stack monitoring shall be installed for the proposed stack's, beside that third party monitoring shall be conducted in every three months.

Ambient Air Quality Monitoring of the surrounding villages shall be done manually at four nearest villages. The monitoring height should not be less than 3 m from ground. The station should not have any obstacles around 500 m area. Station should be 500 m away from road. Monitoring shall be done during the construction stage as well as during the operation stage. The sampling details are given in **Table 6.4.**

Table 6.4 : Ambient Air Monitoring Plan

S.No	Monitoring Stations	Parameters for Monitoring/ Proposed Monitoring Program	Frequency of Monitoring	No. of Monitoring locations
1	Continuous Meteorological Station.	Wind Speed, Wind direction, Temperature, Relative Humidity, Rainfall Solar Radiation	Continuous. as per SPCB/CPCB requirements	One at existing location.
2.1	Continuous Ambient Air Quality Monitoring Station.	PM_{10}, $PM_{2.5}$, SO_2 & NOx	Continuous. as per SPCB/CPCB requirements	4 at existing locations
2.2	Ambient Air Quality Monitoring Stations around plant manual monitoring (Respirable Dust Sampler)	PM_{10}, $PM_{2.5}$, SO_2, NOx, NH3, O3, & others as per NAQMS 2009.	Quarterly /as per SPCB norms, through 3rd party laboratory approved by MoEF&CC / CPCB / SPCB / NABL recognized laboratory	3 in existing STG-I and additional 3 locations in STG-II
3	Continuous Stack Emission monitoring system	PM, SO_2, & NOx	Continuous	All stacks
4	Stack Monitoring through Iso-kinetic Sampling	PM, SO_2, NOx & Hg (Particulate Emissions)	Quarterly through 3rd party laboratory approved by MoEF&CC / CPCB / SPCB / NABL recognized laboratory. Twice in a month-inhouse	All stacks

S.No	Monitoring Stations	Parameters for Monitoring/ Proposed Monitoring Program	Frequency of Monitoring	No. of Monitoring locations
5	Ambient Air Quality monitoring around ash pond, Coal handling plant, material handling areas for fugitive dust.	Particulate matter	Quarterly/ As per SPCB norms through 3rd party laboratory approved by MoEF&CC / CPCB / SPCB / NABL recognized laboratory.	4

C. Water Quality Monitoring:

Water and wastewater monitoring shall be done at observation wells and STP/ETP inlet and outlets respectively. Surface water sample shall be collected from up stream and downstream of Tons River and shall be checked regularly. The details of sampling plan are given in **Table 6.5.**

Table 6.5 : Water Quality Monitoring Plan

S. No	Water Quality Monitoring	Proposed Monitoring Program	Frequency	Number of Monitoring Stations
1	Surface Water Quality	Physico-chemical & Metal, concentration as per BDU criteria of CPCB	Sampling and analysis will be carried through 3rd party laboratory approved by MoEF&CC / CPCB / SPCB / NABL recognized laboratory on quarterly basis.	Raw Water Reservoir, River upstream and downstream.
2	Ground Water Quality	Physico-chemical & Metal concentration	Do	10 sample (4 near Ash Ponds and rest in nearby hotspot/villages)
3	STP Effluents	Physico-chemical & Metal concentration	Do	STP treated water shall be reused for horticulture, green cover development and others.
4	Plant Wastewater Quality (ETP treated effluent)	pH, TSS, TOC (BOD/COD), Conductivity, Temperature, Oil & grease, compliance to wastewater discharge standards.	Online continuous recording of pH, TSS, TOC (BOD/COD), Temp, O&G, as per CPCB/ SPCB requirement.	Station is conceptualized as ZLD. ETP treated water shall be reused for ash disposal and other plant processes.

6.3 Environmental Cost towards Monitoring Setup

The cost of setting up the laboratory, Equipments / instruments required for monitoring of various environmental parameters will be approximately Rs. 2.0 Crores.

6.4 Reporting Schedule of the monitoring Data

It is proposed that voluntary reporting of environmental performance with reference to the EMP should be undertaken.

The environmental monitoring cell shall co-ordinate all monitoring programmes at site and data thus generated shall be regularly furnished to the state regulatory agencies.

The frequency of reporting shall be on as per consent conditions (six monthly basis) to the State Pollution Control Board officials and to Regional Office of MoEF&CC.

The environmental audit reports shall be prepared for the entire year of operations and shall be regularly submitted to regulatory authorities.

Existing Meteorological Station

Existing CEQMS & AAQMS

Existing WTP and ETP

Existing STP

Water sprinkler provided to Control Fugitive Dust emission – CHP

Chapter 7. ADDITIONAL STUDIES

Public consultation, Risk Assessment, Social impact assessment (R&R Action Plan).

7.1. Public Consultation

MUNPL (Meja Urja Nigam Private Limited) submitted the application for public hearing to the Chief Environment Officer, UPPCB office on 01.04.2024. The public hearing was scheduled to be held on 24.06.2024 at 11:00 AM.

The advertisement for public hearing for Meja Stage-II (3x800 MW) was published in the local newspaper Amar Ujala & in the main edition of the national newspaper Hindustan Times, on 22.05.2024. Accordingly, public hearing was held on 24.06.2024 at 11:00 noon at Salai Kala Community Center village Salai Kala, Tehsil Meja, District Prayagraj, UP. The proceeding of public hearing and other documents were forwarded by Regional Office, UPPCB vide letter no: G00410/ लोक सुनवाई/2024, dated 27.06.2024 to Chief Environment Officer (Circle – 2), UPPCB, Lucknow. Further it was forwarded by Member Secretary UPPCB to MoEF&CC, New Delhi vide letter no. H13497/ सी-2/NOC-5376/Public Hearing/24 dated 03.07.2024.

About 55 participants attended the public hearing and 5 persons had spoken during the public hearing and 22 written statements have been received during public consultation. The proceedings of public hearing and other documents like newspaper clippings, objections/ suggestion received during public hearing, reply of project proponent on main issues/quarries related to public hearing, proceedings of public hearing, attendance sheet, objections/suggestion received by RO-UPPCB, and project proponent's response to the querries and the suggested action plans are attached as **Annexure-19** in the EIA Report.

Few Photogrpahs of Public Hearing

Action plan and budget allocation to resolves specific issues raised during the public hearing is given in Table-7.1 & activities planned under capital expenditure for Corporate Environment Responsibility (CER) is given in **Table 7.1**

Table 7.1 : ACTION PLAN TO RESOLVE SPECIFIC ISSUES RAISED DURING PUBLIC HEARING

Serial Number	Name/Address	Reference/Subject	MUNPL's Reply / Commitment	Approx. Amount (CD Works) Lakh	Timeline
1	**Santosh Kumar, Sanjay Kumar Yadav and others (Salaiya Kalan)**	1.1 PAP cards should be given to the displaced people.	1.1 PAP Card will be provided to the land oustees by MUNPL.	-	01 year
		1.2 Displaced people should be given permanent jobs	1.2 Meja Thermal Power Plant has been set up on the basis of state-of-the-art technology, hence employment opportunities in this project are very limited. In the past years, there has been a lot of change in the manpower requirement in the power generation industry and the requirement of executives and non-executives/workers has become very limited. Optimum utilization of manpower has become very important to maintain the long term financial capability and viability of the plant. The construction of 03 units proposed in the project will also be set up on the basis of super critical technology, hence there will be very limited employment opportunities in the project. However, efforts will be made to address employment issues as follows (1) Efforts will be made to provide unskilled employment to claimants from the project affected families as far as possible in the contract agencies involved in construction and operation of MUNPL. (2) Skilled and semi-skilled categories in the construction and operation related agencies associated with MUNPL will be		

Serial Number	Name/Address	Reference/Subject	MUNPL's Reply / Commitment	Approx. Amount (CD Works) Lakh	Timeline
			given priority as per their qualification and requirement.		
		1.3 The cases filed against the displaced people during the agitation should be withdrawn	1.3 Matters relating to action against displaced persons are related to law and order which falls within the jurisdiction of the State Government.	-	-
		1.4 A drain should be constructed for the drainage of water of the displaced people living near Triveni Road	1.4 Based on need based analysis report and consultation with stakeholders, construction of drains in public interest will be done under community development work.	10 Lakh	01 year from start of construction of Project Phase 2
		1.5 Free electricity facility should be provided to displaced people	1.5 MUNPL only generates electricity, as per rules, the work of electricity distribution is the responsibility of the State Government. Electricity distribution is beyond the scope of MUNPL.	-	-
		1.6 NTPC Meja should provide education facility to displaced children	1.6 St. Joseph School located in NTPC Meja Township is available for providing education to the children of nearby residents/displaced persons, in which school fees are charged at concessional rates for the children of displaced persons as per rules. In addition to the above, the primary school can be renovated in the public interest by conducting a need-based analysis report and engaging with stakeholders.	100 Lakh	1-2 years from the commencement of the construction of Phase 2 of the project.
		1.7 Hospitals should be built for the health care of displaced people and free facilities should be provided to the displaced people	1.7 The Township Hospital of the project provides OPD, IPD, Pathology, and X-Ray services, 24X7 emergency services to the displaced people at concessional rates. Apart from this, from time to time, rural medical camps (with medicine distribution), specialty camps (anemia identification, NCD screening, etc.), health awareness camps (common diseases, prevention of anemia, etc.), free TB	200 Lakh	1-5 years from the commencement of the construction of Phase 2 of the project.

Serial Number	Name/Address	Reference/Subject	MUNPL's Reply / Commitment	Approx. Amount (CD Works) Lakh	Timeline
			testing (National TB Control Program), breast cancer awareness and screening, anemia identification and iron distribution camps, menstrual hygiene awareness and sanitary kit distribution are organized in the nearby villages. Also, cataract surgery camps are organized at Superspeciality Hospital Prayagraj. Apart from the above, Meja Urja Nigam is also going to install mobile health vans under community responsibility.		
		1.8 A playground should be constructed for the children to play	1.8 Playgrounds can be constructed in public interest through need based analysis report and interaction with stakeholders.	40 Lakh	02 Years From beginning of construction of Project Phase 2
		1.9 water tank needs to be repaired	1.9 Whatever community development work is done by Meja Urja Nigam, it is transferred to the Gram Sabha as per the rehabilitation and resettlement policy of NTPC, after which the entire responsibility of maintenance and repair lies with the concerned Gram Sabha. However, in public interest, some important repairs of the infrastructure built by Meja Urja Nigam will be done once again on the basis of need.	10 Lakh	01 year from start of construction of Project Phase 2
		1.10 Drains and roads should be repaired	1.10 Whatever community development work is done by Meja Energy Corporation, it is transferred to the Gram Sabha as per the rehabilitation and resettlement policy of NTPC, after which the entire responsibility of maintenance and repair lies with the concerned Gram Sabha. However, in public interest, some important repairs of the infrastructure built by	10 Lakh	01 year from start of construction of Project Phase 2

Serial Number	Name/Address	Reference/Subject	MUNPL's Reply / Commitment	Approx. Amount (CD Works) Lakh	Timeline
			Meja Energy Corporation will be done once again on the basis of need.		
		1.11 A boundary wall should be constructed around the Rakhad pond. Everyday stray cattles are falling into it and losing their lives.	1.11 Rakhad Dam is a restricted area where ash utilization and dam raising works are carried out from time to time, hence it is not possible to construct a boundary wall. However, the concerned contracting agencies have posted their guards to prevent the movement of stray animals.	-	-
		1.12 Ash flying from the pond is making the surrounding lands unfertile. Arrangements should be made.	1.12 Meja Urja Nigam is very sensitive and serious about dust flying and every possible option is worked upon to stop it such as: (1) Our tireless efforts are to keep the Rakhad Dam submerged. (2) Water is sprinkled in Rakhad Dam through sprinkler system. (3) Apart from this, water is also sprinkled on the roads through water tankers. Therefore, the impact of Rakhad Dam on the environment is minimal and there is no possibility of air, water, soil pollution and cultivable land of the concerned villages being affected due to this.	-	-
		1.13 NTPC's small tenders should be given to displaced people	1.13 The committees established by the displaced persons are given contract work as per the rehabilitation and resettlement rules applicable in NTPC. Some works such as grass cutting, water sprinkling, deployment of tractors/tankers, etc. have been specifically identified to be executed through the committees established by displaced persons and are being done. Also, Meja Urja Nigam Limited encourages	-	-

Serial Number	Name/Address	Reference/Subject	MUNPL's Reply / Commitment	Approx. Amount (CD Works) Lakh	Timeline
			the formation of committees from time to time so that displaced persons can get maximum benefits. Apart from this, to provide regular income to PAP, Meja Urja Nigam Limited has also allotted 05 shops in the township under Rehabilitation and Resettlement Rules and 43 jeeps have been deployed through PAP under contract.		
2	**Shri Siddheshwar Nath Pahari Mahadev Service Institute , Meja (Gadewara, Bhatauti, Mamoli) Prayagraj**	Our Seva Samiti is continuously serving Pahadi Mahadev. The boundary of Pahadi Mahadev starts from Mamoli entrance gate, extending for approximately 800 meters. I would like that Pahadi Mahadev is one of your displaced areas. The following works may be done at the earliest: • Installation of street lights from Mamoli entrance gate to Pahadi Mahadev's premises • Construction of entrance gate at the boundary of Pahadi Mahadev premises • Construction of Havan Kund in the premises • Installation of 4 nos. of high mast lights • Provision of accommodation for 50 Jogis and Shiva devotees who reside at the temple complex 24 hours a day.	As per the guidelines of the Government of India, any activity that promotes or supports religious causes, institutions, or sectarian interests is not considered a CER initiative under the Companies Act, 2013 and the CSR Rules. In light of this, we regret to inform that the proposed temple renovation activity does not fall within the purview of permissible CER activities and, therefore, cannot be considered under our CER initiatives.	Nil	Nil

Serial Number	Name/Address	Reference/Subject	MUNPL's Reply / Commitment	Approx. Amount (CD Works) Lakh	Timeline
		Conducting the recital of Sundarkand at Pahadi Mahadev once a month by NTPC Meja.			
3	**Vardhaman Seva Samiti, Secretary Ashwani Jain, Advocate**	Vardhman Seva Samiti NGO Kohdar is doing social work since last many years. Join this committee and make them partners in social work. We'll be grateful to you.	Community development work is done in the respective villages as per the suggestions given in the meeting of Village Development Advisory Committee (VDAC). The concerned NGOs can give their suggestions to the Village Development Advisory Committee.	-	-
4	**Brijesh Singh S/o Rajbali Singh Virendra Singh S/o Samarjit Singh Pankaj Singh S/o Ramsundar Singh Resident of Village Mai Khurd, Meja Prayagraj**	**Regarding the recruitment of other men in place of P.A.P. at Tons Pump.** We, the applicants Brijesh Singh and Virendra Singh etc., on receiving the new tender, the contractor has removed the P.A.P. and has appointed an outsider and has fired us whereas we are the poor people affected by the project and have become unemployed. Hence, we humbly request the gentleman to please give jobs to the affected people again. We will be forever grateful to you.	The applicants were appointed by the contracting agency. The contractor has the right to keep or remove workers as per the requirement. But the contractors have been instructed to give priority to the land-displaced people in the contract work as per their eligibility, qualification and requirement.	-	-
5	**Ram Khelawan S/o Ambika Prasad Brijesh Pandey Vikash Kumar Yadav Lalita Prasad Yadav Ram sajivan Ambika Prasad Bhola Nath Vidyakant**	**Subject: Regarding construction work of public road.** People face a big problem in commuting from Gram Panchayat Salaiya Kalan to Dasauti main road. Small children face problems in studying. Vijay Degree College and Vijay Intercollege are located in Salaiya Kalan. Children face a lot of difficulty in commuting, so a public	Public roads will be constructed in public interest based on need-based analysis report and consultation with stakeholders.	300 Lakh	02 Years From beginning of construction of Project Phase 2

Serial Number	Name/Address	Reference/Subject	MUNPL's Reply / Commitment	Approx. Amount (CD Works) Lakh	Timeline
	Resident Salaiya Khurd	road should be made soon, the distance is about 1-2 kilometers.			
6	**Head of Village Jhadiahi Meja Prayagraj**	**MoU for expansion of Stage-II of Meja Urja Nigam Scheme** I and my Gram Sabha give our consent for the expansion of Stage-II and I have no objection to it.	**Village head Jhadiyahi Meja Prayagraj has given his consent for the expansion of Stage-II**.	-	-
7	**Mohan Lal Shukla S/o Vishwanath Prasad Shukla**	**Subject: Pollution related** gate no. 03 of NTPC Meja. It is requested that along with 7.1 Providing electricity 7.2 Water and roads 7.3 Irrigation facility 7.4 Facility of schools, 7.5 Facility of hospitals 7.6 Employment facilities, 7.7 Pollution should be controlled immediately so that crop damage can be prevented and people can live their full lives..	7.1 Electricity- As per answer of No. 1.5 7.2 Based on the need analysis report and consultation with the stakeholders, solar small drinking water and public road will be constructed in public interest. 7.3 As per rules, the work of irrigation is the responsibility of the State Government. This subject is beyond the scope of MUNPL. 7.4 School- As per answer of number 1.6 7.5 Hospital- As per answer to No. 1.7 7.6 Employment- As per answer to no. 1.2 7.7 Control of Pollution- As per reply to Sr. No. 1.12. Additionally, Electrostatic Precipitators (ESPs) have been installed. PM emission is maintained within 30 MG/NM3. Installation and commissioning work of FGD has been completed, it will be run regularly from October 2024 as against the cut-off date December 2026 as per Gazette Notification GSR 628(E) dated 5th December 2022 of MOEF&CC. Low NOx Burners have been installed and are in use. Specific water consumption for FY 23-24 is 2.56	70 Lakh	03 Years From beginning of construction of Project Phase 2

Serial Number	Name/Address	Reference/Subject	MUNPL's Reply / Commitment	Approx. Amount (CD Works) Lakh	Timeline
			(Std. 3.0 m3/KWhr). All wastewater is treated and recycled for reuse. 4 Ambient Air Monitoring Stations and 01 Waste Water Quality Station have been installed. Online data is sent to Pollution Control Board. During normal operation of the plant all parameters are as per standards.		
8	**Gram Panchayat Gadevra** **Anil Kumar Shukla**	The village adjacent to your Urja Nigan is Gadewara, which is a very backward village where your kind attention is required. • 10 nos. hand pump • 5 pieces high mask • 15 nos. street lights • 400 meter interlocking to connect tribal and Harijan settlements	Based on need-based analysis report and interaction with stakeholders, hand pumps, high mast lights, street lights and public roads will be constructed in public interest.	50 Lakh	02 Year from beginning of construction of Project Phase 2
9	**Village head – Devi Shankar Yadav** **Address-Salaiya Kalan Meja Prayagraj**	The details of hand pump reboring and new hand pumps in the displaced families of Gram Panchayat Salaiya Kalan (New Colony) are as follows new hand pump • Hand pump work in front of Lal Bahadur Yadav's house • Hand pump work in front of Ram Babu Yadav's house • Hand pump work in front of Ram Shiromani Yadav's house • Hand pump work in front of Balgovind Yadav's house. • Hand pump work in front of Indrajit Yadav's house • Hand pump work in front of Nand Kumar Yadav's house	Based on need based analysis report and discussion with stakeholders, hand pumps and hand pump reboring will be done in public interest.	30 Lakh	02 Years From beginning of construction of Project Phase 2

Serial Number	Name/Address	Reference/Subject	MUNPL's Reply / Commitment	Approx. Amount (CD Works) Lakh	Timeline
		• Hand pump work in front of Moolchand Yadav's house • Hand pump work in front of Gore Lal Yadav's house **hand pump reboring** • Mauji Lal Yadav • Uma Shankar Yadav • Munshi Lal Yadav			
10	**Village head– Devi Shankar Yadav Address-Salaiya Kalan Meja Prayagraj**	Repair work of roads and drains is very necessary for displaced families of village Salaiya Kalan (new colony). • Road repair work • Repair work of drains • Solar panel and repair work in water corporation tank	Whatever community development work is done by Meja Urja Nigam, it is transferred to the Gram Sabha as per the NTPC policy, after which the entire responsibility of maintenance and repair lies with the concerned Gram Sabha. However, in public interest, some important repairs of the infrastructure built by Meja Urja Nigam will be done once again on the basis of need.	50 Lakh	02 Years From beginning of construction of Project Phase 2
11	**Village head- Devi Shankar Yadav Address-Salaiya Kalan Meja Prayagraj**	It is very important to beautify Kotiya (Shankar Ji's temple) and construct a boundary wall in Gram Panchayat Salaiya Kala (New Colony). This is a public temple. Fairs and festivals are always celebrated here, therefore it is very important to renovate this temple for betterment.	As per the guidelines of the Government of India, any activity that promotes or supports religious causes, institutions, or sectarian interests is not considered a CER initiative under the Companies Act, 2013 and the CSR Rules. In light of this, we regret to inform that the proposed temple renovation activity does not fall within the purview of permissible CER activities and, therefore, cannot be considered under our CER initiatives.	Nil	Nil
12	**Village head- Devi Shankar Yadav Address-Salaiya Kalan Meja Prayagraj**	Meja Urja Nigam Pvt. Ltd. The expansion of Stage II will provide sufficient electricity to the country, state and village. For this, Gram Sabha Salaiya Kalan is agreeing to the expansion of Stage II.	**Village head Salaiya Kalan Meja Prayagraj has given his consent for the expansion of Stage-II**.	-	-

Serial Number	Name/Address	Reference/Subject	MUNPL's Reply / Commitment	Approx. Amount (CD Works) Lakh	Timeline
13	**Village head- Devi Shankar Yadav Address-Salaiya Kalan Meja Prayagraj**	The individual demand letter of the displaced family of Gram Panchayat Salaiya Kalan (New Colony) is as follows. • Establishment of Community Health Centre (Hospital) • Establishment of Girls Inter College • Employment to persons undergoing IITI (training) • One job per house for each displaced family • Security Guard Jobs • For farmers' compensation dues	13.1 Presently, health facilities are being provided through Project Hospital as per answer to No. 1.7. Apart from this, 01 Health ATM has also been donated to PHC-Meja by Meja Urja Nigam under community responsibility. -Community Health Center (CHC) can be constructed after talking to the district administration and stakeholders. But the district administration and the concerned Gram Sabha will have full responsibility for the maintenance and operation of the CHC. 13.2 Girls Inter College can be constructed after preparing a need based analysis report and after discussing with the district administration and stakeholders. But the district administration and the concerned Gram Sabha will have full responsibility for the maintenance and operation of the school. 13.3 Employment- As per answer to no. 1.2 13.4 Security guards are engaged by the security agency empaneled with Directorate General of Resettlement (DGR) as per the qualification, eligibility of the person and as per DGR guidelines. Accordingly, at present 8 persons from project affected villages are employed by the security agency. 13.5 Meja Urja Nigam has deposited the outstanding compensation of the farmers in the office of Special Land Acquisition Officer (SLAO), Prayagraj. Contact the said office regarding compensation.	100 Lakh 50 Lakh	03 Years From beginning of construction of Project Phase 2 1-3 Years from beginning of construction of Project Phase 2

Serial Number	Name/Address	Reference/Subject	MUNPL's Reply / Commitment	Approx. Amount (CD Works) Lakh	Timeline
14	**Village head- Sunita Singh, Village Panchayat Maikala**	MoU for expansion of Stage-II of Meja Urja Nigam Project	**Village head Mai kala Meja Prayagraj has given his consent for the expansion of Stage-II**.	-	-
15	**Village head- Sunita Singh, Village Panchayat Maikala**	15.1 Lift canal pump through which the fields of farmers of Mai Kala, Mai Khurd, Patai Dandi, Isota, Shahpur Kala, Kohdar Ghat can be irrigated. 15.2 A permanent bathing ghat should be constructed on Mai Kala and Mai Khurd Tons river. 15.3 1200 m interlocking road and drain work in Gram Panchayat Mai Kala. 15.4 15 hand pumps should be installed in the Gram Panchayat Mai Kala. 15.5 30 solar lights should be installed in the Gram Panchayat Mai Kala. 15.6 Tiles and infrastructure should be provided in Panchayat Bhawan and primary schools in Gram Panchayat Mai Kala. 15.7 A big gate and straw boundary wall should be built in the cowshed in Gram Panchayat Mai Kala. 15.8 05 tanks should be installed under small drinking water scheme in village Panchayat Mai Kala. 15.9 05 Solar Himax should be installed in Gram Panchayat Mai Kala. 15.10 Himax and solar pump should be installed in the cowshed in village panchayat Mai Kala.	15.1 Irrigation- As per answer to No. **7.3** 15.2 Based on the need based analysis report and interaction with stakeholders, the possibility of bathing ghats on Mai Kala and Mai Khurd Tons river will be explored in consultation with Uttar Pradesh Irrigation Department in public interest. If feasible, it will be implemented through Irrigation Department. 15.3-15.15 Based on need analysis report and through dialogue with stakeholders, road construction, construction of Panchayat Bhawan, hand pump, solar light, renovation of primary school, Gaushala boundary wall, small drinking water scheme, solar high mast light, distribution of blankets and mosquito nets, and plantation of trees and distribution of fruit trees will be done in public interest. 15.16 In the current project, around 230 PAPs (Project Affected Persons) and approximately 2,000 local people have been employed through contractors. Employment opportunities in the Meja Thermal Power Project will remain very limited. However, during the construction and operation of the proposed three units, PAPs and local people will be given priority for temporary employment through contractors, based on eligibility, qualifications, and requirements.	330 Lakh	04 Years From beginning of construction of Project Phase 2

Serial Number	Name/Address	Reference/Subject	MUNPL's Reply / Commitment	Approx. Amount (CD Works) Lakh	Timeline
		15.11 02 charhi sheds should be made in the cowshed in the Gram Panchayat Mai Kala. 15.12 Trees should be planted along the road in Mai Kala village panchayat till Jhadiyahi. 15.13 Blankets and mosquito nets should be distributed in the Gram Panchayat Mai Kala. 15.14 A community hall should be constructed in the Gram Panchayat Mai Kala. 15.15 Fruit trees should be given to farmers in the Gram Panchayat. 15.16 25% of the workers in the project should be from the project affected villages.			
16	**Dashrath Nishad Head of Village Village Panchayat Bijaura**	With the installation of 03 units of power plant, my village will develop even more, with which I completely agree and I give my full consent to your project and my Gram Panchayat completely agrees with it.	**Village head Bijaura Meja Prayagraj has given his consent for the expansion of Stage-II**.	-	-
17	**Neeta Nishad Head of Village Gram Panchayat Isauta**	Public welfare works such as provision of drinking water, roads for transportation and interlocking roads, etc. have been arranged in my village. My village will benefit more from the expansion of Stage 02. Hence, I give my consent for the expansion of Meja Urja Nigam Private Limited Stage 02.	**The Village Head, Gram Panchayat Isota, Meja Prayagraj has given his consent for the expansion of Stage-II**.		

Serial Number	Name/Address	Reference/Subject	MUNPL's Reply / Commitment	Approx. Amount (CD Works) Lakh	Timeline
18	**Suresh Kumar Head of Village Gram Panchayat Salaiya Khurd**	Meja Urja Nigam Kohdar has proved to be very useful for us, through it not only the whole country is getting electricity, but the people of the area are also being given employment and prosperity has also been achieved through CSR welfare works like road construction, education, drinking water. After this Meja Urja Nigam project is especially important for us, in this context, looking at the demand of electricity in the country, the supply of electricity will increase further with the construction of a new unit, along with this, the construction of the project will open up new opportunities for development along with increase in employment contract work in our area. Therefore, it is very important to expand Meja Urja Nigam Limited Stage 02 so that there can be further development in our area, for this I and our Gram Sabha give their consent for the expansion of Stage 02.	**Village head Salaiya Khurd Meja Prayagraj has given his consent for the expansion of Stage-II**.	-	-
19	**Ramesh Kumar Head of Village Gram Panchayat Kohdar**	With the advent of Project Stage 02, the supply of electricity will increase and there will also be benefits of village development, employment etc. Therefore, Kohdar Gram Sabha gives its consent for the expansion of Meja Energy Corporation Stage 02 and my villagers also agree.	**Village head Kohdar Meja Prayagraj has given his consent for the expansion of Stage-II**.	-	-

Serial Number	Name/Address	Reference/Subject	MUNPL's Reply / Commitment	Approx. Amount (CD Works) Lakh	Timeline
20	**Ramesh Kumar** **Head of Village** **Gram Panchayat Kohdar**	Gram Panchayat Kohdar is your project affected Gram Panchayat which is a very backward area, therefore it is very important to get the development work done. 20.1 1500 m of paver blocks have to be installed. 20.2 05 pieces of small drinking water scheme tanks should be installed. 20.3 2000 m paved drain 20.4 20 nos. hand pumps 20.5 Beautification of Kohdar Bazar 20.6 To fully develop Kohdar playground 20.7 Mass marriage hall in Kohdar bazaar 20.8 Interlocking in Gaushala 20.9 20 Pieces Solar Lights 20.10 Provision of pure drinking water in Kohdar market 02 pieces	20.1-20.6, 20.8-20.10 Based on need based analysis report and discussion with stakeholders, interlocking road, solar small drinking water scheme, hand pump, beautification of market, playground, interlocking and solar lights will be constructed in cowshed in public interest. 20.7 Community hall at Kohdar Bazar has been constructed by MUNPL under Stage-I community development works, which can also be used as a mass marriage hall.	340 Lakh	01-04 Years From beginning of construction of Project Phase 2
21	**Vandana Soni** **Area Panchayat Member Ward No. (52)** **Kohdar Meja**	The village of the applicant is connected to a river, stream and hilly area. There is a need of solar lights in it. The applicant is in urgent need of 12 solar lights. Therefore Sir, it is my humble request and request that you kindly provide solar light to the applicant so that by making the facility provided by you accessible to people they can lead a happy life and it will be a great favour from you.	Solar lights will be installed in public interest by preparing need based analysis report and discussion with stakeholders.	30 Lakh	0 to 1 Year from beginning of construction of Project Phase 2

Serial Number	Name/Address	Reference/Subject	MUNPL's Reply / Commitment	Approx. Amount (CD Works) Lakh	Timeline
22	**All the applicants Salaiya Kala (New Colony) meja prayagraj**	Letter addressed to the MP 22.1 The land and house of the applicants were acquired. They were assured that drinking water would be arranged but after constructing a tank, the matter was closed and they have to crave for every drop of water. 22.2 Some people have been settled between the canal and the road, and some between the south and north of the canal. Rainwater enters the houses. There is no drainage system, although NTPC had promised to build it. 22.3. The hand pumps provided by NTPC are given by the Pradhan himself near his house or to his favourites. We displaced people are left deprived. Some people have to fetch water from a distance of 200-300 metres, such as Bal Govind, Indrajit, Ram Kailash, Lal Bahadur, Ram Janam, Ram Babu etc. 22.4. Some people were given ITI by NTPC and after taking exam and training they were kept in the company. After four years they were thrown out. When the boys went to Honorable Kunwar Sahib they were kept on Rs. 13000/- per month whereas earlier they were paid Rs. 18000/- 22.5 Some boys are not being given jobs even after getting them through ITI and apprenticeship, while the land and house have been acquired. They themselves	22.1 Arrangement of water tank- As per answer of no. 1.9 22.2 Drainage arrangement- As per answer of no. 1.4 22.3 The work of installing hand pumps is done as per the decision taken in the meeting of the Village Development Advisory Committee. 22.4 All contract labour employed in the project are paid wages as notified by the Government of Uttar Pradesh according to their skill category and work. 22.5 Employment- As per answer to number 1.2 22.6 Point no. 6 is not related to MUNPL. 22.7 School - as per answer to number 1.6 and Hospital - as per answer to number 1.7 22.8 All contract workers employed in the project are paid wages as notified by the Government of Uttar Pradesh according to their skill category and work. 22.9 As per reply to case no. 1.3 22.10 Toilets have been constructed in all the houses built for displaced persons in the rehabilitation colony. For other displaced persons, community toilets can be constructed in the second phase of the project by preparing a need-based analysis report and talking to stakeholders. 22.11 MUNPL only produces electricity, as per rules, the work of electricity distribution is the responsibility of the state government. Electricity	50 Lakh	02 Years From beginning of construction of Project Phase 2

Serial Number	Name/Address	Reference/Subject	MUNPL's Reply / Commitment	Approx. Amount (CD Works) Lakh	Timeline
		get it distributed among their family members, their favourites and the people of Purva. 22.6 Occasionally, NTPC provides blankets, bags, mosquito nets, and solar energy devices. However, instead of distributing them to the displaced persons, the village head distributes them to their own family members and favored individuals from other hamlets. 22.7 In plot number 237 in which we have been settled, 5 bighas of land belonging to the village society remains. The Pradhan has given this land to Uma Shankar son of Sharda Din and Munna Nishad son of Sukhai after taking money. These people do farming on it and have also built houses after occupying it. The remaining displaced people do not even have place for their animals and barns. 22.8 At the time of displacement, assurances were given to build a school and hospital in the village but nothing was done. Even the red cards of the displaced people have not been made yet. 22.9 In the name of job, they are making people do hard duty of 8 hours in this scorching sun on the basis of daily wages of Rs. 300/-. 22.10 The contractors used to come to us to get our work done without giving us compensation. We used to go to the spot to present our case for compensation and	distribution is beyond the scope of MUNPL. Apart from the above, about 10 hand pumps and solar powered drinking water scheme have also been installed for drinking water. 22.12 MUNPL only produces electricity, as per rules, the work of electricity distribution is the responsibility of the state government. Electricity distribution is beyond the scope of MUNPL. Apart from the above, about 10 hand pumps and solar powered drinking water scheme have also been installed for drinking water. 22.13 The land acquisition for the ash pond is in accordance with the standards prescribed by the Government of India. During the construction and operation of the ash pond, measures will be implemented to ensure that there are no adverse impacts on health, grazing areas for livestock, wildlife, or neighboring agricultural land.		

Serial Number	Name/Address	Reference/Subject	MUNPL's Reply / Commitment	Approx. Amount (CD Works) Lakh	Timeline
		housing. In order to suppress the peaceful demands, dozens of fake cases have been registered against most of the people under harsh sections, while neither any fighting nor any vandalism took place. Therefore, the fake cases should be withdrawn.. 22.11 All displaced people were asked to be given a toilet each, but it was not given to everyone. 22.12 Three of the displaced people, Dayashankar, Ram Ganesh and Devnath settled in Laltara. Ramkumar settled in his farm near the canal in the village itself. Electricity, water and transformer facilities have not been provided to these people till date. 22.13 The land of Salaiya Kala is being re-acquired for the pond (ash). This will have adverse effects on health, animal grazing, wild animals and the nearby agricultural land. The land will become barren and the fruit trees will not bear fruits. There is still land left to build ten ponds in the land acquired by NTPC, so the acquisition should not be done again.			

Oral demands by speakers

Serial Number	Name/Address	Reference/Subject	MUNPL's Reply / Commitment	Approx. Amount (CD Works) Lakh	Timeline

23	**Sanjay Kumar Yadav son of Shri Basant Yadav, Salaiya Kala, Meja Prayagraj**	PAP cards should be given to the displaced. Permanent jobs should be given to the displaced. The cases filed during the agitation should be withdrawn. Near Triveni Road Drains should be constructed for the drainage of water for the displaced people. Free electricity should be provided to the displaced children. NTPC Meja should provide facilities for studying to the displaced children. A hospital should be constructed for the health care of the displaced people and free facilities should be provided. A ground should be arranged for the children to play. The water tank should be repaired. The repair work of drains and roads should be done. Fencing should be done all around the ash pond so that stray cattle do not fall into it and lose their lives. The ash flying from the pond is making the surrounding lands infertile. Proper arrangement should be made for it. Small tenders should be given to the displaced people.	23.1 PAP Card- As per answer to Sl. No. 1.1 23.2 Employment- As per answer to no. 1.2 23.3 As per reply to case no. 1.3 23.4 Based on the need analysis report and consultation with the stakeholders, the drain will be constructed in public interest under community development work. 23.5 Electricity - As per answer to serial no. 1.5 23.6 As per answer of school no. 1.6 23.7 Hospital- As per answer of No. 1.7 23.8 Playground - As per answer to no. 1.8 23.9 Repair of water tank and drain - As per answer of no. 1.9 & 1.10 23.10 Fencing around ash dam-As per answer to serial no. 1.11 23.11 Ash Management- As per answer to No. 1.12 23.12 As per reply to Small Contract Work No. 1.13 for displaced people	50 Lakh	Around 02 year from the beginning of Stage 2 construction activities.
24	**Ashwani Jain, son of Shri Ramu Jain, Village- Kodhar**	Regarding the power project proposed by him, the view was expressed that there is a huge problem of flying ash from the power plant. There is only greenery inside the plant and the conditions outside are like a desert. Fruit trees should be planted. Through the project, street lights should be installed on one side till Kohdhar and on the other side till Laltara Bazaar.	24.1 Ash Management- As per answer to No. 7.7 24.2 Trees inside the plant have been planted under the notification issued from time to time by the Ministry of Environment, Forest and Climate Change, Government of India, and trees outside the plant have been planted with the help of the Forest Department. MUNPL-MEJA has planted about 374000 trees have been planted inside and outside the plant. MUNPL-MEJA will plant fruit trees with the	30 Lakh	Around 01-02 year from the beginning of Stage 2 construction activities.

		Fly ash should be disposed of properly and water should be sprinkled to control road dust. There are hundreds of schools and busy markets from Kohdar to Rampur. In such a situation, the movement of vehicles carrying fly ash should be restricted from 10:00 am to 10:00 pm. This creates the problem of traffic jam. Kohdar town should be beautified. Roads should be constructed as per the need. People's representatives should be included in the Gram Vikas Advisory Committee formed by NTPC. If work is done as per the suggestions given through the committee, it will help a lot in the development of the area.	help of Gram Sabha and Forest Department as per the availability of land. 24.3 Street lights have been installed by MUNPL-MEJA, on its land for lighting and security, which are maintained by MUNPL. Street lights can be installed in public interest at any other place by MUNPL after preparing a need-based analysis report and talking to stakeholders, but the entire responsibility of power supply, maintenance and operation of street lights lies with the department related to the district administration and the concerned Gram Sabha. 24.5 The ash from the plant is mainly used for cement production and road/ national highway construction. In future, fly ash will also be used for production of ash bricks and its transportation will be done through rail. For various uses of ash, transportation of ash is necessary which is done by tarpaulin covered or closed container vehicles (bulkers). Water is regularly sprinkled on the haulage road by tankers so that there is no inconvenience in traffic. The timing of arrival and departure of vehicles carrying fly ash is decided by the administration. 24.6 Based on the need based analysis report and discussion with the stakeholders, beautification of Kohdar and construction of roads will be done in public interest. 24.7 Village Development Advisory Committee (VDAC)- As per answer to serial no. 3.0		

25	**Mr. Vimlesh Mishra, President, Labor Union, Village-Salaiya Kala, Meja Prayagraj**	The temperature of the area has increased due to the installation of the plant. People of the area should have access to electricity 24 hours a day. There is a problem of unemployment. Local people should be given employment. The problem of dust persists due to the movement of open vehicles from Kohdhar to Naini and water is not sprinkled. Instead of giving employment to local people, people from other states are being given employment. Which is wrong. The check dam built in village Isota should be repaired and the surrounding roads should also be repaired. Lift canal facility should be provided for irrigation in the surrounding villages. He said that if the issue raised by me is not paid attention to by Meja Urja Nigam, then we will be forced to protest.	25.1 Electricity - As per answer to serial no. 1.5 25.2 Employment- As per answer to no. 1.2 25.3 Ash Management- As per answer to no. 24.5 25.4 In the current project, about 230 PAPs and about 2000 local people have been given employment through contract. Employment opportunities in Meja Thermal Power Project will be very limited. But even at the time of construction of the proposed 03 units, PAPs and local people will be given priority in temporary employment through the contractor as per eligibility, qualification and requirement. 25.5 Based on the need analysis report and consultation with the stakeholders, the check dam constructed in village Isota and the surrounding roads will be repaired in public interest. 25.6 Irrigation- As per answer to No. 7.3	35 Lakh	Around 02 year from the beginning of Stage 2 construction activities.
26	**Mr. Anil Shukla, Village-Gadewara Pradhan, Meja Prayagraj**	In Shri Siddheshwar Nath Pahadi Mahadev Mandir, street lights should be installed from the entrance to the temple, the main gate should be constructed and the Pahadi Mahadev Mandir should be developed and arrangements for livelihood should be made for the Shiva devotees residing in the temple.	As per answer to serial no. 2.0	-	Around 02 year from the beginning of Stage 2 construction activities.
27	**Shri Shailesh son of Shri Rajkumar, Village-Salaiya Kala**	A water tank was constructed by Meja Urja Nigam which collapsed within a month and is not being repaired again. Being a hilly area, there is a water problem, this should be resolved immediately. As an alternative arrangement for water supply, water should	27.1 Repair of water tank as per answer to no. 1.9 27.2 Based on the need analysis report and discussion with the stakeholders, solar small drinking water scheme and hand pumps will be installed in public interest.	-	Around 02 year from the beginning of Stage 2 construction activities.

		be provided through tankers and the water tank should be repaired. Employment has not been provided to local people in the plant. Even the job of a guard has not been given to the local people in the plant.	27.3 Employment of local people: As per answer to Sr. No. 1.2. Employment of Security Guards: Security guards are engaged by security agency empanelled with Directorate General of Resettlement (DGR) as per qualification, eligibility of the person and as per DGR guidelines. Accordingly, at present 8 persons from project affected villages are employed by the security agency.		

Table 7.2 Action plan to resolve the issues raised during Public Hearing of proposed Stage -II, (Activities under Public Hearing and Written Demands given by Gram Pradhans & Individuals – CD)

SL. NO.	PROPOSED WORKS TO ADDRESS THE ISSUES RAISED	Total Estimated Cost (Rs. Lakh)	ESTIMATED TIME
1	Installation of 10 hand pump, 05 solar high mast light, 15 solar streetlights, and construction of public road in village Gadewara (400 m)	125	01-02 Year
2	Repair of roads (500 mtr.), drains and water tank in (New Basti), construction of public roads (3000 mtr.), construction of drain for drainage near Triveni Road (500 mtr.), construction of 01 playground for children, providing hand pumps (08) and reboring (03) etc. in village Salaiya Kala and mobile health clinic (for all villages including Salaiya Kala)	715	02 -05 Year
3	Renovation of primary school, construction of public roads (1200 mtr.), installations of hand pumps (15), solar high mast lights (05), solar streetlights (30) and construction of bathing ghat, solar powered mini water scheme(05), cattle shed (02) etc. in Village Mai Kala	400	02 -05 Year
4	Construction of interlocking road (1500 mtr.), mini solar water scheme (07), hand pumps (20), solar streetlights (32), beautification of market, development of playground, interlocking in cowshed (gaushala), construction of paved drains (2000 mtr.) etc. in village Kohdar	490	02 -05 Year

5	Renovation of primary school, construction of interlocking road (2000 mtr.), mini solar water scheme (03), hand pumps (20), solar streetlights (40) etc. in village Salaiya Khurd	300	02 -04 Year
6	Construction of inter-locking road (2000 mtr.), hand pumps (10), solar streetlights (40), repair of overhead water tank and renovation of primary school etc. in village Jhariyahi	200	02 -04 Year
7	Construction of inter-locking road (2000 mtr.), hand pump (20) , solar streetlights (35), and renovation of primary school etc. in village Isota	200	02 -04 Year
8	Construction of interlocking road and drain (1000 mtr.), mini solar water scheme (02), hand pump (10), community toilet, Anganwadi Centre, solar streetlights (30) and renovation of primary school etc. in village Bijaura	200	02 -04 Year
9	**Other Miscellaneous Work:** Women Empowerment through skill development and Job oriented skill development trainings to youth such as CIPET, CRISP, CIDC and other implementation partners	325	01 -05 Year
Total (A)		**2955**	
CD Works in Amilya Kala (STG-II) **(B)**		500.00	
Total A+B		**3455.00**	

Note: i. Final measurement for CD works village wise shall be done after discussion with the stakeholders and Need Assessment Survey (NAS), which is under progress.

ii. Community Development (CD) works shall be executed only after the allotment of Govt. Land for infrastructural projects in the nearby villages.

7.2. Risk Assessment

7.2.1. Purpose

The purpose of this Risk Assessment is to evaluate potential hazards associated with the operation of NTPC's thermal power plant, focusing on bulk storage and handling of hazardous materials. The assessment aims to identify risks, assess their impact, and recommend control measures to mitigate potential hazards.

7.2.2. Scope

This Risk Assessment covers various accident scenarios involving chlorine, hydrogen, and diesel. It examines failure scenarios, evaluates impacts, and proposes safety measures and procedures.

7.2.3. Methodology

The Risk Assessment utilizes historical data, engineering judgment, and professional expertise to evaluate potential failure scenarios. The analysis includes:

- Identification of failure scenarios
- Impact assessment using modeling tools (ALOHA)
- Evaluation of weather effects on hazard dispersion
- Consequence analysis for toxic and thermal hazards
- Recommendations for safety measures and emergency response

7.3. Identification of Failure Scenarios

7.3.1. Likely Failure Scenarios

The following failure scenarios have been identified based on a critical appraisal of raw materials and storage inventories:

S. No	Scenario	Remark
1	Chlorine (~2 cm dia. pipe leakage)	Toxic
2	Chlorine Cylinder Leakage (~1 cm Leak)	Toxic
3	Hydrogen Pipe (2 cm dia) leakage - fire	Thermal
4	Diesel [Spillage - Fire]	Thermal

7.4. Impact Assessment

7.4.1. Weather Effects

Ambient conditions significantly impact the dispersion of hazardous materials and the extent of their impact. The following weather conditions were considered for modeling based on historical meteorological data for Meja:

- Stability Class C: Wind—2.8 m/s; Temperature—35°C; Humidity—50%
- Stability Class B: Wind—1.4 m/s; Temperature—8°C; Humidity—50%
- Wind Direction: East

7.4.2. Hazardous Incidents Impact

The identified failure scenarios were analyzed using ALOHA to determine impact zones. The impact zones for various scenarios are shown in the tables below:

Table 7.3 : Impact Zones for Chlorine Pipe Leakage

Scenario	Impact Zone (m)	Remarks
Chlorine (pipe leakage)	417 (Stability Class C)	IDLH; Template: 1
	472 (Stability Class B)	IDLH; Template: 2

Table 7.4 : Impact Zones for Chlorine Cylinder Leakage

Scenario	Impact Zone (m)	Remarks
Chlorine Cylinder Leakage	778	IDLH; Stability Class C; Template: 3

Table 7.5 : Impact Zones for Hydrogen Leakage-Jet Fire

Scenario	Impact Zone (m)	Remarks
Hydrogen Leakage-Jet Fire	<10	1st degree burn (4kW/m²); Template: 4

Table 7.6 : Impact Zones for Diesel Spillage

Scenario	Impact Zone (m)	Remarks
Diesel Heavy Spillage Fire	17	1st degree burn (4kW/m²); Template: 4

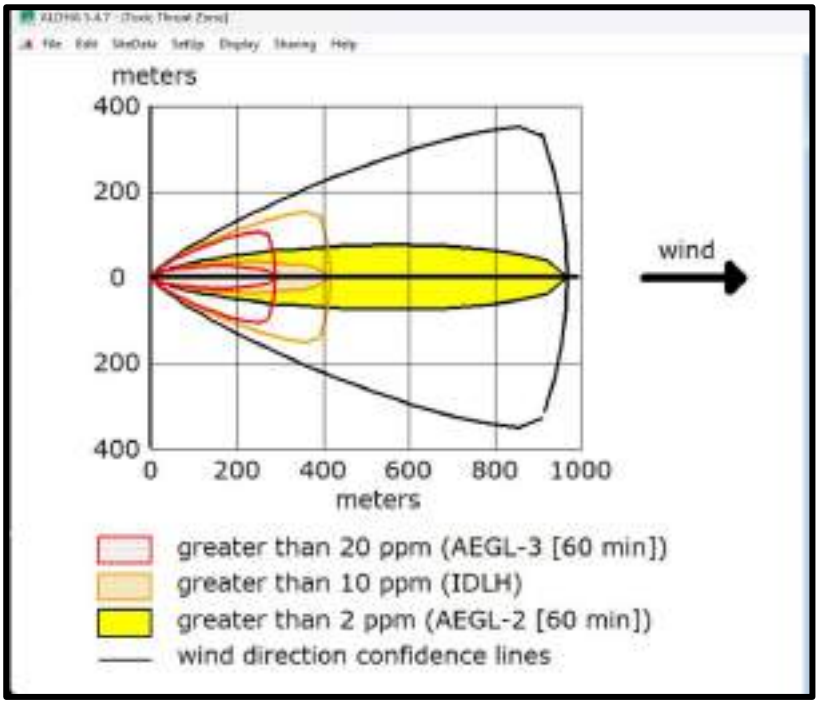


Figure 7.1 : Chlorine Pipe Leakage; Toxic Impact Zone (Stability Class C)

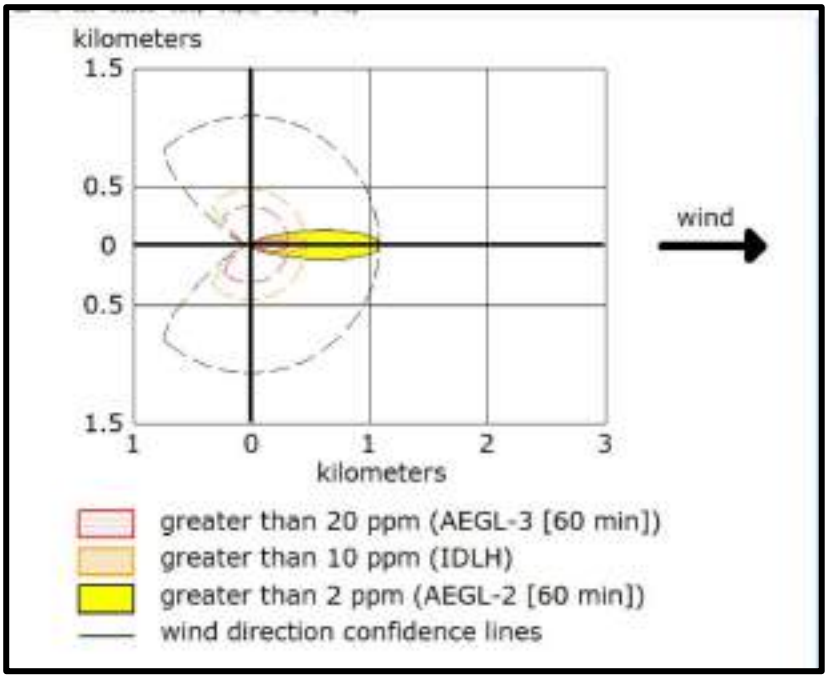


Figure 7.2 : Chlorine Pipe Leakage; Toxic Impact Zone (Stability Class B)

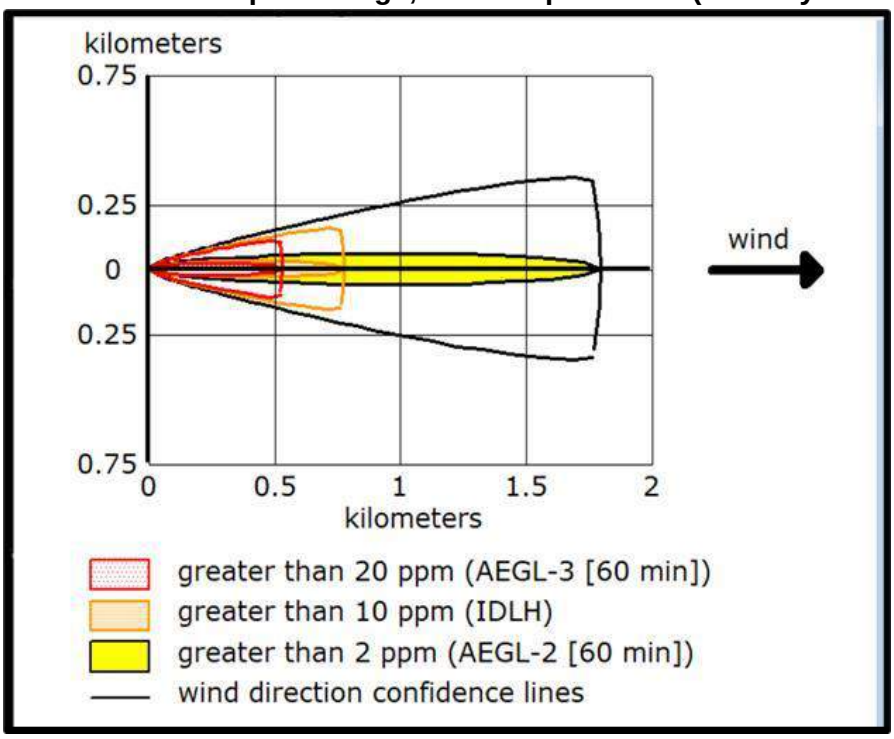


Figure 7.3 : Chlorine Cylinder Leakage; Toxic Impact Zone (Stability Class C)

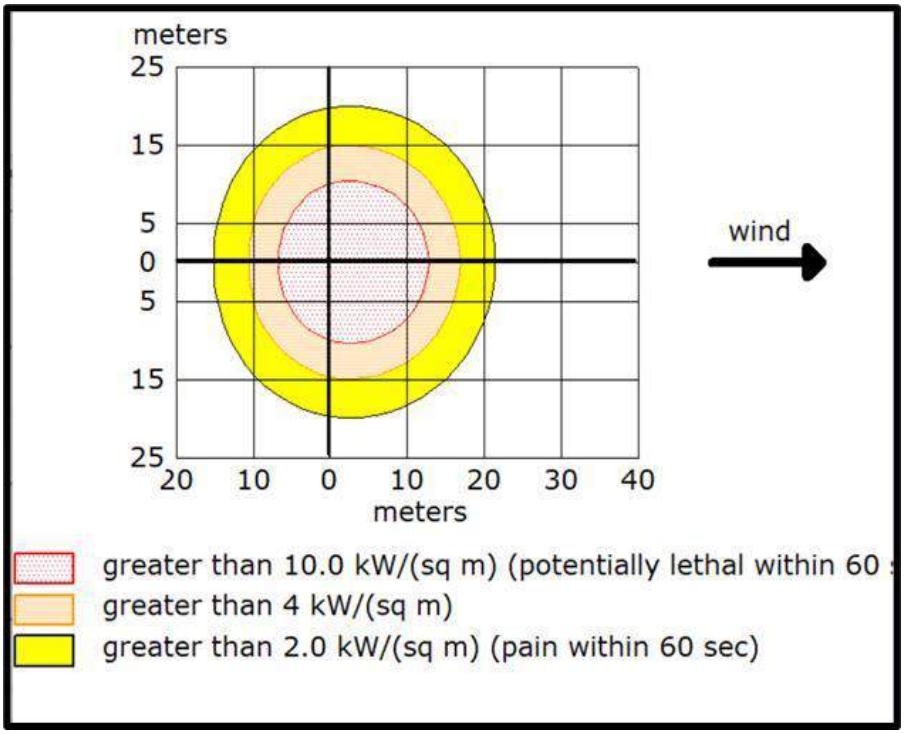


Figure 7.4 : Diesel Spillage—Burning Puddle; Thermal Impact Zone

7.5. Consequence Analysis

7.5.1. Toxicity

The primary toxic hazard is chlorine, which can have severe impacts if not controlled. Chlorine releases can cross plant boundaries depending on the storage location and prevailing wind direction.

7.5.2. Thermal Hazards

Thermal hazards arise mainly from hydrogen and fuel. These impacts are generally confined within the plant boundary but can extend due to domino effects.

7.5.3. Hazardous Scenario Chemicals

Detailed analysis of hazardous chemicals involved is provided below:

Table 7.7 : Hazardous Scenario Chemicals

S. No	Hazardous Chemical	Specific Safety Measures
1	Chlorine	Strong oxidizing agent; water-reactive
2	Hydrogen	Flammable; requires careful handling
3	Diesel	Flammable; may spread and ignite

7.5.4. Detailed Chemical Information

- Chlorine (CAS No: 7782-50-5):
  - Properties: Toxic, strong oxidizing agent

- Health Hazards: Poisonous, may cause burns; bronchitis or chronic lung conditions
- Fire Hazards: Not flammable but can ignite other materials; requires specific firefighting procedures

- Hydrogen:
  - Properties: Colorless, odorless, highly flammable o Health Hazards: Can cause explosion; requires careful handling
  - Fire Hazards: Invisible flame; requires special firefighting measures

- Diesel (CAS No: 68476-30-2):
  - Properties: Flammable, can cause health issues on exposure
  - Health Hazards: Inhalation can cause rapid breathing, dizziness, nausea
  - Fire Hazards: Requires foam, CO2, or dry chemical extinguishers

7.6. Safety Measures and Recommendations

7.6.1. General Recommendations

To manage and mitigate the risks identified in the assessment, the following safety measures are recommended:

- Installation of Sensors: Smoke, thermal, and toxic sensors with alarms should be installed in storage areas.
- Distance from Main Tank Farm: Storage areas for chlorine, hydrogen, and other sensitive chemicals should be located at a safe distance from the main tank farm.
- Caustic Pit: A caustic pit should be constructed to handle heavy chlorine cylinder leaks.

7.6.2. Firefighting Systems

To ensure effective response to fire incidents, the following components should be incorporated into the firefighting system:

- Fire Water Storage: Adequate capacity for fire water storage tanks.
- Fire Water Pumps: Reliable pumps to ensure consistent water supply.
- Water Sprinklers: Installed around storage areas to cool adjoining tanks.
- Fire Water Network: Comprehensive network around storage areas for efficient water distribution.
- Foam System: Foam systems to suppress fires involving flammable liquids.

7.6.3. Safe Operating Procedures

- Documentation: Safe operating procedures must be available for all operations, practices, and equipment.
- Training: Workers should be trained on the importance of adhering to these procedures and understanding the consequences of non-compliance.

7.6.4. Ventilation

- Adequate Ventilation: Ensure proper ventilation to control dust and gaseous emissions.

- Regular Assessment: Regularly assess and monitor the work environment to ensure effective ventilation.

7.6.5. Static Electricity

- Earthing: All equipment and storage tanks containing flammable chemicals should be grounded and earthed.
- Maintenance: Regular inspections of earthing circuits and maintenance of records are essential.

7.6.6. Instrumentation

- Testing: Instruments such as pressure, temperature transmitters, gauges, and alarm switches should be tested according to the preventive maintenance schedule.
- Emergency Shutdown System: Regular testing of the emergency shutdown system is crucial.

7.6.7. Limit Access and Storage

- Quantity Limitation: Limit the quantity of hazardous materials stored to 80% of the maximum capacity.
- Access Control: Restrict access to hazardous material storage areas and post appropriate warning signs.

7.6.8. Spillage and Leakage Prevention

- Maintenance: Implement a preventive maintenance plan to avoid failures in flanges, pipelines, and other components.
- Containment: Confine leakage to the dyke area. Use temporary barriers to control spreading outside the dyke.
- Decontamination: Provide safety showers and eye wash fountains for decontamination in case of exposure.

7.7. Emergency Response and Safety Procedures

7.7.1. Spillage-Fire and Decomposition Products

In case of a spillage-fire, the following considerations are essential:

- Thermal Decomposition Products: Hazardous combustion products may include carbon monoxide, hydrochloric gas, hydrogen, and carbon dioxide.
- Explosive Mixtures: Vapors from solvents/chemicals may form explosive mixtures with air.
- Firefighting Precautions: Staff should be aware of the potential hazards of toxic decomposition products and take appropriate measures.

7.7.2. *Transportation and Unloading of Hazardous Chemicals*

- Standard Procedures: Implement standard procedures for the safe unloading of road tankers.
- Static Earthing: Ensure static earthing is provided during tanker unloading.
- Handling Equipment: Use drum handling trolleys for internal transportation.
- Fire Extinguishers: Provide fire extinguishers as required.

- First Aid: Equip the site with first aid boxes and water showering systems for the storage area.
- No Smoking Zone: Designate the area as a “NO SMOKE ZONE.”

7.7.3. Occupational Health and Safety

- Health Precautions: Ensure adequate precautions are in place to prevent harm to workers handling toxic materials.
- Training: Employees should be trained on:
  - Hazardous chemical substances and potential exposure
  - Protective measures and safety equipment
  - Proper use of safety equipment and good housekeeping practices
  - Procedures for spillages and leakages

7.7.4. Risk Assessment Procedures

- Hazard Identification: Identify potential hazards and assess risks.
- Control Measures: Implement control measures based on risk evaluation.
- Documentation and Review: Record findings and review assessments regularly.

7.8. HIRA (Hazard Identification and Risk Assessment)

7.8.1. Overview

The Hazard Identification and Risk Assessment (HIRA) provides a structured approach to identifying hazards, assessing risks, and implementing control measures. It ensures all potential risks are evaluated and managed effectively.

7.8.2. Risk Assessment Procedure

- Identify Hazards: Systematically identify hazards associated with operations.
- Assess Risks: Evaluate the risks associated with identified hazards.
- Implement Controls: Apply appropriate control measures to mitigate risks.
- Document Findings: Maintain records of risk assessments and control measures.
- Regular Reviews: Conduct regular reviews and updates of risk assessments.

7.8.3. Safety Policy Principles

The safety policy principles of NTPC emphasize:

- Hazard Identification: All hazards can be identified and managed.
- Safety Responsibility: Safety is a responsibility and must be demonstrated visibly.
- Procedural Compliance: Following procedures to control risks.
- Training and Commitment: Ensuring a trained and committed team for safe operations.
- Regulatory Compliance: Adherence to safety regulations and continual improvement.

7.8.4. NTPC Safety Policy NTPC's safety policy is built around:

- Identification and Management: Identifying and managing all hazards.
- Procedural Safety: Ensuring all jobs are done safely.
- Responsibility and Accountability: Demonstrating safety responsibility.

- Control Measures: Implementing appropriate control measures.
- Training and Commitment: Ensuring a well-trained team.
- Regulatory Compliance: Complying with safety regulations and striving for better standards.

7.9. Hazard Identification and Risk Analysis (HIRA)

7.9.1. Overview

The Hazard Identification and Risk Analysis (HIRA) focuses on systematically identifying potential hazards associated with various processes and assessing their associated risks. It ensures that all identified risks are evaluated and controlled effectively to minimize impact.

7.9.2. Methodology

- Hazard Identification: Conduct a thorough analysis of operations to identify potential hazards, including chemical, thermal, and mechanical risks.
- Risk Assessment: Evaluate the risks associated with each hazard by considering the likelihood and impact of occurrence.
- Control Measures: Develop and implement control measures to mitigate identified risks.
- Documentation: Maintain comprehensive records of the risk assessment process, including identified hazards, assessed risks, and implemented control measures.
- Review: Regularly review and update risk assessments to reflect changes in operations and regulations.

7.9.3. Risk Assessment Procedure

- Identify Hazards: Systematic identification of hazards through inspections, historical data, and expert judgment.
- Evaluate Risks: Assess the potential impact and likelihood of each hazard, considering existing control measures.
- Implement Controls: Apply necessary controls to reduce the risk to an acceptable level.
- Monitor and Review: Continuously monitor the effectiveness of control measures and review risk assessments periodically.

7.10. Detailed Failure Scenarios and Impact Analysis

7.10.1. Likely Failure Scenarios

The selection of accident scenarios is based on engineering judgment, historical data from similar plants, and expertise in risk analysis. The identified failure scenarios are:

- Chlorine (~2 cm dia. pipe leakage): Toxic
- Chlorine Cylinder Leakage (~1 cm Leak): Toxic
- Hydrogen Pipe (2 cm dia) leakage - fire: Thermal
- Diesel [Spillage - Fire]: Thermal

7.10.2. Weather Effects on Impact

Ambient weather conditions can influence the impact of hazardous releases:

- Stability Class C: Wind—2.8 m/s; Temperature—35 °C; Humidity—50%
- Stability Class B: Wind—1.4 m/s; Temperature—8 °C; Humidity—50%
- Wind Direction: East

7.10.3. Impact Analysis

The impact of various scenarios was analyzed using ALOHA software, considering thermal and toxic impacts. The impact zones for each scenario are:

Chlorine (pipe leakage)	417 (Stability Class C), 472 (Stability Class B)	IDLH levels; different templates for stability classes
Chlorine Cylinder Leakage	778	IDLH levels; Stability Class C Template
Hydrogen Leakage - Jet Fire	<10	1st degree burn (4 kW/m²)
Diesel Heavy Spillage Fire	17	1st degree burn (4 kW/m²)

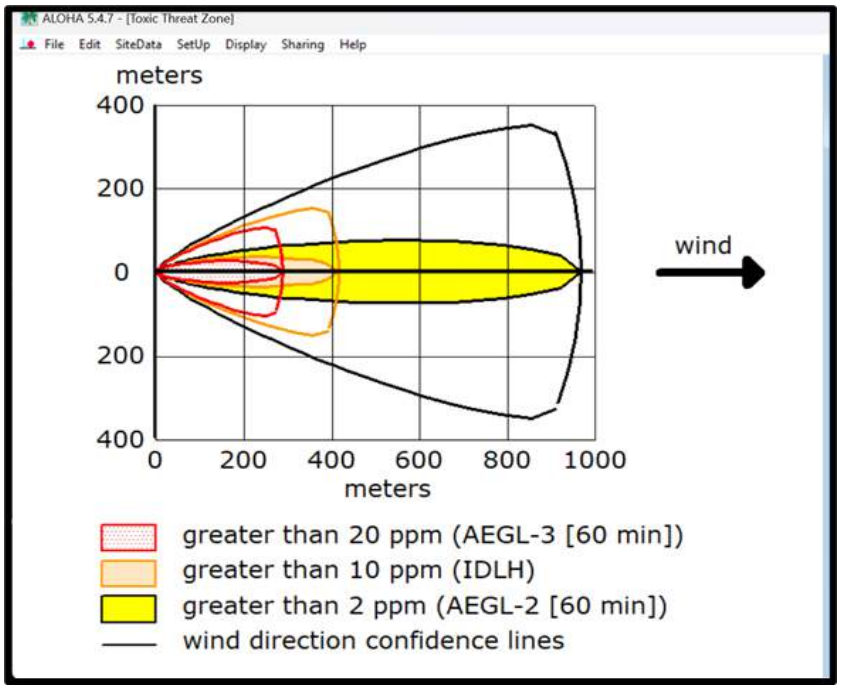


Figure 7.5 : Chlorine Pipe Leakage; Toxic Impact Zone (Stability Class C)

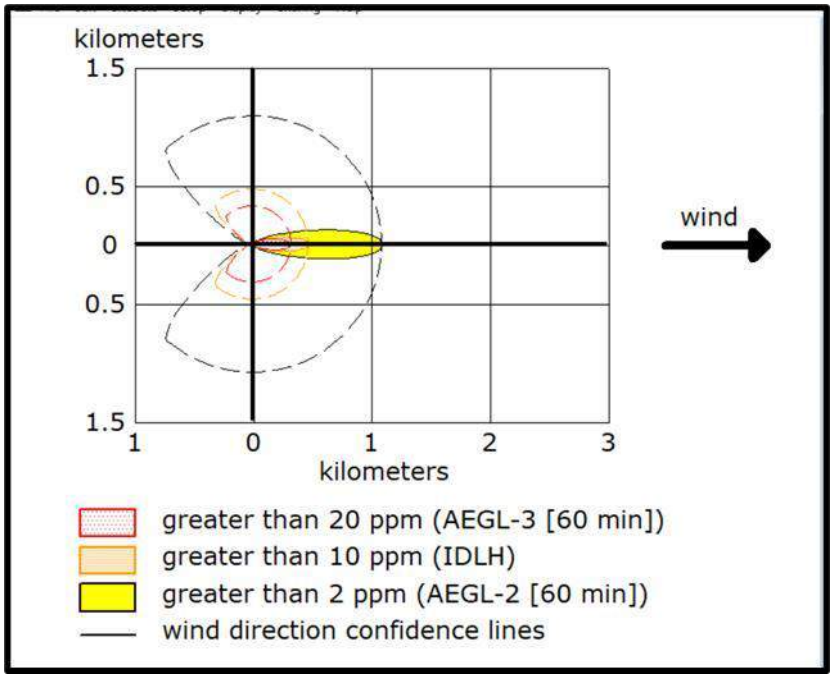


Figure 7.6 : Chlorine Pipe Leakage; Toxic Impact Zone (Stability Class B)

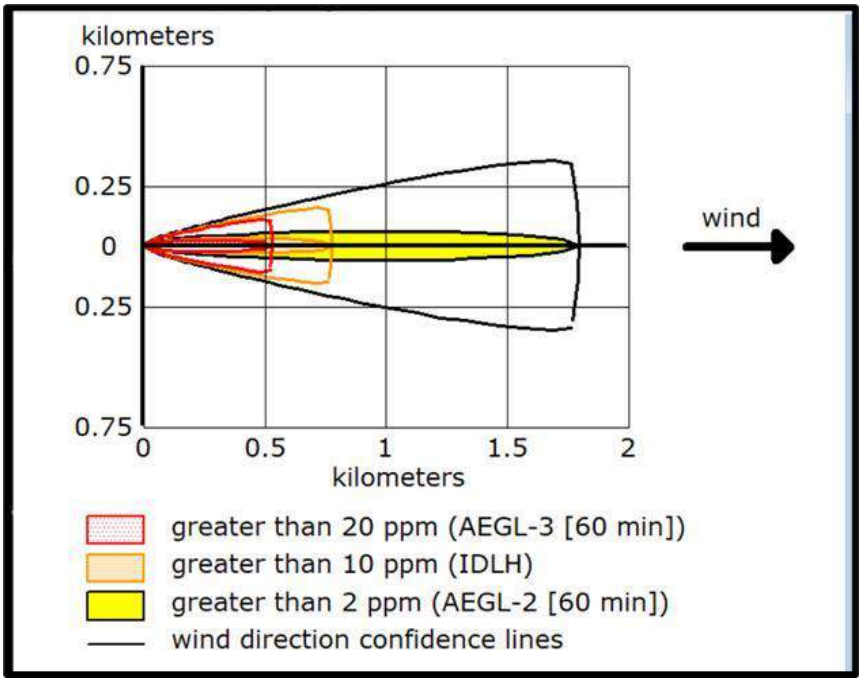


Figure 7.7 : Chlorine Cylinder Leakage; Toxic Impact Zone (Stability Class C)

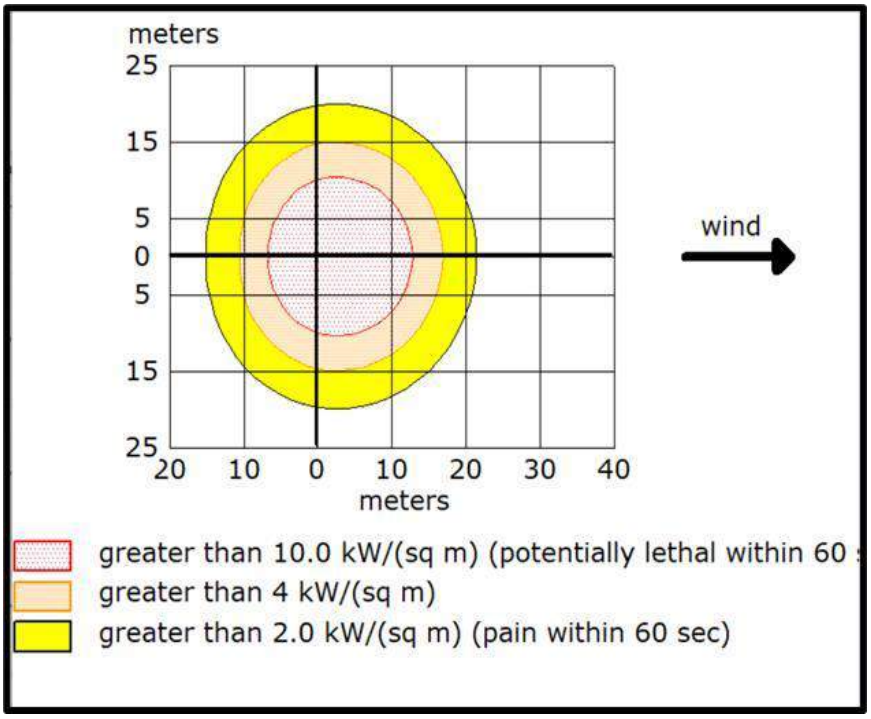


Figure 7.8 : Diesel Spillage—Burning Puddle; Thermal Impact Zone

7.11. Toxicity and Thermal Hazards

7.11.1. Toxic Hazards

Chlorine: Chlorine poses a significant toxic hazard. If not controlled, its impact can extend beyond the plant boundary depending on storage location and wind direction.

7.11.2. Thermal Hazards

Hydrogen and Fuels: Thermal hazards are primarily due to hydrogen, fuels, and other combustible materials. Thermal impacts are generally limited to within the plant boundary but can extend further due to domino effects.

7.11.3. Hazardous Scenario Chemicals

Detailed safety measures for each hazardous chemical are outlined below:

Chemical	Specific Safety Measures	Conditions	Reactivity/In-compatibility	Health Hazard	Fire Hazard	Fire-fighting
Chlorine	Strong oxidizing agent; water reactive	Ambient Boiling Point: -34.0°C	Reacts explosively with common materials	Poisonous; may be fatal if inhaled	Not flammable but may ignite other materials	Evacuate area, stay upwind, use positive pressure breathing apparatus, cool containers with water

Chemical	Specific Safety Measures	Conditions	Reactivity/In-compatibility	Health Hazard	Fire Hazard	Fire-fighting
Hydrogen	Colorless, odorless; easily ignited	Ambient Boiling Point: -252.8°C	Reacts explosively with certain metals; forms explosive mixtures with air	Highly flammable; burns with an invisible flame	Do not extinguish a leaking gas fire unless the leak can be stopped	Small fires: Dry chemical or CO_2; Large fires: Water spray or fog
Diesel	Yellow brownish liquid	Boiling Point: 215—376°C	Incompatible with oxidizers like peroxides	Causes respiratory issues, skin irritation	Fire may liberate hazardous gases	Use foam, CO_2, or dry chemical powder; cool containers with water

7.12. Conclusion

7.12.1. Summary

The risk assessment has identified key hazards, including toxic and thermal risks associated with chlorine, hydrogen, and diesel. The assessment includes recommendations for safety measures, emergency response protocols, and detailed analysis of impact zones.

7.12.2. Recommendations

- Implement recommended safety measures and procedures.
- Ensure proper training and equipment maintenance.
- Conduct regular safety audits and reviews to maintain effective risk management.

7.13. Occupational Health and Safety

7.13.1. Overview

Occupational health and safety are crucial for maintaining productivity and ensuring the wellbeing of workers in the NTPC Thermal Power Plant. Effective safety measures and health practices must be in place to manage the risks associated with handling toxic materials and hazardous chemicals.

7.13.2. Fundamental Principles

- Preventative Measures: Prevent harm by identifying hazards, assessing risks, and implementing control measures.
- Chemical Safety: Assume all chemicals are toxic and take appropriate precautions.
- Accident Preparedness: Be prepared for potential accidents by understanding emergency procedures and following SOPs during hazardous substance handling.

7.13.3. Hazard Identification and Risk Assessment

- Steps to Follow:
  1. Identify the hazards.
  2. Determine who might be harmed and how.

3. Evaluate the risks and decide on appropriate precautions.
4. Record findings and implement control measures.
5. Review and update assessments as necessary.

- Worker Training: Ensure workers are trained on:

o Chemical substance properties and hazards.
o Exposure prevention and protective measures.
o Correct use and maintenance of safety equipment.
o Safe working procedures and emergency response.

7.13.4. Risk Assessments and Safety Audits Risk Assessments:

- Conduct regular risk assessments to evaluate the potential dispersal of toxic chemicals and the impact of explosions.
- Safety Audits: Perform safety audits to ensure hazards are identified and risk control measures are effectively maintained.

7.13.5. NTPC's Safety Commitment

- Core Values: NTPC is committed to providing a safe, healthy, and hygienic work environment. The safety policy emphasizes the importance of preventing accidents and maintaining high safety standards.
- Safety Policy Principles:
  1. Identify all hazards associated with activities.
  2. Prioritize safety in all tasks, regardless of urgency.
  3. Demonstrate responsibility and accountability for safety.
  4. Apply the right procedures and actions to control risks.
  5. Ensure a trained and committed workforce for incident-free operations.
  6. Comply with safety regulations and strive to exceed minimum standards.

7.13.6. Safety Policy and Framework

- Safety Policy: The NTPC safety policy outlines the organization's commitment to safety and includes detailed procedures, manuals, and documentation developed by the safety department.
- Compliance: Adherence to safety policies and procedures is mandatory for all NTPC activities, ensuring the safety and well-being of employees and contractors.

7.13.7. Safe Operating Procedures

7.13.7.1 General Overview

Safe Operating Procedures (SOPs) are essential for ensuring the safety and efficiency of operations within the NTPC Thermal Power Plant. SOPs should be well-documented for all operational practices and equipment to mitigate risks and ensure a safe working environment.

7.13.7.2 Employee Awareness

- Training: Workers must be trained to understand the importance of following SOPs.
- Consequences: Employees should be made aware of the consequences of noncompliance with SOPs, including potential health risks, safety hazards, and legal ramifications.

7.13.7.3 Ventilation

Adequate Ventilation: Ensure that work areas are equipped with sufficient ventilation to maintain air quality and reduce exposure to harmful substances.

- Regular Assessment: Conduct regular assessments of the work environment to monitor ventilation effectiveness.
- Local Ventilation: Implement local exhaust ventilation systems to effectively control dust and gaseous emissions at the source.

7.13.7.4 Static Electricity

- Earthing and Bonding: All equipment and storage tanks containing flammable chemicals should be properly earthed and bonded to prevent static electricity buildup.
- Inspection: Regularly inspect the electrical resistance of earthing circuits. Maintain records of inspections and ensure compliance with established standards.

7.13.7.5 Instruments

- Maintenance: Regularly test and maintain instruments such as pressure and temperature transmitters, gauges, alarm switches, and safety interlocks according to the preventive maintenance schedule.
- Emergency Shutdown System: Ensure that the emergency shutdown system is tested and maintained as per the preventive maintenance schedule.

7.13.7.6 Limit Access

- Storage Limits: Restrict the quantity of hazardous materials in storage to no more than 80% of the storage capacity.
- Access Control: Limit access to hazardous materials storage areas to authorized personnel only.
- Warning Signs: Post clear warning signs in areas where hazardous materials are stored to alert workers of potential dangers.

7.13.7.7 Safety Measures for Spillage and Leakage of Toxic Chemicals

- Preventive Maintenance: Plan and execute preventive maintenance to prevent failures in flanges, pipelines, and other components of transfer lines.
- Containment: Confine any leakage or spillage to the dyke area underneath the vessel.
- Spillage Response: In case of leakage outside the dyke wall or in-plant, control the spread by creating temporary barriers with sand or other neutral, non-reactive materials. Recover and dispose of the material safely.
- Decontamination: Provide decontamination facilities, such as safety showers and eye wash stations, in the plant area. Develop and maintain Standard Operating Procedures (SOPs) for decontamination.

7.13.7.8 Spillage-Fire-Decomposition Products

Thermal Decomposition: During spillage fires, hazardous decomposition products such as carbon monoxide, hydrochloric acid, hydrogen, and carbon dioxide may be released.

- Explosive Mixtures: Vapors from solvents or chemicals may form explosive mixtures with air. Firefighters should be aware of these hazards when responding to fires.

7.13.7.9 Safety Measures for Transportation and Unloading of Hazardous Chemicals

- Standard Procedures: Implement standard procedures for the safe unloading of hazardous chemicals from road tankers.
- Static Earthing: Ensure static earthing provisions are in place during the unloading process.
- Handling Equipment: Use drum handling trolleys for the transportation of drums within the plant and from storage to processing areas.
- Fire Safety: Equip areas with fire extinguishers as required and ensure the availability of first aid boxes.
- Water Showering: Install water showering systems in flammable chemicals storage areas.
- No Smoke Zones: Clearly mark areas as “No Smoke Zones” to prevent ignition sources.

7.13.8. NTPC Safety Framework:

NTPC safety framework is a guidance document to the various functions and roles. It contains a set of expectations that ensure that all efforts are aligned with the overall policy and objectives of NTPC. The expectations are expressed broadly in the form of components –

- Safety Policy & Objective,
- Safety Risk Management,
- Safety Assurance and
- Safety Promotion.

This Framework also covers functional implementation expectations: what the different functions & roles must do to implement a robust system and provides essential guidance and how it will be accomplished. To facilitate such guidance, where required, components are divided into smaller Elements and Processes, as mentioned in Exhibit-1. These components are described as follows.

Component 1. Safety Policy and Objectives

The Policy serves as the foundation for the NTPC Safety Framework, its Components and Elements. The Business unit, functional and individual employee goals and objectives are typically aligned to those of the overall organization.

Component 2. Safety Risk Management

The objective of safety risk management is to ensure that a formal system of hazard identification is in place so that the activity or, situation posing the risk may be avoided, accepted, reduced, shared, or transferred, depending on the facts and circumstances.

Component 3. Safety Assurance

Safety assurance ensures that all projects comply with safety policy, rules, procedures, legal requirements in achieving safety targets and objectives, ensure continual improvement and effectiveness of implementation of the safety framework; through regular inspections, audits and reviews, in order to provide assurance that procedures are followed, and appropriate controls are in place. Safety Assurance also includes Contractors and Contract Control to ensure Safety Policy objectives are achieved effectively.

Figure 7.9 : Over View of Safety Framework

Component 4. Safety Promotion

The objective of safety promotion is to promote Safety as a core value with practices that facilitate & support a sound safety culture. Elements of such promotion include communication, training & promotional activities.

7.13.8.2 SAP Integrated Safety Framework

NTPC has successfully completed full-fledged SAP INTEGRATION OF SAFETY FRAMEWORK in all NTPC stations. This ensures implementation of a uniform and evidence based safety management system across all stations.

SAP Integration of Safety Framework

It triggers auto generated orders for uploading evidence of compliance (in central repository) for mandatory safety activities as per defined set of expectations for different roles and functions. It enables the executives with ease of tracking, monitoring and auditing the safety system of the plants in a seamless manner.

7.13.8.3 Safety Training for Agency Workers:

- Induction training modules and 23 Job Specific Standard Training Module are developed in English and in Hindi. The standard modules of safety trainings include Induction Training, Caught In/ Caught By, Heavy Vehicle Safety, Working at Height, Electrical Safety, Working in Confined Spaces, Struck By, Safety in Using Hand Tools, Safety in Using Power Tools, Fire Prevention, Safety in Hot Works, Safety in Work On or Near Water, Work Permit System, Use of PPE, Manual Handling, Excavation Safety, Safety in Handling Hazardous Substances, Ergonomics, General Safety and Hygiene for Office, Safety in Demolition, Slips and Trips, Safety in Material Handling, Safety in Coal Handling Plant.
- Language of Training modules are kept simple, personal and direct.
- Guidance slides for trainers and prerequisite for training are available in training modules itself.
- The identification of training needs (as per nature of work, potential exposure to hazards, working condition, personal capacity etc.) is to be done by EIC for each worker at the time of processing of gate pass. Thus, worker role competency matrix is to be prepared for all workers.
- Safety Department of the station are required to conduct training on Induction, Fire and PPE Modules mandatorily for all workers.
- Line managers (preferably trained trainers) are required to conduct training on other job specific safety training modules as identified during training need assessment.

- The progress of training in form of identified vis-a-vis trained is to be captured by EIC to keep a track and completion of all identified trainings.

7.13.8.4 Safety in Overhauling Activity:

Overhauling of power plants is an specialised activity and many agencies involving high number of agency workers perform different works simultaneously. Safety provisions mentioned in 'Maintenance Management- Unit Overhauls' and 'Electrical & Mechanical- Safety Rules Handbook' are followed during unit overhauls.

From all the agencies involved in overhauling activities, nominations of Safety Officers/ Supervisors and qualified & trained electricians are obtained from each Agency. Safety Review Meeting with Contractors & Agencies' Safety Supervisors in presence of EICs and head of O&M before start of overhaul works shall be organized. In the meeting safety measures which are to be followed during overhauling works are discussed. Detailed guideline for maintaining safety in over hauling has been prepared and followed.

7.13.8.5 Safe Practices at Work:

For safety Practices at work NTPC has developed various guidance notes and directives on several topics like Hazard Identification and Risk Assessment, Implementation of Safety Rules (Electrical and Mechanical), Job Safety Analysis and Method Statements, First Aid Control and Monitoring, Safety Objectives and Plans, Safety Monitoring, Measurement & Improvement, Safety Awareness, Communication & Promotion, System for Reporting arrangements and Investigation of Accidents, Dangerous Occurrences and Major Incidents in a Power Station, Appointment of Key Safety Roles, Emergency Response Planning, Mitigating Occupational Health Risks - Stressors, Hygiene & Facilities, Periodic Safety Assessments (Internal to Station), Written Safe Work Procedures, General Safety Competencies and Training, Compliance with legal and other requirements, System for action on investigation reports etc.
Apart from above, various communications and circulars are issued from time to time by Corporate Safety regarding safe practices. Accident enquiry recommendations are also source of information regarding safe practice of work which circulated and made readily accessible.

7.13.8.6 Safety Audits:

Audits are conducted to asses whether any deviation is existing from laid out procedure. Every year, internal safety audits are conducted by inter station team of Safety Officers and External safety audits are carried out by reputed organizations as per statutory requirement for each Project/ Station. Every TC document as mentioned above has a section on procedures to conduct audit for that particular document. This also clearly specifies documents to be verified and site samples to be taken. This process is followed for all internal audit purpose.

Apart from that, special audits are conducted from time to time to asses adherence to laid out procedures and rules. NTPC has developed a pool of NOSA certified auditors, certified lead / internal auditors as per ISO 45001 for ensuring quality audit.

All audit observations are notified in SAP ERP system and compliance recorded along with evidence of compliance. Station safety department is required to monitor the progress of the closure of such notifications and present the status of the notifications to station management during review and other forums.

7.13.8.7 Incident Investigation:

There is a formal process for investigation of all accidents to examine each case in detail and in depth to find out the causes of accidents, the extent of losses caused, the circumstances / individuals responsible and to obtain considered recommendations for prevention of recurrences in similar or related nature of accidents.
There are specific guidelines and systems for handling the investigation report so that all recommendations of such investigations are taken up to a logical end and implemented. For all accident enquiry recommendations, action plan is prepared for compliance.

7.13.8.8 Safety' has unique features:

a) If no accident has happened so far probability of incident/accident occurring increases.

b) 'No accident' / good safety record develops complacency inertia/over confidence in the team. This attitude gives rise to gaps/soft spots in the system giving chances to incidents/accidents.

Safety requires novelty. Routine training practices get stale with no positive results. Look for novel scheme of training/ safety practices to build up fresh impetus in safety. Involvement of employees with refreshed outlook for safety is to be achieved.

7.14. Disaster Management Plan

MUNPL currently does not store hazardous chemicals in quantities exceeding the threshold limits as specified under the MSIHC Rules. However, MUNPL has an onsite Disaster Management Plan (DMP) that has been submitted to the State Pollution Control Board and other relevant state authorities for approval. Additionally, MUNPL has established "Mutual Aid agreements" with nearby industries to ensure cooperation in disaster response efforts. The existing DMP will be reviewed and revised to incorporate potential hazards associated with the proposed expansion project. Below are the key features and capabilities of the DMP:

7.14.1. Capabilities of DMP

The DMP is designed to handle a wide range of emergencies, including but not limited to:

7.14.1.1 *Hazardous Materials:*

The plan covers potential incidents involving hazardous chemicals such as chlorine, hydrogen, and light diesel oil (LDO). This includes toxic leaks, fires, gas releases, and major spills.

7.14.1.2 *Fire Management:*

The DMP outlines strategies for combating small and large fires, whether they originate from chemical storage areas or process streams. It also includes evacuation procedures to ensure the safety of personnel.

7.14.1.3 *Medical Response:*

The DMP ensures the availability of emergency medical aid for those affected by toxic exposures, heat radiation, or explosion shockwaves.

7.14.1.4 *Rapid Response:*

The plan emphasizes a swift response to developing emergencies to prevent incidents from escalating into major disasters.

7.14.2. Disaster Control Philosophy

The core strategy of the DMP is the **prevention** of major hazards through comprehensive hazard identification and risk assessment techniques, such as Hazard and Operability Studies (HAZOP) and accident consequence analysis. The following principles guide the disaster control strategy

7.14.2.1 *Total Quality Assurance:*

This objective applies to all stages of technology selection, project engineering, construction, commissioning, and operation.

7.14.2.2 *Preventive Measures:*

Emphasis is placed on preventing loss of containment, which could lead to catastrophic events.

7.14.2.3 *Continuous Improvement:*

Regular review and improvement of the DMP ensure that it remains effective and up-to-date with the latest safety standards.

7.14.3. Structure of the DMP

The DMP is organized into two main components:

7.14.3.1 *On-site Emergency Plan:*

This plan addresses emergencies that occur within the plant premises, including procedures for evacuation, fire-fighting, and containment of hazardous materials.

7.14.3.2 *Off-site Emergency Plan:*

This plan, developed in coordination with district authorities, outlines the response to emergencies that could impact the surrounding communities.

7.14.4. Additional Considerations for the Proposed Expansion

With the proposed expansion, the DMP will be reviewed to consider new hazards introduced by the increased scale of operations. The review will include:

7.14.4.1 *Updated Hazard Assessments:*

Identifying any new risks associated with additional hazardous materials or changes in process operations.

7.14.4.2 *Enhanced Safety Measures:*

Implementing additional safety systems and emergency procedures to mitigate these new risks.

7.14.4.3 *Community Awareness:*

Strengthening communication and coordination with local authorities and nearby communities to ensure they are aware of the updated emergency response procedures.

7.14.5. DMP implementation

7.14.5.1 *Emergency Identification and Analysis:*

The DMP identifies potential hazards, including chemical leaks, fires, explosions, and natural disasters like earthquakes and floods. Hazard analysis includes the identification of undesired events, their mechanisms, and the likelihood and severity of their impacts.

7.14.5.2 *On-Site and Off-Site Emergency Plans*

The on-site emergency plan addresses incidents that occur within the plant premises and focuses on immediate containment and response to protect workers and minimize damage. The off-site emergency plan, developed in coordination with district authorities, manages the broader impact of incidents that extend beyond the plant.

7.14.5.3 *Emergency Control Structures:*

The DMP outlines the roles of key personnel, including the Chief Incident Controller (CIC), Works Incident Controller (WIC), and Incident Controller (IC). These individuals are responsible for initiating and managing the emergency response.

7.14.5.4 *Communication and Coordination:*

Effective communication is critical in the DMP, with detailed procedures for internal and external communication during emergencies. The plan includes a communication network to alert emergency authorities, neighboring industries, and the public in the event of an off-site emergency.

7.14.5.5 *Emergency Response Teams:*

The DMP establishes various response teams, such as the Task Force, Maintenance Team, Fire Fighting Team, and Medical Team, each with specific responsibilities during an emergency. These teams are trained and equipped to handle different types of incidents.

7.14.5.6 *Mock Drills and Continuous Improvement:*

Regular mock drills are conducted to test the effectiveness of the DMP and ensure that all personnel are familiar with their roles during an emergency. The plan is periodically reviewed and updated based on the outcomes of these drills and any new hazards identified.

7.14.5.7 *Safety and Risk Management:*

The plan includes detailed safety policies and procedures, emphasizing the prevention of accidents through hazard identification, risk analysis, and strict adherence to safety standards. It also outlines the responsibilities of top management and departments in maintaining safety and implementing the DMP.

7.14.6. *Recommendations of DMP Regular Updates and Reviews:*

Continuously update the DMP to reflect new hazards introduced by changes in the plant's operations, technological advancements, and feedback from mock drills.

7.14.6.1 *Enhanced Training Programs:*

Expand and enhance training programs for all personnel, especially focusing on new hazards and emergency response techniques. Include scenario-based training to improve decision making under pressure.

7.14.6.2 *Strengthen Off-Site Coordination:*

Improve coordination with local authorities and nearby communities to ensure a seamless response during off-site emergencies. Regular joint drills with external agencies should be conducted to test the coordination and response capabilities.

7.14.6.3 *Public Awareness and Communication:*

Increase public awareness regarding the potential risks associated with the plant and the actions they should take during an off-site emergency. This includes clear communication channels for disseminating information quickly during an incident.

7.14.6.4 *Advanced Safety Systems:*

Invest in advanced safety and monitoring systems to detect and mitigate potential hazards before they escalate into major incidents. This could include automated shutdown systems, improved fire suppression systems, and enhanced chemical leak detection technologies.

7.15. Management Facilities to mitigate the Risk & Disaster at NTPC Meja

7.15.1. Medical Facilities and Health Infrastructure at Meja TPS

The existing Meja Thermal Power Station has already full-fledged hospital (Aarogyam Hospital) to cater the health needs of employees of NTPC, CISF, PAPs and other nearby villages and the same will be extended after the proposed expansion also.

Aarogyam hospital has been serving employees and neighboring community since last 06 years. It is a 30 bedded hospital that provides 24-hour emergency services with regular doctors, administrative staff and regular Para medical staff.

Aarogyam hospital of MUNPL is a full-fledged 30 bedded hospital with an adequate number of qualified medical staff which is serving MUNPL employees & their dependents, Contract workers, School and surrounding PAP affected villages. It also acts as an occupational primary health care center where contract workers also avail services. Hospital provides Emergency services, trauma management, first aid facilities, lifesaving medicines and ambulance to meet any emergency. A 24 x 7 first aid centre is also run by hospital at plant premises catering to employees & contract workers for immediate medical support. More than 25,000 people from surrounding villages have benefitted from doctor's consultation in hospital OPD, and more than 800 people have been treated in emergency since 2018 till date. Annual medical check-up had been conducted for more than 20,000 contract workers till date.

Annual medical check-up of all the employees is done at periodic intervals through empaneled hospitals. Medical checkup of contract workers is done at the hospital. Health records are maintained in HMS for each employee while for contract workers, they are uploaded in CLIMS. Regular health check-up is carried out as and when required at the hospital. Precautionary measures are taken to avoid any occupational health hazards.

Aarogyam hospital has an in-house laboratory which has performed lab tests for more than 21,000 contract workers from 2021 till date. It also has an in-house imaging section where more than 19,571 non-entitled beneficiaries have been screened.

7.15.2. Support during Pandemic

During Covid pandemic, Aarogyam Hospital had worked in co-ordination with nearby Government & District hospital to provide its best services to the needy. More than 15000 people were tested for COVID illness and, more than 5000 COVID vaccinations were done.

The work environment is monitored for occupational accidents, diseases and dangerous occurrences. Near miss events are timely recorded. The following aspects are adopted to ensure good health conditions of employees.

- Pre-employment check-up.
- Awareness programs
- Routine check-up; and
- Periodic vaccination program etc.
- Camps for health promotion

7.15.3. Occupational Health Monitoring for Workers

Engagement of contractual workers is done only after a proper induction health check-up and fitness certificate is by approved a medical practitioner.

Periodic Medical Examination (PME), as required under the Factories Act, is undertaken. However, the investigations performed under the PME are in relevance to the job exposures as communicated by EIC's while sharing the details. Since coal/ash handling workers are prone to dust exposure-related diseases, pulmonary function test is done. Similarly, an audiometry test is done during induction and in annual health checkups, especially in hazard-identified areas. In case of need, the frequency of PME is scheduled, based on observation of the health check-up information. Providing PPE and re-locating of jobs for those workers is also considered.

7.15.4. Health camps

Every year health camps are being conducted targeting both MUNPL residents and surrounding villages in line with government programs. A total of 23 camps were organized in year 20232024 where approx. 3500 beneficiaries could avail of the services. Similarly, in the year 2024 till date, 11 camps have been conducted covering more than 1100 people. Ayush camps and blood donation camps have also been conducted by the hospital.

Aarogyam Hospital has always been a frontier in various NTPC/Government practices. In 2023, more than 500 people including employees & contract workers were provided First Aid and CPR

training by certified trainers to handle emergencies until emergency help arrives. More than 100 people were benefitted from the BMD camp organized at hospital and, more than 50 people could avail services during the Eye camp. Every year more than 300 school children have benefitted from school health camps conducted by Aarogyam hospital.

7.15.5. Medical support during GEM workshop

Many educational lectures on healthy food habits, good touch & bad touch, Menstrual hygiene were conducted for the girls enrolled in the GEM workshop. An anemia detection camp was also organised for those girls, followed by deworming and Iron supplementation to all of them as a part of Anemia eradication camp.

Under the spectrum of Anemia Mukt Bharat, Anemia camp was also organised in rural schools where approx. 100 children were identified and treated. The girls were also educated regarding dietary nutrition & personal hygiene. An awareness session was also conducted for the children and teachers emphasizing the importance of healthy food habits and intake of iron-rich foods for overall well-being.

7.15.6. Menstrual hygiene awareness & Sanitary napkin distribution

Mass health awareness programs were conducted for more than 300 village girls highlighting menstrual hygiene and safe practices to avoid infections. Sanitary napkins were also distributed to the girls.

Promoting the vision of government India “TB Harega Tabhi Desh Jeetega” more than 500 TB patients were supplied with nutritional food packets along with CSR Dept. Our hospital has also been a center for running DMC in association with UP state government.

Aarogyam Hospital, MUNPL was the first to conduct HPV vaccination camp among NTPC hospitals where MUNPL girls within age group of 09 – 25 years were vaccinated.

7.15.7. Food handlers fitness

An enteric infection detection camp was organised for food handlers at Aarogyam Hospital, where more than 50 ICH staff were tested for typhoid & anemia. Deworming was done for all of them and were taught about healthy & hygienic practices to follow during food preparation.

7.15.8. Propagation of AYUSH program

AYUSH camps such as Ayurvedic and homeopathic camps were also conducted in nearby villages where implementation of ayurveda in daily life was emphasized.

7.15.9. Awareness Programs & Training

Intending to spread awareness as the basic precaution against various ailments, Aarogyam hospital has been actively conducting awareness sessions for both MUNPL beneficiaries and nearby PAP beneficiaries.

7.15.10. Breast cancer awareness programs

More than 500 females were educated on breast cancer and were taught self-examination techniques to guide them in early detection of breast lump and in receiving proper care.

7.15.11. Cervical cancer prevention & HPV Vaccination program

More than 500 people were informed about precautionary HPV vaccination and its importance in preventing cervical and anal cancers in human population. Similarly, several awareness sessions such as AIDs prevention & precautions, Tobacco cessation, Safe food handling practices awareness have been conducted for ICH staff, MUNPL residents & CISF personals, plant workers etc.

7.15.12. Healthy Life-style promotion

Walk for health was done during Swachta Pakhwada, World Health Day etc. A public health talk over preventive cardiac health was taken by a renowned cardiologist from Fortis Hospital, New Delhi for more than 1000 people for following healthy lifestyle modifications.

7.15.13. Mental Health Awareness Program

Online webinar and offline sessions on mental health awareness had been conducted for more than 2000 people including NTPC employees & their dependents, CISF, AMS & contract workers. The online webinar was taken by hospital CMO, at pan NTPC level emphasizing work-life balance.

7.15.14. Endemic Diseases in the Area

Most communicable diseases found to be prevalent in surrounding villages are Enteric fever, Malaria, Dengue, chikungunya, Pneumonia, Measles, Tuberculosis etc. while Hypertension, Diabetes, Anemia are common non-communicable diseases. CSR village health camps and eye camps are organized annually to cater to the needs of the surrounding population. Aarogyam hospital in association with District hospital has established a DMC to identify tuberculosis patients from the surrounding villages. Project affected persons of existing plant have been receiving medical facilities at discounted rates or at free of cost depending on the services obtained.

Action Plan to Mitigate the Endemic Diseases

- Conducting regular awareness camps in the hospital and in nearby villages for the surrounding population.
- Conducting regular health camps in the hospital and in nearby villages for the surrounding population.
- Admission, investigations, treatment and follow up of non-entitled patients reporting at emergency needing treatment in Aarogyam hospital.
- DMC at the hospital catering to tuberculosis patients in surrounding areas free of cost.
- Awareness sessions in surrounding schools regarding personal hygiene and protection & precautions against infectious diseases.
- Periodic awareness programs regarding health and safety with active involvement of the workers are organized, covering everyone with a minimum annual average duration of 8 hours per worker.

- Regular community level awareness programs may be organized in the vicinity of the plant for the family members of the workers.
- First-aid training will be imparted to workers on a regular basis to provide immediate relief to accident victims.
- Detailed Onsite and Offsite DMP is enclosed as **Annexure-20.**

7.15.15. Health and Safety Monitoring Plan

Regular health checkups/ occupational health checkups are done for employees and contract labor in existing NTPC hospital. Regular medical checkups of contract work force is carried out to access the healthy work environment and detection of earliest change in their health. The patients with abnormal findings are tracked and called for regular follow-ups and counselling.
The health of all employees engaged in proposed Stage-II shall be monitored once in a year for early detection of any ailment due to exposure to heat and noise.

7.16. Watershed Study and Action Plan

7.16.1. *Watershed Study*

The watershed is the area of land that drains or sheds water into a specific receiving waterbody, such as a lake or a river. As rainwater or melted snow runs downhill in the watershed, it collects and transports sediment and other materials and deposits them into the receiving waterbody. Watershed management planning is a process that results in a plan or a blueprint of how to best protect and improve the water quality and other natural resources in a watershed. Runoff from rainwater can contribute significant amounts of pollution into the waterbodies of the study area. Pond rejuvenation and management involve several steps to restore and maintain the health of a pond, ensuring it supports aquatic life, maintains water quality, and provides aesthetic and environmental benefits. As apart of development of watershed, MUNPL has rejuvenated ponds in village-Salaiya Kala and Mai Khurd (Rs.8 Lakh/pond), constructed well and check dams in Esauta, Patai Dandi, Jhariyahi and Kohdar villages (Rs.55 Lakh).

Development of watershed by MUNPL

A detailed Watershed Study is conducted by MUNPL through National Institute of Hydrology, Ministry of Jal Shakti, Department of Water Resources River Development & Ganga Rejuvenation-Govt. of India, Roorkee. Detailed Watershed Study Report is attached as **Annexure-6.**

The proposed action plan to be followed in the next five years which may be updated following the updated land cover, land availability, other local conditions and consultation with district administration / other stake holders.

Table 7.8 : Watershed Development Action Plan for Next Five Years

Year	Watershed development types	Clusters/S. No.	Approx. Area
2025-2026	Plantation	Cluster 01	20-50 Hectres
	Pond Development	Pond No. 01	
	Soil & Water conservation through trenches	Cluster 01, 02, 03	
2026-2027	Plantation	Cluster 01, 02, 03	30-50 Hectres
	Pond Development	Pond No. 02	
	Soil & Water conservation through trenches	Cluster 04, 05, 06	
2027-2028	Plantation	Cluster 01, 04, 05	30-40 Hectres
	Pond Development	Pond No. 03	
	Soil & Water conservation through trenches	Cluster 07, 08, 09	
2028-2029	Plantation	Cluster 06, 07	30-40 Hectres
	Pond Development	Pond No. 04	
	Soil & Water conservation through trenches	Cluster 10, 11, 12	
2029-2030	Plantation	Cluster 08, 09	30-40 Hectres
	Pond Development	Pond No. 05	
	Soil & Water conservation through trenches	Cluster 13, 14	

7.16.2. *Watershed Development (WSD) Budget:*

WSD aims to ensure the sustainable restoration and upkeep of the ponds, covering activities such as desilting, water quality improvement, vegetation management, and community engagement initiatives. Phase wise for plantation as per the updated land cover, land availability, other local

conditions and consultation with district administration / other stake holders. It also presents a significant opportunity for restoration and reforestation efforts to enhance the overall health and sustainability of the watershed.

1. Cost for pond development / rejivenuation is Rs. 20 Lakh per pond. Tentative budget for developing 5 ponds is Rs. 100 Lakh.
2. The estimated cost for development of planatation as per DFO-Prayagraj in the study area covering an area of 401.5Ha is 38.72 Crores.

Chapter 8. PROJECT BENEFITS

Proposed project will need to offer statewide social, environmental, and economic benefits that are greater than the capital and operating costs of its implementation.

The proposed expansion of Meja Thermal Power Plant project will cause various short/ long term and primary/ secondary impacts on the environment of study Area. Any activity aimed at development will have repercussions on the environment, both positive and negative. Environmental Impact Assessment study is a management tool, which enables the proponent to identify the negative impacts and to mitigate the negative impacts through appropriate Environmental Management Plan.

Hence Meja Urja Nigam Pvt. Ltd (MUNPL) as a part of the compliance to the regulatory requirement i.e. to obtain Environment Clearance from MoEF &CC, has appointed a consultant to carry out the "Environmental Impact Assessment (EIA) Study for the Proposed Expansion of Coal Based Thermal Power Plant**.** There are however, mitigation measures and EMP proposed, non-conformance to which will lead to much higher costs in terms of social and environmental concerns than the cost of the proposed mitigation measures. In addition to that, overall infrastructure development due to this project and the facilities which will come up after commissioning of the project will substantially support the development of the whole area.

This section describes the direct and indirect benefits that the proposed power plant is expected to have at the local, regional and even national levels. It is anticipated that the proposed expansion of power plant will provide benefits for the locals in two phases i.e. during construction phase as well as during operational stage.

The project benefits due to the proposed project on the infrastructure in general and on the socio-economic status are described in the following sections:

8.1. Benefits to the Country

The proposed project would have the following operational advantages:

- The proposed expansion project would enable to meet part of the growing power demand in the state of Uttar Pradesh as well as in India for irrigation, domestic and commercial purposes.
- Further, the proposed expansion (3 x 800 MW) will result in improvement of infrastructure as well as upliftment of social structure in the area.
- Land is already acquired for the project except for acquisition of 114Ha.
- Increase in revenue in terms of taxes at local, state, and national level.
- Opportunity to create direct and indirect employment to several other hundreds more through multiplier effect in terms of downstream socio-economic benefits and consequent improvement in the living conditions of local population in the study area and in region.
- Increased investment on CER; etc

8.2. Revenue to Govt.

The project will contribute to the financial kitty of State Government by means of several direct and indirect taxes. The produced electricity will be provided to meet the need of growing electricity

demand of the state thus bringing financial benefits to the state. However, the power generated from this plant will benefit the Uttar Pradesh State and other states of northern region leading to agricultural and industrial development and also to the country.

8.3. Job Opportunity:

The proposed expansion power plant will require skilled, semi-skilled and unskilled personal during construction and operational phase. Many of the people from neighbouring villages, as found suitable will get opportunity for indirect employment through contractors during construction and operational phase. The total manpower from various agencies during construction of Stage-II would be about 5046 (60 permanent and 4986 temporary) during peak deployment and during operation period is estimated to be about 5250 (210 permanent and 5040 temporary). However, the exact numbers may vary during construction and operation phases.

Employment generation

Sl. No.	Phase	Existing		Proposed	
		Permanent	Temporary	Permanent	Temporary (Peak time)
1	Construction	--	--	60	4986
2	Operation	229	1603	210	5040

8.4 Improvement in livelihood of local people and local infrastructure:

Community development activities are very important aspects for any big organization because people of the villages surrounding the plant are the indirect stakeholders. Marginal positive impact on socio-economic environment is foreseen due to direct and indirect employment, opportunity of business and social welfare taken up by the company. The mostly rural population may see development of educational, medical and infrastructural facilities.

Meja Urja Nigam Pvt. Ltd. (MUNPL) will join hands with village panchayat, district administration, government agencies as well as non-profit & non-governmental organizations to undertake various social development programmes under the banner of Corporate Social &Environment Responsibility (CSER).

8.5 Better Road infra structure and Transportation facilities

MUNPL. has laid roads around the project area and all surrounding villages are availing better and faster connectivity between them. Road infrastructures are strengthened wherever required which facilitates smooth movement of villagers.

8.6 Improved Power Supply

Commissioning of proposed plant, Stage-II (3x800 MW) will improve the power supply position which is vital for economic growth as well as improving the quality of life. The improved power supply will reduce the dependence of general public and commercial establishments on DG sets thereby reducing the noise pollution as well as air pollution at local levels.

8.7 CER Activities/ Community Development Activities

As per the OM F. No. 22-65/2017-IA.III dated 30th September, 2020 on Corporate Environment Responsibility (CER) and subsequent amendments by Ministry of Environment, Forest and

Climate Change Impact Assessment Division have stated that the Expert Appraisal Committee or State Level Expert Appraisal Committee shall deliberate on the commitments made by the project proponent to address the concerns raised during the public consultation and prescribe specific condition(s) in physical terms while recommending the proposal, for grant of prior environment clearance instead of allocation of funds under CER. Public hearing of the project held on 24.06.2024. MUNPL has proposed a budget of Rs. 34.55 Cr for Community Development (CD) under CER. CER plan has been prepared as per the need identified during the public hearing which is detailed and presented in Section 7.1 of Chapter7.

Chapter 9. ENVIRONMENT COST BENEFIT ANALYSIS

This chapter defines the benefits on Environment due to the proposed project.

9.1. Environmental Cost-Benefit Analysis

Environmental cost-benefit analysis, or CBA, refers to the economic appraisal of policies and projects that have the deliberate aim of improving the provision of environmental services or actions that might affect (sometimes adversely) the environment as an indirect consequence.

Cost-Benefit Analysis (CBA) originated in the area of research called welfare economics. It helps to answer questions about the benefit of one outcome over another, from a societal standpoint. Welfare economics uses criterion from the Utilitarian philosophy of the eighteenth century. These researchers tried to "compare outcomes on the basis of what gives the greatest benefit to the greatest number of people. Benefit here means utility: thus, welfare economics looks at ways of comparing outcomes in terms of their contribution to the utility of the population as a whole" (Hanley, 69). The environmental costs and benefits of a developmental project is most clearly understood when represented in qualitative and quantitative terms (monetary units), and then balanced against each another.

9.2. Stages of Cost-Benefit Analysis

- Defining the Project
- Identifying Impacts of the Project
- Valuing Impacts
- Valuing Benefits
- Cost Benefit analysis ratio
- Inference

The existing Meja Urja Nigam Nigam Power Station has an installed capacity of 2x660 MW. Both the units of Stage-I are under commercial operation.

The proposed expansion project of 3x800MW under Stage- II by Meja Urja Nigam Private Ltd. will enable to meet part of the growing power demand in the state of Uttar Pradesh as well as in India due to rapid industrialization and also due to large scale use of electricity for irrigation, domestic and commercial purposes. Further, the proposed expansion of power plant will result in improvement of infrastructure as well social up-liftment in the area. The setting up of the proposed project will lead to direct and indirect benefits to the overall socio-economic status of the region. It is anticipated that the proposed expansion of power plant will provide benefits to the locals in two phases i.e. during construction phase as well as during operational stage.

9.3. Identifying Impacts of the Project

The impacts of construction and operational phases of the proposed expansion project comprise various activities each of which may have an impact on some or other environmental parameters. Various impacts during the construction and operation phase on the environment have been studied to estimate the impacts on the environmental attributes and are discussed in the subsequent sections. Impacts of the project activates are given in **Table: 9.1.**

Table 9.1 : Impacts of the Proposed Stage – II project during construction & operation phase

S. No	Sector	Probable Impact
1.	Air Environment	➢ Fugitive dust and Stack emissions (PM, SO_2 and NO_x).
2.	Water Environment	➢ Effluent generation from project site
3.	Noise Environment	➢ Generation of noise due to construction and operational activities of plant.
4.	Solid Waste Environment	➢ Generation of Solid waste from plant, labour colony and township.
5.	Ecology & Biodiversity Environment	➢ Tree cutiing ➢ Fragmentation of habitat ➢ Light Pollution
6.	Socio-economic Environment	➢ Resettlement of people due to proposed expansion project. ➢ Impact on people due water, noise and air pollution. ➢ traffic impacts.
7.	Land Environment	➢ Change in land use pattern and land degradation

9.4. Evaluation of Impacts

There is no approved methodology for Cost Benefit Analysis of thermal power projects. However, the same has been undertaken based on the parameters identified under the following two documents:

(a) The Methodology for Cost Benefit Analysis for Projects involving Forest Diversion as per Consolidated Guideline & Clarification issued under Van (Sanrakshan evam Samvardhan) Adhiniyam, 1980 and Van (Sanrakshan evam Samvardhan) Rule 2023. Although the project does not involve any forest land, the parameters specified in the analysis, as applicable have been considered.

(b) MoEF&CC OM dated 05.03.2020 on Draft Guidelines for Environmental Damage assessment Cost- Although the project does not involve any violation or damage, the parameters for emission & discharge have been considered as per Draft Guidelines.

Evaluation of the impact during construction and operation is showing in **Table 9.2.**

Table 9.2 : Evaluation of the impact during construction & operation phase of MUNPL Stage – II (3x800 MW)

S.No	Parameters	Remarks	Monetary Equivalent
1	Ecosystem services losses due to proposed forest diversion.	Economic value of loss of ecosystem service due to forest diversion of forest shall be the net-present value (NVP) of the forest land being diverted as prescribed by the Central Government (MoEF&CC) Note: In case of National parks the NVP shall be ten (10) times the normal NVP and in case of wildlife Sanctuary the NPV shall be five (5) times of normal NPV or otherwise prescribed by the ministry or any other competent authority.	Nil As forest land is not involved and the land is already in industrial use.
2	Loss of animal husbandry Productivity including loss of fodder	To be quantified and expressed in monetary terms or 10% of NVP applicable whichever is maximum.	Nil
3	Cost of human resettlement/ rehabilitation	To be quantified and expressed in monetary terms as per approved R&R Plan.	**Rs.36.24 Cr** Human resettlement is not required, only R&R is envisaged.
4	Loss of public facilities and administrative infrastructure (Roads, building, schools, dispensaries, electric lines, railway etc.) on forest land. Which would require forest land if these facilities were diverted due to the project.	To be quantified and expressed in monetary terms on actual cost basis at the time of diversion.	Nil Human resettlement is not required since the land is already in possession and in Industrial use.
5	Possession value of forest land diverted	10% of environment costs (NPV) due to loss of forests or circle rate of adjoining area in the district should be added as a cost component as possession value of forest land whichever is maximum.	Nil
6	Cost of suffering to outees	The social cost of rehabilitation of outsees (in addition to the cost likely to be incurred in providing residence, occupation and social services as per R&R Plan) be worked out as 1.5 times of what oustees should have earned in	Nil

<table>
<tr><th>S.No</th><th>Parameters</th><th>Remarks</th><th>Monetary Equivalent</th></tr>
<tr><td></td><td></td><td>two years had he not been shifted.</td><td></td></tr>
<tr><td>7</td><td>Habitat Fragmentation Cost</td><td>While the relationship fragmentation and forest goods and services is complex for the sake of simplicity the cost due to fragmentation has been pegged at 50% NVP applicable as a thumb rule.</td><td>Nil</td></tr>
<tr><td>8</td><td>Compensatory afforestation and soil & moisture conservation cost.</td><td>The actual cost of compensatory afforestation and soil moisture conservation and its maintenances in future at present discounted value.</td><td>Nil</td></tr>
<tr><td>9</td><td>Cost of air emissions</td><td>Impact Cost; per kg of emission;
PM– Rs. 340/Kg Emission
SO_2 – Rs. 165/Kg Emission
NOx – Rs. 96/Kg Emission
(Source: As per MoEF&CC OM. No. 19-125/2019-IA.III dated 05.03.2020.
Although above parameters are mentioned for emission beyond the limits, the same rate has been considered for emission above the present levels.
Total Emission/ Year based on Air Quality Modeling considering 24 hrs. operation for 330 days for all units of Stage:II with FGD for 25 yrs of design life of plant
<table>
<tr><th>Pollutant</th><th>Emission rate (gm/sec)</th><th>Total emission/ year (Kg)</th><th>Impact cost in Rs (Lakh)/yr</th></tr>
<tr><td>PM</td><td>77.94</td><td>2222225.28</td><td>7555.57</td></tr>
<tr><td>SO_2</td><td>259.8</td><td>7407417.6</td><td>12222</td></tr>
<tr><td>NOx</td><td>259.8</td><td>7407417.6</td><td>7111</td></tr>
</table></td><td>Rs.6722.25 Cr</td></tr>
<tr><td>10</td><td>Water Environment</td><td>ZLD based ETP & STP shall be installed at project site, hence no impact on water environment envisaged.</td><td>Nil (Cost included at Environment Management Plan)</td></tr>
<tr><td>11</td><td>Noise Environment</td><td>Proper Equipment’s design, and PPE kit will be provided, no major impact envisages.</td><td>Nil</td></tr>
<tr><td>12</td><td>Solid Waste Environment</td><td>MUNPL has a facility for management and disposal of solid waste, no adverse impact due to solid waste is envisaged.</td><td>Nil</td></tr>
<tr><td>13</td><td>Cost of EMP</td><td>Environment Management Plan includes all the Pollution control equipment’s, Wildlife conservation plan, Rain water Harvesting, CER and Green Belt development cost</td><td>Rs 2959.22 Cr</td></tr>
</table>

S.No	Parameters	Remarks	Monetary Equivalent
		Recurring cost of EMP (Rs. 58.45 Cr per year) for 25 yrs of design life of plant	Rs. 1461.25 Cr
15	Capital Investment	Total Project Cost	Rs. 25081.88 Cr
	Total Cost or Investment Amount		**Rs. 36224.6 Cr**

Total estimated cost as per Table: 9.2 = **Rs. 36224.6 Cr**

9.5. Evaluation of Benefits

Commissioning of proposed Meja Urja Nigam Pvt Ltd. Stage-II (3x800 MW) will improve the power supply position in states of India, which is vital for economic growth as well as improving the quality of life. The improved power supply will reduce the dependence of general public and commercial establishments on DG sets thereby reducing noise pollution as well as air pollution at local levels.

Under Corporate Social Responsibility, various activities will be started like welfare for poor/physically challenged persons. Capacity-building programs, sports events, assistance to government schools, and scholarships will be done. The major benefit due to the proposed expansion project will be in the sphere of generating temporary employment for a substantial number of personnel during construction and operation phase.

Community Development activities like education, health, water, sanitation, etc. will be carried out at project-affected nearby villages as per company policy in the areas. In addition, Meja Urja Nigam Private Ltd. shall develop necessary infrastructures like water supply, sewerage, medical facility, etc. Evaluation of benefits from the proposed Stage – II project is given in **Table 9.3.**

Table 9.3 : Evaluation of Benefits from the project

S. No	Parameters	Remarks	Monetary Equivalent
1	Increase in Productivity attribute to the specific project	To be quantified & expressed in monetary terms avoiding double counting	**Rs. 36241.05 Cr** (Profit after Tax over the design life of 25 yrs.)
2	Benefits to economy due to the specific project	The incremental economic benefit in monetary terms due the activities attributed to the specific project.	**Rs.53141 Cr** (Tota cash flow during construction and operation of the project)
3	No. of Population benefited due to specific project	As per the Detailed project report.	Based on average electrical consumption of 1331units/capita/year, Total 134.41 Lakh population shall be benefitted. It will help to improve socio- economic development of the area.

S. No	Parameters	Remarks	Monetary Equivalent
4	Economic benefits due to of direct and indirect employment due to the project	As per the Detail project report	**a) During construction (5 yrs)** No of temp. employment: 4986 nos. Man-days in 05 yrs=9099450 Considering Rs.600/man-day =9099450*600= **Rs 545.967 Cr** No of permanent employment=60 Mandys in 05 yrs=109500 Considering Rs.5000/per employee /day = **Rs.54.75 Cr** b) **During operation phase**: No of temporary employment=5040 Man-days in 25yrs=45990000 Considering Rs.800/manday =45990000*800= **Rs 3679.20 Cr** No of permanent employee 210 Considering average value @Rs.6000 per employee/day = 210*25*365*6000 = **Rs.1149.75 Cr** Considering 05 yrs for construction period and 25 yr of plant life, the direct employment potential of the project proposal = Rs.546Cr + 54.75Cr + 3679.20Cr + Rs.1149.75Cr = **Rs.5429.6 Cr**
5	Economic Benefits due to Compensatory afforestation/ Afforestation	Benefits from such compensatory forestation accruing over next 50 years monetized and discounted to the present value should be included as benefits of compensatory. Afforestation * For benefits of CA the guideline of the ministry for NVP estimation may be consulted.	Considering an MPV of ₹8.04 lakh per Ha, the total benefit of afforestation program on 271.5 Ha of degraded forest + 303 Ha inside Plant land under Stage-II is calculated as rupees 8.04 lakh x 574 Ha = **Rs.46.189 Cr**

9.6. Cost Benefit Analysis Ratio

The cost benefit analysis ratio based on above calculations is as under: **Rs.94857.84 Cr**

- Impact Evaluation: Rs. 36224.6 Crores
- Benefits Evaluation: Rs 94857.84 Crores

Environmental Cost Benefit Analysis ratio = Value of Impact: Value of Benefits
Environmental Cost Benefit Analysis ratio = 1:2.618
Hence, the project benefits are 2.618 times higher than the impacts evaluated.

9.7. Inference

The cost benefit analysis for the proposed Meja TPP Stage–II (3x800 MW) indicates in favour of the project. The financial expenditure incurred in preventing, containing, mitigation or removing environmental contaminations occurring as a result of the proposed project activity will further add to the environmental benefit.

Chapter 10. ENVIRONMENT MANAGEMENT PLAN

This chapter provides mitigation and control measures to attenuate or eliminate environmental impacts, which are likely to be caused by the proposed project. An Environmental Management Plant (EMP) has been developed to mitigate the potential adverse impacts and to strengthen the beneficial environmental impacts during the construction and operation phases. In addition to that during the operation phase, the industry will have an additional responsibility to comply with the statutory requirements as per the guidelines of Central/ State Government.

10.1. Introduction

The Environmental Management Plan (EMP) is synthesis of all proposed mitigation and monitoring actions, set to a time frame with specific responsibility assigned and defined follow-up actions. EMP is a plan of actions for avoidance, mitigation and management of the impacts associated with construction and operation stages of the project. The EMP need to be integrated in overall project planning process covering all phases of project cycles i.e, location, design, construction and operation. Management by provision of necessary safeguard in planning of the project itself can lead to reduction of adverse environmental impacts due to project. This chapter spells out the set of measures to be undertaken during project construction and operation to reduce or mitigate or bring down the adverse environmental impacts to acceptable level based on the proposed Environmental Management Plan.

The most reliable way to ensure that the plan will be integrated into the overall project planning and implementation is to include the plan as an integral component of the project. This will ensure that it receives funding and supervision along with other investment components. For optimal integration of EMP into the project, there should be link for:

- Funding
- Management, Training and
- Monitoring

The purpose of the first link is to ensure that proposed actions are adequately financed. The second link helps in embedding training, technical assistance, staffing and other institutional strengthening items in the mitigation measures to implement the overall management plan. The third provides a critical path for implementation and enables sponsors and the funding agency to evaluate the success of mitigation measures, as part of project supervision and as a means to improve future projects. For every use discussed in the above sections, the implementing agency as well as staffing, equipment, phasing and budgeting have been presented as far as possible. All required funds will be channelled through the project authority.

10.2. Objective of Environmental Management Plan

The EMP consists of a set of mitigation, monitoring and institutional measures to be taken up during the design, construction and operation stages of the project. The EMP has been designed keeping in view of the regulatory and other requirements to ensure the following:

- Minimum disturbance to the environment and social components

- Compliance with the environmental acts, rules and guidelines of the GoI & maintaining the quality of air, water, soil and noise as per the prescribed norms by regulatory bodies.
- Compliance for the Policies and Guidelines
- Conservation of natural resources to the extent possible
- Enhancement of Project benefits for Society & Environment
- Sustainable development and operation of project
- Implementation of Environmental Management Plan

Major activities associated with the proposed project are construction and operation of the project. A detailed environmental management plan for each activity of construction and operation phases are prepared. EMP lists the activities involved along with environmental impacts associated with each activity, suggestive impact mitigation measures, and implementation plan covering monitoring and supervisory responsibilities.

The environmental management plan is included as **Table 10.1** and **Table 10.2**. In order to effectively manage the environmental management (including social management) of the project, CSR plan, SDG goal, greenbelt development plan, rainwater harvesting plan, Solid Waste Management Plan; Occupational Health Management Plan, R&R plan, budget for Environmental Management Plan has-been prepared separately and integrated with EMP. These shall be followed for effective implementation of the EMP. The monitoring and implementation of the Environmental Management Plan (EMP) will be to ensure the proper functioning of the Proposed Project. Which will include the following:

- Environmental Management Cell
- Personnel Training on Environmental Awareness Program and Safety Issues

Table 10.1 : Environment Management Plan during Construction Phase

S. No	Project Activity/Component	Environmental Issue/concern	Remedial Measure	Target	Institutional Responsibility	
					Implementation	Supervision
1.	Air pollution: due to site Clearance, levelling , vehicles and other construction activities.	Top soil and debris generation. Air emission and Fugitive dust emission.	Water sprinkling in vulnerable areas Proper maintenance of vehicles & construction equipment. Transportation of construction material in covered trucks, wherever possible.	Control of fugitive dust from construction areas. Control of NOx Emissions. Control of fugitive dust during transportation.	Contractor	MUNPL
2.	Noise generation: due to earth moving equipment, material handling traffic and other construction activities.	High noise exposure to workers and surrounding habitation.	Proper maintenance of vehicles, equipment and machinery Provision of acoustic covers/ enclosures on equipment and machinery, wherever possible. Provision of earmuffs/ earplugs to the workers in high noise areas and enforcement of its use.	Protection of workers and surrounding population.	Contractor	MUNPL
3	Water Pollution: due to sedimentation, wastewater generation, water logging and	Contamination of water.	Channelization and Construction of temporary sedimentation tanks for effluents from construction area through network of drains. Oil separator / interceptor will be provided	Control of water pollution.	Contractor	MUNPL

S. No	Project Activity/Component	Environmental Issue/concern	Remedial Measure	Target	Institutional Responsibility	
					Implementation	Supervision
	accidental Leakage of lubricant or spill.		Wastewater will be collected and treated in the existing ETP. The treated water will be reused for gardening and horticulture purpose.			
4.	Solid Waste Management.	Generation of C&D waste Disposal of top soil and surplus earth generation of domestic work.	Topsoil is required to be preserved and re-used completely. Entire excavated soil will be re-used completely. Recyclable material will be sold to authorized recyclers and remaining will be disposed off at the designated locations by Municipal Authorities as per C & D Waste Management Rules, 2016.	Create a good visual environment. Aesthetics improvement.	Contractor	MUNPL
5.	Traffic Management.	Increased traffic congestion due to construction activities.	Traffic diversion signage shall be displayed. No construction or transportation vehicle or machinery shall be allowed to park on the road beyond the marked project area Comply speed limits of the specific road. All drivers shall carry the valid license and PUC.	Protection from accident and pollution	Contractor	MUNPL
6.	Socio-Economic Environment.	Generation of noise level and air emission. Direct & indirect,	All precaution shall be done to control air and noise pollution. Most of the workforce shall be engaged from the nearby villages/town.	Provision of environmentally and socially safe working space.	Contractor	MUNPL

S. No	Project Activity/Component	Environmental Issue/concern	Remedial Measure	Target	Institutional Responsibility	
					Implementation	Supervision
		employment generation. Increased population density due to migrant labour Impact of 4 Ha pvt. land acquisition	Increase in population density in core zone study area due to workforce involvement during construction phase is only for short term impact. Detail R&R plan shall be prepared after acquisition of complete land. MUNPL has earmarked a fund of 36.24 Cr. for addressing the R&R issues involved for acquisition of additional land.			

Table 10.2 : Environment Management Plan during Operation Phase

S. No	Project Activity/Component	Environmental Issue/concern	Remedial Measure	Target	Institutional Responsibility	
					Implementation	Supervision
1.	Air pollution: due to Project operartion.	Air emission due to operation of Thermal Power plant and DG set.	High efficiency electrostatic precipitators (ESPs) to limit PM emission to 30 mg/ Nm^3. Stack of height 220 m for 2x800 MW common flue and 150 m sigle flue for 1x800 MW above plant grade level is envisaged Flue Gas De- sulphurisation (FGD) system.	To reduce the emission levels of particulate matter PM to 30 mg/Nm^3 Wider dispersion of emitted air pollutions to reduce the SO_2 emission levels 100 mg/Nm^3	contractor	MUNPL

S. No	Project Activity/Component	Environmental Issue/concern	Remedial Measure	Target	Institutional Responsibility	
					Implementation	Supervision
		Fugitive dust emission due to transportation of coal Vehicular emission.	NOx emission reduction system Coal Dust Extraction/ Suppression Systems Sprinklers in ash pond dry areas Reclamation of ash pond after abandonment	To reduce emission levels of NOx as per CPCB Norms Control of fugitive dust from coal handling plant, ash pond area		
2	Noise generation: due to plant operation	Operation of the plant machineries. Due to operation of DG set and vehicular movement Impact of noise on workers health.	Provision of acoustic enclosures/ shields to reduce noise. Design of equipment, provision of personal protective equipment-like ear plugs and ear muffs Greenbelt development.	Attenuation of noise in source receptor pathway To control noise levels to 90 dB(A) at 1 m distance Protection of sensitive receptor	Contractor	MUNPL
3	Impact on Water Quality	Impact due to water drawl	Use of Air-Cooled Condensers to reduce water withdrawal.	Cooling of hot water coming out of condenser and auxiliary cooling systems for recycle HCSD system	Contractor	MUNPL

S. No	Project Activity/Component	Environmental Issue/concern	Remedial Measure	Target	Institutional Responsibility	
					Implementation	Supervision
		Impact due to generation of industrial effluent through different source and domestic effluent.	Reuse of entire boiler blow down for CW make up water. Excess CW blow down through a Central Monitoring Basin. To reduce water consumption with semi dry mode ash disposal system, Reuse of entire blow down water in ash handling, coal handling and fire fighting. Recirculation of all major effluent streams after treatment. Recirculation of ash handling plant effluents and treatment and recirculation of entire quantity of service water effluents. The domestic wastewater generated from the toilets, washrooms and canteen of the plant shall be treated in STP. Storm water network	Main effluent treatment plant for removal of suspended solids, oil and grease and neutralization of pH, to conform to regulatory standards and recycled water shall be utilized for various dust suppression system, housekeeping and ash disposal system. Plant is designed to achieve Zero Liquid Discharge. Treated STP effluent shall confirm the regulatory standards and shall be utilized for green belt development.		

S. No	Project Activity/Component	Environmental Issue/concern	Remedial Measure	Target	Institutional Responsibility	
					Implementation	Supervision
4.	Impact due to solid waste generation	Generation of fly and bottom ash	The fly ash and bottom ash are handled separately. Fly ash is transported by the positive pneumatic conveying system and delivered to the fly ash silos. Then it is carried to users by tank truck. Fly ash shall be utilized for cement & brick making.	Facilitate supply of dry ash to entrepreneurs Reduce land requirement for ash disposal and pollution from ash disposal site. Environmentally safe disposal of unused ash	contractor	MUNPL
		Gypsum disposal system from FGD Impact due to Used oil, Empty/ contaminated drums and ETP Sludge etc	Gypsum shall be utilised for cement manufacturing and allied industries	Reuse within plant/ sale to other industries for reuse Environmentally safe disposal of Gypsum Environmentally safe disposal of municipal waste		
		Impact due to municipal and hazardous solid waste generation	Petroleum oil tank sludge shall be sent to TSDF. Sewage sludge generated from STP will be used as	Safe disposal as per Norms		

S. No	Project Activity/Component	Environmental Issue/concern	Remedial Measure	Target	Institutional Responsibility	
					Implementation	Supervision
			manure in greenbelt development plantation. Municipal Solid waste will be collected, segregated, and disposed off scientifically in compliance of Solid Waste Management Rules, 2016.	Environmentally safe disposal as per norms.		
5	Impact on Biological environment	Gaseous and dust emission on surrounding. Flora and fauna impact due to noise generation on wild fauna . Impact of waste generation on aquatic environment	Pollution control systems for achieving 30 mg/Nm^3 dust emission level from all the stacks. Most of the fugitive dust emission generation points are also fitted with efficient air pollution control systems (Plant dedusting systems). Water sprinkling / dry fog type system will be used at material handling points to suppress the generation of fugitive dust. Provision of acoustic enclosures Provision of greenbelt	Improved vegetation cover at site	contractor	MUNPL

S. No	Project Activity/Component	Environmental Issue/concern	Remedial Measure	Target	Institutional Responsibility	
					Implementation	Supervision
6	Impact on Socio-economic	Employment generation Development of various basic amenities Impact on local people due to air and noise, solid and liquid waste generation	Provision for various pollution control equipment's. Provision of ETP and STP for effluent treatment. Provision of Social welfare under CER. Development of Greenbelt Preference to local people in employment generation	Improvement in quality of life of local people by providing benefits of the project	Contractor	MUNPL
Other						
1	Afforestation/plantation (subject to space availability and feasibility)	-	MUNPL has already established a greenbelt covering 163 Ha within its current facility. Following consultations with the Divisional Forest Office, MUNPL plans to expand the additional greenbelt of 303.03 Ha area within the plant. This will result in a total of 466.03 Ha i.e 33.08% of 1409 Ha land being dedicated to the greenbelt within the plant premises.	Improvement in Eco system, attenuation of air pollutants and noise at source receptor	MUNPL	MUNPL

S. No	Project Activity/Component	Environmental Issue/concern	Remedial Measure	Target	Institutional Responsibility	
					Implementation	Supervision
			Over and above the greenbelt, as carbon sink, additional planation shall be done in 271 Ha of degraded forest area. Native species of trees shall be planted in consultation with DFO, Social forestry department.			
2	Control of fire and explosion hazard	Fire Hazard	Part of main plant package	Improvement in Risk control	MUNPL	MUNPL
3	Control of fire and explosion hazard	Fire Hazard	Part of main plant package/purchase from market	Improvement in Risk control	MUNPL	

10.3. Implementation Schedule of Mitigation Measures

The mitigation measures suggested as above shall be implemented so as to reduce the impact on environment due to the operations of the proposed project. In order to facilitate easy implementation of mitigation measures, the priority of implementation is given in Table-10.3.

Table 10.3 : Implementation schedule

S. No	Recommendations	Time Requirement	Schedule
1	Air pollution control measures	Before commissioning of respective units	Immediate
2	Water pollution control measures	Before commissioning of the plant	Immediate
3	Noise control measures	Along with the commissioning of the plant	Immediate
4	Ecological preservation and up gradation	Stage wise implementation	Immediate & Progressive

10.4. Institutional Framework for Implementation of EMP

MUNPL is responsible for implementation of all the mitigation and management measures suggested in Environmental Monitoring Program. A separate department "Environmental Management Group" (EMG) is established to look after all environmental related matters of the plant. The EMG supervises the reported activity from time to time for smooth implementation of Environmental Mitigation and Management measures and will take necessary actions if required. The cell acts to ensure the suitability, adequacy and effectiveness of the Environment Management Program. It also ensures to meet all the Statutory Requirements.

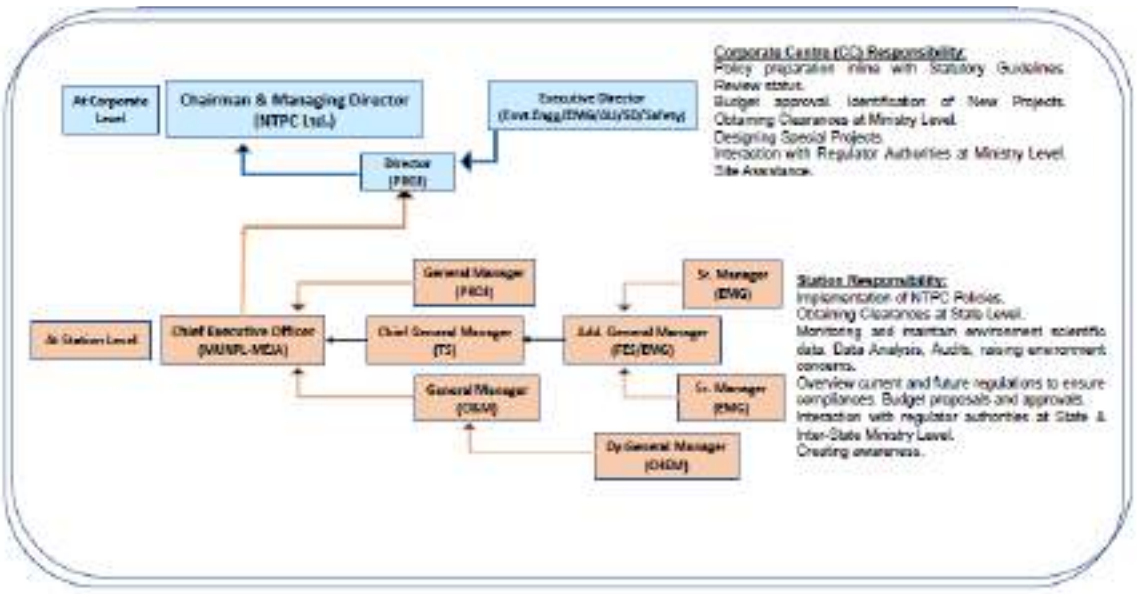


Figure 10.1 : Organization Structure of EMG with role & responsibility

10.5. Roles & Responsibilities of the Environment Management Group (EMG)

Functions of Environment Management Group (EMG): In MUNPL Stage-I the existing EMG Dept shall also ensure compliances of Stage-II requirements. Existing EMG Dept is headed by AGM who reports directly to CEO. For Stage-II EMG Dept shall thoroughly study each activities and suggest additional mitigation measures (if required) for improvement of environmental performance. EMG co-ordinates all related activities for the protection of environment and its awareness. EMG Dept has well qualified trained executives and experienced supporting staff to ensure compliances. Responsibilities of EMG are as below:

- To implement the Mitigation measures.
- To ensure regulatory compliance with all relevant rules and regulations.
- To monitor and ensure regular operation & maintenance of pollution control Equipments.
- To initiate environmental monitoring as per approved schedule.
- Maintain documentation of good environmental practices and applicable environmental laws as ready reference.
- Coordination with regulatory agencies, external consultants, monitoring laboratories; Conducting Environmental Awareness Program for the employees on water management, air and noise pollution control and energy conservation.
- Regular training to employees on Environment Topics.
- Hazardous wastes management and handling.

10.5.1. Institutional Arrangement

MUNPL shall ensure following action items to be complied with throughout the life cycle of the project:

- Formulate/ implement Environmental Health & Safety Policy
- Document the organization structure, roles and responsibilities for implementation and for functioning of Environmental Management System (EMS) and Safety Management System (SMS) Procedures.
- Develop standard operating process and procedures to bring into focus any infringement / deviation / violation of the environment or forest norms/conditions.
- Carry out regular inspections, environment monitoring and auditing.
- Obtaining consent orders from SPCB and ensuring timely extension of validity periods
- Carry out periodical review and issuing amendments.
- Compliance of EC and other clearances and timely submission of compliances to concerned regulatory authorities.
- Interaction for evolving and implementation of modification programmes to improve the availability/efficiency of pollution control systems/devices
- Reporting and communication (including internal and external reporting);
- Coordination with regulatory agencies, external consultants, monitoring laboratories., functional groups of the station
- Conducting Environmental Awareness Program for the employees on, Water management, and Energy conservation.

10.5.2. Quality, SDG's, Environment, Safety Policy of Meja Urja Nigam Pvt. Ltd.

Quality Policy: The Quality Policy Conceived to support the strategic intent and business plan is stated below:

- To construct and commission project and related facilities within the framework of prescribed time schedule, cost, consistent with high standards of quality and with safety.
- To effectively utilize the given resources including human, plant & machinery through complying with requirement set out in NTPC construction Management System, site Material Management System and Financial Management System
- Creating a performance-oriented culture by ensuring emotional, psychological, physical and environmental well-being of all team members of the project
- To contribute to organisation knowledge, resources through pro-active feedback and competency development of project team.

Sustainability Development Goals (SDG's):

The MUNPL-Stage-II project is committed to advancing multiple Sustainability Development Goals (SDGs) through a range of targeted initiatives designed to enhance social, environmental, and economic outcomes. The project plans significant investments across several SDGs, focusing on creating tangible benefits for local communities and contributing to broader global objectives.

S.No	Proposed Activities under MUNPL Stage-II (3x800MW)	SGD Coverage
1.	Adoption of Ultra Super Supercritical Technology - Higher Heat Rate Energy Efficient, Lesser Coal, Water consumption, Lesser GHG emissions.	7,8,9,12,13
2.	30,000 to 40,000 Plantation is carried out every year. Plantation not only improves the environment but also provide habitat to the birds/insects and other creatures.	15
3.	State of Art Technology. "Ultra Super Technology" for higher efficiency leading to lesser emission of CO_2 (12-13 % less). High efficient ESP to reduce PM emission to less than 30mg/Nm^3 Use of Low NOx burner will reduce NOx. Use of Wet FGD will reduce the SPM and SOx as well as low flue gas exit temperature, thus improve climatic conditions.	9, 13
4.	Reducing specific coal and water consumptions with adoption of state-of-the-art technologies. Provision of Closed Cycle Cooling System with COC 5 and Air Cooled Condesors System, Rain Water Harvesting System, .	12, 13, 14
5.	Treating ETP and STP waters, and compliance to Zero Liquid Discharge ensures reusing and reducing load on natural resources	6, 7
6.	Establising and adopting Sustainable Waste Management Practicies (Reduce, Reuse, Recycle, Re-process,etc)	7,9, 12, 13, 14, 15
7.	Plantation inside Plant premises and Afforestation in outside areas	3,13,15,17
8.	A Corporate with Environment and Social Responsibility (CER-CD/CSR) for development of community.	3,4,5,6,10,17

9.	Employment Generation and Economic Activities (Direct and Indirect) Skill development and employment-oriented training to increase employability, creating dignity of labour and increasing the social stand of life in the vicinity	1, 5, 8, 10, 17

SD Goal with tentative budget allocation and timelines.

S.No	SDG detail	Proposed Works	Estimated Cost (In Lakhs)	Estimated time from the award of the project.
1.	No Poverty and Decent Work and economic growth 	CER / CD: Rs.325 Lakh Activities under CER: Training and Skill development: Skill development and employment-oriented training – to increase employability, creating dignity of labour and increasing the social stand of life in the vicinity. Recurring expenditure of Rs. 55 Lakh shall be allocated after commissioning of the MUNPL Stage-II. All the activities shall be planned after carrying Need basis assessment carried through stakeholder consultation on annual basis.	325	01-05Yrs
2.	Good Health and Well Being 	Provision of Rs. 325 Lakh kept in capital budget of MUNPL Stage-II to be undertaken under CER/CD to address issues raised during Public Hearing: Development of health infrastructure, operation of medical camps etc. Activities under CER: Health: Developing health infrastructure, conduct of medical camps etc. Further an expenditure of Rs. 45 Lakh is proposed to be incurred every year after commissioning of the MUNPL Stage-II. The exact activities to be decided based on need assessment and stakeholder consultation on annual basis.	325	01-05Yrs
3.	Quality Education and Gender Equality 	Provision of Rs. 250 Lakh kept in capital Budget of MUNPL Stage-II to be undertaken under CER/CD to address issues raised during Public Hearing: Smart classrooms, better infrastructure, renovation of school, playground, distribution of furniture, education to all, girl empowerment, etc. Activities under CER/CD: Education for all, Construction/ Renovation of school buildings, classrooms/smart class with internet and computers/labs/ parking shed, playground, furniture, rural sports, girl empowerment program, etc. in PAVs and vicinity areas. Further an expenditure of Rs. 45 Lakh is proposed to be	250	01-05Yrs

S.No	SDG detail	Proposed Works	Estimated Cost (In Lakhs)	Estimated time from the award of the project.
		incurred every year after commissioning of the MUNPL Stage-II. The exact activities shall be decided based on need assessment and stakeholder consultation on annual basis.		
4.	Clean Water and Sanitation 	Provision of Rs. 600 Lakh kept in capital Budget of MUNPL Stage-II to be undertaken under CER/CD to address issues raised during Public Hearing: Repair of water tank and expansion of drinking water facilities, construction/repair of drains, latrines and related infrastructure etc. Activities under CER/CD: Sanitation: Construction/ Repair of drains, Toilets and related infrastructure. Water: Construction work for repair of water tank and expansion of drinking water facilities etc. Further, an expenditure of Rs.100 Lakh is proposed to be incurred every year after commissioning of the MUNPL Stage-II. The exact activities shall be decided based on need assessment and stakeholder consultation on annual basis.	600	01-05Yrs
5.	Affordable and Clean Energy 	Provision of Rs. 1455 Lakh kept in capital Budget of MUNPL Stage-II to be undertake under CSR & CER. Activities covered are: Construction work of solar high mast light, construction of roads in project affected villages with solar streetlight, community development in Pahari Mahadev along with beautification of market and others Activities under CER: Infrastructure Development: Solar streetlights along the roads along with Construction/renovation of community center buildings with solar lights, etc. in project affected villages. Roads: Cement Concretization of existing village roads with sola streetlights. Further, an expenditure of Rs. 250 Lakh is proposed to be incurred every year after commissioning of the MUNPL Stage-II. The exact activities to be finalized later.	1455	01-05Yrs
6.	Responsible	Reducing specific coal and water consumptions with adoption of state-of-the-art technologies	-	6Yrs

S.No	SDG detail	Proposed Works	Estimated Cost (In Lakhs)	Estimated time from the award of the project.
	Consumption and Production 	Proposed MUNPL Stage-II is "Ultra Super Technology" for higher efficiency leading to lesser emission of CO_2 (12-13% less) Minimizing production of waste and recycling/ re-use of wastes: Ash utilization through new avenues like production of Bricks, Light weight aggregate and Geopolymer based concrete. Zero liquid discharge plant and all treated effluents are being recycled back in plant.		
7.	Climate Action 	Proposed MUNPL Stage-II is "Ultra Super Technology" for higher efficiency leading to lesser emission of CO_2 (12-13 % less). Use of Low NOx burner will reduce NOx. Use of Wet FGD will reduce the SPM and SOx as well as low flue gas exit temperature, thus improve climatic conditions.	-	6Yrs
8.	Life below Water 	Proposed MUNPL Stage-II is "Ultra Super Technology" for higher efficiency with reduced usage of water and coal. Less usage of water for power generation will enhance life below water. Rejuvenation of ponds will also enhance aquatic life.	100	01-05Yrs
9.	Life on Land 	Proposed MUNPL Stage-II is "Ultra Super Technology" for higher efficiency with reduced usage of water and coal. Clean Power with less pollutant and cost economics will improve life on land. 30,000 to 40,000 Plantation is carried out every year. Plantation not only improves the environment but also provide habitat to the birds/insects and other creatures.	3872	01-05Yrs

Environment Policy

Environment Policy-2022

I. Purpose:

NTPC being the country's largest power generator, with its presence across the energy value chain, recognizes that protection of environment is essential for sustainable business.

In the context of this Policy, the definition of Environment covers all the domains of environment - physical, chemical, biological and socio- economic aspect.

NTPC hereby adopts Environment Policy-2021, superseding its earlier policy document of 2017.

The intent of this policy is to meet environmental expectations and provide actionable guidance, as NTPC strives to foster a culture of excellence and challenges itself for continual improvement.

This document contains:

I. Purpose
II. Policy Statement
III. Applicability
IV. Principles
V. Institutional Framework
VI. Policy
- *Stewardship*
- *Compliance & Assurance*
- *Stakeholder Engagement*
- *Capacity Building*

VII. Review

II. Policy Statement:

"To provide cleaner energy by committing to the highest possible levels of performance in environmental compliance, practices and stewardship."

III. Applicability:

This policy shall apply to all establishments of NTPC and each employee shall be made a partner in implementing the policy.

IV. Principles:

This policy is based on the following principles:

1. Consideration of Environmental factors right from the stage of planning, design and operation of project/station to ensure that mandatory principles of conservation and sustainability are adhered to.

2. Adopting the best possible environment management practices and state-of the-art technology to minimize impact of business on Environment.

3. Adopting the latest, relevant and feasible Environmental Management Systems (EMS) at all operating stations to improve our environmental performance through more efficient use of resources and reduction of waste.

4. To commit as a responsible corporate citizen by striving to achieve and sett benchmarks not limited to statutory compliances.

5. Innovation by carrying out Research & Developmental activities, coupled with enablers leading to continual improvement.

6. Accepting accountability for all operations and expeditiously respond to any aberration.

7. Continuous monitoring and sharing of environmental indicators with stakeholders.

8. Develop each employee as an Environmental Steward by improving his/her awareness levels while soliciting their commitment.

V. Institutional Framework:

Our three tier structure for environmental systems implementation is presented below:

1. Corporate Level Functions - Engineering, planning and monitoring

2. Regional Level Functions – Compliance monitoring, Facilitators to stations and Coordination between Stations & Corporate.

3. Stations: Functions - Execution and reporting

Note: These charts do not reflect the organizational structure/reporting arrangement, but serve to identify responsible departments within NTPC.

VI. Policy:

NTPC shall achieve these objectives by:

1. Stewardship:

NTPC shall:

a. Adopt a pro-active approach and place environmental aspects as one of the prime consideration in decision-making process.

b. Identify and manage environmental impacts due to business activities by adopting the latest environment management technologies and practices.

c. Act to manage risks, as identified by the Risk Management Committee (RMC)*.

d. Evaluate performance of our environment protection equipment, programs and practices with respect to legal provisions and prepare action plans for concerned functional groups.

e. Ensure efficient and optimal use of resources such as land, water, fuel, construction materials, oils, and chemicals etc, especially the non-renewable ones.

f. Spearhead waste management by adopting the 3Rs principle (Reduce, Re-use and Recycle) and safe disposal.

g. Adopt more environment friendly and energy-efficient inputs.

4. Capacity Building:

a. NTPC shall ensure all employees are made environmentally aware to enable them to integrate its principles into their activities and decisions by participating in suitable trainings/skill development programmes.

b. The Environment Management Group shall come up with focused requirements (including skill training and culture building), clearly bringing out the desired objectives, audience and responsibility.

VII. Review:

This policy shall be reviewed at opportune time, but not later than once in three years.

Safety Policy

Safety Policy of NTPC

(First Release: 07th Nov'16; Last Reviewed: 1st March 2022)

Applicable to all employees of NTPC and are required to comply.

Chairman and Managing Director is responsible to issue and review the Safety Policy periodically describing intent, responsibility and broad frame work.

A. Statement of Intent:

Safety is part of our core values; therefore, safety shall be at the forefront of all our activities.

We recognize all accidents are preventable.

The objective is to provide safe working environment and strive for zero incidents at work. This policy, supported by safety rules and procedures, is applicable for all business activities carried out by NTPC.

Safety policy is built around following principles:

1. Our activities carry various hazards; however, all such hazards can be identified.
2. Every job shall be done safely, no matter how important or urgent it is.
3. Putting people to work carries a specific responsibility and accountability for safety which shall be visibly demonstrated.
4. Right procedures and actions can bring the risks under control.
5. Trained and committed team can ensure incident free operations.
6. We shall comply with all applicable safety regulations and other legal requirements. We shall strive to improve and make it better than the minimum standard(s).

B. Organization's Responsibility:

We have a three tier approach to make work place incident-free:

1. Top Management responsibility:
   a. Directors and REDs are accountable for:
      i. Ensuring that all work activities under their control are carried out in adherence with this policy;
      ii. Ensuring that Heads of Projects / Stations are individually accountable for implementation of this policy and ensuring they have the necessary skills in safety management;
      iii. Setting appropriate standards for safety in their work area;
      iv. Putting Safety as a part of appraisal system, both for self and their teams;
      v. Ensuring that safety audit is conducted periodically through third party at all sites
2. Head of the Project/Stations are accountable for:
   a. Implementing this policy by introduction of local management systems with high standards of safety;
   b. Ensuring identification and display of all hazards;
   c. Establishing rotating cross-functional team for internal audits.
   d. Making employees accountable for working safely by creating a safer work environment and ensuring that their actions do not harm either themselves or

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10.5.3. Training Requirement of Staff:

Training systems, covering the following items, shall be in place for all staff of Environment Management Cell and other staff of various departments, which cover the following:

- Awareness of the regulatory implications of the Environmental standardsthe activity and their work activities.
- Awareness of all potential environmental effects from operation under normal and abnormal circumstances.
- Awareness of the need to report deviation from the standards.
- Awareness on prevention of accidental emissions and action to be taken when accidental emissions occur.

The staff of the EMG will be trained every year by arranging in house training programs by inviting experts or faculty members from reputed institutes.

Periodical Review Annually review of the EMP and identified management action plans to address any changes in the organization, process or regulatory requirements.

Documentation and Record Keeping: The EMG will maintain following documents for effective implementation of the EMP:

- Master management system document.
- Legal Register.
- Operation control procedures.
- Work instructions.
- Incident reports.
- Emergency preparedness and response procedures.
- Training records.
- Monitoring reports.
- Auditing reports; and
- Complaints register and issues attended/closed.

10.6. Management of Construction Site

About 4986 workers (contractual) will be engaged under EPC Engineering , Procurement and Construction contractor during the site preparation work. Most of workers will be taken from nearby villages. Experts and engineers will stay at colony/guest house. For the workers at plant site, desired facilities as porta cabins; toilets, kitchens, adequate supply of electricity and water and other things of daily needs including the facility of first aid shall be provided. A drainage system shall be constructed to drain off all runoff water from the work site into suitable drain outlet. Temporary drainage shall be maintain, removed and reinstated as required. Wastewater arising from toilets of site offices shall be treated in STP. Truck loading, unloading and hauling operations so as to minimize noise impact near surrounding villages to be properly scheduled. Vehicular movement on the village roads will be avoided. Machinery that emits noise in one specific direction would, where

possible be oriented in a direction away from noise sensitive receptor (human habitation). Silencers and mufflers on construction equipment, wherever required, to be properly fitted and maintained. The foundation of every machinery shall be so designed that vibrations are minimized and isolate the every machine from each other so as to travel of vibrations from one machine to another machine. Vibrations curtailing material shall be used in the foundations. Litter disposal and collection points will be established around all work sites. Biodegradable garbage from kitchen and tree litters will be composted and used as manure. A road roller shall also be deployed to compact the loose surface of the haul road. A water sprinkling tanker shall also be deployed to maintain the haul road surface moist at all time.

Labour Look after Plan: A brief of the measures that have been suggested for the labour under the labour management action plan (Labour including contract workers and drivers) include the following:

- Provision of common toilets and bathing facilities duly segregated for male and female labour;
- Supply of kerosene, coal/fuel wood by the contractors for their labour to prevent deforestation
- Collection of domestic waste and disposal in the onsite incinerator.
- Monthly inspection of labour camps to focus on the following:
  General observations on cleanliness.
- Drinking water availability with respect to source, cleanliness of storage tanks and quality fit to be consumed.
- Provision of sanitation facilities to water availability in toilets their cleanliness and drainage.
- Provision of garbage collection, segregation and disposal facilities.

10.7. Road Traffic Management

About 100% of the coal (raw materials) shall be transported by rail rack. While expansion could contribute to a marginal increase in public transport due to the engagement of more people, there are concerns about the potential negative impacts on existing road traffic, local residents, and an increased risk of road accidents. The traffic management plan includes the following elements:

- Transport management planning.
- Driver training.
- Access road maintenance.
- Vehicle management and maintenance, and
- Community liaison and safety.

The traffic management action plan covers the following aspects:

- Sourcing or recruitment of drivers and number of qualified drivers needed,
- Drivers' training and approval,

- Hours of driving and rest periods,
- Driver, vehicle and load security arrangements,
- Driver communication with control point and vehicle equipment,
- Language/communication,
- Source of suitable vehicles,
- Vehicle quality and specification,
- Vehicle management and preventative maintenance programme,
- Vehicle routes, route planning and alternative routes,
- Overall vehicle movements – access route selection and management,
- Strategic vehicle parking locations – to minimize impact of vehicles on local community, villages, roads, and Inspection and audit of the project traffic.

10.8. Corporate Environment Responsibility (CER)

M/s Meja Urja Nigam Private Limited (MUNPL) is amongst India's leading power producing company that believes in the efficient utilization of all available resources. From managing operations, enhancing social and economic benefits, minimizing environmental impacts and employing cutting-edge innovation, MUNPL has grown steadily and strongly through the years. M/s Meja Urja Nigam Private Limited (MUNPL) is fully conscious of its Corporate Social and Environment Responsibility towards the community as well as environment. MUNPL is already doing many social activities under the CSR. MUNPL has already planned to play a leading and meaningful role in bringing qualitative improvement in the life of the community and the surrounding environment. Our vision is governed by the ideology that every life is important and must be given fair opportunities to make the best out of it.

10.8.1. CSR Objectives of MUNPL

Meja Urja Nigam Private Limited (MUNPL) is a Joint Venture between NTPC Limited (A Maharatna CPSE under the aegis of Ministry of Power, Government of India) and Uttar Pradesh Rajya Vidyut Utpadan Nigam Limited was registered under the Companies' Act, 1956 on 2nd April, 2008. The CSR/CD activities of MUNPL are aligned with the **UNSDGs** and as per the provisions of **Schedule-VII** of the Companies Act 2013.

The CSR objectives of MUNPL are:

- To deliver business and environmental values through the Company and its Project(s) that is aligned towards economic growth and holistic development of the larger ecosystem.
- To ensure sustainable power generation by ensuring minimal wastage across operations.
- To actively contribute towards socio-economic development of the communities in the vicinity of Company.
- To be a leader in the areas of resettlement and rehabilitation and environment protection including effective ash-utilization, peripheral development, and energy conservation practices.

- MUNPL has adopted the following policies of NTPC (Promoter company of MUNPL) to actualize its community development (CD) & social welfare objectives:

  1. Resettlement and Rehabilitation Policy (R&R) – 2005

  2. Revised NTPC Policy for CSR – 2022

The Meja Urja Nigam Pvt. Limited (MUNPL) has its maiden project of 1320 MW (2x660 MW) capacity located at Village Kohdar, P.O. NTPC-Kohdar, Tehsil Meja, Prayagraj (U.P.), at around 50 kms from the District Headquarter. The proposed expansion in Stage-II (3x800 MW) is at the same location. The community around the project was socio-economically backward and deficient in the basic civic amenities.

MUNPL, as a responsible corporate citizen has taken various initiatives in the focused areas like Education, Water, Health & Sanitation, Infrastructure Development, Capacity Development etc, to address the issues of community development in the nearby community of its station, which had been impacted due to the establishment of project (Stage-I). Some of the major community development initiatives undertaken by MUNPL at Meja are as follows:

A. Education:

Education is a vital component of Corporate Social Responsibility (CSR) because it fosters long-term social and economic development. By investing in education, MUNPL is contributing to building a skilled and knowledgeable workforce, which is essential for sustainable growth and empowers individuals to improve their quality of life. It is also aligned with **UNSDGs** such as Quality Education (**Goal-04**), Reducing Inequality (**Goal-05**) and promoting Inclusive Development (**Goal-10**).

Hence, recognizing the importance of education, MUNPL is actively involved in supporting education to build a skilled and knowledgeable workforce. The broad activities being undertaken are:

- Provided education under GEM (Girl Empowerment Mission) to girl child from the nearby community. As on date, 157 girl students have been covered from 07 affected villages participated in the GEM program.
- Sponsoring education of 13 GEM girls in the St. Joseph's School, MUNPL from class 6th to 10th.
- Distribution of bicycles to 81 GEM / local girls.
- Improving the existing infrastructure such as distribution of 500 School Benches
- Providing study materials such as stationery items, umbrella, and books for library in the nearby Govt. Schools.
- Bala Painting in the Govt. Schools' premises to engage and enhance the learning environment for children
- Installation of Smart Classes in 02 Govt. Schools.
- Construction of boundary walls in 02 Govt. Schools.
- Construction of 09 Mini Water RO Scheme in Govt. Schools.
- Construction of 05 Rooms & Workshops along with the provision of 02 DG Sets, Furniture, Tools/Equipment in ITI, Naini.

B. Health & Sanitation:

Health is a crucial area of focus for Corporate Social Responsibility (CSR) to address the country's diverse and widespread health challenges. Health-focused CSR activities not only improve public health outcomes but also contribute to economic development by ensuring a healthier workforce and reducing healthcare-related financial burdens on individuals and communities. It is also connected to broader **UNSDGs** such as Good Health and Well-being (**Goal-03**) and Sanitation (**Goal-06**).

Considering the above, MUNPL is committed to provide quality services not only to its employees and their dependents but also to the local community at large living in the surrounding villages. The following are the MUNPL's initiatives in the area of health:

- Organizing free general health check-up camps in the nearby affected villages. Apart from this, special camps (esp. anemia detection, screening of NCDs etc.) and health awareness camps (common diseases, prevention of anemia etc.) are organized in nearby villages.
- Organizing free surgery camp camps.
- Donation of 01 Health ATM to PHC-Meja.
- 24X7 extension of medical facilities to locals in the township hospital.
- MUNPL has also been associated with government sponsored programmes like on TB eradication, Pulse Polio Campaign and Cervical Cancer.
- Organizing anemia detection and iron distribution camps, menstrual hygiene awareness and sanitary kit distribution are carried out
- Financial support to Red Cross Society, Prayagraj.
- Provided equipment to the Dist. Authority, Prayagraj during Covid.
- Installation of sanitary napkin machines in all Govt. Schools of neighbouring community.
- Distribution of 3000 sanitary pads to girls in all Govt. Schools and Colleges of the nearby area.

C. Water:

Water is also a critical area of focus for Corporate Social Responsibility (CSR) in India, given the local challenges related to water scarcity and inadequate access to clean drinking water. By focusing on water, MUNPL ensures that nearby communities have access to clean and safe drinking water, which is vital for health, hygiene, and overall well-being. This community development initiatives aligned with **UNSDGs** such as Clean Water (**Goal-06**) and Sustainable Water Management (**Goal-11**).

MUNPL as a responsible corporate citizen has taken various concrete measures for ensuring access to clean and safe water in the neighbouring communities thus reducing the risks of waterborne diseases and improving the overall public health outcomes. The details are as follows:

- Installation of 18 Solar Powered mini water schemes in the affected villages.
- Construction of 04 Check dams in Esauta, Patai Dandi, Jhariyahi and Kohdar.
- Rejuvenation of ponds in village-Salaiya Kala and Mai Khurd

- Installation of 130 Handpumps in the neighbouring villages.
- Construction of 02 Overhead Tanks in Resettlement Colonies.
- Construction of 01 Blast Well in Village-Salaiya Kala.
- Construction of 09 Mini Water RO Scheme in Govt. Schools.
- Distribution of water filters to villagers incl. Home Stead Oustees.
- Installation of 02 Water Coolers with RO in Atal Awasiye Vidyalaya.
- Installation of 23 Water Coolers with RO in the neighbouring villages.
- Installation of 01 Water Cooler with RO in Govt. Polytechnic, Meja.

D. Infrastructure Development:

Road construction is an important aspect of Corporate Social Responsibility (CSR), particularly in rural areas surrounding MUNPL. MUNPL has invested in building roads to improve connectivity, facilitate access to essential services, and promote economic development. Apart from this, MUNPL has invested other important infrastructure such as Community Centres, Solar Street Lights, Solar High Masts, Fencing of Gaushalas etc. as per the demand of Gram Sabha and local villagers at large. Infrastructure development is also linked to UNSDGs such as Economic Growth (**Goal-08**), Developing Essential Infrastructure (**Goal-09**) and Better Roads (**Goal-11**). Meja Urja Nigam has carried out the following Infrastructure Development works:

- Construction of approx. 15 km of approach roads and drains in villages- Kohdar, Mai Kala, Mai Khurd, Bijaura, Jhariyahi, Saliaya Khurd, Salaiya Kala, Esauta and Patai Dandi.
- Construction of 05 Community Centers in villages Salaiya Kala, Salaiya Khurd, Kohdar, Jhariyahi and Bijaura.
- Construction of 06 Rain Sheds in the nearby villages.
- Installation of 200 Solar Lights in the neighbouring villages.
- Installation of 20 Solar High Masts in the neighbouring villages.
- Installation of Roof top Solar in Women's Degree College.

E. Capacity Building:

Under CSR/CD, skill development is a key focus area for MUNPL especially given its surrounding rural areas and its youthful population. MUNPL has conducted various skill development programmes that enhanced the employability of individuals, particularly those from underprivileged backgrounds and affected villages. Further, need based skill and vocational development programmes suited to both genders, as women can become a source of additional income for the family, have been conducted helping individuals to gain the required competencies. This initiative is aligned with sustainable global efforts of UN such as No Poverty (**Goal-01**), Quality Education (**Goal-04**), Decent Work & Economic Growth (**Goal-08**) and Reduced Inequalities (**Goal-10**). The following skill development courses have been carried out under this head:

- Provided ITI training to 350 local youth as per Rehabilitation Plan of Stage-I. Organization of skill development programmes such as mobile repairing, CFL/LED Light Assembling, Plumbing and Two Wheelers Servicing to 150 local youth.

- Provided Plastic Processing and Injection Moulding Training to 60 local youth through CIPET, Lucknow and linked with 100% placement.
- Provided Plastic Machine Operator Training to 22 local youth through CIPET, Lucknow and linked with 100% placement.
- Provided Basic Beauty & Hair Cutting Training to 15 local women.
- Provided Jute Bag Making Training to 20 local women.
- Provided Cutting & Tailoring Training to 15 local women.

F. Special Initiatives:

As a part of our CSR/CD programs, MUNPL has also taken various special initiatives as per the demand of locals and their representatives. The following special welfare initiatives have been undertaken:

- Distribution tri-cycles and additive aids to differently-abled persons.
- Distribution of woollen blankets to the needy in peak winters.
- Organization of Rural Sports Meet for promotion of sports.
- Distribution of relief materials to the locals during Covid.
- Contribution to Sansad Khel Pratiyogita, Prayagraj.
- Distribution of 900 mosquito nets to locals in the project affected villages.
- Distribution of sweet packets in the nearby Govt. Schools on Republic Day and Independence Day.
- Organization of Animal Health Veterinary Camps in the project affected villages.

PICTORIAL REPRESENTATION OF CSR THEMATIC AREAS

EDUCATION:

S.No	Head	Picture
1.	Distribution of 500 Nos. Desk in Govt. Schools.	

2.	Boundary wall Constructed at Primary School, Mai Kala, Salaiya Khurd and Jhariyahi.	
3.	Distribution of stationery kits and umbrella in Govt. Schools.	
	 	
4.	09 Solar powered RO Water Scheme in Govt. Schools.	

5.	Construction 05 Rooms and Workshops in Govt. ITI, Naini	
6	02 DG Sets, Furniture and Tools for Govt. ITI, Naini	

7. Girl Empowerment Mission (GEM) residential program for 04 weeks for 40 girls (Every Year)

8.	Distribution of bicycles to Girl Empowerment Mission (GEM) girls

Meja Urja Nigam (P) Limited

(A joint venture of NTPC &UPRVUNL)

बेटियों के हौसलों को पंख दे रहा मेजा ऊर्जा निगम

मेजा-प्रयागराज (एसएनबी)। मेजा ऊर्जा निगम द्वारा समीप के एक दर्जन गांव की बेटियों के जीवन स्तर को सुधारने के लिए निरन्तर प्रयासरत है। संस्थान की जेम कार्यशाला से प्रशिक्षित बेटियां फर्श से अर्श का सफर तय करते हुए खुद के साथ परिवार का सहारा बन रही हैं। बालिका सशक्तिकरण कार्यशाला में चयनित इड़ियाही की अंशु कुमारी का सपना साकार हो गया, जो मां की गोद में सिर रख कई बार सवाल कर चुकी थी। पिछले कुछ वर्षों में यह देखा गया है कि जैसे ही यहां गर्मियों का आगमन होता

- संस्थान की जेम कार्यशाला ने सैकड़ों बालिकाओं को दी ऊंचाई
- इड़ियाही की अंशु कुमारी के वचन से उसका सपना हुआ सच

मां के साथ इड़ियाही की अंशु कुमारी। फोटो : एसएनबी

जेम कार्यशाला की प्रवेश परीक्षा के लिए कड़ी मेहनत शुरू कर देती हैं। मां-बाप भी अपनी बेटियों को लगातार प्रेरित कर उन्हें पढ़ाते हैं ताकि उनका चयन बालिका सशक्तिकरण कार्यशाला में हो सके और वह अपने साथ-साथ परिवार का भी भविष्य सुधार सके।

मां से सवाल कर चुकी थी कि मां मुझे भी स्कूल जाना है, मुझे भी एसटीपीसी में डाक्टर बनना है। उसके बाद हमारे घर के सभी कष्ट दूर हो जाएंगे। यह 13 वर्षीय छोटी बालिका अंशु अपनी मां की गोद में सिर रखते हुए बड़ी आशा के साथ कहती रही है। अंशु की जब पता चला कि वह अब एसटीपीसी के स्कूल में एक महीने तक पढ़ेगी तो वह खुशी से झूम उठी, लेकिन उसके बाल मन ने मां से सौ सवाल पूछ कर मन को शांत किया। अंशु की ही तरह अन्य बालिकाओं में भी इस तरह के सवाल उठते हैं।

अंशु डाक्टर बन कर मुफ्त इलाज के साथ सेवा करना चाहती है। कोहड़ार का क्षेत्र पहाड़ी है, गरीबी और अशिक्षा से लोग जूझ रहे हैं। यहां की परम्पराएं भी बेटियों की शिक्षा और विकास के आड़े

Rashtriya Sahara

	Health & Sanitation:	

1.	**Free general health check-up camps in nearby villages**

2.	Free cataract checking camp in the township hospital and operation thereof.

3.	Distribution of Artificial Limbs to the 08 nos. specially-abled Individuals in the associated villages of MUNPL. Distribution of Aids and assistive devices like hearing aids, walking sticks, crutches to 18 nos. needy individuals of the associated villages.

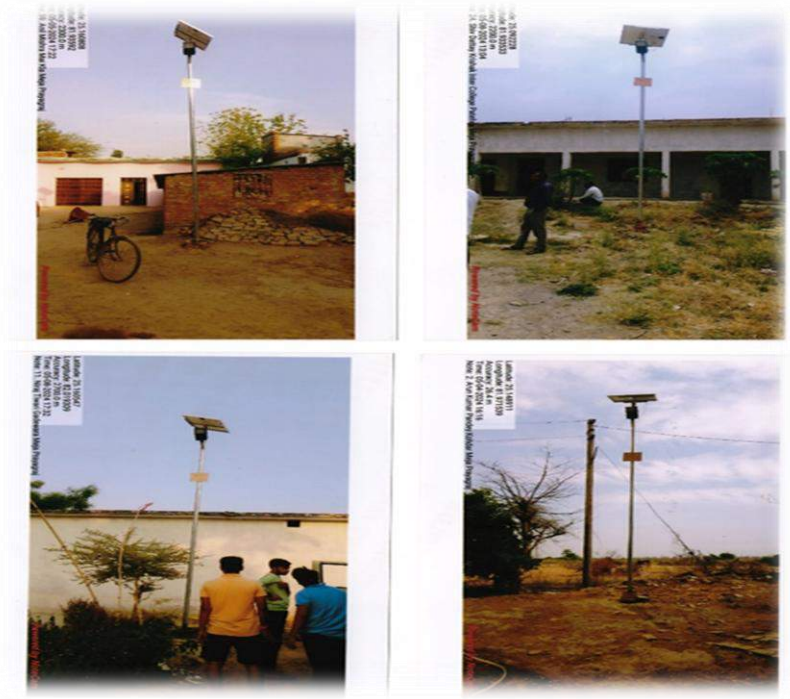
4.	Distribution of woollen blankets to the needy in peak winters	
5.	Breast cancer awareness campaign at Govt. Polytechnic College	

6.	Session on personal hygiene at Women's Inter College, Kohdar	
	Safe Drinking Water:	
1.	18 Solar Power Mini Water Scheme	
2.	Installation of 130 Hand Pumps in the nearby villages	
3.	Construction of 02 Overhead Tanks in Salaiya Kala and Jhariyahi	

4.	Construction of Blast Well in Salaiya Kala	
5	Restoration of Ponds in Salaiya Kala and Mai Khurd	
6.	Construction of check dams in affected villages	
7.	Distribution of water filters to project affected villgers	

	Infrastructure:
1.	Construction of community centers

2.	Construction of rain sheds in the nearby villages	
3.	Construction of 15 KM interlocking roads/ CC roads in the nearby villages	 

4.	Consecution of fencing of gaushalas	
5.	Installation of solar lights in the nearby villages	
	Capacity Building:	
1.	Jute bag making training	

2.	Basic beauty & hair dressing training	
3.	Plastic machine operator training	
		 
4.	Mobile phone repair training	
5.	Cutting & tailoring programme	

Special Initiatives:		
1.	Veterinary camp in the affected village	
2.	Rural Sports Meet	
3.	Support to Women Self Help Group during Culture Fest	
4.	Interaction of Top Management with school children of Govt. School	

5.	Support to Sansad Khel Pratoyogita	

10.8.2 CSR Budget & Expenditure Stage – I

Sanctioned CD Budget for Stage-I is Rs. 3672 Lakh. CSR Budget for different financial budget is given in following tables.

Table 10.4 CSR Expenditure For The Financial Year 2023-24

S. No	PROPOSED RECURRING WORKS UNDER CSR /CER	2023-24 (in Lakh)
1	Improvement in educational standards, development of educational facilities, etc.	57.00
2	Free general health check-up camps, eye camp etc.	11.00
3	Expansion of drinking water facilities, improvement in water supply infrastructure, etc.	60.56
4	Development of basic and essential infrastructure facilities.	70.00
5	Promotion of sports and cultural activities.	5.00
6	Skill development and vocational training programs to enhance employability.	20.00
7	Essential aids to differently abled people	3.00
8	Various other activities aimed at community development as per demand of locals and their representatives.	62.00
	Total (Lakh)	**288.56**

Table 10.5 CSR Activities Planned For The Financial Year 2024-25

S. No	PROPOSED RECURRING WORKS UNDER CSR /CER	2024-25 (Budget in Lakh)
1	Improvement in educational standards, development of educational facilities, etc.	85.00
2	Free general health check-up camps, eye camp etc.	9.00
3	Expansion of drinking water facilities, improvement in water supply infrastructure, etc.	50.00

4	Development of basic and essential infrastructure facilities.	90.00
5	Promotion of sports and cultural activities.	5.00
6	Skill development and vocational training programs to enhance employability.	150.00
7	Essential aids to differently-abled people	3.00
8	Conducting surveys to assess needs and evaluate social impact.	7.50
9	Various other activities aimed at community development as per demand of locals and their representatives.	63.50
	Total (Lakh)	**463.00**

Table 10.6 CD (Community Development) Stage-I Expenditure (till Sept'24)

CD expenditure Stage-I		
S. No	**Heads**	**Amount (Rs in Lakhs)**
1	Construction of Roads	1309.78
2	Development of Basic Infrastructure and Sanitation	886.40
3	Drinking Water	647.50
4	Other Social Welfare Activities	194.88
5	Restoration of Infrastructure	88.93
6	Skill Development/Vocational Trainings	54.03
7	Other strategic community development activities	348.92
	Total	**3530.44**

For CSR activities, MUNPL has incurred an expenditure of Rs. 2.88 Cr for the 2023-24 and Rs 4.63 Cr is planned for the FY 2024-25. This will continue during construction phase of Stage-II, in line with Section 135 of the Companies Act, 2013. The details CSR activities are given in Table-10.7 & Budget for Community Development works is given in Table-10.8.

Table 10.7 : CSR Activities Planned For FY 2024-25

S. No	PROPOSED RECURRING WORKS UNDER CSR /CER	2024-25 (Budget in Lakh)
1	Improvement in educational standards, development of educational facilities, etc.	90.00
2	Free general health check-up camps, eye camp etc.	10.00
3	Expansion of drinking water facilities, improvement in water supply infrastructure, etc.	50.00
4	Development of basic and essential infrastructure facilities.	100.00
5	Promotion of sports and cultural activities.	5.00
6	Skill development and vocational training programs to enhance employability.	135.00
7	Essential aids to differently-abled people	5.00
8	Conducting surveys to assess needs and evaluate social impact.	7.50
9	Various other activities aimed at community development as per demand of locals and their representatives.	58.00
	Total (Lakh)	**460.50**

The activities proposed are tentative and shall be decided in consultation with District Administration and other local stakeholders based on need and requirement under the ambit of CD (i.e. Community Development).

Table 10.8 Budget for Community Development Works for MUNPL of Stage- II

S. No	CD/Activities	Expenditure in (Rs. Lakhs)	Major Activities Description
1	Infrastructure Development	1455.00	Construction of roads in project-affected villages, installation of solar high mast lights, solar streetlights, market beautification, interlocking in gaushalas, expansion of Anganwadi centers, etc.
2	Sanitation	350.00	Construction/repair of drains, toilets, and related infrastructure, etc.
3	Water	250.00	Repair of water tanks and expansion of drinking water facilities, etc.
4	Health	325.00	Development of health infrastructure, organization of medical camps, etc.
5	Education	250.00	Renovation of schools, development of playgrounds, distribution of furniture, establishment of smart classes, and renovation of educational infrastructure.
6	Skill Development and Employment-Oriented Training	325.00	Developing education Infrastructure including construction/ renovation of classrooms/ lab/ parking shed/playground/smart classrooms/ furniture etc. PAVs and vicinity areas.
7	Community Development Works in Amiliya Kala (MGR Stage-II)	500.00	Construction of roads, community centre, water, health etc. in village-Amiliya Kala
Total (Lakhs)		**3455.00**	

Rolling Plan for CD Works (Stage-II): 7.00 Crore per annum for 05 years

10.9. Human Health and Safety Plan

The objective is to ensure that the health and safety of on – site personnel is proactively managed during the construction stage of the project. Below given are the proposed project related human health and safety environmental concerns and its management.

The primary concern on potential health risks for the construction workers and other employees on site during construction are associated with drinking water quality. The project would ensure safe potable water supply to the workers on site.

- Construction site will be provided with a readily available first aid kit including an adequate supply of sterilized dressing materials and appliances. Suitable transport to take injured or sick person to the nearest hospital will be immediately provided.
- The project will ensure the safe working of all workers. Workers will be provided with safety gadgets and enforce to wear it during the construction work. This will include protective footwear, helmets and gloves to all workers employed for the work on mixing, engaged in welding works; earplugs to workers exposed to loud noise; safety belt to the labors working at higher platforms and face masks to avoid dust.
- The project will strictly follow the statutory child labor act. The project will also ensure that no paint containing lead or lead products is used except in the form of paste or readymade paint. Facemasks will be provided for use to the workers when paint is applied in the form of spray. Adequate safety measures will be ensured for workers during handling of materials at site.
- The project will comply with all regulation regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations and safe means of entry and exit.
- The project will take adequate precautions to prevent danger from electrical equipment's. No material will be so stacked or placed to cause danger or inconvenience to any person or the public.
- All machines to be used in the construction will conform to the relevant Indian Standard Code, it will be free from patent defect and will be kept in good working condition, will be regularly inspected and properly maintained as per IS provision
- To maintain hygienic conditions in the site during construction phase, suitable toilet facilities will be provided for workers separately. Also, sewage generated during construction phase will be treated in septic tank and soak pit to avoid impact on ground water.
- Work spots will be maintained clean and provided with optimum lighting.

10.10. Greenbelt Development Plan

Green vegetation cover is beneficial in many ways leading to conservation of biodiversity, retention of soil moisture, recharge of ground water and maintaining pleasant microclimate of the region. In addition, vegetation cover can also absorb pollutants from the environment and helps in effective pollution control. Green vegetation is not only for the purpose of creating a green view for soothing the eyes but has an important role in conserving the ecological and biological diversity of flora and fauna in soil, water and air. The green belts around the plant site also capture the fugitive emissions emanating from Plant operations, attenuate the noise generated, improve the aesthetics and acting as a carbon sink. Development of planation with green belt has been considered as an important domain as certain species of plants can even absorb the pollutants while others can thrive in polluted atmosphere.
The main objective of the green belt is to provide a barrier between the plant and the surrounding areas. The green belt helps to capture the fugitive emissions and to attenuate the noise generated in the plant apart from improving the aesthetics of the plant site.

Trees and plants are an essential component of healthy environment. In addition to maintaining the oxygen-carbon dioxide balance in the atmosphere through photosynthesis,

trees and plants control air and noise pollution, control soil erosion, provide food and shelter to domestic and wild animals including birds and insects, and improve the aesthetic value of the environment. The utility of the green belt predominantly lies in its capacity to attenuate the fugitive emissions and spillage. Thus, the objectives of the proposed green belt program are as follows:

- To control air pollution due to fugitive emissions and spillage.
- To attenuate noise generated by various machines.
- To attenuate the effect of accidental release of toxic gases.
- To reduce the effect of fire and explosion.
- To improve the general appearance and aesthetics of the area.
- To provide food and habitat for wildlife.
- To control soil erosion.
- To obscure the proposed facilities from general view.

10.10.1. Greenbelt in Existing Stage-I

MUNPL Meja Stage-I was developed on Plateau/rocky land. Plantation and its survival in such land profile is a challenging. At present about 163 Ha with survival percentage of 81.7% is carried. The geology of the study area and MUNPL area (Main Plant, Township, Ash Dyke and others) is located in the Plateau part of Vindhya Region. MUNPL Stage-I was developed on Plateau/rocky land. Plantation and its survival in such land profile is a challenging. MUNPL MEJA has approached domain expert the Divisional Forest Officer-Prayagraj for plantation in the Study Area.

As per ToR issued by MoEF&CC, certificate is obtained from Divisional Forest Officer-Prayagraj for the existing plantation carried by MUNPL Meja in Stage-I. Copy of the certificate is attached as **Annexure-22**. As per DFO-Prayagraj the total planation carried is 3,68,160 and existing survival rate is 81.7%.

Table 10.9 Plantation carried out in existing Stage-I

Planation Year	Plantation	Survived	Survival %
2011-12	94000	70500	75
2012-13	12000	10200	85
2013-14	10000	8500	85
2014-15	14000	11900	85
2015-16	100000	78000	78
2016-17	15000	12750	85
2017-18	15000	12750	85
2018-19	12000	10200	85
2019-20	14160	11611	82
2020-21	40000	34000	85
2021-22	12000	10200	85
2023-24	30000	30000	100
Total	**368160**	**300611**	**81.7**

Source: DFO-Prayagraj

As availability of suitable land for plantation is a constrain. MUNPL has adopted new method of plantation – Miyawaki method of plantation in 2023-24. Existing total land covered under greenbelt is about 163.0 Ha. In addition to the above plantation, every year more than 2,000 fruit bearing plants are distributed to villages through gram panchayaths to PAP villages, schools, institutions, etc.

Details of tree species planted is provided in below **Table 10.10**. Photographs of existing greenbelt is given after the table.

Table 10.10 : Details of Tree Species Planted in Existing Stage-I

S.No	Common Name	Botanical Name		S. No	Common Name	Botanical Name
1	Ganga Omli	*Pithecellobium dulce*		22	Pakar	*Ficus urens*
2	Siris	*Albizia labbeck*		23	Kaintha	*Limonia sps.*
3	Mango	*Mangifera indica*		24	Jungle jalebi	*Acacia Auriculiformis*
4	Neem	*Azadiracta indica*		25	Kasod	*Casseia seamia*
5	Jamun	*Syzygium cumini*		26	Baiken	*Melia azidarch*
6	Karanj	*Pongamia pinnata*		27	Bel	*Aegle marmelos*
7	Amla	*Phyllanthus emblica*		28	Amrood	*Psidium guajava*
8	Shisham	*Delbergia sisoo*		29	Chilbil	*Holoptelea integrifolia*
9	Guava	*Pisidium guajava*		30	Sahtut	*Morus alba*
10	Saptaparni	*Alstonia Scholaris*		31	Kachnar	*Bauhinia variegata*
11	Gulmohar	*Delonix regia*		32	Amaltas	*Cassia fistula*
12	Teak	*Tectona grandis*		33	Kathal	*Atrocarpus hitrophillus*
13	Bahera	*Teminalia belarica*		34	Chitwn	*Alstonia scholaris*
14	Pipal	*Ficus religiosa*		35	Tecoma	*Tecoma stans*
15	Arjun	*Terminalia arjuna*		36	Ber	*Ziziphus mauritiana*
16	Imli	*Tamarindus indica*		37	Botte brush	*Callistemon sps.*
17	Mahua	*Madhuca longifolia*		38	Peltophorum	*Peltophorum pterocarpum*
18	Lisoda	*Cordia myxa*		39	Gamhaar	*Gmelina arborea*
19	Kadam	*Neolamarckia cadamba*		40	Harsingaar	*Nyctanthes arbor-tristis*
20	Semal	*Bombax ceiba*		41	Kaner	*Narium indicum*
21	Bargad	*Ficus bengalensis*		42	Karipatta	*Murraya koenigii*

Birds Eye View

Plantation along Railway Line

Plantation along Railway Line

Neem Path in Main Plant towards Service Building

Plantation towards Administrative Building

Existing Greenbelt

Water Reservoir : Plantation Before and After


New Administrative Building Area: Plantation before and after


Anversary Park : Plantation before and after

Plantation along DFA Road

Miyawaki Method of Planation

Mass Planation Drives

Mass Planation Drives

10.10.2. Proposed Greenbelt Development Plan

Plantation inside MUNPL Project Premises

MUNPL has already developed a dense greenbelt covering 163 hectares within its existing facility. For the proposed expansion, MUNPL plans to establish an additional 303.03 hectares of dense greenbelt within the premises, bringing the total greenbelt area to 466.03 hectares.

As part of the proposed MEJA-Stage-II project, in line with the ToR guidelines, an effective greenbelt will be developed around the plant. A diverse mix of native tree species will be planted in close proximity to minimize gaps. The greenbelt will be designed with at least three tiers of trees around the plant boundary, ensuring a minimum tree density of 2,000 trees per hectare with a survival rate exceeding 80%. Additionally, grasses, bushes, and hedges will be planted along the roads as part of avenue plantation.

Greenebelt Budget: MUNPL has earmarked a total budget of Rs. 55.42 Cr for greenbelt development. Out of this, Rs. 38.72 Cr has already been approved by DFO Prayagraj. Additionally, MUNPL has allocated an extra budget of Rs.16.7 Cr for greenbelt development, which is pending approval from DFO.

Plantation outside MUNPL Project Premises

Beside that Over and above the greenbelt, as carbon sink, additional planation shall be done in 271 Ha of degraded forest area in consultation with DFO Prayagraj. Native species of trees shall be planted in consultation with DFO, Social forestry department. MUNPL consulted Divisional Forest Officer-Prayagraj for assistance in plantation within MUNPL premises and in the surrounding degraded forest land under DFO-Prayagraj. MUNPL has proposed planting in degraded forest areas, A total of 271 Ha of plantation has been identified by MUNPL in consultation with the Forestry Division Prayagraj. A comprehensive action plan for this external plantation has been developed and approved by the Forestry Division Prayagraj. Under greenbelt plantation Neem (*Azadiracta Indica*), Karanj (*Pongamia pinnata*), Kadamb (Neolamarckia cadamba), Jungle Jalebi (*Pithecellobium dulce*),, Mahua (*Madhuca longifolia*), Imli (*Tamarindus indica*), Sagon (*Tectona grandis*), Amaltas (*Casia fistula*) , Chilbil (*Holoptelea integrifolia*), Bargad (*Ficus benghalensis*), Pakad (*Ficus virens*), Peepal (*Ficus religiosa*), Khair (*Acacia catechu*), Bans (*Dendrocalamus sps*.), Cassia (*Cassia afrofistula*) and semia (*Senna siamea*) and Arru tree species shall be planted.

As per MoEF&CC guidelines for tree development of around 2000 no. of trees/Ha, shall be planted. Thus total approx. 8,03,000 no. of trees shall be planted within the plant as well as in degraded forest land. A comprehensive budget of Rs. 38.72 Crores has been allocated for greenbelt development inside the plant as well as outside of plant in degraded areas. The proposed greenbelt development action plan from DFO-Prayagraj is attached as **Annexure-23.** The plantation will be carried in a phase manner from 2024-25 to 2033-34. Details of the area and cost of plantation is summarised in Table 10.10 and action plan of tree plantation is given in Table 10.11.

Table 10.11 : Details of the year wise Plantation outside plant

Planation Year	Plantation Area in MUNPL (Ha)	Plantation Area in RF (Ha)	Total Cost in Rs. Crore
2024-25	10	21.5	3.06
2025-26	10	30	3.79
2026-27	10	30	3.79
2027-28	10	30	3.79
2028-29	20	20	4.01
2029-30	10	30	3.79
2030-31	20	20	4.01
2031-32	10	30	3.79
2032-33	15	30	4.35
2033-34	15	30	4.34
Total	**130**	**271.5**	**38.72**

Beside this, plantation shall be carried out in nearby areas and surrounding villages of project, Panchayat lands, along the roads, in surrounding schools/colleges, near water bodies and others. Copy of letters received from neighbouring schools is attached as **Annexure-24**.

Table 10.12 Action Plan of Tree Plantation Project by Meja Urja Nigam Private Limited

S.No	Year	Name of Plantation Site	Area of Plantation Site (in hectares)	Earmarked Budget (Rs. In Crores)
1	2024-2025	M.U.N.P.L., Meja (Next to Railway Line)	10	1.14
		Kohdhar Reserved Forest (Degraded Forest Area)	21.5	1.92
2	2025-2026	M.U.N.P.L., Meja (Next to Railway Line)	10	1.11
		Kohdhar Reserved Forest (Degraded Forest Area)	30	2.68
3	2026-2027	M.U.N.P.L., Meja (Next to Railway Line)	10	1.11
		Kohdhar Reserved Forest (Degraded Forest Area)	30	2.68
4	2027-2028	M.U.N.P.L., Meja (Next to Railway Line/ Near Ash Dyke)	10	1.11
		Kohdhar/ Mudpela Reserved Forest (Degraded Forest Area)	30	2.68
5	2028-2029	M.U.N.P.L., Meja (Beside Railway Line/ Near Ash Dyke)	20	2.22
		Salaiya Khurd/ Mudpela Reserved Forest (Degraded Forest Area)	20	1.79
6	2029-2030	M.U.N.P.L., Meja (Near Ash Dyke)	10	1.11
		Salaiya Khurd/ Mudpela Reserved Forest (Degraded Forest Area)	30	2.68

S.No	Year	Name of Plantation Site	Area of Plantation Site (in hectares)	Earmarked Budget (Rs. In Crores)
7	2030-2031	M.U.N.P.L., Meja (around Ash Dyke)	20	2.22
		Mudpela Reserved Forest (Degraded Forest Area)	20	1.79
8	2031-2032	M.U.N.P.L., Meja (Near Plant Area)	10	1.11
		Singhpur Khurd Reserved Forest (Degraded Forest Area)	30	20.68
9	2032-2033	M.U.N.P.L., Meja (Near Plant Area)	15	1.67
		Dari/ Mudpela Reserved Forest (Degraded Forest Area)	30	2.68
10	2033-2034	M.U.N.P.L., Meja (Near Plant Area)	15	1.66
		Dari Reserved Forest (Degraded Forest Area)	30	2.68
Total			**401.50**	**38.72**

10.11. People/Public Health Management

The existing Meja Thermal Power Station has already full-fledged hospital (Aarogyam hospital) to cater the health needs of employees of NTPC, CISF, PAPs and other nearby villages and the same will be extended after the proposed expansion also.

Aarogyam hospital has been serving employees and neighbouring community since last 06 years. It is a 30 bedded hospital that provides 24-hour emergency services with regular doctors, administrative staff and regular Para medical staff.

Aarogyam hospital of MUNPL is a full-fledged 30 bedded hospital with an adequate number of qualified medical staff which is serving MUNPL employees & their dependents, Contract workers, School and surrounding PAP affected villages. It also acts as an occupational primary health care center where contract workers also avail services. Hospital provides Emergency services, trauma management, first aid facilities, lifesaving medicines and ambulance to meet any emergency. A 24 x 7 first aid centre is also run by hospital at plant premises catering to employees & contract workers for immediate medical support. More than 25,000 people from surrounding villages have benefitted from doctor's consultation in hospital OPD, and more than 800 people have been treated in emergency since 2018 till date. Annual medical check-up had been conducted for more than 20,000 contract workers till date.

Annual medical check-up of all the employees is done at periodic intervals through empanelled hospitals. Medical checkup of contract workers is done at the hospital. Health records are maintained in HMS for each employee while for contract workers, they are uploaded in CLIMS. Regular health check-up is carried out as and when required at the hospital. Precautionary measures are taken to avoid any occupational health hazards.

Aarogyam hospital has an in-house laboratory which has performed lab tests for more than 21,000 contract workers from 2021 till date. It also has an in-house imaging section where more than 19,571 non-entitled beneficiaries have been screened.

Details of the existing medical facilities is provided below:

Existing Medical Facility:

- OPD services
- Telemedicine services
- Physiotherapy services
- Laboratory services
- PFT, Audiometry services
- Imaging services - X-Ray services
- Rural Health Camps
- Workers CLIMS Medical check Up
- Emergency Services
- IPD services (15 Beds+1 Burn Unit)
- First Aid Centre (FAC) in plant premises
- Ambulances – 01 BLS and 01 ACLS Ambulance at Hospital
- 01 BLS Ambulance at FAC

10.12. Management of Construction Site

Contractual workers will be engaged during the site preparation and plant construction work. For the workers at plant site, desired facilities at porta cabins; toilets, kitchens, adequate supply of electricity and water and other things of daily needs including the facility of first aid shall be provided.

A drainage system shall be constructed to drain off all runoff water from the work site into suitable drain outlet attached to STP. Temporary drainage shall maintain, removed and reinstated as required. Wastewater arising from toilets of site offices shall be treated in STP. Truck loading, unloading and hauling operations so as to minimize noise impact near surrounding villages to be properly scheduled. Machinery that emits noise in one specific direction would, where possible be oriented in a direction away from noise sensitive receptor (human habitation). Silencers and mufflers on construction equipment, wherever required, to be properly fitted and maintained. The foundation of every machinery shall be so designed that vibrations are minimized and isolate the every machine from each other so as to travel of vibrations from one machine to another machine. Vibrations curtailing material shall be used in the foundations. Litter disposal and collection points will be established around the all work sites. Biodegradable garbage from kitchen and tree litters will be composted and used as manure. A road roller shall also be deployed to compact the loose surface of the haul road. A water sprinkling tanker shall also be deployed to maintain the haul road surface moist at all time.

Labour Look after Plan: A brief of the measures that have been suggested for the labour under the labour management action plan (Labour including contract workers and drivers) include the following:

- Provision of common toilets and bathing facilities duly segregated for male and female labour;
- Supply of kerosene, coal/fuel wood by the contractors for their labour to prevent deforestation
- Collection of domestic waste and proper disposal.
- Monthly inspection of labour camps to focus on the following:

General observations on cleanliness.

- Drinking water availability with respect to source, cleanliness of storage tanks and quality fit to be consumed.
- Provision of sanitation facilities to water availability in toilets their cleanliness and drainage.
- Provision of garbage collection, segregation and disposal facilities.

10.13. Roof Top Solar Plant

The Solar Photo Voltaic (PV) installation on Rooftop of various buildings of the Power Plant shall be carried out preferably on shadow free area in such a way that the generation is maximized on each building suitable for installation of Solar PV power plants. Solar PV rooftop system will be installed on the buildings under proposed plant on the basis of 15 square metre area (shadow free) per kwp. Estimated capacity for roof top solar is 1500kWp.
Technical Requirements for Rooftop Solar Power Plant shall be as below:

- Shadow free flat roof top area having proper drainage
- Total distributed load of the roof top PV due to panels, supporting structures, equipment's and concrete blocks etc. and imposed load will not be more than 100 kg/m^2
- Proper approach to the roof top through lift / staircase.
- Availability of water for panel washing

Implementation Schedule

- Implementation schedule for "Roof Top Solar PV Plant" will be approximately 6 months from the Award of solar package by EPC contractor subject to availability of roofs identified in the tender documents. It will be commissioned before commercial operation of the last unit of the thermal project.

In addition to the above, MUNPL has pinpointed rooftop locations within the existing township and plant area for harnessing solar energy and It is planned to be installed by 2025-2026. The specific locations for solar rooftops on various buildings are detailed in Table 10.13.

Table 10.13 Solar Rooftop potential of various buildings Under Stage#1

S. No	Building	Location	Approx. Area (in sq m)	Potential KW
1	Club building	Township	400	40
2	Guest House	Township	1200	120
3	Auditorium	Township	1200	120
4	Shopping Complex	Township	870	87
5	Hospital Building	Township	3000	300
6	Main plant house Unit-1	Plant	5000	500
7	Service building	Plant	1200	120
8	Canteen	Plant	1000	100
9	Main plant house Unit-2	Plant	5000	500
10	Admin building	Outside plant	1000	100

Other Energy Saving Measures: Besides above the other power savings methods are adopted for energy conservation:

- Temperature sensors with visible temperature indicators in the switch boards
- Check metering at various locations to check the power consumption and power loss if any.
- Suitable rating and size cables selection to limit the total power distribution losses less than 1%
- Solar water heater for pre – heating water required for bathing and cooking.
- Solar streetlights to be provided in plant area, nearby villages and other public roads.

10.14. Rainwater harvesting plan

MUNPL as an environmentally responsible company is working as a specific “Rainwater Harvesting Policy” of company. MUNPL has already constructed two no. of rain harvesting pits and two rainwater recharge pits are already existing in the plant. Beside that MUNPL has restored many ponds in the study area. The photographs of the existing pits are given below:

Rainwater Harvesting Pits in Colony area

Renovation of pond in village Salaiya kala

Rainwater Harvesting in Proposed Stage-II

MUNPL/NTPC as an environmentally responsible company is working as a specific "Rain Water Harvesting Policy" of company. The rainwater harvesting will be planned as per said policy.

The Rainwater Harvesting (RWH) study undertaken for Meja, Uttar Pradesh, by the National Institute of Hydrology (NIH), Roorkee, focuses on optimizing water resources in the region through the collection and storage of rainwater. Given the region's climatic conditions and the sporadic availability of groundwater, RWH presents an opportunity to enhance water availability for agricultural, domestic, and industrial purposes. The rainwater harvesting study conducted by National Institute of Hydrology (NIH), Roorkee is attached as **Annexure-25.**

A. Groundwater Conditions in Project Area

In the study area wells and tube wells are the main ground water abstraction structures. Ground water is being developed in the area by medium to deep tube wells, dug wells, dug-cum bored wells. Based on 3 exploratory wells data in the area CGWB observed yield at Pipraon village was about 770 lpm (good to excellent on groundwater prospective) whereas yield of 107 lpm encountered at Saliya Khurd village belongs to very poor prospective area. Depth to water level ranges from 2.4 to 8.6 mbgl, during the survey period in September 2023. In Monsoon 2024, it was observed that water levels are higher which are going down by about 5-10 m down in the pre-monsoon period. The stage of ground water development in Meja block is 51.25% and is in safe category.

B. Rainwater Harvesting in Proposed Meja TPP

Objectives: The key objective of the project was to develop a comprehensive RWH system that can:

- Capture and store excess rainwater during the monsoon season.
- Recharge groundwater levels.
- Provide water for irrigation, reducing dependency on bore wells.
- Reduce soil erosion and runoff, preventing degradation of land.

The water demand in the MEJA campus is fully met from the Ganga River water supply and supply from groundwater in the campus is nil. As the ground water conditions of area are good

and levels of groundwater are satisfactory. However, considering the groundwater status, water supply and water demand in the MEJA campus, rainwater harvesting in the campus has been planned. Depending upon the location, size of sub-catchments in the MEJA plant and existing settlements, plant buildings, ash pond and open area in the MEJA, four possible sites has been identified by NIH Roorkee for Rainwater Water Harvesting structures. Looking into the increasing water demand due to expansion of residential facility and development of gardens around the residential area it was planned to install Rainwater Harvesting Systems (RWHS) in residential areas to recharge the groundwater. The total runoff potential from the study area comes out to be 1935648 m^3 i.e. 1.94 MCM. This is the total estimated rainwater harvesting potential of the whole area of MUNPL area.

Present ground water level around the site is less than 5 m below groundwater level during post-monsoon. Therefore, artificial ground recharge is not recommended in the project area either in Township or Plant area as per CGWB norms. However, it is recommended to prefer surface storage with existing or by constructing suitable storage structures (e.g., Dugout Ponds or storage tank) and proper surface storage can be preferred to avoid water logging issues in the future. However, the depth of the dugout pond needs to be restricted and it is not recommended more than 1.8 m due to shallow water table in the project area.

C. Conclusion:

By considering the limitations of the groundwater levels and space availability, it is recommended to utilize the presently available four ponds in study area for rainwater harvesting with its existing water storage capacity.

The suggested plan is also in tune with the existing rainwater harvesting policy of NTPC also, which prefers surface storage structures over ground water recharge.

While in plant area it is not recommended to design any surface storage structures due to water logging issue may be generated in the future.

Proposed Rainwater Harvesting in MUNPL

Based on the outcome of the NIH, Roorkee study at present MUNPL has identified three ponds within the township and an pond outside plant premises where rooftop runoff will be directed for rainwater harvesting. Additionally, MUNPL has selected one pond outside the plant premises for rainwater storage. The total volume for rainwater to be harvested in these ponds is estimated to be 41,120.64 cubic meters. MUNPL will develop the necessary drainage network for this purpose. The layout of the rainwater harvesting pond located within the township and outside the plant premise is presented in Figure 10.2 and Figure 10.3, respectively. Detailed area and volume of these ponds are provided below:

Table 10.14 Volume and Area of the Ponds

Sl. No.	Location Identified	Unit	No.	Area m^2	Depth (m)*	Vol. m^3
1	**Inside Pond -1**	m^3	1	1570.8	1.80	2827.44
2	**Inside Pond -2**	m^3	1	4505.8	1.80	8109.00
3	**Inside Pond -3**	m^3	1	13346.0	1.80	24022.80
4	**Plant outside**	m^3	1	3423.0	1.80	6161.40
Total Pond details		m3		**22844.8**		**41120.64**

Source: MUNPL Note: (*The depth of ground water table is more than 8 m at these pond sites)

MUNPL has allocated a budget of around Rs. 4.0 crore for rainwater harvesting through dugout ponds.

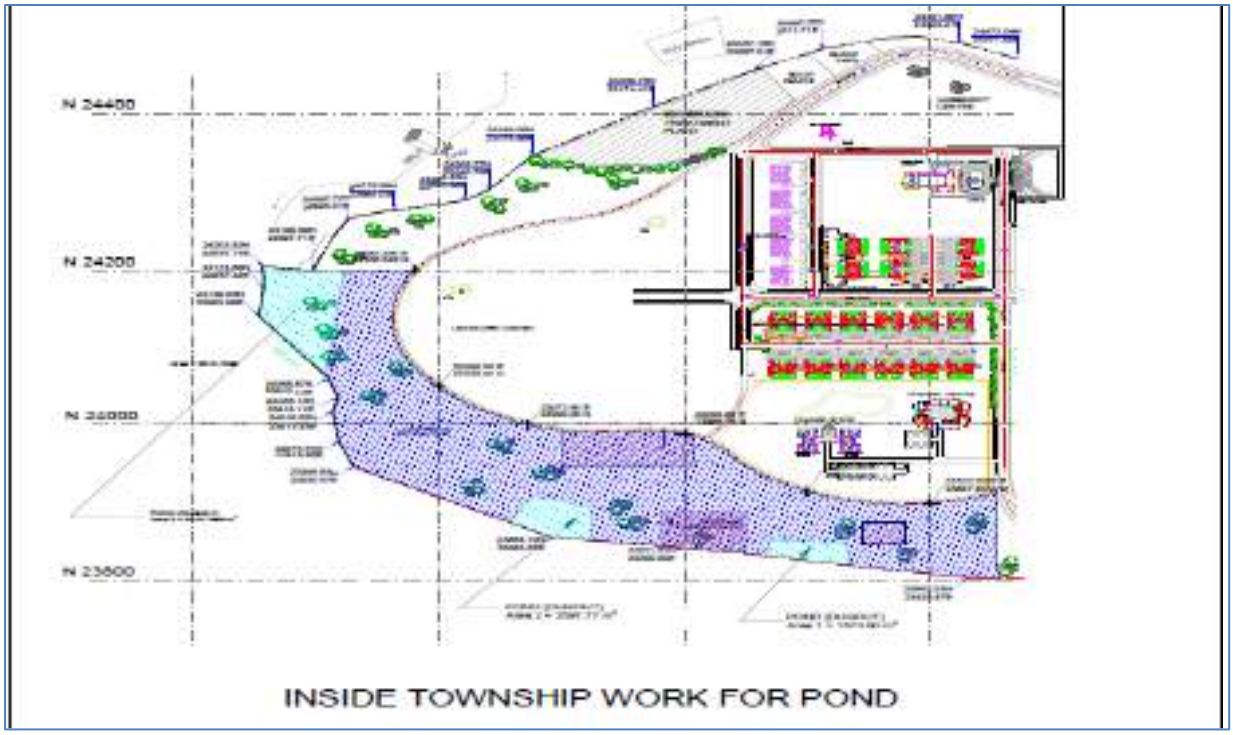


Figure 10.2 Rainwater Harvesting Pond inside Township area

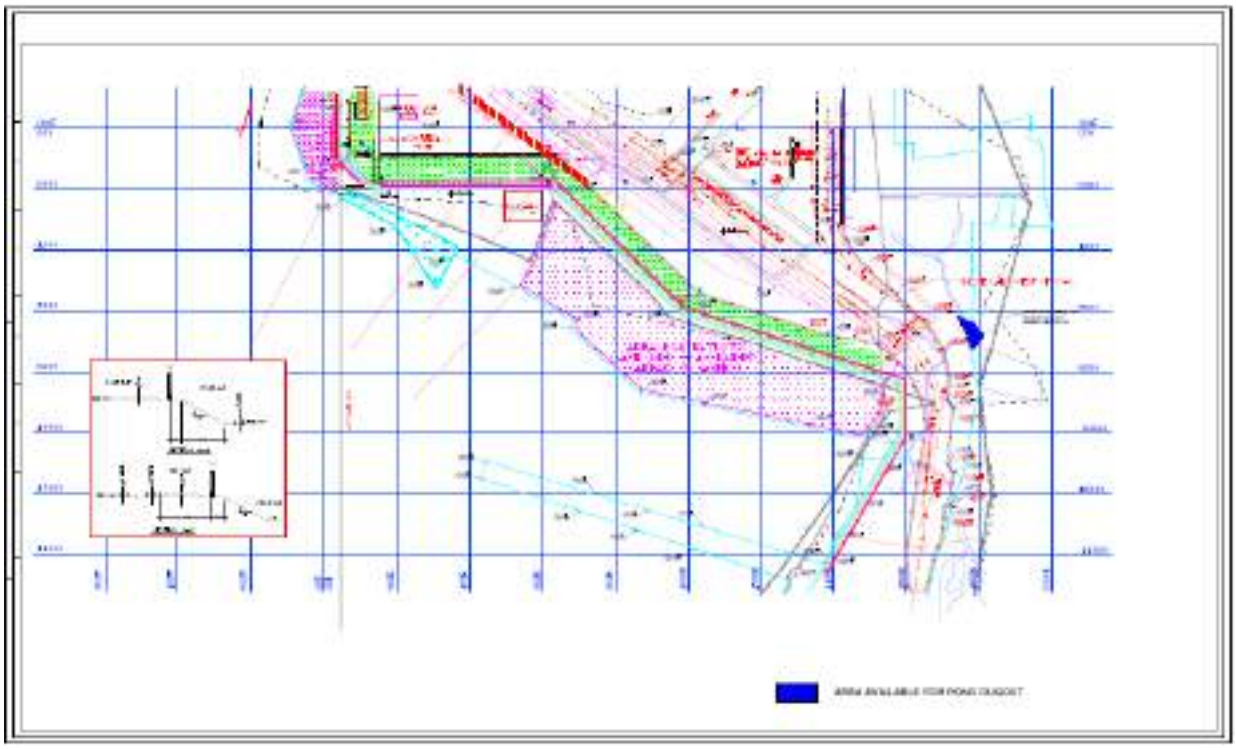


Figure 10.3 Rainwater Harvesting Pond outside Plant Permises

10.15. Rehabilitation & Resettlement Plan

The project site is situated near the villages of Kohdar, Mai Khurd, and Patai Dandi, within the Tehsil of Meja, Prayagraj, Uttar Pradesh. MUNPL already owns the land where the proposed expansion will take place, and this expansion will occur within the current premises, so no resettlement and rehabilitation (R&R) is needed for the existing land. However, an additional 114 Hectares of land will be acquired for the project: 110 Hectares of government land for the ash dyke and 4 Hectares of private land for the railway siding. There are no R&R issues associated with the 110 hectares of government waste land, but R&R issues will arise for the 4 hectares of private land required for the railway siding development.

There are about 150 PAP involved with the land. The land identification is in its initial stage and detailed R&R study shall be conducted in latter stages. For the implemetation of the R&R issues a tenetative cost of Rs. 36.24 Cr. has been earmarked by MUNPL. Details of the cost is given in follwing Table 10.15.

Table 10.15 Detailing of the R&R Budget

S. No	R & R Entitlement (Tentative Estimate)	No. of PAFs	Entitlement as per LARR Act'13 as on 01.01.2014 (₹ In Lakh)	Entitlement as per LARR Act'13 as on 30.06.2024 (₹ In Lakh)	Tentative cost of R&R (₹ In Lakh)-W/o Indexation
1	One-time cash grant in lieu of employment / Annuity	200	5	8.59	1000.00
2	Cost of Home-stead land for Resettlement Colony & Development of Infrastructure (if applicable)	150	-	-	398.21
3	Assets Cost on Land for Resettlement Colony	0	0	0	0.00
4	Cost of Infrastructure (Resettlement Colony)	150	-	-	1050.00
5	House Building Assistance - as per IAY	150	1.65	2.84	247.50
6	Subsistence Grant	150	0.36	0.62	54.00
7	In addition to this SC/ST will also get Rs. 0.5 lakh (Considering 25% HHs as SC/ST)	50	0.5	0.86	25.00
8	Transportation Allowance	150	0.5	0.86	75.00
9	Cattle shed / petty shops cost	150	0.25	0.43	37.50
10	One time grant to artisans, small traders & certain others (Considering 25% Families)	50	0.25	0.43	12.50

S. No	R & R Entitlement (Tentative Estimate)	No. of PAFs	Entitlement as per LARR Act'13 as on 01.01.2014 (₹ In Lakh)	Entitlement as per LARR Act'13 as on 30.06.2024 (₹ In Lakh)	Tentative cost of R&R (₹ In Lakh)-W/o Indexation
11	One-time resettlement allowance	450	0.5	0.86	225.00
12	Other R & R Benefits				500.00
13	Cost of CPR (if exists in to be acquired land)				
14	**Total R&R Cost**				**3624.00**
	CD Works		**LS**		**3454.00**
	Total (Rs. in Lakhs)				**7078.00**

10.16. Cost provision for Environment Management Plan (EMP Budget)

EMP for effective management of environmental impacts due to the proposed project and ensuring overall protection of the surrounding environment through appropriate management procedures has been prepared.

The capital cost for environmental management of the proposed project is estimated to be Rs 2952.71 Crores. This amount shall be used for constructing pollution control equipment & structures operation phase, Occupational Health & Safety of workers, Water Supply & Drainage system, Storm water management, Solar streetlight within project area, wastewater management, environmental monitoring, CSR/CER and greenbelt development. Recurring cost per annum is estimated to be Rs. 58.45 Cr.

10.17. Pollution Control Equipment Maintenance schedule

MUNPL will ensure that all air pollution control devices, wastewater treatment and water re-circulating systems function effectively. Contractor under the supervision of the company will do implementation of pollution control measures during construction phase. MUNPL shall also ensure the regular maintenance of the pollution control equipment. Yearly/Half yearly maintenance shall be done through the contractor. Air pollution control equipment (ESP, FGD, NOx Control and Dust equipment/Suppression system) are integral part of main plant equipment and the same are being/shall be maintained as per operation and maintenance philosophy of NTPC. the contractor. MUNPL will also ensure cleanliness and industrial hygiene in the plant. All records shall be submitted to the regulatory authorities (State Pollution Control Board), displayed at company gate and website. Pollution Control Equipment Maintenance schedule is provided in **Table 10.16**.

Table 10.16 Pollution Control Equipment Maintenance schedule

S. No	Description/ Pollution Control Equipment	Remarks	Check/Maintenance Schedule
1	ESP, FGD, NOx controller Preventive maintenance check for ESP.	ESP is checked for daily, weekly, monthly, quarterly and yearly for different parameters and if any irregularity noted schedule maintenance done accordingly	**Daily Check for:** Record Electrical Readings and transmission meter data **Weekly Check for** Check the rapping system operating condition **Quarterly Check for** Check control panels (clean & operating condition) **Yearly Check for:** Clean insulator rooms and all insulator surfaces. Examine and clean all contactors and inspect tightness of all electrical connections and Clean and inspect all gasket connections check and adjust operation of switchgear check and tighten rapper insulator connections
2	02 DFDS (Dry Fog Dust Suppression) pumps and 02 Air compressors	Sprays mix of water and air in every coffin box near coal chute	DFDS Pump: 4W PM schedule DFDS Comp: 4W PM schedule
3	02 DSWT (Dust suppression Wagon Tippler	Sprays service water at WT area above and in hopper	DSWT Pump: 4W PM schedule
4	02 DSPF (Dust suppression Paddle Feeder) pumps	Fills the tank of water in each Paddle feeder for water spraying purpose when PF in use	DSPF Pump: 4W PM schedule
5	02 DSTH (Dust Suppression Track Hopper) pumps are available	In BOBR unloading area i.e. TH - dust suppression system PR initiated	DSTH Pump: 4W PM schedule
6	02 Sprinkler pumps for stockpile dust suppression	Sprays water for dust suppression in all 04 Coal yard through 88 spray Nozzles.	Sprinkler Pump: 4W PM schedule
7	New Modified pre wetting system has also been installed which takes water from service water pumps	Sprays water at following conveyors: Conv 02 A/B, 05A/B, 10A/B - Tail end	Service Water Pump: 4W PM schedule

S. No	Description/ Pollution Control Equipment	Remarks	Check/Maintenance Schedule
		Conv 01 A/B - near penthouse Conv-11 A/B - Head end at TP-11	

10.17.1. *EMP Budget*

A cost provision of Rs. 2952.71 Crores have been kept towards providing environmental measures and details are presented in **Table-10.17.**

Table 10.17 : Proposed EMP Budget for Stage – II (3 x 800 MW)

S. No	Item Description	Cost Rs. Crores	Recurring Cost Rs. Crores
1	Electrostatic Precipitator	519.14	10.4
2	Chimney	164.84	3.3
3	Cooling Towers incl. Civil Works	29.24	0.6
4	Ash Handling	946.03	18.9
5	Ash Disposal Area	373.72	7.5
6	Ash Water Recirculation Incl. ETP	2.1	0
7	Dust extraction & suppression System	7.5	0.2
8	DM plant waste treatment systems	31.25	0.6
9	Sewerage collection, treatment & disposal	8	0.2
10	Green Belt, Afforestation & Landscaping	55.42	0.55
11	FGD	770.42	15.4
12	CER	34.55	0.4
13	Environmental Lab with monitoring Equipments	2	0.3
14	Wildlife Conservation Plan	3.5	0
15	Water Shed Development Plan	1	0.02
16	Rainwater Harvesting	4	0.08
Total		***2952.71***	***58.45***

Source: MUNPL

Chapter 11. SUMMARY AND CONCLUSION

11.1. Introduction

Meja Urja Nigam Private Limited (MUNPL), a 50:50 Joint Venture Agreement of NTPC Ltd & UPRVUNL and was registered as a company on 02.04.2008, with an intent to establish Meja Thermal Power Project. Meja Urja Nigam Private Limited (MUNPL) has an installed capacity of 1320 MW with both units (2X660 MW) under commercial operation since 30.04.2019 and 31.01.2021 respectively. The power plant is located near Villages Kohdar, Mai Khurd and Patai Dandi, Tehsil-Meja, District-Prayagraj, Uttar Pradesh. Both the units of the power plant have been commissioned. The power generated by the plant is supplied mainly to Uttar Pradesh along with the states of Uttarakhand, Chandigarh, Rajasthan, Punjab, J&K, Delhi, Madhya Pradesh and Haryana.

MUNPL is planning to install a 3X800 MW Coal based thermal power plant near Villages- Kohdar, Mai Khurd and Patai Dandi, Tehsil-Meja, Prayagraj, Uttar Pradesh in line with MoU with govt. of Uttar Pradesh. MoM dated 27.12.2022, Ministry of Power and CEA identified Meja Stage-II Project (2X660 MW) for capacity addition by the year 2030, decided during the meeting held on 09.12.2022 under the Chairmanship of Secretary (Power).

Ministry of Power vide Office MEMO dated 25.10.2023 reviewed the capacity addition upto year 2031-32 with upgradation of capacity of Meja Project for Stage-II from 2X660 MW to 3X800 MW. Recently, a supplementary JV Agreement has been signed between NTPC and UPRVUNL (Uttar Pradesh Rajya Vidyut Urja Nigam Limited)/ Govt. of Uttar Pradesh on 13.09.2023 for the joint development of Meja-II with Anpara-E and Obra-D projects.

As per Environmental Impact Assessment (EIA) Notification dated 14.09.2006 and subsequent amendments of Ministry of Environment and Forests and Climate Change (MoEF&CC), the proposed project falls under Category A of Schedule 1(d) and requires prior Environmental Clearance from MoEF&CC. Further, Category A projects also attract the provisions of Public Consultation as per EIA Notification dated 14.09.2006. An application for accord of ToR (Terms of Reference) for the project was submitted to MoEF&CC on 20.10.2023. ToR has been accorded for the project by MoEF&CC vide F.No. J-13012/03/2008- IA.II (T) dated 14th December 2023.

The EIA/EMP (Environmental Impact Assessment/Environmental Management Plan) report has been prepared by M/s EQMS India Pvt. Ltd., Delhi (Formerly known as EQMS India Pvt. Ltd.) in accordance with the Terms of Reference (TOR) provided by the Ministry of Environment, Forest and Climate Change (MOEF&CC). The public hearing for the project was conducted on 24 June 2024. The Final EIA report has been prepared after incorporating the comments/ suggestion raised by the public during public hearing and are incorporated in Chapter-7.

11.2. Project Description

Location: Proposed 3x800 MW Super Thermal Power Plant of **M/s Meja Urja Nigam Private Limited (MUNPL),** is located near Villages Kohdar, Mai Khurd and Patai Dandi, Tehsil-Meja,

Prayagraj, Uttar Pradesh. The latitude and longitude of centre of the site are 25^0 09' 10'' North and 81^0 56'50'' East, respectively.

Nature of Project: MUNPL Stage-II project will be a coal fired thermal power project. The proposal involves construction and operation of 3x800 MW. Salient features of the project is given in Table 11.1.

Table 11.1 : Salient features of Proposed Project

S. No	Features	Description	
		Existing Stage-I (2X660MW)	Proposed Expansion Stage-II (3X800MW)
1	Capacity/Configuration	2x660 MW	3x800 MW
2	Technology	Super-Critical Technology	Ultra Super-Critical Technology
3	Construction Power	-	4MW construction power for the Meja Stage II would be met from existing 2 No. power sources (Each having capacity to handle 4MW) installed for Meja Stage-I, from Purvanchal Vidyut Vitran Nigam Limited.
4	Source of Coal	NCL & CCL	BCCL. Coal allotment letter is attached as **Annexure-16**
5	Coal requirement	7.34 MTPA	9.94 MTPA
6	Mode of Transportation	Through Rail	Through Rail
7	Moisture (%)	13-14	13-14
8	Sulphur content	0.3 to 0.5 %	0.3 to 0.5 %
9	Average gross Calorific value (kCal/kg)	3000 (NCL) 3900 (CCL)	3900
10	Capacity of Installed Boiler	2120 TPH	2580 TPH
11	Ash Content in Coal	34-43%	40%
12	Total Ash Generation	2.79 MTPA	3.78 MTPA
13	Fly ash	2.232 MMTPA	3.024 MTPA
14	Bottom ash	0.558 MTPA	0.756 MTPA
15	ESP efficiency (%)	>99.9	>99.9
16	Stack height (Meters)	One twin flue chimney of 275M height	One twin flue chimney of 220M height & one single flue chimney of 150M height
17	Water requirement	Allocated: 44 Cusecs Current usage: 39 Cusec Surplus: 5 Cusec	Requirement: 30 Cusec Surplus available: 5 Cusec from Stage-I
18	Water source	River Ganga	River Ganga

S. No	Features	Description	
		Existing Stage-I (2X660MW)	Proposed Expansion Stage-II (3X800MW)
		(29 Km, pipeline)	(29 Km, pipeline)
19	Land requirement (Ha)	1295 Ha	Within existing land. Additionally, proposed acquisition - 114 Ha (110Ha. for Ash Pond & 4Ha. for Railway siding).
20	Project cost	Rs.13,093 Crores	Rs. 25,081.88 Crores

Source: MUNPL

Land Requirement: The project site is located near Villages-Kohdar, Mai Khurd and Patai Dandi, Tehsil: Meja, Prayagraj, Uttar Pradesh. The land is already in possession of MUNPL. Proposed expansion shall be done with in the existing permises. Additional 114 Ha of land for Ash dyke (110 Ha Govt. land) and railway siding (4 Ha Pvt land) shall be aquaired for the project. The land breakup of the project site is shown in **Table 11.2.**

Table 11.2 : Land Requirement

Description	Existing Land Area		Proposed Additional Land requirement for Stage-II (Ha)
	Land area for Stage-I as per EC/EIA (Ha)	Land area for Stage-II already taken with Stage-I (Ha)	
Main Plant	144.2	183.8	0
Ash Pond	262	Shared with Stage-I	110
Township	85	Shared with Stage-I	0
Railway Siding	171	Shared with Stage-I	4
Reservoir	75	Shared with Stage-I	0
Makeup water	5.22	Shared with Stage-I	0
*Existing Green belt *(along plant boundary, reservoir boundary, between reservoir, ash dyke, ash silo etc., area protected/marked*)	87*	0	0

Proposed Greenbelt *(unutilised/vacant area along plant boundary, Township boundary, reservoir boundary, ash dyke boundary, between reservoir and ash dyke, ash silo etc., area protected/marked)*	0	186.42	0
**Miscellaneous	**95.36	Shared with Stage-I	0
Sub-Total (Ha)	**924.78**	**370.22**	**114**
Total (Ha): Existing and Proposed	**1295**		**114**
Grand Total (Ha)	**1409**		
***In addition to the 87 Ha of existing greenbelt as mentioned above, additional 76Ha. greenbelt has been already developed within main plant, township & railway siding area thus total greenbelt in existing plant is 163 Ha. (Details given in table below)**			
***** Includes Public roads, vegetable market, Parking, admin building, undulating land, drains, dry fly ash silo, outside area, open areas etc.***			

Source: MUNPL

Table 11.2.1: Existing and proposed Greenbelt details within the MUNPL Premises

Description	Existing Greenbelt area (in Ha)	Proposed Greenbelt area (in Ha)
Green belt within Main Plant area	10	21.15
Green belt within Ash Pond area	0	14.41
Green belt within Township area	22	5.05
Green belt within Railway Siding area	44	76
Green belt within Reservoir area	0	0
Green belt within Makeup water area	0	0

Existing Green belt (*along plant boundary, reservoir boundary, between reservoir and ash dyke, ash silo etc., area protected/marked)*	87	0
Proposed Greenbelt *(unutilised/vacant area along plant boundary, Township boundary, reservoir boundary, ash dyke boundary, between reservoir and ash dyke, ash silo etc., area protected/marked)*	0	186.42
Miscellaneous	0	0
TOTAL	**163**	**303.03**
Grand Total	**466.03**	
% of Total Land (1409 Ha)	**33.08 %**	

Source: MUNPL

Coal Requirement: Main Raw material required for Power plant is Coal. Approx. 9.94 MTPA corresponding to 85% PLF considering GCV of 3900 Kcal/Kg shall be required for the project. Coal linkage source is allocated from BCCL for Meja STPP Stage-II vide CIL letter dated 20.06.2024. Copy of the Coal linkage is attached as **Annexure-16.**

Water Requirement:

Construction Stage: Approx. 400 KLD of water shall be required during the construction phase. Source of water requirement will be from the surplus water from the existing plant.

Operational Phase: Water requirement for existing Stage-I is 39 Cusec and is presently being drawn from Ganga River. Govt. of UP (GoUP) has allocated 44 Cusec of water for Stage-I. The water requirement for Stage-I is 39 Cusec and Surplus water available is 5 Cusec. For meeting the requirement of Stage-II, an additional water allocation of 25 Cusec shall be obtained from GoUP from Ganga River.

The make-up water requirement for this project would be about 3000 m^3/Hr., (30 Cusecs) with bottom ash as lean slurry and fly ash as HCSD system for ash handling. Air Cooled Condensers (ACC) is envisaged for Stage-II (3x800 MW) units.

Proposed site photograph

Manpower Requirement

The proposed expansion power plant will require skilled, semi-skilled and unskilled personal during construction and operational phase. Many of the people from neighbouring villages, as found suitable will get opportunity for indirect employment through contractors during construction and operational phase. The total manpower from various agencies during construction of Stage-

II would be about 5046 (60 permanent and 4986 temporary) during peak deployment) and during operation period is estimated to be about 5250 (210 permanent and 5040 temporary). However, the exact numbers may vary during construction and operation phases.

11.3. Description of environment

As per the ToR prescribed by MoEF&CC for the proposed project, the study area is 10 km radius from the project site. The baseline environmental data generation has been done for the period of 1st October 2023 to 31st December 2023 based upon which the EIA report has been prepared. The micro-meteorological data like wind speed, wind direction, temperature, relative humidity and atmospheric pressure were collected using the weather stationed cloud cover was recorded for the study period. The Power Plant site falls under Seismic Zone-III (Moderate Risk Zone). The meteorological parameters have been recorded and are presented in **Table 11.3**.

Table 11.3 : Summary of the Meteorological Data of Site (Oct 2023 - Dec 2023)

Parameter		Oct- 2023	Nov-2023	Dec-2023
Temperature (°C)	**Max**	37	32	31
	Min	22	14	11
	Avg	29.84	24.86	21.07
Relative Humidity (%)	**Max**	80	71	70
	Min	18	15	19
	Avg	44.80	31.44	35.94
Rainfall (mm)	**Avg.**	18.7	2.3	4.3
Wind Speed (m/s)	**Avg**	1.21 m/s		
Predominant Wind Direction	**(from)**	W, SW		
Calm Period	**%**	30.34%		

Particulate Matter (PM_{10}): The maximum PM_{10} level were found at Project Site (Meja TPP Main Entry Gate) (94 µg/m^3) and lowest PM_{10} level (42 µg/m^3) were observed at Sonbarsi, Piprau and Rithaiya Village, while the mean conc. of all location ranges between 65-75 µg/m^3. The PM_{10} level in all the monitoring locations is within the standard i.e. NAAQMS level 100 µg/m^3.

Particulate Matter ($PM_{2.5}$): The maximum $PM_{2.5}$ level were found at Project Site (54 µg/m^3) and lowest $PM_{2.5}$ level were observed at Sonbarsi, Piprau and Rithaiya Village (17 µg/m^3) while the mean conc. of all location ranges between 34-42 µg/m^3. The $PM_{2.5}$ level in all the monitoring locations is within the standard i.e. NAAQMS level 60 µg/m^3.

Sulphur Dioxide (SO_2): The maximum SO_2 level were found at Project Site (13.9 µg/m^3) and lowest SO_2 level were observed at Piprau Village, (5.4 µg/m^3) while the mean conc. of all location ranges between 7.8 to 11.0 µg/m^3. The SO_2 level in all the monitoring locations is found quite below the standard i.e. NAAQMS level 80 µg/m^3.

Oxides of Nitrogen (NO_2): The maximum NO_2 level were found at Project Site (17.3 µg/m^3) and lowest NO_2 level were observed Son Barsi and Rithaiya Village (9.0 µg/m^3) while the mean conc. of all location ranges between 10.9 – 14.5 µg/m^3. The NO_2 level in all monitoring location are quite below the standard i.e. NAAQMS level 80µg/m^3.

Other Parameters: NH_3 were found <20 µg/m^3 which is found far below the standard i.e. NAAQMS level 400µg/m^3. CO conc. was found between 0.12 to 0.29 mg/m^3 which is found within the standard i.e. NAAQMS level 2 mg/m^3, Ozone conc. was found between 11.2 to 19.6 mg/m^3 which is found within the standard i.e. NAAQMS level 100 mg/m^3, Metals were also not detected from the study area.

The noise monitoring has been conducted for determination of noise levels at 10 locations in the study area. The noise level is within the prescribed limit in all the monitoring stations. Baseline ambient daytime and nighttime Noise levels recorded in the study area during day time is ranging between 51.4 to 60.4 dB(A). and Night time noise levels is ranging between 40.3 to 53.9 dB(A) respectively. The noise level was found slightly higher compared to other location at identified commercial/mixed used area due to its proximity to road leading to vehicular traffic noise and commercial activities in the area. The major source of the noise in the study area is the community noise and vehicular movement.

12 ground water and 6 surface water samples were collected from the study area. Surface water samples were collected from Tons River & Ganga River. Bacterial contamination were observed in the surface water sample. However, the surface water was found to meet the Best Designated Use – 'C' Criteria of CPCB (i.e., Drinking water source after conventional treatment and disinfection)**.**

Ground water sample were collected from nearby villages, hotspots like school, around ash pond etc. pH value of the sample varies from 6.89 to 7.78 in all locations, which is well within the specified standard of 6.5 to 8.5. Electric Conductivity levels vary from 385 to 1305 µmhos/cm. Total dissolved solids range from 258 to 874 mg/l which is found within the permissible limit as per IS:10500. The total hardness values in ground water of the study area ranges between 148 to 544 mg/l which is found well within the permissible limit at all locations. The Calcium and Magnesium values in ground water of the study area are well within the specified permissible limit. The Chloride values in ground water of the study area ranges between 40 to 311 mg/l which is also well within the permissible limit. No biological and metallic contamination have been found in any of the ground water sample of the study area. Overall, the parameters in ground water sample were well within the permissible limit of Indian Standard IS: 10500-2012 at all locations.

10 Soil sample were collected from the study area. Locations for soil sampling were selected based on various land use conditions & agricultural practices for Soil monitoring and determination of Soil quality in the study area. Based on Nutrient Index Value for N, P & K, the soils of study area fall into low (for nitrogen) and medium (for phosphorous & potassium) fertility

status. Soils have medium to high organic carbon and are capable of moderately supporting for agriculture. The soils of study area are alkaline to slightly alkaline in nature as pH value of sampled soils observed less than 8.5 and simultaneously the value of EC is less than 1 dS/m (1000 µmhos/cm) and Exchangeable Sodium Percentage (ESP) values are observed less than 15% in all ten sampled soil during the study season. Based on above interpretation of study area, soil analysis report reveals that the soils are "**Low to Moderately fertile"** in the study area.

There is no national park, wildlife sanctuary, biosphere reserve present in the study area. There are few patches of forests are present within the study area. There is no forest land involved in the project. The forest of the study area is crooked and stunted. During primary and secondary study carried out under present project, 53 tree species, 26 shrub species, 21 herbs and 26 grasses, climber and weeds were recorded from the study area. Recorded floral species from the study area were assessed for their conservation status by cross-checking with red data book of Indian plants (Nayar & Sastri, 1987-90). There is only one "Near Threatened" species i.e. *Aegle marmelos* (*Common name: Bael*) present in the study area.

Faunal survey was carried out for the species of Mammals, Birds and Herpetofauna. 14 species of mammals, 2 species of amphibians, 4 species of snakes, 4 species of lizards recorded/confirmed, and 48 avifaunal species were recorded from the study area. The listed animals were also cross checked with WPA/IUCN red data book and found that out of the reported species, Hyena, Jangle cat, Porcupine, Blackbuck, Russell's Viper, Rat snake, and Peafowl are Schedule-I species reported. As per IUCN criteria (2010), the study area harbours one "Near Threatened" species (Hyena).

As per the census records 2011, the total population of 10-km radius study area was recorded as 176658 persons of 122 revenue villages of Prayagraj District in Uttar Pradesh state. All the villages falls under Tehsil Karchhana (59) & Meja (63), Prayagraj District in Uttar Pradesh. Total number of 'Households' was observed as 27055 in the study area. Male-female wise total population was recorded as 92717 males and 83941 females respectively.

11.4. Anticipated impacts and Mitigation during Operation Phase.

Impact on Air Quality

Air quality modelling was carried for the cumulative impact assessment for Stage-I and Stage-II. The maximum resultant Ground Level Concentrations (GLC's) for parameters PM and SO_2 are observed to be are observed to be 96.42 µg/m^3 and 21.96 µg/m^3. And for NOx, it is predicted to be 25.36 µg/m^3 and 52.73 µg/m^3 respectively for the norms of 100 mg/Nm^3 and 350 mg/Nm^3. The incremental GLC's when super imposed over the baseline concentrations, the resultant concentrations were observed to be well within the stipulated limits of NAAQMS 2009.

Mitigation Measures: Air pollution control systems proposed are given below:

- In the proposed project, coal handling plant will be properly operated with control measures such as dust extraction and dust suppression system.

- HCSD system of ash disposal will be practiced and hence, no dust emissions are envisaged from ash dump areas.
- Coal will be received through rail line and the solid waste will be sent to dyke areas in slurry form through pipeline. Hence, very minimal amount dust emissions from transportation are envisaged.
- Internal roads are to be asphalted to reduce fugitive dust emissions.
- Regular water sprinkling shall be done dust generating areas.

Noise Impact Prediction:

The major noise generating sources are turbine, generator, ACC boiler pumps and coal handling plant. The predicted noise level at 500 m distance from source is 29.6 dB(A). Baseline ambient daytime and nighttime Noise levels recorded at nearest village (Kohdar) outside the project area (0.9 km, northeast from project boundary) was found to be 52.0 and 41.7 dB(A) respectively which was found within the standard i.e. 55 dB(A) during daytime and less than 45 dB(A) during night time. Therefore, there will not be any significant impact on the ambient noise quality in the surrounding villages due to operation of the power plant.

Mitigation Measure

- Acoustic enclosures shall be provided wherever required to control the noise level below 85 dB(A).
- Wherever it is not possible technically to meet the required noise levels, the personnel protection shall be provided.
- Provision of plantation in available spaces, wherever feasible, will further help in reducing the noise levels.
- To protect the workers within plant area, adequate protective measures in the form of ear-muffs/ ear plugs/ masks shall be provided, which will minimize/eliminate adverse impacts

Noise Impacts due to Transportation: The major noise generating sources that should be given high priority are those which annoyes such as wheel squeal, brake squeal, and the noise from track joints and turnouts as they generally evoke a community reaction. The noise mitigation that reduces these annoying characteristics shall be followed to provide a noise free environment to the local community, even where there may be no measurable changes in measured noise levels.

Mitigation Measure: The noise mitigation strategy will be as follows:

- **Track Measures:** rail grinding, welding to smooth discontinuities, lubrication, use of soft rail pads, and relocation of signals or turnouts
- **Rolling Stock Measures**: effective muffling of diesel locomotive exhaust noise, wheel truing, on-board wheel lubrication, use of disc brakes, dampening of wheels, and use of resilient wheels, wheel vibration absorbers and low-squeal brake blocks.
- In applying mitigate on measures the principles of 'Best Management Practice' (BMP) and 'Best Available Technology Economically Achievable' (BATEA) will be followed.

Impact on Water Quality

No ground water shall be used for the project during the operation phase. The entire water demand for the project is proposed to be sourced from the Ganga River. Hence, no adverse impact on ground water sources is envisaged. Operation of the proposed thermal power project will not have any long-term impact on water quality as it is proposed to be almost ZLD from plant.

The make-up water requirement for this project would be about 3000 m^3/Hr., (30 Cusecs) with bottom ash as lean slurry and fly ash as HCSD system for ash handling. Air Cooled Condensers (ACC) is envisaged for Stage-II (3x800 MW) units. The consumptive water requirement for Stage-II includes make up water, evaporation losses and effluent. Existing water pipeline infrastructure shall be used.

Mitigation Measures

- The filter backwash water of Pre-Treatment Plant shall be collected and recycled back to the DM system clarifier.
- The sludge from clarifiers of Water PT plants shall be taken to a sump/pit and pumped to ash slurry sump for disposal to ash dyke.
- The waste effluents from neutralization pits of DM plant and Condensate Polishing Plant shall be collected in the respective neutralization pits and neutralized before pumping to ash slurry sump or for final disposal.
- CW system blow down would be used for coal dust suppression system, FGD system and Ash handling Plant. Excess Aux.CW blow down, if any, shall bleed to Central Monitoring Basin. Blow down (if required) shall also be led to Central Monitoring Basin.
- A coal settling pond shall be provided to remove coal particles from coal handling plant waste. Decanted water shall be pumped back to the coal dust suppression system for use. To receive & treat excess storm water (considering rainstorm condition), Clarifier feed pumps, reactor clarifier, belt filter press, clarified water transfer pumps and required chemical storage & dosing system shall also be provided.
- Service water effluent drains from various areas shall be separately routed to a sump. From the sump, the waste service water shall be pumped up to lamella clarifier / tube settler for treatment. Treated service water shall be sent back to service water tank for possible reuse.
- The treated effluents conforming to the prescribed standards only shall be re-circulated and reused within the plant.
- Arrangements shall be made that plant effluents and storm water do not get mixed.

Impact due to Solid Waste generation

Fly ash, Bottom ash, Gypsum, Used oil, Empty/ contaminated drums, ETP Sludge etc. will be generated from the proposed project operation. The waste generated shall be disposed-off as the Hazardous & Other Waste (Management and Transboundary Movement) Amendment Rules, 2022.

Mitigation Measures

- The fly ash and bottom ash are handled separately. Fly ash is transported by the positive pneumatic conveying system and delivered to the fly ash silos. Then it is carried to users by tank truck.
- MUNPL has proposed total area of ash pond 110 Ha, near the project boundary.
- The proposed ash pond is for emergency disposal only.
- Dry Fly ash shall be given to Cement Industries and brick manufacturer for 100% utilization.
- Bottom ash shall be given to road construction projects and filling of low laying areas.
- Petroleum oil tank sludge shall be sent to TSDF.
- Sewage sludge generated from STP will be used as manure in greenbelt development plantation.
- MUNPL/ NTPC has an approved policy for management and sale of gypsum generated from its power projects. The policy includes the following options for 100% utilisation of gypsum
- Installation of POP/Gypsum Plaster Plant at NTPC/MUNPL Stations
- Sodic soil reclamation: as an initiative for community development
- Sale of Raw Gypsum on as where basis
- Used oil or Spent oil will be generated will be generated as per Schedule I of Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, which will be sold to CPCB authorized recycler.
- Municipal Solid waste generated from plant canteen & colony will be collected, segregated, and disposed off scientifically in compliance of Solid Waste Management Rules, 2016.
- Used Lead acid batteries will be stored in the designated storage area and will be sold to registered vendors as per Battery waste.
- Plastic waste generated will be disposed through authorized recycler.
- E-Waste generated will be disposed to authorised recyclers.

Impacts due to Transportation

Since coal will be transported using rail, no significant road traffic movement due to this is envisaged in the proposed project on existing public road network. The various material like fuel oil, chemicals, spares etc. will be brought periodically by road network due to which vehicular traffic will increase intermittently. Project is well connected to the nearby National Highway-135 C which is adequate to cater to the additional traffic.

Effective implementation of the pollution emission compliance prescribed under Motor Vehicles Act by the transport authorities will minimize the vehicular pollution impact.

Mitigation Measures

- Provide adequate traffic signs and signages to notify residents.
- Install safety mirrors to aid visibility in conflict points.
- Prevent on street parking.
- Provide speed humps to regulate speed of vehicles on local streets.
- Provide pedestrian crossings and dedicated footpath to cater to the walking population.
- Assign traffic wardens to regulate flow of project traffic during peak hours
- Vehicle movement will be regulated inside the site with adequate roads and parking lots shall be provided.

Impacts on Ecology Environment

During the operation phase, activities that might impact on terrestrial flora include, operation of boiler, turbine and generator, coal conveying, disposal of gypsum, fly ash and bottom ash, hazardous and domestic waste disposal. The major pollutants from the operation of coal based thermal power plants are PM, SO_2 and NOx. Accidental dispersion of flue gas, fly ash and bottom ash might create impacts of terrestrial flora.

Mitigation Measures

a) The incremental emission of air pollutants will not be likely to induce any significant changes in the ecology because the national ambient air quality standards will remain within the limits.
b) The project is therefore planned with most efficient air pollution control systems for achieving 30 mg/Nm^3 dust emission level from all the stacks.
c) Further the modelling study proves that the incremental maximum GLC of PM, SO_2 and NOx generated from the proposed plant is well within the limits and overall incremental GLC will remains within the NAAQS 2009, and it will not harm the ecology of the study area.
d) Most of the fugitive dust emission generation points are also fitted with efficient air pollution control systems (Plant dedusting systems).
e) Water sprinkling / dry fog type system will be used at material handling points to suppress the generation of fugitive dust.
f) Have a standard operating procedure on how to deal with spills;
g) Intake Screens: Install intake screens or mesh at the entry point of the water supply pipeline. These screens can help prevent larger aquatic organisms (e.g., fish, frogs, and toads) and debris from entering the pipeline while allowing water to pass through.
h) Wildlife Conservation plan for the schedule -I species has been prepared to conserve the Schedule-I species. A conservation budget of Rs. 3.51 Crores has been earmarked by MUNPL for conservation of Schedule-I species.
i) All the process wastewater generated from the plant shall be treated and reused in process.
j) The domestic wastewater generated from the toilets, washrooms and canteen of the plant shall be treated in STP.

k) Acoustic enclosures shall be provided wherever required to control the noise level below 85 dB(A).
l) The equipment like turbine, Compressors, blowers, fans, various drums etc will be provided with Acoustic pad insulation / Acoustic enclosures to limit the noise level as per the standard.
m) Dense greenbelt shall be provided all around the project.

Impacts on Socioeconomics

Due to proposed project operation and emission of dust, wastewater and solid waste generation. Improper management of waste material (Solid waste or liquid effluents) from the proposed activities may affect the aesthetic of the area. There will be air emissions in the operation phase of the plant. These impacts can be minimized by implementing the proposed mitigation measures. The plant will create indirect job opportunities for the local people. MUNPL will undertake various social development programmes under the banner of Corporate Social & Environment Responsibility (CSER) which will be ultimately improve the infrastructure of surrounding villages.

Mitigation Measures

- All possible air pollutants will be scrubbed properly by various pollution control equipment's before emitting into atmosphere. The norms will be maintained through regular monitoring and analysis of gases.
- All the wastewater generated from the plant shall be treated and reused in process and greenbelt development. Domestic sewage is treated in Sewage Treatment Plant.
- Many of the people from neighbouring villages, as found suitable will get opportunity for indirect employment through contractors during construction and operational phase.
- The total manpower from various agencies during construction of Stage-II would be about 5046 (60 permanent and 4986 temporary) during peak deployment) and during operation period is estimated to be about 5250 (210 permanent and 5040 temporary). However, the exact numbers may vary during construction and operation phases. .
- Detail R&R plan shall be prepared after acquisition of complete land.
- Most of the land shall be acquired from landowner through on one-to-one negotiation/through district administration.
- R&R of project affected families shall be applicable as per the R&R Policy of the UP Govt.
- MUNPL has earmarked a fund of 36.24 Cr. for addressing the R&R issues involved for acquisition of additional land.
- MUNPL has earmarked a budget of Rs. 34.55 Cr for undertaking CER/CSR activities based on need-based analysis. This budget is for upcoming 5 years. This money will be spent for different CER/CSR activities like agro based livelihood, women empowerment, health and community welfare in surrounding villages.
- With the implementation of the CER/CSR budget, the living conditions will be improved due to the improvement in socio-economic conditions, employment, education, health care and physical infrastructures like roads and other facilities.

- MUNPL Meja Stage-I was developed on Plateau/rocky land. Plantation and its survival in such land profile is a challenging. At present about 163 Ha with survival percentage of 81.7% is carried.
- MUNPL has already established a greenbelt covering 163 Ha within its current facility.
- Following consultations with the Divisional Forest Office, MUNPL plans to expand the additional greenbelt of 303.03 Ha area within the plant.
- This will result in a total of 466.03 Ha i.e 33.08% of 1409 Ha land being dedicated to the greenbelt within the plant premises.
- Over and above the greenbelt, as carbon sink, additional planation shall be done in 271 Ha of degraded forest area. Native species of trees shall be planted in consultation with DFO, Social forestry department.

11.5. Environmental Monitoring Plan

The environmental monitoring program encompasses the location, duration, frequency of the parameters that must be monitored. Monitoring of environmental components during the construction and operation phase is a part and parcel of the environmental mitigation measures. Only frequent monitoring can assess the functioning and efficiency of all pollution control equipment. Regular monitoring will be carried out for air quality, water quality, soil quality and noise levels. A cost provision of Rs. 2.0 Crores has been kept towards routine monitoring works.

11.6. Additional Studies

Risk Mitigation Measures: Necessary risk mitigation measures, including firefighting measures will be implemented. Hazards due to mechanical injury will be reduced by use of standard design and operating procedures. Oil storage tanks will be located and designed as per the guidelines. Firefighting system with fire extinguishers, hydrant system, sprinkler system, pumps and pipeline network shall be provided. Disaster Management Plan shall be implemented in consultation with the District Administration.

Occupational Health and Safety Management: The workers will be routinely checked for any clinical complaints and abnormal symptoms by the medical department. Workers will be given safety helmet, nose mask, ear plugs, clean drinking water and toilet facility. Regular safety training and awareness programs will be conducted.

11.7. Project Benefits

The proposed Expansion of Coal Based Thermal Power Plant project will cause various short/ long term and primary/ secondary impacts on the environment of study area. The proposed project would have the following operational advantages:

- The proposed expansion project would enable to meet part of the growing power demand in the state of Uttar Pradesh as well as in India for irrigation, domestic and commercial purposes
- Further, the proposed expansion (3 x 800 MW) will result in improvement of infrastructure as well as upliftment of social structure in the area.

- The total manpower from various agencies during construction of Stage-II would be about 5046 (60 permanent and 4986 temporary) during peak deployment) and during operation period is estimated to be about 5250 (210 permanent and 5040 temporary). However, the exact numbers may vary during construction and operation phases.
- MUNPL has earmarked a budget of Rs.34.55 Cr for undertaking CER/CSR activities based on need-based analysis. This budget is for upcoming 5 years. This money will be spent for different CER/CSR activities like agro based livelihood, women empowerment, health and community welfare in surrounding villages.
- Overall, with the implementation of the CER/CSR budget, the living conditions will be improved due to the improvement in socio-economic conditions, employment, education, health care and physical infrastructures like roads and other facilities.

11.8. Environmental Management Plan

EMP for effective management of environmental impacts due to the proposed project and ensuring overall protection of the surrounding environment through appropriate management procedures has been prepared.

The capital cost for environmental management of the proposed project is estimated to be Rs 2952.71 Cr. This amount shall be used for pollution control measures during construction phase, Occupational Health & Safety of workers during construction phase, Water Supply & Drainage system, Storm water management, Solar streetlight within project area, wastewater management, environmental monitoring, CSR/CER and greenbelt development. The recurring expenditure will be Rs.58.45 Cr per annum.

EMG and concerned HOD's will ensure that all air pollution control devices, wastewater treatment and water re-circulating systems function effectively. The EMG & Safety Dept's will also ensure cleanliness and industrial hygiene in the plant. All records shall be submitted to the regulatory authorities, displayed at company gate and website.

11.9. Conclusion

The proposed expansion project would add significant value to Indian economy. The project will not only help ensure our country by becoming self-sufficient in terms of power generation but also drive macro-economic growth by generating employment, enhancing socio-economic infrastructure, revenue generation etc.

The proposed expansion project would have minimal impacts on the environment. However, with proper and judicious implementation of the mitigation and environment management measures, the impacts can be further minimized and can be maintained well within the permissible limits specified by the regulatory authorities.

Thus, it can be concluded that with the strict implementation of the pollution control and mitigation measures, with proper environment management system in place, the proposed expansion project will be beneficial to the society and will contribute to the economic development of the state in particular and the country in general.

CHAPTER 12. DISCLOSURE OF CONSULTANT

EQMS is a leading ISO 9001: 2008 complying consulting company constantly striving towards newer heights since its inception in 1998. Our company is dedicated to providing strategic services in the areas of Environmental Impact study, Social Impact Assessment Study, Preparation of EMP, Preparation of RAP, Risk Assessment study, Environmental & Social Audits, Due Diligence Assessments, Policy Trainings, Quality, Occupational Health & Safety, Social Accountability Management Systems; Enterprise level Behavioural Based Safety (BBS) Management; EHS Performance Benchmarking and Post Project Management.

EQMS has over two-decade experience of successfully conducting various Impact Assessment, studies/Audits for various sectors including infrastructure, industries, energy, transportation, mining, and telecommunications across India and Outside India. We are also offering our services in Sri Lanka, Nepal, Bangladesh, Bhutan, Saudi Arabia and Abu Dhabi.
With our head office in New Delhi, our Business is spread across all over India and abroad. All EQMS activities are effectively managed with the co-ordination of the diverse specialization of its two wings viz: ESIA & Policy and Systems Divisions. Our projects are funded by well-known organizations like World Bank, ADB, USAID, UNDP, MoEF, AFD, KFW amongst others. Our client includes leading Industries of India, multinational companies (including amongst fortune 500 companies).

EQMS is a NABET (QCI) & MOEF Accredited consultancy for carrying out Environmental Impact Assessment study for 18 sectors.

Table 12.1 : Details of EQMS Global Pvt. Ltd.

S.No	Particulars	Details
1.	Corporate Office	EQMS Global Pvt. Ltd. Office No. 305, 3rd Floor, Rishabh Corporate Tower, Plot No.#16, Community Centre, Karkardooma Delhi - 110092
2.	URL	www.eqmsglobal.com
3.	Landline	011 - 42270087, 43062757
4.	Cell No.	+91 9810297612 (MD S.K. Jain)
5.	Branch Offices	Gujarat (Vadodara), Maharashtra (Mumbai)

We provide remarkably simple, straightforward and cost-effective services that help our clients to meet their diverse needs. We always maintain to have synergistic associations with our clients to facilitate them and utilize an adaptable and effective technique to support our clients.

a) **Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP)** Preparation Services for Industrial, Mining, power and Infrastructural sectors as defined by MOEF&CC and Approved by NABET.
b) **Social Impact Assessment (SIA) and Rehabilitation Action Plan (RAP)** preparation services
c) **Permitting Services** like, clearances, consents and NOCs for Environmental, Forests, **Wildlife and CRZ** from centre and state Governments.

d) **Auditing Services** related to regulatory compliance, System compliance, environmental performance, safety audits.
e) **Due Diligence Assessments** as per ASTM Standards for acquisition and other purposes
f) **Post Project Management and Monitoring Services** like, EMP, RAP implementation monitoring, mitigation measures effectiveness assessment.
g) **Laboratory Services** for Baseline and industrial monitoring (air, water, soil, hazardous substances, noise) and have Network of self and associated laboratories all over India.
h) **Safety and Risk Assessment Services** like, Qualitative and quantitative
i) risk assessment, safety management, and behaviours-based safety management
j) **System Services** like, Design and implementation of EMS, OHASA, IMS systems development and implementation.
k) **Design and commissioning Services** for Liquid, Gaseous and hazardous waste treatment.
l) **Training and Awareness Services** like, EMS, OHSAS, Systems, Internal audit, and environmental training and awareness for institutional strengthening.
m) **3 D Risk Assessment and Modelling**.

EQMS have been providing consulting services in almost all states of India and countries like Sri–Lanka, Nepal, Bangladesh, Bhutan, Saudi Arabia and Abu Dhabi. EQMS has a team of highly talented and experienced professionals including all required NABET approved Environmental Coordinators and Functional Area experts who work in sync with each other & clients. We also have experience of working on various projects which are funded by bilateral and multilateral funding agencies like World Bank, ADB and IFC etc.

EQMS is continually arriving at new statures since its origin in 1998 considering various Industries and Organisations for Environmental, social and Occupational Health & Safety. Our master workforce follows very much conceived approaches that empower us to conduct various services and training programs proficiently and on time like environment assessment services, environment safety audits, risk assessment services, audit services. We assess and survey the method of working of various associations and give them significant proposals to roll out essential improvements in their tasks.

We have a group of profoundly skilled and experienced experts including all required NABET affirmed Environmental Coordinators and Functional Area Experts who work in sync with each other and clients ensuring that the defined assessment, survey or reporting is executed with a high level of efficiency.

- The management principal of EQMS enable conduct the procedures such as audit, certification & public training & third – party inspection services with expediency & competence.
- We consider the different prerequisites of environmental management through our value.
- added services and training programs.
- The versatile range of services that we deliver is strict as per the requirements of project applications, which are directed to the safety of the environment, society, and occupation.

Our experts are Environmental Engineers, Environment Experts, Socio-Economic Experts, Ecologist, Economists, Hydrogeologists, Geologists, Civil Engineers, Chemical Engineers and Risk & Hazard managers and they are highly competent to carry out Environment Impact Assessment, Social Impact Assessment, Framing Environment & Social Management Plans, Land Acquisition and Preparing Rehabilitation & Resettlement Plans. Our experts are involved in the project undertaken from design to implementation stage depending on the nature of the assignment and having diverse experience of working on the sectors namely: transportation, urban management, rural development, environment management, environment impact assessment, socio-economy, Power Generation & Industries with National (Both Private & Government) & International Clients.

QUALITY COUNCIL OF INDIA

National Accreditation Board for Education and Training

Certificate of Accreditation

EQMS Global Pvt. Ltd. *formerly known as EQMS India Pvt. Ltd.*, New Delhi

305, 3rd Floor, Plot No. 16, Rishabh Towers, Community Centre, Karkardooma, Delhi – 110 092

*The organization is accredited as **Category-A** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3: for preparing EIA-EMP reports in the following Sectors –*

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1.	Mining of minerals including opencast and underground both	1	1 (a) (i)	A
2.	River Valley projects	3	1 (c)	A
3.	Thermal power plants	4	1 (d)	A
4.	Metallurgical industries (ferrous only)	8	3 (a)	B
5.	Cement plants	9	3 (b)	B
6.	Petroleum refining industry	10	4 (a)	A
7.	Chemical fertilizers	16	5 (a)	A
8.	Pesticides industry and pesticide specific intermediates	17	5 (b)	A
9.	Petro-chemical complexes	18	5 (c)	A
10.	Synthetic organic chemicals industry	21	5 (f)	A
11.	Pulp & paper industry excluding manufacturing of paper from wastepaper and manufacture of paper from ready pulp without bleaching	24	5 (i)	A
12.	Isolated storage & handling of Hazardous chemicals	28	-	B
13.	Air ports	29	7 (a)	A
14.	Industrial estates/ parks/ complexes/areas, export processing Zones (EPZs), Special Economic Zones(SEZs), Biotech Parks, Leather Complexes	31	7 (c)	A
15.	Bio-medical waste facilities	32A	7 (d a)	A
16.	Ports, harbours, break waters and dredging	33	7 (e)	A
17.	Highways.	34	7 (f)	A
18.	Common Effluent Treatment Plants (CETPs)	36	7 (h)	B
19.	Common Municipal Solid Waste Management Facility (CMSWMF)	37	7 (i)	B
20.	Building and construction projects	38	8 (a)	B
21.	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated Aug 22, 2023 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no QCI/NABET/ENV/ACO/23/2878 dated Sept 18, 2023. The accreditation needs to be renewed before the expiry date by EQMS Global Pvt. Ltd, New Delhi following due process of assessment.

Sr. Director, NABET
Dated: Sep 18, 2023

Certificate No.
NABET/EIA/2225/RA 0303

Valid up to
Nov 23, 2025

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to the QCI-NABET website

National Accreditation Board for Testing and Calibration Laboratories

NABL

CERTIFICATE OF ACCREDITATION

ADVANCED ENVIRONMENTAL TESTING AND RESEARCH LAB PRIVATE LIMITED

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

63/1, KAILASH VIHAR, GWALIOR, MADHYA PRADESH, INDIA

in the field of

TESTING

Certificate Number: TC-12780

Issue Date: 19/12/2023 **Valid Until:** 18/12/2025

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.
(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Name of Legal Entity: ADVANCED ENVIRONMENTAL TESTING AND RESEARCH LAB PRIVATE LIMITED

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer