

DRAFT ENVIRONMENT IMPACT ASSESSMENT REPORT & ENVIRONMENTAL MANAGEMENT PLAN

FOR

**Proposed 210 KLPD Grain based Distillery along with
6.25 MW Co-Generation Power Plant**

**At
Village: Beltukri, Tehsil & District: Mahasamund,
Chhattisgarh**

Baseline Study Period: Summer Season (March to May, 2023)

/// APPLICANT ///

M/s. Piccadily Agro Industries Ltd.

**Regd. Address: - Village Bhadson, Umri Indri Road,
Tehsil Indri District Karnal, Haryana 134101
Email: environment.indri@piccadily.com**

TOWHOM ITMAY CONCERN

I, Dharmendra Kumar Batra, Director & Authorized Signatory of M/s. Piccadily Agro Industries Ltd. give this undertaking to the effect that the ToRs prescribed by MoEF&CC New Delhi vide letter no. IA-J-11011/277/2023-IA-II(I) dated 31st July, 2023 for Proposed 210 KLPD Grain based distillery along with 6.25 MW Co-Generation Power Plant at Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh by M/s. Piccadily Agro Industries Ltd. have been complied and data submitted are factually correct.

We further certify that we have reviewed the EIA report and take full responsibility and ownership of the contents presented in the EIA report by J.M. EnviroNet Pvt. Ltd.

We also assure that there is no litigation pending against the proposed project and/or any direction/ order passed by any such litigation whatsoever, the sole responsibilities will be borne by the company.

Yours faithfully

For M/s. **Piccadily Agro Industries Limited**



Dharmendra Kumar Batra
Director

Date: 11.08.23

(Distillery)

Piccadily Agro Industries Ltd

Address: Village Bhadson, Umri-Indri Road, Tehsil: Indri, Distt: Karnal (Haryana)

Website: www.piccadily.com

CIN:L01115HR1994PLC032244

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LIST OF ABBREVIATIONS

ABBREVIATIONS	DESCRIPTION
AAQ	Ambient Air Quality
AAQM	Ambient Air Quality Monitoring
APHA	American Public Health Association
BDL	Below Detectable Level
BGL	Below Ground Level
BIS	Bureau of Indian Standards
BOD	Biochemical Oxygen Demand
CCR	Central Control Centre
CGWB	Central Ground Water Board
CMT	Crisis Management Team
CO ₂	Carbon Dioxide
COD	Chemical Oxygen demand
CPCB	Central Pollution Control Board
CPP	Captive Power Plant
CSR	Corporate Social Responsibility
DFO	District Forest Office
DMP	Disaster Management Plan
DO	Dissolved Oxygen
E	East
EAC	Expert Appraisal Committee
EC	Environmental clearance
ECC	Emergency Control Centre
EIA	Environmental Impact Assessment
EMC	Environmental Management Cell
EMP	Environmental Management Programme
EMS	Environmental Management System
ENE	East of North East
EPA	Environmental Protection Agency
ERDAS	Earth Resource Data Analysis System
ERT	Emergency Response Team
ESC	Enterprise Social Commitment
ESE	East of South East
ESP	Electrostatic Precipitator
ETP	Effluent Treatment Plant
FCC	False Colour Composite
FH	Functional Heads
FPS	Fine Particulate Sampler

ABBREVIATIONS	DESCRIPTION
Ft	Feet
GCP	Ground Control Points
GLC's	Ground Level Concentrations
GOI	Government of India
GPS	Global Positioning System
GW	Ground Water
HC	Hydrocarbon
HSD	High Speed Diesel
IMD	Indian Meteorological Data
IRP	Incident Response Plan
IRT	Incident Response Team
IS	Indian Standard
JM	Jharkhand Mahadev
JMEPL	J.M. EnviroNet Private Limited
KLPD	Kilo Litre Per Day
LPH	Litre per hour
LULC	Land Use Land Cover
Max.	Maximum
MCR	Maximum Continuous Rating
Min.	Minimum
MoEFCC	Ministry of Environment Forest& Climate Change
MoU	Memorandum of Understanding
MSIHC	Manufacture Storage & Import of Hazardous Chemicals
MT	Metric Ton
MTPA	Metric Tonne Per Annum
MW	Mega Watt
N	North
NAAQS	National Ambient Air Quality Standards
NABET	National Accreditation Board for Education & Training
NABL	National Accreditation Board for Testing and Calibration Laboratories
NE	North-East
NH	National Highway
NO ₂	Nitrogen Dioxide
NTU	Nephelometric Turbidity Unit
NW	North-West
OHS	Occupational Health Safety
PAS	Public Address System
PCE	Pollution Control Equipment
PF	Protected Forests

ABBREVIATIONS	DESCRIPTION
PM	Particular Matter
PPE	Personal Protective Equipment
ppm	Parts Per Million
PWL	Pumping Water Level
RDS	Respirable Dust Sampler
RF	Reserved Forests
RO	Reverse Osmosis
S	South
SC	Site Controller
SC	Schedule Castes
SE	South-East
SEAC	State Level Expert Appraisal Committee
SEIAA	State Level Environmental Impact Assessment Authority
SMC	Site Main Controller
SO ₂	Sulphur Dioxide
SOI	Survey of India
SPCB	State Pollution Control Board
SPM	Suspended particulate Matter
ST	Schedule Tribes
STP	Sewage Treatment Plant
SW	Surface water
SW	South-West
SWL	Static Water Level
TCD	Tons of Cane per Day
TDS	Total Dissolved Solid
ToR	Terms of Reference
TPD	Tons Per Day
TPH	Tonnes Per Hour
VOC	Volatile Organic Carbon
W	West



सत्यमेव जयते

File No.: IA-J-11011/277/2023-IA-II(I)
Government of India
Ministry of Environment, Forest and Climate Change
IA Division



Dated 31/07/2023



To,

Dharmendra Kumar Batra
PICCADILY AGRO INDUSTRIES LIMITED
Village Bhadson, Umri Indri Road, Tehsil Indri, District Karnal, Haryana , KARNAL, HARYANA, ,
134109
environment.indri@piccadily.com

Subject:

Grant of Standard Terms of Reference (ToR) to the proposed Project under the EIA Notification 2006-
and as amended thereof-regarding.

Sir/Madam,

This is in reference to your application submitted to MoEF&CC vide proposal number
IA/CG/IND2/437306/2023 dated 19/07/2023 for grant of Terms of Reference (ToR) to the project under
the provision of the EIA Notification 2006-and as amended thereof.

2. The particulars of the proposal are as below :

(i) ToR Identification No.	
(ii) File No.	IA-J-11011/277/2023-IA-II(I)
(iii) Clearance Type	Fresh ToR
(iv) Category	A
(v) Project/Activity Included Schedule No.	5(g) Distilleries
(vi) Sector	Industrial Projects - 2
(vii) Name of Project	Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation power plant at Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh by M/s Piccadily Agro Industries Limited
(viii) Name of Company/Organization	PICCADILY AGRO INDUSTRIES LIMITED
(ix) Location of Project (District, State)	MAHASAMUND, CHHATTISGARH
(x) Issuing Authority	MoEF&CC
(xi) ToR Date	31/07/2023
(xii) Applicability of General Conditions	NO

3. The **MoEF&CC** has examined the proposal in accordance with the Environment Impact Assessment (EIA) Notification, 2006 & further amendments thereto and after detailed examination hereby decided to grant Standard Terms of Reference to the instant proposal of **M/s. PICCADILY AGRO INDUSTRIES LIMITED** under the provisions of the aforementioned Notification.
4. The brief about products and by products as submitted by the Project proponent in Form-1 (Part A, B) and Standard Terms of Reference are annexed to this letter as Annexure (1).
5. The Ministry reserves the right to stipulate additional TORs, if found necessary.
6. The Standard Terms of Reference (ToR) to the aforementioned project is under provisions of EIA Notification, 2006 and as amended thereof. It does not tantamount to approvals/consent/permissions etc required to be obtained under any other Act/Rule/regulation. The Project Proponent is under obligation to obtain approvals /clearances under any other Acts/ Regulations or Statutes, as applicable, to the project.
7. The granted letter, all the documents submitted as a part of application viz. Form-1 Part A and Part B are available on PARIVESH portal which can be accessed by scanning the QR Code above.

Details of Products & By-products

Name of the product /By-product	Product / By-product	Quantity	Unit	Mode of Transport / Transmission	Remarks (eg. CAS number)
Ethanol/Rectified Spirit /Extra Neutral Alcohol/Industrial Alcohol/Denatured Spirit/Specially Denatured Spirit & Malt Spirit	Product	210	Kilo Litre per Day (KLD)	Road	Main product mix
DDGS	By-Product	88	TPD	Road	DDGS will be utilized as Cattle feed
Carbon dioxide	By-Product	154	TPD	Road	CO2 will be collected and sold to vendors
Power	Product	6.25	Mega Watt (MW)	Cables	60 TPH Boiler with ESP

Standard Terms of Reference for conducting Environment Impact Assessment Study for Distilleries and information to be included in EIA/EMP report

1. Executive Summary

Sr. No..	Terms of Reference
1.1	Executive Summary

2. Introduction

Sr. No..	Terms of Reference
2.1	Details of the EIA Consultant including NABET accreditation
2.2	Information about the project proponent

3. Project Description

Sr. No..	Terms of Reference
3.1	Cost of project and time of completion.
3.2	Products with capacities for the proposed project.If expansion project, details of existing products with capacities and whether adequate land is available for expansion, reference of earlier EC if any.
3.3	List of raw materials required and their source along with mode of transportation.
3.4	Other chemicals and materials required with quantities and storage capacities
3.5	Details of Emission, effluents, hazardous waste generation and their management. Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract)
3.6	Process description along with major equipments and machineries, process flow sheet (quantitative) from raw material to products to be provided.
3.7	Hazard identification and details of proposed safety systems.
3.8	<p>Expansion/modernization proposals:</p> <p>a. Copy of all the Environmental Clearance(s) including Amendments thereto obtained for the project from MOEF/SEIAA shall be attached as an Annexure. A certified copy of the latest Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 08th June, 2022 on the status of compliance of conditions stipulated in all the existing environmental clearances including Amendments shall be provided. In addition, status of compliance of Consent to Operate for the ongoing /existing operation of the project from SPCB shall be attached with the EIA-EMP report.</p> <p>b. In case the existing project has not obtained environmental clearance, reasons for not taking EC under the provisions of the EIA Notification 1994 and/or EIA Notification 2006 shall be provided. Copies of Consent to Establish/No Objection Certificate and Consent to Operate (in case of units operating prior to EIA Notification 2006, CTE and CTO of FY 2005-2006) obtained from the SPCB shall be submitted. Further, compliance report to the conditions of consents from the SPCB shall be submitted.</p>

4. Site Details

Sr. No..	Terms of Reference
4.1	Location of the project site covering village, Taluka/Tehsil, District and State, Justification for selecting the site, whether other sites were considered.
4.2	A toposheet of the study area of radius of 10 km and site location on 1:50,000/1:25,000 scale on an A3/A2 sheet. (including all eco-sensitive areas and environmentally sensitive places)
4.3	Co-ordinates (lat-long) of all four corners of the site. Google map-Earth downloaded of the project site. Layout maps indicating existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities etc. If located within an Industrial area/Estate/Complex, layout of Industrial Area indicating location of unit within the Industrial area/Estate.

Sr. No..	Terms of Reference
4.4	Photographs of the proposed and existing (if applicable) plant site. If existing, show photographs of plantation/greenbelt, in particular.
4.5	Land use break-up of total land of the project site (identified and acquired), government/ private - agricultural, forest, wasteland, water bodies, settlements, etc shall be included. (not required for industrial area).
4.6	A list of major industries with name and type within study area (10km radius) shall be incorporated.
4.7	Details of Drainage of the project up to 5km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be provided. (mega green field projects).
4.8	Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land.
4.9	R&R details in respect of land in line with state Government policy.

5. Forest and wildlife related issues (if applicable):

Sr. No..	Terms of Reference
5.1	Permission and approval for the use of forest land (forestry clearance), if any, and recommendations of the State Forest Department. (if applicable)
5.2	Land use map based on High resolution satellite imagery (GPS) of the proposed site delineating the forestland (in case of projects involving forest land more than 40 ha).
5.3	Status of Application submitted for obtaining the stage I forestry clearance along with latest status shall be submitted.
5.4	The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden-thereon
5.5	Wildlife Conservation Plan duly authenticated by the Chief Wildlife Warden of the State Government for conservation of Schedule I fauna, if any exists in the study area
5.6	Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972, to the Standing Committee of the National Board for Wildlife.

6. Environmental Status

Sr. No..	Terms of Reference
6.1	Determination of atmospheric inversion level at the project site and site-specific micrometeorological data using temperature, relative humidity, hourly wind speed and direction and rainfall.

Sr. No..	Terms of Reference
6.2	AAQ data (except monsoon) at 8 locations for PM10, PM2.5, SO2, NOX, CO and other parameters relevant to the project shall be collected. The monitoring stations shall be based CPCB guidelines and take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests.
6.3	Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAQPM Notification of Nov. 2009 along with - min., max., average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an annexure to the EIA Report.
6.4	Surface water quality of nearby River (100m upstream and downstream of discharge point) and other surface drains at eight locations as per CPCB/MoEF&CC guidelines.
6.5	Whether the site falls near to polluted stretch of river identified by the CPCB/MoEF&CC, if yes give details.
6.6	Ground water monitoring at minimum at 8 locations shall be included.
6.7	Noise levels monitoring at 8 locations within the study area.
6.8	Soil Characteristic as per CPCB guidelines.
6.9	Traffic study of the area, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project, parking arrangement etc.
6.10	Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic and endangered species. If Schedule- I fauna are found within the study area, a Wildlife Conservation Plan shall be prepared and furnished.
6.11	Socio-economic status of the study area.

7. Impact and Environment Management Plan

Sr. No..	Terms of Reference
7.1	Assessment of ground level concentration of pollutants from the stack emission based on site specific meteorological features. In case the project is located on a hilly terrain, the AQIP Modeling shall be done using inputs of the specific terrain characteristics for determining the potential impacts of the project on the AAQ. Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be assessed. Details of the model used and the input data used for modeling shall also be provided. The air quality contours shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any.
7.2	Water Quality modeling - in case of discharge in water body
7.3	Impact of the transport of the raw materials and end products on the surrounding environment shall be assessed and provided. In this regard, options for transport of raw materials and finished products and wastes (large quantities) by rail or rail-cum road transport or conveyor cum- rail transport shall be examined.

Sr. No..	Terms of Reference
7.4	A note on treatment of wastewater from different plant operations, extent recycled and reused for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E(P) Rules.
7.5	Details of stack emission and action plan for control of emissions to meet standards.
7.6	Measures for fugitive emission control
7.7	Details of hazardous waste generation and their storage, utilization and management. Copies of MOU regarding utilization of solid and hazardous waste in cement plant shall also be included. EMP shall include the concept of waste-minimization, recycle/reuse/recover techniques, Energy conservation, and natural resource conservation.
7.8	Proper utilization of fly ash shall be ensured as per Fly Ash Notification, 2009. A detailed plan of action shall be provided.
7.9	Action plan for the green belt development plan in 33 % area i.e. land with not less than 1,500 trees per ha. Giving details of species, width of plantation, planning schedule etc. shall be included. The green belt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated.
7.10	Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to use for the various activities at the project site to conserve fresh water and reduce the water requirement from other sources.

8. Occupational health

Sr. No..	Terms of Reference
8.1	Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers.
8.2	Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, colour vision and any other ocular defect) ECG, during pre placement and periodical examinations give the details of the same. Details regarding last month analyzed data of above mentioned parameters as per age, sex, duration of exposure and department wise.
8.3	Details of existing Occupational & Safety Hazards. What are the exposure levels of hazards and whether they are within Permissible Exposure level (PEL). If these are not within PEL, what measures the company has adopted to keep them within PEL so that health of the workers can be preserved.
8.4	Annual report of health status of workers with special reference to Occupational Health and Safety.

9. Corporate Environment Policy

Sr. No..	Terms of Reference
9.1	Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.

Sr. No..	Terms of Reference
9.2	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.
9.3	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.
9.4	Does the company have system of reporting of non compliances / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report.

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

Sr. No..	Terms of Reference
10.1	undefined

11. Enterprise Social Commitment (ESC)

Sr. No..	Terms of Reference
11.1	Adequate funds (at least 2.5 % of the project cost) shall be ear marked towards the Enterprise Social Commitment based on Public Hearing issues and item-wise details along with time bound action plan shall be included. Socio-economic development activities need to be elaborated upon.
11.2	Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details there of and compliance/ATR to the notice(s) and present status of the case.
11.3	A tabular chart with index for point wise compliance of above TOR.

12. Specific Conditions

Sr. No..	Terms of Reference
12.1	List of existing distillery units in the study area along with their capacity and sourcing of raw material.
12.2	Number of working days of the distillery unit.
12.3	Details of raw materials such as molasses/grains, their source with availability.
12.4	Details of the use of steam from the boiler.
12.5	Surface and Ground water quality around proposed spent wash storage lagoon, and compost yard.
12.6	Plan to reduce spent wash generation within 6-8 KL/KL of alcohol produced.

Sr. No..	Terms of Reference
12.7	Proposed Effluent treatment system for molasses/grain based distillery (spent wash, spent lees, condensate and utilities) as well as domestic sewage and scheme for achieving zero water conservation.
12.8	Proposed action to restrict fresh water consumption within 10 KL/KL of alcohol production.
12.9	Details about capacity of spent wash holding tank, material used, design consideration. No. of peizometers to be proposed around spent wash holding tank.
12.10	Details of solid waste management including management of boiler ash, yeast, etc. Details of incinerated spent wash ash generation and its disposal.
12.11	Details of bio-composting yard (if applicable).
12.12	Action plan to control odour pollution.
12.13	Arrangements for installation of continuous online monitoring system (24x7 monitoring device)
12.14	If Sugar and distillery will have integrated effluent treatment facilities. Details regarding the same.

Additional Terms of Reference

1. Public Hearing Report containing details such as (i) Details of advertisements (ii) Copy of forwarding letter of SPCB to MoEF&CC (III) Legible copy of public hearing proceedings duly signed by the presiding officer. (iv) Attendance sheet (v) Copy of representations / grievances/submissions along with action plan on issues raised if any.
2. Status of land Acquisition for the proposed project along with land ownership document and land use conversion permission.
3. Valid copy of QCI accreditation Certificate

Copy To

Signature valid

Digitally Signed by Mr A N Singh
Member Secretary, MoEFCC (EC)

Date: 31/07/2023

ToR Compliance

Point-wise compliance for the ToR points issued by MoEFCC, New Delhi vide letter no. IA-J-11011/277/2023-IA-II(I) dated 31st July, 2023 for Proposed 210 KLPD Grain based distillery along with 6.25 MW Co-Generation Power Plant at Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh by M/s. Piccadily Agro Industries Ltd.

ToR Point No.	ToR Point	Compliance	Reference in Draft EIA/ EMP Report
1.	Executive Summary	Executive Summary of the project has been incorporated in this EIA/EMP Report.	Chapter XI, Page no.241 to 249
2.	Introduction		
i.	Details of the EIA Consultant including NABET accreditation.	The environmental consultant is J.M. EnviroNet Pvt. Ltd. The company is NABET (QCI) accredited for Category “A” projects in distillery sector. Details of the EIA Consultant including NABET accreditation has been incorporated in this EIA/EMP Report.	Chapter XII, Page no. 250
ii.	Information about the project proponent.	Project proponent, M/s. PiccadilyAgro Industries Ltda Public Limited Company was incorporated in the year 1994. Details regarding the information about the project proponent has been incorporated in this EIA/EMP Report.	Chapter I, Section 1.2.2, Page no. 27
3.	Project Description		
i.	Cost of project and time of completion.	<ul style="list-style-type: none"> Total cost of the proposed project is Rs.182 Crores. After obtaining all the regulatory approvals project will be completed within 2 years. 	Chapter II, Table 2.1, Page no.38
ii.	Products with capacities for the proposed project.	<ul style="list-style-type: none"> Ethanol/ Rectified Spirit /Extra Neutral Alcohol/ Industrial Alcohol/ Denatured Spirit/ Specially Denatured Spirit & Malt Spirit Malt Spirit- 210 KLPD Power- 6.25 MW 	-
	If expansion project, details of existing products with capacities and whether adequate land is available for expansion, reference of earlier EC if any.	Not applicable as this is a proposed project	-
iii.	List of raw materials required and	List of raw materials & chemicals, other	Chapter II, Table

ToR Point No.	ToR Point	Compliance			Reference in Draft EIA/ EMP Report
	their source along with mode of transportation.	chemicals and materials required along with quantities and storage capacities is incorporated in EIA/EMP Report.			2.4, Page no. 39
iv.	Other chemicals and materials required with quantities and storage capacities.				
v.	Details of Emission, effluents, hazardous waste generation and their management.	Particulars	Type	Source	Mitigation measures
		Emissions	PM, SO ₂ , NO _x	60 TPH	<ul style="list-style-type: none"> • ESP installation with boiler • Stack of 60 m for 60 TPH as per norms • Necessary temperature profile is maintained in boiler.
			CO ₂	Fermentation	Will be collected and sold to authorized vendors.
		Effluent (Zero effluent discharge)	Spent wash	Distillation	Raw spent wash generated during Grain based operation will be concentrated in MEE and dried in decanter and DWGS drier to obtain DDGS which is sold as cattle feed.
MEE condensate,	MEE, cooling tower, boiler,		Treated in CPU&100%		

ToR Point No.	ToR Point	Compliance			Reference in Draft EIA/ EMP Report
			Vapour Condensate, & blow downs	DM Plant Reject	recycled/reused in plant
			RO reject	RO plant	Treated in MEE.
		Hazardous waste	Used Oil & grease	D G Set, Machinery/ gear boxes	Sold to CPCB authorized recyclers
			Spent resin	DM plant	
		Details of their mitigation measures & management are included in this EIA/EMP Report in Chapter II, IV and X.			
	Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract)	Parameters	Requirement	Source	
		Freshwater	1102 KLPD	Surface water (Mahanadi river through Samodha Dam)	
		Power (MW)	6.0 MW	Proposed 6.25 MW Co-generation Power Plant	
		Man power (Persons)	150	Unskilled / Semi-Skilled - Local Areas; Skilled-Local &Outside	
		<p>STATUS OF APPROVAL: The company has obtained the permission from Chhattisgarh Government, State Investment Promotion Board for the abstraction of 533630 m³/annum (1462 KLPD) of water from Mahanadi River (Samodha Dam) vide letter no. 1073/SIPB/2021 dated 10.05.2023. Copy of same is enclosed as <i>Annexure 2</i>.</p> <p>Water/mass balance flowchart has also been incorporated in this EIA/EMP Report in Chapter II, Figure 2.4, Page no. 40.</p>			
vi.	Process description along with major equipment and machineries, process flow sheet (quantitative) from raw material to products to be provided.	Process description along with process flow sheet from raw material to products is incorporated in EIA/EMP report. Major equipment and machineries are also incorporated in EIA/EMP report.			Chapter II, Section 2.6 Page no. 45 Chapter II, Section 2.6.1 Page no.56

ToR Point No.	ToR Point	Compliance	Reference in Draft EIA/ EMP Report
vii.	Hazard identification and details of proposed safety systems.	Hazard identification and details of safety systems specific to distillery operations has been incorporated in EIA/EMP Report.	Chapter VII, Section 7.3.1 Page no. 168
viii.	Expansion & Modernization proposals:		
a)	Copy of all the Environmental Clearance(s) including Amendments thereto obtained for the project from MOEF/SEIAA shall be attached as an Annexure. A certified copy of the latest Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 30 th May, 2012 on the status of compliance of conditions stipulated in all the existing environmental clearances including Amendments shall be provided. In addition, status of compliance of Consent to Operate for the ongoing/ existing operation of the project from SPCB shall be attached with the EIA-EMP report.	Not applicable as this is a proposed project.	-
b)	In case the existing project has not obtained environmental clearance, reasons for not taking EC under the provisions of the EIA Notification 1994 and /or EIA Notification 2006 shall be provided. Copies of Consent to Establish/No Objection Certificate and Consent to Operate (in case of units operating prior to EIA Notification 2006, CTE and CTO of FY 2005 – 2006) obtained from the SPCB shall be submitted. Further, Compliance		

ToR Point No.	ToR Point	Compliance	Reference in Draft EIA/ EMP Report
	report to the conditions of consents from the SPCB shall be submitted.		
4.	Site Details		
i.	Location of the project site covering village, Taluka/Tehsil, District and State, Justification for selecting the site, whether other sites were considered.	<ul style="list-style-type: none"> Location map showing the project site along with Village, Tehsil, District and State has been incorporated in this EIA/EMP Report. No alternative site has been considered for the proposed project as the land has already been acquired by the company, easier raw material & market availability, nearness to highways for easier transportation, no National Parks, Wildlife Sanctuaries, Biosphere Reserves, Tiger/ Elephant Reserves, Wildlife Corridors etc. lies within 10 km radius and the area falls in safe groundwater zone. 	Chapter II, Figure 2.1 Page no. 34
ii.	A toposheet of the study area of radius of 10 km and site location on 1:50,000/ 1:25,000 scale on an A3/A2 sheet (including all eco-sensitive areas and environmentally sensitive places).	Map showing project site and 10 km radius study area on Toposheet of 1:50,000 scale on an A3 sheet has been incorporated in this EIA/EMP Report.	Chapter III, Figure 3.1 Page no. 61
iii.	Co-ordinates (lat-long) of all four corners of the site.	Google Earth downloaded map showing corner co-ordinates of the project site are given in this EIA/EMP Report.	Chapter II, Figure 2.2 Page no. 35
	Google map-Earth downloaded of the project site.		
	Layout maps indicating existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities etc. If located within an industrial area/Estate/Complex, layout of Industrial Area indicating location of unit within the Industrial area/Estate.	<p>Plant layout has been prepared for total project area i.e., 9.0 ha (22.24 acres). Plant Layout showing proposed unit, storage area, greenbelt area, other utilities etc. is incorporated in this EIA/EMP Report.</p> <p>Project site is not located in industrial area/Estate/Complex.</p>	Chapter II, Figure 2.3 Page no. 37
iv.	Photographs of the proposed and existing (if applicable) plant site. If existing, show photographs of plantation/ greenbelt, in	Photographs of the project site have been incorporated in this EIA/EMP Report.	Chapter II, Section 2.3.4 Page no. 38

ToR Point No.	ToR Point	Compliance	Reference in Draft EIA/ EMP Report
	particular.		
v.	Land use break-up of total land of the project site (identified and acquired), government / private - agriculture, forest, wasteland, water bodies, settlements, etc. shall be included (not required for industrial area).	The total project area is 9.0 ha (22.24 acres) & complete land is under possession of the company. The company will apply for land conversion to industrial use. Land use break-up of total land of the project site (core zone) has been incorporated in this EIA/EMP Report.	Chapter II, Section 2.3.3 Page no. 36
vi.	A list of major industries with name and type within study area (10 km radius) shall be incorporated.	A list of major industries with name and type within study area (10 km radius) has been incorporated in this EIA/EMP Report.	Annexure 7 Page no.
vii.	Details of Drainage of the project up to 5 km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be provided (mega green field projects).	Drainage pattern details of the project site and 10 km radius study area have been shown on a map and incorporated in this EIA/EMP Report. Project site is not within 1 km radius of any major river.	Chapter III, Section 3.3.2.2 & Figure 3.5 Page no. 69&70 respectively.
viii.	Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land.	The total project area is 9.0 ha (22.24 acres) & complete land is under the possession of company. Zamabandi documents for the same are enclosed as Annexure 1 .	Annexure 1 (Page no.....)
ix.	R & R details in respect of land in line with state Government policy.	R & R is not applicable; the complete land is already under the company's possession.	-
5.	Forests & Wildlife related issues (if applicable)		
i.	Permission and approval; for the use of forest land (forestry clearance), if any, and recommendations of the State Forest Department (if applicable)	No forest land is involved in the proposed project; thus, no such permission / approval are required.	-
ii.	Land use map based on High	No forest land is involved in the	-

ToR Point No.	ToR Point	Compliance	Reference in Draft EIA/ EMP Report
	resolution satellite imagery (GPS) of the proposed site delineating the forestland (in case of projects involving forest land more than 40 ha)	proposed project.	
iii.	Status of Application submitted for obtaining the stage I forestry clearance along with latest status shall be submitted.	Not applicable.	-
iv.	The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animal; the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-a-vis the project location and the recommendations or comments of the Chief Wildlife Warden - thereon.	No National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animal exists within 10 km radius of the project site. Map showing Environmental Settings of the study area is incorporated in EIA/EMP Report.	Chapter III, Table 3.1 Page no. 60
v.	Wildlife Conservation Plan duly authenticated by the Chief Wildlife Warden of the state government for conservation of schedule I fauna, if any exists in the study area.	No Schedule I species was found within 10 km radius study area of the project site.	-
vi.	Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972, to the Standing Committee of the National Board for Wildlife.	Not applicable.	-
6.	Environmental Status		
i.	Determination of atmospheric inversion level at the project site and site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall.	Atmospheric inversion level (Mixing height data) has been obtained from secondary data (IMD) and incorporated in EIA/EMP Report. Site-specific micro-meteorological data (temperature, relative humidity, wind speed and direction) were collected during Summer Season (March to May, 2023). Details of the same have	Chapter III, Section 3.4 Page no. 73 Chapter III, Table 3.7 Page no.72 Annexure 3 (Page

ToR Point No.	ToR Point	Compliance	Reference in Draft EIA/ EMP Report
		been incorporated in the EIA/EMP Report. Hourly meteorological data has been enclosed as Annexure 3 along with the EIA/EMP Report. Rainfall data has also been incorporated in the EIA/EMP Report.	<i>no</i>) Chapter III, section 3.3.4 Page no.71
ii.	AAQ data (except monsoon) at 8 locations for PM10, PM2.5, SO ₂ , NO _x , CO and other parameters relevant to the project shall be collected. The monitoring stations shall be based CPCB guidelines and take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests.	AAQ monitoring for PM10, PM2.5, SO ₂ and NO ₂ was carried out at 8 locations during Summer Season (March to May, 2023) within 10 km radius study area. The monitoring stations were selected taking into account the dominant wind direction, population zone and sensitive receptors etc. during the season. Details of the same have been incorporated in this EIA/EMP Report.	Chapter III, Section 3.5 Page no. 75
iii.	Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAAQM Notification of Nov. 2009 along with- min., max., average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an annexure to the EIA Report.	Raw data of all AAQ measurement of all AAQ stations along with min., max., average and 98 percentile values for each of the AAQ parameters has been enclosed as Annexure 4 along with the EIA/EMP Report.	Annexure 4 (Page no.....)
iv.	Surface water quality of nearby River (100m upstream and downstream) and other surface drains at eight locations as per CPCB/MoEF&CC guidelines.	Water quality of surface water bodies present within 10km radius of the projectsite has been analyzed and the details of the same are incorporated in this EIA/EMP Report. The distillery will be based on Zero Effluent Discharge so no discharge point. Hence, upstream/downstream directions are not defined.	-
v.	Whether the site falls near to polluted stretch of river identified by the CPCB / MoEFCC guidelines.	The project site does not fall near to polluted stretch of river identified by the CPCB/ MoEFCC guidelines.	-
vi.	Ground water monitoring minimum at 8 locations shall be included.	Ground water monitoring was carried out at 8 locations in the study area during Summer Season (March to May, 2023).	Chapter III, Section 3.7.2 Page no. 89

ToR Point No.	ToR Point	Compliance	Reference in Draft EIA/ EMP Report
		Details of the same have been incorporated in the EIA/EMP Report.	
vii.	Noise levels monitoring at 8 locations within the study area.	Noise level monitoring was carried out at 8 locations during Summer Season (March to May, 2023) within 10 km radius of the project site. Details of the noise level monitoring have been incorporated in this EIA/EMP Report.	Chapter III, Section 3.6 Page no. 81
viii.	Soil Characteristics as per CPCB guidelines.	Soil quality sampling was carried out at 8 locations within the study area based on land use during Summer Season (March to May, 2023). Details of the same have been incorporated in the EIA/EMP Report.	Chapter III, Section 3.8 Page no. 94
ix.	Traffic study of the area, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project, parking arrangement etc.	Traffic study of the area with respect to existing traffic, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project, parking arrangement etc. was conducted and details for the same have been incorporated in this EIA/EMP Report.	Chapter IV, Section 4.5.2.2 Page no.139
x.	Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic and endangered species. If Schedule-I fauna are found within the study area, a Wildlife Conservation Plan shall be prepared and furnished.	Details of the flora and fauna found within the study area of 10 km radius have been given in this EIA / EMP Report as Annexure 5 . No Schedule- I fauna was found within 10 km radius study area of the project site.	Annexure 5 (Page no.....)
xi.	Socio-economic status of the study area.	Details regarding socio-economic status of the study area along with population projection have been incorporated in this EIA/EMP Report. Detailed demography of study area & surveyed villages is incorporated as Annexure 6 .	Chapter III, Section 3.10 Page no.102 Annexure 6 (Page no.....)
7.	Impact & Environmental Management Plan:		
i.	Assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features.	Ground level concentration of pollutants has been assessed for the proposed project by using AERMOD 10.2.1. Point source has been considered for prediction; details (including	Chapter IV, Section 4.5.2.1 Page no. 132

ToR Point No.	ToR Point	Compliance	Reference in Draft EIA/ EMP Report
	In case the project is located on hilly terrain, AQIP Modelling shall be done using inputs of the specific terrain characteristics for determining the potential impacts of the project on the AAQ. Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be assessed. Details of the model used and the input data used for modeling shall also be provided. The air quality contours shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any.	model input) are incorporated in this EIA/EMP Report. The project site is almost flat and not located on a hilly terrain. Isopleths showing air quality contours plotted on location map have also been incorporated in this EIA/EMP Report.	Chapter IV, Figure 4.1 to 4.4 Page no.135 to 138
ii.	Water Quality modeling- in case, of discharge in water body.	No effluent will be discharged from the plant; as the plant will be based on “Zero Effluent Discharge”. Therefore, water quality modeling study is not required.	-
iii.	Impact of the transport of the raw materials and end products on the surrounding environment shall be assessed and provided. In this regard, options for transport of raw materials and finished products and wastes (large quantities) by rail or rail-cum road transport or conveyor-cum-rail transport shall be examined.	There will be no major impact of the transport of the raw materials and end products on the surrounding environment due to proposed project as proper mitigation measures will be adopted. Details are incorporated in EIA/EMP Report. Major raw material Grains such as damaged grain feed stock, broken rice, maize, bajra & sorghum and fuel like Biomass/Rice husk or Low sulphur coal for Grain based distillery operations will be sourced from local suppliers. Transportation of remaining raw material, final product/by-products will be done by existing road network.	-
iv.	A note on treatment of wastewater from different plant operations, extent recycled and reused for different purposes shall be included. Complete scheme of effluent treatment.	Details regarding treatment of wastewater from different plant operations, extent recycled and reused for different purposes, complete scheme of effluent treatment, characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E (P) Rules have	Chapter II, Section 2.6 (E) Page no. 53

ToR Point No.	ToR Point	Compliance	Reference in Draft EIA/ EMP Report
	Characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E (P) Rules.	been incorporated in EIA/EMP Report.	
v.	Details of stack emission and action plan for control of emissions to meet standards.	The proposed stack emission details have been incorporated in this EIA/EMP Report. ESP will be installed for boiler to the control of emissions from point source within the prescribed limit. Details of the action plan for control of emissions to meet standards have been incorporated in this EIA/EMP Report.	Chapter IV, Table 4.6 Page no. 133 Chapter X, Section 10.3.1 Page no. 232
vi.	Measures for fugitive emission control.	Measures for control of fugitive emission have been incorporated in this EIA/EMP Report.	Chapter IV, Section 4.5.2 Page no.130
vii.	Details of hazardous waste generation, and their storage, utilization and management. Copies of MOU regarding utilization of solid and hazardous waste in cement plant shall also be included. EMP shall include the concept of waste-minimization, recycle/ reuse/ recover techniques, Energy conservation, and natural resource conservation.	Used oil & grease generated from plant machinery/gear boxes as hazardous waste will be sold out to the CPCB authorized recyclers. Spent resin from DM plant (500 kg/annum) will be supplied to authorized recyclers. Boiler ash generated during coal-based operations will be given to cement/brick manufactures & during biomass-based operations will be given to brick manufacturers in covered vehicles. Concept of waste - minimization, recycle/ reuse / recover techniques, energy conservation and natural resource conservation has been incorporated in this EIA/EMP Report.	- Chapter X, Section 10.4 Page no.238
viii.	Proper utilization of fly ash shall be ensured as per Fly Ash Notification, 2009. A detailed plan of action shall be provided.	Ash generated from the boiler will be collected through proper ash collection system and covered conveyance system. Boiler ash generated during coal-based operations will be given to cement/brick manufactures & during biomass based operations will be given to brick manufacturers in covered vehicles.	-
ix.	Action plan for the greenbelt development plan in 33 % area i.e. land with not less than 1,500 trees per ha. Giving details of species, width of plantation, planning schedule etc. shall be	2.97ha i.e. 33% of total project area will be covered under greenbelt & plantation. Greenbelt will be developed as per Central Pollution Control Board (CPCB) guidelines. Native species will be planted in consultation with the local DFO. Details regarding proposed	Chapter IV, Section 4.5.7.1, Page no.150

ToR Point No.	ToR Point	Compliance	Reference in Draft EIA/ EMP Report
	included. The greenbelt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated.	greenbelt & plantation along with name and number of species have been incorporated in this EIA/EMP Report.	
x.	Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to use for the various activities at the project site to conserve fresh water and reduce the water requirement from other sources.	Rain Water harvesting measures will be undertaken within the plant premises. Details of the action plan for rainwater harvesting measures have been given in EIA/EMP Report.	Chapter X, Section 10.3.3.3 Page no. 234
8.	Occupational health:		
i.	Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers.	Rs. 50 lakhs per annum has been allocated to ensure the occupational health and safety of all contract and casual workers. Details have been incorporated in this EIA/EMP Report.	Chapter VII, Section 7.4.1Page no.216
ii.	Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, colour vision and any other ocular defect) ECG, during pre-placement and periodical examinations give the details of the same. Details regarding last month analyzed data of abovementioned parameters as per age, sex, duration of exposure and department wise.	Not applicable as this is a proposed project	-
iii.	Details of existing Occupational & Safety Hazards. What are the exposure levels of above	Not applicable as this is a proposed project	-

ToR Point No.	ToR Point	Compliance	Reference in Draft EIA/ EMP Report
	mentioned hazards and whether they are within Permissible Exposure level (PEL). If these are not within PEL, what measures the company has adopted to keep them within PEL so that health of the workers can be preserved.		
iv.	Annual report of health status of workers with special reference to Occupational Health and Safety.	Not applicable as this is a proposed project	-
9.	Corporate Environment Policy:		
i.	Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.	Yes, the company has laid down Environment Policy approved by its Board of Directors. Corporate Environment Policy of the company has been incorporated in this EIA/EMP Report.	Chapter X, section no. 10.2.2, Page No. 229
ii.	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, the Environment Policy prescribes for standard operating process to implement the environmental standards.	-
iii.	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.	Hierarchical system of the company to deal with the environmental deviations and for ensuring compliance with the environmental clearance conditions is given.	-
iv.	Does the company have system of reporting of non-compliances / violations of environmental norms to the Board of Directors	The environmental management system of the company engages right from the senior management to the implementation team on the ground. System of reporting the performance of	-

ToR Point No.	ToR Point	Compliance	Reference in Draft EIA/ EMP Report
	of the company and / or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report.	environmental management system has been incorporated under roles & responsibilities of Corporate Environment Policy.	
10.	Details regarding infrastructure facilities such as sanitation, fuel, restroom etc. to be provided to the labor force during construction as well as to the casual workers including truck drivers during operation phase.	There will be construction activities in the project site for the installation of the plant. Adequate infrastructure facilities will be provided to the labor force including truck drivers such as restroom, canteen, sanitation, drinking water, etc. during construction & operation phase.	-
11.	Enterprise Social Commitment (ESC)		
i.	Adequate funds (at least 2.5 % of the project cost) shall be earmarked towards the Enterprise Social Commitment based on Public Hearing issues and item-wise details along with time bound action plan shall be included. Socio-economic development activities need to be elaborated upon.	As per OM dated 30 th September and 20 th October, 2020, company will propose a detailed action plan along with budgetary allocation after conduction of Public Hearing considering the issues raised during public hearing. The funds allocated will be spent for various socio-economic development activities proposed to be undertaken in the study area with a priority to villages falling in the impact zone, which may be further extended to other villages depending upon budget and requirement.	Chapter VIII, Section 8.3 Page no. 224
12.	Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details	No litigation is pending against the project and/or any direction/order passed by any Court of Law against the project.	-

ToR Point No.	ToR Point	Compliance	Reference in Draft EIA/ EMP Report
	thereof and compliance/ATR to the notice(s) and present status of the case.		
13.	A tabular chart with index for point wise compliance of above TORs.	Point-wise compliance of the ToRs has been given in the tabular form.	Page no.9 to 25
Specific Conditions			
1.	List of existing distillery units in the study area along with their capacity and sourcing of raw material.	List of existing distilleries is attached as Annexure 7	Annexure 7 (Page no.....)
2.	Number of working days of the distillery unit.	Total working days are 350 days/annum depending on the availability of raw material.	-
3.	Details of raw materials such as molasses /grains, their source with availability.	Major raw material for Grain based operation will be Grain (Broken Rice, Sorghum, Maize) from nearby areas. Fuel for boiler will be Biomass/rice husk or low sulphur coal & will be procured from local suppliers and transported by road.	-
4.	Details of the use of steam from the boiler.	Steam from the boiler will be used in liquefaction, distillation, MEE & dryer and for the production of power. Steam breakup has been incorporated in this EIA/EMP Report.	Chapter II, Section 2.4.1.4, Page no. 42
5.	Surface and ground water quality around proposed spent wash storage lagoon and compost yard.	Surface & groundwater quality has been assessed and results of the same have been incorporated in the EIA/EMP Report.	Chapter III, Section 3.7 Page no. 84
6.	Plan to reduce spent wash generation within 6-8 KL/KL of alcohol produced.	Spent wash generation will be within 6-8 KL/KL of alcohol produced. Grain Slop (Spent Wash) generated will be taken through Centrifuge Decanters for separation of Suspended Solids separated as Wet Cake & will then be treated in Multi Effect Evaporator followed by dryer.	-

ToR Point No.	ToR Point	Compliance	Reference in Draft EIA/ EMP Report
7.	Proposed effluent treatment system for molasses/grain based distillery (spent wash, spent lees, condensate and utilities) as well as domestic sewage and scheme for achieving zero water conservation.	Distillery will be based on zero effluent discharge. Scheme for Zero Effluent Discharge with details of treatment of spent wash, spent lees, condensate & utilities has been incorporated in EIA/EMP Report.	Chapter II, Section 2.6 (E)Page no. 53
8.	Proposed action to restrict fresh water consumption within 10 KL/KL of alcohol production.	Fresh water consumption will be restricted within 6.5 KL/KL of alcohol production. Water balance showing the same has been incorporated in EIA/EMP Report.	Chapter II, Section 2.4.1.3 Page no. 39
9.	Details about capacity of spent wash holding tank, material used, design consideration. No. of piezometers to be proposed around spent wash holding tank.	The spent wash storage holding tank (RCC lined lagoon) of 5 days capacity shall be constructed as per CPCB guidelines. Two piezometers are proposed to be installed.	-
10.	Details of solid waste management including management of boiler ash, yeast, etc.Details of incinerated spent wash ash generation and its disposal.	<ul style="list-style-type: none"> Solid waste generally comprises of fibers and proteins in the form of DDGS (88TPD), which will be ideally used as Cattle, poultry and fish feed ingredients. Boiler ash (116 TPD) generated during coal-based operations will be given to cement/brick manufactures & during biomass (62 TPD) based operations will be given to brick manufacturers in covered vehicles. 	-
11.	Details of bio composting yard (if applicable).	Not applicable.	-
12.	Action plan to control odor pollution.	Action plan to control odor pollution has been incorporated in the EIA/EMP Report.	Chapter IV, Section 4.5.2 (C) Page no. 132
13.	Arrangements for installation of	Continuous online monitoring system (24x7	-

ToR Point No.	ToR Point	Compliance	Reference in Draft EIA/ EMP Report
	continuous online monitoring system (24x7 monitoring device).	monitoring device) for stack emissions will be installed by the Company.	
14	Add: If Sugar and distillery will have integrated effluent treatment facilities. Details regarding the same.	Not applicable.	



CHAPTER-I INTRODUCTION

1.1 PURPOSE OF THE REPORT

This report has been prepared in accordance with the Terms of Reference issued by Ministry of Environment, Forest & Climate Change (MoEFCC) vide letter no. IA-J-11011/277/2023-IA-II(I) dated 31st July 2023. The sole objective of this report is to assess and quantify the Environmental impacts due to the proposed project and suggest most feasible and influential mitigation measures, thus managing the sustainability of the environment through a well-designed Environmental Management Plan (EMP). Recognizing the importance of EMP, the Ministry of Environment, Forest & Climate Change (MoEFCC), Government of India had formulated policies and procedures governing the industrial and other developmental activities to mitigate & control uncontrolled use of natural resources and to promote involvement/incorporation of environmental concern in developmental projects. Ministry of Environment, Forest & Climate Change (MoEFCC) has made prior Environmental Clearance (EC) for certain developmental projects mandatory through its notification issued on 14th September, 2006 and its subsequent amendments.

EIA Report contains essential information for:

- ❖ The project proponent to commence the operational activities of the proposal in an environmentally, economically & socially responsible manner;
- ❖ The concerned authority to make a completely analyzed & informed decision on the proposal, including the terms of references that must be attached to an approval or authorization; and
- ❖ The public to understand the proposal and its likely impacts on people and the environment.
- ❖ The proponent to implement the mitigation measures suggested and allocate appropriate budget for the same.

1.2 IDENTIFICATION OF PROJECT AND PROJECT PROPONENT

1.2.1 Identification of the Project

A. Project Proposal

M/s Piccadily Agro Industries Ltd. is proposing 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant at Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh. The total area for the proposed project is 9.0 ha (22.24 acres) & complete land is under possession of the company. The company will apply for land conversion to industrial use. The proposal for the project is given in the table below:

Table - 1.1
Project proposal

S. No.	Units	Proposed Capacity	Products
1.	Grain based Distillery	210 KLPD	Ethanol/Rectified Spirit /Extra Neutral Alcohol/Industrial Alcohol/Denatured Spirit/Specially Denatured Spirit/Malt Spirit
3	Co-generation power plant	6.25 MW	Power

B. Screening Category

As per EIA Notification dated 14th Sep, 2006 and as amended on 13th June, 2019, the project falls under Category “A”, Project, or Activity ‘5(g)’ Distilleries [Non-Molasses based distilleries>200 KLD].

C. Status of the Proposed Project with respect to Environment Clearance

The chronology of the project activities undertaken so far with respect to the process of getting EC is given in the table below:

Table: 1.2
Status of the Proposed Project with respect to Environment Clearance

Application uploaded on MoEFCC portal	19 th July, 2023
Standard ToR Letter issued by the MoEFCC, New Delhi vide letter no. IA-J-11011/277/2023-IA-II(I)	31 st July, 2023
Baseline data collection study period	Summer Season (March to May, 2023)

1.2.2 Introduction of the Project Proponent

Piccadily Agro Industries Ltd. (PAIL), a Public Limited Company was incorporated on 25.03.1994 with the registered address at Village: Bhadson, Umri - Indri Road, Tehsil: Indri, Distt. Karnal Haryana (India), Pin code: 132117 and bearing the CIN No. L01115HR1994PLC032244. It is spread over an area of 168 Acres of Land. It started its operation in the year 1996 - 97 for manufacture of White crystal sugar with installed capacity of 2500 TCD along with in- house facilities for 6 MW Co-generation of power at Umri-Indri Road, Tehsil Indri, Distt. Karnal, (Haryana). The company there after started expansion & modernization of the Sugar Mill and enhanced the crushing capacity to 5000 TCD w.e.f. 02/12/2004 i.e. from crushing season 2004 - 2005. The company further expanded its business & set up a Distillery Unit with an installed capacity of 60 KLPD in year 2007, which has further been expanded to 90 KLPD. The company has set up an automatic 750 ml & 180 ml Pet Bottle plant. The unit is producing pet bottles to cater to the distillery’s own consumption. The company has recently set up capacity augmentation of the existing distillery from 90 KLPD to 250 KLPD. Now the company has proposed to establish a grain-based distillery plant of 210 KLPD at Mahasamund, Chhattisgarh.

The brief profile of the Directors is detailed below:

Harvinder Singh Chopra- Sh. Harvinder Singh Chopra is a qualified Chartered Accountant and is having more than 40 years' experience in Finance, Accounts, Project implementation, administration, designing, construction, expansion, Commercial Banking, Direct & Indirect taxation etc. Expertise in overall management. He has been associated with the company since its inception. He has been managing the affairs of the company for the last 40 years. He is involved with designing, construction, expansion and successful running of all the units of the company.

Akhil Dada: Sh. Akhil Dada (46) is a graduate in Commerce from Punjab University and Postgraduate in Business Administration (MBA) from VTU Belgaum. He is having more than 23 years of experience in managing different business including Specialized sales & Team Management.

Jai Parkash Kaushik: Sh. Jai Parkash Kaushik is retired IAS officer of the Government of India and he is well experienced and possesses expertise in administration, business, & entrepreneurship qualities. He specialises in Risk management. During his tenure as an IAS Officer, he was looking after the affairs of various Co-operative Sugar Mills at Meham, Kaithal and Shahbad in the state of Haryana as MD. He was also posted as a Deputy Commissioner of Ambala and Yamuna Nagar Districts. His last assignment was as a Registrar Co-operative Societies (RCS) Haryana and Chairman Group D Selection Committee of Haryana.

Dharmendra Kumar Batra: Sh. Dharmendra Kumar Batra, is an IT professional with an experience of more than 29 years in the field of System Analysis, Design, Development, and Implementation of quality software etc

Heena Gera: She is a Commerce graduate from Delhi University, with expertise in Finance, accounts, preparation of cost reports, Budgets and annual operating plans.

Rajeev Kumar Sanger: Mr. Rajiv Kumar Sanger (32) is a Practicing Company Secretary having 7+ years' experience. He has immense knowledge and experience in dealing with matters relating to company Law, Securities Law, Labour Law, Trademark and Copy right, Legal Due Diligence, Transaction documents, Joint Ventures, Mergers and Acquisitions, Listings and Capital Market Transactions, National Company Law Tribunal Proceedings, Insolvency and Bankruptcy Code, Income Tax, GST, Authority etc.

1.3 BRIEF DESCRIPTION OF NATURE, SIZE, LOCATION OF THE PROJECT AND ITS IMPORTANCE TO THE COUNTRY, REGION

1.3.1 Brief Description of Nature, Size and Location of Project

M/s. Piccadily Agro Industries Ltd is proposing 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant at Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh. The proposed distillery plant will be designed for manufacturing Ethanol/Rectified Spirit /Extra Neutral Alcohol/Industrial Alcohol/Denatured Spirit/Specially Denatured Spirit along with Malt

Spirits from broken grains (Maize, Broken Rice, Barley malt & Sorghum). Along with the main products, the proposed new installation of distillery will also produce animal feed called as Distiller's Dried Grain with Soluble (DDGS) from Grain based operations depending upon the market demand. As per EIA Notification dated 14th Sep, 2006 and as amended on 13th June, 2019, the project falls under Category "A", Project, or Activity '5(g)' Distilleries [Non-Molasses based distilleries >200KLD].

Brief Description of Nature, Size and Location of the Project is given in table below.

S. No.	Particulars	Details	
A.	Nature of the Project	Proposed Grain based Distillery and Co-generation power plant	
B.	Size of the Project	Units	Proposed Capacity
		Grain based Distillery	210 KLPD
		Co-generation power plant	6.25 MW
C.	Location details		
	Village	Beltukri	
	Tehsil	Mahasamund	
	District	Mahasamund	
	State	Chhattisgarh	
	Latitude	21°13'8.83" N to 21°13'20.19" N	
	Longitude	82°4'41.10"E to 82°4'57.78"E	
	Topo sheet No.	56H/7, 56H/8	

1.4 SCOPE OF THE STUDY

Scope of this study covers all the points given in the Terms of References (ToR) issued by the MoEFCC, New Delhi vide letter no. IA-J-11011/277/2023-IA-II(I) dated 31st July 2023. This EIA/EMP report includes total twelve chapters as per Appendix-III of the EIA Notification, 2006.

Scope of the study

Chapter	Description
Chapter-1	Introduction
Chapter-2	Project Description
Chapter-3	Description of the Environment
Chapter-4	Anticipated Environmental Impacts and Mitigation Measures
Chapter-5	Analysis of Alternatives (Technology & Site)
Chapter-6	Environmental Monitoring Program
Chapter-7	Additional Studies
Chapter-8	Project Benefits
Chapter-9	Environmental Cost Benefit Analysis
Chapter-10	Environmental Management Plan
Chapter-11	Summary & Conclusion
Chapter-12	Disclosure of Consultants Engaged

1.5 REGULATORY SCOPING

The study covers the requirements of various acts, rules, Notifications and Office Memorandum applicable for Distillery industry related to air pollution, water pollution and solid waste management and guidelines of MoEFCC, CPCB/SPCB etc.



CHAPTER - II PROJECT DESCRIPTION

2.1 TYPE OF THE PROJECT

As per EIA Notification dated 14th Sep, 2006 and as amended on 13th June, 2019, the project falls under Category “A”, Project or Activity ‘5(g)’ Distilleries. [Molasses based distilleries >100 KLPD & Non-Molasses based distilleries >200 KLD]. The project involves installation of equipment required for processing of feedstock, fermentation, distillation and manufacturing of desired products, development of required technical facility for effective implementation of EMP and necessary infrastructure development required for operating distillery unit and co-generation power plant.

2.2 NEED FOR THE PROJECT

Rice, maize and other grains are one of the main course cereal crops of India. India’s market year 2015-16 rice ending stocks are estimated to be 18.50 million tonnes (16.2 million government rice and 2.3 million tonnes private) due to higher procurement and relatively weak off take, according to the FAS. Market year 2016-17 ending stocks are also forecasted to be higher at 16.4 million tonnes on normal procurement and government off take. Out of total stock 18.50 million MTs of corn/rice, about 2-3 million MT is wasted due to grain blackening following un-seasonal rains. This grain is not suitable for human or animal consumption. Hence, it is sold at a low price and thus gives lower returns to the farmers. Thousands of the marginal farmers will be benefited if such grains can be used for alcohol production.

The grain-based distillery is very promising to new technologies developments (such as raw starch hydrolysis, new generation of efficient enzymes, dry germination etc.) are taking place in dry milling grain alcohol production, which will bring down the cost of conversion substantially in future. Under PM-JIVAN scheme, 12 commercial plants and 10 demonstration plants of Second Generation (2G) Bio-Refineries (using ligno-cellulosic biomass as feedstock) are planned to be set up in area having sufficient availability of biomass so that ethanol is available for blending throughout the country. Already Rs. 1969.50 Crores have been earmarked for this scheme. These plants can use feed stocks such as rice straw, wheat straw, corn cobs, corn stover, bagasse, bamboo and woody biomass, etc.

The energy demand in our country is rising due to an expanding economy, growing population, increasing urbanization, evolving lifestyles and rising spending power. About 98% of the fuel requirement in the road transportation sector is currently met by fossil fuels and the remaining 2% by bio fuels. Today, India imports 85% of its oil requirement. The Indian economy is expected to grow steadily despite temporary setbacks due to the COVID pandemic. This would result in a further increase of vehicular population which in turn will increase the demand for transportation

fuels. Domestic bio fuels provide a strategic opportunity to the country, as they reduce the nation's dependence on imported fossil fuels. In addition, when utilized with appropriate care, biofuels can be environmentally friendly, sustainable energy sources. Currently the gasoline vehicles (2 wheelers & 4 wheelers) in the country are designed for running on pure gasoline and can be tuned to suit ethanol blended fuels ranging from E0 to E5 depending on the vehicle type. On the material compatibility front, the rubber and plastic components are compatible with E10. However, with the proposed target of E20 (blending of 20% Ethanol) the vehicles are now required to become both material compatible and tuned for use of E20 fuel. Flex fuel vehicle is well accepted concept in other countries. India has also notified the use of E85 and E100 in 2016 and in future the vehicles designing will meet the E85 & E100 compatibility which will increase the demand of ethanol eventually. The Global transportation sector is facing three major challenges, namely depletion of fossil fuels, volatility in crude oil prices and stringent environmental regulations. Alternative fuels specific to geographies can address these issues. Ethanol is considered to be one of most suitable alternative blending, transportation fuel due to its better fuel quality (ethanol has a higher-octane number) and environmental benefits. The projected requirement of ethanol based on petrol (gasoline) consumption is estimated. The National Policy on Bio-fuels had set a target of 20 per cent blending of bio-fuel by 2025. According to the report, India's Ethanol Blending Program stipulates procurement of ethanol produced directly from sugarcane juice, and damaged food grains. Average ethanol blending targets for the period ESY 2020-21 to ESY 2025-26 are calculated and given in the below table:

Ethanol Supply Year	Projected Petrol Sale (MMT)	Projected Petrol Sale (Cr. litres)	Blending (in %)	Requirement of ethanol for blending in Petrol (Cr. litres)**
A	B	$B \times 141.1$	C	$B \times C$ %
2019-20	24.1 (Actual)	3413 (Actual)	5	173
2020-21	27.7	3908	8.5	332
2021-22	31	4374	10	437
2022-23	32	4515	12	542
2023-24	33	4656	15	698
2024-25*	35	4939	20	988
2025-26*	36	5080	20	1016

* The petrol projections may undergo revision due various factors like penetration of EVs, etc.

** The figures are optimistic, as the E20 fuel will be consumed by new vehicles from April 2023 only. The demand for ethanol will, however, increase due to penetration of E100 two wheelers, which are now being manufactured in the country.

Source: Report of Expert Committee NITI Aayog, Ministry of Petroleum and Natural Gas The following benefits to the State and Country can be envisaged as below:

- Contribution in Ethanol blending programme
- Capital Investment being made in the State
- Employment generation (direct and indirect)
- Long term gains to farmers for sale to an industry rather than to small scale wholesalers

Moreover, there will be employment generation along with introduction of socio-economic developmental activities for the welfare of nearby villages. Various sanitation measures will be undertaken, infrastructure facilities will be improved in nearby villages, trainings and skill development programs will be undertaken and in turn social and economic upliftment of the area will be envisaged.

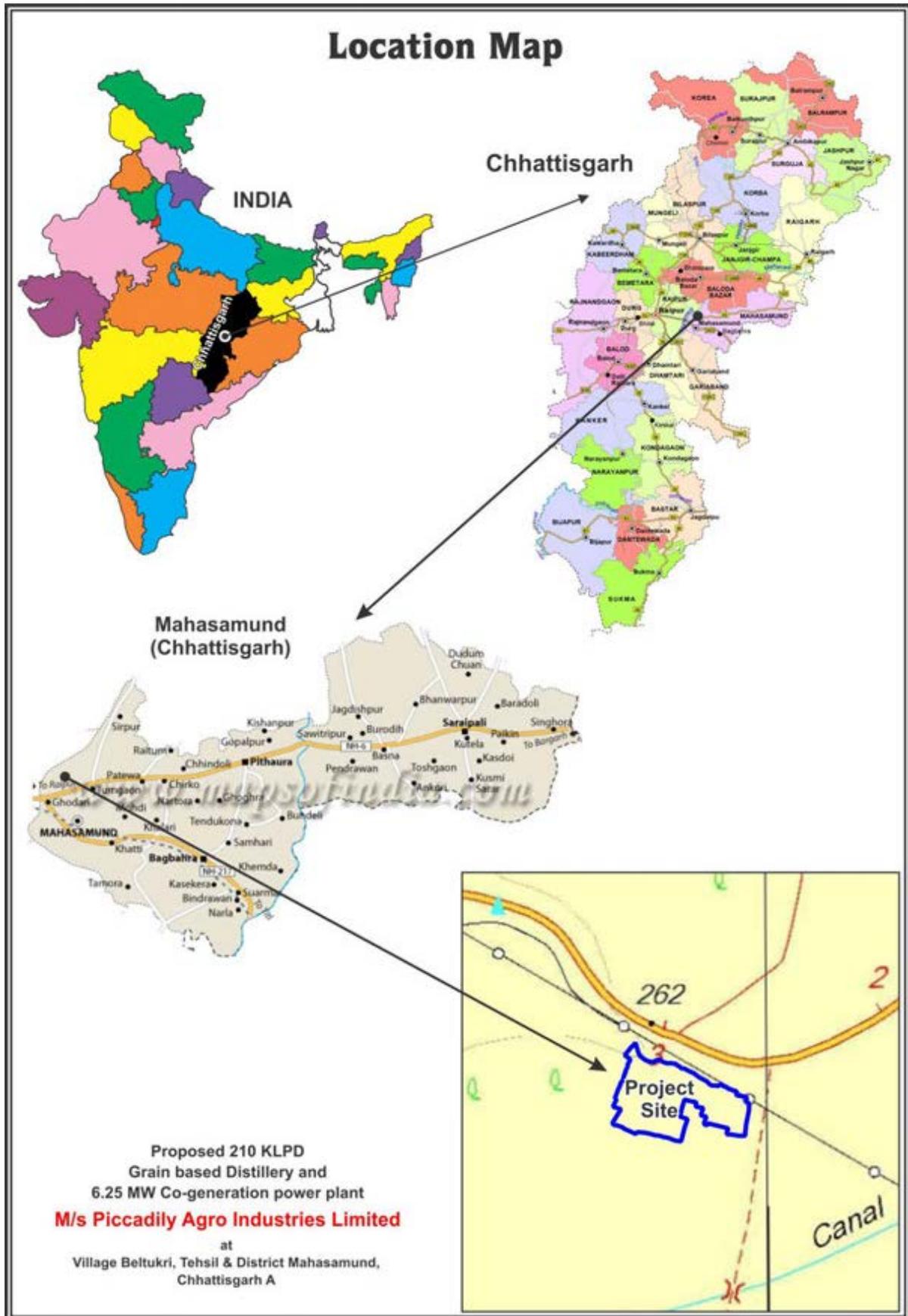
With respect to India, three types of Alcohol are majorly produced, i.e., Rectified Spirit (RS), Extra Neutral Alcohol (ENA) and Ethanol. RS is used for large number of industrial, scientific, laboratory, medical and many other applications. Hence, demand for the same is immense and it is ever increasing. ENA is used for making liquors and other alcoholic beverages. Ethanol is a fuel alcohol; it is used for blending with petrol and intoxicating ingredient of alcoholic beverages. With hundreds of kind of alcoholic beverages being made and consumed in India, the industry can be categorized into four broad groups' viz. Indian Made Foreign Liquor (IMFL), Country Liquor (CL), illicit liquor & Beer. IMFL products contain about 42.85% of alcohol. The consumption of CL is slowly on the decreasing trend as some cheap IMFL is available. In spite of this, the CL industry is growing at around 8%. However, government is taking necessary steps to restrict the illicit liquor as it causes loss of revenue and spoils the health of the people, also bad quality may lead to death of consumer. The major consumption of alcohol as of now is for alcoholic beverages. Ethyl alcohol has the potential to become the fuel of the future relegating gasoline to a secondary place. The ethanol produced from the grains is superior in quality as compared with that from molasses. It is estimated that IMFL market will require around 3000 million litres in the year 2014 and expected to grow more than 50% in next 3 years. With increasing shift of molasses to ethanol production as Government declares 5% to 10% mandatory mixing of fuel ethanol in the gasoline there is great potential for new distillery establishment.

2.3 LOCATION

The project site is located at Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh.

2.3.1 General Location Map

The map showing location of the project site is given in the figure below.

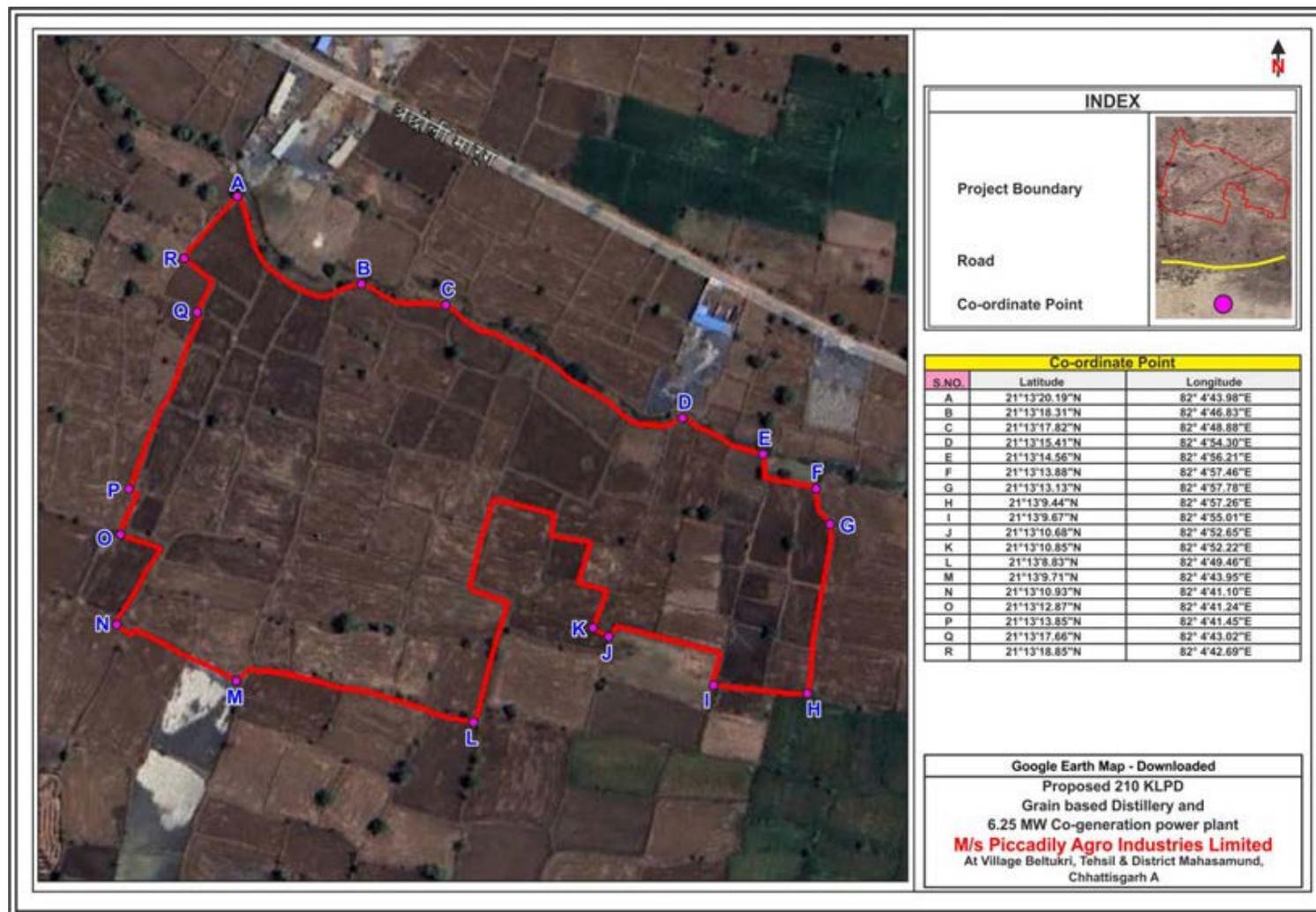


Source: Toposheet

Figure 2.1: Location Map of the project site

2.3.2 Specific Location Map

The map showing specific location of the project site along with boundary coordinates marked on a Google image is given below:



Source: Google Earth

Figure 2.2: Google image showing the specific location of the project site

2.3.3 Plant Layout

The total project area is 9.0 ha (22.24 acres) & complete land is under the possession of company. Land documents are enclosed as **Annexure 1**. The company will apply for land conversion to industrial use.

Greenbelt will be developed in 33% of the total area of the proposed project. 2.97 ha (7.34 acres) i.e. 33% of total project area will be covered under Greenbelt & Plantation Area.

Table - 2.1
Area break-up

S. No.	Particulars	Area (ha)
1.	Main Plant, machineries & Utilities	1.80
2.	Storage area of raw material and products	1.50
3.	Parking area (15% of total area)	1.35
4.	Admin office	0.10
5.	Bottling Area	0.28
6.	Roads & paved area	0.5
7.	Open area	0.5
8.	Greenbelt & plantation (33%)	2.97
	Total	9.0

Layout map showing the proposed unit indicating storage area, plant area, greenbelt area, parking area etc. has been given in Figure below:

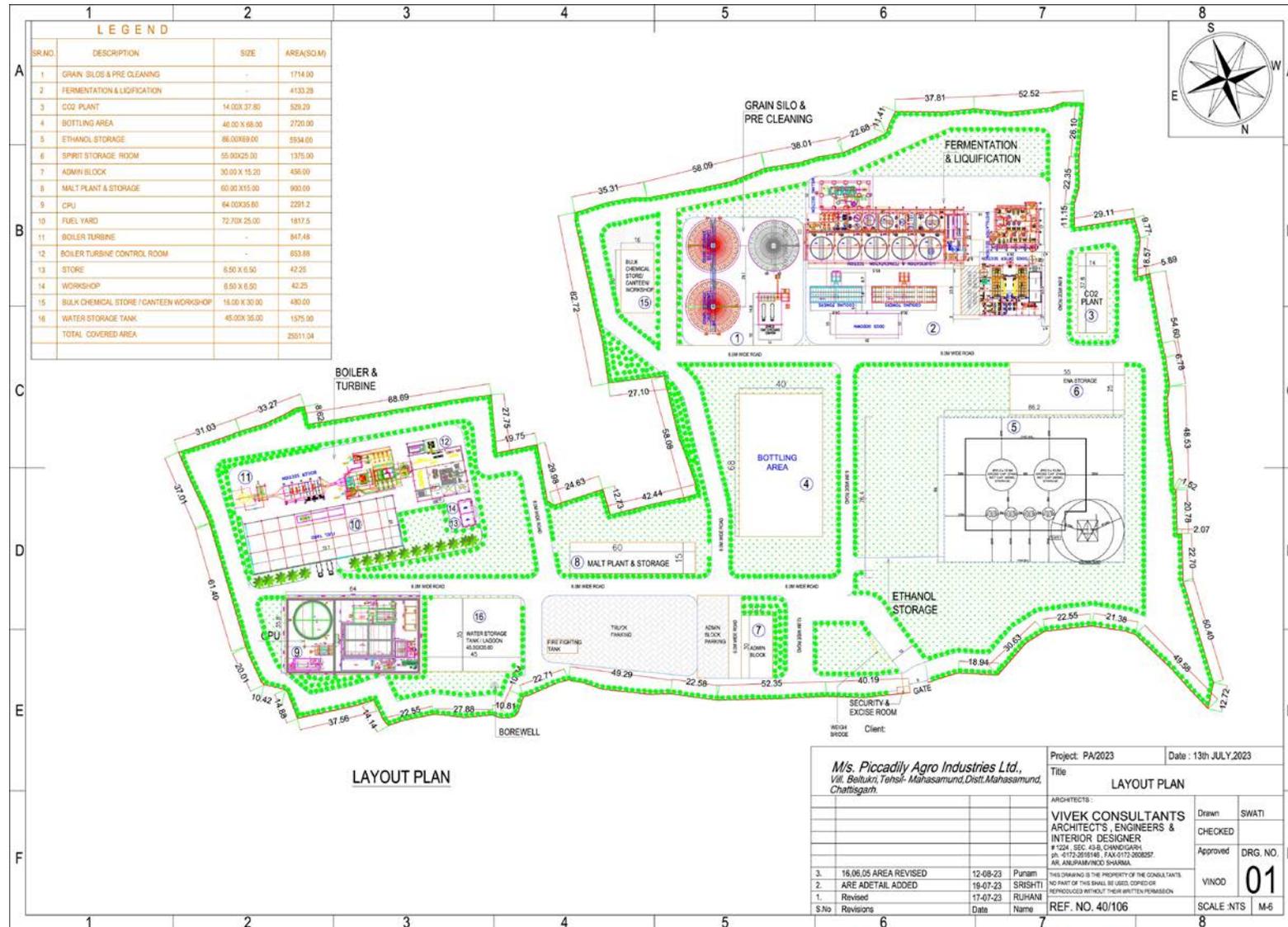


Figure 2.3: Tentative Plant Layout

2.3.4 Photographs of the Proposed Project Site

The photographs showing the proposed project site are given below.



2.4 SIZE OR MAGNITUDE OF THE OPERATION

Size or magnitude of operation for the proposed project is given below:

Table: 2.2
Details of the proposed project

S. No.	Units	Capacity	Products
1.	Grain based Distillery	210 KLPD	Ethanol/ Rectified Spirit /Extra Neutral Alcohol/ Industrial Alcohol/ Denatured Spirit/ Specially Denatured Spirit & Malt Spirit
3.	Co-generation Power Plant	6.25 MW	Power

Table 2.3
Other details of the Project

A.	Cost Details	
1.	Total Cost for the Project	Rs. 182 Crores
2.	Cost of Environment Management Plan (EMP)	Capital Cost- Rs. 20.0 Crores Recurring Cost- Rs. 2.0 Crores/annum
B	No. of working days	
		Total no. of working days is 350 days / annum
C.	Product Mix	
		Ethanol/ Rectified Spirit /Extra Neutral Alcohol/ Industrial Alcohol/ Denatured Spirit/ Specially Denatured Spirit & Malt Spirit & Power
D.	By-products	
		DDGS & CO2

2.4.1 Requirements for the project

The project requirement such as area, raw material, fuel, water, steam, power, manpower with source of supply is described in the section below:

2.4.1.1 Raw material requirement

Grains such as damaged grain feed stock, broken rice, maize, bajra & sorghum will be used as raw material which is easily available from the local market. Details regarding quantity of raw materials required their source along with mode of transportation for project are given in table below:

Table- 2.4
Raw Material Requirement for Distillery

S. No.	Particulars	Total Requirement	Storage facility	Source & mode of transportation
1.	Grains- Maize, Broken Rice & Sorghum	464 TPD	Steel Silo	Near-by Markets via road
2.	Barley Malt	20 TPD	Steel Silo	Near-by Markets via road
3.	Process Chemicals			
	Sodium Hydroxide (Caustic soda)	2100 Kg/day	Stores/Steel Tanks	Near-by Markets via road
	Nutrients	420 Kg/day	In Stores	
	Enzymes (Alpha amylase, Amyloglucosidase)	273 Kg/day	In Stores	
	Antifoam Agent	105 Kg/day	In Stores	
	Dry Yeast	105 Kg/day	In Stores	

2.4.1.2 Fuel Requirement

The fuel required for proposed boiler to generate steam & power is biomass like rice husk or coal. Details regarding fuel requirements are given below.

Table- 2.5
Fuel Requirement

Name of Raw Material	Total Requirement (TPD)	Storage facility & capacity	Source & Mode of Transportation
Biomass/Rice husk	412 TPD	Covered sheds	From local suppliers by road
Or			
Low sulphur Coal	288 TPD	Covered sheds	From local suppliers by road

2.4.1.3 Water Requirement

Total fresh water requirement will be 1102 KLPD (802 KLPD for Distillery along with co-generation power plant, 100 KLPD for Malt spirit plant, 150 KLPD for Bottling plant & 50 KLPD Domestic usage & others) which will be sourced from Surface water (Mahanadi river through Samodha Dam). Total input for first run for distillery will be 3144 KLPD. 2342 KLPD will be recycled and net fresh water requirement for distillery unit only will be 802 KLPD.

STATUS OF APPROVAL-The company has obtained the permission from Chhattisgarh Government, State Investment Promotion Board for the abstraction of 533630 m³/annum (1462 KLPD) of water from Mahanadi River (Samodha Dam) vide letter no. 1073/SIPB/2021 dated 10.05.2023. Copy of the same is enclosed as **Annexure 2**.

Table no. 2.6
Water requirement break-up

S. No.	Unit	Quantity
1.	Raw water requirement for Distillery along with co-generation power plant	802 KLPD (4.0 KL/KL)
2.	Malt spirit plant	100 KLPD
3.	Bottling plant	150 KLPD
4.	Domestic use & others	50 KLPD
Total		1102 KLPD

Table- 2.7
Total water input

Particulars	Water requirement (KLPD)
Process water in Liquefaction & Fermentation	1203
Boiler	1064
Cooling tower	757
Auxiliaries & Pump sealing	120
Total Water Input (A)	3144

Table-2.8
Recycling streams

Particulars	Water requirement (KLPD)
Steam condensate	745
Spent Lees	277
Thin slop	245
Process Condensate (MEE condensate & Dryer Condensate)	830
CT blow down, Boiler Blow down, DM plant reject & washing	128
Auxiliaries & Pump sealing	116
Total recycling streams (B)	2342
Net fresh water requirement (A-B)	3144-2342=802

GRAIN ETHANOL PROJECT - 200 KLPD ABSOLUTE ALCOHOL (AA)

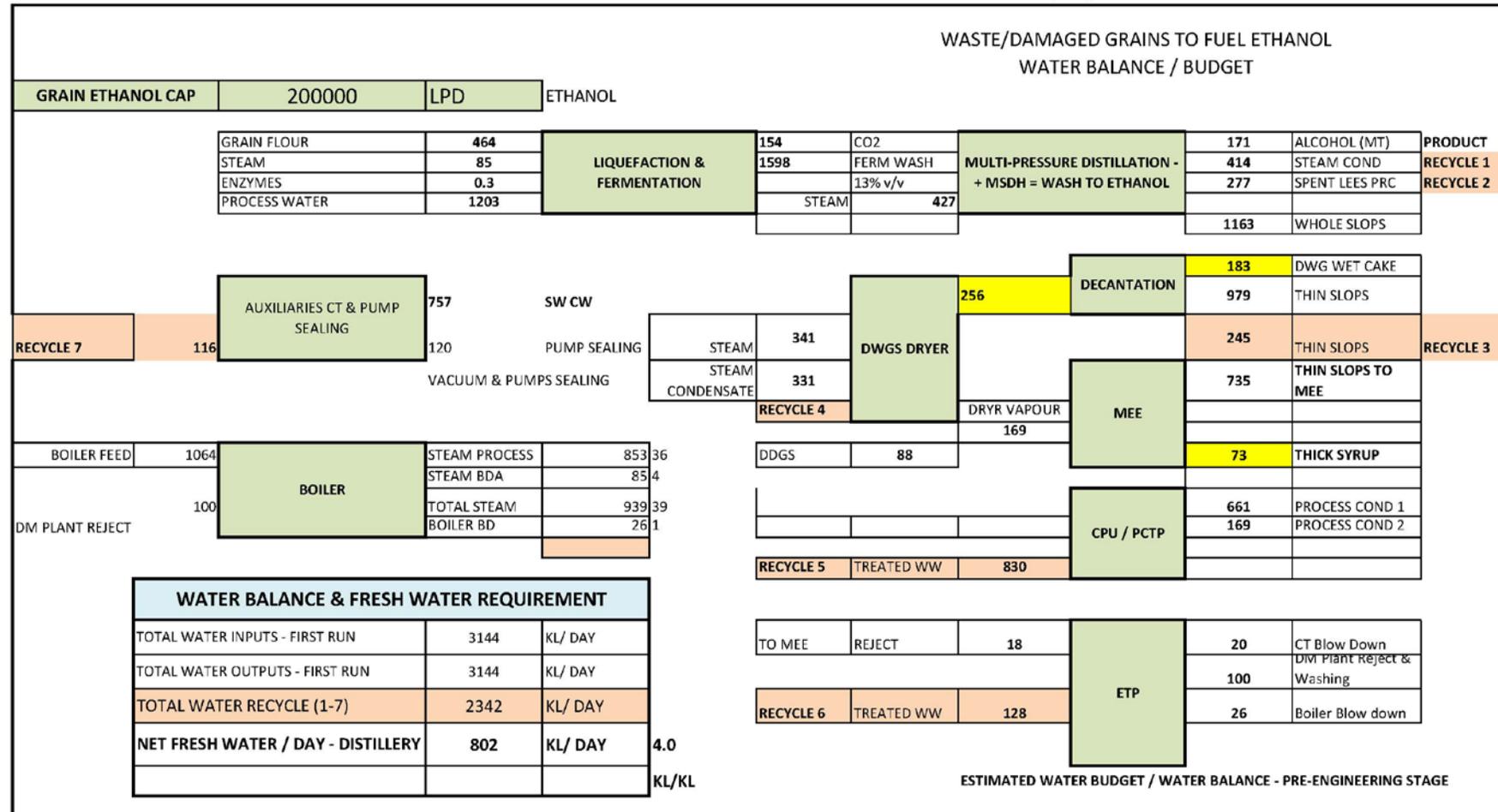


Figure 2.4: Water Balance/ Mass Balance of proposed 200 KLPD Grain based distillery

2.4.1.4 Steam Requirement

Steam requirement for Grain based Distillery operation will be 938 TPD (39.08 TPH) which will be sourced from proposed boiler of 60 TPH capacity. The steam requirement for different sections is given below-

Table – 2.9
Steam requirement

S. No.	Purpose	Steam requirement (TPD)
1.	Cooking & Liquefaction	85
2.	Multi-pressure Distillation + MSDH section	478
3.	DWGS Drier	290
4.	Boiler De-aeration	85
Total		938 TPD (39.08 TPH)

2.4.1.4.1 Boiler details

Boiler of 60 TPH capacity with ESP as Air Pollution Control Equipment will be installed. Details regarding proposed boiler are mentioned in the table given below:

Table – 2.10
Proposed boiler details

S. No.	Item	Boiler details
1.	Boiler Capacity	60 TPH
2.	Type of Fuel	Biomass/Rice Husk or Low sulphur Coal
3.	Stack Height	60 Meters
4.	Pollution Control Equipment Measures	Electrostatic Precipitator (ESP)

2.4.1.5 Power requirement

The power requirement for the proposed distillery is 6.0 MW which will be sourced from proposed 6.25 MW Co-Generation Power Plant.

D.G. set of 1 x 1500 KVA will be installed for the power backup. Details regarding the D.G. Sets are mentioned in the table given below:

Table 2.11
Details Regarding the D.G. Sets

S. No.	Details	
1.	Type of Fuel	HSD
2.	Capacity	1 x 1500 KVA
3.	Stack Height (above roof level)	As per CPCB/SPCB norms (8 m)
4.	Pollution Control Equipment Measures	Adequate stack height/ Acoustic enclosures

2.4.1.6 Manpower requirement

There will be direct & indirect jobs and business opportunities to the local people such as daily wage labour, transporters and raw material suppliers. The manpower required for the proposed project will be 150 persons.

Source: Unskilled/ semi-skilled manpower from local area and skilled from outside/local.

Details regarding manpower requirement is given in the table below.

Table-2.12
Manpower Requirement

Temporary employment during construction	90
Permanent employment during construction	10
Total during construction	100
Temporary employment during operation	50
Permanent employment during operation	100
Total during operation	150

2.5 PROPOSED SCHEDULE FOR APPROVAL AND IMPLEMENTATION

The project will start only after obtaining Environmental Clearance and all other required clearance and will complete within 1.5 – 2 years of commencement.

Activity	Months																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Appointment of consultant, basic engineering and issue of tender enquiries and main machinery order placement for units	3																								
Civil construction				5																					
Fabrication and mechanical work								7																	
Electrical and instrumentation erection																3									
Refractory works																			3						
Trial runs and commissioning																							3		

2.6 TECHNOLOGY AND PROCESS DESCRIPTION

A. GRAIN BASED DISTILLERY PROCESS

(i) Grain Storage Silos, Cleaning, Handling and Milling Section

This is the front end of the process where the rice will be milled in to flour suitable for cooking and further treatment. As rice is a seasonal commodity, the procurement of rice required for the annual operation of the distillery need to planned well and adequate storage facilities need to be created for storing the seasonally procured rice. The rice from the storage go downs shall be conveyed through bucket elevators to temporary storage grain silos for the continuous feeding of the process. The grain stored in the silo will be taken to the mills by gravity, through the vibratory pre-cleaner, magnetic separator and de-stoner for the removal of impurities like straw stem, fine dust, iron particles and heavier particles like stone. Generally hammer mills are employed to grind the rice to fine flour.

(ii) Liquefaction and Saccharification

This is a major process section where the starch which is a glucose polymer is broken down to the monosaccharide glucose, which makes the raw material suitable for fermentation with yeast. The fine ground flour from the mill will be mixed homogenously in the mixing tank where process water along with process condensate from the evaporator and thin still age from the decanter will be used for dilution. Some quantity of liquefying enzyme (Alpha-amylase) is added to the slurry. The slurry is pumped to a jet cooker, where the temperature of the slurry is instantly raised to 105 Deg.C, with steam as the heating medium. To ensure that thorough cooking is done to gelatinize the starch, adequate residence time is provided. The cooked slurry is pumped to liquefaction tank where the balance of the liquefying enzyme (Alpha-amylase) is added to the slurry. With the action of the liquefying enzyme, the gelatinized starch is converted to dextrin, which is a short chain polymer of glucose molecules. The starch thus converted to dextrin is taken to the saccharification tank where saccharifying enzyme, Amylo glycosidase, is added and the dextrin (glucose polymer) is converted to dextrose (an alternative name for glucose). Then the Glucose media is cooled and pumped to the fermentation section where the glucose is fermented with yeast in the fermenters.

(iii) Fermentation

Starch converted into fermentable sugar glucose, through the process of Liquefaction and Saccharification is fermented using yeast. Yeast is a unicellular fungi and each yeast cell by itself is an independently living entity, capable of growth and reproduction.

Yeast consumes the fermentable sugar and converts it into alcohol and carbon-dioxide. Alcohol so produced in yeast cell diffuses out of its body cell wall and get accumulated in the fermenter vessel. Alcohol yield varies with yeast strain and the quantum of starch converted to fermentable sugars.

The Glucose media obtained from the gelatinization and Saccharification of the starch will be diluted with water and or with thin slop and evaporator condensate to give the required optimum sugar concentration for the stress free performance of the yeast. This glucose media is usually not sterilized, although in certain cases it has been pasteurized with a resultants light increase in efficiency. The diluted glucose media, often called the mash is adjusted to a pH of 4 to 5 by suitably adding Sulphuric acid, as required. Although the optimum pH for maximum efficiency varies with different raw material used, an initial pH of 4.8 to 5.0 is usually considered the best. The fermentation process converts the fermentable sugars in feedstock in to alcohol using yeast. During fermentation, the glucose molecules are broken down in to alcohol and carbon-dioxide. Significantly then a release takes place during the fermentation and it is important to maintained the wash in the fermenter at a temperature of around 32°C by circulating the mash through coolers. Once the fermentation reactions are completed the mash will be ready for distillation, which is a process of separating the alcohol from the rest of the mash.

(iv) CO₂ Recovery Plant

During the biochemical reaction in fermentation section, CO₂ is generated as by product along with ethyl alcohol. This raw CO₂ gas having 99% v/v purity (DB) is taken for purification followed liquefaction. Initially gas is taken to Foam trap to eliminate liquid particle carried over from fermentation section. Here process water is used to rinse down the foam. Clean gas from Foam trap is then fed to Low pressure organic removal system with the use of booster blower. Organic impurities associated with carbon dioxide gas are scrubbed using high efficiency packing. Main impurities like ethanol, aldehyde, ethyl acetate, are extracted in the scrubbing water through counter current operation of the scrubber. This purified gas is then fed liquid knock out drum for removal of water traces. Purified gas is compressed in two stages reciprocating non lubricated water cooled compressor. This high pressure gas is cooled down to desired temperature in water cooled after cooler. Additional impurity separation step is used to enhance CO₂ gas purity by scrubbing impurities present in traces by use of potable water. Odour producing hydrocarbons and other sulphur based compounds will be removed in adsorption tower by using activated carbon as a media. De odorized high pressure carbon dioxide gas will be cooled down to remove significant portion of moisture using ammonia as coolant. It will be further dried in molecular sieve dehydration unit. This step is essentially required to avoid ice formation during liquefaction of carbon dioxide.

This purified is carbon dioxide gas will be then liquefied by using refrigeration system. Refrigeration system consists of screw compressor, pre cooler, refrigerant condenser and accessories. Liquid CO₂ still contains non condensable gases like nitrogen, oxygen which are removed through venting. Liquid CO₂ stripper is used to avoid high vent CO₂ losses which uses packed tower with re-boiler and reflux condenser. Oxygenates of nitrogen are removed through

molecular sieve NO_x tower. Purified liquid CO₂ of desired quality will be then sent to liquid CO₂ storage tank. Liquid storage tank will be equipped with all necessary accessories like pressure safety valves, insulation. After the scrubber, the pressurized CO₂ will be liquefied and stored in the storage container which will be disposed through tankers to the soft drink manufacturing units.

(v) Multi Pressure Vacuum Distillation

The Alcohol is produced in the fermentation process and is separated from the rest of the mash and purified in the distillation process. The distillation process uses the concept of fractional distillation which utilizes the difference in the boiling points of the various constituents to separate them from a mixture. Distillation process consumes a considerable amount of energy and is also a deciding factor in the quality of ethanol produced. With the escalating cost of energy and energy being a major constituent in the total cost of production of alcohol, efforts have always been to minimize the consumption of energy in the distillation process. Conventionally, thermal energy was supplied to each of the columns directly through steam and all the columns operated almost at the same pressure. This process consumed a lot of energy. In the multi pressure distillation technology, thermal energy in the form of steam will be supplied to only a few of the columns and the rest of the columns operate using the vapour generated in the columns that are supplied with steam. This results in the columns operating at various pressures like some of them will be at above atmospheric pressure, some of them will be under atmospheric pressure and the rest of them operate under vacuum. In terms of energy consumption, the multi pressure vacuum distillation plants consume only about 60% of the thermal energy requirements of the conventional single pressure distillation plants.

Apart from the production of ENA, the distillation plants also produce some impurities which are basically organic compounds. The lighter fractions are clubbed together and are called as technical alcohol (Impure Spirit) and the heavier fractions are clubbed together and are called as Fusel Oil. The technical alcohol and fusel oil have applications in the industry and in cosmetic industry. The ethyl alcohol produced in the distillery will be cooled and stored in daily receiver tanks and then in the bulk storage tanks.

(vi) Decantation

The Decanter is a centrifuge used for the separation of the suspended solids from the liquid. The thick slop discharged from the distillation section is taken to the decanter, where the suspended solids are separated as 30% W/W wet cake. The separated liquid with all the dissolved solids is called the thin slop and part of this thin slop is used for dilution of the glucose media in the fermentation. The rest of the thin slop will be taken to the evaporation section for concentration.

(vii) Multi Effect Evaporation

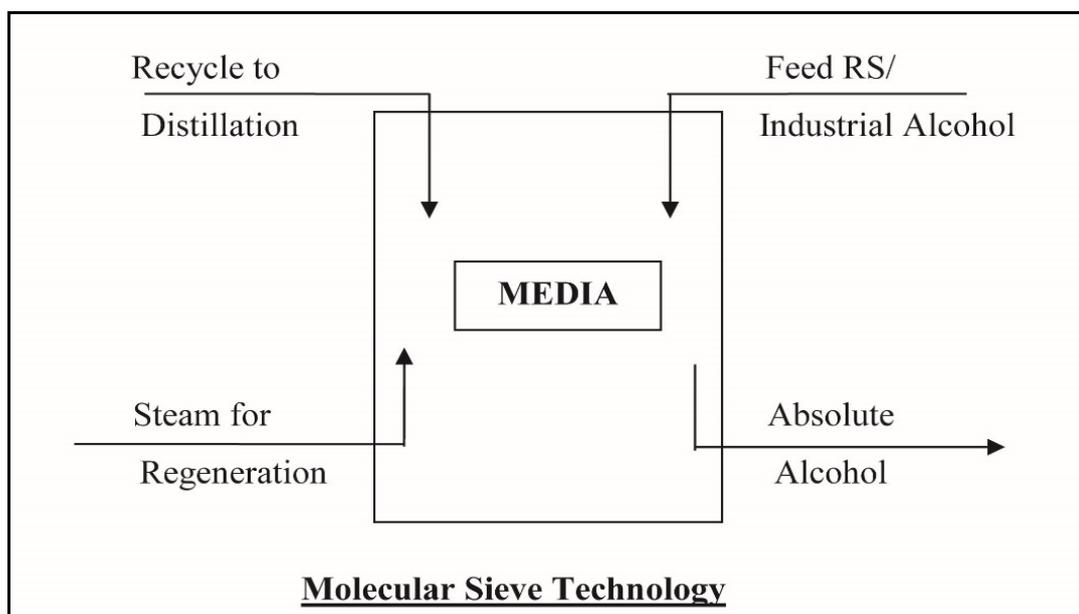
This section consist of Falling film evaporators and forced flow evaporators with the aim of concentrating the thin slop to the thick syrup with the solids contents of 30%w/w. In order to economize on the energy consumption, part of the evaporation section, consisting of falling film evaporators will be integrated with the distillation section. This integrated evaporator section will used the energy available in the mash column vapours to partly concentrate the thin slop. The rest of the concentration to 30% w/w will be done in the independent evaporator section.

Ethanol production

Absolute alcohol will be produced by dehydration of Rectified Spirit. The process which will be implemented is based on Pressure Swing Adsorption (PSA) system using Molecular Sieves. After preheating by waste hot streams, RS is vaporized and superheated by using medium pressure steam at 6 Kg/cm²g pressure. Hot vapors at 6 kg/cm²g pressure and 130°C temperature will pass through PSA column, where the water vapors are retained while water free alcohol is released as vapors. The alcohol vapors are condensed and collected as absolute alcohol. After saturation of molecular sieve bed, the alcohol vapors are shifted to the other tower and the first tower is taken for regeneration. Regeneration will be done by releasing pressure followed by creation of vacuum and then by elutriating with dehydrated alcohol vapors from the tower in dehydration operation. The obtained vapors will be condensed and the vent vapors will be recovered through scrubber. Vacuum can be created. After cooling of Product, it will be transferred to absolute alcohol receiving tank and then to storage tank.

Molecular Sieve Technology

Molecular sieve technology works on the principle of pressure swing adsorption. Here water is removed by adsorbing on surface of 'Molecular sieve' and then cyclically removing it under different conditions (Steaming).



Benefits of Molecular Sieve Technology

- The process ensures high process yield and negligible losses as 99.5 to 99.75% of the ethanol in feed are recovered in the product.
- High Energy efficient process.
- The plant is automated, which virtually eliminates the human error.
- The plant can suitably be operated to 60-65 % turndown.

(viii) DWGS Dryer

Wet distiller's grains shall be fed into the dryer housing at controlled rate through a suitable feeding system. The Rotary Bundle will be enclosed in an insulated dryer housing and on its outer flights will be fixed. Dry, saturated steam will be supplied to the bundle through rotary joint at one end & the condensate will be discharged through rotary joint mounted of another end. During the course of rotation, these flights pick up the material and shower them on to the tube bundles. The heat transfer will be primarily by conduction. The water vapours will be exhausted through an Exhaust Blower & passed through a cyclone separator for separating fines. Dry product partially recycled back to feed conditioner for feed conditioning through Product Screw & Recycle Conveyor. Entire operation of the Dryer will be controlled through local indication cum Control panel. The finished product will be with a moisture content of 10%. This finished product with 90% w/w solid sand 10% moisture is called as the Distillers Dried Grain with Soluble (DDGS). Theoretically the Distillers Dried Grain is the wet cake separated in the decanter and then dried in the drier. As this is mixed with the dried soluble matter in the thin slop the mixture is called as the DDGS. As seen elsewhere, this is rich in protein and is used as animal feed.

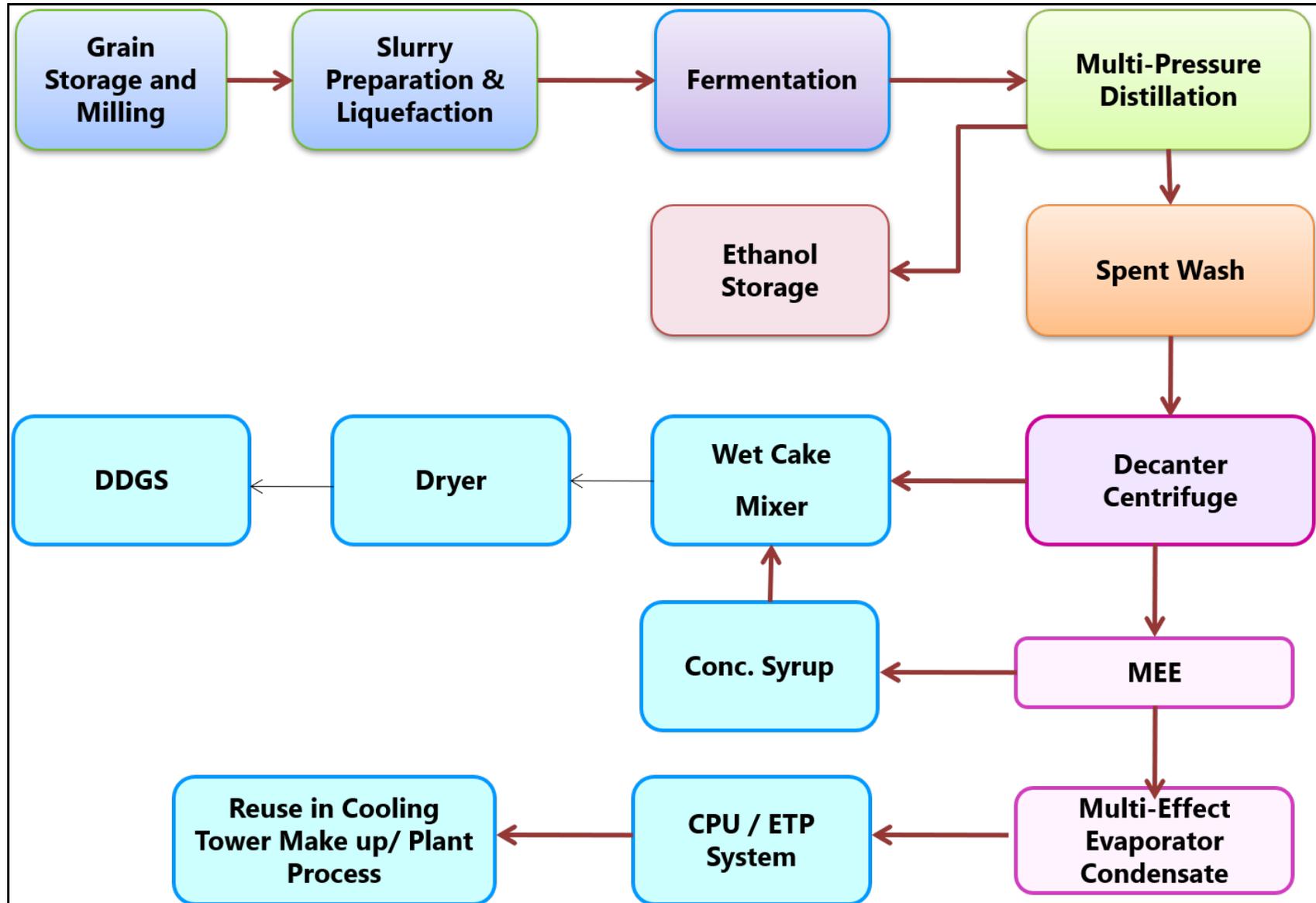


Figure 2.7: Process flow diagram of Grain based Distillery

C. MALT SPIRIT PLANT (10 KLPD)

Malt handling- Malt is usually stored in silos before being milled and mashed. It has a low moisture content of between 3% and 5%. The main processes in malt handling are Intake, storage, conveying, removing unwanted materials & stones, weighing.

Milling - The objective of milling is to reduce the malt to particle sizes, which will yield the most economic extract (wort) and will operate satisfactorily under plant conditions. The more extensive the malt is milled, the greater the extract production.

Mashing- Mashing is the process of combining a mix of milled grain (typically malted barley with supplementary grains such as corn, sorghum, rye or wheat), known as the "grain bill" and water, known as "liquor", and heating this mixture. Mashing allows the enzymes in the malt to break down the starch in the grain into sugars, typically maltose to create malty liquid called wort.

Fermentation- Fermentation is an essential stage in the brewing process. It involves adding yeasts to the cooled malt. These yeasts are fed by the amino acids in the brew and produce alcohol from the sugar that is present. These natural reactions also produce carbon dioxide.

Pot Distillation - Malt Whisky is distilled twice - although a few distilleries may undertake a third distillation - in Pot Stills which resemble huge copper kettles. The spirit is driven off from the fermented liquid as a vapor and is then condensed back to a liquid. In the first distillation the fermented liquid, or wash, is put into the Wash Still which is heated by steam -heated coils. At this stage the wash contains yeast, crude alcohol, some un-fermentable matter and the by - products of fermentation. During the process of boiling the wash, changes take place in its constituents which are vital to the flavour and character of the whisky. As the wash boils, vapours pass up the neck of the still and then pass through a water -cooled condenser or a worm, a coiled copper pipe of decreasing diameter enclosed in a water jacket through which cold water circulates. This condenses the vapours and the resulting distillate, known as low wines, is collected for re- distilling. The liquor or slops remaining in the Wash Still is known as pot ale or burnt ale and is passed through decanters. The thin slop is taken to MEE and the mixture of wet cake and syrup from MEE is dried in DWGS dryers to get animal feed supplement which is widely sold as cattle feed.

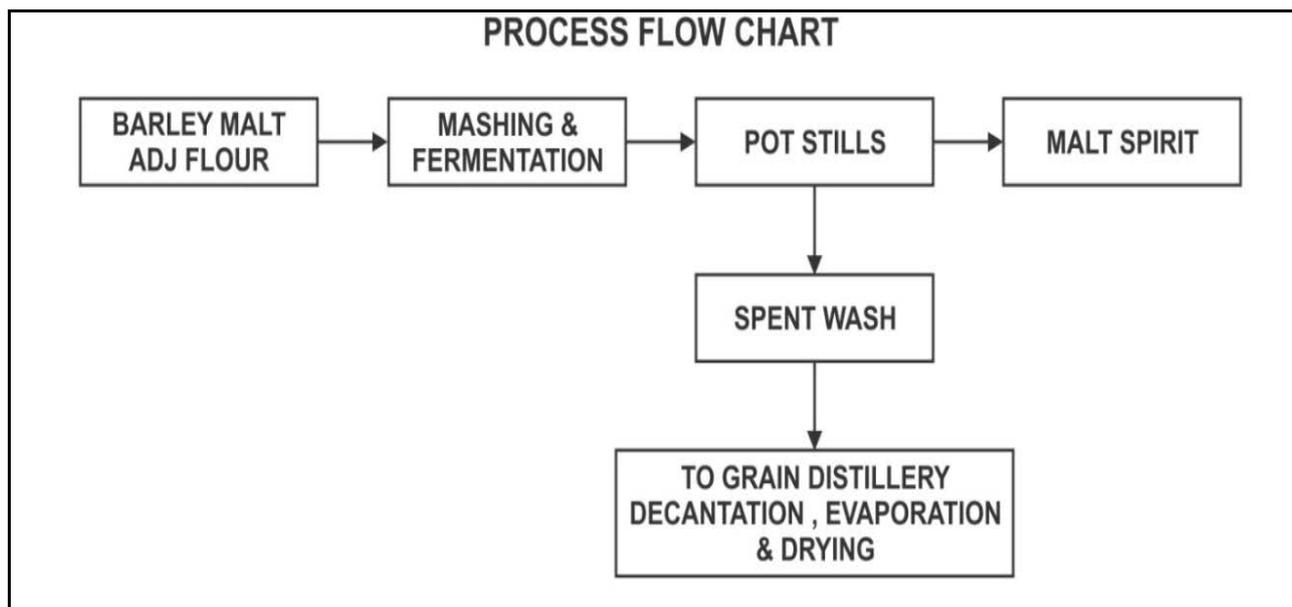


Figure 2.8: Process flow diagram of Malt Spirit production

D. POWER GENERATION (6.25 MW)

Proposed 6.25 MW Co-generation Power Plant consists of a high-pressure water tube steam boiler (60 TPH) extraction cum condensing steam turbine. Fuel in the steam boiler will be burnt with the help of air in the boiler furnace. Water will be circulated in the boiler drum and tubes thus getting heated by the flame burning in the boiler furnace. Water comes out of the boiler drum located at the top of the boiler as steam. Flue gases rise in the boiler furnace and come in contact with the steam coming out of boiler drum. Steam after coming in contact with flue gases gets heated up further thus getting superheated. Super-heated steam leaves the boiler in a pipe. Flue gases after super heating the steam pass through economizer where they pre-heat the boiler feed water before it enters the boiler drum. After economizer, flue gases pass through air pre-heaters where they heat the air which is fed to the boiler furnace for burning the fuel. After air pre heaters flue gases pass through an ESP where the dust particles are collected on charged electrodes. The dust is collected from the bottom of the ESP.

High pressure superheated steam from boiler is passed through a steam turbine of 6.25 MW, which is used for plant process operations. While passing through the turbine, the high pressure and temperature steam rotates the turbine rotor and an electric alternator mounted on the same shaft. Electric power is generated by the alternator. This electric power generated is consumed in house i.e. for running the distillery and utilities like boilers auxiliaries etc.

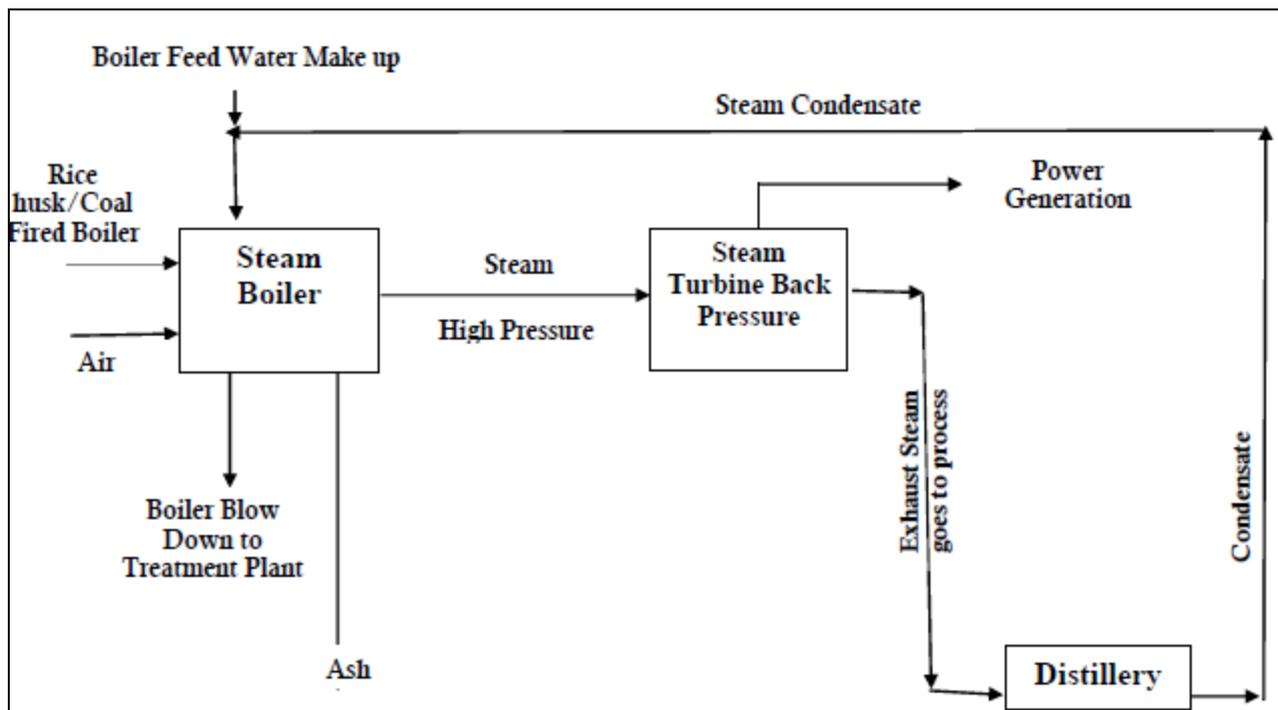


Figure 2.9: Process Flow Chart for proposed Co-generation Power Plant

E) DISTILLERY EFFLUENT TREATMENT - CONDENSATE POLISHING UNIT

Quantity of Effluent generation from process	Capacity of proposed ETP/CPU
976 KLPD (Process Condensate – 830 KLPD, 20 KLPD CT Blow down, 100 KLPD DM plant reject, washing & 26 KLPD Boiler Blow down)	1200 KLPD
<i>Others recycling stream directly use in plant activities.</i>	

Treatment process description of treatment plant

The process condensate treatment plant will be based on the process of Reverse Osmosis technology. The system will comprise of following unit process & equipment.

- Equalization tank & Neutralization tank
- Anaerobic digester
- Aerobic digester
- Tertiary treatment like carbon and sand filter
- Filtration section
- Pressure sand filter
- Dual media filter
- UF/RO system
- RO CIP system

1. Equalization Tank: Equalization tank of adequate retention time is provided for flow and characteristics equalization. BRIO Submersible mixer shall be provided for mixing the equalization tank content. The equalized effluent is now pumped to the UASB Reactor for further treatment. Highly Power Efficient, Submersible BRIO Mixer is provided for mixing the tank content.
2. Neutralization Tank: The condensate from Equalization tank shall be pumped to Neutralization tank for increasing the pH. The neutralization tank shall be provided with an agitator to mix the lime solution in the condensate. Lime / Caustic shall be added to the condensate for the neutralization purpose.
3. Anaerobic digester- Reduction of COD and BOD concentration in effluent up to 80% of initial value will be achieved through this process.
4. Aerobic digester- Balance COD an 800 reduction up to 95%+ will be achieved in this process.
5. Carbon and Sand Filters- These filters will remove suspended solids resulting is decreased turbidity of the wastewater.
6. Pressure Sand Filter (PSF): The filter is provided as primary filtering unit. Biologically treated effluent shall be filtered by PSF to remove suspended matters & turbidity present in the effluent.
7. Filtered Water Sump: The filtered water shall be received in filtered water sump constructed in RCC. The Effluent from this sump shall further be pumped to the successive treatment units.
8. Ultraviolet process- A stream from above process will be passed through UV to remove bacterial contamination and wooded v be fed to fermenter as a process water.
9. RO system- The second balance stream from carbon and sand filter will be treated through RO system. The RO skid will be two stage system comprising of two pressure vessels containing six elements each configured in series.

Characteristics at outlet of biological treatment system & softener

S. No.	Characteristic	Characterization at outlet of biological treatment System	Characterization outlet of Softener
1.	pH	7 to 8	7 to 8
2.	COD	<250 mg/l	<100 mg/l
3.	BOD	<30 mg/l	<10 mg/l
4.	TSS	<30 mg/l	NIL

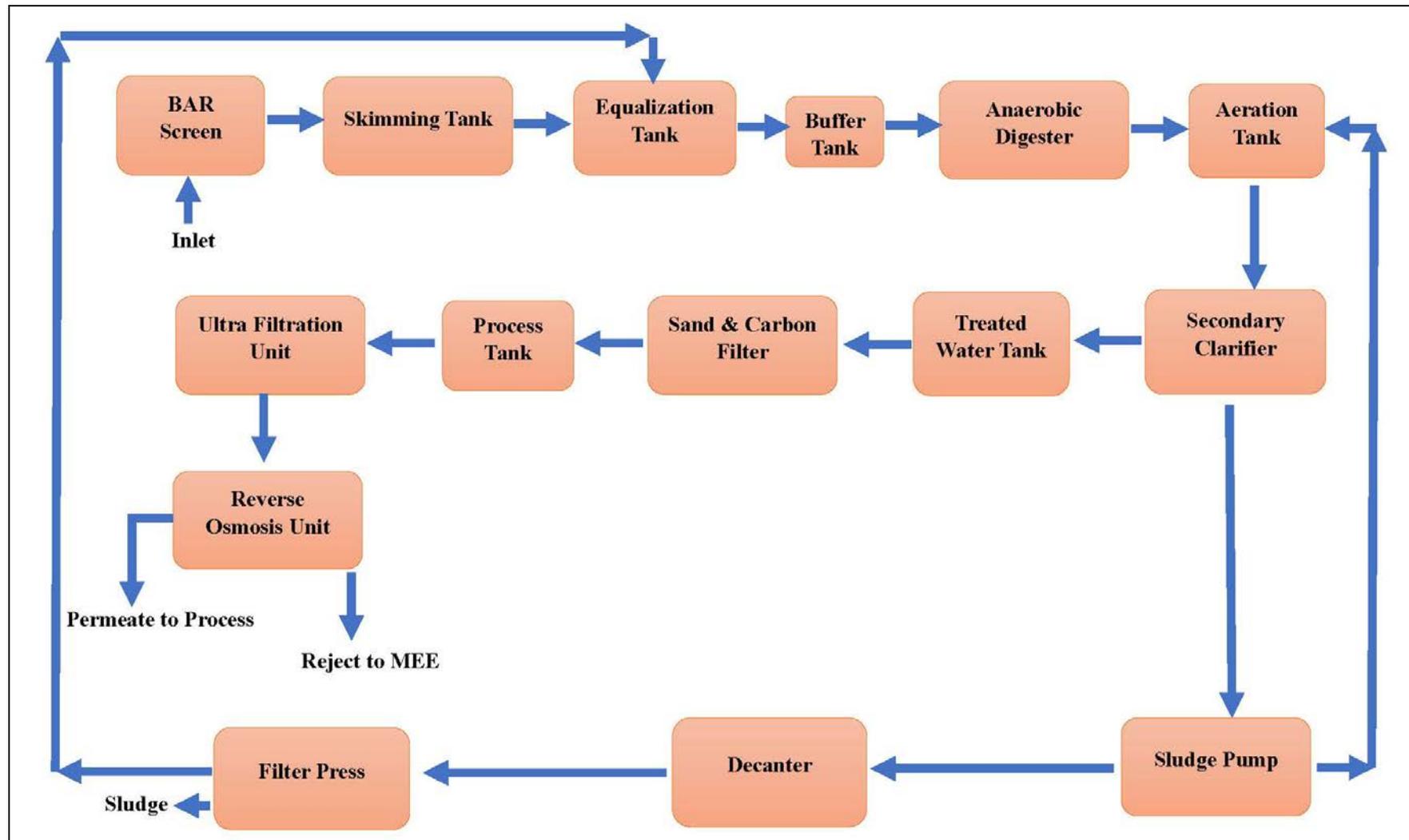


Figure 8: Flow diagram for Condensate Polishing Unit (CPU)

2.6.1 Major equipment and machineries

Details regarding major plant equipment & machineries are given in the table below:

S. No.	Description	S. No.	Description
Grain based distillery			
1	Grain Crushing Mill	8	Distillation plant
2	Liquefaction Tank Agitator (I)	9	Decanters
3	Slurry tank Agitator	10	Multi effect evaporator
4	Liquefaction Tank Agitator (II)	11	DDGS Rotary Dryer
5	Fermenters	12	Co2 Plant
6	Bear- well Agitator	13	CPU/RO system
Co-generation power plant			
1	Boiler	9	DCS
2	TG Set	10	Electrical HT & LT
3	ESP	11	Air Compressor
4	ID Fan	12	Fuel Handling
5	FD Fan	13	Ash Handling
6	SA Fan	14	Fire Fighting System
7	Transformer	15	Stack

2.7 DESCRIPTION OF MITIGATION MEASURES

The company will implement mitigation measures for different environmental components (air, water, noise, solid & hazardous waste, greenbelt & odour) in order to meet environmental standards. This section will describe in detail the mitigation measures that the company will follow in order to remain within prescribed limits of standards.

2.7.1 Air Management

- For proposed 60 TPH boiler, ESP as Air pollution control equipment will be installed with stack height of 60 m to control the particulate and gaseous emissions in accordance with CPCB guidelines.
- CO₂ generated (154 TPD) during the fermentation process will be collected and sold to authorized vendors.
- DG Set (1 x 1500 KVA) will be provided with adequate stack height as per CPCB Guidelines.
- Adequate measures for control of fugitive dust emissions will be taken.
- All the internal roads will be asphalted and regular sweeping & sprinkling of water in dust generating areas.
- Greenbelt development around the periphery & within the premises of the plant will help in attenuating the pollutants emitted and maintaining air quality.

- Online Continuous Emission Monitoring System will be installed with the proposed stack and data will be transmitted to CPCB/SPCB servers.
- Regular monitoring will be done to ensure ambient air quality standards.

2.7.2 Water Management

- The Grain based distillery will be based on “Zero Effluent Discharge”.
- **For Grain based operation:** Grain Slops (1163 TPD) will be taken through Centrifuge Decaners for separation of Suspended Solids separated as Wet Cake and which goes as cattle, poultry and fish feed as it contains high protein. (Also known as DWG – Distillers Wet Grains). Thin Slops from the Decanter Centrifuge will be partly recycled back to process and balance portions shall be taken to Thins Slops Evaporation Plant for concentration of remaining solids to form Syrup. This Syrup will be also mixed into the Wet Cake coming out of Centrifuge and forms part of Cattle, poultry and fish Feed. DWGS Drier: The Wet Cake (DWGS) and Syrup mixture will be dried in Steam Tube Bundle Dryer for producing DDGS with 8-10% moisture (max.). DDGS (88 TPD) will be utilized as Cattle, poultry and fish feed ingredients.
- **During Malt Spirit Process:** Malt Spirit Slops will be passed through centrifuge decaners for separation of suspended solids separated as Wet Cake (also known as DWG – Distillers Wet Grains).
- Process condensate, boiler Blowdown, DM plant reject & washing, CT blowdown will be treated in CPU/ETP of capacity 1200 KLPD and treated water will be reused in process activities.
- Domestic waste water will be treated in Sewage Treatment Plant of Capacity 30 KLPD.
- Regular monitoring of ground water quality will be carried out.

2.7.3 Noise management

- Personal Protective Equipment like earplugs and earmuffs will be provided to the workers exposed to high noise level.
- Proper maintenance, oiling and greasing of machines at regular intervals will be done to reduce generation of noise.
- Greenbelt inside the plant premises and at the plant boundary will be developed & maintained.
- Regular monitoring of noise level will be carried out in and around plant premises to find out any high noise level zones and measures will be implemented accordingly.
- Regular auditing of process area to find out any loosened nuts/bolts/joints to avoid unnecessary noise.

2.7.4 Solid and hazardous waste management

- Solid waste from the Grain based distillery operations generally comprises of fibers and proteins in the form of DDGS (88TPD), which will be ideally used as Cattle, poultry and fish feed ingredients.
- Boiler ash (116 TPD) generated during coal-based operations will be given to cement/brick manufactures & during biomass (62 TPD) based operations will be given to brick manufacturers in covered vehicles.
- Spent resin from DM plant (500 kg/annum) will be supplied to authorized recyclers.
- Used oil & grease (0.5 KL/annum) generated from plant machinery/gear boxes as hazardous waste will be given to the CPCB authorized recyclers or used as in-house lubricant.

2.7.5 Greenbelt Development & Plantation

- Out of the total Plant area of 9.0 ha (22.24 acres), 33% of project area will be developed under greenbelt & plantation i.e., 2.97 ha (7.34 acres).
- Native/Indigenous wild plant species will be planted in consultation with local DFO.
- Greenbelt will be developed as per Central Pollution Control Board (CPCB) guidelines.
- Greenbelt & plantation development will begin simultaneously with the initiation of construction activities of the proposed unit.

2.7.6 Odour Management

- Boiler will be installed which is based on an eco-friendly and odourless technology.
- Adequate greenbelt all around the periphery of the plant and in odour prone areas will be developed. Species like *Azadirachta indica* (Neem), *Millingtonia hortensis* (Indian cork tree), *Pongamia pinnata* (karanj) will be given preference to minimise odour in every possible way.
- Efficient CO₂ collection to avoid carryover of alcohol vapours & other fumes.
- Regular steaming of all fermentation equipment.
- Longer storages of any product/by-products will be avoided & use of efficient biocides to control bacterial contamination.
- Regular use of eco-friendly disinfectants in the drains to avoid generation of putrefying micro-organisms.

2.8 ASSESSMENT OF NEW & UNTESTED TECHNOLOGY FOR THE RISK OF TECHNOLOGICAL FAILURE

For this proposed project, the company will be using Grains such as damaged grain feed stock, broken rice, maize, bajra & sorghum will be used as raw material and Biomass/rice husk or low sulphur coal as a fuel and only proven technologies will be selected. No new or untested technology will be used. The Process will be based on proven technologies for Grain based distillery and Malt spirit plant operation, generated spent wash will be passed in grain based operation i.e. Multi Pressure distillation with Integrated Evaporation followed by DDGS dryer.



CHAPTER-III

DESCRIPTION OF THE ENVIRONMENT

3.1 INTRODUCTION

To predict and evaluate the impacts of proposed project on the surrounding area, it is vital to assess the baseline status of the environmental quality in the vicinity of the project site. An exhaustive attempt has been made in the current chapter to disclose all possible base line status of environmental quality in the vicinity of the plant, which further serves as the basis for identifying, prediction and evaluation of impacts. To assess the baseline environmental quality of the area, field assessment has been conducted considering following components of the environment, viz. land, air, meteorology, noise, water, soil, biological and socio-economic. The baseline monitoring has been conducted during the summer season (March to May, 2023) in the study area covering an area of 10 km radius from the project site.

3.2 STUDY AREA, PERIOD, COMPONENTS AND METHODOLOGY

3.2.1 Study Area

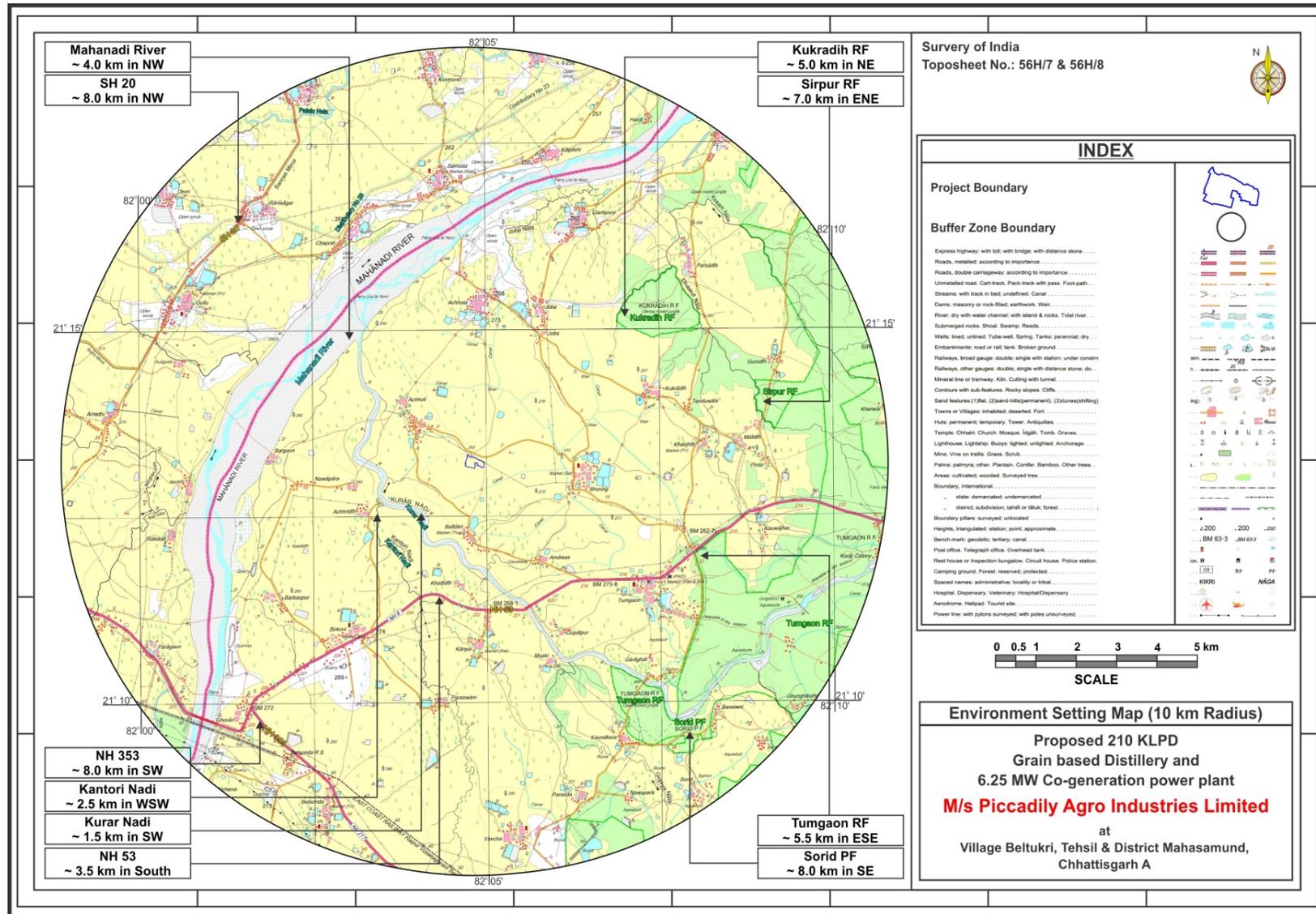
The study area considered is an area of 10 km radius (aerial distance) from the project site, also known as buffer zone. The area of project site is considered as core zone. The major environmental settings of the study area are as given in the table below-

Table 3.1
Environmental settings of the study area

S. No.	Particulars	Details
1.	Nearest Town & City	Mahasamund (~10.5 km in SSE direction)
2.	Nearest National Highway / State Highway	<ul style="list-style-type: none"> • NH 53 (~3.5 km in South Direction) • NH 353 (~8.0 km in SW direction) • SH 20 (~8.0 km in NW Direction)
3.	Nearest Railway station	Belsonda RS (~8.4 km in SW direction)
4.	Nearest Airport	Swami Vivekananda Airport, Raipur (~ 35.0 km in WSW direction)
5.	National Parks, Wildlife Sanctuaries, Biosphere Reserves, Reserved Forests (RF)/ Protected Forests (PF), Tiger/ Elephant Reserves, Wildlife Corridors etc. within 10 km radius	No National Parks, Wildlife Sanctuaries, Biosphere Reserves, Protected Forests (PF), Tiger/ Elephant Reserves, Wildlife Corridors etc. within 10 km radius. Reserved Forests (RF): RF (~5.0 km in North direction), RF (~7.3 km in NNE direction), Dilawarnagar RF (~8.8 km in North direction)
6.	Water Body (within 10 km radius)	Kurar Nadi (1.5 km in SW direction), Kantori Nadi (2.5 km in WSW direction), Mahanadi river (4 km in NW direction) Some nalas are present within 10 km radius
7.	Seismic Zone	The project site falls in Seismic Zone – II Low damage risk zone [based on the Vulnerability Atlas of India – 3 rd Edition, BMTPC]

Source: Toposheet, site visit & Pre-feasibility report

The environmental settings are shown below on toposheet of study area of 10 km radius and site location on scale of 1:50000:



Source: SOI Toposheet

Figure 3.1: Environmental settings of 10 km radius study area

3.2.2 Period of baseline data collection and components of environment

The baseline data used in this report has been collected for Summer Season i.e. March to May, 2023 in accordance with the guidelines for preparation of EIA studies. Sampling, preservation, transportation & storage of samples was carried out by J.M. EnviroLab Pvt. Ltd. under supervision of the concerned EC/FAE. Analysis of samples has been carried out by JM EnviroLab Pvt. Ltd. The sampling period for various environmental components is given below.

Table - 3.2

Frequency and location of primary data collection of various environmental components

S. No.	Description
1.	Meteorology Meteorological parameters on hourly basis at project site based on ToR requirement. <i>Parameters:</i> Relative humidity, Temperature, Wind direction, Wind Speed.
2.	Air Ambient air quality monitoring (24 hourly), twice a week. <i>Parameters:</i> PM10, PM2.5, SO ₂ , NO _x , CO. <i>No. of Locations:</i> 8 locations in core and buffer zone based on ToR requirement.
3.	Noise Noise level monitoring (day and night time), once in a season. <i>No. of Locations:</i> 8 locations in core and buffer zone based on ToR requirement.
4.	Water Surface water sampling, once in a season. <i>No. of Location:</i> Samples were collected from 3 locations, remaining locations were found dry. Ground water sampling, once in a season. <i>No. of Locations:</i> 8 locations in core and buffer zone. Tested for physical and chemical parameters based on ToR requirement.
5.	Soil Soil sampling, once in a season. <i>No. of Locations:</i> 8 locations in core and buffer zone based on ToR requirement.
6.	Biological Environment Biodiversity survey, once in a season. <i>Location:</i> Project site (Corezone) and study area (BufferZone) based on ToR requirement.
7.	Socio-economic Environment Socio-economic survey, once in a season. <i>Location:</i> Study area (BufferZone) based on ToR requirement.

Source: Terms of Reference

3.2.3 Methodology

Instruments Used for Environmental Baseline Data Collection

Following instruments were used at the site for environmental baseline data collection work.

1. Respirable Dust Sampler with attachment for gaseous pollutants, Envirotech APM 460
2. Fine Particulate Matter (FPM) Sampler APM 550
3. Sound Level Meter Model Envirotech SLM - 100
4. Digital D.O. Meter Model - 831 E (CPCB Kit)
5. Weather Monitoring Station Model Enviro WM 271
6. Global Positioning System (GPS)

Apart from collecting samples of air, water, noise and soil from respective sampling points given in proceeding sections, the data on land use, vegetation and agricultural crops were also collected by the field team through interaction with a large number of local inhabitants of the study area and different Government departments / agencies like Revenue Department, Tehsil office, District headquarter, the Department of Forest & Wildlife Preservation etc. The methodology used for various environmental components is given below:

Table 3.3
Standardized methods adopted for baseline data establishment

S. No.	Environmental Component	Primary data		Secondary data
		Parameters	Methodology	
1.	Land	Land use and land cover	Ground Truthing	Satellite image from NRSC, Hyderabad
2.	Meteorology	Temperature, Relative Humidity, Wind Speed, Wind Direction	Weather monitoring station	IMD book (Climatological Normals 1981 - 2010)
3.	Air	PM ₁₀ , PM _{2.5} , SO ₂ , NO _x and CO	<i>Sampling:</i> CPCB Guidelines/NAAQS/ IS 5182 and Instrument Manual <i>Analysis:</i> CPCB Guidelines / IS 5182	-
4.	Noise	Equivalent noise levels in dB (A)	<i>Sampling:</i> IS 9989 <i>Analysis:</i> CPCB Guidelines/IS 9989	--
5.	Surface Water	Parameters as per IS 10500 - 2012	<i>Sampling:</i> CPCB Guideline & APHA 22nd edition 2012	--
6.	Ground Water		<i>Analysis done by</i> IS 10500-2012/ IS 3025/APHA 22 nd edition 2012	--

S. No.	Environmental Component	Primary data		Secondary data
		Parameters	Methodology	
7.	Soil	Parameters as per Indian Agricultural Research Institute Handbook	<i>Sampling:</i> USDA <i>Analysis:</i> As per IS 2720/USDA	-
8.	Biological Environment	Flora and fauna	Quadrante method/ random sampling	Forest working plan
9.	Socio- Economic Environment	Socio- Economic status	Household survey through questionnaire, group discussion and random sampling	Census data, 2011

Source: JMEPL lab manual

3.3 ESTABLISHMENT OF BASELINE WITH BASE MAPS OF ALL VALUED ENVIRONMENTAL COMPONENTS

3.3.1 Details of LU/LC of Study area

Data of Indian Remote Sensing Satellite Multi Spectral Satellite Image has been used for preparation of Land use/ Land cover thematic map of study area.

Technical details of Data

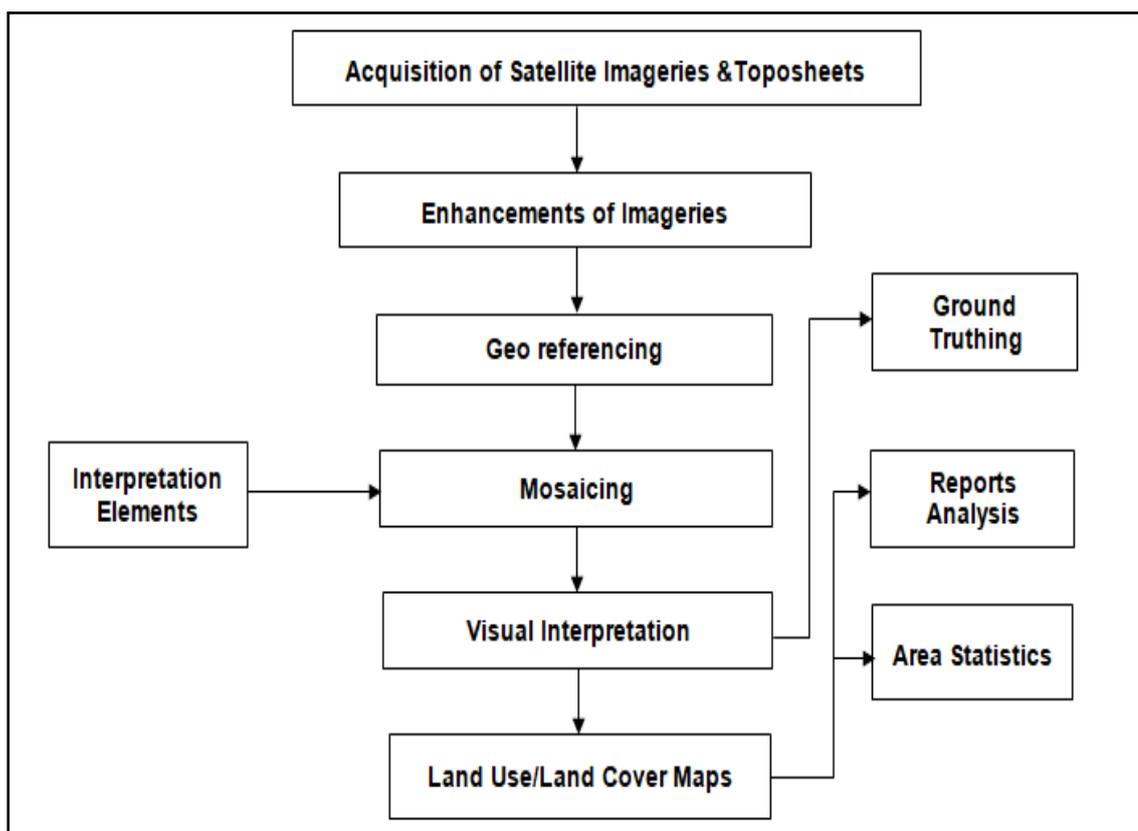
- Satellite Image - RESOURCESAT-2 (L3FMX)
- Software Used - Earth Resources Data Analysis System (ERDAS) Imagine 9.2
- SOI Toposheets No. - 56H/7, 56H/8
- Satellite Data Source - NRSC, Hyderabad

A hybrid technique has been used i.e., visual interpretation and digital image processing to generate output for land use/land cover map of 10 km radius of the study area on 1:50000 scale. Statistical data observed and results obtained from satellite image are given below:

Methodology

The land use/land cover map is prepared by adopting the interpretation techniques of the Satellite image in combination with collateral data such as Survey of India topographical maps. Image classification is done by using visual interpretation techniques and digital classification using any of the image processing software. The various activities for preparation of LULC include pre processing, rectification, image enhancements and classifying the satellite data for assessing the change in land use land cover due to proposed developmental activities.

The imagery is interpreted and ground checked for corrections. The final map is prepared after ground truthing. The different land use/land cover categories in the study area have been carried out based on the NRSC land use/land cover classification system.



Description of Land Use Pattern of the Study area

Ten classes of land use/ land cover of study site were classified shown in the table 3.4. Majority (69.56 %) of the study area falls under agricultural land followed by surface water bodies (9.37%), Forest (8.36%), Vegetation/Plantation (3.76%), Settlement (3.38%), Open Scrub/ Waste Land (2.57%), Road (1.89%), Stone Quarry (0.64%), Industries (0.39%), Railway Line (0.08%).

Table - 3.4
Details of LU/LC of Study area

S. No.	Legend	Area (in Ha)	% Area
1.	Agricultural Land	22796.29	69.56
2.	Surface Water Bodies	3072.26	9.37
3.	Forest	2740.95	8.36
4.	Vegetation/ Plantation	1232.96	3.76
5.	Settlement	1104.67	3.38
6.	Open Scrub/ Waste Land	840.47	2.57
7.	Road	620.24	1.89
8.	Stone Quarry	210.88	0.64
9.	Industries	126.45	0.39
10.	Railway Line	26.75	0.08
	Total	32771.92	100.0

Source: LU/LC Map for Buffer Zone

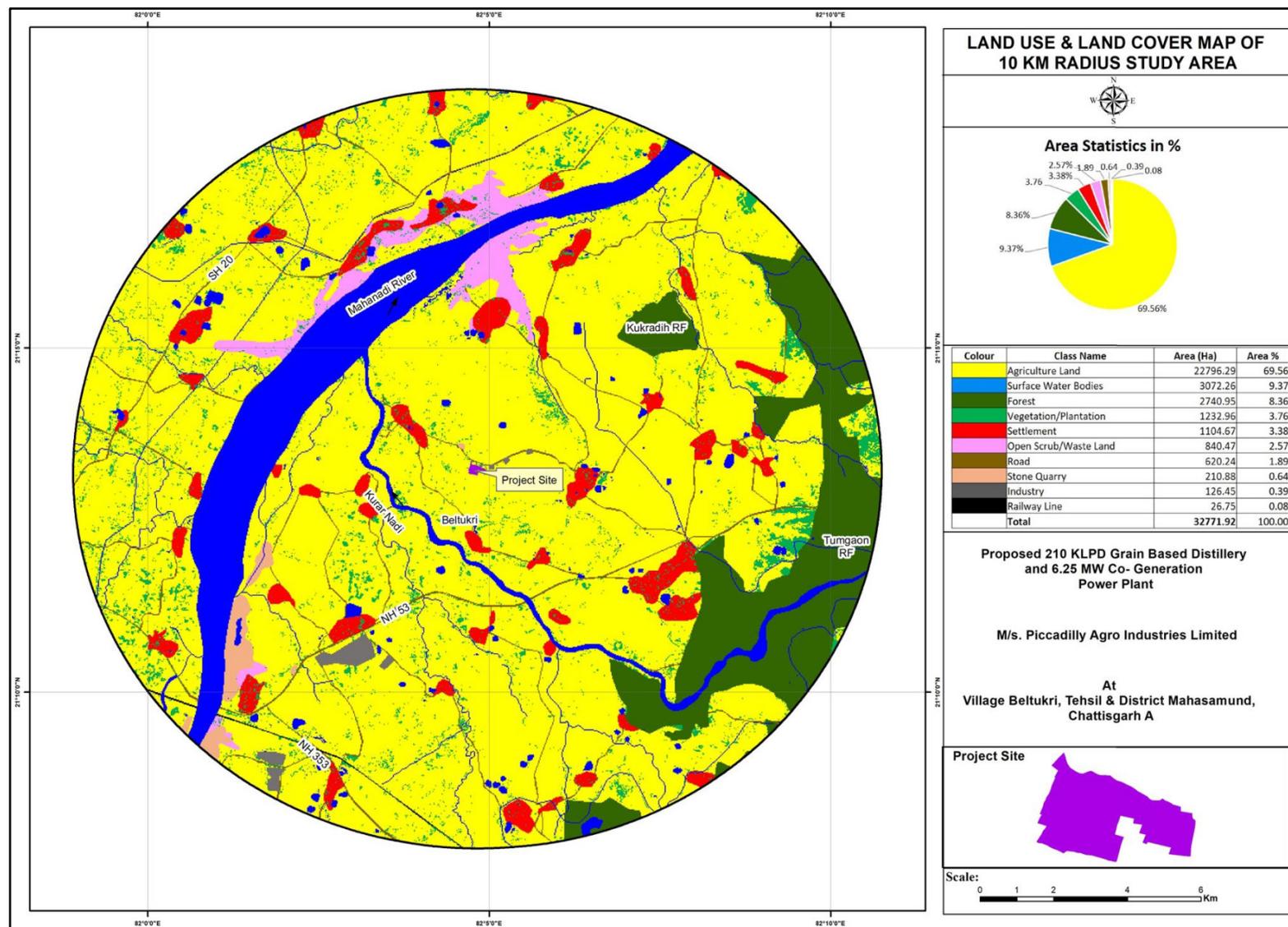


Figure - 3.2: Land Use / Land Cover Map of the Buffer Zone

Source: NRSC

3.3.2 Seismicity and Flood Hazard Zonation of the Area

3.3.2.1 Seismicity of the Area

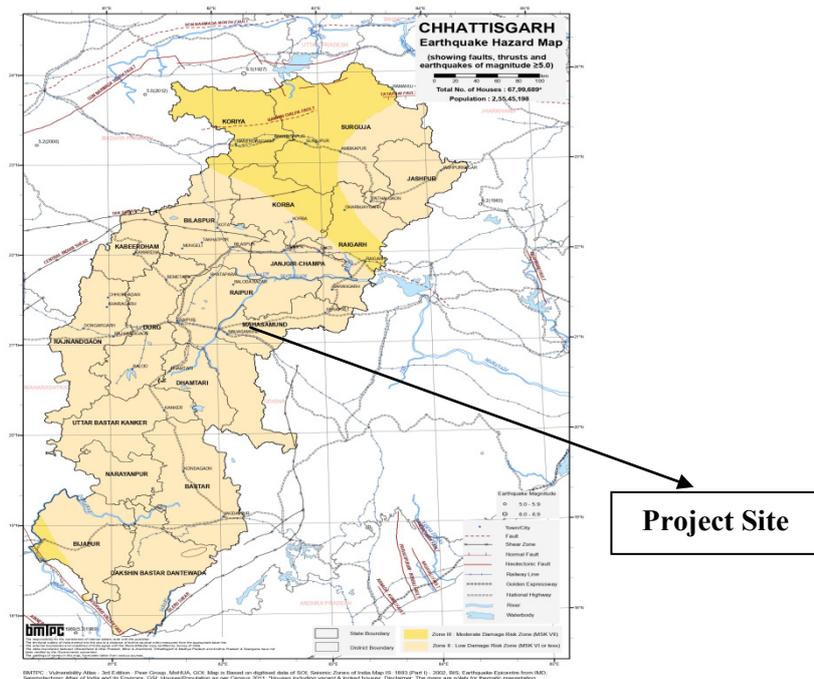
Bureau of Indian Standards [IS-1893 (Part-1): 2002], has grouped the country into four seismic zones viz. Zone-II, III, IV and V. Modified Mercalli (MM) intensity scale measures the impact of the earthquakes on the surface of the earth and is broadly associated with various zones as follows:

Table - 3.5
Seismic Zones in India

S. No.	Seismic Zone	Risk
1.	Zone - V	Very High Risk Zone
2.	Zone - IV	High Risk Zone
3.	Zone - III	Moderate Risk Zone
4.	Zone - II	Low Risk Zone

Source: Ministry of Earth Science, GOI

Chhattisgarh falls in the seismic zone III, & II and therefore, the region is vulnerable to earthquakes. Although, in recent past, no major earthquakes have occurred in Chhattisgarh, yet tremors have been felt whenever there is an earthquake in the Himalayan foot-hills. The project site as well as study area lies in **Zone- II** of Seismic Zoning Map of India, updated by India Metrological Department (IMD) and National Institute of Disaster Management (NIDM), and thus can be said to be located in an area of Low seismic hazard by national standards. Seismic Zoning Map of India and the state showing the project site is given in figure below.

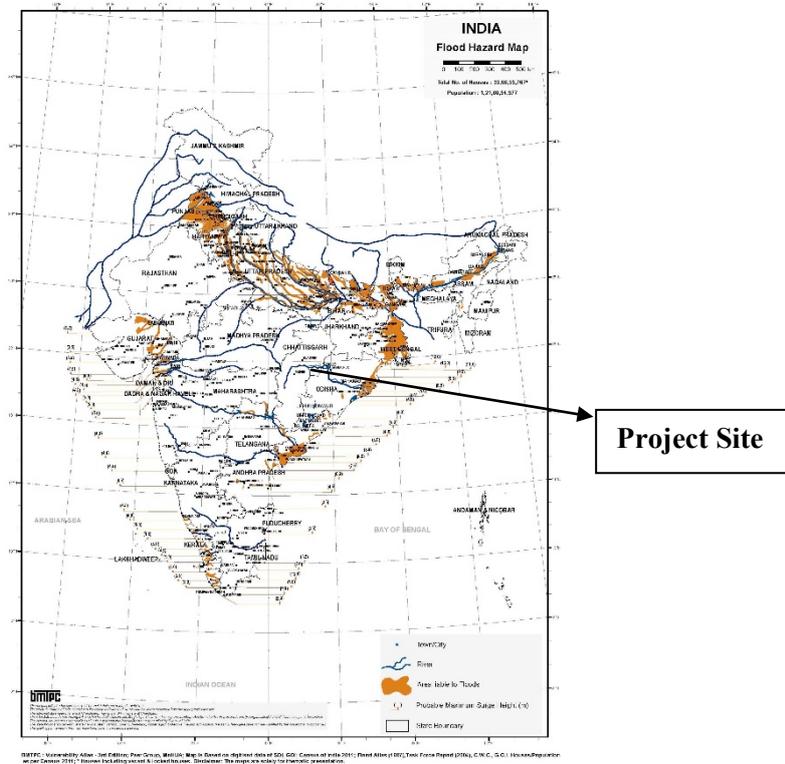


Source: BMTPC

Figure 3.3: Seismic zones of Uttar Pradesh

3.3.2.2 Flood hazard zonation of the area

As per the India Flood Hazard Map, BMPTC, MoHUA the project site does not fall under “area liable to flood”. Flood Hazard Zonation Map showing the project site is given in Figure below.



[Source: Vulnerability Atlas 3rd Edition; Peer Group, MoHUA]

Figure - 3.4: Flood Hazard Zonation Map

Interpretation of drainage and flood scenario of the study area

The map above shows that the entire Mahasamund district does not fall in flood prone zone. According to the District Disaster Management Plan, Mahasamund (Chhattisgarh) some areas of the district are susceptible to flood due to vicinity of Mahanadi River. However, the project site does not fall in the flood prone areas.

Mahanadi and Jonk are the prime rivers of district. The western boundary of the district running along the Mahanadi. The Jonk rivers passes through the central part of the district and is running in northern direction. the Kurar nala, Nami nala, Keswa nala and Sukha nadi forms part of the drainage system for Mahanadi River basin. The Machka nala, Bagh nala, Racme nala, Lath nala forms part of the Jonk River basin.

[Source: District Disaster Management Plan (DDMP-Mahasamund, Revenue & Disaster Management Department, Mahanadi Bhawan, Mantralaya, Atal Nagar, Raipur, Chhattisgarh, Government of Chhattisgarh.]

Drainage Pattern of Study Area:

The drainage map witnesses Kurar Nadi (~1.5 km in SW direction), Kantori Nadi (2.5 km in WSW direction), Mahanadi river (~4 km in NW direction), Joba Nala (~2.5km in NE direction), Dhaskut Nala (~7.2 km in NE direction), Sati Nala (~7.5 km in West direction), Gopiya Nala (~8.7 km in SE direction), Kosam Nala (~9 km in NE direction), Patalu Nala (~9.3 km in NNW direction). Many drains & distributaries are present within 10 km radius from project site. Kurar Nadi is the nearest water body from the project site that flows towards west direction and form the part of drainage system for Mahanadi basin. . The drainage system can be classified as dendritic to sub-dendritic in pattern in the study area, which indicates that river follows the natural gradient of the terrain. Significant number of ponds are also present in the study area. Gentle slope is found towards north direction. The drainage characteristics of the area are shown in the map below.

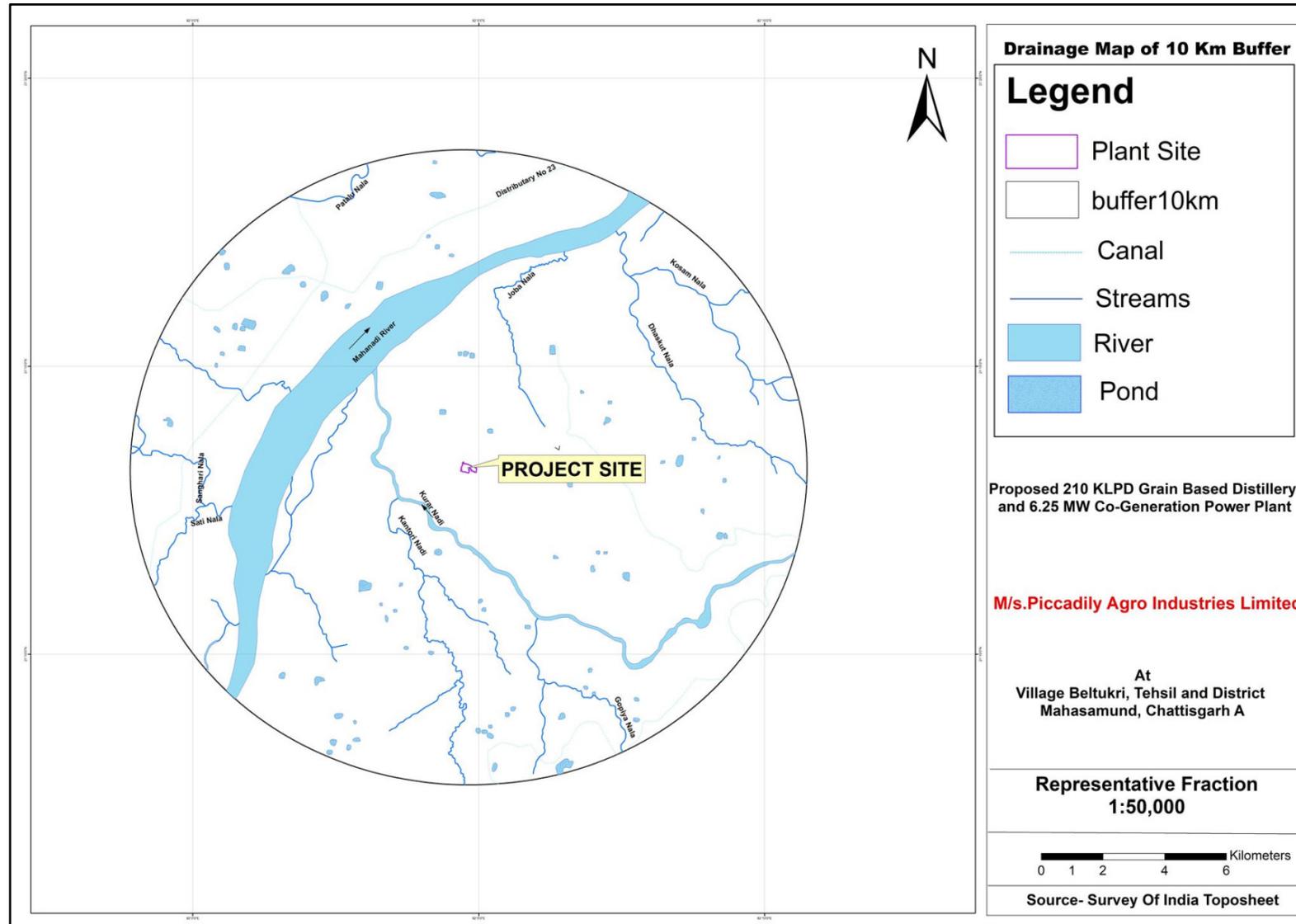


Figure 3.5: Drainage map of the study area

Source: SOI Toposheet

3.3.3 Geological and hydro-geological features

Geology of the area:

Mahasamund district is mainly underlain by hard rock belonging to Precambrian age, part from these alluvium and laterite of Quaternary age occur in very isolated pocket with and limited extension. Hard rock mainly include granites and its variants, metasediments, ultramafites, rhyolite etc and also sandstone-shale– limestone / dolomite sequence belonging to Proterozoic Purana rocks of Chhattisgarh super group. The country rocks are intruded by basic and acid intrusive like dolerite dykes and sills and quartz and pegmatite veins. Major part of the district is occupied by granitic rocks belonging to Dongargarh group followed by Purana rocks of Chhattisgarh Supergroup which mainly consists of sandstone, shale, limestone / dolomite sequence. The rock of Chhattisgarh supergroup mainly occupies the eastern and western part of the district. The Chhattisgarh supergroup consists three-group i.e. oldest Singhora group, followed by Chandrapur group and youngest Raipur group. The Singhora group is occur in eastern part of the district, Raipur group occupies western part of the district, while Chandrapur group occur both in eastern and western part, with predominant occurrence in western part. The predominant occurrence of limestone in western part in Raipur group of rocks. The rocks of Bangpal group is occur in central part and rocks of Sonakhan group occur mainly in North eastern part. The Bangpal group of rocks includes high-grade gneiss and schistose rocks and granite etc and Sonakhan group includes metasediments, ultramafics, Rhyolite, Amphibolites etc. The laterite occurs as capping over the country rock in pockets particularly in elevated area in limited thickness. The recent alluvium with limited thickness and extension occur along the major river and stream channels.

[Source: https://cgwb.gov.in/District_Profile/Chhattisgarh/Mahasamund.pdf

[Source: Ground Water Brochure of Mahasamund District, Chhattisgarh 2012-13, Government of India Ministry of Water Resources Central Ground Water Board.]

Depth to water level (mbgl)

Pre Monsoon level (2011): 2.12 to 11.74 mbgl

Post monsoon level (2011): 1.08 to 9.18 mbgl

[Source: Ground Water Brochure of Mahasamund District, Chhattisgarh 2012-13, Government of India Ministry of Water Resources Central Ground Water Board.]

3.3.4 Climate and Rainfall

The district receives rainfall mainly from south-west monsoon. The months of July and August are the heaviest rainfall months and nearly 95% of the annual rainfall is received during June to September months. The average annual rainfall for the district is 1131 mm. The annual temperature varies from 10°C in winter to 40°C in summer. The relative humidity varies from 75% in rainy season to 30-40% during winter.

[Source: Ground Water Brochure of Mahasamund District, Chhattisgarh 2012-13, Government of India Ministry of Water Resources Central Ground Water Board.]

Rainfall data for last 10 years

S.No	Year	Rainfall (mm)
1.	2013	1345
2.	2014	1762.01
3.	2015	1069.26
4.	2016	980.69
5.	2017	928.37
6.	2018	1213.67
7.	2019	1383.53
8.	2020	1452.12
9.	2021	1059.01
10.	2022	1198.42
Average Rainfall in 10 years		1239.21

[Source: <https://indiawris.gov.in/wris/#/>]

3.4 METEOROLOGY

Meteorological characteristics of an area play significant role in assessing anticipated environmental impacts and in preparing environmental management plan. As meteorological factors show wide fluctuations with time, meaningful interpretation can be drawn only from long-term reliable data. Such source of data is India Meteorological Department (IMD), which maintains a network of meteorological stations at several important locations. The nearest IMD station to the project site is located in Raipur (~43.5 km in West direction).

Based on the previous IMD data [Climatological Normals (1981-2010)], the pre-dominant wind direction (seasonal as well as annual) was taken into consideration. As per the data, pre-dominant wind direction throughout study period was observed from West, followed by South West, accordingly the locations for ambient air quality monitoring stations were selected.

Meteorological station was installed at site for recording hourly parameters i.e. relative humidity, temperature, wind direction, wind speed & cloud cover. Wind rose diagram was prepared with the data collected for study period i.e. Summer Season (March, 2023 to May 2023) which is given in Figure below. Summary of the micro-meteorology at site is given in table below. Detailed Hourly Meteorological Data has been enclosed as **Annexure 3** with this EIA / EMP Report.

Table - 3.7
Micro-meteorology at site

Month	Temperature (°C)		Relative Humidity (%)		Wind Speed (m / sec.)	
	Min.	Max.	Min.	Max.	Min.	Max.
March ,2023	16.98	38.87	13.19	85.75	0.1	4.95
April ,2023	21.63	43.58	10.06	91.31	0.2	4.91
May,2023	21.99	44.42	8.56	91.69	0.14	4.95

Source: Meteorological Station at Site

a) Mixing height

Mixing Height (MH) is the vertical limit through which the contaminant plume can be mixed. Forecasting of mixing height is done with the aid of the vertical temperature profile. The MH is a function of stability. In unstable air the MH is higher and in stable air the MH is lower. With a lower MH, there is a smaller volume of air in which the pollutant can be dispersed, resulting in higher concentrations in the ambient environment. There is a seasonal variation of MH. During summer daylight hours, MH can be few thousand feet whereas for winter it can be a few hundred feet. It varies also in the course of a day. It is lowest at night and increases during the day. As site specific mixing heights were not available, mixing heights based on IMD publication, “Atlas of Hourly Mixing Height and Assimilative Capacity of Atmosphere in India”, has been considered to establish the worst-case scenario. Secondary information has been used to determine the mixing height over the study region for the study period (March, 2023 to May, 2023) and it varies from 80 to 2350 meters (IMD).

Table –3.8
Mixing Height for the project site
Summerseason (March, 202 to May, 2023)

Time (Hours)	Mixing height (m)	Time (Hours)	Mixing height (m)
07:00	80	14:00	2050
08:00	275	15:00	2150
09:00	440	16:00	2350
10:00	740	17:00	1825
11:00	1100	18:00	1800
12:00	1750	19:00	1350
13:00	2100		

Source: IMD publication, “Atlas of Hourly Mixing Height and Assimilative Capacity of Atmosphere in India”

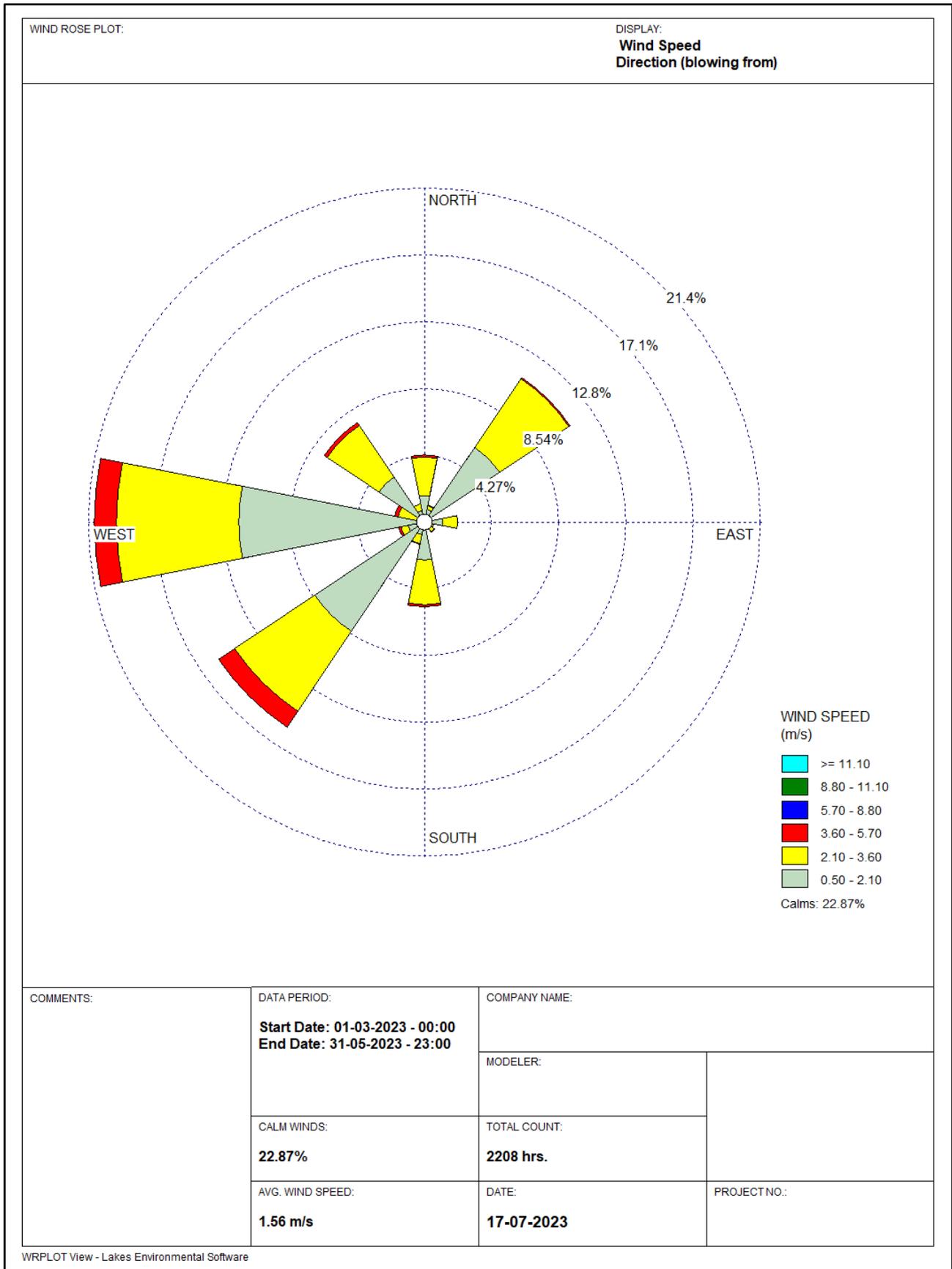


Figure - 3.6: Wind Rose Diagram

Source: IMD & Monitoring station

3.5 AMBIENT AIR ENVIRONMENT

Monitoring schedule:

Ambient air quality monitoring is done to determine the general background concentration levels of air pollutants. For baseline study monitoring of air pollutants was conducted for three months (from 1st March, 2023 to 31st May, 2023). The frequency of sampling was twice a week at each sampling site. 24-hour average samples for PM₁₀, PM_{2.5}, SO₂, NO₂, CO were collected from each sampling station. Standard methods were followed for analysis of collected samples which is shown in table 3.9.

Table-3.9
Methodology adopted for collection and analysis of sample

S. No.	Parameters	Test Method Specification against which tests are performed	Range of testing	Limit of detection	Equipment used for monitoring	
					Equipment required for Sampling	Equipment required for Analysis
1.	Sulphur Dioxide (SO ₂)	IS: 5182, (P-2), 2001 Reaffirmed 2017	5 µg/m ³ to 1050 µg/m ³	5 µg/ m ³	Respirable dust sampler/Low flow Pump	UV spectrophotometer
2.	Nitrogen Dioxide (NO ₂)	IS: 5182, (P-6), 2006 Reaffirmed 2017	5 µg/ m ³ to 750 µg/m ³	5 µg/ m ³	Respirable dust sampler/Low flow Pump	UV spectrophotometer
3.	Particulate Matter (PM ₁₀)	IS: 5182, (P-23), 2006 Reaffirmed 2017	10 µg/ m ³ to 1000 µg/m ³	10 µg/ m ³	Respirable dust sampler	Desiccators, high accuracy weighing balance
4.	Particulate Matter (PM _{2.5})	JMELPL/STOP/03 (Issue Date – 09.11.2017)	10 µg/ m ³ to 500 µg/m ³	10 µg/ m ³	Fine Particulate sampler	Desiccators, high accuracy weighing balance
5.	Carbon Monoxide (CO)	IS: 5182, (P-10), 199	0.5 mg/ m ³ to 50 mg/m ³	0.5 mg/ m ³	Sampling in Tedlar Bag with low flow pump	Gas chromatography with detector (FID)

Protocol Used: CPCB Guidelines/IS-5182

RDS: Respirable Dust Sampler

FPS: Fine Particulate Sampler

Sampling locations:

Sampling sites for monitoring of ambient air quality were determined on the basis of meteorological condition (dominant wind direction) and proximity of sensitive places. Wind direction influences the horizontal dilution of air pollution. Sampling sites are shown in table 3.10. Samples were collected in the 10 km study area to observe the existing level of pollutants concentration throughout the region. It helps in providing a data base for evaluation of effects of the plant activity in that region. It will be also useful in ascertaining the quality of air environment in conformity to standards of the ambient air quality during operation phase of project.

Table - 3.10

Locations of ambient air quality monitoring stations

S. No.	Name of Monitoring Locations	Tentative distance (from boundary) & direction (from centre point)	Selection Criteria
1.	Project site	-	Core zone
2.	Village Bargaon	~5.0 km in West direction	As per IMD annual & baseline season data- Upwind of dominant air direction
3.	0.5 km from project site	~0.5 km in East direction	As per IMD annual & baseline season data-Downwind of dominant air direction
4.	Village Bhorng	~2.5 km in East direction	As per IMD annual & baseline season data-Downwind of dominant air direction
5.	2.5 km from project site	~2.5 km in NE direction	Downwind of crosswind direction as per IMD annual data
6.	Nr. Village Barbaspur	~5.5 km in SW direction	Upwind of crosswind as per IMD annual data
7.	Village Achholi	~1.5 km in NW direction	-
8.	Village Beltukri	~1.5 km in South direction	Nearest Village

Source: SOI Toposheet

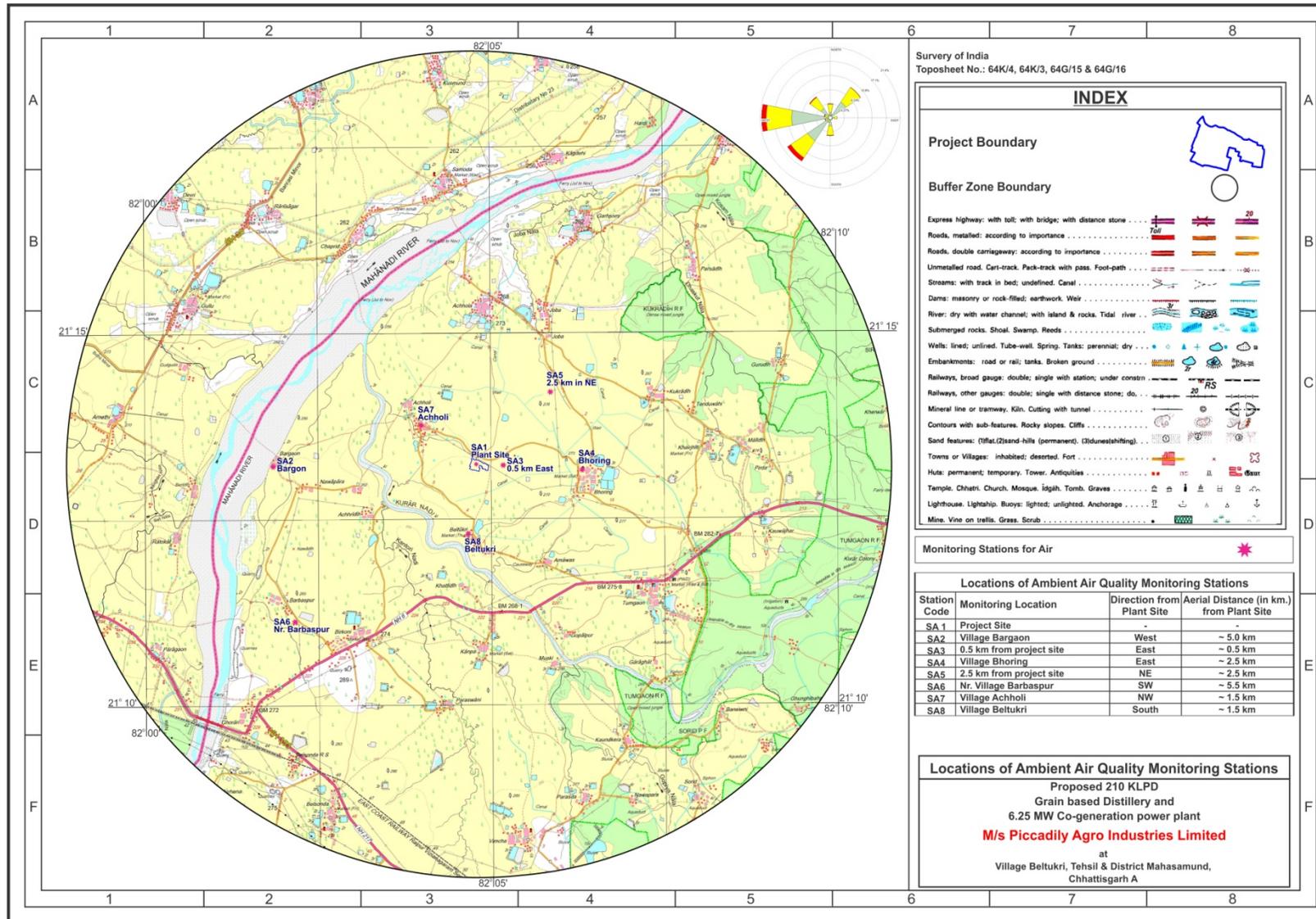


Figure - 3.7: Key Plan Showing Ambient Air Quality Monitoring Locations

Source: SOI toposheet and Google Earth

3.5.1 Ambient Air Quality Monitoring Results

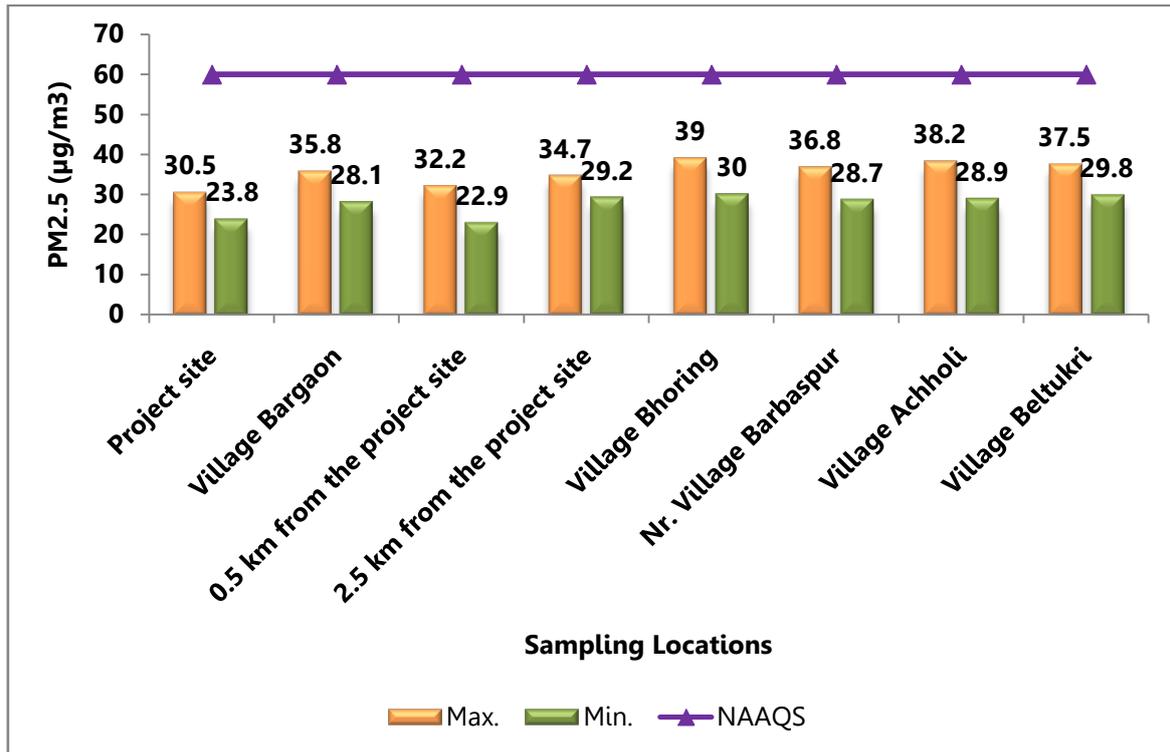
Results of ambient air quality of selected study sites are shown in terms of maximum and minimum concentration with respect to the selected parameters (Table 3.11). All 24 observations of pollutants for each location are detailed in Ambient Air Quality Monitoring Tables enclosed as **Annexure 4** along with this report. Graph depicting ambient air quality monitoring results along with minimum, maximum, average and NAAQS standard is given below.

Table - 3.11
Ambient Air Quality Monitoring Results

Station ID	Sampling Location	Particulate matter 2.5 (PM _{2.5}) (µg/m ³)		Particulate matter 10 (PM ₁₀) (µg/m ³)		Nitrogen Dioxide (NO ₂) (µg/m ³)		Sulphur Dioxide (SO ₂) (µg/m ³)		Carbon Monoxide (CO) (mg/m ³)	
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
SAN1	Project site	30.5	23.8	59.2	51.3	19.6	13.9	10.1	5.2	BDL (DL-0.50)	
SAN2	Village Bargaon	35.8	28.1	64.9	57.7	20.3	14.3	11.7	6.1	BDL (DL-0.50)	
SAN3	0.5 km from the project site	32.2	22.9	61.0	52.2	19.2	13.7	10.9	5.7	BDL (DL-0.50)	
SAN4	2.5 km from the project site	34.7	29.2	64.1	53.9	22.6	14.3	12.2	6.4	BDL (DL-0.50)	
SAN5	Village Bhoring	39.0	30.0	70.6	61.2	23.3	14.8	12.6	7.0	0.76	0.54
SAN6	Nr. Village Barbaspur	36.8	28.7	67.3	56.5	23.9	15.2	12.9	6.6	BDL (DL-0.50)	
SAN7	Village Achholi	38.2	28.9	68.4	56.2	23.1	14.5	12.8	6.3	0.72	0.56
SAN8	Village Beltukri	37.5	29.8	65.8	56.4	21.9	14.6	11.7	6.0	0.63	BDL (DL-0.50)
NAAQS*(24 hours)		60		100		80		80		4*	

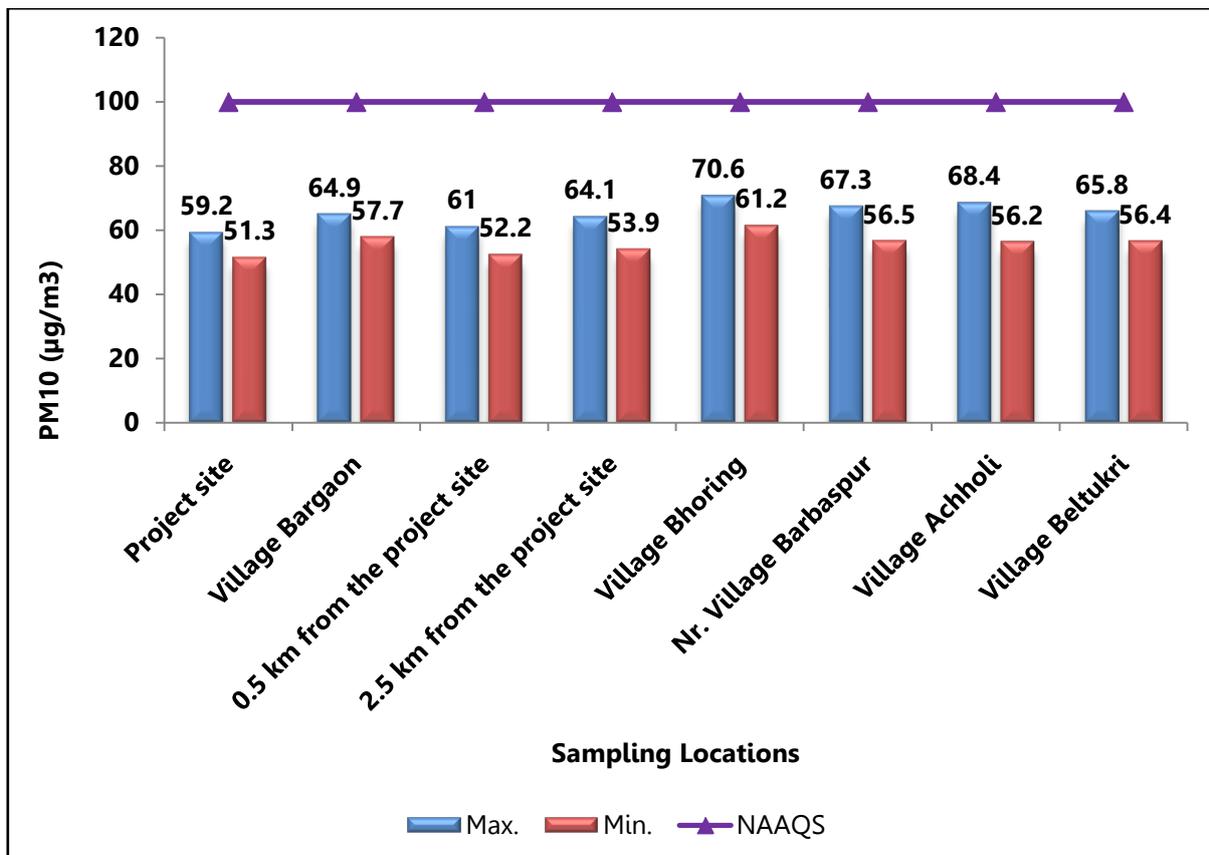
Source: Ambient Air Quality Monitoring

NAAQS - National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009



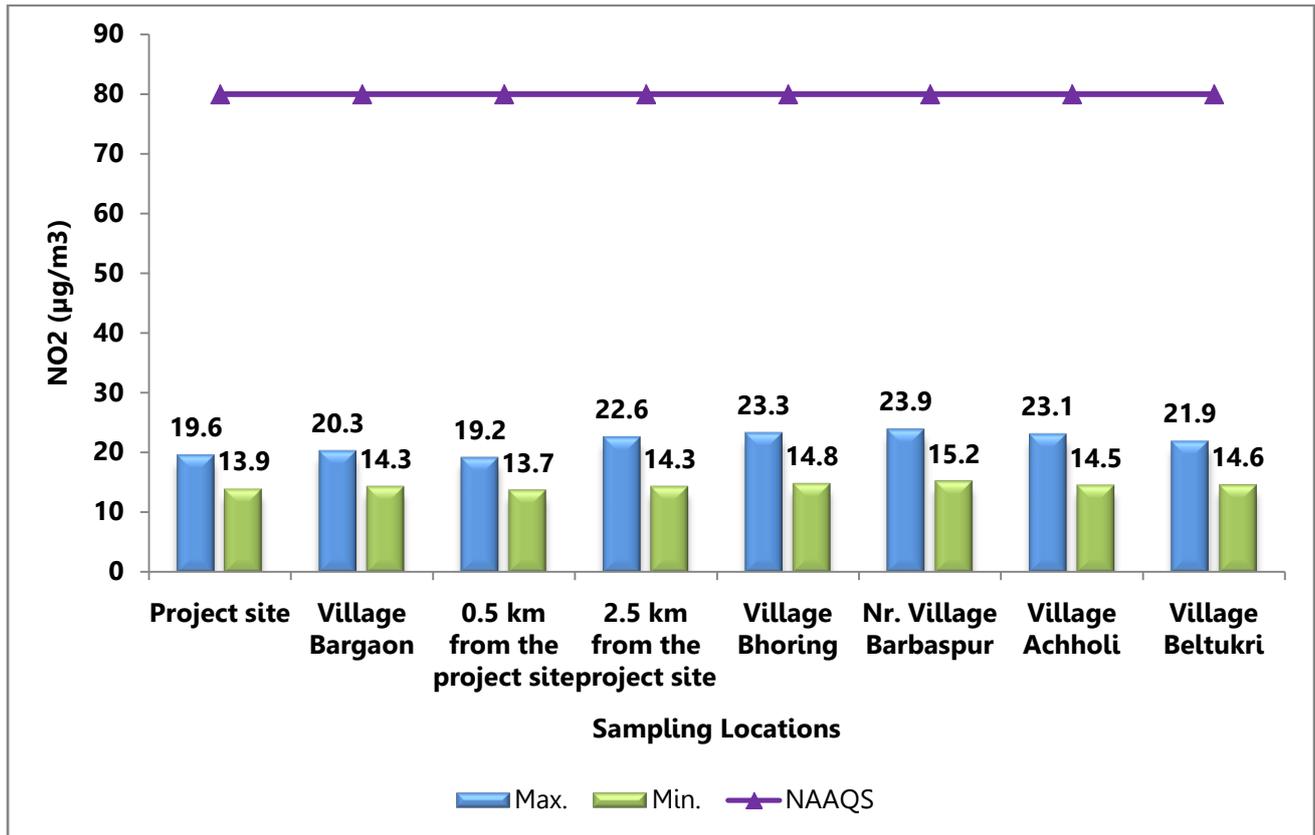
Source: Ambient Air Quality Monitoring

Figure - 3.8(A): Graph Showing PM_{2.5} Concentrations at different Monitoring Stations



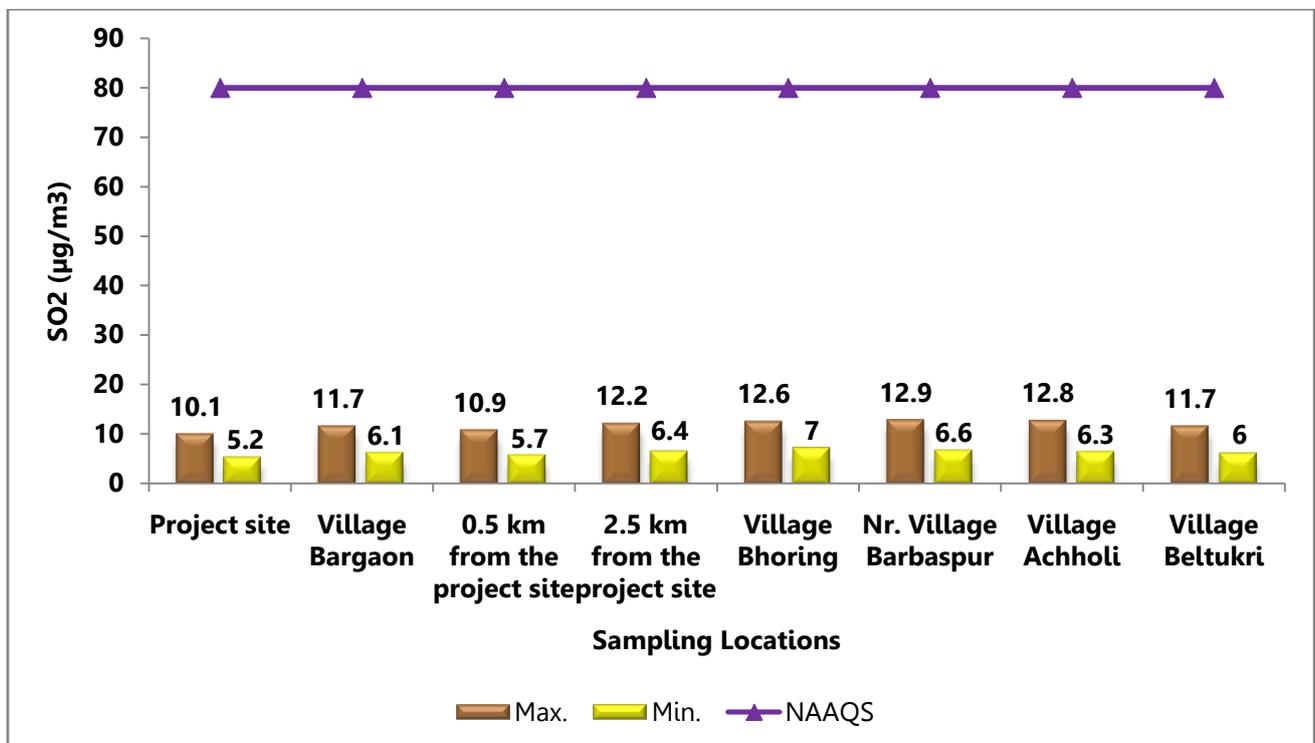
Source: Ambient Air Quality Monitoring

Figure - 3.8 (B): Graph Showing PM₁₀ Concentrations at different Monitoring Stations



Source: Ambient Air Quality Monitoring

Figure - 3.8 (C): Graph Showing NO₂ Concentrations at different Monitoring Stations



Source: Ambient Air Quality Monitoring

Figure - 3.8(D): Graph Showing SO₂ Concentrations at different Monitoring Stations

3.5.2 Conclusion

Ambient Air Quality Monitoring reveals that the concentrations of PM₁₀ and PM_{2.5} for all the 8 AAQM stations were found between 51.3 to 70.6 µg/m³ and 22.9 to 39 µg/m³ respectively. The concentrations of SO₂ and NO₂ were found to be in range of 5.2 to 12.9 µg/m³ and 13.7 to 23.9 µg/m³ respectively. Highest PM concentration were found near Village Bhorng as it is located near the confluence of adjoining roads to NH-53. Hence it justifies increased levels of particulate matters. Highest SO₂ and NO₂ concentration were found near Village Barbaspur which may due the vicinity of NH-53.

The proposed distillery will result in increase in ambient concentration due to increase in fugitive emissions during construction phase and it will be confined within plant boundaries. During operation phase, the movement of men, material and plant operations will result in increase of fugitive emissions and vehicular emissions and in turn increase in PM, SO₂ and NO_x concentrations.

The ambient air quality monitored in the season is within the prescribed limits of NAAQS. Proper mitigation measures need to be followed.

3.6 NOISE ENVIRONMENT

Noise often defined as unwanted sound, interferes with speech communication, causes annoyance, distracts from work, and disturbs sleep, thus deteriorating quality of human environment.

Procedure for ambient noise monitoring – For the monitoring of ambient noise level in the study area, a Digital Noise/Sound Level Meter was used. Location was selected as per Ambient Noise standards or requirements and instrument was placed with minimum of 1 meter height to know the actual sound pressure on human hearing and Switch ON the instrument. Determine proper measuring range by selecting the range to minimize the tolerance of readout. Note down the reading in dB (A) with the interval of 6 minutes or minimum 10 values in 24 hours.

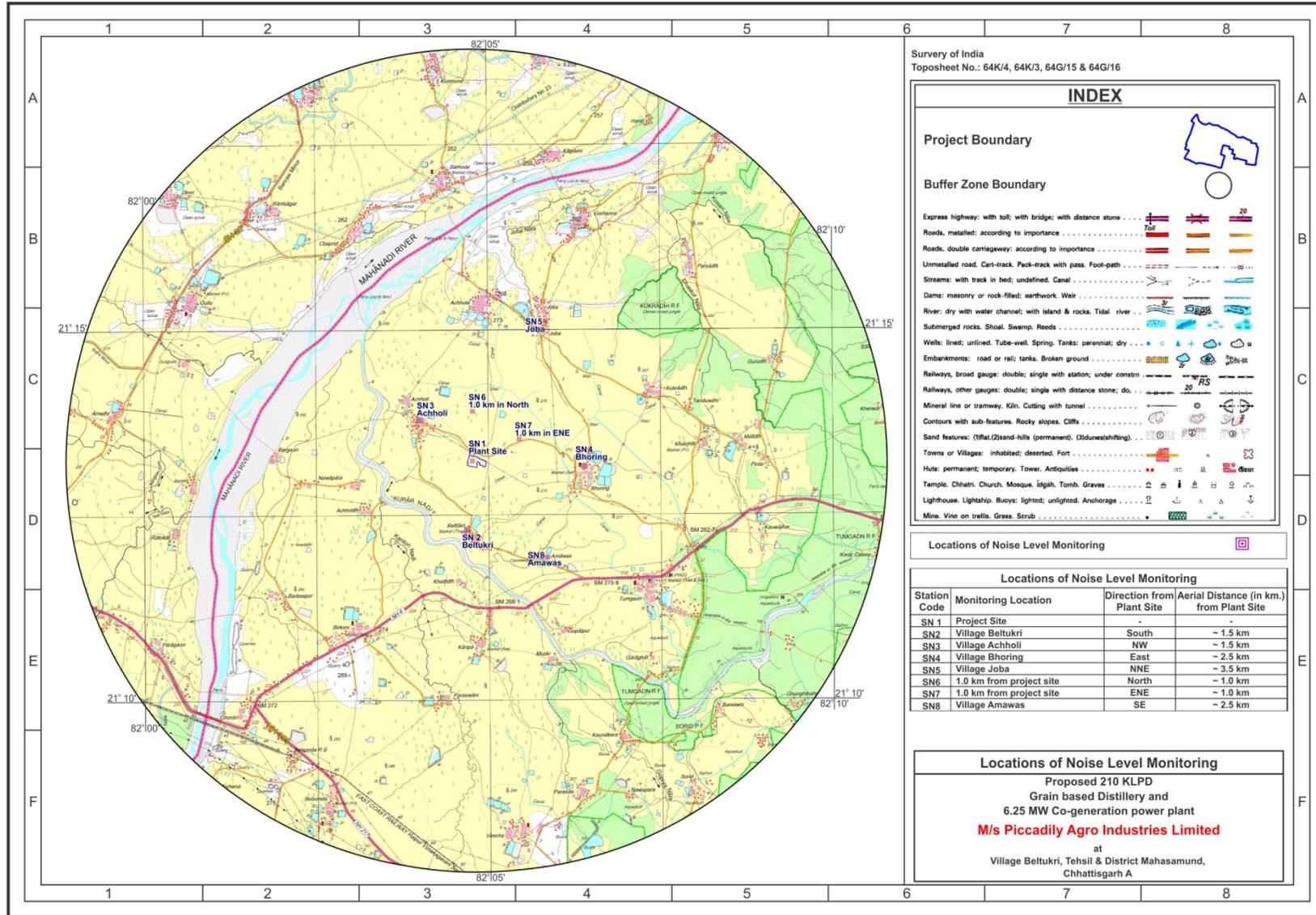
3.6.1 Sampling Locations

Locations / stations selected for noise level monitoring are given in table and figure below. The results are given further based on monitoring results.

Table- 3.12
Locations of Noise Monitoring Stations

S. No.	Monitoring stations	Tentative distance (from plant lease boundary) & direction (from center point)
01	Project Site	-
02	Village Beltukri	1.5 km in South direction
03	Village Achholi	1.5 km in NW direction
04	Village Bhorng	2.5 km in East direction
05	Village Joba	3.5 km in NNE direction
06	1.0 km from project site	1.0 km in North direction
07	1.0 km from project site	1.0 km in ENE direction
08	Village Amawas	3.0 km in SE direction

Source: SOI Toposheet



Source: SOI toposheet and Google Earth

Figure - 3.9: Key Plan Showing Ambient Noise Monitoring Locations

3.6.2 Ambient Noise Level Monitoring Results

Ambient noise levels monitoring results monitored at different locations are given below along with prescribed standards.

Table - 3.13
Ambient Noise Level Monitoring Results

Station code	Locations	Day Time (06:00 AM to 10:00 PM)	Prescribed CPCB standards	Night Time (10:00 PM to 06:00 AM)	Prescribed CPCB standards
		Leq in dB(A)	Day Time	Leq in dB(A)	Night Time
SAN 1	Project Site	50.6	75	40.2	70
SAN 2	Village Beltukri	53.9	55	43.3	45
SAN 3	Village Achholi	53.5	55	42.8	45
SAN 4	Village Bhorng	52.8	55	43.9	45
SAN 5	Village Joba	54.0	55	43.7	45
SAN 6	1.0 km from project site	53.6	55	43.9	45
SAN 7	1.0 km from project site	53.5	55	43.2	45
SAN 8	Village Amawas	52.3	55	41.6	45

Source: Ambient Noise Quality Monitoring

CPCB NOISE STANDARDS

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6.00 AM to 10.00 PM.
2. Night Time is reckoned between 10.00 PM to 6.00 AM
3. Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational Institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.

Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply

3.6.3 Conclusion

Ambient noise levels were measured at 8 locations within the 10 km radius from the project site. Noise levels vary from 50.6 to 54.0 Leq dB (A) during day time and 40.2 to 43.9 Leq dB(A) during night time. Maximum noise levels are seen near SAN 5 (1.0 km in SE direction), which may be due to its proximity to village road and movements of vehicle in day time. During day & night time, the values are not much varying and some level of noise is always found due to human and vehicular activities for residential areas. From the above study, it can be concluded that the resultant noise levels in the study area are within the limits as prescribed by the Noise Pollution (Regulation and Control) Rules, 2000. All required measures will be adopted to minimize the noise level at the project site during construction & operation phase. During construction phase, minor temporary increase of noise levels is envisaged due to movement of vehicles and hauling of

machineries & during operation phase, noise levels will be slightly increased but they will be confined within plant boundary mostly.

3.7 WATER ENVIRONMENT

As a significant part of predefined framework of the present study water samples were collected from selected locations. The Reconnaissance survey was undertaken and monitoring locations were finalized based on:

- Presence, Location and uses of major water bodies in the region
- Type and Location of Industrial/residential areas, their intake and effluent disposal locations
- Likely area that can represent baseline conditions

The water resources in the study area were divided into two categories for getting ideal upshot of baseline status of water quality of the region. These two major categories as determined are:

- Surface water resources including streams, nalas, ponds, river, canals, estuary
- Ground Water resources (tube well, open well, springs etc.)

A) Preservation and storage of water samples

Parameter	Container	Minimum sample size (ml)	Preservation	Maximum storage	
				Recommended	Regulatory
Acidity	P/G	100	Refrigerate	24 hrs.	14 days
Alkalinity	P/G	200	Refrigerate	24 hrs.	14 days
BOD	G	1000	Refrigerate	6	48 hrs.
Boron	P/G	1000	HNO ₃ to pH<2	28 days	6 months
COD	G	100	H ₂ SO ₄ to pH<2	7 days	28 days
Chloride	P/G	100	Non required	N. S.	28 days
Chlorine (Residual)	P/G	500	Analyzed immediately	0.25 h.	0.25 h.
Color	P/G	500	Refrigerate	48 hrs.	48 hrs.
Sp. Conductance	P/G	500	Refrigerate	28 hrs.	28 hrs.
Fluoride	P/G	100	Non required	28 hrs.	28 hrs.
Hardness	P/G	100	HNO ₃ or H ₂ SO ₄ topH<2	6 months	6 months
Chromium	P/G	1000	Refrigerate	24 hrs.	24 hrs.
Copper	P/G	1000	Refrigerate	24 hrs.	24 hrs.
Nitrate	P/G	100	Analyzed immediately	48 hrs.	48 hrs.
Nitrite	P/G	100	Refrigerate	None	48 hrs.
Oil & Grease	G	1000	H ₂ SO ₄ to pH<2 Refrigerate	28 days	28 days
Phenol	P/G	500	H ₂ SO ₄ to pH<2 Refrigerate	As soon as possible	28 days
Dissolve Oxygen	P/G	300	Analyzed immediately	0.25 h.	0.25 h.
pH	P/G	50	Analyzed immediately	0.25 h.	0.25 h.
Phosphate	P/G	100	Refrigerate	48 hrs.	N.S.

Silica	P/G	200	Refrigerate, Don't Freeze	28 days	28 days
Sulphate	P/G	100	Refrigerate	28 days	28 days
Turbidity	P/G	100	Analyze same day Refrigerate	24 hrs	24 hrs

Note: P- PVC, G-Glass

Source: Water and waste water testing manual (J.M. EnviroLab Pvt. Ltd.)

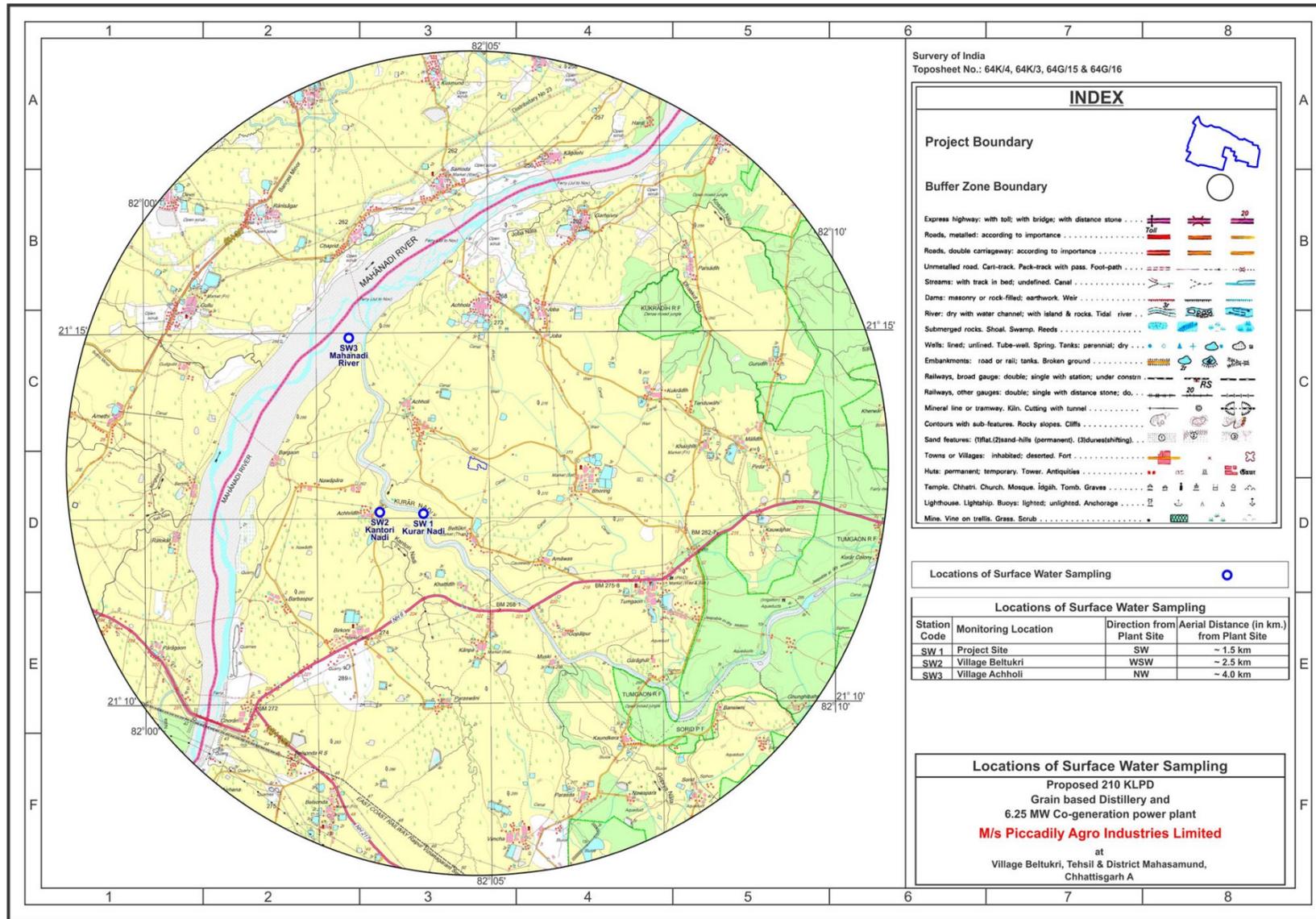
3.7.1 Surface Water

There are three water bodies present in the study area. During monitoring two water bodies were found dry, hence, samples were collected only from following locations:

Table- 3.14
Locations of Surface water Sampling Stations

S.No.	Sampling Stations	Distance	Direction	Status of water body
3.	Mahanadi river	~4 km	NW	Sample collected

Source: SOI Toposheet



Source: SOI toposheet and Google Earth

Figure - 3.10: Key Plan Showing Surface

Water Monitoring Locations

Table - 3.15
Surface Water Analysis

S.	Parameters	Unit	Mahanadi River
1.	pH (at 25°C)	--	7.42
2.	Colour	Hazen Unit	BDL (DL 1.0)
3.	Turbidity	NTU	8.0
4.	Total Hardness as CaCO ₃	mg/l	102.35
5.	Calcium as Ca	mg/l	23.61
6.	Alkalinity as CaCO ₃	mg/l	123.78
7.	Chloride as Cl	mg/l	26.14
8.	Residual free Chlorine	mg/l	BDL (DL 0.20)
9.	Cyanide as CN	mg/l	BDL (DL 0.02)
10.	Magnesium as Mg	mg/l	10.56
11.	Total Dissolved Solids	mg/l	206.00
12.	Sulphate as SO ₄	mg/l	14.98
13.	Fluoride as F	mg/l	0.63
14.	Nitrate as NO ₃	mg/l	8.69
15.	Iron as Fe	mg/l	0.41
16.	Aluminium as Al	mg/l	BDL (DL 0.03)
17.	Boron	mg/l	0.89
18.	Phenolic Compounds	mg/l	BDL (DL 0.001)
19.	Anionic Detergents as MBAS	mg/l	BDL (DL 0.02)
20.	Hexa Chromium as Cr ⁺⁶	mg/l	BDL (DL 0.03)
21.	Zinc as Zn	mg/l	BDL (DL-0.0005)
22.	Copper as Cu	mg/l	BDL (DL 0.02)
23.	Manganese as Mn	mg/l	BDL (DL-0.01)
24.	Lead as Pb	mg/l	BDL (DL-0.008)
25.	Selenium as Se	mg/l	BDL (DL 0.005)
26.	Arsenic as As	mg/l	BDL (DL 0.002)
27.	Mercury as Hg	mg/l	BDL (DL 0.001)
28.	Phosphate as Po ₄	mg/l	0.09
29.	Total Suspended Solid	mg/l	12.1
30.	Biochemical Oxygen Demand	mg/l	4.2
31.	Chemical Oxygen Demand	mg/l	14.5
32.	Sodium as Na	mg/l	23.6
33.	Potassium as K	mg/l	2.1
34.	Conductivity	µs/cm	318.00
35.	Nickel	mg/l	BDL (DL 0.005)
36.	Dissolve Oxygen	mg/l	7.2

Source: Surface Water Analysis Report by JMEPL Lab

Note: Surface water quality was also analysed for Colour, Residual free Chlorine, Cyanide as CN, Aluminium as Al, Boron, Phenolic Compounds, Anionic Detergents as MBAS, Hexa Chromium as Cr+6, Zinc as Zn, Copper as Cu, Manganese as Mn, Lead as Pb, Selenium as Se, Arsenic as As, Mercury as Hg and Nickel were found below detection limit.

Interpretation

The value of Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) were found to be 4.2 mg/l and 14.5 mg/l respectively. The value of BOD and COD indicates that organic pollutants in the river water is too low. The pH of the water sample was found to be 7.42 (slightly alkaline) which is optimum for river water. Based on the BOD and pH value, the surface water falls under D class i.e. water is suitable for propagation of wild life and fisheries. The value of dissolved oxygen was found to be 7.2 mg/l, higher DO during Summer season indicate healthy aquatic environment. On the basis of DO value, surface water falls under Class A category i.e. surface is suitable for drinking water sources without conventional treatment but after disinfection. it can be best used as aquaculture, Irrigation, industrial cooling controlled waste disposal. The colour of water samples were BDL and odour were agreeable.

Conclusion:

As per the CPCB standards, the water quality is good and is less polluted due to anthropogenic activity.

3.7.1.1 Standards of surface water classification

Parameters	Class A	Class B	Class C	Class D	Class E
Designated best use	Drinking water source without conventional treatment but after disinfection	Outdoor bathing (organized)	Drinking water source after conventional treatment & disinfection	Propagation of wildlife and fisheries	Irrigation, industrial Cooling controlled waste disposal
pH	6.5 – 8.5	6.5 – 8.5	6 - 9	6.5 – 8.5	6.0 – 8.5
Dissolved Oxygen, mg/l	6 or more	5 or more	4 or more	4 or more	-
BOD, mg/l (5 days 200C)	2 or less	3 or less	3 or less	-	-
Total coliform organism, Most Probable Number/100 ml	50 or less	500 or less	5000 or less	-	-
Total Hardness (mg/L)	300 or less	-	-	-	-
Chlorides (mg/L)	250	-	600	-	600
Sulfates (mg/L)	400	-	400	-	1000
Nitrates (mg/L)	20	-	50	-	-
Free CO ₂ (mg/L)	-	-	-	6	-

Free ammonia (as N), mg/l	-	-	-	1.2 or less	-
Flourides (mg/L)	1.5	1.5	1.5	-	-
Cooper (mg/L)	1.5	-	1.5	-	-
Electrical conductivity, µmhos/cm (at 250C)	-	-	-	-	2500 max.
Sodium absorption ratio	-	-	-	-	6 max
Boron (mg/l)					2 max
Iron (mg/L)	0.5	-	-	-	-
Zinc (mg/L)	15	-	15	-	-
Barium (mg/L)	1	-	-	-	-
Silver (mg/L)	0.05	-	--	-	-
Arsenic Total (mg/L)	0.05	0.2	0.2	-	-
Mercury (mg/L)	0.001	-	-	-	-
Lead (mg/L)	0.1	-	0.1	-	-
Cadmium (mg/L)	0.01	-	0.01	-	-
Chromium (mg/L)	0.05	0.05	0.05	-	-
Selenium (mg/L)	0.01	-	0.05	-	-
Cyanide (mg/L)	0.05	0.05	0.05	-	-
Phenols (mg/L)	0.002	0.005	0.005	-	-
Anionic Detergents (mg/L)	0.2	1	1	-	-
PAH (mg/L)	0.2	-	-	-	-

Source : CPCB website (<https://cpcb.nic.in/water-quality-criteria-2/>)

3.7.2 Ground Water Quality

The sources of potable water are the tube-wells, dug-wells, hand pumps, pipeline for domestic purpose in the area. Details of ground water sampling locations and their distance and directions are given in table and figure below.

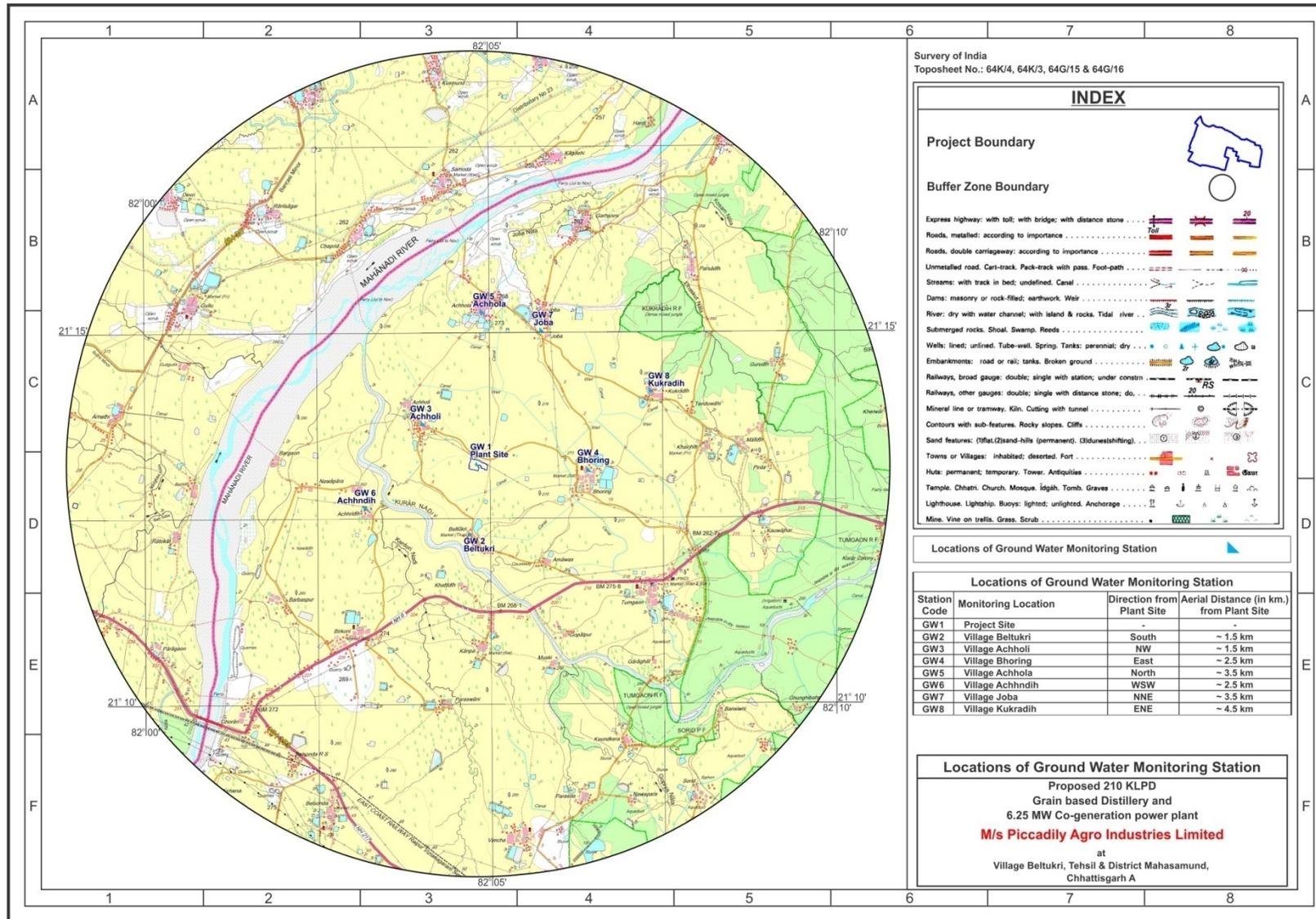
Table - 3.16(A)
Locations of Ground Water Sampling Stations

S. No.	Sampling Station	Tentative distance (from boundary) & direction (from center point)	Source of sample collection
1.	Project site	-	Core zone
2.	Village Beltukri	~1.5 km in South direction	Domestic and agricultural activities
3.	Village Achholi	~1.5 km in NW direction	Domestic and agricultural activities
4.	Village Bhoring	~2.5 km in East direction	Domestic and agricultural activities
5.	Village Achhola	~3.5 km in North direction	Domestic and agricultural activities
6.	Village Achhdih	~2.5 km in WSW direction	Domestic and agricultural activities
7.	Village Joba	~3.5 km in NNE direction	Domestic and agricultural activities
8.	Village Kukradih	~4.5 km in ENE direction	Domestic and agricultural activities

Source: Google Image and SOI toposheet

Table- 3.16(B)
Phreatic surface monitoring in 10 km study area

S. No.	Sampling Station	Tentative distance (from boundary) & direction (from center point)	Elevation (m)	Depth to Water level (m)	Type of well
1.	Project site	-	286	3.5	Borewell
2.	Village Beltukri	~1.5 km in South direction	286	3.35	Borewell
3.	Village Achholi	~1.5 km in NW direction	282	6.5	Borewell
4.	Village Bhoring	~2.5 km in East direction	299	4.5	Borewell
5.	Village Achhola	~3.5 km in North direction	287	6.5	Borewell
6.	Village Achhndih	~2.5 km in WSW direction	294	5.5	Borewell
7.	Village Joba	~3.5 km in NNE direction	283	6.25	Borewell
8.	Village Kukradih	~4.5 km in ENE direction	292	7.0	Borewell



Source: SOI Toposheet and Google Earth

Figure 3.11: Key plan showing Groundwater & Phreatic Surface Sampling locations

Table - 3.17
Ground Water Analysis

S. No.	Parameters	Unit	Project site	Village Beltukri	Village Achholi	Village Bhorng	Village Achhola	Village Achhndih	Village Joba	Village Kukradih
1.	pH (at 25°C)	-	7.32	7.97	7.21	7.65	7.53	7.77	7.97	7.54
2.	Colour	Hazen Unit	BDL (DL- 1.0)	BDL (DL- 1.0)	BDL (DL- 1.0)	BDL (DL- 1.0)	BDL (DL- 1.0)	BDL (DL- 1.0)	BDL (DL- 1.0)	BDL (DL- 1.0)
3.	Turbidity	NTU	BDL (DL- 1.0)	BDL (DL- 1.0)	BDL (DL- 1.0)	BDL (DL- 1.0)	BDL (DL- 1.0)	BDL (DL- 1.0)	BDL (DL- 1.0)	BDL (DL- 1.0)
4.	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5.	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
6.	Total Hardness as CaCO ₃	mg/l	207.65	241.63	279.28	175.22	221.69	211.65	217.89	286.87
7.	Calcium as Ca	mg/l	40.33	44.12	54.15	36.98	47.87	59.23	55.11	46.69
8.	Alkalinity as CaCO ₃	mg/l	189.36	191.59	255.97	158.05	183.65	223.98	179.78	173.65
9.	Chloride as Cl	mg/l	66.32	87.54	52.57	51.23	66.12	63.98	70.62	78.76
10.	Cyanide as CN	mg/l	BDL (DL- 0.02)	BDL (DL- 0.02)	BDL (DL- 0.02)	BDL (DL- 0.02)	BDL (DL- 0.02)	BDL (DL- 0.02)	BDL (DL- 0.02)	BDL (DL- 0.02)
11.	Magnesium as Mg	mg/l	26.01	31.97	35.03	20.16	24.85	15.52	19.53	41.40
12.	Total Dissolved Solids	mg/l	356.0	398.0	412.0	294.0	388.0	429.0	406.0	418.0
13.	Sulphate as SO ₄	mg/l	25.36	14.56	29.97	27.89	35.43	36.69	45.45	58.12
14.	Fluoride as F	mg/l	0.55	0.66	0.58	0.57	0.6	0.75	0.88	0.97
15.	Nitrate as NO ₃ -N	mg/l	7.29	8.24	7.97	9.42	11.73	11.62	10.12	8.68
16.	Iron as Fe	mg/l	0.24	0.29	0.32	0.41	0.34	0.31	0.22	0.37
17.	Aluminium as Al	mg/l	BDL (DL- 0.03)	BDL (DL- 0.03)	BDL (DL- 0.03)	BDL (DL- 0.03)	BDL (DL- 0.03)	BDL (DL- 0.03)	BDL (DL- 0.03)	BDL (DL- 0.03)
18.	Boron	mg/l	0.28	0.32	0.36	0.42	0.51	0.36	0.42	0.22
19.	Phenolic Compounds	mg/l	BDL (DL- 0.001)	BDL (DL- 0.001)	BDL (DL- 0.001)	BDL (DL- 0.001)	BDL (DL- 0.001)	BDL (DL- 0.001)	BDL (DL- 0.001)	BDL (DL- 0.001)
20.	Anionic Detergents as MBAS	mg/l	BDL (DL- 0.02)	BDL (DL- 0.02)	BDL (DL- 0.02)	BDL (DL- 0.02)	BDL (DL- 0.02)	BDL (DL- 0.02)	BDL (DL- 0.02)	BDL (DL- 0.02)
21.	Hexa Chromium as Cr ⁺⁶	mg/l	BDL (DL- 0.03)	BDL (DL-0.03)	BDL (DL-0.03)	BDL (DL- 0.03)	BDL (DL- 0.03)	BDL (DL- 0.03)	BDL (DL- 0.03)	BDL (DL- 0.03)
22.	Chromium as Cr	mg/l	BDL (DL- 0.03)	BDL (DL-0.002)	BDL (DL-0.002)	BDL (DL- 0.03)	BDL (DL- 0.03)	BDL (DL- 0.03)	BDL (DL- 0.03)	BDL (DL- 0.03)

			0.002)			0.002)	0.002)	0.002)	0.002)	0.002)
23.	Zinc as Zn	mg/l	BDL (DL-0.0005)							
24.	Copper as Cu	mg/l	BDL (DL-0.02)							
25.	Manganese as Mn	mg/l	BDL (DL-0.01)							
26.	Cadmium as Cd	mg/l	BDL (DL-0.002)							
27.	Lead as Pb	mg/l	BDL (DL-0.008)							
28.	Arsenic as As	mg/l	BDL (DL-0.002)							
29.	Mercury as Hg	mg/l	BDL (DL-0.001)							
30.	Sodium as Na	mg/l	36.8	33.3	23.8	26.3	23.6	43.6	32.3	22.3
31.	Potassium as K	mg/l	3.2	4.3	3.9	3.9	3.5	4.7	5.3	3.6
32.	Phosphate as PO ₄	mg/l	BDL (DL-0.02)							
33.	Nickel	mg/l	BDL (DL-0.005)							
34.	Conductivity	µS/cm	574.00	631.00	646.00	496.00	621.00	663.00	639.00	638.00
35.	Total Suspended Solid	mg/l	BDL (DL-1.0)							

Source: Water Analysis Report by JMEPL Lab

BDL- Below Detectable Limit, DL- Detection Level

Parameters found below detection limit range: Colour, Turbidity, Cyanide, Aluminium, boron, Phenolic Compounds, Anionic detergents, HexaChromium, Chromium, Zinc, Copper, Manganese, Cadmium, Lead, Arsenic, Mercury, Nickel, TSS

3.7.2.1 Interpretation of ground water analysis

The physico-chemical analysis of groundwater samples was compared with Drinking Water Standard (IS: 10500-2012) as the groundwater is expected to be good and is utilized for domestic purpose and for irrigation purpose. The pH of the groundwater samples ranged from 7.21 to 7.97 which is within the permissible limit. The color and turbidity were below detection limit and odor and taste were agreeable. The total dissolved solids ranged from 294 to 429 mg/l. Physical quality of the groundwater samples was fair. According to the BIS Standards, the maximum acceptable limit of TDS is 500 mg/l and maximum permissible is 2000 mg/l. WHO states that the water containing TDS concentrations below 900 mg/liter are acceptable for the consumers. Lesser the TDS, Better the Water. This observation is supported by moderate to high values of total hardness 175.22 to 286.87(mg/l) and alkalinity 158.05 to 255.97 (mg/l). Hard water has no known adverse health effect, WHO says at its Geneva Conference. In addition, very hard water could provide an important supplementary contribution to total calcium and magnesium intake to people who use this water for drinking purposes. However, many industrial and domestic water users are concerned about the hardness of their water. When hard water is heated, solid deposits of calcium carbonate can form. Scaling can reduce the life of equipments, raise the costs of heating the water, lower the efficiency of electric water heaters, and clog pipes due to incrustations. The cost of utilization of water increases for the industries, hence, proper treatment should be done for utilizing groundwater for industrial operations. Samples were less polluted as indicated by the values of chlorides 51.23 to 87.54 (mg/l) and sulphates 14.5 to 58.12 (mg/l). The Fluoride concentration is 0.55 to 0.97 (mg/l). Fluoride when ingested in small quantities (<0.5 mg/L) is beneficial in promoting dental health by reducing dental caries, whereas higher concentrations (>1.5 mg/L) may cause fluorosis. Based on the moderate conductivity values (496 to 663 μ S/cm), the groundwater samples are rich in dissolved substances and minerals which are good for irrigation purpose. The sodium 22.3 to 43.6 (mg/l) and potassium 3.2 to 5.3(mg/l) concentration are very low indicating absence of pollution of groundwater samples. Total suspended solids, Nickel, Mercury, Arsenic, Lead, Cadmium, Manganese, Copper, Zinc, Chromium, Anionic Detergents, Phenolic compounds, Boron, Aluminium and phosphates were BDL for all the villages.

Conclusion

The groundwater samples from the project site and from study area are of fair quality, not polluted and good for irrigation and domestic use.

3.8 SOIL ENVIRONMENT

The sampling locations were finalized with the following considerations:

- To enable information on baseline characteristics and,
- To determine the impact of Plant activities on soil characteristics of the proposed distillery unit.

Details of Sampling Procedure—Collection of samples from near-surface soil can be accomplished with tools such as spades, shovels, trowels, and scoops. Surface material is removed and sample is collected from 15-30 cm of depth with a stainless steel or plastic scoop or auger. For volatile organic analysis to be done, the sample is transferred directly into an appropriate, labeled container with a stainless-steel lab spoon, or equivalent and cap is closed tightly. Remainder of the sample is placed into a stainless steel, plastic, or other appropriate container facilitating homogenization and mixed thoroughly in order to obtain a homogenous sample representative indicative of the entire sampling interval.

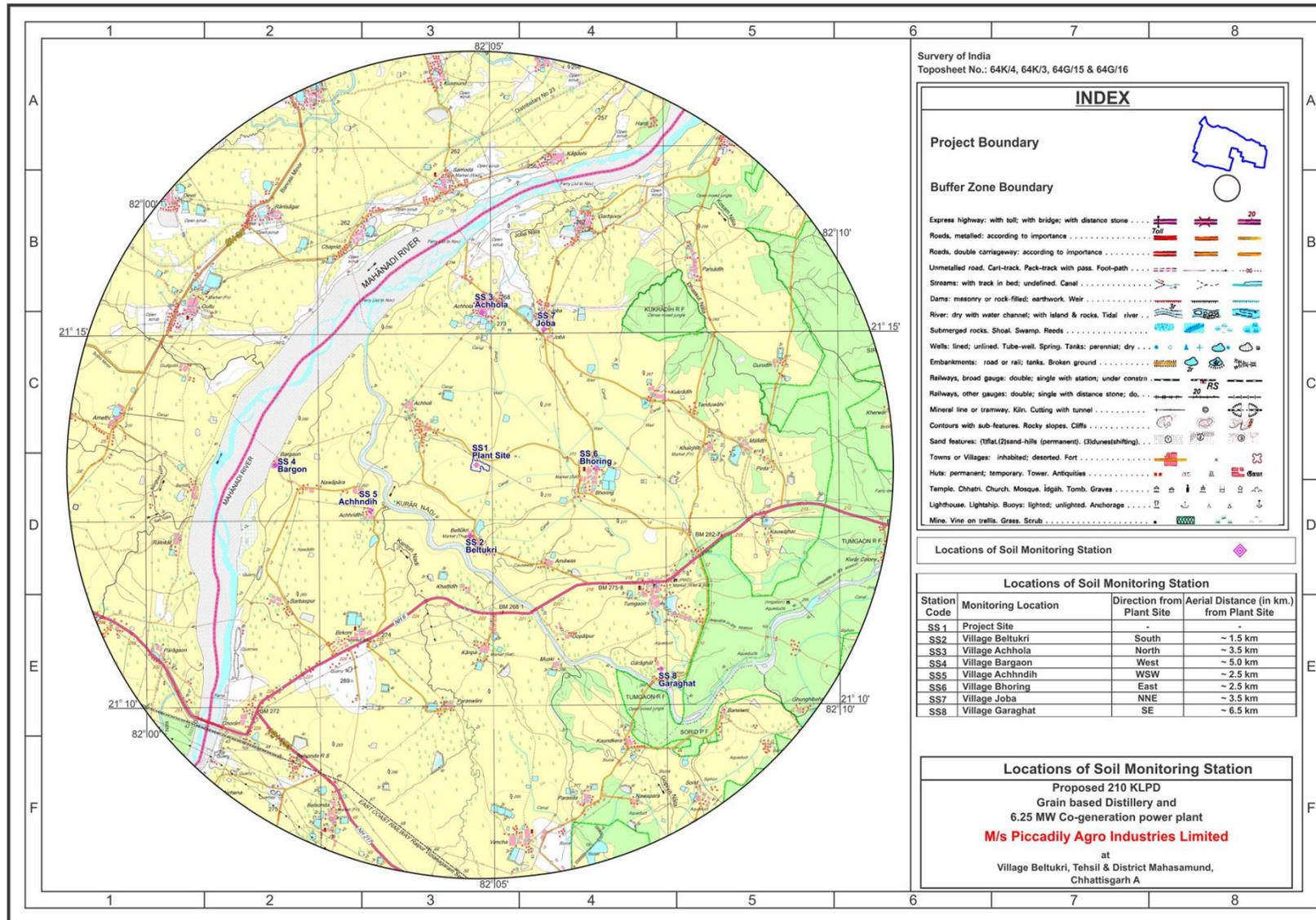
In case of individual sample collection, place the sample is placed in labeled container and capped tightly; or, if more than one/composite samples are to be analyzed then another sample with definite sampling interval is placed or located into the container facilitating homogenization hence mixed thoroughly.

Locations are shown in tabular form and on key plan also. The results are provided on table given further.

Table - 3.18
Locations of Soil Sampling Stations

S. No.	Sampling Station	Distance & Direction from Project site	Major Activity Nearby Sampling Station
1.	Project Site	-	Core zone
2.	Village Beltukri	1.5 km in South direction	Grazing/Open land & Catchment area of Kurari nadi
3.	Village Achhola	3.5 km in North direction	Human settlement
4.	Village Bargaon	5.0 km in West direction	Catchment area of Mahanadi river
5.	Village Achhndih	2.5 km in WSW direction	Vegetation/plantation
6.	Village Bhoring	2.5 km in East direction	Agricultural Land
7.	Village Joba	3.5 km in NNE direction	Open scrub/barren land
8.	Village Garaghat	6.5 km in SE direction	Near sensitive area (RF/PF)

Source: Toposheet Map



Source: SOI Topo sheet and Google Earth

Figure 3.12: Key plan showing Soil Sampling locations

Table - 3.19
Soil Analysis

S. No.	Parameters	Unit	Project site	Village Beltukri	Village Achhola	Village Bargaon	Village Achhndih	Village Bhoring	Village Joba	Village Garaghat
1.	pH (at 25°C) (1:2.5 soil water sus.)	-	7.99	7.90	7.91	8.11	7.66	7.80	7.94	7.93
2.	Conductivity (1:2soil water sus.)	mS/cm	0.51	0.46	0.34	0.41	0.37	0.39	0.45	0.52
3.	Salinity	ppt	0.34	0.30	0.17	0.26	0.22	0.24	0.26	0.31
4.	Soil Texture	-	Clay	Silty Clay	Silty Clay	Clay	Silty Clay	Clay	Silty Clay	Silty Clay
5.	Sand	%	10	10	13	18	12	14	16	10
6.	Silt	%	18	42	42	13	51	18	40	41
7.	Clay	%	72	48	45	69	37	68	44	49
8.	Colour	-	Redish Brown	Blackish Brown	Blackish Brown	Redish Brown	Brownish black	Redish Brown	Brownish black	Brownish black
9.	Water holding capacity	%	58.9	49.3	48.4	59.7	47.6	61.9	50.3	51.3
10.	Porosity	%	57.6	50.1	47.9	58.6	46.7	60.2	49.7	50.2
11.	Bulk density	gm/cc	1.23	1.30	1.28	1.26	1.30	1.25	1.29	1.32
12.	Chloride	mg/kg	259.82	149.54	229.75	268.76	158.87	149.69	259.51	299.22
13.	Exchangeable Calcium as Ca	mg/kg	2289.6	1633.8	1566.1	1749.3	1859.9	1409.45	1890.56	2333.74
14.	Exchangeable Sodium as Na	mg/kg	243.23	150.92	134.45	137.92	245.47	167.63	160.78	169.69
15.	Available Potassium as K	kg/hect	320.12	386.36	377.76	247.28	385.43	437.24	423.45	401.23
16.	Organic Matter	%	1.22	1.24	1.26	1.22	1.33	1.23	1.29	1.19
17.	Exchangeable Magnesium as Mg	mg/kg	389.59	363.36	358.41	298.25	380.36	379.15	302.68	324.56
18.	Nitrogen as N	Kg/hect	218.43	308.69	327.78	347.96	317.96	242.54	220.56	215.65
19.	Available Phosphorus	Kg/hect	23.74	25.03	30.73	31.88	29.66	25.65	34.14	32.12
20.	Total Zinc as Zn	mg/kg	19.78	20.73	28.08	31.73	29.24	36.75	34.67	33.22
21.	Manganese as Mn	mg/kg	401.37	448.17	500.63	485.71	508.63	338.54	414.34	424.98

22.	Chromium as Cr	mg/kg	9.65	7.02	BDL (DL 5.0)	6.98	BDL (DL 5.0)	8.65	BDL (DL 5.0)	BDL (DL 5.0)
23.	Total Lead as Pb	mg/kg	12.35	11.96	13.67	11.98	13.67	14.68	16.98	20.32
24.	Total Cadmium as Cd	mg/kg	BDL (DL 5.0)							
25.	Total Copper as Cu	mg/kg	16.35	17.25	23.02	14.98	15.23	14.65	12.33	17.89
26.	Organic Carbon	%	0.71	0.72	0.73	0.71	0.77	0.71	0.75	0.69
27.	SAR Value	-	1.24	0.88	0.80	0.80	1.36	1.02	0.91	0.87

Source: Soil Analysis Report by JMEPL Lab,

Parameters found below detection limit range: chromium and cadmium.

Table 3.20
Standard Soil Classification

S. No.	Parameters	Classification
1.	pH	<4.5 extremely acidic 4.6 - 5.50 Strongly acidic 5.6 - 6.5 Moderately acidic 6.6- 6.9 Slightly acidic 7.0 - Neutral 6.51 - 7.3 Neutral 7.1 – 8.5 Moderately alkaline >8.5 Strongly alkaline
2.	Salinity Electrical Conductivity (µmhos/cm) 1 ppm = 640 ppm µmhos/cm	Up to 1.0 average 1.01-2 harmful to germination 2.01-3 harmful to crops (sensitive to salts)
3.	Organic Carbon (%)	< 0.5 – Low 0.5 – 0.75 Medium >0.75 High
4.	Nitrogen (kg/ha)	<280 Low 280-560 Medium >560 High
5.	Phosphorus as P ₂ O ₅ (kg/ha)	< 10 low 10 – 24.6 Medium > 24.6 High
6.	Potassium (kg/ha)	<108 Low 108– 280 Medium >280 High

Source: Department of Agriculture & Cooperation Ministry of Agriculture Government of India New Delhi, January, 2011

3.8.1 Interpretation of soil analysis

The soil samples including project site and from agricultural and commercial land based on different land uses in study area were collected and analyzed for physico-chemical characterization. All the soil samples collected were varying in colour, i.e. Reddish Brown, Brownish Black and Blackish Brown. Texture analysis of soil samples were shown different proportion of sand, silt, and clay percentage in soil samples. Higher percentage of clay in soil samples showed relatively smaller pore space than silt and sand, hence contaminant solutes remain adhered to the silt particle surfaces which is acceptable to agriculture. The pH ranged from 7.66 to

8.11 which is slightly to moderate alkaline and appropriate for agricultural soils. Water holding capacity (47.6% to 61.9%) is favorable for the crops but showed tendency towards water logging. However, the bulk density 1.23 to 1.32 (g/cc) was within the optimum level.

Calcium ranges from 1409 to 2333.74mg/kg, Sodium 134.45to 245.47 mg/kg, Potassium 247.28to 437.24(kg/ha) was high, Available nitrogen 215.65 to347.96 (kg/ha) was moderate and Available phosphorus 23.74to 34.14(kg/ha) is high. High soil phosphorus levels also can threaten streams, rivers, lakes and oceans. Phosphorus can become water-soluble and mobile, entering surface waters and causing algae and other undesirable plants to grow. This reduces water quality and desirable fish and aquatic plants. This will result in Eutrophication in water bodies and not acceptable. Lead contaminated soil has been found in almost all villages. Lead is one of the most widespread heavy metal contaminant in soils. It is highly toxic to living organisms and has no biological function but can cause morphological, physiological, and biochemical dysfunctions as well as affect water and protein content in plants. Chloride levels range from 149.54 to 299.2 mg/kg and SAR ranges from0.80 to 1.36 of the soil samples. High chloride concentrations can persist in groundwater because of the long traveltimes from recharge areas to discharge at a well or surface-water body.This indicates that soil fertility is medium to high. Nitrogen fertilizer addition may be necessary during plantation and green belt development. The average conductivity values are0.34 to 0.52 (mS/cm) which is average in all locations.

Conclusion: The soil samples were affected by the anthropogenic activity. The soils are of medium tohighfertility and using organic fertilizers with known fertilizer values also can significantly improve the recommended rate of application during plantation and green belt development.

3.9 BIOLOGICAL ENVIRONMENT

3.9.1 Introduction

The sum of environments where the life forms exist is called the Biosphere. Biosphere involves a portion of land, water and air occupied with living organisms. Biological environment includes the Habitat (Place where the organism lives) and natural surroundings of all species (living organisms) of the particular area. Biological study is essential to understand the impact of industrialization and urbanization on existing flora and fauna of the study area. Studies on various aspects of ecosystem play an important role in identifying sensitive issues for under taking appropriate action to mitigate the impact, if required.

The biological study was under taken as a part of the EIA/EMP study report to understand the present status of ecosystem prevailing in the study area, to compare it with past condition with the help of available data, to predict changes in the biological environment as a result of present activities and to suggest measures for maintaining its health.

A primary field survey was carried out within 10 km radius impact zone in and around the plant area to study the floral and faunal diversity of the terrestrial and aquatic environment of the study area.

3.9.2 Cropping pattern of the area

Agriculture is practiced in the area during Kharif and Rabi season every year. During the Kharif, cultivation is done through rainfall while during the Rabi season, it is done through ground water as well as partly through surface water like canals and other sources. During Rabi period, 57.4% irrigated area use groundwater. The groundwater abstraction structures are generally Dugwells, Borewells /tubewells. The principal crops are paddy, wheat, vegetables and pulses. Among cereals, the highest crop under cultivation is Rice (272522 ha) followed by Wheat (984 ha), Jowar & Maize (141 ha) and Kodokutki (133 ha). Net irrigated area of district is 99047 ha which involve mainly ground water-based irrigation (57.37%).

[Source: https://cgwb.gov.in/District_Profile/Chhatisgarh/Mahasamund.pdf

[Source: Ground Water Brochure of Mahasamund District, Chhattisgarh 2012-13, Government of India Ministry of Water Resources Central Ground Water Board.]

3.9.3 Interpretation of Flora and fauna study

No Schedule I species was found in the core as well as buffer zone. No endangered or endemic species (as notified in IUCN Red Data Book) are located within the study area. No migratory birds breed in the study area. No Tiger Reserve/ Elephant Corridor/ Turtle breeding place is located within 10 km radius of the study area. Baseline study period was during March , 2023 to May, 2023. Visit was conducted by FAEs concerned.

Flora

The present baseline floristic study has been carried out to inventories floral composition in the study area. Sampling stations were selected from project site and buffer zone of 10 km radial area around the core zone for carrying out vegetation surveys and an inventory of various floral species. In order to understand the composition of the vegetation, most of the plant species were identified in the field itself whereas the species that could not be identified a specimen was collected along with their photographs for identification later with the help of available published literature and floras of the region.

The vegetation of the district belongs to moist deciduous forest and presents very open form so that the trees and shrubs are widely spaced. In the present study, a total of 217 floral species including trees, shrubs, bamboos, climbers and grasses have been recorded.

Buffer zone of study area

In the buffer area of the plant, many tree species recorded during field survey Palas (*Butea monosperma*), Neem (*Azadirachta indica*), Sheekakai (*Acacia concinna*), Ramphal (*Annona reticulata*), Seetaphal, sareefa (*Annona squamosa*), Kachanar (*Bauhinia variegata*), Palasbel (*Butea superba*) etc. Shrubby vegetation of this zone includes Bantulsi (*Croton bonplandianum*),

Red barleria (*Barleria repens*), Crown Flower (*Calotropis gigantea*), Copperleaf (*Acalypha wilkesiana*) etc. The list of plant species recorded in the study area is given in **Annexure 5**.

Fauna

In order to study wild animals, avifauna, herpetofauna of the project area, a normal systematic transect sampling was done in different strata. Under this sampling, a 2 km long transect walks were carried out in the different locations, and the avifauna and animals were recorded. In addition, information was collected by enquiry with village people and secondary data from the Forest Department. The common fauna recorded from the study area were Rohu (*Labeo rohita*), Rita Catfish (*Rita rita*), Nile Tilapia (*Oreochromis niloticus*), Indian Glass Barb (*Laubuca laubuca*) etc. The list of fauna recorded in the study area is given in **Annexure 5**.

Conclusion

The study area has no reserve or protected forest or national park or sanctuaries. Therefore the biodiversity is medium in the study area due to dominance of anthropogenic activity in the study area. No Schedule I wild life species or rare and endangered species have been recorded from the study area.

3.10 SOCIO-ECONOMIC STATUS OF THE STUDY AREA AND POPULATION PROJECTION

In order to assess and evaluate the likely impacts arising out of new project in socioeconomic environment, it is necessary to gauge the status of the people in the surrounding areas. Socio-economic survey/studies an effective tool for processing this requirement.

The Socio-Economic environment includes demography structure, population density, literacy level, and employment levels. The data establish a baseline for the prediction of likely impacts of the proposed activity on the socio-economic environment. Secondary information pertaining to the study area villages was collected from government agencies, census data for the year 2011, and statistical abstracts to compile the socio-economic data. Socio economic survey was conducted in year March 2023.

OBJECTIVES OF THE STUDY

The main objectives of this socio-economic report consist of:

- To conduct socio-economic assessment study in Study Area.
- To know the current socio-economic situation in the region to cover the sub sectors of education, health, sanitation, and water and food security.
- To recommend practical strategic interventions in the sector.
- To help in providing better living standards.
- To help in providing employment opportunities to eligible persons.

SCOPE OF WORK

- To study the Socio-economic Environment of area from the secondary sources
- Developing a questionnaire for SIA Survey.

- Data Collection and Analysis
- Identification of impacts due to the proposed projects
- Mitigation Measures.

METHODOLOGY

To understand the socio economic/demographic status of the study area, a Qualitative approach was used. Few primary data during the site visit were also collected.

(I) Data Collection:

Data for this project was collected from primary sources like Household survey, Personal Interview, Group Discussion in community meetings etc. and secondary sources like Government department, Census 2011, District Census Handbook, Maps, Literature research etc. JMEPL conducted the socio-economic baseline survey using a survey team of Field Assistants and a Supervisor apprising them about the project area and relevant documents. Detailed demography table enclosed as **Annexure 6**.

Sample selection techniques

The Survey was conducted using Simple Random Sampling method with a well-structured questionnaire prepared enabling subjects to reply appropriately. The questionnaires were designed to suit the subjects considering their rural background enabling them to furnish correct information and data to the extent possible. Primary data has been collected at village level, household level by questionnaires and focused group discussions.

The study area for the field survey has been divided into three major segments namely Primary Zone (0 - 3 km), Secondary Zone (3 - 7 km) and Outer Zone (7 - 10 km).

Sample size selection-

Sample size refers to a number to a number of factors including the purposed of study

$$n = \frac{n_0 \times N}{n_0 + (N - 1)}$$

Here

- ***n = Sample size of known population***
- ***n₀ = proportion of unknown population***
- ***N = Known population size***

We first calculate the proportion and then use the formula for correction factor to calculate the exact sample size

$$n_0 = \frac{Z^2 \times P (1 - P)}{e^2}$$

- ***Z= Critical value of desired level of confidence (here 95% confidence taken and Z value of it 1.96)***
- ***e = Margin of error / desired level of precision (That is ± 5% or 0.05)***
- ***P = Maximum probability of variation in distribution (that can be 50% maximum)***

For socio economic survey sample size has been calculated 376 household out of 18418 total household (as per census 2011) in 10 km study area.

(II) Data Presentation and Analysis

The data collected were presented in a suitable, concise form i.e., tabular or diagrammatic or graphic form for further analysis. These tabulated data were interpreted and analyzed with the help of various qualitative techniques and ideographic approaches.

BACKGROUND OF THE REGION

- On July 2, 1998, the district of Raipur was divided to create the district of Mahasamund. It is located in the state's eastern central region. In the north, west, and south, Raigarh and Raipur districts surround it. Odisha State's Nawapara and Bargarh districts the eastern. The district has the name of its head office. Mahasamund town. According to a proverb, the town had a sizable circular pond, and the name appears to be It had been used to derive "Maha" into "Mahasamund" meaning big, while "Samund" is pond. Mahasamund District is located in the central-eastern region of Chhattisgarh State and spans an area of 4789.75 sq km. The district is surrounded by the districts of Nawapara and Bargarh in the state of Odisha, as well as Raipur and Raigarh in the state of Chhattisgarh, between 20°47' and 21°31'30' north latitude and 82°00' and 83°15'45' east longitude.
- The elevation of this area is 400–600 meters in length. Shishupal (664 meters), Barkothli (597 meters), and Jhanj (681 meters) are the principal the mountain peaks. Most of this is already addressed. with trees. portions of the northern and some southern Tahsil Basna is a plateau. Mama is in the northern section Bilari Dongri (492 meters) and Bhanja Donger (474 meters). In the southern part, at Karia Donger (481 meters), Budha donger (461 meters) and Sirko Donger (478 meters) are mountain peaks.
- There are plateaus in the northern, south-central, and north eastern portions of the Mahasamund tahsil. There are many high mountain peaks in the South Raital woods that are between 500 and 600 meters high, including Chadoura Dongri (429 meters), Sigangarh Kila (63 meters), and Chadoura Dongri (429 meters). Pithora is bordered to the north and east by the mountains Chhuria Donger (478 meters) and Honi Donger (368 meters), and to the south and east by Sathpahari (52 meters), another mountain summit.
- Apart from the mountainous area, the remainder of the district is a plain area. There are three sizable plain areas in the Mahasamund tahsil: (1) in the west from Achhola to south of Mahasamund, (2) in the middle from Khallari and east of Pithora, and (3) the surrounding area in the southeast. Between Basna and Saraipali, in the plain region, the terrain is uneven, sloppy, stony, and productive. A sizable portion of plain land is used for agriculture.
- Mahanadi, Jonk, and Surangi are the district's three principal rivers. Sukha and Bagnai rivers flow along the district's southern boundary and join the Mahanadi River, which forms the

district's western border. Other Mahanadi River tributaries include Kurar, Naini, and Sitli. The only river in this tahsil's southern region that runs toward the southwest and eventually empties into the Jonk River is the Kandajori River.

- Narsingpur, Keshwanala, Sunsunia, Thakurdaiya, Lavkeni, Dongri, Kalmijhar, Bemeka, Gonabahal, Lamkeni Manal, Pekin, Mudpar, Sonasili, Chandkhuri, Hinchha, Amodidih, Amakoni, Singhora, Dhabri, Dewalgarh, and Rajdeo are notable ponds in the district.
- In general, the district experiences rising temperatures starting at the beginning of March and continuing through mid-June. In May, the highest temperature reaches 48 C. It is extremely hot before the south-west monsoon from late May to early June. The monsoon season begins in mid-June and lasts through September. The winter season begins in October and lasts through mid-March. Sometimes the temperature in December and January drops from 60 degrees Celsius to 50 degrees. The temperature occasionally drops below 40 C (minimum) throughout the winter due to cold waves mixing with western waves from Northern India.
- The district has a total forest area of 134039.470 hect. There are 33000.660 hect of protected forest and 63995.160 hect of reserved forest. The district is primarily covered in sagon, mixed, and sal woods, which are dry, deciduous forests in arid climates.
- The district is home to a variety of wild creatures, including leopards, nilgais, wild dogs, udbillaos, hyenas, country foxes, rabbits, and wild boars. Because of the loss of forests, fewer wild creatures are now present; often, only hyenas, foxes, and rabbits are visible.
- One of the best and most significant animal sanctuaries in the area is Barnawapara animal Sanctuary, which is situated in the northern section of the Mahasamund district. Tropical dry deciduous forest dominates the vegetation of the Barnawapara Wildlife Sanctuary, with Teak, Sal, Bamboo, and Terminalia being the most notable trees. Semal, Mahua, Ber, and Tendu are a few other notable plants that can be found in the sanctuary. In the sanctuary, a diverse range of species is supported by the abundant and luxuriant vegetation cover.
- The major wildlife of the Barnawapara Sanctuary include Tigers, Sloth Bear, Flying Squirrels, Jackals, Four-horned Antelopes, Leopards, Chinkara, Black Buck, Jungle Cat, Barking Deer, Porcupine, Monkey, Bison, Striped Hyena, Wild Dogs, Chital, Sambar, Nilgai, Gaur, Muntjac, Wild Boar, Cobra, Python to name a few. In addition, the sanctuary is home to a large number of birds, some of which include the following: Parrots, Bulbuls, White-rumped Vultures, Green Avadavats, Lesser Kestrels, Peafowl, Wood Peckers, Racket-tailed Drongos, Egrets, and Herons.
- Limestone, quartzite stone slabs, and trace amounts of gold are found in the area. In Mahanadi Valley, the lower level of Mahasamund generally slopes upward. In the Mahasamund tahsil, excavation of quartzite and sandstones is significant. Additionally, Ghodari hamlet, which is close to the Mahanadi River and Mahasamund, is where dark-

colored limestone is extracted. In several locations throughout Mahasamund, tiny amounts of gold are extracted by breaking crystal rocks.

- The regions of Bagbahra, Basna, and Pithora are home to granite rocks. Rocks in Chhattisgarh are primarily limestone, and they date back to the Upper Pre-Cambrian Cuddapah group, containing layers of sandstone, shale, or limestone quartzite. Quartz, dolerite, and neo-granite in intrusive. The district also contains forms. there is a result extensive and active mining operations.
- The district's agricultural economy is dominated by the paddy crop. Among soil types, Kanhar, Dorsa, Matasi, Urkaha, and Sandy predominate. Paddy, urad, groundnut, lac, kodokutki, moong, and wheat are the main crops. In addition, fruits, vegetables and masalas are sowed, too.
- According to the Department of Animal Husbandry's livestock statistics, there are 363637 cattle, 88097 buffalo, 67263 goat, and 5500 pigs in the district. Other animals include 171137 chickens, 186 horses, and 15985 sheep.
- Most of the settlements in the district feature both small and large ponds. Rivers and ponds are home to a wide variety of fish, including snake-like fish, Bam, Bami, and Jatwami fish. The two primary species of fish with wings are Patla and N-Chitla. Other fish species present in the district include Kotai, Borai, Sarangi, Chela-fool, Chilhari, etc.
- A significant paddy-producing area in the State is this district. The district is home to several small and cottage industries that produce things like building supplies, wood, and bamboo. The main source of employment for the locals in the district is small and medium-sized traditional enterprises including carpentry, brick-making, oil manufacture, handloom weaving, etc.
- The state capital Raipur, as well as other regions of the State, are easily accessible by rail and road to the Mahasamund district. Mahasamund connects a number of south-eastern-central railway trains headed toward Valtair, Vishakhapatnam, etc. in Andhra Pradesh and Kantabhanji, Puri, etc. in Odisha that are passing through Raipur junction. Air travel is not possible. The district is located along National Highway No. 6, and it has excellent road connections to the neighboring districts of Bilaspur, Raipur, and Raigarh, as well as locations like Khariyar Road, Sambalpur, and others in the neighboring state of Odisha.
- The district has many educational institutes like primary schools, secondary schools, degree colleges, medical colleges, engineering colleges etc.

Source: District Census Handbook 2011, Mahasamund

3.10.1 Study Area

The study area (buffer zone) was categorized on the basis of the distance of the villages from project site. The Primary zone relates to 0 to 3 km radius area, secondary zone 3-7 km and outer zone 7-10 km radius area. The demography of study area is given below:

3.10.2 Demographic Structure

The state of Chhattisgarh is one of the populated states of India covering an area of 135,192 square kilometers., Almost 76.76% of male working population engaged in non-agricultural pursuits while rest in urban region.

The district Mahasamund has overall literacy rate of 70.72%, with male literacy rate 82.68 % higher than female literacy rate 58.89 %, this gap poses questions on the availability of education for women pertaining in the region. Following table entails brief information about demography structure at state level, district level and study area.

S. No.	Particular	Chhattisgarh	Mahasamund	Study area
1.	Area (sq. Km.)	135,192	4790	328
2.	No. of households	56,33,422	18418	18418
3.	Population	25,545,198	10,32,754	83236
4.	Sex ratio	991	1017	994
5.	Schedule caste	7,822,902	32183	15656
6.	Schedule tribe	3,274,269	49208	8068
7.	Literacy rate (%)	71.04	70.72	69.53
8.	Male literacy (%)	81.45	82.68	82.97
9.	Female literacy (%)	60.59	58.89	59.96
10.	Working population (%)	47.68	31.45	48.29
11.	Non-working population (%)	52.32	68.55	51.43

Source – Census data, 2011

3.10.2.1 Population composition of study area

Census data suggests that the study area is composed of 50.23% of male population while 49.93% of female population. Following table entails information about basic demographic structure of 46 villages falling in study area (buffer zone) as primary, secondary and outer zone.

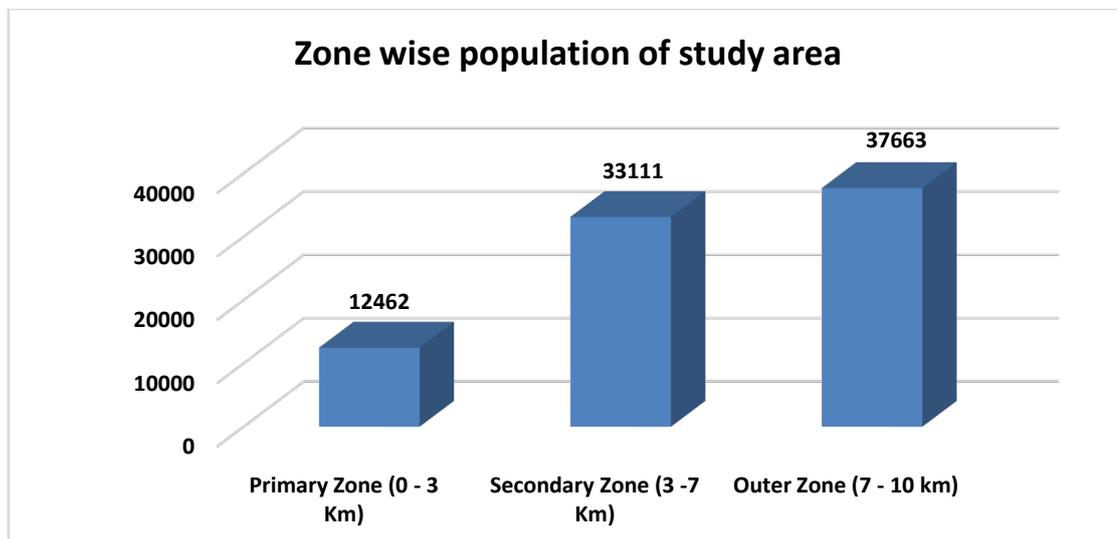
Zone	No. of Villages	Total Household	Total Population	Total Male Population	Total Female Population
Primary Zone (0 - 3 Km)	6	2804	12462	6203	6259
Secondary Zone (3 - 7 Km)	19	6934	33111	16460	16651
Outer Zone (7 - 10 km)	21	8680	37663	19144	18646

Source: Census of India, 2011

- Above table highlights that in primary zone (0 – 3 km radius from project site) 6 villages fall where as much as 2804 houses reside with a total population of over 12462 people. Due to shorter distance from project site, it gives people living in here fair opportunity to get

enrolled in upcoming project and avail possible benefits (less transport cost/time saving) than to people living in other zones.

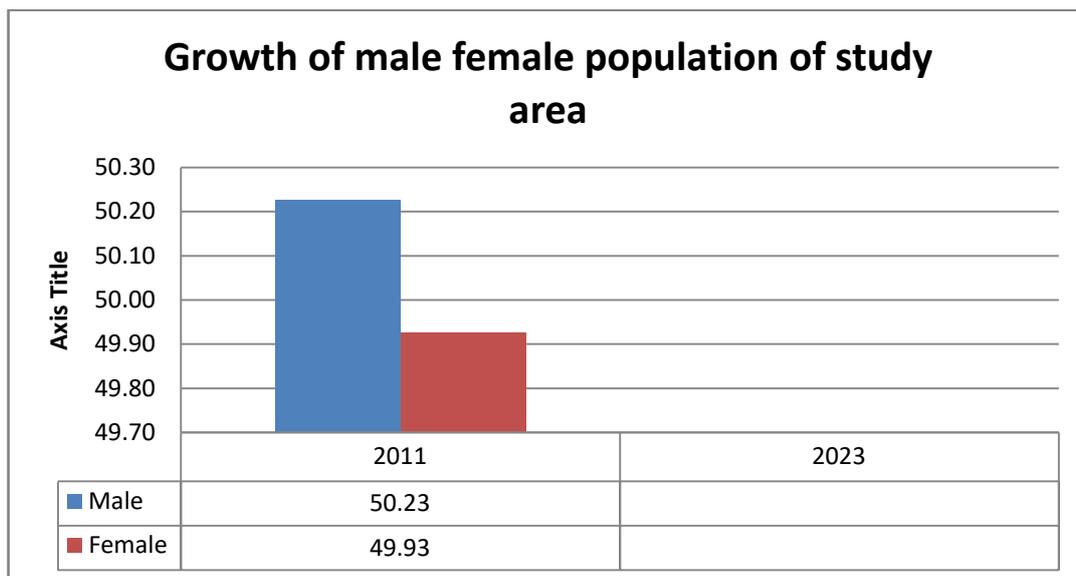
- Secondary and outer zone both comprise of 19 and 21 villages holding a total population of 6934 and 8680 respectively. This suggests that most of the population in the study area lies mainly in the secondary and outer zone when compared to primary.



Source: Census of India, 2011

3.10.2.2 Growth of Male – Female Population

In order to learn about region's social development, understanding gender specific growth pattern is very important. Following graph highlights comparative datasets as per Census 2011 and field survey conducted in 2023. As per census 2011 around 50.23% of male were located in the study area of total population which is almost same 51.25% of total population by the end of year 2023. Subsequently, the ratio of women has decreased (1.42%) from the year 2011 to 2023.



Source: Census of India, 2011 & field Survey year 2023

Possible reason for this gap could be gender selective birth and could be growing industries and agriculture related activities in the area, It attracts more men (agriculture labors) than women to work, therefore gender specific migration results in decrease in proportion of women in this region.

3.10.2.3 Gender and Sex Ratio

Gender and sex ratio determine the Human Development Index (HDI) of an area thereby understanding the status of women in that region.

The sex ratio in the study area is 994 females per 1000 males (as per Census 2011) while the female sex ratio is decreasing in surveyed villages (conducted in 2023). This is due to proportion of women in this region to decline since it draws more men than women to work in industries.

S. No.	Buffer Zone	Sex Ratio of Study area Female/ 1000 Male
1	Primary Zone (0-3 km)	1009.028
2	Secondary zone (3-7 km)	1012
3	Outer Zone (7-10 km)	974
4	Overall Study Area (0-10 km)	994

Source: Census of India, 2011

Despite continuing social welfare schemes and awareness programs run by the government, this variation has been referred to restricted sources of earning. Since families in these villages are mostly involved at working in informal sector (as marginal labors) men are preferred more over women. Most of these men are involved at manufacturing industries, stone industries, units, small scale businesses etc. for survival.

3.10.2.4 Child Sex Ratio

In India, Child sex ratio is defined as number of females born per 1000 males in age group 0 – 6 years in a human population. The child sex ratio in study area is 1000 female per 1000 male (as per census 2011).

According to a field survey, each home has an average of 2 to 3 children. There are equal numbers of boys and girls. Since we now understand that there is no longer gender equality, both boys and girls are able to provide for their families in the same ways. It's not like only the boy can work and support the family; both can. This supports the gender equality.

S. No.	Buffer Zone	Child Sex Ratio of Study area Female/ 1000 Male
1.	Primary Zone (0-3 km)	970
2.	Secondary zone (3-7 km)	1029
3.	Outer Zone (7-10 km)	984
4.	Overall Study Area (0-10 km)	1000

Source: Census of India, 2011

3.10.2.5 Vulnerable Groups

While developing an action plan, it is very important to identify the population who fall under the marginalized and vulnerable groups and special attention has to be given towards these groups while making action plans. Special provisions should be made for them. In the observed villages, large number of scheduled caste (S.C.) population is (18.80%) and Schedule Tribe population is (9.69%) in study area while (71.51%) of the population has been observed as others.

3.10.2.6 Literacy Rate

Literacy Rate is the percentage of people in the area with the ability to read and write. The analysis of the literacy levels is done in the study area. The 10 km radius study area demonstrates a literacy rate of 69.53 % as per census data.

The male literacy rate in the study area works out to be 82.97% whereas the female literacy rate, which is an important indicator for social change, is observed to be 59.96% in the study area as per the census data 2011. This shows that women's social growth is necessary, and they should receive more education.

The distribution of literates and literacy rates in the observed village is given in Table---

In the present study, the literacy rate is average level in the study area. Male and Female literacy rate of villages are varying place to place. Although Female literacy rate in the region is coming out low as compared to male.

Literacy Level of the Study Area

Zone	No. of Villages	Total Literacy Rate (%)	Male Literacy Rate (%)	Female Literacy Rate (%)
Primary Zone (0 - 3 Km)	6	61.86	89.29	58.37
Secondary Zone (3 - 7 Km)	19	70.05	81.93	59.67
Outer Zone (5 - 10 Km)	21	71.60	81.83	60.75
Total in the Study Area (10 Km)	46	69.53	82.97	59.96

3.10.2.7 Occupational structure

- Occupational structure of surveyed households suggests that most of people are engaged in unorganized sector.
- They either work as an agricultural labors or work at large and small scale industries/ manufacturing units.
- Rice, Pulses, Wheat, Jowar and Maize are cash-crops also involves some people in the region.
- The proposed distillery unit would aim to give most of these people employment opportunity to earn decent living.

- Presence of small projects and portable local businesses in the region, most of them also do not prefer to migrate to other parts of state or country. They either work at industries such as Food industry work, or work as agricultural labors and cultivators.
- The population is divided occupation wise into three categories, viz., main workers, marginal workers and non-workers. The main workers include cultivators, agricultural laborers, those engaged in household industry and other services. The study shows that out of the total working population, the percentage of main workers is 33.03%, while 16.68% are marginal workers. Working population is 48.38% and non-working population is 51.43% in the study area. More percentage of main workers reflects a developing economy and growth of the region.

3.10.2.8 Family size

Size of family also describes about family functioning, resource consumption, total income generated and their expenditure pattern.

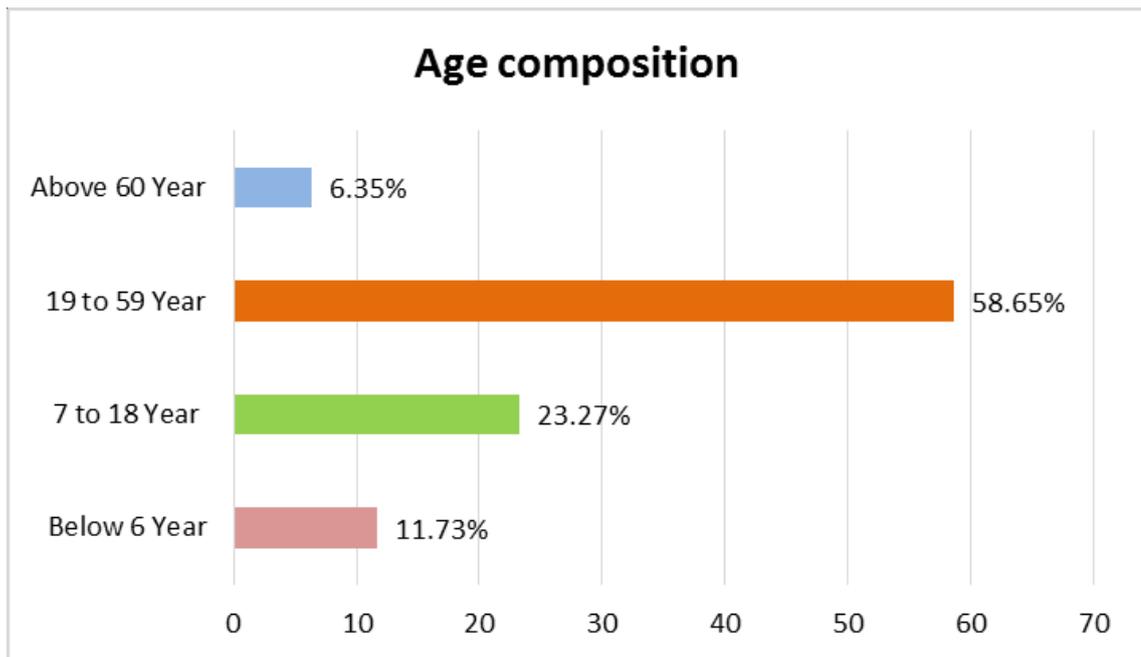
S. No	Family Size	Percent (%)
1.	Up to 4	59
2.	5 to 7	29
3.	Above 8	12

Source: Field Survey, 2022

Field survey suggests that most of these households are having family size of 5 to 7 members 29 %, while 59 % of people are up to 4 family members together. There are 12 % families cited with 8 or above family members. These ranges give fair understanding of relating how much resource consumption is being incurred, annual income being generated and spent. Surveyed information revealed that average basic annual income of a family varies from 30,000 to 5.79 lakh where major expenses are borne on food, medical expenses and shelter.

3.10.2.9 Age composition

Age composition or age distribution is proportionate number of persons in successive age categories in a given population of a region. Here, trends of fertility define what proportion of age specific population a region has. Below graph suggests categorically how distribution of population is located in surveyed villages. About 58.65 % of population comes under adult age category (i.e. 19 - 59 years) following with 23.27 % of population is under adolescent age (i.e. 7 – 18 years). Considering both, small proportion of ratio comes under below 6 years of age (11.73 %) and old age people (6.35 %) respectively. This suggest that high proportion of people are potential workers in the region if are unemployed.



Source: Field Survey, 2022

3.10.3 Infrastructure Base

A better network of physical infrastructure facilities (well-built roads, rail links, irrigation, power and telecommunication, information technology, market-network and social infrastructure support, viz. health and Education, water and sanitation, veterinary services and co-operative) is essential for the development of the rural economy.

A review of infrastructural facilities available in the area has been done based on the information from base line survey & census data of the study area. Infrastructural facilities available in the area are described in the subsequent sections.

- Administrative offices are located in Mahasamund town area approx. 15 km from project site which is commutable.
- Functioning of Primary health centre and sub centre is fair in these villages. Community health centre is located at Mahasamund, A PHC covers a population of 20,000 in hilly, tribal or difficult areas and 30,000 populations in plain areas with 4-6 indoor/observation beds. It acts as a referral unit for 6 sub-centres.
- Availability of Government pre-primary, primary, middle, secondary, senior secondary schools in all these villages are present within village.
- Various Degree college, technical, Medical College, engineering college, Management College, vocational degree colleges and institutes are present within the region.
- Water availability in the region is mostly household tap water with few depending upon public hand pump.
- LPG Gas cylinders are available in 95 % of these households against provision of 'Ujwala Yojna' scheme, however villagers are unable to fill gas due to unavailability of finances.

- Most of these households are of one to two room dwellings made of brick walls and concrete roofs. It also has functioning toilets inside them.
- Electricity is also available for most of the hours in these households.
- Government Campaign on 'Sanitary and Hygiene' and availability of running welfare social protection schemes are still less. They are restricted to Gram Sabha meeting which usually occurs on 26th January (Republic Day), 1 May (Labour Day), 15 August (Independence Day) and 2nd October (Gandhi Jayanti).
- Settlements in the study area mostly developed alongside road. These settlements are connected with thin roads (metalled roads) that eventually merge with main road and highways.
- During field survey, it was found, villager have requested Gram Panchayat take necessary actions against rebuilding of road.

3.10.4 Provision to Basic Amenities

Primary survey conducted in these villages suggests that availability of basic needs such as provision to food, clothes, shelter, employment opportunities, transport connectivity, education availability, health infrastructure, cooking fuel and natural resource availability is fairly well.

- Various irrigation programmes through CSR activities and state government initiatives in the region has helped inhabitants in shaping their livelihood needs.
- Men and women in these villages are involved at large and small industries such as food factory, stone factory, agricultural factory etc.
- The economy of the district is predominantly based on agriculture, as maximum per cent of the population resides in rural areas and their main occupation is agriculture. Kharif and Rabi are the two principal harvests grown in the district. Rice occupies the predominant place in terms of area and production and it is the most important commercial crop in the district. Wheat, Jowar, Maize and Pulses are other main crops of the district.
- In study area, Census 2011 reveals that out of total working population, ratio of non-workers is more than working population. In the study area, 48.38% people work while remaining are non-workers (51.43 %). Those who work are mainly cultivators, agricultural labours, small- and large-scale manufacturing workers who are paid however, those performing household duties, dependents, infants / children and adults who are engaged for small period of time (informal and marginal workers) constitutes higher proportion.
- Irrigation is an important factor for improved agricultural production. Tube-wells and canals are the major source of irrigation in the district. Area was irrigated through canals, government tube-wells, private tube-wells, ponds, well and by other sources.

- Surveyed information revealed that average annual income of a family is varying from 30,000 to 5.79 lakh where major expenses are borne on food, medical expenses and shelter.
- While surveying it was found, most of these houses are made up of brick walls and cemented roof tops. Villages located in outer region are built semi structured, with walls made of bricks.
- Facilities relating to sanitary & hygiene in the region is not very satisfactory it need various awareness program. Toilets in the most of these houses are built inside premises while some use community toilets.
- Many households use LPG gas as fuel for cooking with very few still dependent on wood and hay.
- Sources of water are primarily present in the form of tap water, hand pump inside houses or open wells.
- Every household on an average has 1 mobile phone for communication and 1 bicycle for transport.
- People also have motor cycle for commuting otherwise they are dependent on public transport – bus and auto.

3.10.4.1 Education

- Household survey on prevailing educational conditions in these villages' highlights that study area performs fairly well, especially at Primary and Secondary schools for both genders.
- Senior Secondary schools however have less participation of female students when compared to male.
- Most of these families have stated that major reason behind this is due to financial constraints. Families prefer their girl child to take care of household chores and look after other young siblings so that adults can work outside and earn.
- Also, because considering women a soft gender they are expected to settle down early than completing her education.
- Provision to free books, uniform and food (mid-day meal) as per Government welfare benefits for students are provided in these primary school however, ratio of teachers to student is extremely low. It becomes little stressful on the teachers run all the five classes in school at this average.
- In these sampled villages, senior secondary schools are available within villages. Thus, if one has to pursue further, he/she has not to go out from village for senior secondary education.

- During survey it was found, high proportion of dropouts occurs between secondary and senior secondary standard, that too independent of gender.
- These dropouts are mainly due to financial crunch. Village communities are not in position to cater multiple needs – food, clothing, shelter, medical needs etc.
- Facilities provided by Government in kind - such as mid-day meal arrangements are already in practice however still face severe problems of mismanagement among the organizers.
- This area needs larger attention from policy making communities in order to improve prevailing social norms and cultural stigmas related to women.

3.10.4.2 Health

- The gap that exists in basic amenities and education categories appear small when compared to health facilities available in these villages.
- Infrastructure facilities during survey in few of these villages show that government healthcare institutions are available within villages but not in good condition.
- During survey it was found, villages have primary healthcare center and sub center facility. However, for medical issues villagers have to visit community health centre located in tehsil.
- Availability of doctors, physicians and pharmacists are also few in numbers in surveyed region.
- During field visit, it was revealed that government drives for the implementation of vaccinations among children have been quite prevailing across communities and that has played effective role in giving awareness to locals.
- Regarding vaccination of children under the age of 5, 95 % of all communities in these villages were covered, while those who did not participate mainly owes to lack of awareness.
- Ambulance is available in the region during emergency however it is time taking.

3.10.4.3 Transport

- Study area is served by road and rail network mostly.
- These villages are indirectly connected with major road and rail links via thin roads that merge into national and state highway in the region.
- Railways are old to be known here and that people here take best advantage of it while travelling far.
- Rickshaw and auto service are available however is limited only to the city.

3.10.5 Other Issues

- Gender disparity – in terms of wage / remuneration, social treatment, decision making power, domestic violence etc.
- Lack of awareness towards Menstrual Hygiene in all these village.
- Poor of road condition.
- Lack of awareness among vulnerable groups for their welfare.
- Requirement of government colleges in these villages.
- Requirement of family welfare centers in the region.
- Requirement and improvement in condition of community health centers and primary health centers in the region.
- Requirement of doctors and nurses in health care centers at village level.
- Requirement of secondary and senior secondary schools at village level.

3.10.6 Interpretation

Based on the data, following inferences could be drawn:

- The literacy rate in the study area is lesser than the district literacy rate.
- As per census 2011 data, majority of population belongs to Hindu (97.61%) and Muslim religion has population of 1.22% while Christians are only 0.51%.
- The agriculture and rice farming are main sources of income. As total working population is less than 50 % of the total population of the study area.
- The study area is well connected by National Highways and village road (Tar Roads).
- The study area has good telephone/mobile connectivity with 3G / 4 G / Broadband internet facility.
- The study area is well connected by various means of transport.
- The study area (rural) has health facilities of primary level which is not in good condition.
- The study area had average educational facilities. The overall status depicts that the education is limited to primary and middle level.
- The study area is facing the problem of unemployment of youth.
- Due to the proposed project, employment opportunities will be increased in area.
- Considering the above facts, the proposed project will boost the socio-economic development activities in the area and hence will leave positive impact.

3.10.7 Recommendation and Suggestion

The village development plans are made in consultation with the community through Gram Sabha; these appear to address the needs of the community. However, it may be noted that at the implementation stage these plans often are fraught with problem of inadequate funds, lack of

proper planning, corruption, vested interests and political agendas. Hence, while ascertaining the scope for convergence with the government activities, care must be taken to ascertain realistic possibilities for implementation.

- Women empowerment– Home based income generation activities, vocational training programmes, common education centre for increase in literacy.
- Education – free uniform, construction of common rooms and library, computer education and physical education, additional schools for girls, furniture and equipment in schools.
- Transportation – Construction of roads will help in improvement of transportation network of the region.
- Vocational Trainings – Establishment of a vocational training center within the villages with a curriculum designed to suit market demands. Vocational training for disability persons.
- Agriculture/livestock – Infrastructure such as agriculture electric connections, assistance in buying improved tools and equipment, capacity building, supply and/or knowledge of better variety of seeds, pasture land development and trainings on animal husbandry & facility of veterinary doctor.
- Health – Improvement in sanitary conditions of the villages, assistance with construction of latrines, improvement in drainage system, health camps and awareness campaigns for diseases like malaria, typhoid, tuberculosis, pneumonia and covid. Repairing of PHCs and Aanganbadi centers. Free health checkup camps could help more people there.
- Persons with disability–Establishment of centre for special education, sensitization of the community towards disabled and awareness on government schemes.

3.10.9 Summary and Conclusion of Socio-Economic Study

The Socio – economic study of the area where distillery project is proposed (Mahasamund district of Chhattisgarh) gives a clear picture of how it is a favorable place in bringing development. It cites demographic patterns (viz. gender and sex ratio, male – female growth, child sex ratio, family size, age composition), present infrastructures, provision to basic amenities, educational facilities, occupational structure, health and hygiene, transport facilities, various social protection schemes running by central and state governmental schemes for welfare of locals and vulnerable groups.

Broadly it suggests that region has normalized difference in the population difference in between male (50.03 %) and female (50.20 %). Considering child sex ratio, Female births and male births are same.

Since the area has large non-working population and decent proportion of people living in nuclear families, the pressure on using resources and to generate livelihood income becomes high. As far as literacy is concerned, study area has fair literacy patterns among men and women at primary schooling however participation at secondary and senior secondary schools by girl child is comparatively lesser than boys. Also, dropout rates are higher among both genders after completing secondary schooling. Major reason behind this cause is monetary constraint. Considering health facilities in the region, study area has presence of PHCs and dispensaries. Ambulance facilities are available during emergency. Presence of water availability in the region is mainly in the form of tap water, hand pump, tube well and community wells. As far as sanitary and hygiene is concerned in study area, under Swachh Bharat Mission, toilets have been provided in each household. Almost 95% of these households are even using it however those who aren't is possibly due to unavailability of water. Women sanitary hygiene is a matter of concern here as during survey it was found; menstrual hygiene is ignored among women. Therefore, more focus is needed on giving timely awareness on sanitary hygiene and taking benefits of social protection schemes running in the region since many vulnerable groups are still unknown of most of these welfare schemes.

The infrastructure and amenities available in the area denotes the economic wellbeing of the region. The study area as a whole possesses average infrastructural facilities. The proportion of main workers is higher than the marginal workers in the study area. The proposed project would lead to direct and indirect employment opportunities. The unskilled and semi-skilled categories of labour are available from the nearby villages and towns. Further, many of the agricultural laborers are being attracted to take up the steady, round the year employment at industry site. While people are happy with opening of this project and the increase in employment opportunities, more attention and care should be taken so that the population get more exposure to modern facilities of education and development for a bright future.

Thus, this whole study of socio – economic concludes that project site is suitable for sound social economic development and with time it will only keep on positively evolving the region and its inhabitants thereby meeting end needs.

3.11 CONCLUSION

The environment baseline study was conducted in the study area during Summer season. Abiotic factors including air, water and soil were studied for the core & buffer zone. It was found that most of the parameters were within the limits as per the Indian Standards. In general, there is no major threat to the quality of the major components of environment. Similarly, the study for the biotic factors was conducted. Hence, it can be concluded that the present environment status of the study area is good enough for the proposed project. Adoption of adequate pollution control measures will protect the surrounding environment.



CHAPTER - IV

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 INTRODUCTION

The impact assessment focuses on the study area within 10 km radius around the project site. The anticipated environmental impacts of the proposed installation of distillery and co-generation power project would be due to constructional & operational activities. The impact of proposed project activity may be primary or secondary depending on its direct or indirect impact on environmental variables. Further project activities may influence the environment in construction and operation phase, which will have different extent of impact on environment. Activities during construction phase may have short term environmental impact but operational phase of distillery will pose long term environmental impacts. On the other hand, installation of distillery project will create new opportunities for the development of the local community. Operations in distillery can disturb the environment in various ways, such as change in air, noise level, water & soil quality of that area. While for the purpose of development and economic upliftment of people, there is need for establishment of industries, but these have to be environment friendly. Therefore, it is essential to assess the impacts of proposed project on different environmental parameters, so that abatement measures could be planned in advance for eco-friendly operation in the area. Chapter 3 provides the information on the baseline environmental conditions at the proposed project site for various parameters, while Chapter 4 provides the various pollution loads and stressors that could impact the environment and their mitigation measures which will be implemented by the company.

4.2 POTENTIAL IMPACTS OF PROPOSED PROJECT

Impacts of any project activity have been divided according to the temporal scale into 'Impacts during Construction Phase' and 'Impacts during Operation Phase'.

The environmental impacts of the project will be caused due to activities to be carried out during construction and operation phase. Construction activities spread over pre-construction, installation and commissioning stages, which ends with the induction of manpower and start-up. During the operation phase, impacts would be mostly permanent and irreversible in nature.

4.3 EVALUATION OF IMPACTS

The impact of the proposed project would be assessed on the basis of their characteristics i.e. nature, type, extent, duration, intensity & frequency and its significance.

Characteristics of Impacts

The impact is described in terms of its characteristics such as nature, type etc. Impact characteristics are given in Table below.

Table - 4.1
Impact Characteristics

Characteristic	Classification	Description
Nature	Positive impact	When impact is considered to represent improvement to baseline or introduce a new positive factor/change.
	Negative impact	When impact is considered to represent adverse change from the baseline or introduce a new undesirable factor/change.
	Neutral	When there is no impact to represent any change from the baseline and not introducing any new factor/change.
Type	Direct impact	Resulting from a direct interaction between a project activity and the receiving environment / receptors.
	Indirect impact	Resulting from other activities that happened as a consequence of the project.
	Cumulative impact	Impacts that act together with other impacts (including those from concurrent or planned future third-party activities) to affect the same resources and/or receptors as the Project.
Extent	Project Area	When impact due to the project related activities is restricted within the premises of project area i.e. core zone.
	Local	When impact due to the project related activities is restricted within the immediate surroundings i.e. up to 3 km radius.
	Zonal	When impact due to the project related activities is restricted within the study area i.e. up to 10 km radius.
	Regional	When an impact due to the project activity extends within as well as beyond 10 km radius.
Duration	Short - term	When the impact is usually temporary or last for a short time or will have an effect soon rather than in the distant future.
	Long- term	When impact would occur during the development of the project and either takes a long time or lasts a long time or cause a permanent change in the affected receptor/resource.
Intensity	Low	When resulting in slight changes of prevailing baseline conditions and quality of existing physical environment is good. Ecological environment as well as human receptors are not likely to be affected due to the project activity.
	Medium	When resulting in changes of prevailing baseline conditions which are within the benchmark norms and quality of existing physical environment shows some signs of stress. Ecological environment as well as human receptors could be sensitive to change in quality of prevailing baseline condition, but human receptors retain an ability to adapt to change.
	High	When resulting in changes of prevailing baseline conditions which are exceeding the benchmark norms and quality of existing physical environment is already under stress. Ecological environment as well as human receptors would be impacted to the larger extent and the ability of human receptors to adapt to changes would be undermined.
Frequency	Remote (R)	When resulting in remote or one off chance of an event due to an activity on a receptor/ resource.
	Occasional (O)	When an impact due to an activity is occurring intermittently from time to time on a receptor/resource.
	Periodic (P)	When an impact due to an activity is resulting on periodic basis for a week or a month on a resource/receptor.
	Continuous (C)	When an impact due to an activity is continuously resulting on a resource/receptor.

Significance of Impacts

Impacts are described in terms of ‘significance’. Significance is a function of the magnitude & sensitivity / importance of the impact.

Classification of impact significance is given in Table below.

Table - 4.2
Significance of Impact

Significance	Description
Insignificant	Negligible impact or where a resource or receptor (including people) will not be affected in any way by a particular activity, or the predicted effect is deemed to be ‘negligible’ or ‘imperceptible’ or is indistinguishable from natural background variations.
Minor	Where an effect will be experienced, but the impact is well within accepted standards/guidelines with or without mitigation.
Moderate	Where an effect will be experienced and the impact is within accepted standards/guidelines with mitigation.
Major	Impact where an accepted limit or standard may be exceeded or the impact occurs to the highly valued/sensitive resource/receptors.

Irreversible and Irretrievable commitments of environmental components

Determining the irreversible and irretrievable commitment of the resources is one of the major stages of impact evaluation, which gives an understanding about the potential impacts that are likely to affect future generations of the area and facilitates for adoption of proper mitigation measure regarding the same.

Table - 4.3
Irreversible and Irretrievable commitments of environmental components

Commitment of resources	Description
Irreversible	Irreversible commitment of resources refers to the impact or loss of the resources that cannot be recovered or reversed. Irreversible is a term that describes the loss of future options. It applies primarily to the impacts of use of non-renewable resources or to those factors that are renewable only over long periods of time.
Irretrievable	Irretrievable is a term that applies to the loss of production, harvest, or use of natural resources. Irretrievable commitment of resources may be considered as the loss of resources as a result of change (both reversible & irreversible) due to any project activity that cannot be regained or recovered.

4.3.1 Interaction Matrix

The interaction matrix enables a methodical identification of the potential interactions each project activity may have on the range of resources/receptors within the Area of Influence for the Project. The interaction matrix for the project activities and likely impacted resources/receptors is presented in Table - 4.5 which covers potential interactions, regardless of probability of occurrence. The matrix consists of a list of resources/ receptors that could be affected against a list of project activities.

Entries in the matrix cells are tick marked to indicate whether:

An interaction is not reasonably expected (blank); The interaction is reasonably possible and may lead to potential impact (tick marked).

Table: 4.4
Likely Impacted Resources / Receptors

S. No.	Likely Impacted Resources / Receptors	
A.	Physical	Air
		Odour
		Noise
		Land Use
		Topography
		Geology
		Ground Water
		Soil
		Traffic load
B.	Biological environment	Flora
		Fauna
C.	Socio economic environment	Habitation & Demography
		Land use (w.r.t. population influx)
		Economy & Livelihood
		Social & Cultural Structure
		Infrastructure & Public Services
		Public Health
		Agriculture
		Transport Infrastructure
D.	Occupation Health & Safety	Injury
		Health
		Non-Routine Risk

Source: Interaction Matrix

According to the interactions identified between project activities and resource/receptors as described in the above table, it is evident that the following aspects are likely to have impact due to the distillery project and therefore, to be considered for Impact Assessment:

Table: 4.5
Impact Matrix without mitigation measures

S. No.	Project activity Likely Impacted Resources/ Receptors	Construction phase							Operation phase							Miscellaneous phase		
		Civil works and building of temporary structures	Transportation of equipment /machinery	Heavy equipment operations	Installation of distillation equipment	Disposal of construction wastes	Influx of construction	Generation of domestic sewage	Transportation of raw material and products	Fermentation process & Boiler operations	Operation of cooling systems	Storage of raw materials and products	Effluent treatment plant operations	Solid waste generation	Meeting points of workers for rest, shelter, canteen, workshops.	Plant operations	Socio-economic developmental activities	
A.	Physical																	
1.	Air	√	√	√	√	√		√	√	√	√	√		√				
2.	Odor					√		√	√				√	√				
3.	Noise	√	√	√	√			√		√	√				√			
4.	Land Use				√								√	√		√	√	
5.	Topography																	
6.	Geology												√					
7.	Drainage pattern																	
8.	Surface Water					√							√	√				
9.	Ground Water	√				√	√	√		√	√		√	√				
10.	Soil	√				√		√		√	√		√		√			

S. No.	Project activity	Construction phase							Operation phase							Miscellaneous phase		
		Likely Impacted Resources/ Receptors	Civil works and building of temporary structures	Transportation of equipment /machinery	Heavy equipment operations	Installation of distillation equipment	Disposal of construction wastes	Influx of construction	Generation of domestic sewage	Transportation of raw material and products	Fermentation process & Boiler operations	Operation of cooling systems	Storage of raw materials and products	Effluent treatment plant operations	Solid waste generation	Meeting points of workers for rest, shelter, canteen, workshops.	Plant operations	Socio-economic developmental activities
11	Traffic load		√						√									
B.	Biological																	
1.	Flora					√						√		√				
2.	Fauna					√				√		√		√				
3.	NP/WLS/BR/reserves/For ests etc.																	
C.	Social / Socio-Economic																	
1.	Demography						√											
2.	Physical Displacement																	
3.	Land Use (w.r.t. Population influx)						√								√			
4.	Habitation																	
5.	Economy & Livelihood						√										√	

S. No.	Project activity	Construction phase						Operation phase						Miscellaneous phase				
		Likely Resources/	Impacted Receptors	Civil works and building of temporary structures	Transportation of equipment /machinery	Heavy equipment operations	Installation of distillation equipment	Disposal of construction wastes	Influx of construction	Generation of domestic sewage	Transportation of raw material and products	Fermentation process & Boiler operations	Operation of cooling systems	Storage of raw materials and products	Effluent treatment plant operations	Solid waste generation	Meeting points of workers for rest, shelter, canteen, workshops.	Plant operations
6.	Social & Cultural Structure						√											√
7.	Infrastructure and public services		√													√		√
8.	Public Health			√		√		√					√		√	√		√
9.	Agriculture																	√
10.	Transport infrastructure								√				√					√
D.	Occupational Health																	
1.	Injury		√	√	√		√		√		√						√	
2.	Health					√	√			√	√		√		√		√	
3.	Non-routine risk		√	√	√		√		√	√	√		√				√	

The impacts of distillery on various environmental parameters were assessed and are given below:

4.4 ANTICIPATED IMPACTS DURING CONSTRUCTION PHASE & PROPOSED MITIGATION MEASURES

During construction phase, the activities related to land de-weeding, leveling of site and construction of building structures and installation of machineries and equipment will lead to emission of particulate matter emissions. Construction activities will temporarily alter the environment of the nearby areas due to movement of heavy machineries and vehicles.

4.4.1 Impact on topography and land use & mitigation measures

Topography of the land is almost flat. Existing land use i.e. Agricultural land will be changed into industrial for installation of proposed project. 33% of the project area will be developed under greenbelt / plantation after implementation of proposed project. There will be change in topography of the site is envisaged due to proposed plant erection.

Mitigation measures

- Excavated soil in the open area will be stored properly to avoid the spread of wind-blown dust and shall be reused for backfilling and landscape development.
- Proper disposal of construction debris will be maintained so that top soil is not contaminated at the construction place.
- The sewage of domestic routine will be treated properly and garbage if any shall be utilized to make a compost to avoid the impact of these pollutants on the land.

4.4.2 Impact on air quality & mitigation measures

The main sources of dust emissions during the construction phase are the movement of equipment at site leveling, grading, earthwork and foundation works. Exhaust emissions from vehicles and equipment to be deployed during the construction phase is also likely to result in marginal increase in the levels of particulate matter, SO₂, NO_x and CO. The impact will be for short duration. This will be confined within the plant boundary and is expected to be negligible outside the plant boundary. The impact will, however, be reversible, marginal and temporary in nature and mitigation measures will be taken as below.

Mitigation measures

- Construction equipment having PUC Certificate will be deployed during the activity to restrict exhaust emission.
- Proper maintenance of vehicles and construction equipment will help in controlling the gaseous emissions.
- Water sprinkling on roads and construction site will prevent fugitive dust.
- Proper coverage with tarpaulin of all construction material.
- A separate storage area will be demarcated for construction material to confine the dust dispersion.
- Temporary barricading structures shall be provided to reduce carryover of particulates away from the construction area.

- Ideal running of machinery and vehicles will be avoided.
- Proper PPEs will be provided to workers to avoid accumulation of dust in respiratory tracts and prevent air borne diseases.

4.4.3 Impact on noise environment & mitigation measures

During construction phase, noise will be generated due to following activities/ processes:

- Movement/ operation of transport and construction vehicles/ equipment.
- Transportation of equipment, materials, and people.
- Other important activities involved in construction stage such as excavation, earthmoving, compaction, concrete mixing, crane operation, steel erection, mechanical/electrical installation. Long term exposure to workers and nearby villagers can cause nasal irritation, disturbance etc.

The noise generated will be high due to construction activities, high noise levels can cause irritation and gradual hearing loss to construction laborer's if high levels of noise are continuously present. Sudden exposure can cause irritation in ear drums and sudden loss in hearing whereas long term exposure will result in gradual ENT problems. Though the noise generation during construction phase will be temporary and will be limited to the project site but workers who are directly exposed to it can have problems related to it.

Expected noise levels during construction phase:

Earth movers	
Front end loaders	86-94 dB(A)
Heavy duty bulldozer	97-107 dB(A)
Tractors	84 dB(A)
Scrapers, Graders	85 dB(A)
Pavers	85 dB(A)
Pickup Trucks	55 dB(A)
Roller	85 dB(A)
Material Handlers:	
Concrete Mixer Truck	79-85 dB(A)
Concrete Pump Truck	82 dB(A)
Tower Crane	70-76 dB(A)
Impact Pile Driver	95-101 dB(A)
Drum Mixer	80 dB(A)
Dump Truck	76- 84 dB(A)
Stationary Equipment:	
Pumps	77-81 dB(A)
Generators	70 – 82 dB(A)
Other Construction Equipment:	
Welder/Torch	73 dB(A)

Source: CPWR – Center for Construction Research and Training- OSHA's Approach to Noise Exposure in Construction and https://www.fhwa.dot.gov/Environment/noise/construction_noise/handbook/handbook09.cfm

Mitigation measures

- The vehicles used for movement will be taken for preventive maintenance to reduce noise generation.
- The construction labors will be provided with adequate personal protective equipment.
- Continuous exposure of workers will be avoided by alternating the duties on daily basis.

4.4.4 Impact on water quality & mitigation measures

The water requirement during the construction phase would be approximately 20 KLD which will be easily sourced from ground water. Water requirement has been cited mainly for preparation & mixing of concrete, cooling of construction equipment, usage in spray and sprinklers for dust suppression etc. Water will be stored in RCC tank / overhead and used in civil construction, canteen, besides domestic use by construction workers. Water is a resource and its depletion can certainly affect the concerned areas. Moreover, construction debris and domestic waste, if discharged in water bodies nearby can affect the aquatic flora and fauna to a great extent. If waste water generated during construction activities is discharged on ground, then it can reach the ground water table by leaching and affect the soil quality as well as ground water quality will also be compromised.

Mitigation measures

- Domestic waste water will be disposed off in soak pit via septic tank.
- Storm water drains will be properly aligned in conformity with the site drainage pattern so that the alteration is kept to the minimum and flooding or soil erosion does not occur. The storm water drains will be diverted to a water reservoir to collect the runoff. This stored water will be utilized for civil construction purpose.
- Construction workers will be brought from nearby villages so that domestic water is saved in many ways due to temporary requirements only.
- No disposal of solid waste/construction debris of any kind will be done inside or outside plant premises in any water body.
- No discharge of waste water generated during construction activity will be done on soil or land area.

Thus, there will not be any discharge from the site which can have any impact on the water quality and no effluent will be discharged.

4.4.5 Impact on soil & mitigation measures

During construction activity, the impact on soil will be limited to the construction site only. Impact on soil during construction would be mainly due to the left-out construction material. If construction material will be disposed off on land, then it can modify the soil quality to various extent and top soil will get affected which will result in loss of fertility. There will be deteriorating soil quality and decrease in vegetation abundance. It will result in pH, alkalinity, heavy metal content modifications and can affect the vegetation growth of that area.

Mitigation measures

- Construction wastes will be segregated as much as possible at site itself to increase the feasibility of recycling concrete and masonry as filling material and steel pieces as saleable scrap.
- Litter disposal and collection points will be established around the work sites.
- Empty packaging materials, drums, glass, tin, paper, plastic, pet bottles, wood, thermocol and other packaging materials, etc. will be disposed through recyclers.
- No dumping on open grounds will be accepted and strict instructions will be given to workers for not disposing any solid or liquid wastes.

4.4.6 Impact on socio-economic environment

The social impact during the construction stage will be of beneficial nature. More than 400 people will get employment during the construction and operational stages on daily average basis. Proposed project will result in growth of the surrounding areas by increased direct and indirect employment opportunities in the region including ancillary development and supporting infrastructure. In addition to the opportunity of getting employment in construction work, the local population would also have employment opportunities in related activities like petty commercial establishments, small contracts and supply of construction materials etc. Local people will be given preference for employment on the basis of their skill and experience. Further, the project will also lead to the development of market, trade centers, activities etc.

4.5 ANTICIPATED IMPACTS DURING OPERATION PHASE AND PROPOSED MITIGATION MEASURES

The process involved in the proposed project has varying impacts on the different components of the environment. All these impacts will be considered for impact assessment and accordingly the mitigation measures will be adopted. The design basis for all process units will lay special emphasis on measures to minimize the impact at source itself.

4.5.1 Impact on land topography and suggested mitigation measures

The total project area is 9.0 ha (22.24 acres) & complete land is under possession of company. The company will apply for land conversion to industrial use. Land of 2.97 ha is proposed to be covered under greenbelt and plantation. Besides, no adverse impact on the surrounding land is anticipated. It will be ensured that there would be no effluent discharge from the plant during operation and management will adopt best practice measures for 100% recycling the effluent after treatment in process.

4.5.2 Impact on air quality and suggested mitigation measures

During operation phase, air emissions both gaseous and fugitive will be on account of process emissions from stack of boiler unit, fermentation process, D.G. Sets as well as transportation of men and material. The industrial gases like Sulphur oxides and nitrogen oxides if released into the atmosphere result into formation of acids like sulphuric acid and nitric acids and when rainfall occurs, they affect the environment in devastating ways. These gases remain in the atmosphere during winters and form a part of smog that damages the respiratory tract of individuals inhaling in the ambient environment. The gases tend to remain at ground level due to cold winds which are higher in density and form a layer which can harm human respiratory system in various ways. Asthma, bronchitis is severe diseases that can be caused from long term exposure.

Impact evaluation for ambient air quality without mitigation measures

Impact evaluation element	Incremental concentrations of pollutants due to more fuel usage and increased fugitive emissions due to transportation, storage activities			
Potential effect/ concern	Impact on health of humans and nearby biological/ecological receptors due to line and point sources of air emissions including fugitive dust emissions.			
Characteristics of Impacts				
Nature	Positive		Negative	Neutral
			√	
Type	Direct	Indirect	Cumulative	
	√		√	
Extent	Project Area	Local	Zonal	Regional
		√		
Duration	Short - term		Long- term	
			√	
Intensity	Low		Medium	High
			√	
Frequency	Remote (R)	Occasional (O)	Periodic (P)	Continuous (C)
				√
Significance of Impact				
Significance	Insignificant	Minor	Moderate	Major
				√

A) Stack Emissions

- ESP with adequate stack height (60 m) will be installed with the proposed 60 TPH boiler.
- CO₂ generated during the fermentation process will be collected and sold to authorized vendors.
- DG Sets (1 x 1500 KVA) will be provided with adequate stack height as per CPCB Guidelines.
- Greenbelt development around the periphery & within the premises of the plant will help in attenuating the pollutants emitted and maintaining air quality.
- Online Continuous Emission Monitoring System will be installed with the proposed stack and data will be transmitted to CPCB/SPCB servers.
- Regular monitoring will be done to ensure ambient air quality standards

- In order to carry out efficient dispersion of gaseous pollutants, desired velocity of emission shall be ensured through proper functioning of FD/ID fans.
- Necessary temperature profile will be maintained to decrease nitrogenous emissions.
- Optimum air-fuel ratio (AFR) in the co-generation power plant will be ensured throughout the operation period to reduce the emissions of carbon in the atmosphere.
- Sampling port & monitoring point and online continuous emission monitoring system (OCEMS) will be provided at prescribed stack height.

B) Fugitive emissions

- **Transportation:** Movement of heavy trucks/vehicles on the roads generates substantial quantity of dust. This is due to the presence of dust over the road, which is carried away by the wind.
- **Fuel handling-**The handling of biomass/low sulphur coal generates dust that disperses in the ambient environment and sustains for long hours.
- **Fly ash handling-** The respirable pollutants released from ash handling can affect the normal respiratory behaviors and harm the nearby flora by blocking the stomata pores. Ash remains in environment for long hours, as such inhalation by humans can cause accumulation inside respiratory systems and can cause inhalation problems. The flora present in the area will get affected by long term deposition on leaves surfaces and can cause blockage of stomatal pores. Wilting of leaves of plants primarily exposed to ash can be seen. Deposition of ash on soil surface can reach to ground water and can cause contamination beyond acceptable extents. The dispersion of ash can also cause accumulation in treated waste water and can cause contamination of treated waste water. Bagasse and grain dust is said to cause grain diseases and respiratory problems in humans.

Mitigation measures

- All internal roads shall be asphalted to control fugitive emissions.
- Vehicles and machineries will be regularly maintained. Proper upkeep and maintenance of vehicles will be done.
- Adequate greenbelt will be developed in the plant area. Greenbelt acts as a surface for settling of dust particles and thus reduces the concentration of particulate matter in air.
- Regular water sprinkling on roads will be carried out to suppress any dust dispersion.
- Engines of idle vehicle machineries/equipment shall be turned off.
- Use of low-emission vehicles and wherever feasible, construction equipment powered by electricity shall be preferred.
- All transportation vehicles shall carry a valid PUC (Pollution under Control) Certificate.
- Proper servicing & maintenance of vehicles will be carried out.
- Pneumatic conveyors are suggested to be used for stacking of husk to avoid manual stacking.

- The overall quality of the ambient air will be maintained within the limit prescribed by CPCB/SPCB after the commencement of the operations of proposed project.

C) Odor problems and mitigation measures

Odor is a problem in the distillery plant due to typical odor compounds like alcohol, iso-amyl & iso-butyl alcohol (fusel oils). The odour problems are the prime cause of irritation to people working in plant site. Foul odour might not cause direct damage to health but toxic stimulants of odour may cause ill health or respiratory symptoms leading to side effects like nausea, insomnia and discomfort. Strong & continuous odour can result in irritation in nasal pathway, enhance symptoms of breathing problems or asthma.

Thus, the cited mitigation measures for odor control are as follows:

- Adequate greenbelt all around the periphery of the plant will be developed.
- Efficient CO₂ collection to avoid carryover of alcohol vapours & other fumes
- Regular steaming of all fermentation equipment.
- Longer storages of any product/by-products will be avoided & use of efficient biocides to control bacterial contamination.
- Regular use of disinfectants in the storm water drains to avoid generation of micro-organisms.
- Uses of leak proof technology within all pumps and pipelines.
- Proper maintenance of ETP/CPU and periodic audits to inspect cleanliness.
- Proper replacement of micro-organisms and no storage of waste water for long intervals.

4.5.2.1 Air quality impact prediction through mathematical modelling

The present study assesses the impact on air environment due to the proposed Grain based distillery along with Co-generation power plant.

The present study assesses the impact on air environment due to the proposed project. This section gives the peak incremental ground level concentrations of PM₁₀, PM_{2.5}, SO₂ & NO_x up to a distance of 10 km radius from the plant site. The concentrations have been predicted in all directions covering all types of weather conditions. Spatial distributions of all the pollutants are also presented in the form of isopleths. Prediction of impacts on air quality has been carried out employing mathematical model based on a steady state Gaussian plume dispersion model designed for multiple point sources for short term. In the present case, AERMET View 10.2.1 and AERMOD View 10.2.1 based on steady state Gaussian plume dispersion, designed for multiple sources and developed by United States Environmental Protection Agency [USEPA] has been used for simulations from Industrial sources.

The options used for short-term computations in AERMOD are:

- The plume rise is estimated by Briggs formulae, but the final rise is always limited to that of the mixing layer;

- Stack tip down-wash is not considered;
- Buoyancy Induced Dispersion is used to describe the increase in plume dispersion during the ascension phase;
- Calms processing routine is used by default;
- Wind profile exponents is used by default, 'Irwin';
- Flat terrain is used for computations;
- It is assumed that the pollutants do not undergo any physio-chemical transformation and that there is no pollutant removal by dry deposition;
- Washout by rain is not considered;
- Cartesian co-ordinate system has been used for computations

4.5.2.1.1 Model input data

a) Meteorological data

Meteorological inputs required are temperature, relative humidity, wind speed & wind direction etc. which was recorded at site during Summer Season (March to May, 2023). Hourly meteorological data has been enclosed as **Annexure 3** with this EIA / EMP Report.

b) Stack emissions

The emission details are given in table below

Table - 4.6
Proposed stack emission details

Stack attached to.	Fuel Type	Height from ground level (m)	Internal Diameter (Top) (m)	Emission Rate (g/sec)			Exit Velocity (m/sec)	Exhaust Gas	
				PM ₁₀	SO ₂	NO ₂		Temp (°C)	Volumetric Flow (Nm ³ /sec)
Proposed 60 TPH Boiler	Biomass/ Rice Husk or Low Sulphur coal	60 m	2.5	1.0	3.4	3.4	10	150	33.685

4.5.2.1.2 Presentation of results

In the present case, model simulations have been carried using the hourly Triple Joint Frequency data. Short-term simulations were carried to estimate concentrations at the receptors to obtain an optimum description of variations in concentrations over the site in 10 km radius covering 16 directions.

The incremental concentrations are estimated for the monitoring period. For each time scale, i.e. for 24 hour the model computes the highest concentrations observed during the period over all the measurement points.

Existing value has been covered in the background ambient air quality monitoring.

Table - 4.7
Peak incremental concentration for different scenarios

Scenarios	Incremental concentration of pollutants ($\mu\text{g}/\text{m}^3$)		
	PM ₁₀	SO ₂	NO ₂
Maximum Background Concentrations (24 Hrs.)	59.2	10.1	19.6
Predicted Max. GLC (24 Hrs.)	0.52	0.72	0.82
Total Concentration	59.72	10.82	20.42
NAAQS - Industrial Limits	100	80	80

Thus, prediction of maximum incremental GLCs has been done for the project.

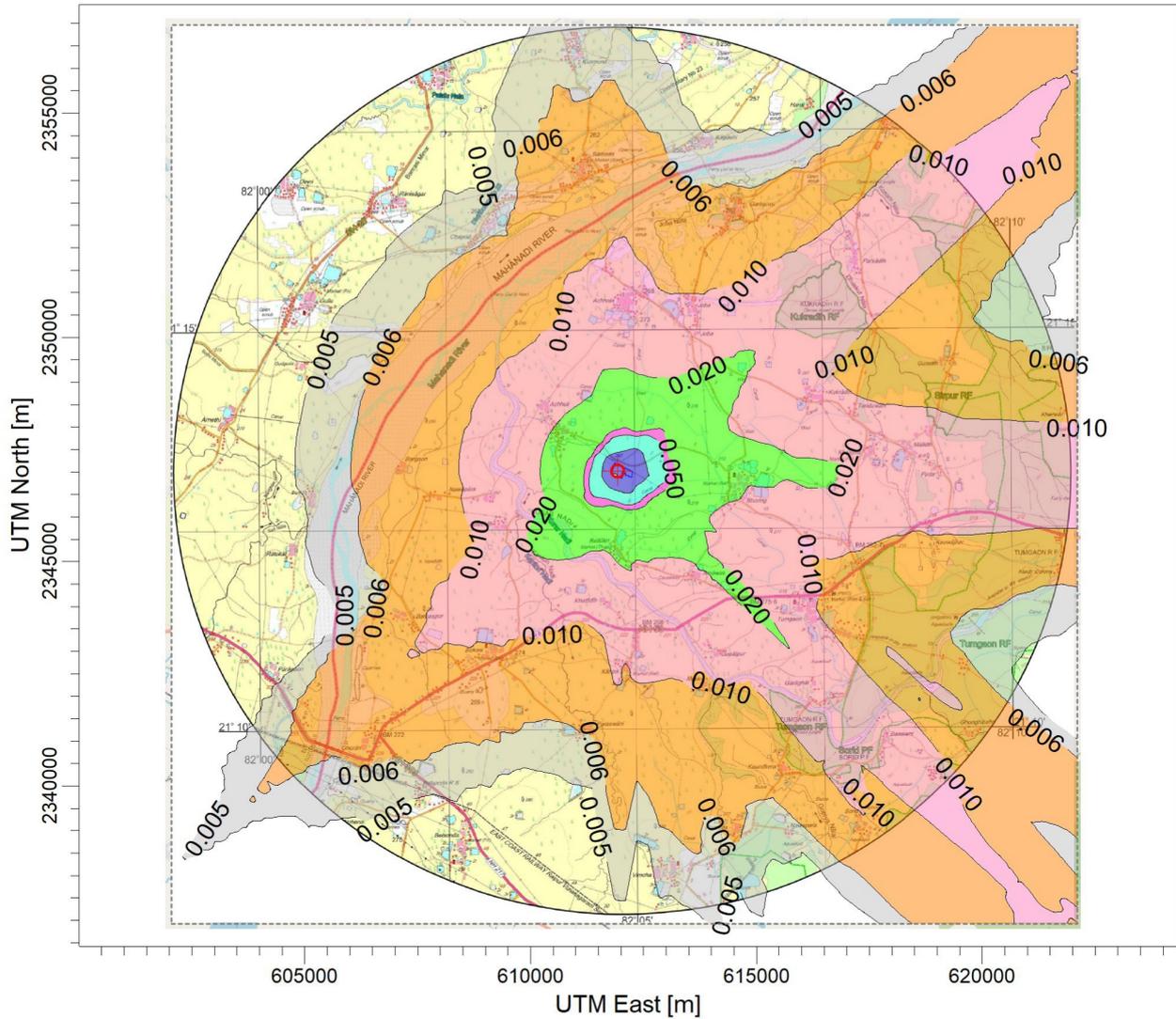
The maximum incremental GLCs due to the project for particulate matter PM_{2.5} and PM₁₀ are 0.206 $\mu\text{g}/\text{m}^3$ and 0.516 $\mu\text{g}/\text{m}^3$; for SO₂ & NO₂ is 0.72 $\mu\text{g}/\text{m}^3$ & 0.82 $\mu\text{g}/\text{m}^3$ respectively.

Conclusion: -

Pollution mitigation and management plan should be followed to curtail the impact of gaseous and dust emissions in the study area. The maximum predicted incremental GLCs after implementation of the project for PM₁₀, PM_{2.5}, SO₂ and NO_x are superimposed on the maximum monitored baseline concentrations recorded at the plant site are likely to be found within the prescribed NAAQ standards. There will be no significant threat to the gaseous pollutants of the ambient air quality; however, concentration of particulate matter is a subject of concern - though not immediate. Proper mitigation plan for dust control will be implemented in the plant premises. In advent of any failure of APCE, plant will automatically get tripped / shut down; therefore, will not have any impact on the surrounding environment.

PROJECT TITLE:

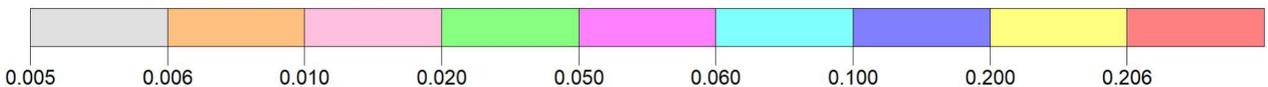
D:\AQ\



PLOT FILE OF HIGH 10TH HIGH 24-HR VALUES FOR SOURCE GROUP: ALL

ug/m³

Max: 0.206 [ug/m³] at (611854.81, 2346922.57)



COMMENTS:

PM 2.5- 0.21 ug/m³

SOURCES:

1

COMPANY NAME:

M/s. Piccadily Agro Industries Ltd

RECEPTORS:

6561

MODELER:

JMEPL

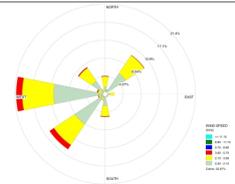
OUTPUT TYPE:

Concentration

SCALE:

1:152,729

0 5 km



MAX:

0.206 ug/m³

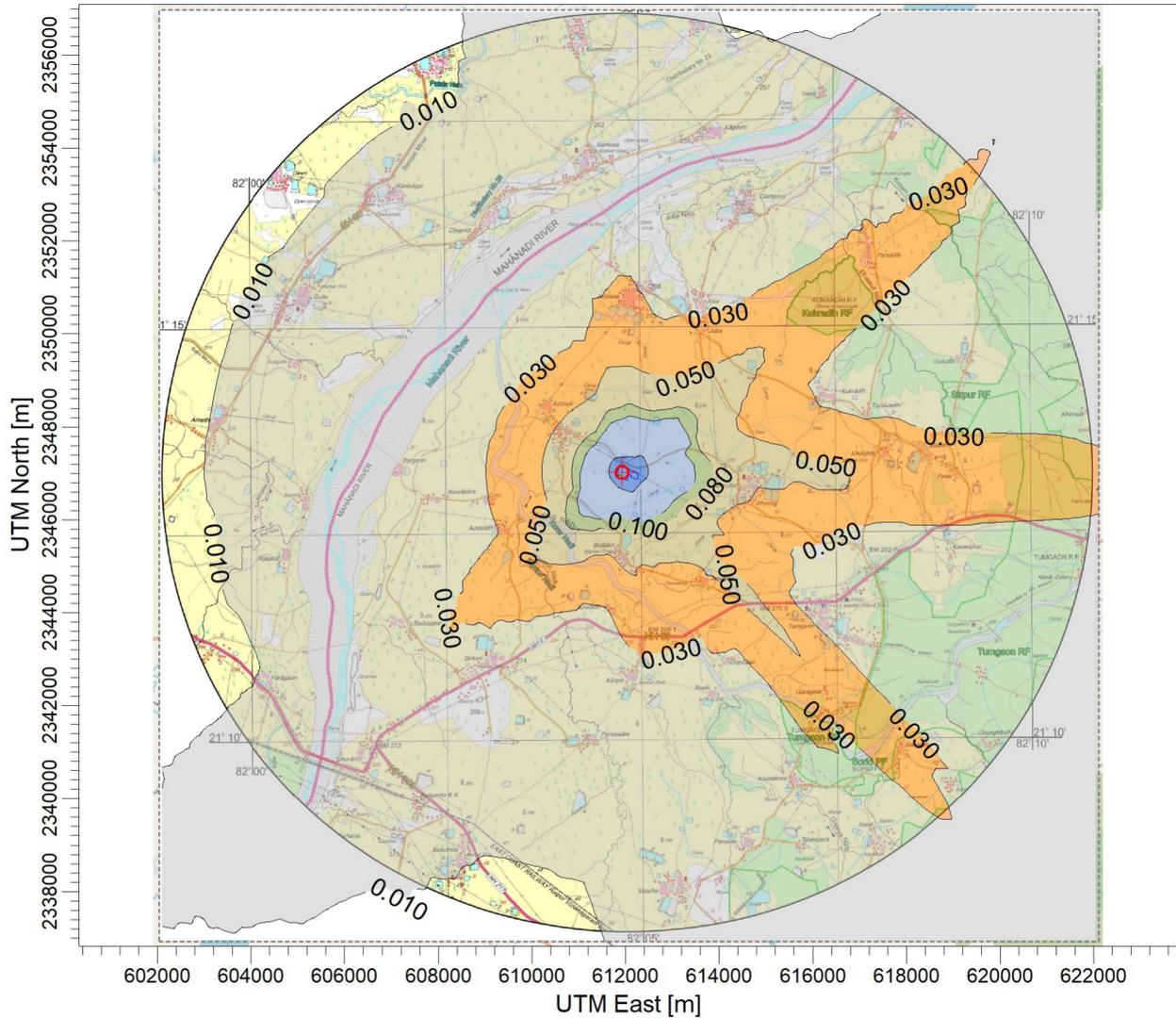
PROJECT NO.:

21

Figure 4.1: Isopleth Showing Maximum Predicted GLC of PM_{2.5}

PROJECT TITLE:

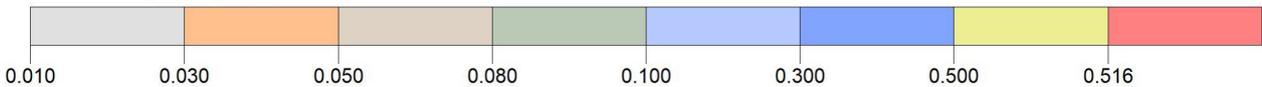
D:\AQ



PLOT FILE OF HIGH 10TH HIGH 24-HR VALUES FOR SOURCE GROUP: ALL

ug/m³

Max: 0.516 [ug/m³] at (611854.81, 2346922.57)



COMMENTS:

PM10 - 0.515 ug/m³

SOURCES:

1

COMPANY NAME:

M/s. Piccadily Agro Industries Ltd

RECEPTORS:

6561

MODELER:

JMEPL

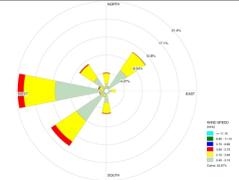
OUTPUT TYPE:

Concentration

SCALE:

1:147,440

0 5 km



MAX:

0.516 ug/m³

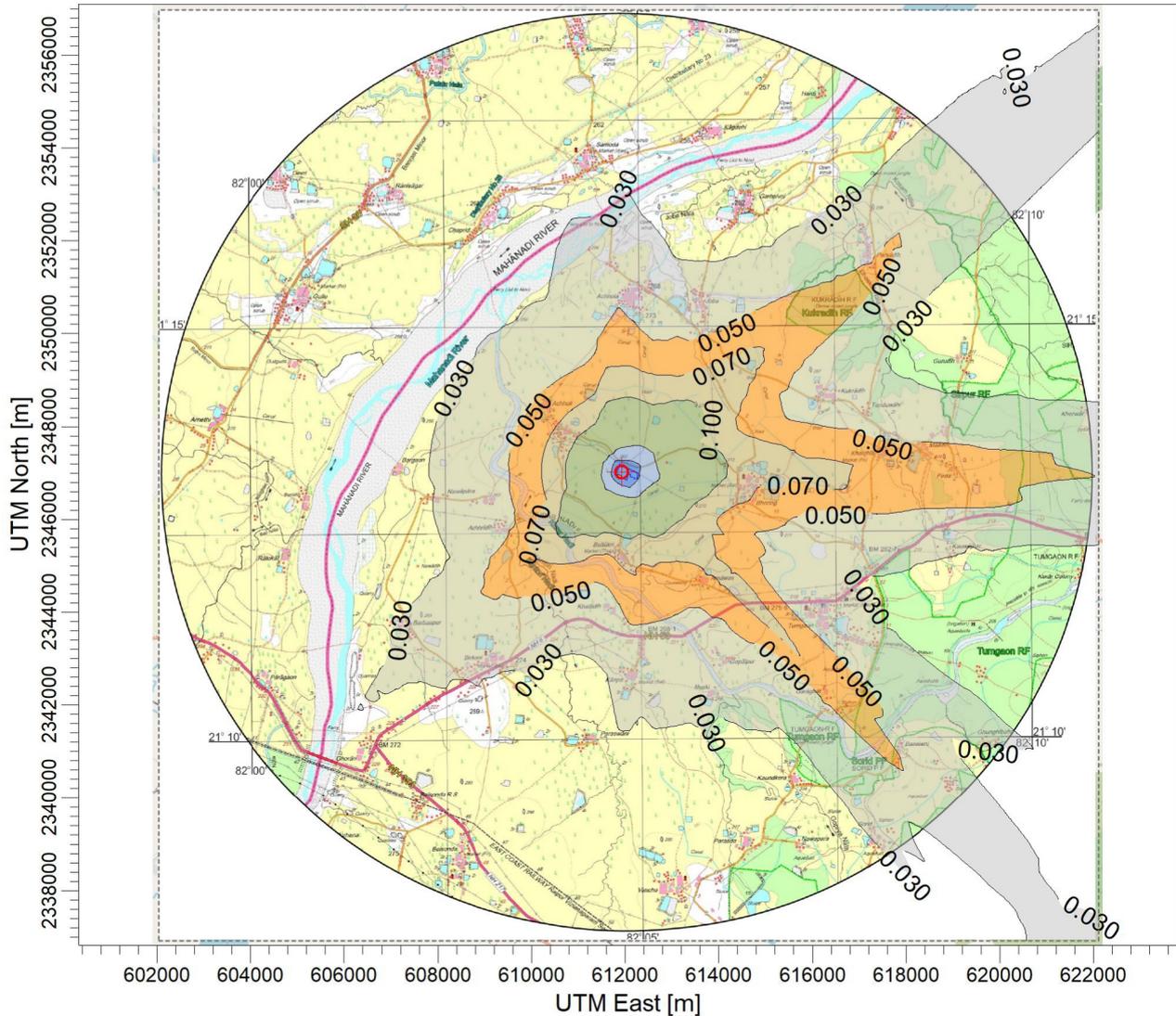
PROJECT NO.:

21

Figure 4.2: Isopleth Showing Maximum Predicted GLC of PM₁₀

PROJECT TITLE:

D:\IAQ\



PLOT FILE OF HIGH 10TH HIGH 24-HR VALUES FOR SOURCE GROUP: ALL

ug/m³

Max: 0.722 [ug/m³] at (611854.81, 2346922.57)

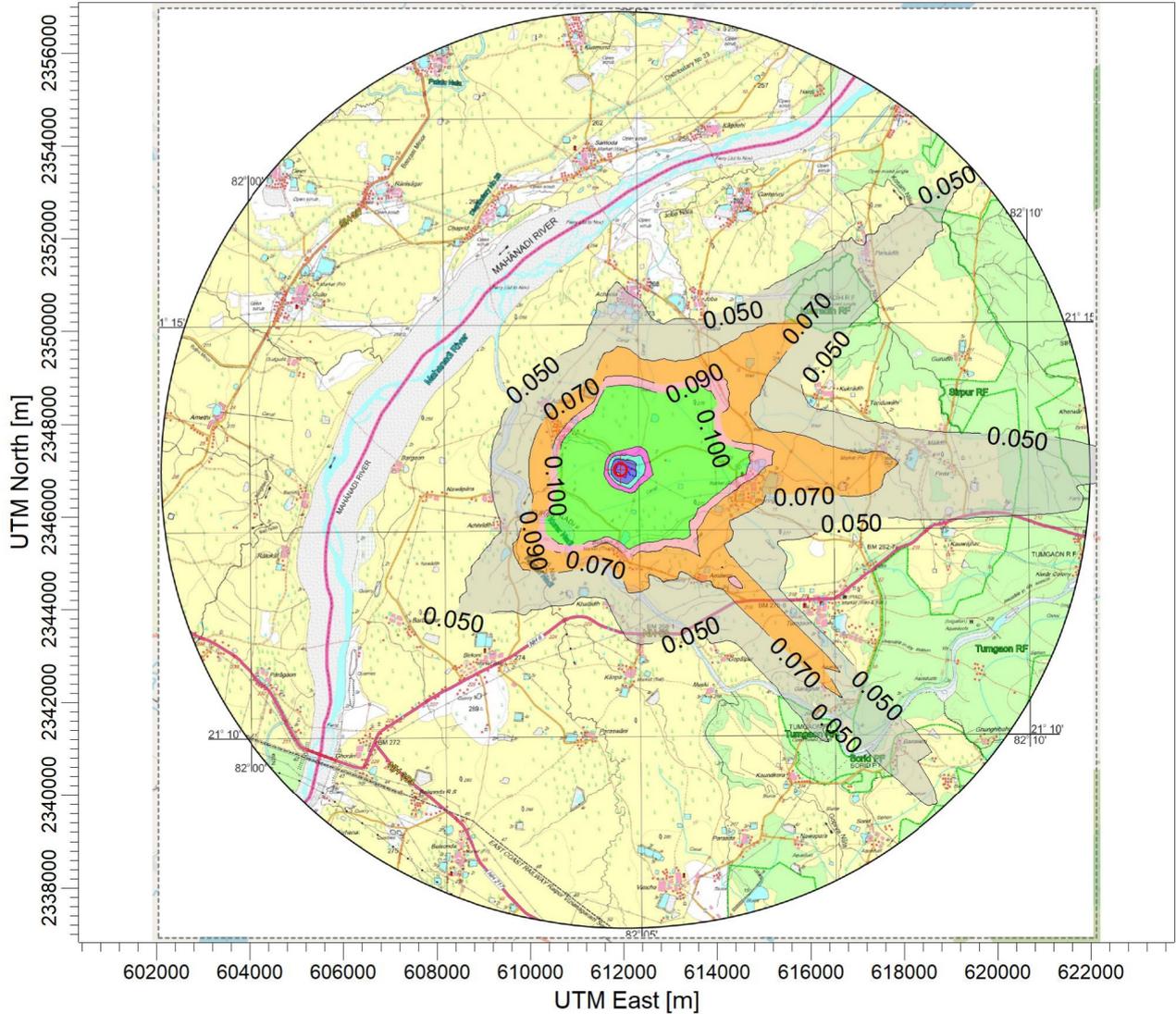


COMMENTS: So2 - 0.72 ug/m3	SOURCES: 1	COMPANY NAME: M/s. Piccadily Agro Industries Ltd	
	RECEPTORS: 6561	MODELER: JMEPL	
	OUTPUT TYPE: Concentration	SCALE: 1:147,440 0 5 km	
	MAX: 0.722 ug/m³		PROJECT NO.: 21

Figure 4.3: Isopleth Showing Maximum Predicted GLC of SO₂

PROJECT TITLE:

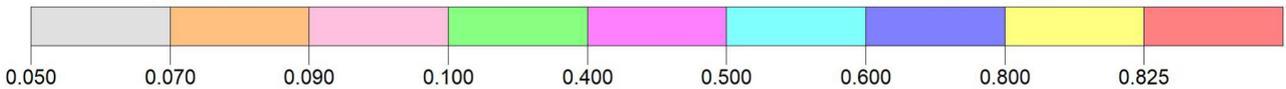
D:\AQ



PLOT FILE OF HIGH 10TH HIGH 24-HR VALUES FOR SOURCE GROUP: ALL

ug/m³

Max: 0.825 [ug/m³] at (611854.81, 2346922.57)



COMMENTS:

No2 - 0.825 ug/m³

SOURCES:

1

COMPANY NAME:

M/s. Piccadily Agro Industries Ltd

RECEPTORS:

6561

MODELER:

JMEPL

OUTPUT TYPE:

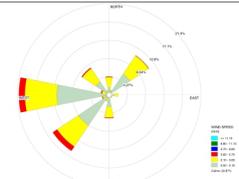
Concentration

SCALE:

1:147,440

0

5 km



MAX:

0.825 ug/m³

PROJECT NO.:

21

Figure 4.4: Isopleth Showing Maximum Predicted GLC of NO₂

4.5.2.2 Impact due to transportation of raw material & products

The proposed distillery project site is located at Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh. The project site is well connected with NH – 53 (~3.5 km in South Direction), NH 353 (~8.0 km in SW direction), SH – 20 (~8.0 km in SW direction). Nearest Railway Station is Belsonda RS (~8.4 km in SW direction).

Impact evaluation for transportation infrastructure without mitigation measures

Impact Evaluation Element	Change in traffic density due to transportation of material by road from trucks to end users after installation of distillery unit			
Potential Effect/ Concern	There will be overall decrease in traffic load as explained below.			
Characteristics of Impacts				
Nature	Positive √		Negative	Neutral
Type	Direct √	Indirect	Cumulative	
Extent	Project Area	Local	Zonal	Regional √
Duration	Short – term √		Long- term	
Intensity	Low √		Medium	High
Frequency	Remote (R)	Occasional (O)	Periodic (P)	Continuous (C) √
Significance of Impact				
Significance	Insignificant	Minor	Moderate √	Major

4.5.2.2.1 Existing traffic count

Traffic survey has been conducted for 24 hours at NH – 53 (~3.5 km in South Direction). The traffic survey monitoring was performed to predict the future traffic growth and the load on the plant road and surroundings due to the proposed project.

Details of sample collection:

Manual Classified Turning Count (MCTC) is the method used for counting the number of vehicles passing through intersections and classify the vehicles according to type (e.g. cars, motorbikes etc.). Measurements of traffic density were made continuously for 24 hours by visual observation and counting of vehicles under six categories, viz., Motor cycle/ scooter, Passenger car/ van/ auto rickshaw, tractors, trucks, bus and trailers. Two persons were deployed to count the number of vehicles from each side. Total numbers of vehicles per hour under the six categories were determined. The details of the traffic volume count have been provided in table given below.

Table- 4.8
Traffic Count Survey

Time of Monitoring	Types of Vehicles				Total Vehicles
	Motor Cycle /Scooter	Passenger Car / Auto rikshaw/ Pickup Van	Trucks	Buses	
10:01 to 11:00 am	68	105	41	32	246
11:00 to 12 noon	71	99	39	33	242
12:01 to 1:00 pm	56	88	32	23	199
1:01 to 2:00 pm	51	74	29	23	177
2:01 to 3:00 pm	44	71	21	22	158
3:01 to 4:00 pm	39	75	16	21	151
4:01 to 5:00 pm	48	76	13	15	152
5:01 to 6:00 pm	51	99	39	28	217
6:01 to 7:00 pm	55	109	48	22	234
7:01 to 8:00 pm	48	118	42	18	226
8:01 to 9:00 pm	33	86	38	16	173
9:01 to 10:00 pm	21	39	29	13	102
10:01 to 11:00 pm	16	22	21	11	70
11:01 to 12:00 pm	10	17	16	9	52
12:01 to 1:00 am	6	11	13	4	34
1:01 to 2:00 am	4	9	11	3	27
2:01 to 3:00 am	6	7	9	6	28
3:01 to 4:00 am	9	11	9	8	37
4:01 to 5:00 am	11	13	17	11	52
5:01 to 6:00 am	15	38	13	9	75
6:01 to 7:00 am	28	31	24	13	96
7:01 to 8:00 am	40	44	38	18	140
8:01 to 9:00 am	52	62	42	28	184
9:01 to 10:00 am	57	75	48	32	212
Total	839	1379	648	418	3284

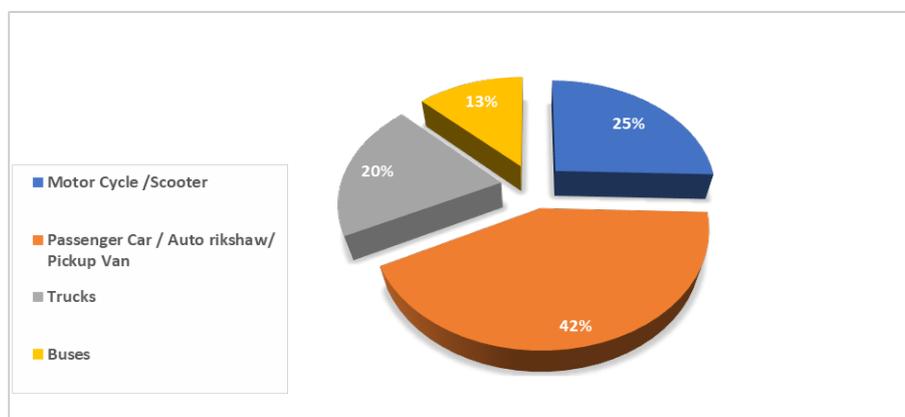


Figure 4.5: Traffic Volume count survey

Table- 4.9
No. of vehicles with respect to PCU

S. No.	Vehicle type	No. of vehicles per day	Passenger car unit (PCU) factor as per IRC 64:1990	Total no. of vehicles (PCU)/day
1.	Motor Cycle / Cycle/Scooter	839	0.5	419.5
2.	Passenger Car / Auto rikshaw/Pickup Van	1379	1.0	1379
3.	Truck	648	3.0	1944
4.	Buses	418	3.0	1254
	Total	3284		4996.5
	PCU/hr=(PCU/day)/24			209 PCU/hr

EXISTING TRAFFIC SCENARIO & LOS

Road	V (Volume in PCU/hr.)	C (Capacity in PCU/hr. as per IRC 64:1990)	Existing V/C Ratio	LOS
NH-53	209	625	0.33	B

CAPACITY AS PER IRC: 64-1990

V/C	LOS (Level of Service)	Performance
0.0 - 0.2	A	Excellent
0.2 - 0.4	B	Very Good
0.4 - 0.6	C	Good / Average / Fair
0.6 - 0.8	D	Poor
0.8 - 1.0	E	Very Poor

Traffic Analysis

From the study, it was observed that traffic movement in the 10 Km radius of the study area is high. At present, the traffic load calculated is 3284 vehicles per day approximately. The majority of vehicles include Motor cycle/cycle/scooter & Passenger car/van. The LOS value is calculated as 0.33 i.e., B and the traffic condition is “Very Good”. There will be no major impact of the transport of raw materials and end products on the surrounding environment due to proposed project as the highway is already a busy route and no effect will be seen due to minimal no. of trips required during construction and operation phase. The raw material will be easily transported through road transport.

4.5.2.2.2 Additional traffic due to proposed project

The proposed project will have some impact (as discussed earlier) on transportation due to the movement of construction materials as the installation of distillery is taking place. Proper arrangements for movement of vehicles and parking have been proposed in the project site. Parking arrangement will be provided in plant premises after installation also as very less

transportation through road is envisaged for raw material as well as product. The raw material required for the distillery unit will be molasses/cane juice/grain which will be transported by road and fuel from nearby open markets. Fly ash and alcohol will be also be primarily transported by road. Details regarding the additional traffic due to proposed project are given below:

Table 4.10
Increase in traffic load due to proposed project

S. No	Name of material to be transported by road	Quantity of material required/produced	Type of vehicle and capacity	No. of trips/day (filled)
Raw material				
2.	Grain	464 TPD	Trucks/25 ton	19
3.	Others	-	-	4
Fuel requirement				
4.	Biomass/Rice husk	412 TPD	Trucks/15 ton	28
Product				
5.	Alcohol	210 KLPD	Tankers/20 KL	11
Solid waste				
6.	Fly ash	116 TPD	Trucks/15 ton	8
7.	DDGS	88 TPD	Trucks/15 ton	6
8.	CO2	-	-	3
Total trips/day				79 trips/day

Note: Calculations have been done considering extreme worst cases.

Total No. of increased trucks / tankers per day=79

Total No. of increased trucks / tankers per hour=4 trucks/hour

Increased PCU / hr. = 4x3.0=12

MODIFIED TRAFFIC SCENARIO AND LOS (LEVEL OF SERVICE)

Road	Increased PCU	V (Volume in PCU/hr.)	C (Capacity in PCU/hr as per IRC 64:1990)	V/C Ratio	LOS
NH-.53	12x100%	209+12 =221	625	0.35	B

The LOS value is “Very Good” for NH 53 even after calculating additional traffic load increase per day; hence, the additional load on the carrying Capacity of the concern roads has not changed LOS value.

Thus, it can be concluded that the present road network is good enough to bear the minor increased traffic load. The company will take all appropriate measures to reduce the impact of transportation. The additional load of 94 trips per day will also be added to the initial count. Proper mitigation measures will be adopted by the company to minimize traffic flow to the best possible extent resulting in low level of dust, noise & gaseous emissions.

Anticipated impacts

- Increase in traffic density will lead to air pollution.
- Movement of vehicles will cause noise pollution.
- No direct impact envisaged on the flora and fauna of the area.
- Increased traffic may cause accidental incidences and public health problems.

Mitigation measures

- Vehicles with larger capacity will be preferred in order to decrease no. of trips.
- Trolleys will be preferred as compared to trucks/tractors if the source is near to project site.
- Vehicles with PUC Certificate will be hired.
- Regular maintenance of vehicles will be done to ensure smooth running of vehicle.
- Vehicles will be covered with a tarpaulin & not over loaded.
- Vehicular emissions will be kept under control and regularly monitored.
- Un-necessary blowing of horn will be avoided.
- Roads will be maintained in good condition to reduce noise due to traffic.
- Greenbelt of appropriate quality & width will be maintained
- To avoid accidents the speed of vehicles will be low near habitation areas.

4.5.3 Impact on water environment and mitigation measures

The effluents generated during distillery process, if not discharged properly can enter into ground water through leaching and can harm the biota to a lethal extent as the pollutants will have the tendency to increase BOD, COD, TSS, TDS of the water body. It will result in loss of aquatic fauna and long term change in characteristics of water bodies present in the vicinity. The discharge will also harm the soil flora and fauna and result in reduction of fertility of soil.

Impact evaluation of water pollution without mitigation measures

Impact Element	Evaluation	Change in water quality parameters		
Potential Effect/ Concern		Impact on aquatic biota and ground water quality due to discharge of tertiary treated waste water/spent wash in nearby drain.		
Characteristics of Impacts				
Nature	Positive		Negative	Neutral
			√	
Type	Direct	Indirect	Cumulative	
	√		√	
Extent	Project Area	Local	Zonal	Regional
				√
Duration	Short - term		Long- term	
			√	
Intensity	Low		Medium	High

				√
Frequency	Remote (R)	Occasional (O)	Periodic (P)	Continuous (C)
				√
Significance of Impact				
Significance	Insignificant	Minor	Moderate	Major
				√

Mitigation measures:

- The Grain based distillery will be based on “Zero Effluent Discharge”.
- **For Grain based operation:** Grain Slops (1163 TPD) will be taken through Centrifuge Decanters for separation of Suspended Solids separated as Wet Cake and which goes as cattle, poultry and fish feed as it contains high protein. (Also known as DWG – Distillers Wet Grains). Thin Slops from the Decanter Centrifuge will be partly recycled back to process and balance portions shall be taken to Thins Slops Evaporation Plant for concentration of remaining solids to form Syrup. This Syrup will be also mixed into the Wet Cake coming out of Centrifuge and forms part of Cattle, poultry and fish Feed. DWGS Drier: The Wet Cake (DWGS) and Syrup mixture will be dried in Steam Tube Bundle Dryer for producing DDGS with 8-10% moisture (max.). DDGS (88 TPD) will be utilized as Cattle, poultry and fish feed ingredients.
- **During Malt Spirit Process:** Malt Spirit Slops will be passed through centrifuge decanters for separation of suspended solids separated as Wet Cake (also known as DWG – Distillers Wet Grains).
- Process condensate, boiler Blowdown, DM plant reject & washing, CT blowdown will be treated in CPU/ETP of capacity 1200 KLPD and treated water will be reused in process activities.
- Domestic waste water will be treated in Sewage Treatment Plant of Capacity 30 KLPD.
- Regular monitoring of ground water quality will be carried out.
- Storm water drainage system to collect surface runoff is separately connected to rainwater harvesting tank and water will be reused in plant activities.
- Treated wastewater (such as sewage, industrial wastes, or stored surface runoffs) will be re-circulated in the process.

Zero Effluent Discharge scheme:

Total fresh water requirement for 210 KLPD Grain based operation will be 1102 KLPD (802 KLPD for Distillery along with co-generation power plant, 100 KLPD for Malt spirit plant, 150 KLPD for Bottling plant & 50 KLPD Domestic usage & others), which will be sourced from Surface water (Mahanadi river through Samodha Dam). 100 % waste water will be recycled internally. Waste water generated in the form of Process condensate, boiler Blowdown, DM plant reject & washing, CT blowdown will be treated in CPU/ETP of capacity 1200 KLPD and recycled again within process.

Grain Slops (1163 TPD) will be taken through Centrifuge Decanters for separation of Suspended Solids separated as Wet Cake and which goes as cattle, poultry and fish feed as it contains high protein. (Also known as DWG – Distillers Wet Grains). Thin Slops from the Decanter Centrifuge will be partly recycled back to process and balance portions shall be taken to Thins Slops Evaporation Plant for concentration of remaining solids to form Syrup. This Syrup will be also mixed into the Wet Cake coming out of Centrifuge and DWGS Drier: The Wet Cake (DWGS) and Syrup mixture will be dried in Steam Tube Bundle Dryer for producing DDGS with 8-10% moisture (max.). DDGS (88 TPD) will be utilized as Cattle, poultry and fish feed ingredients. STP (30 KLPD) will be used to treat domestic waste water. Treated water from STP will be used for greenbelt development and miscellaneous purpose. Hence, no discharge will be done outside plant premises.

Details regarding Effluent Treatment Plant/CPU, flow diagram and characteristics of inlet and outlet effluent are given in Chapter 2.

4.5.4 Impact on noise level and mitigation measures

During operation phase, there is likely hood of some increase in noise. The sources of noise will be running equipment viz. exhaust fans, compressors, pumps, motors, etc. Unnecessary noise levels increase may occur due to poor lubrication in machinery, worn out parts of old machinery, loosened nuts/ bolts, improper foundation and its mountings, flattened springs support etc. The noise can also be generated due to other ancillary activities and movements of vehicles on roads, highways etc. The noise level near the machinery will be maintained below 85 dB (A) and the expected noise levels at the plant boundary will be maintained below 75 dB (A) during day time & 70 dB (A) during night time. Higher noise level health effects are related to physical and psychological health deterioration by regular & consistent exposure to elevated sound levels. Elevated noise in workplace or ambient noise can cause hearing impairment/damage, ischemic heart disease, hypertension, annoyance and sleep disturbance. Impact on Immune system and birth defects can also be seen due to high & long term noise level exposure.

Impact evaluation for noise without mitigation measures

Impact Evaluation Element	Change of noise level due to the proposed project of distillery		
Potential Effect/ Concern	Impact on health of humans and biological factors/receptors due to noise generated due to distillery activities during day and night time and also on occupational health of the workers exposed to noise.		
Characteristics of Impacts			
Nature	Positive		Negative
			√
Type	Direct	Indirect	Cumulative
	√		

Extent	Project Area	Local	Zonal	Regional
	√			
Duration	Short - term		Long- term	
	√			
Intensity	Low		Medium	High
			√	
Frequency	Remote (R)	Occasional (O)	Periodic (P)	Continuous (C)
				√
Significance of Impact				
Significance	Insignificant	Minor	Moderate	Major
			√	

Mitigation measures

Proper noise abatement measures will be taken and persons working just close to machine and machine operators will be provided with personal protective equipment viz. ear plugs / ear muffs etc. for further protection. Vibrations due to any other operation are ruled out.

Apart from the above, the following measures will be taken:

- Personal Protective Equipment like earplugs and earmuffs will be provided to the workers exposed to high noise level.
- Proper maintenance, oiling and greasing of machines at regular intervals will be done to reduce generation of noise.
- All noise producing equipment will be enclosed in acoustic hoods and in sound proof buildings.
- Greenbelt of appropriate width at the plant boundary will be developed to absorb noise and reduce its intensity to an acceptable extent.
- Noise generating equipment like pump, motors, compressors, blower, turbine/engines, power generator sets/ engines etc. will be mounted on sturdy concrete foundations with proper & suitable rubber padding to reduce vibrations & thereby noise generation. Pumps, fans, compressor, etc. will be statically and dynamically balanced.
- The major noise producing equipment such as turbine will be provided with sound proof container, where ever possible. Acoustic enclosure for DG set and similar provision like noise attenuator wherever suitable/possible.

4.5.5 Impact due to solid and hazardous waste generation and mitigation measures

Solid waste generated in project will be sludge and conc. spent wash. These solid wastes, if not disposed properly can result in odour issues, top soil degradation, harm to soil fauna and flora etc. Solid and hazardous wastes, if not disposed as per the standards can cause soil pollution and harm to flora and fauna at the regional to local level. It can result in fugitive emissions in the ambient

environment. Yeast sludge will result in odor problems in the surrounding area. Used oil and grease when disposed of incorrectly it can harm the land, waterways, underground reservoirs and the marine environment. Oil stored is also a potential fire hazard.

Impact evaluation of solid and hazardous waste management without mitigation measures

Impact Evaluation Element	Soil, ground, ambient environment of the specific area where solid/hazardous waste will be disposed off.			
Potential Effect/ Concern	Odour issues, leaching of harmful chemicals and waste, pollution of ground water, top soil degradation.			
Characteristics of Impacts				
Nature	Positive		Negative	Neutral
			√	
Type	Direct	Indirect	Cumulative	
			√	
Extent	Project Area	Local	Zonal	Regional
			√	
Duration	Short – term		Long- term	
			√	
Intensity	Low		Medium	High
			√	
Frequency	Remote (R)	Occasional (O)	Periodic (P)	Continuous (C)
				√
Significance of Impact				
Significance	Insignificant	Minor	Moderate	Major
			√	

Following mitigation measures will be implemented:

- Solid waste from the Grain based distillery operations generally comprises of fibers and proteins in the form of DDGS (88TPD), which will be ideally used as Cattle, poultry and fish feed ingredients.
- Boiler ash (116 TPD) generated during coal-based operations will be given to cement/brick manufactures & during biomass (62 TPD) based operations will be given to brick manufacturers in covered vehicles.
- Spent resin from DM plant (500 kg/annum) will be supplied to authorized recyclers.
- Used oil & grease (0.5 KL/annum) generated from plant machinery/gear boxes as hazardous waste will be given to the CPCB authorized recyclers or used as in-house lubricant. Proper labeling of hazardous waste will be done.
- Hazardous waste will be stored in separate designated areas where no biological sensitivity is found.
- Dewatering of sludge and appropriate disposal of solids from the settling tank.
- Hazardous chemicals shall be stored in tanks, farms, drums, carboys etc.
- Transfer of chemicals or liquid reactants should be automated to avoid spillage.
- Solid/hazardous waste shall be handled in closed loop to avoid spillage.

4.5.6 Impact on soil environment

During operation phase, air pollutants like gaseous and fugitive emissions, if not collected by air pollution control devices i.e. ESP can result in settling on soil environment and affect the flora and fauna of the area as well as ground water by leaching through soil.

The effluent from industrial and domestic wastes, if not treated properly and discharged outside plant premises can result in soil contamination and change in fertility of soil. The soil property will be modified and if leaching occurs, it will result in contamination to deep extents.

The impact of installation of distillery on soil will be mainly due to accumulation of solid or hazardous waste or discharge of waste water on soil environment. If particulate matter are not controlled and prevented from depositing on soil, then it can result in drastic changes in soil environment. Soil will be majorly affected if any kind of waste is discharged without treatment and allowed to decompose on soil.

Impact evaluation of soil environment without mitigation measures

Impact Evaluation Element	Change in top soil quality if any solid or liquid waste is dumped on soil environment.			
Potential Effect/ Concern	Modification of soil on top, increase in soil degradation, decreased fertility of soil, leaching of waste water.			
Characteristics of Impacts				
Nature	Positive		Negative	Neutral
			√	
Type	Direct	Indirect	Cumulative	
			√	
Extent	Project Area	Local	Zonal	Regional
			√	
Duration	Short – term		Long- term	
			√	
Intensity	Low		Medium	High
			√	
Frequency	Remote (R)	Occasional (O)	Periodic (P)	Continuous (C)
				√
Significance of Impact				
Significance	Insignificant	Minor	Moderate	Major
			√	

Mitigation measures

- Greenbelt development will provide a positive effect by preventing soil erosion and improving top soil quality.
- The social developmental activities by company will include training of farmers on agricultural backgrounds in order to increase productivity of study area and in turn soil fertility.

- The industrial waste will be treated properly as described in air and water pollution mitigation measures and utilized within industry itself in order to avoid soil contamination.
- Regular measures will be undertaken to improve soil fertility.

4.5.7 Impact on biological environment & mitigation measures

There may be an impact on the biological environment of the area due to operation of unit, if proper care will not be taken. There are no eco-sensitive zones in 10 km radius study area, so no major impact is envisaged. The local flora and fauna might be affected due to dust and waste water presence in the local environment if not discharged properly. Fugitive emissions due to transportation activity & material handling may degrade the soil quality of surrounding environment that may affect the biodiversity of surrounding environment. Fugitive emissions (dust) may impact the terrestrial flora. The settlement of dust on the laminar surface of plants can impede the efficiency of photo-transduction and thereby, affect the productivity of plants. In some of the plants, it may also smother the leaf surface blocking stomata, resulting in reduced transpiration. The water bodies within 10 km radius of the plant site could possibly be impacted by the fugitive emission in terms of increased turbidity and TS content which ultimately affect the aquatic flora & fauna. Wastewater from the plant may affect the surrounding biodiversity, if it will be discharged in nearby aquatic and terrestrial environment. It will increase BOD, COD, TDS, TSS and decrease DO of water body in which it is discharged.

Impact Evaluation on biological resources without mitigation measures

Impact Evaluation Element	Change in the biological resources of the area due to distillery operation and generation of emissions			
Potential Effect/ Concern	Loss of habitat, Impact on health of biological receptors due to area and line sources of air emissions including fugitive dust emissions during development & operation activities			
Characteristics of Impacts				
Nature	Positive		Negative	Neutral
			√	
Type	Direct	Indirect	Cumulative	
	√		√	
Extent	Project Area	Local	Zonal	Regional
		√		
Duration	Short – term		Long- term	
	√		√	
Intensity	Low		Medium	High
	√		√	
Frequency	Remote (R)	Occasional (O)	Periodic (P)	Continuous (C)
				√
Significance of Impact				
Significance	Insignificant	Minor	Moderate	Major
		√		

Mitigation measures

- Proper mitigation measures will be undertaken as described in earlier sections in order to prevent pollutants of air/water/solid and hazardous waste from dispersing in the nearby environment.
- Proper sprinkling of water will be carried out in greenbelt and plantation along the plant boundary and roads.
- Proper greenbelt/plantation will be carried out in order to develop pollutant resistant varieties and to prevent noise levels by absorbance.
- Maintenance of greenbelt will be carried out daily and checked for any kind of alteration in plant growth in order to find out timely any kind of fugitive emissions or leakages within plant premises.
- Species tolerant to industrial pollutants will be developed.
- Species that are less prone to hazards will be preferred.

4.5.7.1 Greenbelt development program

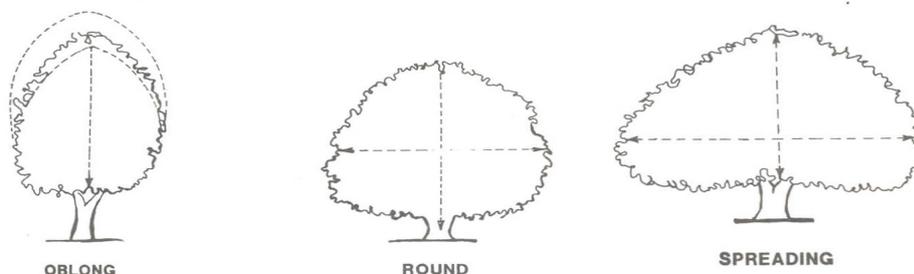
The company has social obligation to recreate the environmental status by providing thick canopy cover to suppress fugitive emission and provide aesthetic beauty. Trees form important part of the biosphere in the eco-system. The ecological belt maintains the natural balance of the area. 2.97 ha (7.34 acres), i.e. ~33% of the project area will be covered under greenbelt & plantation and the same will be maintained. A greenbelt of tree plantation around the project site will help to arrest the particulate matter in the area and hence attenuate the pollution to a great extent.

The following characteristics will be taken into consideration while selecting plant species for green belt development and tree plantation.

- I. They should be fast growing and tall trees.
- II. The leaf surfaces should be stick and hairy
- III. They should be perennial, evergreen & indigenous.
- IV. They should have thick canopy cover.
- V. The planting should be in appropriate alternate rows around the site to prevent lateral pollution dispersion.
- VI. The trees should maintain regional ecological balance and conform to soil and hydrological conditions. Indigenous species should be preferred.
- VII. They should be resistant to SPM Pollution.
- VIII. Heterogeneous tree species will be selected and planted considering soil and climate adaptability, flowering & growth characteristics, canopy structures & resistance to pollution load.

Characteristic features of plants to be used for absorption of pollutant gases

- Plant species should be perennial and evergreen with thick canopy cover.
- The crown of tree (mass of foliage/leaves and branches growing outward from the trunk of the tree) should be either Oblong, Round or Spreading for effective absorption of pollutant gases.



Crown (Canopy Shapes) of trees for plantation

- Plant should have foliage of longer duration.
- The foliage should be freely exposed through: Adequate height of crown, Openness of foliage/leaves in canopy, big leaves (long and broad laminar surfaces).

Proposed pollutant tolerant species in 2.97 ha

The rate of pollutant removal is found to increase linearly as the concentration of the pollutant increases over the range of concentration that are encountered in ambient air and which are low enough not to cause stomatal closure. Pollutants are absorbed most efficiently by plant foliage near the canopy surface where diffusion process is high due to favorable light conditions. Following species are suggested that will be beneficial for the purpose of reducing pollution.

Dust tolerant species:

Citrus lemon (Lemon), *Ficus elastica* (India Rubber tree), *Tectona grandis* (Teak), *Mangifera indica* (Mango), *Ficus benghalensis* (Banyan Tree), *Anthocephalus kadamba* (Kadamba), *Bauhinia purpurea* (Kanchan).

Sulphur-dioxide tolerant species:

Azadirachta indica (Neem), *Opuntia monacantha* (Drooping prickly pear), *Caesalpinia pulcherima* (Peacock flower), *Pithecolobium dulce* (Monkey pod), *Ficus religiosa* (Sacred fig), *Alstoniascholaris* (Saptapami), *Saracaasoca* (Ashoka), *Cassia fistula* (Amaltas).

Noise absorbing species:

Butea monosperma (Palash), *Melia azedarach* (Chinaberry), *Grevillea pteridifolia* (Darwin silky oak), *Tamarindus indica* (Tamarind).

Odour control species:

Azadirachta indica (Neem), *Millingtonia hortensis* (Indian cork tree), *Pongamia pinnata* (karanj)

Species having low fire index:

Tectona grandis (Teak), *Magnolia grandiflora* (bull bay), *Parkinsonia aculeate* (jelly bean tree), *Dadonea Viscosa* (hobush), *Callistemon citrinus* (lemon bottlebrush).

[Source: CPCB guidelines]

Table – 4.11
Action Plan for greenbelt development

Planning Schedule	Approx. number of saplings	Area (Ha)	Width of greenbelt (along the boundary of plant)	Fund allocation
1 st Year	3700	1.48	10 m	Funds to be allocated for greenbelt development and all miscellaneous requirement will be 35 Lakhs as capital cost for 2 years.
2 nd Year	3725	1.49	10 m	
Total	7425	2.97		

Local/indigenous wild Species of Study Area to be planted:
Neem (Azadirachta indica), *Kadamb (Anthocephalus cadamba)*, *Aonla (Phyllanthus emblica)*, *Khamhar (Gmelina arborea)*, *Anjan (Hardwickia binate)*, *Mahua (Madhuca longifolia)*, *Bihi (Psidium guajava)*, *Bahera (Terminalia belleirica)*, *Peepal (Ficus religiosa)*, *Gular (Ficus racemose)*, *Kasai (Bridelia squamosa)*, *Saja (Terminalia tomentosa)*, *Khujuri (Phoenix sylvestris)*, *Tendu (Diopyros melanoxylon)*, *Bija (Pterocarpus marsupium)*, *Karra (Cleistanthus collinus)*, *Palas (Butea monosperma)*, *Sitafal (Annona squamosa)*, *Maulsari (Mimusops elengi)*, *Bar (Ficus benghalensis)*.

4.5.8 Impact on socio-economic environment

Project specific potential impacts on socio-economic environment are summarized below and categorized either as positive / beneficial or negative / adverse impacts.

Positive Impacts:

➤ **Employment**

Employment opportunities will be created by the company and it will provide a sustainable and safe working environment for workers.

➤ **Community skills development**

The employees will be benefited from the training programs that are instituted by the company to enable the community labor force to work in the different areas of operation.

➤ **Improved standard of living**

Employment opportunities created by the project will increase income and therefore, improve the overall standards of living in the area.

➤ **Community organizational capacity development**

Through engagement of community members in development structures such as Community Development Committees, the community organizational capacity will be developed.

➤ **Economic exposure and development**

Implementation of the project will make financial institutions as well as related economic facilities, infrastructure and services available to the people. This will expose and introduce the local population to factors of economic development including the banking system, financial services, and credit and investment schemes.

Adverse social impact

➤ **Health impacts:**

The project has the potential for triggering health impacts through air pollutants from heavy vehicles, increased dust, creation of breeding grounds for disease vectors, population influx which might introduce new diseases in the area and inadequate sanitation facilities.

➤ **Livelihood change:**

Due to the labor intensity of the manufacturing sector, the project will attract the more able-bodied persons from the community which in turn will lead to low labor availability in other sectors of the economy including agricultural, education and health skilled workers. Local employment opportunities will be created by the project. This impact will not be significant due to low level of education and skills in the area which will result in sourcing skilled workforce from outside the immediate area. But the magnitude of this impact will be high due to high number of dependents in a household.

Impact Evaluation of Socio economic Environment

Impact Evaluation Element	Impact on socio economics due to the proposed project			
Potential Effect/ Concern	Employment generation, social developmental activities			
Characteristics of Impacts				
Nature	Positive √		Negative	Neutral
Type	Direct √	Indirect	Cumulative	
Extent	Project Area	Local	Zonal √	Regional
Duration	Short – term		Long- term √	
Intensity	Low		Medium √	High
Frequency	Remote (R)	Occasional (O)	Periodic (P)	Continuous (C) √
Significance of Impact				
Significance	Insignificant	Minor	Moderate	Major √

Mitigation Measures

➤ **Mitigating health impacts:**

An awareness program on health hazards can be implemented to safeguard the employees as well as the local population's health. This way, the health issues can be monitored and addressed.

➤ **Managing loss of livelihood and income:**

To cushion the population against impacts of manufacturing unit closure, comprehensive retrenchment packages that include adequate advance warning to employees and contractors to allow them to source alternative opportunities should be undertaken.

4.5.9 Occupational health and safety

The distillery unit has few potentially hazardous manufacturing processes. Some examples of hazards associated with the distillery plant are:

- Exposure to dust
- Noise exposure
- Boiler heat exposure
- Physical hazards
- Others

These hazards are concerned with the workers working within the industry majorly, though some hazards can also affect local & regional public if hazard occurs at a larger scale. During handling, storage, transportation of chemical, accidental exposure can occur in the workplace which may cause acute or long-term detrimental health effects. Biological agents, including microorganisms and toxins produced by living organisms, can cause health problems in workers. Viral infection through Influenza virus is an example of suffering which affects a broad population of workers. Psycho-social hazards are occupational hazards that affect someone's social life or psychological health. Psycho-social hazards in the workplace include occupational burnout and occupational stress, which can lead to burnout.

Impact evaluation of occupational health and safety without mitigation measures

Impact Evaluation Element	Impact on occupational health and safety of workers during natural or man-made hazards.			
Potential Effect/ Concern	Physical hazards during construction and operation phase			
Characteristics of Impacts				
Nature	Positive		Negative	Neutral
			√	
Type	Direct	Indirect	Cumulative	
	√		√	
Extent	Project Area	Local	Zonal	Regional
	√			
Duration	Short – term		Long- term	

	√		√	
Intensity	Low		Medium	High
Frequency	Remote (R)	Occasional (O)	Periodic (P)	Continuous (C)
	√			
Significance of Impact				
Significance	Insignificant	Minor	Moderate	Major
				√

Exposure to dust

Exposure to fine particulates is associated with work in most of the dust-generating stages of plant, but most notably from, raw material handling, internal transfer of materials and transportation etc. Workers with long term exposure to fine particulate dust are at risk of pneumoconiosis, emphysema, bronchitis, and fibrosis.

Methods to prevent and control exposure to dust include the following:

- Control of dust through implementation of good housekeeping and maintenance
- Use of air-conditioned, closed cabins
- Use of PPE, as appropriate (e.g. masks and respirators) to address residual exposures following adoption of the above-referenced process and engineering controls.

Noise exposure

- Exhaust fans, compressors and motors are the main sources of noise and vibrations in a distillery unit. Control of noise emissions includes the use of silencers for ID fans, room enclosures for mill operators, noise barriers, and, if noise cannot be reduced to acceptable levels, personal hearing protection (ear plugs/muffs).

Physical hazards

- Injuries during project operation are typically related to slips, trips, and falls; contact with falling / moving objects; and lifting / over-exertion.
- Other injuries may occur due to contact with, or capture in, moving machinery. Activities related to maintenance of equipment, fans, coolers, and belt conveyors, represent a significant source of exposure to physical hazards. Such hazards may include the following:
 - Falling / impact with objects;
 - Transportation
- Following management measures will be ensured to prevent the physical hazards in the plant:
 - Any person working on equipment with moving parts personally ensures the equipment is de-energized, isolated and locked/tagged out.
 - Any person working from a position with the potential risk for a fall from height uses fall protection.
 - Prescribed PPE will be provided to all workers exposed to open processes or systems.
 - In case of any accident immediate & proper medical care will be provided at the plant site

4.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF ENVIRONMENTAL COMPONENTS

The purpose of this Section is to identify elements of the proposed project that could result in an irreversible or irretrievable commitment of environmental components. The discussion includes a description of the Project's long-term benefits and how these benefits offset the irretrievable commitment of resources.

Environmental component	Irreversible and irretrievable commitment
Water	Surface water will be withdrawn for industrial operations. Hence, ground water resources will not be depleted.
Flora / vegetation	This is a proposed project; negligible vegetation will be disturbed. Implementation of mitigation measures would ensure that resources will not be significantly impacted.
Geology and soils	Construction activities are involved in the proposed project, which would not result in irreversible and irretrievable commitment of losses to geology and soil resources. Though Project's effects to top soil are less than significant as discussed in Section 4.4.1. Greenbelt development and its maintenance will help in enriching the fertility of soil to major levels.
Land Use and Planning	The land will be converted to industrial use so there will be no Irreversible effect to land use due to project activity. Instead land use intensity will increase by introducing advanced technology/equipment.
Mineral Resources	Construction activities will involve use of rocks, sand, gravel, and other minerals to fabricate construction materials such as steel and concrete. The extraction of mineral resources for various end uses and purposes, most of them construction and development-related, are considered to be non-renewable resources that will be extracted from future uses. Therefore, construction activities will result an irreversible and irretrievable commitment of losses to mineral resources. The use of construction materials is not considered a significant impact.
Public Services and Utilities	Construction and operation activity would consume fossil fuels, a non-renewable resource to generate energy for vehicles during construction, and to operate pumps for the life of the Project. Though the use of energy is justified.

4.7 ANTICIPATED ENVIRONMENTAL IMPACTS, ASPECTS AND MITIGATION MEASURES

The table showing distillery & malt spirit plant process, factors, aspects and impacts are given below. The respective mitigation measures are also given below:

S. No.	Project Activity	Pollutant		Impact	Mitigation	Remarks, if any
		Factor	Aspect			
1.	Transportation of raw material & Product	Air	PM	Increase in particulate matter concentration in air environment	<ul style="list-style-type: none"> • Sprinkling of water • Development of greenbelt/ plantation • Proper concreting of roads • Vehicles should carry valid PUC certificate 	-
		Water	Nil	-	-	Proper drainage system to be ensured.
		Noise	Noise generation	Increase in noise levels near source generation	<ul style="list-style-type: none"> • Vehicles should carry valid PUC certificate • Development of greenbelt/ plantation 	-
		Occupational Health	-	Accidents	Proper parking arrangement.	-
2.	Grain storage	Air	Grain dust	Increase in dust and respiratory diseases related to grain inhalation	<ul style="list-style-type: none"> • Regular water sprinkling in grain & malt storage area. • Covered sheds. • Silos to be installed. • Covered system for transferring of grain & malt and provision of water sprinkling. 	-
3.	Malt storage	Air	Malt dust			
4.	Fermentation	Air	CO2	Increase in CO2 concentration in air environment	<ul style="list-style-type: none"> • Setting up of CO2 plant for CO2 collection. • CO2 generated will be collected and sold to authorized vendors. 	-

S. No.	Project Activity	Pollutant		Impact	Mitigation	Remarks, if any
		Factor	Aspect			
		Water	Leakage	Contamination of ground water	<ul style="list-style-type: none"> • Proper drain area around fermentation tanks. • Regular checking of tanks. 	-
		Noise	Noise Generation	Increase in noise levels near source generation	<ul style="list-style-type: none"> • Proper maintenance of pumps will be done. • Pumps will be kept in closed enclosures. 	-
		Solid waste	Yeast Sludge	Soil contamination	Mixed with wet cake in case of grain operation.	-
5.	Distillation Column along with MEE	Water	Spent wash (High organic Effluent). Spent lees Effluent, MEE Condensate & other effluents.	Water & soil contamination	<ul style="list-style-type: none"> • Concentration and drying of spent wash to obtain DDGS in case of malt spirit plant followed by grain based operation. • Spent lees recycled in process directly. • MEE condensate is sent to CPU/ ETP then reused in the process. 	-
		Solid waste	Spent Wash	Soil & water contamination	Dried in DWGE dryer to obtain DDGS.	-
		Occupational Health	Steam around column	Burn, injuries if collapse	Proper PPEs for working zone employees.	-
6.	Co-generation power plant	Air	PM, SO ₂ , NO _x	Increase in the concentration in air environment	<ul style="list-style-type: none"> • Installation of ESP for control of PM emissions. • Maintenance of proper stack height for gaseous emissions. • Installation of continuous online stack monitoring system. 	-
		Water	Boiler blow down	Contamination of water	Sent to RO for proper treatment and recycled within process.	-
		Noise	Noise generation	Increase in noise levels near	<ul style="list-style-type: none"> • Proper maintenance of 	-

S. No.	Project Activity	Pollutant		Impact	Mitigation	Remarks, if any
		Factor	Aspect			
				source generation	machines (turbine) should be done • Acoustic enclosures • Proper PPEs to workers	
		Solid waste	Fly Ash	Contamination of soil	Closed loop system for ash collection. Ash will be supplied to brick/cement manufacturers in closed covered trucks.	-
		Occupational Health	Particulate matter	Effect on lungs, eye irritation, respiratory diseases	• Personal protective measures to reduce occupational hazard. • Proper fly ash management plan.	-
7.	Cooling Tower	Water	CT blow down	Water contamination	Treated in CPU/ETP and then reused in the process.	-
		Noise	Noise generation	Increase in noise levels near source generation	Proper maintenance of machines should be done. Proper PPEs	-
		Occupational Health	No direct impact	-	Personal protective measures to reduce occupational hazard	-
8.	ETP, CPU	Air	Odour problems	Irritation in nasal area, flies and insects problems	• Regular cleaning of all tanks. • No longer storages of culture or microbes in the aeration or anaerobic tanks. • Proper greenbelt in and around ETP/CPU area	-
		Water	Leakage	Contamination of ground water	• Proper HDPE lining of the tanks.	If leakage happens there will be ground water contamination.
		Solid waste	Primary & Secondary Sludge	Soil contamination	Used as manure	-
		Occupational	Trip or fall	Physical injuries	Proper PPEs while visiting the	-

S. No.	Project Activity	Pollutant		Impact	Mitigation	Remarks, if any
		Factor	Aspect			
		Health			ETP/CPU area and for people working in that area.	
9.	Odour from working zone areas	Air	ETP/CPU, Bacterial growth in interconnecting pipes & unattended drains	Ambient environment is contaminated and irritation to people present near bad odor areas, flies and insects are attracted.	<ul style="list-style-type: none"> • Proper Housekeeping • Sludge management in biological ETP/CPU units, Steaming of major pipe lines • Regular use of disinfectants in the drains • Efficient handling, prompt & proper disposal of sludge. • Adequate development of greenbelt which are odour absorbent. 	-
10.	Alcohol storage	Water & soil	Leakage or explosion of alcohol tank	Ground water contamination and modification in soil characteristics	<ul style="list-style-type: none"> • Proper flow meters in tanks • Proper storage in tanks • Regular checking of tanks 	-
		Occupational Health	Fire or explosion	Physical injuries	<ul style="list-style-type: none"> • Use of extinguishing media surrounding the fire as water, dry chemicals (BC or ABC powder), CO, Sand, dolomite, etc. • The storage shall be at cool & dry temperatures • Proper cross air supply i.e. proper ventilated storage and closed containers. • Container shall be grounded to eliminate static electric sparks. 	-

4.8 SUMMARY AND CONCLUSION

Though every development activity has some negative impact on the environment, but by taking proper mitigation measures and with the help of environment management systems, such impacts can be checked to acceptable levels. In this project, use of improved technology, appropriate pollution control equipment, development & maintenance of greenbelt development (~33% of the total project area) will help in abating pollution at source and will prevent any significant impact on the environment and human health of the study area.



CHAPTER-V

ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

5.1 ANALYSIS OF ALTERNATIVES

As per EIA Notification dated 14th Sept., 2006 and its subsequent amendments; the Chapter on “Analysis of Alternatives (Technology and Site)” is applicable only, if the same is recommended at the Scoping stage. As per the ToR points issued by MoEFCC, New Delhi vide letter no IA-J-11011/277/2023-IA-II(I) dated 31st July, 2023 for the proposed project, the Analysis of Alternatives of Site is not required.

5.1.1 Alternative Site

No alternative site has been taken into consideration as the proposed site has been acquired by the company keeping in mind following mentioned factors:

- The land is completely under the possession of the company.
- Geographical diversification of the Group as the existing plants are located at North India.
- Raw material availability & markets for both products & by-products within the state.
- Sales Avenues through Oil Marketing Companies
- Nearness to NH – 53 (~3.5 km in South Direction), NH 353 (~8.0 km in SW direction), SH – 20 (~8.0 km in SW direction) makes it easier to transport raw materials & final product to market.
- No National Parks, Wildlife Sanctuaries, Biosphere Reserves, Tiger/ Elephant Reserves, Wildlife Corridors etc. lies within 10 km radius.
- The proposed project site falls in the safe groundwater zone.

5.1.2 Alternative Technology

In Grain based operations & Malt Spirit Plant, spent wash is the main pollutant which has high BOD, COD, TDS, TSS and if not treated properly can create many environmental issues within the distillery itself.

In case of Malt spirit plant followed by Grain based operation, some distilleries decant the spent wash generated through decanter centrifuge and the solid/heavy particles remaining known as DWGS (Distillers wet grain soluble/stillage) is sold as cattle feed which contains unfermented grain residues (protein, fibers, fat and ~70% moisture) having a shelf life of 2-3 days only. The water content is too much so it can be transported only to small distances.

Overcoming the issues mentioned above, the company has proposed DWGS dryer technology. This technology is used for drying DWGS obtained to such extent so that moisture level decreases to 10-12% from ~70%. This decrease in moisture favors indefinite shelf life and it may be shipped

to long distances also favoring easy handling and storage. Also, DDGS is a good source of protein, fibers for cattle, poultry feeds.

Thus, the company will be installing best and proven technologies with increased energy utilization in manufacturing products that are useful for mankind. Thus, the company will be installing best and proven technologies in grain based operations and no alternative technology will be required.



CHAPTER - VI

ENVIRONMENTAL MONITORING PROGRAMME

6.1 INTRODUCTION

Post-project monitoring is a necessity to keep check on the environmental status of the area. The project will be regularly monitoring quality status of the various environmental components. The monitoring will be carried out on a regular basis as per Environmental Clearance obtained and as per CPCB norms to:

- Record the level of pollution within the plant site and nearby areas
- Monitor the efficiency of pollution control system adopted at the plant site
- To fulfill and obey the statutory and community obligations

6.2 MEASUREMENT METHODOLOGIES

6.2.1 Instruments to be used

Below given instruments will be used majorly for monitoring:

1. Respirable Dust Sampler (RDS)
2. Fine Particulate Matter (FPM) Sampler
3. Stack Monitoring Kit
4. Online continuous monitoring device for stack emissions
5. Sound Level Meter
6. Water Level Indicator

Table 6.1
Measurement methodologies

Attributes	Measurement method	Test procedure
Ambient air environment		
PM ₁₀ & PM _{2.5}	Gravimetric method	-
SO ₂	EPA Modified West & Geake method	Absorption in Potassium Tetra Chloromercurate followed by Colorimetric estimation using P-Rosaniline hydrochloride and Formaldehyde (IS: 5182 Part - II).
NO ₂	Arsenite modified Jacob & Hochheiser	Absorption in dil. NaOH and then estimated colorimetrically with sulphanilamide and N (I-Nephthyle) Ethylene diamine dihydrochloride and Hydrogen Peroxide (CPCB Method).
Stack monitoring		
PM	Gravimetric method	As per CPCB guidelines
SO ₂	As Per IS-11255-part (2) 1985 (Absorbing Solution of H ₂ O ₂ , Isopropanol Reagent)	Absorption in H ₂ O ₂ , Isopropanol followed by Colorimetric estimation using Sulphuric acid and Barium Chloride as Per IS-11255 part (2) 1985
NO ₂	As Per IS-11255-part (7) 2005	Absorption of Sample in NO _x flask

	with NOx flask assembly.	assembly Followed by Colorimetric estimation using Phenol-di-sulphonic acid and other reagent as Per IS-11255 part (7) 2005
Water environment		
pH, Turbidity, Colour, Odour, Taste, TDS, Total Hardness, Calcium hardness, Magnesium hardness, Chloride, Fluoride, Sulphate, Nitrates, Alkalinity, Iron, Copper, Manganese	As per IS 10500-2012	Samples for water quality should be collected and analyzed as per: IS: 2488 (Part 1-5) methods for sampling and testing of Industrial effluents. Standard methods for examination of water and wastewater analysis published by American Public Health Association.
Noise monitoring		
Noise levels at Day & night time -Leq dB (A)	As per CPCB norms	As per CPCB norms

6.3 MONITORING FREQUENCY AND LOCATIONS

The frequency of monitoring is different for different components. The monitoring frequency will be decided as per conditions of EC and CTO.

The locations of the monitoring stations will be selected on the basis of prevailing micro-meteorological conditions of the area and consultation with SPCB. Three AAQM stations will be selected (including minimum 1 location in upwind side, more sites in downwind side / impact zone) to assess ambient air quality of the area. Noise level monitoring will be carried out on plant boundary and in high noise generating area within the site. Water and soil monitoring locations will be decided on the basis of general slope of the area and drainage pattern. Locations for the post project monitoring are given in table below:

Table - 6.2
Frequency & locations for post project monitoring

S. No.	Description	Frequency of Monitoring	Locations of monitoring
1.	Ambient Air Quality	As per EC/CTO condition	3-4 Location in and around plant site (1 within and 3 outside plant area at an angle of 120 ⁰ each)
2.	Stack Monitoring	Continuous Monitoring	Plant Site (Boiler)
3.	Performance Guarantee (PG) test of pollution control equipment	Yearly	All pollution control devices
4.	Fugitive Emission	As per EC/CTO condition	In the plant site
5.	Ground water quality	Twice a year (Pre and Post Monsoon)	In & around the plant site
6.	Effluent quality (CPU)	Daily (In house laboratory)	ETP Outlet
7.	Noise Level Monitoring	As per EC/CTO condition	In & around the plant site
8.	Soil Quality	Yearly	In & around the plant site
9.	Medical checkup of employees	Yearly	Nearby hospitals/dispensary
10.	Compliance Audit	Half yearly	In & around the plant site
11.	OHS Audit	Yearly	In & around the plant site

6.4 DATA ANALYSIS

Monitoring data analysis will always be carried out by MoEFCC approved laboratory as per CPCB guidelines and will be regularly submitted to concerned authority (specified in Environment Clearance Letter issued by MoEFCC, New Delhi and Consent issued by UPPCB on regular basis.

6.5 REPORTING SCHEDULES

Post project environmental monitoring program will be prepared considering conditions stipulated in the Environmental Clearance issued by the MoEFCC, New Delhi and Consent to Operate issued by UPPCB.

Half yearly compliance reports will be submitted to the concerned regulatory authorities. There will be submission of environmental statement report for each financial year ending 31st March in Form V as is mandate shall be submitted to the concerned SPCB as prescribed under EPA rules, 1986.

The Environmental Statement Report should also be uploaded on the website of the company along with status of EC compliance regularly and also sent to respective Regional Offices of MoEFCC.

6.6 EMERGENCY PROCEDURES

During an emergency, the main center to look at the scenario is Emergency Control Center. EMC has certain hierarchy as per EC conditions which is well defined and people are aware of their responsibilities related to any kind of emergency.

Emergency planning

- The complete distillery unit will have a provision of interlocking system where failure of an equipment or machinery will shutdown the whole process instantly and after rectifying only, the whole process will be started.
- During an emergency, the Emergency Management Staff, including the site controller shall gather in the ECC.
- The ECC will be consisting of all adequate communication systems in the form of telephones and other equipment in order to respond quickly and inform the whole plant instantly.
- The communication systems will be designed such that they are protected from possible shutdown.
- The center will have its own lighting arrangement in case of emergency and electric communication system.
- Automatic fire detectors will be installed leading to fire alarms and proper control system.
- The hydrant pipeline network will be provided at all danger prone areas.

- All emergency valves and switches and emergency handling facilities shall be made easily accessible.

Detailed description is provided in Chapter VII under the head Emergency Planning and Procedures.

6.7 DETAILED BUDGET

Environmental monitoring budget will be decided by the environmental management cell according to the requirements of the industry. EMC shall inspect the necessity & availability of the materials, technologies, services & maintenance works. There will be regular view of records in order to detect any gaps and appropriate budgetary allocations will be made on the basis of it.

Table 6.3
Environmental monitoring budget

S. No.	Attributes	Approximate Capital cost (Crores)	Approximate recurring cost per annum (Crores)
1.	Lab & instruments	0.7	0.1
2.	Monitoring instruments & others		
3.	Third party investment for monitoring		



CHAPTER-VII ADDITIONAL STUDIES

7.1 ADDITIONAL STUDIES

As per the EIA Notification dated 14th September, 2006, and its subsequent amendments. The Committee had issued Terms of Reference (ToR) vide letter no. IA-J-11011/277/2023-IA-II(I) dated 31st July, 2023 for the preparation of Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP). The following additional studies were done in reference to the additional Terms of References;

- A) Public Consultation
- B) Risk Assessment

7.2 PUBLIC HEARING

For the proposed project, public hearing is yet to be conducted.

7.3 RISK ASSESSMENT

Accidents related to industrial hazards results in great personal & financial loss. Accidental risk needs to be managed and in today's environment, this is the concern of every industry, because these risk and hazards can quickly jeopardize the financial viability of a business. The main objective of the risk assessment study is to propose a comprehensive but simple approach to carry out risk analysis and conducting feasibility studies for planning hazard analysis in Indian context.

7.3.1 Hazard Identification & Risk Assessment (HIRA)

Hazard identification involves the enlisting of hazards in each unit of the distillery and conduct HAZOP study on the basis of it. Risk assessment involves the finding of impact evaluation of a hazard, its frequency, its probability of major accidents etc.

Major on site and off site hazards in distillery are given below:

On-site

- Uncontrolled exposure to fugitive dust, noise, and other emissions
- Contact with chemicals and solid wastes
- Accidents like uncontrolled emissions/spillages due to handling of product and raw material

Off-site

- Exposure to pollutants due to release from offsite/ storage/related activities
- Unpredicted contamination due to accidental explosions/release due to a natural hazard
- Possible sudden releases and deposition of toxic pollutants in vegetation

7.3.1.1 Identification of hazards and proposed safety systems

Disasters at a distillery & malt spirit plant and co-generation power plant may occur due to following hazards:

- Fire electric panels
- Oil storage area
- Alcohol storage area
- Explosion in boiler house etc.
- Electrocutation
- Chemical containers
- Fall of material etc.

The potentially hazardous areas and the likely accidents with the concerned area have been enlisted below:

Table 7.1
Possible hazardous locations on site

S. No.	Hazardous Area	Likely Accident
1.	Boiler Area	Explosion
2.	Turbine room	Explosion
3.	Electrical rooms	Fire and electrocution
4.	Transformer area	Fire and electrocution
5.	Cable tunnel	Fire and electrocution
6.	Storage yard (biomass like Rice Husk/low sulphur coal)	Sliding, fire
7.	Storage tank (alcohol & malt spirit)	Fire
8.	Stack	Uncontrolled air pollution due to failure of ESP
9.	Lagoon storage	Odor
10.	HSD storage area	Fire due to spillage

Fire

It might occur in the boiler area, fuel storage yard, electrical rooms, transformer area etc. due to accidental failure scenario.

Explosion

Explosion may lead to release of heat energy & pressure waves.

Electrocution

Fatal accidents during working hours if not proper care is undertaken.

7.3.2 Hazard identification and Risk Assessment Matrix

Defining scales based on assumptions:

Scale, S1		Scale, S2				Risk classification	
		Likelihood		Level of Consequence			
0-5	Low	0-5	Rare	0-5	Low	0-50	Low
6-8	Medium	6-8	More often	6-8	Medium	51-80	Medium
9-10	Severe	9-10	Frequent	9-10	High	81-100	High

RISK CALCULATOR

LEVEL	PROBABILITY	SEVERITY(S)	RISK CATEGORY	RISK RATING
1.	Unlikely/ Remote	Negligible/minor injury/ minimal env. Impact/ minor theft	LOW RISK	1, 2
2.	Likely/ Occasional	Major/injuries beyond first aid/major spillage contained within unit/forced entry/mineral loss of critical info	MEDIUM RISK	3, 4
3.	Certain	Serious accidents/ fatality/ major spills spread outside unit/counterfeiting	HIGH RISK	6, 9

S. No.	Activity	Hazard	Impact	Present Controls Available	Legal Requirement (Y/N)	Severity (S)	Likelihood (P)	Risk Rating (S) X (P)	Risk Level	additional control measures	Responsibility	Target Date
1.	Blending	ENA	It is harmful for human being and environment	Use PPE during the handling	No	High	Low	High	4	No	Blending Head	
2.	Blending	Fire	It is harmful for human being and environment	Use PPE during the handling & fire extinguisher	Yes	Low	Low	Low	2	No	Blending Head	
3.	Blending	Confined space	It is harmful for human being	Such space are labeled and enter are only after permit	No	High	Low	Medium	4	No	Blending Head	
4.	Blending	Contractual activity	Untrained worker may lead to hazards like fire	Contractor is allowed to work in factory only after permit	Yes	High	Low	Medium	4	Administrative control in unit	Blending Head	
5.	Blending	Spillage	Risk of slip trip injury	Regular cleaning activity	No	High	Low	Low	2	Administrative control in unit	Blending Head	

S. No	Activity	Hazard	Impact	Present Controls Available	Legal Requirement (Y/N)	Severity (S)	Likelihood (P)	Risk Rating (S) X (P)	Risk Level	Additional Control Measures	Responsibility	Target Date
1.	DG House and Diesel Storage	Diesel	It is harmful for human being and environment	Use PPE during the handling	No	High	Low	High	4	No	Power House Head	
2.	DG House and Diesel Storage	Fire	It is harmful for human being and environment	Use PPE during the handling & fire extinguisher	Yes	Low	Low	Low	2	No	Power House Head	
3.	DG House and Diesel Storage	Confined Space	It is harmful for human being	Such space are labeled and enter are only after permit	No	High	Low	Medium	4	No	Power House Head	
4.	DG House and Diesel Storage	Contractual activity	Untrained worker may lead to hazards like fire	Contractor is allowed to work in factory only after permit	Yes	High	Low	Medium	4	Administrative control in unit	Power House Head	
5.	DG House and Diesel Storage	Spillage	Risk of slip trip injury	Regular cleaning activity	No	High	Low	Low	2	Administrative control in unit	Power House Head	

S. No.	Activity	Hazard	Impact	Present Controls Available	Legal Requirement (Y/N)	Severity (S)	Likelihood (P)	Risk Rating (S) X (P)	Risk Level	Additional Control Measures	Responsibility	Target Date
1	Distillation Plant	Fire due to flammable material	It is harmful for human being and environment	Use PPE during the handling and fire	Yes	Low	Low	Low	2	No	Distillation Head	

2.	Distillation Plant	Confined space entry during repair and maintains of distillation column	It is harmful for human being	extinguisher Such space are labeled and enter are only after permit	No	High	Low	Medium	4	No	Distillation Head	
3.	Distillation Plant	Contractual activity	Untrained worker may lead to hazards like fire	Contractor is allowed to work in factory only after permit	Yes	High	Low	Medium	4	Administrative control in unit	Distillation Head	
4.	Distillation Plant	spillage	Risk of slip trip injury	Regular Cleaning activity	No	High	Low	Low	2	Administrative control in unit	Distillation Head	
5.	Distillation Plant	Electrical hazard due to improper handling of electrical equipment	Fire may lead to loss of life as well as infrastructure	Regular maintenance of electrical installation	Yes	High	Low	Low	4	Engineering control in unit	Distillation Head	
6.	Distillation Plant	Health hazard to worker as it may bite workers	Health hazard, risk of injury	Implementation of building maintenance and cleaning schedule	No	High	Low	Low	4	Administrative control in unit	Distillation Head	
7.	Distillation Plant	Use of temporary fixture	Health hazard, risk of injury	Implementation of building maintenance and cleaning schedule	No	High	Low	Low	4	Engineering control in unit	Distillation Head	

8.	Distillation Plant	Use of loose wiring	Health hazard, risk of injury	Regular maintenance of electrical installation	No	High	Low	Low	4	Engineering control in unit	Distillation Head	
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S. No.	Activity	Hazard	Impact	Present Controls Available	Legal Requirement (Y/N)	Severity (S)	Likelihood (P)	Risk Rating (S) X (P)	Risk Level	Additional Control Measures	Responsibility	Target Date
1.	ENA Storage House	ENA	It is harmful for human being and environment	Use PPE during the handling	No	High	Low	High	4	No	QC Head	
2.	ENA Storage House	Fire	It is harmful for human being and environment	Use PPE during the handling & fire extinguisher	Yes	Low	Low	Low	2	No	QC Head	
3.	ENA Storage House	Confined space	It is harmful for human being	Such space are labeled and enter are only after permit	No	High	Low	Medium	4	No	QC Head	
4.	ENA Storage House	Contractual activity	Untrained worker may lead to hazards like fire	Contractor is allowed to work in factory only after permit	Yes	High	Low	Medium	4	Administrative control in unit	QC Head	
5.	ENA Storage House	Spillage	Risk of slip trip injury	Regular cleaning activity	No	High	Low	Low	2	Administrative control in unit	QC Head	

S. No.	Activity	Hazard	Impact	Present Controls Available	Legal Requirement (Y/N)	Severity (S)	Likelihood (P)	Risk Rating (S) X (P)	Risk Level	Additional Control Measures	Responsibility	Target Date
1.	Power House & Turbine	Electrical Shock	It is harmful for human being and environment	All equipment proper earthing is done and same also checked and use PPE during the handling	No	High	Low	High	4	No	Power House Head	
2.	Power House & Turbine	Fire	It is harmful for human being and environment	Use PPE during the handling & fire extinguisher	Yes	Low	Low	Low	2	No	Power House Head	
3.	Power House & Turbine	Confined space	It is harmful for human being	Such space are labeled and enter are only after permit	No	High	Low	Medium	4	No	Power House Head	
4.	Power House & Turbine	Contractual activity	Untrained worker may lead to hazards like fire	Contractor is allowed to work in factory only after permit	Yes	High	Low	Medium	4	Administrative control in unit	Power House Head	
5.	Power House & Turbine	Spillage	Risk of slip trip injury	Regular cleaning activity	No	High	Low	Low	2	Administrative control in unit	Power House Head	

S. No.	Activity	Hazard	Impact	Present Controls Available	Legal Requirement (Y/N)	Severity (S)	Likelihood (P)	Risk Rating (S) X (P)	Risk Level	Additional Control Measures	Responsibility	Target Date
1.	Softener & Cooling tower	H2SO4 and anticline chemical	It is harmful for human being and environment	All equipment proper earthing is done and same also checked and use PPE during the handling	No	High	Low	High	4	No	Plant Head	
2.	Softener & Cooling tower	Fire	It is harmful for human being and environment	Use PPE during the handling & fire extinguisher	Yes	Low	Low	Low	2	No	Plant Head	
3.	Softener & Cooling tower	Confined space	It is harmful for human being	Such space are labeled and enter are only after permit	No	High	Low	Medium	4	No	Plant Head	
4.	Softener & Cooling tower	Contractual activity	Untrained worker may lead to hazards like fire	Contractor is allowed to work in factory only after permit	Yes	High	Low	Medium	4	Administrative control in unit	Plant Head	
5.	Softener & Cooling tower	Spillage	Risk of slip trip injury	Regular cleaning activity	No	High	Low	Low	2	Administrative control in unit	Plant Head	

S. No.	Activity	Hazard	Impact	Present Controls Available	Legal Requirement (Y/N)	Severity (S)	Likelihood (P)	Risk Rating (S) X (P)	Risk Level	Additional Control Measures	Responsibility	Target Date
1.	Water Treatment Plant	HCL and NaoH	It is harmful for human being and environment	Use PPE during the handling	No	High	Low	High	4	No	Water Treatment Head	
2.	Water Treatment Plant	Fire	It is harmful for human being and environment	Use PPE during the handling & fire extinguisher	Yes	Low	Low	Low	2	No	Water Treatment Head	
3.	Water Treatment Plant	Confined space	It is harmful for human being	Such space are labeled and enter are only after permit	No	High	Low	Medium	4	No	Water Treatment Head	
4.	Water Treatment Plant	Contractual activity	Untrained worker may lead to hazards like fire	Contractor is allowed to work in factory only after permit	Yes	High	Low	Medium	4	Administrative control in unit	Water Treatment Head	
5.	Water Treatment Plant	Spillage	Risk of slip trip injury	Regular cleaning activity	No	High	Low	Low	2	Administrative control in unit	Water Treatment Head	

Aspect and Impact (Manufacturing Process & Maintenance)

S. No.	Sub Operations	Activities	Interacts with Env. Y/N	Direct (D)/ Indirect (I)	Conditions N/A/E	Environmental Aspects	Environmental Impacts	A	B	C	D	E	F	Total G	S/NS	Remarks
1	Manufacturing and utility/machine maintenance	All machine operation	Y	D	A	Generation of noise	Noise pollution	3	4	2	1	1	3	72	NS	Major to be taken and ear plugged to be used
		All machine maintenance	Y	D	N	Generation of cotton waste soaked in oils & lubricants	Waste management	3	4	2	1	1	3	72	NS	All generated waste to be kept in the specified yard
		All utilities cleaning	Y	D	N	Generation of waste	Waste management	3	4	5	1	2	2	144	S	The disposal of liquid waste sell be done there ETP
		Running of D.G. sets	Y	D	A	Emission of smoke & high of D.G stack	Air ambient air pollution	2	4	2	1	1	3	48	NS	Testing is done from external source
		Running of D.G. sets	Y	D	A	Generation of noise	Noise pollution	3	4	2	1	1	2	48	NS	Testing is done from external source
		Running of D.G. sets	Y	D	E	Use of lubricants & diesel	Air pollution & land contaminations	3	3	2	1	1	3	54	NS	Care as taken by maintains
		Running of air	N	D	N	Uses of Power	Resource	3	2	3	1	2	3	108	S	Switch off when not in

		compressor					depletion								use	
		Running of air compressor	Y	D	A	Generation of noise	Noise pollution	3	4	2	1	1	2	48	NS	Major to be taken and ear plugged to be used
		Running of air compressor	Y	D	A	Explosion of air tank	Noise pollution	4	1	4	1	1	2	32	NS	Half yearly inspection is done by external competent person
		Electric panel	N	D	N	Uses of power	Resource depletion	3	2	3	1	2	3	108	S	Switch off when not in use
		Water tank over flow	Y	D	A	Water wastage	Resource wastage	3	4	3	1	1	2	72	NS	Care is taken by maintenance
		Cables	Y	D	A	Fining & Smoke	Air pollution	4	1	4	1	2	2	64	NS	Major to be taken by safety team
		Transformer maintains	Y	D	A	Oil spillage & fining	Air pollution	4	1	4	1	2	2	64	NS	Care to be taken by maintenances

Aspect and Impact (Store)

S. No.	Sub Operations	Activities	Interacts with Env. Y/N	Direct (D)/ Indirect (I)	Conditions N/A/E	Environmental Aspects	Environmental Impacts	A	B	C	D	E	F	Total G	S/NS	Remarks
1	Store	Storage of fresh diesel barrels/cans	Y	D	N	Oil spillage from damage barrel/canon concrete yard	DNR	3	3	3	1	1	3	81	NS	Measure to be taken
		Storage of material like machine parts, electrical part, plastics parts etc.	Y	D	E	Catch fire	AP	3	2	4	1	2	2	96	NS	Safety team will work as per need & time to time fire mock drill to be conducted
		Storage of grease barrels/box	Y	D	N	Grease spillage from damaged barrel/box on concrete floor	DNR	2	2	2	1	2	3	48	NS	
		Storage of grease barrels/box	Y	D	N	Catch fire	AP	2	2	4	1	2	2	64	NS	
		Unloading of diesel berried cans	Y	D	N	Opening of oil barrels/cans while unloading and oil falling on the concrete floor	DNR	2	2	2	1	2	3	48	NS	
		Unloading of grease barrels/box	Y	D	N	Opening of grease barrels/box while unloading	DNR	2	2	2	1	2	3	48	NS	

					and falling while unloading & falling on the concrete floor											
		Respires of lead acid batteries, glass wool and paints	Y	D	N	Chances of leakage on floor like acid, paint etc.	WM	2	2	2	1	2	3	48	NS	
		Receipt of waste/scrap material like damage glass/bottles/used oil glass wood, plastic	Y	D	N	Chances of leakage used oil scattered glass wood	WM	2	2	2	1	2	3	48	NS	
		Receipt of waste/scrap material like damage glass/bottles/used oil glass wood, plastic	Y	D	E	Catch fire	AP	3	2	4	1	2	2	96	NS	
		Energy consumption in light. Fan, AC, scanner, printer etc	Y	D	N	Consumption of power	DNR	3	2	3	1	2	3	108	NS	Switch off when not in use
		Paper consumption	N	D	N	Consumption of Paper	DNR	3	4	3	1	3	1	108	NS	Double side printing to be done & soft date need to be kept.

Aspect and Impact (HR, Quality, Marketing, Purchase)

S. No.	Sub Operations	Activities	Interacts with Env. Y/N	Direct (D)/ Indirect (I)	Conditions N/A/E	Environmental Aspects	Environmental Impacts	A	B	C	D	E	F	Total G	S/NS	Remarks
1	Office Activity	Energy consumption in light. Fan, AC, scanner, printer etc	Y	D	N	Consumption of power	DNR	3	2	3	1	2	3	104	S	Wastage to energy to controlled and switch off when not in use
		Paper consumption	N	D	N	Consumption of Paper	DNR	3	4	3	1	3	1	108	S	Double side printing to be done & soft date need to be kept.
		Disposable of stationary wastes	N	D	N	Disposable of stationary waste	IC	1	3	1	1	3	2	18	NS	To be sold out the responsible source who use as recycle purpose
								DNR								

2.	Housekeeping and premises	Consumption of water	Y	Dt	N	Consumption of water	DNR	3	3	3	1	2	1	54	NS	Disposed through drainage
		Discharge of waste water	N	Dt	N	Disposable of waste water	WP	2	4	2	1	3	1	48	NS	Dispose as dumping yard
		Disposable of housekeeping waste	N	Dt	N	Disposable of housekeeping waste	LC	2	4	2	1	3	1	48	NS	Mopping water sprinkling done where required
		Dust generation	Y	Dt	N	Generation of dust	AP	1	4	2	1	3	2	48	NS	Mask used spraying done during occupance hours
		Generation of mist during spraying	Y	Dt	N	Generation of mist	AP	1	2	2	1	3	2	24	NS	Use as per requirement
3.	Washroom	Consumption of water	Y	D	N	Consumption of water	DNR	2	4	3	1	3	1	72	NS	Care thought energy congestions
		Discharge of waste water	Y	D	N	Disposable of waste water	WP	2	4	2	1	3	1	48	NS	Periodic maintenance
		Water leakage from	N	D	N	Consumption of	DNR	2	1	3	1	4	2	48	NS	Use as per

		taps overflow of water tank				water										requirement
4	Guarding and horticulture	Consumption of water	N	Dt	N	Consumption of water	DNR	2	3	3	1	3	1	54	NS	Use as per requirement
		Tree plantation	Y	Dt	N	If tree plantation is not there	Global warming	4	3	4	1	1	3	144		Care of plants
		Disposable of waters leaves twigs	N	Dt	N	Disposable of waste	IC, IP	1	3	2	1	3	3	54	NS	Disposable f dumping yard
		Generation of mist during sparing	N	Dt	N	Generation of mist	AP	1	2	2	1	3	3	56	NS	Mask used
5	Painting and white washing	Use of paint, thinner etc	N	Dt	N	Disposable of waste	DNR	3	1	3	1	3	2	54	NS	Use as per requirement
		Disposal of brusher clothes etc.	N	Dt	N	Disposable of waste	IC	1	1	1	3	3	18	NS	Taken back by contractor	
		Fire in plant thinner	N	Dt	A	Disposable of waste	AP	3	1	5	1	3	1	NS	No smoking area handle carefully	

7.3.3 Proposed mitigation measures

(A) Electricity hazard

- All electrical equipment/machinery to be provided with proper earthing.
- Earthed electrode shall be regularly tested and maintained
- Emergency lighting shall be available at all critical locations
- Easy accessibility of fire-fighting facilities
- All electrical equipment shall be free from carbon dust, oil deposits
- Use of approved insulated tools
- Flame and shock detectors and central fire announcement system to be provided
- Temperature sensitive alarm and protective relays to make alert and disconnect equipment before overheating shall be provided

(B) Fuel storage

- Biomass handling unit/Agency will be at minimum 500 meters away from the residential area and eco-sensitive zones.
- Biomass handling unit will be located at a minimum 500 meters away from the state or national highway.
- The unit will have adequate water supply through pipe. Biomass storage unit is to be ensured for stacking in heaps.
- Ash dispersion will be prevented by covered transportation.
- Fire-fighting measures will be readily available

(C) Precautionary measures for falling material

- Safety helmets to be used to protect workers against falling material.
- Barriers like toe boards or mesh guards is to be provided to prevent items from slipping or being knocked off the edge of a structure.
- No-entry zone will be defined in working areas.
- Dangerous areas during construction phase will be excluded and proper PPEs will be made available.

(D) Safety measures for storage & handling of alcohol

Handling and storage of alcohol will be done as per prescribed norms. Automated handling will be installed. Following precautionary measures would be taken for safety:

(a) Handling and storage measures

- (i) Alcohol storage area shall be kept away from oxidizers, heat and flames.
- (ii) Proper care will be ensured for handling alcohol.
- (iii) Ventilation shall be properly provided.
- (iv) Avoidance of storage of plastics, rubber and coatings in the alcohol area.

- (v) Grounding of the container and transferring of equipment to eliminate static electric sparks.

First aid measures

For skin contact, eye contact & inhalation.

(b) Fire Fighting Measures

Following media will be used for extinguishing fire as water, dry chemicals (BC or ABC powder), CO, Sand, dolomite, etc. Foam System will be provided to extinguish fire from the alcohol storage tank. The foam blanket will suppress the flammable vapors that can combine with air and result in more fire subsequently.

Special Fire Fighting Procedures; Keeping the fire upwind and avoiding downwind direction, closing all possible sources of ignition. Water in straight hose stream shall be avoided which will scatter and spread fire. Spray or fog nozzles will be promoted.

Hazardous Decomposition Products: gases of Carbon Monoxide (CO) & Carbon Dioxide (CO₂).

(c) Accidental release measures

In case of alcohol spillage, removal & shutting off of all possible sources of ignition, absorb small quantities with paper towels and safe place like fume hood shall be chosen for proper evaporation and burning of these towels should be done in a safe manner, use of respiratory and/or liquid-contact protection by the clean-up personnel will be promoted.

7.3.3.1 Need of establishing a fire fighting group

The alcohol spillage can cause uncontrolled fire and explosion scenes which will result in great economic losses and loss of life as well as property. Fire extinguishers/ hydrants/ water monitors/hose boxes/ nozzles etc will be regularly checked/ tested. The plant will have trained firefighting staff (security men) under control of Security Officer.

Inspection

Fire alarm panel (electrical) will cover the entire site. There will be regular inspection of fire extinguishers and hydrant networks. Two types of the inspections are carried out in the plant i.e. On Stream Inspection & Shutdown Inspection.

The emergency telephone number boards will be displayed at vital points.

Procedure for extinguishing fire

The following steps will be taken during a fire accident in the system:

- On receiving message about fire, one of the systems will be diverted to the place of the fire accident along with a staff member.
- Followed by plant fire station to be informed by phone or walkie-talkie of nearby area.
- In the meanwhile, the pipe system will be operated to obtain maximum pressure on output.

Fire-fighting with water

Adequate and reliable arrangement is required for fighting the fire with water such as:

- Provision for fire hydrant.
- Arrangement of pipelines of water all around vulnerable areas.
- Provision of valves at appropriate points
- Provision of overhead tanks which will be providing water.

Fire-fighting with fire extinguishers

Carbonaceous fire can be extinguished with water, whereas other types of fire require suitable fire extinguishers to do the job effectively. Adequate number of fire stations would be provided.

- In case of fire, other spray groups will be diverted to the fire area.
- In case of fire in the greenbelt, greenbelt will be cut near the burning portion to save the remaining parts.
- Foam material fire-fighting will be provided to control fire from the alcohol storage tank.

7.3.3.2 Environment Health and Safety Cell

The company will have full-fledged EHS cell (Environment Health & Safety Cell).

Main function of EHS cell will be

- To assess/quantify the potential risks/hazards to environment, health of employees & society
- Provide safety within the plant.
- Supervising installation of fire-fighting system, fire alarm, provision of safety/protective equipment to workers
- Keep a record of regular medical check-ups.
- Periodic monitoring of different parameters shall be carried out to ensure safety of environment and society.
- Conduction of trainings and mock drills in regular intervals for workers to ensure the safety in case of any accident or natural hazard.

7.3.3.3 Emergency Planning & Procedure

Emergency Control Center

Emergency Control Centre (ECC) is a cell which is active during emergency majorly and from where emergency operations are directed and coordinated. This center gets activated as soon as on-site emergency is declared.

General Description of ECC

The ECC will be designated in an area that poses minimal risk being directly exposed to possible accidents. During an emergency, site controller and emergency management staff shall gather. ECC shall consist of adequate communication systems in the form of telephones and other equipment to allow proper control in case of emergency.

Only limited no. of people specific to various tasks required in emergency are admitted to the ECC, when in use to avoid unnecessary interference, confusion & panic.

The ECC will consist of following facilities:

- Updated manual of the On-site Disaster Management Plan.
- Contact numbers required at the time of emergency.
- Contact numbers of external agencies, Govt. authorities.
- More than two telephones to be kept.
- Emergency lights, clocks, personal protective equipment.
- List showing fire extinguishers with their type no. and location, capacity, etc.
- No. of Safety helmets - list of quantity & location.
- Material safety data sheets for hazardous chemicals to be handled.
- Several maps of the facility including drainage system for surrounding area showing hazardous material storage area, water pipelines, PPEs storage, Pumping stations and water resources, roads and main entrances and assembly area along with network of hydrant lines.

7.3.3.4 Emergency planning for disaster due to fire and major hazards

Fire prone areas are cable rooms, transformer unit, auxiliary transformers, oil tanks, etc. within the plant for which emergency plan has to be delineated. Stores, workshop, canteen and administrative building will be included.

7.3.3.4.1 Consequence analysis

Major hazards associated with distillery are fire and explosion. Fire hazard due to alcohol storage, fuel storage, boiler operations etc. and explosion due to boiler operations. Ethanol is a highly flammable liquid.

Hazards due to ethanol - Flammable. Risk of ignition. Vapors may form explosive mixtures with air. Vapours of ethanol might travel/spread to a potential source of ignition capability and then flash back immediately. Containers may explode when heated. Vapors may form explosive mixtures with air. *[Source: MSDS of ethanol]*

Fire due to ethanol leakage can cause irreparable damage within plant premises. Burning of men and property in areas of leakage.

Common terminologies

Accident Site

The location either the factory premises or a transportation route where an unexpected event of failure / release of hazardous substance which have the potential of resulting into serious injuries or loss of life, extensive damage to property and/or environment occurs.

Airborne release

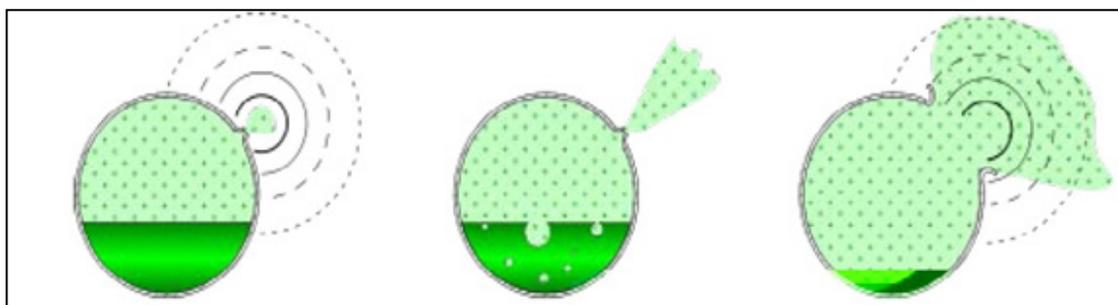
Release of any chemical into the air.

Boiling Liquid Expanding Vapor Explosion (BLEVE)

A BLEVE is a combination of fire and explosion with an intense radiant heat emission within a relatively short time interval. The phenomenon can occur within a vessel or tank containing pressurized liquid is ruptured as a result of a weakening of its structure, the contents are instantaneously released from the vessel as a turbulent mixture of liquid and gas, expanding rapidly and dispersing in air as a cloud. When this cloud is ignited, a fireball occurs, causing enormous heat-radiation intensity within a few seconds. This heat intensity is sufficient to cause severe skin burns and deaths at several hundred meters from the vessel, depending on the quantity of the gas involved. BLEVE can be caused by a physical impact on a vessel or tank, which is already overstressed or damaged.

A BLEVE event is shown below, the liquid of this vessel; heats up, the pressure rises and the relief valve operates, the release being ignited by the flame playing on the vessel. For a time the metal of this vessel is kept cool by liquid in contact with it, but the level falls as the liquid is vaporized, metal cooled only by vapor is exposed, becomes hot, weakens and ruptures. A large fraction of the flammable liquid gas released, vaporizes and forms a burning vapor cloud, often a fireball, causing enormous heat-radiation intensity within a few seconds. This heat intensity is sufficient to cause severe skin burns and deaths at several hundred meters from the vessel, depending on the quantity of the gas involved.

BLEVE OF A VESSEL CONTAINING A FLAMMABLE LIQUID GIVES RISE TO THE FOLLOWING EFFECTS



While the term BLEVE is most often used to describe the results of a container of flammable liquid rupturing due to fire, a BLEVE can occur even with a non-flammable substance such as water, liquid nitrogen, liquid helium or other refrigerants or cryogenics, and therefore is not usually considered a type of chemical explosion.

Chemical Abstract Service Number (CAS No.)

The chemicals will be listed by their common names and also by their Chemical Abstract Service (CAS) Number. While a chemical may be known by several different trade names, the CAS Number provides a unique and unambiguous identification.

Domino Effects (Knock-on)

An event at one site/plant may be the cause of a further event at another site / plant leading to escalation of hazard.

Evacuation

Removal of occupants and other persons from an area of danger.

Fire:

Pool Fire-

A pool fire occurs when a flammable liquid spills onto the ground and is ignited. A fire in a liquid storage tank is also a form of pool fire, as is a trench fire. A pool fire may also occur on the surface of flammable liquid spilled on to water.

Jet Fire

The ejection of flammable liquid from a vessel, pipe or pipe flange can give rise to a jet flame if the material ignites. Scenarios involving jet flames are not easy to handle, since a large jet flame may have a substantial reach sometimes up to 50 m or more. Jet flame may cause overheating of adjacent vessel and burst, giving a boiling liquid expanding vapor explosion or BLEVE.

Flash Fire / Vapor Cloud Explosion

When hydrocarbons' vapor is released accidentally and spread out in the direction of wind, it finds a ignition source before dispersed completely below the LEL (Lower Explosive limit) a flash fire occurs. If such fire occurs under pressure occurs the event is called vapor cloud explosion (VCE)

Fireball-

Fireball usually occurs as part of a BLEVE when a vessel ruptures after it has been engulfed in fire or has been subjected to a direct flame. The fireball may result either by bursting of a pressure vessel that may occurs under fire conditions and be part of a BLEVE /momentum forces predominate if a fireball is formed from bursting of a vessel, and buoyancy forces predominate in one formed from a vapor cloud in the absence of fire or by formation of a vapor cloud.

Threshold Limit Value (TLV)

TLV is a recommended time-weighted average concentration of a substance to which most workers can be exposed without adverse effect on health. The TLV's for gases and vapors are expressed in ppm (parts per million), which stands for parts of gases or vapors per million parts of air. The TLV's for fumes, mists, and some dusts are given as milligrams per cubic meter (mg/m³).

Vapour Cloud Explosion (VCE)

Clouds of flammable vapours with concentration within LEL and UEL (Upper Explosive Limit) may explode when it finds a source of ignition. Such explosions may occur within or outside the plant depending upon how the vapour has drifted before it finds the source of ignition. The explosion radiates intense heat.

Vulnerable Zone

An estimated geographical area that may be affected by the toxic release at levels that could cause irreversible acute health effects or death to human population within the area following an accidental release.

List of damages envisaged at various heat loads

S. No.	Heat loads (kW/m ²)	Type of Damage Intensity	
		Damage to Equipment	Damage to People
1.	37.5	Damage to process equipment	<ul style="list-style-type: none"> • 100% lethality in 1 min. • 1% lethality in 10 sec
2.	25.0	Minimum energy required to ignite wood	50% Lethality in 1 min. Significant injury in 10 sec
3.	19.0	Maximum thermal radiation intensity allowed on thermally unprotected equipment	--
4.	12.5	Minimum energy required to melt plastic tubing	1% lethality in 1 min
5.	4.0	--	First degree burns, causes pain for exposure longer than 10 sec
6.	1.6	--	Causes no discomfort on long exposures

Source: World Bank (1988). Technical Report No. 55: Techniques for Assessing Industrial Hazards. , Washington, D.C. The World Bank

Carbon dioxide gas released during fermentation can also cause various hazards if not collected properly and leakage occurs. Carbon dioxide is an odourless, colourless and toxic gas. The consequence analysis at various concentrations is given below: Carbon Dioxide is a powerful cerebral dilator. Carbon dioxide, if present at concentrations between 2 and 10% might cause nausea, dizziness, headache, mental confusion, increased blood pressure and respiratory rate. Above 8% nausea and vomiting might appear and above 10% it might cause suffocation and lethality can occur within minutes. [Source: SDS of Carbon dioxide]

Effects of blast over-pressure on structure

Structural Element	Failure	Approximate peak side-on overpressure psi (1 bar = 14.7 psi)
Window Panes	5 % broken	0.1 – 0.15
	50 % broken	0.2 – 0.4
	90 % broken	0.5 – 0.9
Houses	Tiles displaced	0.4 – 0.7
	Doors and window frames broken	0.8 – 1.3
	Inhabitable after repair-some damage to Ceilings, windows and tiling	
	Minor structural damage, partitions	0.2 – 0.4
	Uninhabitable: partial or total collapse of Roof, partial demolition of one or two external walls, severe damage to load bearing partitions	
	50-75 % external brickwork destroyed or rendered unsafe	
	Almost complete demolition	0.5 – 0.9
Telephone Poles	Destroyed	10 – 25
Large Trees	Destroyed	24 – 55
Rail freight Wagons	Limit of derailment	12 – 27

Emergency Response Planning Guidelines (ERPGs)-

ERPGs estimate the concentrations at which most people will begin to experience health effects if they are exposed to a hazardous airborne chemical for 1 hour. (Sensitive members of the public—such as old, sick, or very young people—aren't covered by these guidelines and they may experience adverse effects at concentrations below the ERPG values.) A chemical may have up to three ERPG values, each of which corresponds to a specific tier of health effects.

The three ERPG tiers are defined as follows:

ERPG-3	The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing life- threatening health effects.	
ERPG-2	The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action.	
ERPG-1	The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient health effects or perceiving a clearly defined, objectionable odor.	

7.3.3.4.2 Proposed Alcohol Storage tanks:

S. No.	Fluid	Material of Construction	No. of tank	Size (mm)		Capacity in KL
				Diameter	Height	
1	Ethanol	MS	3	6000	8000	678
2	Ethanol	MS	2	15000	15500	5478
3	Ethanol	MS	1	6000	9000	254
4	ENA	MS	3	6000	8000	678
5	ENA	MS	3	7200	9500	1160
6	RS	MS	2	6000	8000	452
7	Impure spirit	MS	2	2500	4500	44
8	Impure spirit	MS	1	5000	8000	157
9	Malt Spirit	SS	3	2000	4000	37
10	Malt Spirit	SS	2	6500	8000	530

Scenario of Ethanol in different forms:

SITE DATA:

Location: MAHASAMUND, CHHATTISGARH, INDIA

Building Air Exchanges Per Hour: 0.5 (user specified)

Time: August 5, 2023, 17:25 hours ST (using computer's clock)

CHEMICAL DATA:

Chemical Name: ETHANOL

CAS Number: 64-17-5

Molecular Weight: 46.07 g/mol

ERPG-1: 1800 ppm ERPG-2: 3300 ppm ERPG-3: N/A

IDLH: 3300 ppm LEL: 33000 ppm UEL: 190000 ppm

Ambient Boiling Point: 77.5° C

Vapor Pressure at Ambient Temperature: 0.098 atm

Ambient Saturation Concentration: 101,581 ppm or 10.2%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 2.5 meters/second from W at 3 meters

Ground Roughness: open country

Cloud Cover: 5 tenths

Air Temperature: 29° C

Stability Class: C

No Inversion Height

Relative Humidity: 65%

SCENARIO 1: LEAKING TANK, CHEMICAL IS NOT BURNING AND FORMS AN EVAPORATING PUDDLE

Potential hazards from flammable chemical which is not burning as it leaks from tank.

- Downwind toxic effects
- Vapour cloud flash fire
- Over pressure (blast force) from vapour cloud explosion

SOURCE STRENGTH:

Leak from hole in vertical cylindrical tank

Flammable chemical escaping from tank (not burning)

Tank Diameter: 15 meters

Tank Length: 15.5 meters

Tank Volume: 2,739 cubic meters

Tank contains liquid

Internal Temperature: 29° C

Chemical Mass in Tank: 2,035,668 kilograms

Tank is 95% full

Circular Opening Diameter: 20 centimeters

Opening is 3.88 meters from tank bottom

Ground Type: Concrete

Ground Temperature: equal to ambient

Max Puddle Diameter: Unknown

Release Duration: ALOHA limited the duration to 1 hour

Max Average Sustained Release Rate: 538 kilograms/min

(averaged over a minute or more)

Total Amount Released: 20,376 kilograms

Note: The chemical escaped as a liquid and formed an evaporating puddle.

The puddle spread to a diameter of 147 meters.

When, flammable chemical escaping from tank chemical is **NOT** on fire Choose Hazard to

Analyze: **Toxic Area of Vapour Cloud**

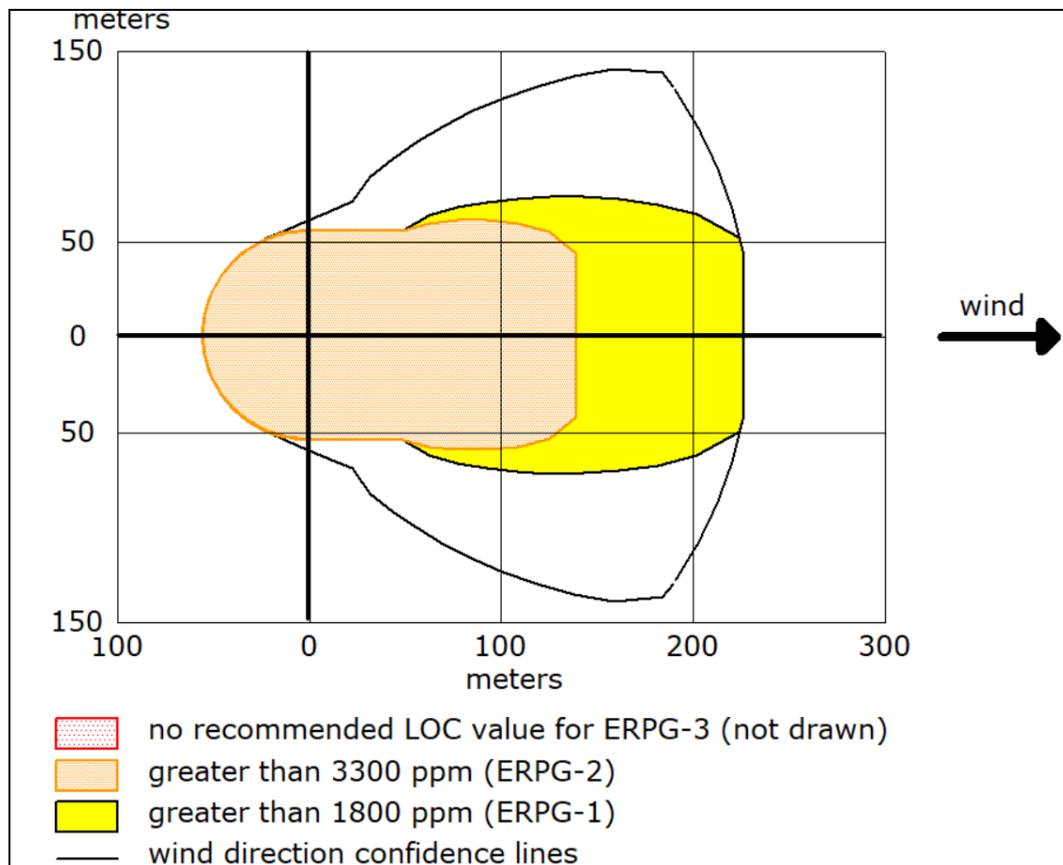
THREAT ZONE:

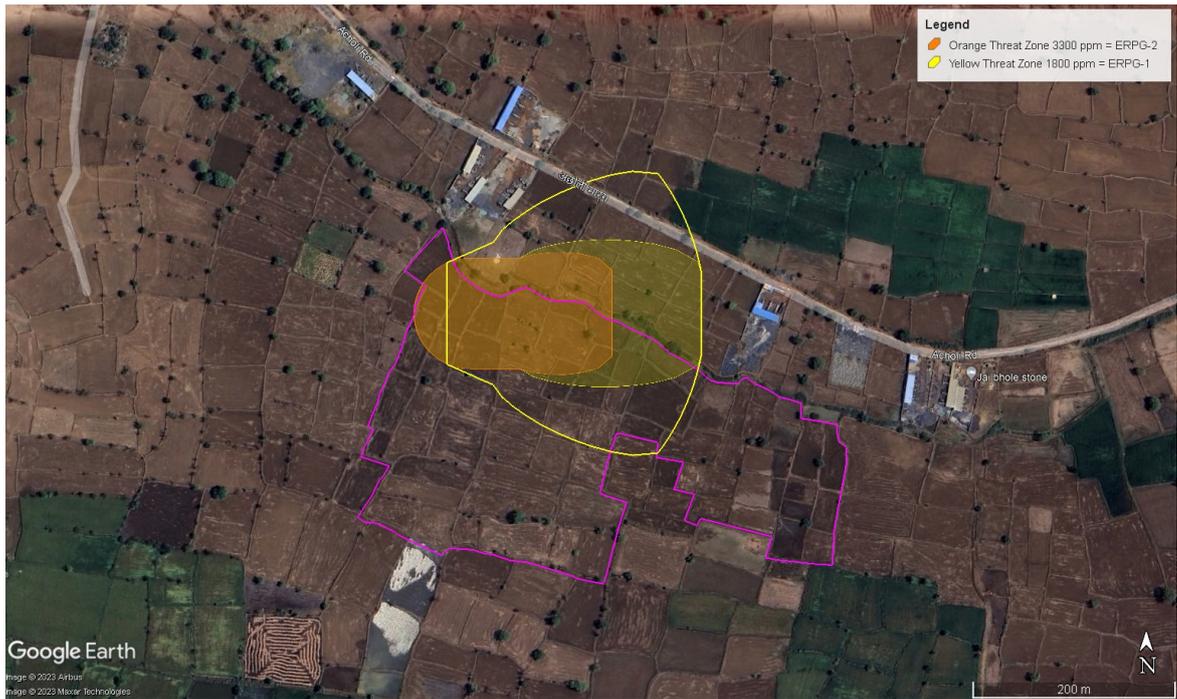
Model Run: Heavy Gas

Red: no recommended LOC value --- (N/A = ERPG-3)

Orange: 140 meters --- (3300 ppm = ERPG-2)

Yellow: 227 meters --- (1800 ppm = ERPG-1)





When, Flammable chemical escaping from tank chemical is NOT on fire Choose Hazard to Analyze:

Flammable Area of Vapour Cloud

Local areas of flame can occur even though the average concentration is below the LEL. Model finds the flammable area by using 60% of LEL.

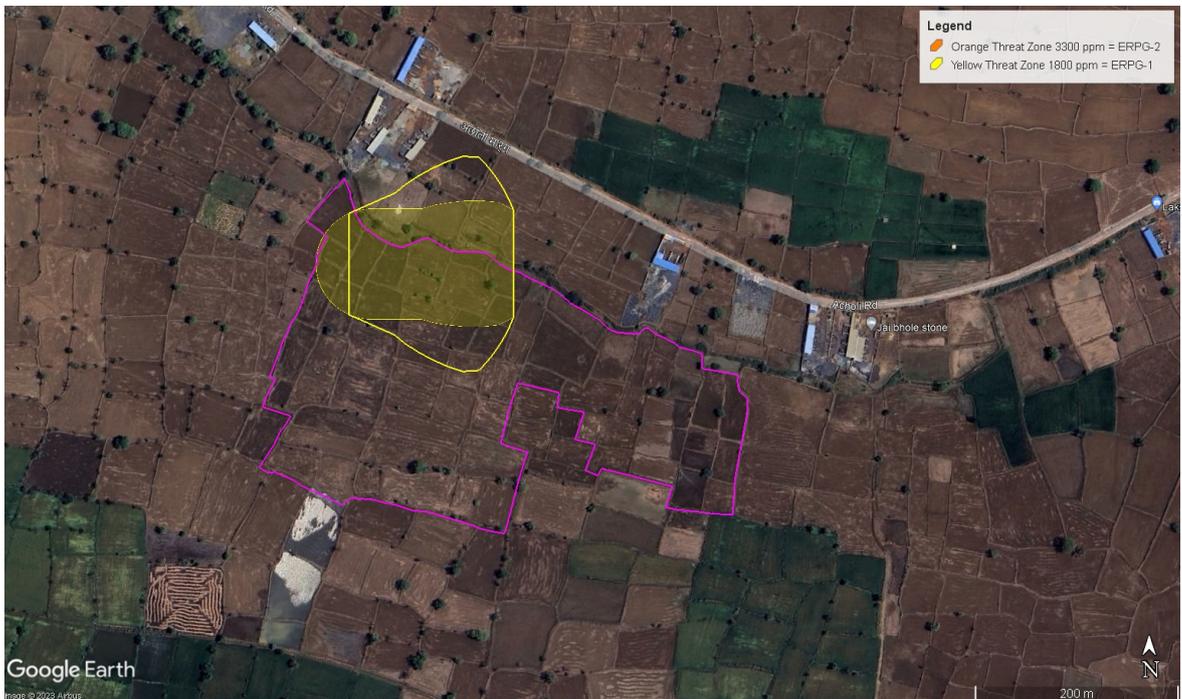
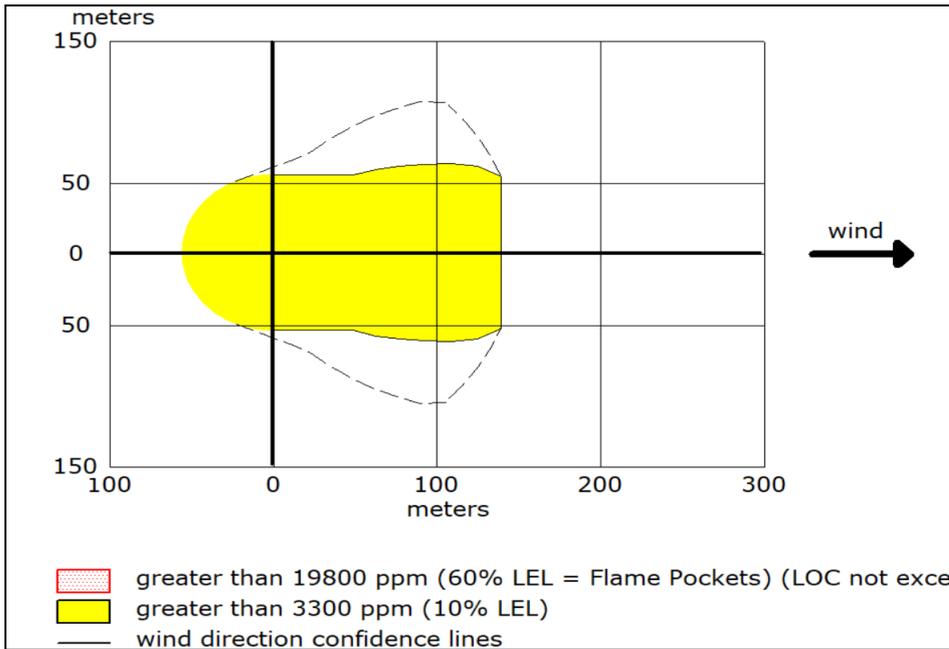
THREAT ZONE:

Threat Modeled: Flammable Area of Vapor Cloud

Model Run: Heavy Gas

Red: LOC was never exceeded --- (19800 ppm = 60% LEL = Flame Pockets)

Yellow: 140 meters --- (3300 ppm = 10% LEL)



When, flammable chemical escaping from tank chemical is **NOT** on fire Choose Hazard to Analyze: **Blast Area of Vapour Cloud Explosion**

THREAT ZONE:

Threat Modeled: Overpressure (blast force) from vapor cloud explosion

Type of Ignition: ignited by spark or flame

Level of Congestion: congested

Model Run: Heavy Gas

No explosion: no part of the cloud is above the LEL at any time

SCENARIO 2: LEAKING TANK, CHEMICAL IS BURNING AND FORMS A POOL FIRE

Potential hazards from chemical which is burning as it leaks from tank:

- Thermal radiation from pool fire
- BLEVE (if heat rises the internal tank temperature and causes the tank to fail)
- Downwind toxic effects of fire byproducts

SOURCE STRENGTH:

Leak from hole in vertical cylindrical tank

Flammable chemical is burning as it escapes from tank

Tank Diameter: 15 meters

Tank Length: 15.5 meters

Tank Volume: 2,739 cubic meters

Tank contains liquid

Internal Temperature: 29° C

Chemical Mass in Tank: 2,035,668 kilograms

Tank is 95% full

Circular Opening Diameter: 10 centimeters

Opening is 3.88 meters from tank bottom

Max Puddle Diameter: Unknown

Max Flame Length: 13 meters

Burn Duration: ALOHA limited the duration to 1 hour

Max Burn Rate: 362 kilograms/min

Total Amount Burned: 20,921 kilograms

Note: The chemical escaped as a liquid and formed a burning puddle.

The puddle spread to a diameter of 16.7 meters.

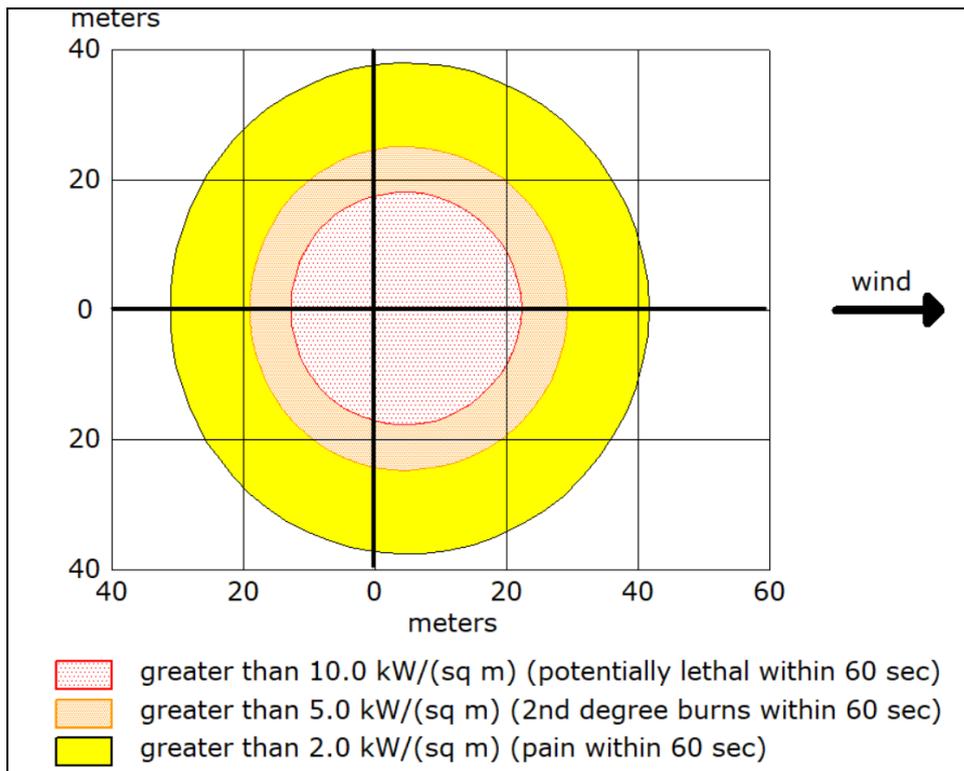
THREAT ZONE:

Threat Modeled: Thermal radiation from pool fire

Red: 22 meters --- (10.0 kW/(sq m) = potentially lethal within 60 sec)

Orange: 29 meters --- (5.0 kW/(sq m) = 2nd degree burns within 60 sec)

Yellow: 42 meters --- (2.0 kW/(sq m) = pain within 60 sec)



SCENARIO 3: BLEVE, TANK EXPLODES AND CHEMICAL BURNS IN A FIREBALL

Potential hazards from BLEVE:

- Thermal radiation from fireball and pool fire
- Hazards fragments and blast force from explosion
- Downwind toxic effects of fire by-products

BLEVE/Fire ball Scenario: The higher the internal tank pressure/temperature at the time of tank failure, the larger the fire ball. Any liquid not consumed by the fire ball will form a pool fire.

SOURCE STRENGTH:

BLEVE of flammable liquid in vertical cylindrical tank

Tank Diameter: 15 meters

Tank Length: 15.5 meters

Tank Volume: 2,739 cubic meters

Tank contains liquid

Internal Storage Temperature: 29° C

Chemical Mass in Tank: 2,035,668 kilograms

Tank is 95% full

Percentage of Tank Mass in Fireball: 100%

Fireball Diameter: 735 meters

Burn Duration: 34 seconds

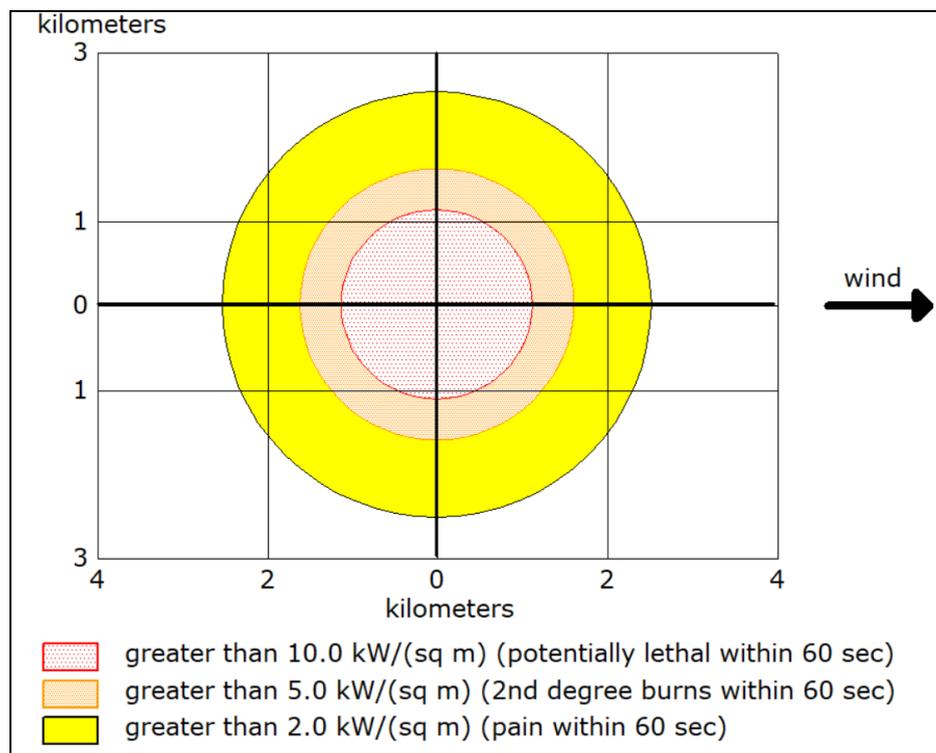
THREAT ZONE:

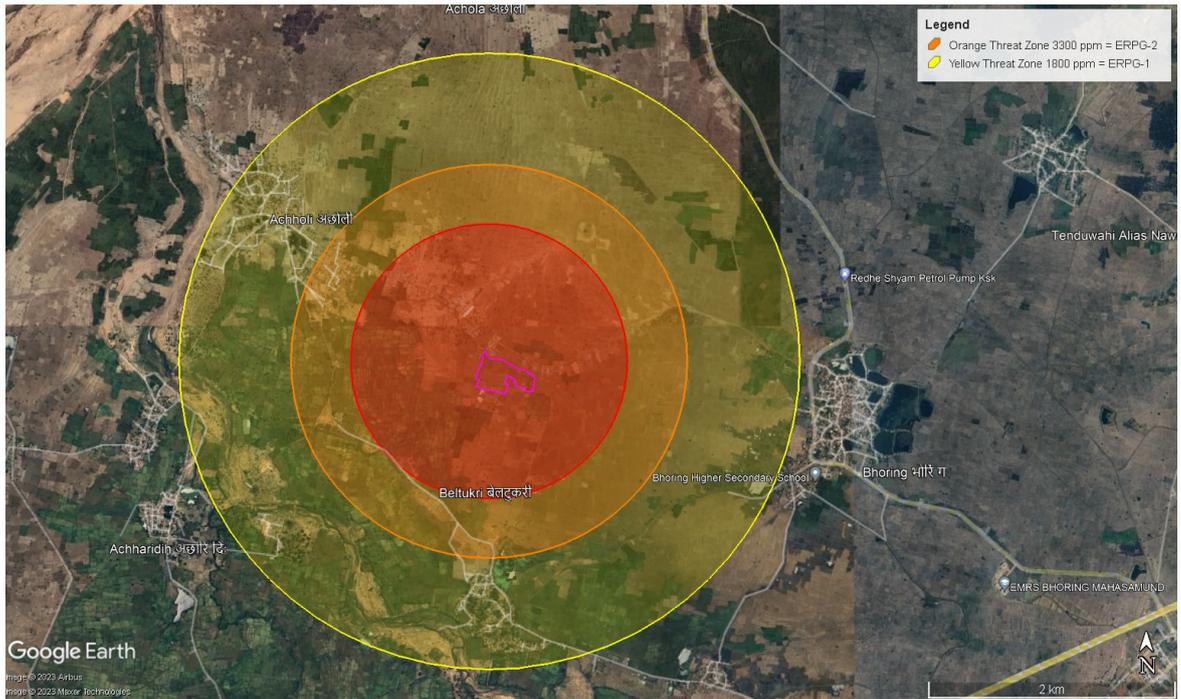
Threat Modeled: Thermal radiation from fireball

Red: 1.1 kilometers --- (10.0 kW/(sq m) = potentially lethal within 60 sec)

Orange: 1.6 kilometers --- (5.0 kW/(sq m) = 2nd degree burns within 60 sec)

Yellow: 2.5 kilometers --- (2.0 kW/(sq m) = pain within 60 sec)





Conclusions

Scenario 1

When ethanol is leaking from tank and is NOT burning, forms an evaporating puddle; the threat zone for the Ethanol tank does not recommend the LOC value as per the Emergency Response Planning Guidelines ERPG-3. Hence the Red colored level of concern is not recommended. No villages are falling within this area.

Scenario –2

When ethanol is leaking from tank and is burning forms a pool fire; the thermal radiation for the Ethanol tank confined to the maximum at 22 meters only for which the thermal radiation intensity of 10 kW/m² is potentially lethal within 60 seconds. Similarly, the other threat zone of 5.0 kW/m² causes 2nd degree burns within 60 seconds at 29 m and the rest is 2.0 kW/m² at 42 m which causes pain within 60 seconds. Hence, all Red, Orange & Yellow colored level of concerns are almost within plant premises only which will not affect any nearby villages.

Scenario-3

When tank explodes and ethanol is in a fireball due to BLEVE; the thermal radiation for the Ethanol tank is confined to the maximum at 1.1 Km for which the thermal radiation intensity of 10 kW/m² is potentially lethal within 60 seconds. Two stone mills is falling within 1.1 km which is likely to be affected. Similarly, the other threat zone of 5.0 kW/m² causes 2nd degree burns within 60 seconds at 1.6 km and the rest is 2.0 kW/m² subjected at 2.8 km within the study area, which causes pain within 60 seconds. Villages Achholi, Beltukri and some small habitats are likely to be slightly affected in orange and yellow level of concern.

7.3.4 Onsite emergency plan/disaster management plan

Definition

A major on site emergency in an operational plant is one which has the potential to cause serious injury or loss of life. It has the ability to cause great loss of life and property as well as economical losses.

Objective

The overall objectives of the emergency plan will be:

- To prevent the emergency situation within plant premises boundary only so that it does not harm life and property outside the zone
- To best possible minimize the effects of the accident on people and property.

Elimination will require immediate and prompt action by operations and work emergency staff, for example, fire-fighting equipment, water sprays etc.

Minimizing the effects may include rescue, first aid, evacuation and giving information promptly to people living nearby.

7.3.4.1 Disaster Control Management System

Disaster Management group plays an important role in combating emergency in a systematic manner. Details of Emergency Control Management system with key personnel and their responsibilities and duties are listed below.

Key personnel of the Emergency Organization

1.	Site Main Controller (SMC)	Location Head / Factory Manager
2.	Operation Coordinator / Incident Controller (IC)	Area In charge (Sr. V. P/V.P/AVP/Sr.GM/GM/ DGM/AGM/Sr. Manager/Manager)
3.	Fire Fighting /Rescue Coordinator	Security Sr. Manager/ Safety Sr. Manager/Safety Officer / Security officer
4.	Service Coordinator	Engineering Head/GM/DGM/AGM/Sr. Manager/Dy. Manager/Asst. Manager
5.	Medical Coordinator	Administrative Manager/ Factory Medical Officer/ Authorized First Aider
6.	Assembly Point Coordinator	HR & Personnel Manager/Dy. Manager/Asst. Manager/Time office Asst./Contractors

PERSONS AUTHORIZED TO RAISE THE MCP (Manual Call Points)

(In priority order)

1. Concerned department head
2. Shift In-charges of concerned department
3. Section Chemist / Operator / security in-charge
4. Any person noticing the incident.

Key personnel	Responsibilities and duties
Site Main Controller (SMC)	<ul style="list-style-type: none"> • Immediately after hearing about emergency, he will go to emergency control center & relieve the incident controller of the responsibilities for overall main control. • Assess scale of emergency; decide if intimation of off-site emergency plan is required. If it is so, take necessary action. • Decide about the nature of help required such as evacuation, traffic control, warning to the public, vehicles requirement etc. • Consult head of department & decide about the operation of the factory. Decide safe shutdown & evacuation of plant personnel. • If necessary, arrange of evacuation of neighboring population. • Arrange for chronological record of emergency to be maintained. • Appraise the works managers of the neighboring industries about the situation for additional help, if needed. • Ensure that the causality (If any), are given medical attention and that the relatives are informed, if necessary. • Authorize the termination of emergency by sounding of “All clear” Siren which will be a continuous long siren for three minutes. • Issue an authorized statement in the news media.
Operation Coordinator / Incident Controller (IC)	<ul style="list-style-type: none"> • To assess scale of emergency. Give the message to main Control Room. • If major emergency exists, immediate informed to SMC • Formulate the strategies & advise to SMC. • Maintain the direct communication with the member of emergency team. • Ensure about information to nearby factory & alert them. (if required.) • Ensure that outside agencies have been called in. • Decide safe route of entry for external help. • Brief the site main controller & keep them informed of the developments. • Check casualty & injured person & help during head count of workers of plant. • Co-ordinate with external agencies after arrival of site main controller. • Preserve all evidence for use in the subsequent enquiry.
Fire Fighting /Rescue Coordinator	<ul style="list-style-type: none"> • Be over all in charge of the firefighting & provide support in rescue operation • Inform the Site main controller if external fire tender /firefighting equipment is required.

	<ul style="list-style-type: none"> • Maintaining adequate supplies for firefighting equipment well as personal protective equipment. • Ensure that the firefighting team members in danger their lives during firefighting due to anxiety. • Reply to the questions raised by the external fire bridge and guide them for their necessary support. • Maintain the necessary advice by Incident controller • Give the final combat message to Site main Controller
Security Team	<ul style="list-style-type: none"> • On hearing the siren locate the place of emergency. • Keep the main gate open till getting all clear siren • Stop visitor to come inside the factory premises • Allow only essential vehicles like fire tender / foam tender, Ambulance, First Aid vehicle to come inside the plant. • Deputy Security guard to control traffic on internal road • Lead the external agencies to reach the incident site.
UTILITY & ENGINEERING TEAM (Service – Co-Ordinator)	<ul style="list-style-type: none"> • Ensure un-interrupted electric supply to hydrant pumps. • On hearing siren ensure that fire water pumps are running. • Monitor the fire water level & maintain it. • Arrange to remove or isolate the restriction on the channels as required under the situations. • The team will help the operation team in isolating the plants/ equipment/ storage tanks/ and putting the blinds in pipelines. • Maintenance team will also get necessary equipment's like cranes, dozers, trucks, welding and cutting set etc. as needed for tackling the emergency and make available required personnel to operate above facilities.
FIRST AIDERS	<ul style="list-style-type: none"> • On hearing the Siren / Message departmental First Aiders will rush to the incident site/ location with first aid kit and report to incident controller. • He will assess the type of injury and number of victims and call for Ambulance and inform the occupational Health center • Other departmental first aiders will rush to the incident site / location with first aid kit (after informing his departmental head and closing his departmental critical activities) and report to incident controller.
Medical & Assembly Co-Ordinator	<ul style="list-style-type: none"> • Personnel department shall be able to reconcile head count of that area immediately • Co-ordinate with OHC for injured persons and attendance of O.K Persons

	<p>from that area</p> <ul style="list-style-type: none"> • Ask OHC doctor / Pharmacist about help from hospital / Nursing home and arrange for items required urgently by the pharmacist and doctor for first aid purpose • Arrange for refreshment / water etc. engaged in emergency handling • Get ready with additional transport arrangement if required • Inform relative of victim in case something serious is observed as well as inform contractor's supervisor in case of contractual labor.
COMMUNICATION OFFICER (EPBAX / Telephone Operator)	<ul style="list-style-type: none"> • Ensure that telephone operator has conveyed message to key personnel. • Maintain communication with the incident officer. • From information received, advise factory manager to give order for evacuation of the staff. • Identify suitable staff to act as runner in case of failure of telephone (Internal) • After receiving names of persons not reached to the assembly point inform incident officer about the same.
Shift Incharges of Other Plants	<p>Follow your specific duty if you are leader of an essential team. But ensure following points.</p> <ul style="list-style-type: none"> • Try to identify plant under emergency & type of emergency. • If your plant is affected due to emergency you can stop the plant partially or fully. • Suspend all hot work / vessel entry jobs. Ask persons inside the vessel to come outside immediately. • Instruct contractor's labor to stop work safely & go to assembly point. • Relieve firefighting core group members immediately. • Ask plant employees to carry out DCP extinguishers on main road
<p>All workers, including contract workers who have not been assigned any duty, will rush to the assembly point and remain there and wait for instructions from the Assembly Point coordinator and should render help if required and as per instructions..</p>	

7.3.4.2 NFPA Rating of Hazardous Chemicals

Toxicological data for hazardous chemicals is given below:

NFPA Rating of Hazardous Chemicals

Hazardous chemicals	Degree of purity	NFPA hazard classification		
		Toxicity	Flammability	Reactivity
Rectified Spirit	95%	2	3	0
Ethanol	99.7%	2	3	0
Hazard Classification	Definition			
Health Hazard Classification				
4	Materials which on every short exposure could cause death or major residual injury even through prompt medical treatment were given			
3	Materials which on short exposure could cause serious temporary or residual injury even through prompt medical treatment were given.			
2	Materials which on intense or continued exposure could cause temporary incapacitation or possible residual injury unless prompt medical treatment is given.			
1	Materials which on exposure could cause irritation but only, minor residual injury even if on treatment is given.			
0	Material beyond that of ordinary combustible material.			
Flammability classification				
4	Materials; which will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature, or which are readily dispersed in air and which will burn readily.			
3	Liquid and solids that can be ignited under almost all ambient temperature conditions.			
2	Material that must be moderately heated or exposed to relatively high ambient temperature before ignition can occur			
1	Material that must be preheated before ignition can occur.			
0	Materials that will not burn.			
Reactivity classification				
4	Materials which in themselves are readily capable of detonation or of explosive decomposition or reaction at normal temperature and pressure			
3	Materials which in themselves are capable of detonation or explosive reaction but require a strong initiating source or which must be heated under confinement before initiation or which react explosively with water			
2	Materials which in themselves are normally unstable and readily undergo violent chemicals change but do not detonate. Also materials which may react violently with water or which may form potentially explosive mixture with water.			
1	Materials which in themselves are normally stable, but which can become unstable at elevated temperature and pressure or which may react with water with some release of energy but not violently.			
0	Materials which in themselves are normally stable, even under fire exposure conditions, and which are not reactive with water.			

7.3.4.3 Communication

- (a) On declaration of an emergency, the Emergency control Centre that is to be used M/s Piccadily Agro Industries Ltd., will be provided with adequate telephones that can be used for internal and external communication. In the event that telephones fail, external communications will be maintained through the police wireless system. In fact, the police wireless system is most reliable communication network. Short distance communication within the vulnerable zone or outside may also be done using walkie talkies.
- (b) **Telephone Numbers:** Important telephone numbers need to be made available and displayed at all vulnerable points.
- (c) **Transport:** In the initial phases of the emergency, use of transport vehicles will be minimal. As the emergency progresses, M/s Piccadily Agro Industries Ltd. and police vehicles, ambulances and other government and private vehicles will be pressed into service. State transport buses may also requisition, if necessary.
- (d) **Evacuation:** Evacuation procedures in the vulnerable zone should be initiated within 10 minute declaring emergency. They will follow all instructions already mentioned in onsite emergency plan in previous chapter. Evacuees should leave all belongings, lock their homes or shops, and shut all doors and windows to prevent vapour entrainment and proceed to the nearest roadblock point or temporary shelter, in a direction perpendicular to wind flow. From the roadblock points, the police transport all evacuees may to the closest temporary shelter camp.
- e) **Warning alarm and security system:** Plant has electric alarm to sound emergency at plant and has following patterns to indicate emergency. For efficient security of the plant adequate security guards and supervisors with adequate training for firefighting undertake security round the clock.

S. No.	SIRENS	INDICATES	AUTHORITY
1.	10-Second-long Weep 2 Second Small Weep (Two min.)	ON SITE EMERGENCY (ALERT)	INCIDENT CONTROLLER/Sr. Safety Manager/Sr. Security Manager
2.	02 Minutes Continuous weep	EMERGENCY CONTROLLED (ALL CLEAR)	SITE CONTROLLER

- f) **Protective Equipment (PPE):** The list of Personal Protective Equipment provided at the Piccadily Agro Industries Plant facility and their locations shall be available in ECC. Personal protective equipment play a vital role in overcoming major disastrous situation saving life during onsite emergency.

Table 7.2

Summary of recommended personal protective equipment according to hazard onsite

Objective	Workplace Hazards	Suggested PPE
Eye and face protection	Flying particles, molten metal, liquid chemicals, gases or vapors, light radiation	Safety glasses with side-shields, protective shades, etc.
Head protection	Falling objects, inadequate height clearance, and overhead power cords	Plastic helmets with top and side impact protection
Hearing protection	Noise, ultra-sound	Hearing protectors (ear plugs or ear muffs)
Foot protection	Falling or rolling objects, points objects. Corrosive or hot liquids	Safety shoes and boots for protection against moving and falling objects, liquids and chemicals
Hand protection	Hazardous materials, cuts or lacerations, vibrations, extreme temperatures	Gloves made of rubber or synthetic material (Neoprene), leather, steel, insulation materials, etc.
Respiratory protection	Dust, fogs, fumes, mists, gases, smokes, vapors	Facemasks with appropriate filters for dust removal and air purification (chemical, mists, vapors and gases). Single or multi-gas personal monitors, if available
	Oxygen deficiency	Portable or supplied air (fixed lines). Onsite rescue equipment
Body / leg protection	Extreme temperatures, hazardous materials, biological agents, cutting and laceration	Insulating clothing, body suits, aprons etc. of appropriate materials
Contact with HSD	Fuel oil storage and fuel Handling	Canister type gas mask. PVC or Rubber. Goggles giving complete protection to eyes. Eye wash fountain with safety
Fly Ash	Fly ash handling and storage	Wear dust-proof goggles and rubber or PVC gloves.

ASSEMBLY POINTS

In case of an EMERGENCY the employees should assemble near the defined Assembly Points, as indicated below: -

Assembly Point-01

Assembly point-02

Assembly Point-03

Assembly Point-04

Wind direction to be determined by the windsocks installed on top of the tank. The employees should run perpendicular to the wind direction and not against / along the wind direction.

TRAINING AND EDUCATION:

Experience with on site –emergency planning has proved the need of training and rehearsal. Major emergency procedure should be laid down clearly and convincingly to everyone on site particularly Key Personnel and Essential workers.

It is obvious that in house or outdoor training is essential. The duties and responsibilities of each person and the emergency procedure to be followed by him should be very clear.

Seminar/refresher guidance On Site Emergency Plan Seminar: Seminar is conducted in house/. Site controller will explain the plan to all associated concerned employees.

Expert from outside explain the plan to all associated concerned employees. Expert from also may be invited to impart training.

MOCK REHEARSAL:

Inform all the employees about mock drill. Fix the date for mock drill.

Observers will not be involved in the exercise. They will monitor the Mock drill. Emergency Siren / alarm will be raised.

After hearing the Siren / alarm, Emergency procedure will be followed as mentioned in the OEP.

Observer will note down the activities with respect to the time.

7.3.4.4 Emergency Action Plan

ANYONE NOTICING EMERGENCY SITUATION LIKE FIRE, EXPLOSION, TOXIC GAS LEAKAGE ETC.

MUST DO's

Attract the nearby person/employee by shouting “FIRE – FIRE – FIRE. “ Raise the nearby Manual Call point.

Seek help from the persons working nearby.

Try to control the incident at its initial stage with available means/sources quickly. Inform Shift In-charge / Duty Officer (In Night Shift) about the Incident.

DON'Ts

Do not be panicky.

Do not run – Walk fast.

An INCIDENT CONTROLLER MUST

DO's

A. IF FIRE / OTHER INCIDENTS ARE CONTROLLABLE

Approach the emergency site immediately taking note of wind direction. Assess the situation.

Inform Control Room-444, Tell – NAME, TYPE OF INCIDENT, ACTION TAKEN, HELP NEEDED and Order Security Officer/Guard to inform all KEY persons.

Take lead in controlling emergency until such time concerned Section Manager takes over the charge.

DON'TS

Do not be panicky.

Do not lose temperament.

B IF FIRE/OTHR INCIDENTS ARE NOT CONTROLLABLE

In Addition to Above (A)

Approach the emergency site immediately taking note of wind direction.

Assess the situation.

Inform Control Room Tell – NAME, TYPE OF INCIDENT, ACTION TAKEN, HELP NEEDED and Order Security Officer/Guard to inform all KEY persons.

Take lead in controlling emergency until such time concerned Section Manager takes over the charge. Order to blow emergency `ALERT` Siren as per identification of siren

Organize Firefighting / rescue team members to control the Incident.

Take stock of situation if required shut down the plant / process in affected area. Call Fire Brigade if situation demands.

Evacuate affected area. Organize head count of the plant.

Act as INCIDENT CONTROLLER till such time senior person takes charges as indicated in Emergency organization

NOTE:

1. Messenger will wait until such time Security Officer arrives.
2. Also inform Telephone Operator.

SECURITY OFFICER / SAFETY OFFICER / SECURITY GUARD/FIRE MAN (Control Room)

DO's

Do not allow any vehicle to come inside the factory.

Do not entertain any outside call except for emergency purpose. Do not allow visitors to move around.

Inform all key persons about location and type of emergency.

Follow this sequence – Inform concerned HOD/Section Head, Main Site Controller, Main Incident Controller & Safety Officer, and other KEY persons.

Inform Main Site Controller about Government visitors, if any.

DON'Ts

Do not entertain any outside call except for emergency purpose. Do not allow visitor to move around, from reception.

SECURITY GUARD/FIRE MAN

DO's

Immediately report at Security Gate in shortest possible time.

Follow instructions of Officer In-charge. Assist in controlling emergency.

Assist in controlling contractors, vehicle movement and mob. Assist in cordoning off the area.

Take note of wind direction while approaching emergency site. Render all possible help for controlling overall situation.

DON'Ts

Do not leave the site unless asked to do so.

EMERGENCY VEHICLE DRIVER (AMBULANCE, FOAM TENDER)

DO's

Immediately start vehicle and reach rescue squad assembly point (near security gate). Rescue squad members to emergency site.

Take vehicle near to emergency site as directed. Take note of wind direction.

Reverse the emergency vehicle for quick transports of injured, if any. Keep vehicle engine running.

Always be on Driver's seat of the vehicle. Take the injured to the hospital as directed.

DON'Ts

Do not leave the vehicle.

Do not take the vehicle very near to the site

After getting satisfied with the situation, give instruction to blow ALL CLEAR Siren.

DON'Ts

Do not instruct to blow ALL CLEAR siren unless the situation is fully under control. Don't evacuate the entire plant unless the situation demands.

FIRE FIGHTING & RESCUE SQUAD ON HEARING SIREN DO's

Inform fellow employees/Officers. Report to Fire Squad Assembly point. Find out emergency location.

Approach emergency site immediately.

Take quick action as per the instructions from Incident controller. Bring emergency under control as early as possible.

Get in touch with security about location and type of emergency.

Approach emergency site quickly with Breathing Apparatus set and First Aid box. Get in touch with incident controller.

Follow instructions of Incident controller.

Render first aid to the injured, hospitalize, if required. Accompany him to hospital and assist Doctor / Nurse. Search for missing person in that area, if required.

Help in head count.

DON'Ts

Do not leave process/equipment in **UNSAFE CONDITION**. Do not leave emergency site unless **ALL CLEAR** siren blown. Do not use improper fire extinguisher.

Do not be panicky.

ALL GENERAL EMPLOYEES EXCEPT THOSE WHO ARE IN EMERGENCY ORGANIZATION ON HEARING SIREN

DO's

Be alert and be available if required. Wait for further instructions.

Bring down the process/plant/equipment in **SAFE CONDITION** in case of **DISASTER** siren as per instructions from Incident Controller.

Approach respective safe assembling points route as taking note of wind direction. Help in taking roll call.

After hearing **ALL CLEAR**, go back to the departments.

Start the work again after setting instruction from Incident controller.

DON'Ts

Do not be panicky. Do not run.

Do not approach emergency site unless asked for.

Do not engage telephone except for emergency purpose. Keep lines free.

TECHNICAL TEAM: ENGINEERING DEPARTMENT (Electrical, Mechanical, Civil, Instrumentation, Technical Contractor)

DO's

Be available in Engineering Department at respective location for any help.

Approach emergency site with required with tools and equipment and should work on instructions of Incident controller.

Help Incident Controller to provide technical assistance.

Isolate lines, process equipment, if required by Incident Controller.

Provide emergency equipment like Fire Extinguisher, Hoses, etc., if asked by Incident Controller.

Provide stop gap arrangements as per the requirement of Incident Controller. Carry out electrical isolation of area as per instructions from Incident Controller.

GENERAL INTRUCTIONS

DO'S

Stop work at height. / Stop all hot works. Stop all vessel entry.

Take note of wind direction.

On hearing Emergency Siren evacuates as per evacuation route without running and panicky and assembles at respective safe Assembly Points.

DON'Ts

Do not use telephone except for emergency purpose.

Do not start work at height, vessel entry, hot work unless permit conditions are verified. Do not allow unauthorized person to approach emergency site.

7.3.5 Off-Site Emergency Planning

Off site emergency plan is based on those accidents/mishaps identified by the works management, which could affect people and the environment outside the project site. The roles of the various parties that may be involved in the implementation of an off-site plan are described below. The responsibility for the off-site plan will be likely to rest either with the management of industry or with the local Government authority. Table below shows communication nos. during offsite emergency.

Table 7.3
Local Statutory Government bodies

S. No.	Name of Govt. Agency	Phone Nos.
1	District collector/ Magistrate	+91 7723222540
2	Upper Collector	07723-223307
3	Deputy Collector	9425564594
4	Nagar Palika, Mahasamund	07723-222090
5	Superintendent of Police	9479192300
6	CEO Zila Panchayat	07723223834
7	SDM Mahasamund	+91 9630819999
8	Police helpline	112
9	Fire helpline	101
10	Ambulance helpline	102
11	Chief Medical and Health Office, Mahasamund	07723-222232/224885
12	District Disaster Control Room	07723-223305

Consideration of evacuation in case of emergency may include the following factors:

- If fire hazard occurs but without explosion risk (e.g. an oil storage tank), only houses close to the fire area need evacuation
- In case fire is escalating very fast it is necessary to evacuate people nearby
- In case of acute emergency people are advised to stay indoors and shield themselves from the fire.

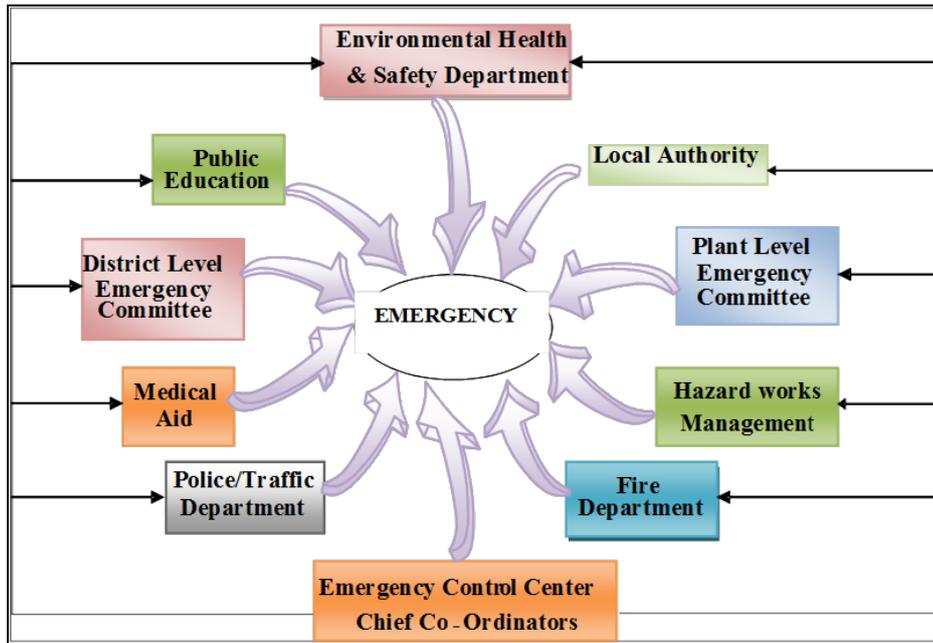


Figure 7.1: Various organizations involved during emergency

Organization

The organizations which may be involved, predefined warning systems, defined implementation procedures, emergency control centers include name and appointments of all personnel having prior responsibilities.

Communications

Identification of personnel involved during emergency situations, communication center, call signs, network, list of telephone numbers.

Special Emergency Equipment in case of offsite emergency

Details of availability and location of special emergency equipment like heavy lifting gear, specified fire-fighting equipment, fireboats etc.

Voluntary Organizations

Chief authorities shall have telephone numbers, contact numbers of all organizations concerned in case of emergency.

Non-governmental organizations (NGO)

NGO's shall be involved to provide valuable source of expertise in specific fields and information to support emergency response efforts. NGOs shall be performing tasks required during emergency.

- Evacuation of personnel from the affected area
- Arrangements at rallying posts and parking yards
- Rehabilitation of evacuated places

Chemical information

All the Material Safety Data Sheet of hazardous chemicals shall be made available in case of handling chemical disaster.

Meteorological information

Arrangements shall be made for obtaining details of weather conditions prevailing at or before the time of accident and weather forecast updates.

Humanitarian Arrangements

Transport, evacuation centers, emergency feeding, treatment of injured, first aid, ambulances, temporary mortuaries.

Public Information

- Persons shall be allotted responsibility to deal with the media-press office
- Information shall be conveyed to relatives etc.

Assessment

- Analyzing the accident scenario and collecting information on the causes of the emergency
- Updating and reviewing the efficiency and effectiveness of all aspects of the emergency plan.

Role of local authority

Local Authorities like Panchayat, Sabha, Samiti, municipalities can help in combating emergency situation after assessing the impact scenario in rescue phase.

Role of police

Police force will assist in controlling situation at the accident site, organizing evacuation and removing of any seriously injured people to hospitals. It will also co-ordinate with the transport authorities, civil defense and home guards if required, co-ordination with army, navy, air force and state fire services if accident is major, Establish communication centre with easy contact with ECC.

Role of Fire Brigade

The fire brigade is to be organized to put out fires and provide assistance as required during emergency.

Media

The media will be made available with ready and continuous access to designated officials with relevant information, as well as to other sources in order to provide essential and accurate information to public throughout the emergency and to avoid confusion.

Role of health care authorities

- Hospitals and doctors must be ready to treat all type of injuries to casualties during emergency.
- Co-ordination with Primary Health Centers and medical centers for easy availability of medicines near plant site.

- Temporary mortuary and identification of dead bodies.
- Receiving information for no. of casualties and emergency cases to act accordingly.

7.4 OCCUPATIONAL HEALTH & SAFETY HAZARDS AND THEIR MANAGEMENT

Occupational health and safety will be categorised broadly into two categories:

1. Protection of Health
2. Promotion of Health

Protection of Health

In an industry, the most important factor for proper running of it is the health of employees which has to be taken care of by following some measures like:

- Proper regular checkup of employees
- Regular training of employees
- 24 hrs First aid and medical availability
- Records maintenance

Promotion of Health

- Training regarding importance of health
- Programs related to health education
- Records maintenance
- Organizing health campaigns

Occupational health centre

The industrial premises will be having one occupational health centre for regular check-up of employees and to deal in case of emergency. Qualified doctors and staff are available. One ambulance will be also available at the factory. The medical action team consists of Medical Officer, first aiders at factory and medical staff. In case the condition of the affected person goes or seems beyond control the victim will be shifted to outside hospital for further necessary medical facilities under the supervision of Factory Medical Officer.

7.4.1 Plan and Fund allocation for Occupational and Safety Hazards

Piccadily Agro Industries Ltd. will be allocating a fund of Rs 50 lakhs/annum for occupational and safety measures inside the plant premises.

S. No.	Description	Amount (Rs. In lakhs per annum)
1.	Doctor's Retainer Fee (including staff)	15
2.	Medicine Expenses	10
3.	Health Checkup Exp.	13
4.	Ambulance Expenditure	12
	Total Amount in (Rs.)	50

7.4.2 Details of Occupational hazards and their mitigation

The plant has following hazardous chemicals that are used in process and can prove harmful if not handled properly. The medical health checkup will be carried out regularly to find out any previous symptoms related to any disorder or disease. The industry will provide proper training to employees pertaining to medical emergencies and situations. The exposure levels of hazardous chemicals will never be surpassed and in case of leakage or sudden emergency, proper measures will be taken to avoid emergency situations.

Occupational Hazards & Their Mitigation Measures during Distillery Operations

S. No.	Hazards	Threshold limit	Impacts	Mitigation measures
1.	Sodium hydroxide	2 mg/m ³ Acute toxicity of the vapor (LC50): 320 mg/m ³	Caustic soda can cause burns.	<ul style="list-style-type: none"> • Proper PPEs to be provided to workers. • Handling in accordance with good industrial hygiene and safety practice • Avoid contact with water. Direct contact with water may cause an exothermic reaction.
2.	Carbon di-oxide	5000 ppm	Headaches, dizziness, restlessness, a tingling or pins or needles feeling, difficulty breathing, sweating, tiredness, increased heart rate, elevated blood pressure, coma, asphyxia, and convulsions	<ul style="list-style-type: none"> • Carbon dioxide will be collected in scrubbers and sold to vendors. • Proper monitoring and maintenance of fermentation equipment. • Proper PPEs to be provided to workers exposed to the zone. • Regular checking of pipes and bolts for avoiding any fugitive emissions. • Proper CO₂ monitors to be provided.
3.	Ethyl alcohol	1000 ppm	Alcohol storage tank bursting or leakage can cause fire or explosion hazards	<ul style="list-style-type: none"> • Proper flow meter to check the flow of alcohol in storage tanks. • Proper training to employees to act in case of alcohol leakage. • Proper fire extinguishers adequate for the fire that can happen in distillery i.e. foam type. • Proper fire hydrant network will be spread in all the areas prone to fire hazard. • Fire sensors and alarms. • PESO guidelines to be strictly followed.

S. No.	Hazards	Threshold limit	Impacts	Mitigation measures
5.	Dust exposure	-	Sudden dust cloud can affect the respiratory tract and interfere with breathing. Cause pneumoconiosis Some particles dissolve in the bloodstream. The blood then carries the substance around the body where it may affect the brain, kidneys and other organs.	<ul style="list-style-type: none"> • Proper dust mask for persons handling biomass. • Regular water sprinkling to avoid dust dispersion. • Storage of biomass in covered sheds and continuous water sprinkling. • Proper greenbelt will be developed in all the areas having the probability of dust explosions.
6.	Noise exposure	75 dB(A) during day time And 70dB(A) during night time	Elevated workplace or environmental noise can cause hearing impairment, hypertension, ischemic heart disease, annoyance, and sleep disturbance.	<ul style="list-style-type: none"> • Proper PPEs to be provided like ear muffs and ear plugs • Alternation of duties. • Regular audiometry check-up. • Proper maintenance, oiling & greasing of machines to detect any loosened nuts, bolts.
7.	Heat exposure	-	Prolonged or intense exposure to hot temperatures can cause heat-related illnesses such as heat exhaustion, heat cramps, and heat stroke	<ul style="list-style-type: none"> • Alternation of duties. • Proper PPEs to the workers.
8.	Electrocution	-	Electric shock, brain damage	<ul style="list-style-type: none"> • Proper earthing. • Doubly insulated instruments/machineries. • Proper PPEs like rubber gum boots to be provided.
9.	Physical	-	Fall, slip trip, physical injuries.	<ul style="list-style-type: none"> • Proper PPEs for workers operating at heights like safety helmets, fall protection etc. • Proper first aid facilities at all danger prone areas.

Source: National Institute of Occupational Safety and Health document

7.4.3 Occupational health surveillance

In distillery & malt spirit plant, the occupational health surveillance of the employee will be done on a regular basis periodically and record of the health check-ups will be maintained as per the Factories Act.

Pre placement and periodical health check-up tests to be undertaken

The check-ups will be dependent on age, sex, duration of exposure and department wise.

Following tests will be done regularly:

S. No.	Name of the test
1.	Physical Fitness Certificate
2.	Pulse Rate
3.	Blood Pressure
4.	Complete Blood Examination Haemoglobin % (Hb%), WBC, RBC, etc.
5.	Vision
6.	Central Nervous System (CNS)
7.	Respiratory System-Lung Function (RS)
8.	Cardio Vascular System (CVS)
9.	Electro Cardio Gram (ECG)
10.	Chest X-ray
11.	Total Leucocyte Count (TC)
12.	Differential Leucocyte Count (DLC)
13.	Absolute Eosinophil Count (AEC)
14.	Complete Urine Examination [Physical / Chemical /Albumin, Sugar & Bile Salt
15.	Random blood Sugar (RBS)

Frequency of Medical Examination

- Once in a year

Personal Protective Devices and Measures

- Full body Safety harness
- Goggles
- Safety Shoes & Rubber Gumboots
- Ear muffs and Ear Plugs
- Industrial Safety helmets, Crash helmets
- Leather hand gloves, Heat Resistive hand gloves, Chemical hand gloves and Cut resistance hand gloves
- Aprons
- Safety belt / line man's safety belt

Implementation of OHS standards as per OHSAS/USEPA

Occupational Health and safety are the most important aspect in an industry which envisages the proper analysis of hazards with respect to workers and human population present inside and around plant premises and the measures which has to be taken in order to run operations smoothly and on ethical back grounds. An industry needs its workers, in turn the industry should make such arrangements so that not even a single life is wasted with the perspective of implementation of every security details and very stringent rules. Following measures will be adopted for implementation of OHS standards.

- Well-equipped Occupational Health Centre with adequate paramedical staff
- Routine & periodic investigation related to operations pertaining to occupational hazards
- Health surveillance and maintenance of annual health record
- Proper implementation of Health and Safety policy
- Round the clock ambulance facility
- Sufficient number of first aid boxes
- Formulation of OHS implementation team/ cell
- Implementation of OHS management program
- Proper visual aids which display the health & safety policy along with specific instructions depending on area covered.
- Training and placards visualizing safe operational procedure (SOP) in case of disaster at all danger prone areas
- Investigation of fatal, serious accidents
- Investigation of reports of occupational diseases
- Corrective and preventive action plan for any kind of small or big disaster if occurred and brain storming for avoiding such situations in the near future
- Regular & periodic conduction of safety training, seminars, workshops to handle disastrous situation.
- Proper training for accidental measures outside plant premises and knowledge of driving mishaps with implementation of strict driving rules.
- Ensure proper use of PPEs according to the work zone like helmet, safety shoes, goggle, dust mask, ear plug and hand gloves etc.
- Establishment of Occupational Health Centre for pre and periodic medical examination of workers and staff to detect any onset of occupational disease and corrective measures
- Display Material Safety Data Sheet (MSDS) at proper locations for use of every hazardous substance
- Implement the recommendations of HAZOP (Hazard and operability study) for examination of problems in existing process / operation that may represent risks to personnel or equipment

7.5 CONCLUSION

It is concluded from the above study that there will be no major risk involved due to proposed project. For risk management, proper precautionary measures will be taken to minimize risks. Personal Protective Equipment (PPEs) will help to minimize the health hazards and accidental casualties.



CHAPTER – VIII
PROJECT BENEFITS

8.1 INTRODUCTION

This chapter is focused on those points which become beneficial to the surrounding area or community in terms of infrastructural development, social development, employment generation and other tangible benefits due to upcoming project activities.

8.2 PROJECT BENEFITS

The Company will provide various benefits across the nearby areas which are attributed below:

1. Environment
2. Employment
3. Economic
4. Social

1. Environmental Benefits

a. Greenbelt Development

2.97 ha (7.34 acres), i.e. 33% of the project area equivalent to 9.0 ha (22.24 acres) has been earmarked and will be developed under greenbelt & plantation. The width of plantation along the plant periphery will be 10 m. The greenbelt/ plantation around the industries will act as a positive effective barrier between the plant and the surroundings. Strengthening/ development of Greenbelt/ plantation within the area will help in better harnessing of the run-off thereby would be helpful in potential recharging of the groundwater and help in reducing the soil erosion. The development of greenbelt/ plantation within the project area will be helpful in capturing the fugitive emissions, attenuate the noise generated thereby maintaining the air quality and noise levels and will also improve the aesthetic beauty of the surrounding. Horticulture specialist will be deployed for planting trees, their maintenance and protection based on the geology, soil condition and topography of the area.

b. Rain water Harvesting

Construction of rain water harvesting pits / surface storage tanks with cemented floor within plant premises in order to avoid contamination of ground water will be done. The water will be collected and harvested in the tanks and will be utilized in several plant activities.

c. Employment Benefits (Direct & Indirect)

The proposed project is capable of generating both direct & indirect employment. Total manpower required for operation of plant is around 150 employees (100 permanent & 50 temporary) which will be provided to the local people and will be employed as per their skills and abilities. Apart from direct employment, various indirect employment opportunities are envisaged by the way of transportation, workshops, petty contractors and shopkeepers, network of retailers throughout the state and in its marketing regions.

d. Economic Benefits

For proposed installation of Grain based Distillery, contribution in Ethanol Blending Program driven by Government of India is one of the main targets of the company. To reach the Centre's ambitious target of 20 per cent in blending by 2025, a back of the envelope calculation with India's current fuel consumption shows that there is the requirement of around 800-900 crore litres of ethanol in a year. But India's current ethanol production capacity is only around 684 crore litres. India is one of the largest importers of crude oil. The indigenous production of ethanol for blending in petrol will substitute this imported crude oil. Special emphasis on financial and social benefits will be given to the local people. Development of social amenities will be in the form of medical facilities, education to underprivileged and creation of self-help groups. Availability of large arable land, rising production of food grains and sugarcane leading to surpluses, availability of technology to produce ethanol from plant based sources, and feasibility of making vehicles compliant to ethanol blended petrol make E20 not only a national imperative, but also an important strategic requirement. The target of 20% blending of petrol in the country by 2025 thus appears feasible and within reach and the proposed project will contribute for the same. In addition to this, blending locally produced ethanol with petrol will help India strengthen its energy security, enable local enterprises and farmers to participate in the energy economy and reduce vehicular emissions. Thereby it will provide a boost to agriculture sector. Ethanol has medical applications as an antiseptic and disinfectant and also used as a chemical solvent and in the synthesis of organic compounds, apart from being an alternative fuel source thus will fulfill the nation's requirement for the same as well. Also, this will reduce the nation's dependence on imported fossil fuels and is a good alternative to non-renewable fuels like fossil fuels and crude oil. Thus, the project will prove to have an overall economic growth of the area and of the nation.

2. Social Benefits

The beneficial aspects of the projects on the socio-economic environment of the area involve employment opportunities, services, promotion of trade and commerce, public utility, literacy, social awareness, health care facilities, recreation etc. The company will contribute substantially to the overall economy and social development of the area through various activities. The operation zone of the developmental activities for the proposed project will be extended to the nearby villages of project site. Environmental awareness will be created among people by organizing awareness camps. Developmental activities will be carried out keeping sustainable development in mind. Based on the needs assessment and public hearing issues, the developmental program and budget has been customized for implementation while partnering with Government Agencies, NGOs and Local Panchayats for implementation.

8.3 PROPOSED ACTION PLAN-SOCIO ECONOMIC DEVELOPMENTAL ACTIVITIES

As per OM dated 30th September, 2020 and 20th Oct., 2020, company will propose a detailed action plan along with budgetary allocation after conduction of Public Hearing considering the issues raised during public hearing. The funds allocated will be spent for various socio-economic development activities proposed to be undertaken in the study area with a priority to villages falling in the impact zone, which may be further extended to other villages depending upon the budget and requirement.

8.4 CONCLUSION

Due to the proposed project, there will be improvement in the standard of living such as better education facilities, good health and proper sanitation facilities housing and skill development in farmers and youths. This is envisaged as a major positive benefit which will ultimately lead to the sustainable development of the region.



CHAPTER-IX

ENVIRONMENTAL COST BENEFIT ANALYSIS

9.1 ENVIRONMENTAL COST BENEFIT ANALYSIS

As per the EIA Notification 2006 & its subsequent amendments, this chapter on the 'Environmental Cost Benefit Analysis' is applicable only if it is recommended at the Scoping stage.

However, as per the ToR points issued by MoEFCC, New Delhi vide letter no. IA-J-11011/277/2023-IA-II(I) dated 31st July 2023, Environmental Cost Benefit analysis is not desired for the proposed project and hence has not been prepared.



CHAPTER–X ENVIRONMENTAL MANAGEMENT PLAN

10.1 INTRODUCTION

Environmental Management Plan consists of the set of management, mitigation, & monitoring measures to be undertaken during construction and operation of a plant to eliminate adverse environmental impacts or reduce them to prescribed limits. The present environmental management plan addresses the components of environment affected during the different activities forming part of the processes of proposed plant.

Based on the identification and evaluation of impacts and baseline conditions, an Environmental Management Plan (EMP) has been prepared to mitigate the adverse impacts on environment of the area due to the proposed installation of Grain based distillery. The EMP is herein outlined in view of the various acts, rules and regulations/ standards concerned with the environmental management.

Environmental Management Plan is detailed under the following heads to meet the regulatory compliances:

- Air Quality Management
- Noise Management
- Waste Water Management
- Solid & Hazardous Waste Management
- Energy Conservation
- Greenbelt Development & Plantation Programme
- Occupational Health & Safety Measures.

Purpose of EMP:

- To control emission, waste minimization and proper disposal of waste to meet statutory requirement of appropriate technology.
- To support & implement best technology to achieve environmental standards.
- Judicious use of natural resources such as water and other material during the construction and operational phase of proposed activity/ project.
- To ensure good working condition for safety, welfare and good health of the work force.
- Ensure effective implementation of all control measures.
- Vigilance towards probable hazard/disasters and accidents.
- Monitoring of cumulative and long-term impacts.
- To reduce accident hazards.
- Allocation of funds for environment management supplies.
- To promote greenbelt development to create effective barrier between the plant site and surrounding environment.

Elements of EMP:

EMP includes four major elements: -

- 1. Planning:** This includes identification of environmental impacts, legal requirement, commitments, and policies, setting environmental objectives and environment, health & safety and social compliance requirements;
- 2. Implementation:** This comprises of resources available for the project, accountability of employees, contractors and documentation of measures to be taken;
- 3. Checking (Measurement & Evaluation):** This includes regular inspection, audits, monitoring corrective actions and record keeping;
- 4. Management Review:** Actions are taken to continually improve the environment, health, safety, and social performance of the organization.

10.2 ADMINISTRATIVE MANAGEMENT AND POLICIES

Environmental management plan can be implemented effectively if the company has certain employees dedicated towards environment and certain policies depicting the various goals towards sustainable environment. Piccadily Agro Industries Ltd. has been indulged as a group towards the same purpose and the policies as well as people are defined, strictly demarcating their roles towards environment and growing with the same motto. The responsibility of Environment Management Cell (EMC) and the policies implemented in Piccadily Agro Industries Ltd. are given below:

10.2.1 Environmental management cell (EMC)

In order to maintain the environmental quality within the standards, regular monitoring of various environmental components is necessary. Project will have a full-fledged Environmental Management Cell (EMC) for environmental monitoring and management. The EMC team will take care of pollution monitoring aspects and implementation of control measures.

A group of qualified and efficient engineers with technicians will be deputed for maintenance, up keeping and monitoring of the pollution control equipment, to keep them in working at the best of their efficiencies.

Responsibilities of EMC

- Environmental monitoring of the surrounding area.
- Proper & timely commissioning of pollution control equipment and facilities.
- Enlist Specification and applicable regulation of maintenance schedules for pollution control equipment.
- Ensuring that standards are maintained.
- Developing the greenbelt.
- Ensuring optimum water usage.

- Implementation of the Environmental Management Plan.
- Managing meetings of the Environment committee and reporting to the management.
- Regular submission of six-monthly compliance reports and conducting audits at proper intervals to know any deviations from prescribed standards.
- Implementation of proper check measures in case of any diversions from prescribed standards of environmental laws.
- Coordination with the concerned authorities/consultants for all statutory requirements to obtain EC.

10.2.2 Corporate Environment Policy

Corporate Environment Policy is an important part of the company's motives and goals. The Company will set goals and objectives laid by its board of Directors. CEP presents standard operating process/ procedures to bring into focus any infringement/ deviation/ violation of the environmental or forest norms/ conditions. It also shows the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions. The company will have system of reporting of non-compliances/ violations of environmental norms of the Board of Directors of the company and/ or shareholders or stakeholders at large. Corporate Environment Policy showing EMC hierarchy and responsibilities of Company towards Environment is shown below.



Corporate Environment Policy

Piccadily Agro Industries Limited (PAIL) is committed to Environmental leadership in all of its business activities. PAIL continuously strives to provide a safe and healthy workplace, pursue protection of the environment, conservation of energy and natural resources. With this Corporate Environment Policy in place we aspire at PAIL, a safe environment:

Integrate the consideration of environmental concerns into the entire decision making, activities and its implementation.

Thrust on continual improvement in operation and technologies to reduce wastes as well as pollution, and it's appropriate disposal that would ensure minimum of health and safety risk.

Establish procedures for periodic review of environmental compliance with all applicable laws and regulations. To report all noncompliance issues promptly, evaluate root cause of noncompliance, and implement corrective actions.

To Provide a safe and healthy work environment and also to ensure that personnel are adequately trained with the appropriate safety and emergency equipment.

To immediately correct any practice or condition not in compliance with this policy

Natural resources conservation by adopting appropriate measures.

Environment, Health & Safety (EHS) Policy

Piccadily Agro Industries Limited (PAIL) has set a high degree of values to:

- Protect the health and safety of the employees, contactors, customers and nearby residents
- Environment Protection
- In addition to compliance with laws and regulatory requirements, the company will pursue the following objectives:
 - To provide adequate information, appropriate instruction and befitting training that could enable employees in meeting their roles and responsibilities in order to contribute significantly towards compliance with the policy
 - To create safe and healthy work places

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- Set measurable objectives and targets to ensure continual improvements in EHS performance
- To create awareness on EHS requirements amongst all contractors and associates of the company
- To protect the environment by preventing or minimizing the environmental impact due to our activities and products through appropriate design, manufacturing, distribution and by promoting responsible use and disposal practices.
- To inculcate Sustainable Development Practices, such as; Reduce, Reuse, Recycle, Recover and Rethink



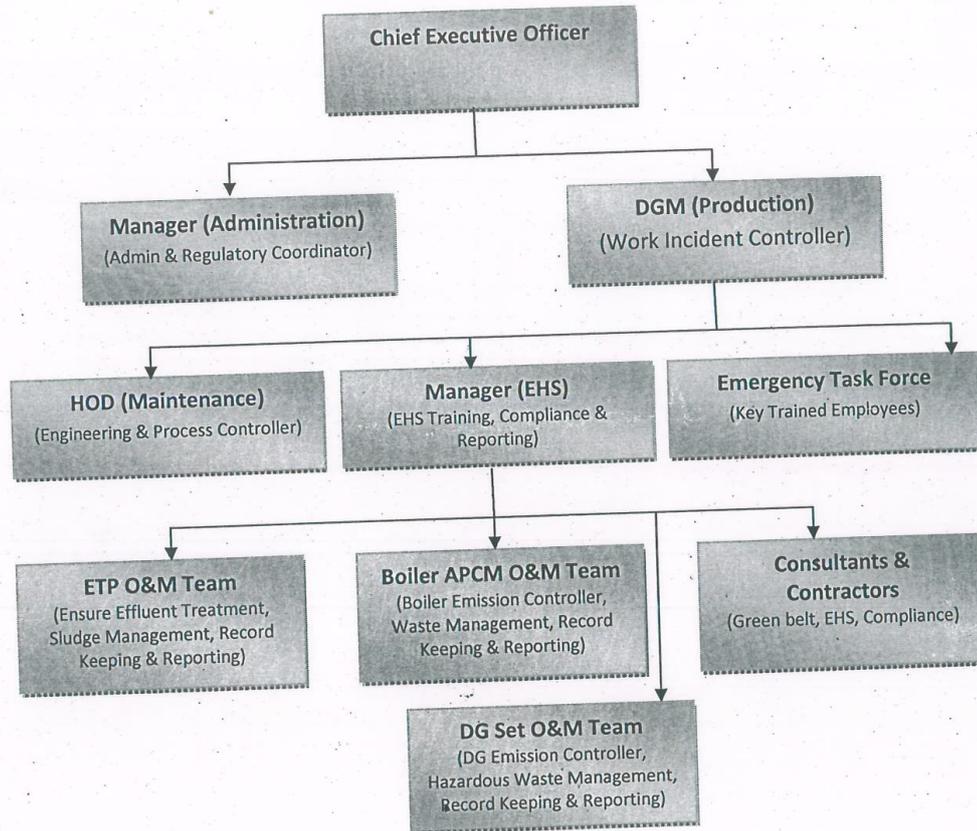
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Structure of Environment Cell



For Piccadily Agro Industries Limited


Director

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10.3 ENVIRONMENTAL MANAGEMENT PLAN

A detailed study for the identification & prediction of anticipated environmental impacts of the project was carried out and the outcomes of the study are described in Chapter-IV. The major impacts which require proper administrative management to protect the environment are further considered for formulation of Environmental Management Plan (EMP).

10.3.1 Air quality management

A) Stack emissions

- Online stack monitoring system will be provided to keep a check on emissions and the data shall be transmitted to CPCB and SPCB servers.
- Regular cleaning, inspection and maintenance of air pollution control equipment will be carried out.
- DG sets emissions will be maintained within prescribed standards of CPCB guidelines.
- Workers will be provided with personal protective equipment and trained regarding emergency actions to be taken during equipment failure.
- The whole unit will be provided with facility of inter locking so that any failure of equipment or APCE will result in instant shut down of the complete process.

B) Fugitive emissions

- Regular monitoring of alcohol storage areas will be carried out to check for any kind of VOCs emissions.
- Monitoring will be conducted in work zone areas where dispersion of dust is maximum like storage area, working area, etc.
- Flow meters will be installed to keep a check on filling of alcohol storage tanks so that over flow condition does not occur.
- The locations of ambient air quality monitoring stations shall be decided in consultation with the SPCB and it shall be ensured that stations should be installed in the upwind and downwind direction including all the places where maximum predicted ground level concentrations can be found. Regular monitoring of ambient air quality will be carried out.
- Proper rules will be demarcated for usage of PPEs and strict actions will be taken in case of carelessness.

10.3.2 Noise management

- Workers will be provided with trainings regarding importance of PPEs and fines will be imposed on workers not following the rules.
- Periodic monitoring of noise levels as per post-project monitoring plan shall be done on regular basis.

- Workers close to high noise generating areas will be regularly subjected to audiometry check-up.
- Alternation of duties will be preferred to avoid long term and continuous exposure of noise on any individual.
- Ambient noise levels in and around the plant area shall be kept within the standards of EPA, 1986 rules, 1989 viz. 75 dB(A) (Daytime) and 70 dB(A) (Night time).

10.3.3 Water quality management

Following measures will be implemented:

- Online continuous monitoring of effluent will be carried out by installing web camera with night vision capability and flow meters in the channels carrying effluent within the premises and connected to SPCB and CPCB online servers.
- Proper maintenance of state-of-the-art CPU/ETP will be carried out.
- Proper ETP lab will be constructed with all the useful equipment/measurement devices to monitor effluent quality daily.
- Regular monitoring and maintenance of equipment/machineries will be done and records maintained.
- Record of ground water being extracted will be kept with installation of flow meters.
- Proper record of chemicals used will also be maintained.
- The piezometer to be installed (observation well) shall be present at a minimum distance of 15 m from the bore well/production well. The piezometer shall be located suitably to ensure that zone of aquifer tapped in the piezometer is the same as that of the pumping well. A permanent display board should be installed at Piezometer/ Tube well site for providing the location, piezometer/ tube well number, depth and zone tapped of piezometer/tube well for standard referencing and identification.
- Water level data shall be submitted to the concerned authority.
- The Company will construct storage ponds for collection of roof top water to be used in plant activities.
- Recycled water will be used for greenbelt development.
- Regular monitoring of ground water quality shall be done once in a year.

10.3.3.1 Action plan to control ground water pollution

The proposed distillery will be based on “Zero Effluent Discharge”. The following measures will be adopted to prevent groundwater pollution-

- Slops from grain-based operation will be concentrated in MEE and dried in DWGS dryer to finally obtain animal feed supplement (DDGS) which can be ideally used as cattle feed due to high nutrient content.
- Latest water efficient technologies shall be installed to reduce dependency on ground water requirement.

- Storage areas shall be made of pucca platform (preferably concrete/clay compacted) and provided with garland drains and sedimentation pit to avoid seepage and contamination of ground water.
- Maximum recycling and reuse of wastewater after treatment.
- The spent wash holding tank will be made up of RCC & steel.
- Two piezometers will be installed to keep a proper check on ground water quality and levels.
- Spillage of chemicals/ oils/ alcohol etc. will be avoided as best possible.
- Treatment of secondary streams like spent lees, condensates, blow downs, etc. shall be in closed loop & any discharge outside the distillery shall not be done.
- Process effluent/any waste water shall not be allowed to mix with storm water.
- The storm water will be discharged through separate conveyance system.

10.3.3.2 Water conservation

The following measures will be adopted to minimize use of ground water-

- Complete recycling and reuse of wastewater after treatment.
- Periodic preventive maintenance of water distribution system.
- Training and awareness on water conservation measures.
- Condensate water will be re-used & recycled.
- Rainwater harvesting will be practised.
- Spillage and unnecessary usage of water will be avoided in domestic areas.
- Use of high-pressure hoses for equipment clearing to reduce wastewater generation.

10.3.3.3 Details of rainwater harvesting

The basic principle of Rainwater harvesting systems is to channelize rainwater from a catchment surface (roof or other raised solid surface), through a distribution system (gutters, downspouts and pipes) and then into storage tank. Rainwater harvesting potential/runoff calculation is based on the catchment area and its corresponding runoff coefficients. The formula is:

$$\text{Runoff} = \text{Monsoon rainfall} \times \text{Area of catchment} \times \text{Runoff coefficient}$$

Summarization of Rainfall Run-off within Industrial Premises

S. No.	Land use type	Area (Sq.m.)	Average Annual Rainfall (m)	Runoff Coefficient (as per CPWD)	Quantity of Rainfall Runoff (Cum/annum)
1.	Roof-top	36800	1.24	0.85	38787.2
2.	Road and Paved	18500	1.24	0.65	14911
3.	Open area	5000	1.24	0.2	1240
4.	Green Belt	29700	1.24	0.15	5524.2
Total		90000			60462.4

Hourly runoff [Source: www.imd.gov.in]

S. No.	Land use type	Area (Sq.m.)	Hourly Rainfall (m)	Runoff Coefficient (as per CGWB)	Quantity of Rainfall Runoff (cum/hr)
1.	Roof-top	36800	0.037	0.85	1157.36
2.	Road and Paved	18500	0.037	0.65	444.925
3.	Open area	5000	0.037	0.2	37
4.	Green Belt	29700	0.037	0.15	164.835
Total		90000			1804.12

The total catchment area for rooftop harvesting is 1157.36 cum/hr. The underground tank should be built up to 10% larger than required, i.e., 1273.096 cum/hr. A typical size of about 2 rectangular underground storage tanks will be constructed having dimensions of about 16m × 16m × 2.5m (Length × Width × Depth).

The following measures should be taken for the proper harvesting of rain water:

- ❖ Rooftops from where rainwater collected will be cleaned periodically every year before rainy season.
- ❖ Presence of mesh inside the pipe to filter the water before reaching the storage tanks.
- ❖ Periodic maintenance of the structures.

The water is collected through open area and roads along the slope and Rain water collected shall be diverted to the vertical down pipes and allowed to fall in the Proposed Settling Concrete Pond directly for harvesting of rain water. The total runoff generated from plant through roads, open area & greenbelt is 21675.2 cum/annum for rainwater harvesting. After 30% evaporation loss the total water available for harvesting is 15172.64 cum/annum. To accommodate this amount of water, 1 pond of 41m length and 42m width with 3m depth is proposed. The details of the proposed pond are given below. There will 3 seasons of filling and net water harvested will be 15498 cum/annum.

Details of Proposed Pond

S. No.	Particulars	Values
1.	Length	41 m
2.	Width	42 m
3.	Depth	3 m
4.	Storage Capacity	5166 cum
5.	No. of Fillings	3
6.	Net Water Harvested	15498 cum/annum

The Project site falls in District and Assessment unit Mahasamund which comes under *Safe* Category as per CGWB Categorization 2020. The net summarization of Rainwater Harvesting is given below:

Summarization of Rainwater Harvesting

S. No	Particulars	Details
1.	Total Ground Water Requirement	1102 KLD/385700 cum/annum
2.	Net Rainwater Harvested inside the Project Site	155.1 KLPD/ 54285.2 cum/annum

RECOMMENDATION

- The project proponent in consultation with Irrigation Department may provide artificial harvesting structure for better percolation of rain water.
- The design and construction will be done after detailed engineering in case of requirement of harvesting structure development in ponds.
- Methods to prevent or minimize the clogging effect by suspended matter can be classified into following broad groups which industry will have to adopt: Periodical desilting, removing of the mud cake and scrapping of the surface layer when dry. This will also kill the algal growth.
- Periodic cleaning of the harvesting structures.
- Cultivation of certain covers, notably certain kinds of grass
- Reduction of high flow velocities by provisions of perennial vegetation.
- The industry will take up area specific plantation program to enhance the recharge measures.

10.3.4 Solid and hazardous waste management

- Maximum recycling and utilization of generated solid waste shall be carried out as per the guidelines.
- Unit will prepare Hazardous waste disposal plan, as per applicable statutory conditions under the Hazardous Wastes Management Rules, 2016 and same will be implemented.
- EMC will keep a record of quantity of solid and hazardous waste generated and their proper disposal.
- A separate storage area shall be provided with proper sign boards/labels for storage of hazardous waste.
- The concerned person will prepare a site manual on the total program and activities of solid/hazardous waste management.
- Regular training will be conducted for employees engaged in solid waste management works.

10.3.5 Odour management

Odour management plan outlines the methods by which odorous emissions will systematically be assessed, reduced and prevented potentially from the distillery unit.

- A horticulturist will be employed to develop greenbelt according to CPCB guidelines and plantation of such trees that are known to prevent odours.
- The areas will be identified with preferably more dust and gaseous emissions and greenbelt tier will be made dense.
- 10 meter width will be maintained and regular inspection will be carried out to find any rare phenomena in flora so that pollutants levels can be monitored for the cause.

10.3.6 Occupational and health safety management

- Training shall be imparted to all employees on safety and health aspects of chemical handling.
- Pre employment and routine check-ups to be undertaken regularly.
- Proper counselling sessions will be conducted to know well being of employees.
- Proper safety signs and boards will be displayed.
- Records of accidents happened will be kept and discussed for the preventive measures to avoid the same.
- Proper personal protective equipment will be provided in each area as per applicability.
- Proper assembly points and emergency gate will be defined and employees will be given training regularly for the same.

10.3.7 Disaster Management plan

The Company has made provisions for on-site and off-site disaster management plan:

For On-site disaster management plan, following points will be taken into consideration:

- To identify, assess, foresee and work out various kinds of possible hazards, their places, potential and damaging capacity and area in case of above happenings.
- Review, revise, redesign, replace or reconstruct the process, plant, vessels and control measures if so assessed.
- Measures to protect persons and property of processing equipment in case of all kinds of accidents, emergencies and disasters.
- To inform people and surroundings about emergency if it is likely to adversely affect them.

For off-site disaster management plan, following points will be taken into consideration:

- The plan will identify an emergency coordinating officer who would take overall command of the off-site activities.
- Proper co-ordination will be there between the company and outside regulatory authorities.

Details are provided in Chapter VII of EIA/EMP Report.

10.4 CONCEPT OF WASTE MINIMIZATION, 3R'S (REUSE, RECYCLE & RECOVER TECHNIQUES), ENERGY AND NATURAL RESOURCE CONSERVATION MEASURES

The company has always considered environment as important element which can be impacted by the project activities. They believe in prevention than curing. They believe in concept of conservation & waste minimization.

10.4.1 Waste Minimization – 3R's

(A) Reuse:

- Solid waste from the Grain based distillery operations generally comprises of fibers and proteins in the form of DDGS (88TPD), which will be ideally used as Cattle, poultry and fish feed ingredients.
- Boiler ash (116 TPD) generated during coal-based operations will be given to cement/brick manufactures & during biomass (62 TPD) based operations will be given to brick manufacturers in covered vehicles.
- Yeast sludge will be added to wet cake.
- CPU/ETP sludge will be dewatered using filter press and will be used as manure.
- In malt spirit plant, weak wort is collected back into one of the hot process water tanks and used as mashing water for the next batch.
- Steam condensate will be reused in the boiler as makeup water.

(B) Recycle:

- Process condensate, boiler Blowdown, DM plant reject & washing, CT blowdown will be treated in CPU/ETP of capacity 1200 KLPD and treated water will be reused in process activities.
- Domestic waste water will be treated in Sewage Treatment Plant of Capacity 30 KLPD.
- pent resin from DM plant (500 kg/annum) will be supplied to authorized recyclers.
- Used oil & grease (0.5 KL/annum) generated from plant machinery/gear boxes as hazardous waste will be given to the CPCB authorized recyclers or used as in-house lubricant.

Recovery:

- CO₂ generated (154 TPD) during the fermentation process will be collected and sold to authorized vendors.
- Water conservation & recirculation system shall be installed for recovery of cooling water.

10.4.2 Energy Conservation

The following measures will be adopted for reduction in specific energy consumption:

- Installation of energy efficient lightings. Use of energy saving light fittings.
- Installation of LED lighting.
- Use of energy efficient electric motors complying IEE3 Standards.
- Use of DCS controls
- Use of highly efficient VFD, minimizing idle running of machines.
- Optimizing loads and periodic preventive maintenance & lubrication
- Prevention of leakages of compressed air
- Optimized compressed air pressure.
- Periodic energy audits.
- Training, awareness, and motivational programmes.
- Layout is designed for gravitation flow.
- Plant is designed for very low steam and power consumption with the use of state of art technology.

10.4.3 Natural resource conservation

- Usage of biomass like rice husk as main fuel.
- Water will be conserved by practising rainwater harvesting and maximum recycling within plant premises.
- Use of solar power will be explored and maximum appliances will be installed at plant premises based on their feasibility.

10.5 BUDGETARY PROVISION FOR ENVIRONMENT MANAGEMENT PLAN (EMP)

The budget for the proposed project and that for the environmental protection measures is given as below:

- **Capital cost for the proposed project:** Rs. 250 Crores
- **Cost for environmental protection measures:**
 - ✓ Capital cost: Rs. 20.0 Crores
 - ✓ Recurring cost: Rs 2.0 Crores/annum

S. No.	Description		Capital Cost (Crores)	Recurring Cost/annum (Crores)
1	Air Pollution management	Boiler stack + ESP + Online Monitoring System	7.35	0.65
2	Effluent Treatment Facilities	Spent wash treatment facilities, ZLD System, Condensate polishing unit, ETP and STP	9.8	1.1
3	Environment monitoring	Lab instrument, Online monitoring System, Third party monitoring, audit	0.7	0.1

4	Solid waste management	Ash handling & management	1.3	0.1
		Others		
5	Greenbelt & plantation development	Plantation for greenbelt	0.35	0.05
6	Rain water harvesting	Required infrastructure	0.5	-
Total			20	2

10.6 CONCLUSION

As discussed, it is safe to say that the proposed project is not likely to cause any significant impact on the ecology of the area, as adequate preventive measures will be adopted to maintain the various pollutants within permissible limits. Greenbelt development around the area would also be taken up as an effective pollution mitigation technique, as well as to control the pollutants released from the premises of the company.



CHAPTER - XI SUMMARY AND CONCLUSION

11.1 INTRODUCTION

M/s Piccadily Agro Industries Ltd. is proposing 210 KLPD Grain based distillery along with 6.25 MW Co-Generation Power Plant at Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh. The proposed distillery plant will be designed for manufacturing Ethanol/Rectified Spirit /Extra Neutral Alcohol/Industrial Alcohol/Denatured Spirit/Specially Denatured Spirit along with Malt Spirit from broken grains (Maize, Broken Rice, Sorghum & Barley Malt).

As per EIA Notification dated 14th Sep, 2006 and as amended on 13th June, 2019, the project falls under Category “A”, Project or Activity ‘5(g)’ Distilleries. [Non-Molasses based distilleries > 200 KLPD] and will be appraised at Central level in MoEFCC, New Delhi.

Standard ToR has been issued by MoEFCC, New Delhi vide letter no. IA-J-11011/277/2023-IA-II(I) dated 31st July, 2023 for the preparation of EIA/EMP Report.

11.2 JUSTIFICATION FOR THE PROJECT

Following points show the justification for implementation of the project:

- The Land is completely under the possession of the company.
- Geographical diversification of the Group as the existing plants are located at North India.
- Raw material availability & markets for both products & by-products within the state.
- Raw material to be used are MGrains such as damaged grain feed stock, broken rice, maize, bajra & sorghum unfit for human consumption. These products once thought to be waste will be utilized for production of alcohol.
- Nearness to NH – 53 (~3.5 km in South Direction), NH 353 (~8.0 km in SW direction), SH – 20 (~8.0 km in SW direction) makes it easier to transport raw materials & final product to market.
- The company will install its own co-generation power plant and use biomass like rice husk or coal as fuel.
- Incorporation of advanced technique i.e. Multi Effect Evaporator and DWGS dryer will enable substantial reduction of final effluent.
- 33% of the total project area will be developed under greenbelt & plantation.
- The proposed project will generate employment for the local people.
- There will not be any kind of major pollution due to the project activity, as the project will be implemented with environment friendly technology.
- Emissions will be maintained within the prescribed limits, as per guidelines.
- No National Parks, Wildlife Sanctuaries, Biosphere Reserves, Tiger/ Elephant Reserves, Wildlife Corridors etc. within 10 km radius.

11.3 DETAILS ABOUT THE PROJECT

11.3.1 Brief description of the project

Brief description about the project is given in Table below.

S. No.	Particulars	Details	
A.	Nature & Size of the Project	Units	Proposed Capacity
		Grain based Distillery	210 KLPD
		Co-generation power plant	6.25 MW
B.	Category of the Project	As per EIA Notification dated 14 th Sep, 2006 and as amended on 13 th June, 2019, the project falls under Category “A”, Project or Activity ‘5(g)’ Distilleries [Non-Molasses based distilleries>200 KLD].	
C.	Location Details		
	Village	Beltukri	
	Tehsil	Mahasamund	
	District	Mahasamund	
	State	Chhattisgarh	
	Latitude	21°13'8.83" N to 21°13'20.19" N	
	Longitude	82°4'41.10"E to 82°4'57.78"E	
	Toposheet No.	56H/7, 56H/8	
D.	Area Details		
	Total Plant Area	9.0 ha (22.24 acres)	
	Greenbelt & Plantation Area	2.97 ha (7.34 acres) i.e., 33% of the plant area will be developed as greenbelt & plantation area.	
E.	Environmental Setting Details (with approximate aerial distance & direction from plant site)		
1.	Nearest Town & City	Mahasamund (~10.5 km in SSE direction)	
2.	Nearest National Highway / State Highway	<ul style="list-style-type: none"> • NH 53 (~3.5 km in South Direction) • NH 353 (~8.0 km in SW direction) • SH 20 (~8.0 km in NW Direction) 	
3.	Nearest Railway station	Belsonda RS (~8.4 km in SW direction)	
4.	Nearest Airport	Swami Vivekananda Airport, Raipur (~ 35.0 km in WSW direction)	
5.	National Parks, Wildlife Sanctuaries, Biosphere Reserves, Reserved Forests (RF)/ Protected Forests (PF), Tiger/ Elephant Reserves, Wildlife Corridors etc. within 10 km radius	No National Parks, Wildlife Sanctuaries, Biosphere Reserves, Tiger/ Elephant Reserves, Wildlife Corridors etc. within 10 km radius. Kukradih RF (5.0 km in NE direction), Tumgaon RF (5.5 km in ESE direction), Sirpur RF (7.0 km in NE direction), Sorid PF (8 km in SE direction) within 10 km radius.	
6.	Water Body (within 10 km radius)	Kurar Nadi (1.5 km in SW direction), Kantori Nadi (2.5 km in WSW direction), Mahanadi river (4 km in NW direction) Some nalas are present within 10 km radius	
7.	Seismic Zone	The project site falls in Seismic Zone – II Low damage risk zone [based on the Vulnerability Atlas of India – 3 rd Edition, BMTPC]	

F.	Cost Details	
	Total Cost of the Project	Rs. 182 Crores
	Cost for Environment Management Plan	Capital Cost- Rs. 20 Crores Recurring Cost- Rs. 2.0 Crores/annum
	G. Basic Requirements for the project	
	Water Requirement	1102 KLPD
	Source – Surface water	
	Power Requirement for distillery	6.0 MW
	Source – Proposed 6.25 MW Co-generation power plant	
	Man Power Requirement (Operation phase)	150 persons (100 Permanent + 50 Temporary)
	Source: - Unskilled / Semi-Skilled - Local Area; Skilled- Local & Outside	
H.	Product Mix	Ethanol/ Rectified Spirit /Extra Neutral Alcohol/ Industrial Alcohol/ Denatured Spirit/ Specially Denatured Spirit & Malt Spirit
I.	By-products	DDGS & CO2
J.	Working Days	350 days per annum

11.3.2 Requirements for the project

11.3.2.1 Raw material requirement

Grains such as damaged grain feed stock, broken rice, maize, bajra & sorghum will be used as raw material which is easily available from the local market. Details regarding quantity of raw materials required their source along with mode of transportation for project are given in table below:

Table - 11.1
Raw Material and chemicals requirement

S. No.	Particulars	Total Requirement	Storage facility	Source & mode of transportation
1.	Grains- Maize, Broken Rice & Sorghum	464 TPD	Steel Silo	Near-by Markets via road
2.	Barley Malt	20 TPD	Steel Silo	Near-by Markets via road
3.	Process Chemicals			
	Sodium Hydroxide (Caustic soda)	2100 Kg/day	Stores/Steel Tanks	Near-by Markets via road
	Nutrients	420 Kg/day	In Stores	
	Enzymes (Alpha amylase, Amyloglucosidase)	273 Kg/day	In Stores	
	Antifoam Agent	105 Kg/day	In Stores	
	Dry Yeast	105 Kg/day	In Stores	

Fuel Requirement

The fuel required for proposed boiler to generate steam & power is biomass like rice husk or coal. Details regarding fuel requirements are given below.

Table - 11.2
Fuel Requirement

Name of Raw Material	Total Requirement (TPD)	Storage facility & capacity	Source & Mode of Transportation
Biomass/Rice husk	412 TPD	Covered sheds	From local suppliers by road
Or			
Low sulphur Coal	288 TPD	Covered sheds	From local suppliers by road

Source: Pre-feasibility Report

11.3.2.2 Other Basic Requirements

Other basic requirements for the project are given in Table below.

Table - 11.3
Basic Requirements for the Project

S. No.	Parameters	Quantity Requirement	Source
1.	Fresh Water (KLPD)	1102 KLPD	Surface water
2.	Power (MW)	6.0	6.25 MW Co-generation Power Plant
3.	Manpower (persons)	150 persons (100 Permanent + 50 Temporary)	Unskilled / Semi-Skilled - Local Areas; Skilled-Local & Outside

Source: Pre-feasibility Report

11.4 Manufacturing Process

The process of grain based distillery comprises of following stages:

- A. Grain storage silos, cleaning, handling and milling
- B. Liquefaction & Saccharification
- C. Fermentation
- D. CO₂Recovery plant
- E. Multi Pressure Vacuum distillation
- F. Decantation
- G. Multi Effect Evaporation
- H. DWGS Dryer Section

The process of Malt Spirit Plant for Malt spirit production comprises of following stages:

- A. Malt Handling
- B. Milling
- C. Mashing
- D. Fermentation
- E. Pot Distillation

11.5 DESCRIPTION OF ENVIRONMENT

11.5.1 Presentation of Results (Air, Noise, Water and Soil)

Baseline study of the study area was conducted during Summer Season (March to May, 2023). Ambient Air Quality Monitoring reveals that the concentrations of PM₁₀ and PM_{2.5} for all the 8 AAQM stations were found between 51.3 to 70.6 µg/m³ and 22.9 to 39 µg/m³ respectively. The concentrations of SO₂ and NO₂ were found to be in range of 12.9 to 5.2 µg/m³ and 13.7 to 23.9 µg/m³ respectively.

Ambient noise levels were measured at 8 locations within the 10 km radius area from the project site. Noise levels vary from 50.6 to 54 Leq dB (A) during day time and 40.2 to 43.9 Leq dB(A) during night time.

Groundwater was analyzed for 8 locations. The pH of the groundwater samples ranged from 7.21 to 7.97 which is within the permissible limit. The color and turbidity were below detection limit and odor and taste were agreeable. The total dissolved solids ranged from 294 to 429 mg/l. Physical quality of the groundwater samples was fair. This observation is supported by moderate to high values of total hardness 175.22 to 286.87 (mg/l) and alkalinity 158.05 to 255.97 (mg/l). Samples were less polluted as indicated by the values of chlorides 51.23 to 87.54 (mg/l) and sulphates 14.5 to 58.12 (mg/l). The Fluoride concentration is 0.55 to 0.97 (mg/l). Based on the moderate conductivity values (496 to 663 µS/cm), the groundwater samples are rich in dissolved substances and minerals which are good for irrigation purpose. The sodium 22.3 to 43.6 (mg/l) and potassium 3.2 to 5.3 (mg/l) concentration are very low indicating absence of pollution of groundwater samples. Total suspended solids, Nickel, Mercury, Arsenic, Lead, Cadmium, Manganese, Copper, Zinc, Chromium, Anionic Detergents, Phenolic compounds, Boron, Aluminium and phosphates were BDL for all the villages.

Soil monitoring was carried out at 8 locations and the analysis results show that soil is slight acidic to basic in nature, pH ranged from 7.66 to 8.11 Water holding capacity (47.6 % to 61.9 %) is favorable for the crops but showed tendency towards water logging. However, the bulk density 1.23 to 1.32 (g/cc) was within the optimum level 1.0 to 1.8 (g/cc). Calcium ranges from 1409 to 2333.74 mg/kg, Sodium 134.45 to 245.47 mg/kg, Potassium 247.28 to 437.24 (kg/ha) was high, Available nitrogen 215.65 to 347.96 (kg/ha) was moderate and Available phosphorus 23.74 to 34.14 (kg/ha) is high. Chloride levels range from 149.54 to 299.2 mg/kg and SAR ranges from 0.80 to 1.36 of the soil samples. Nitrogen fertilizer addition may be necessary during plantation and green belt development. The average conductivity values are 0.34 to 0.52 (mS/cm) which is average in all locations.

11.6 ENVIRONMENTAL MONITORING PROGRAMME

Details of the environmental monitoring schedule / frequency, which will be undertaken for various environmental components, as per conditions of EC/CTE/CTO are given in Table below.

Table - 11.4
Post Project Monitoring

S. No.	Description	Frequency of Monitoring	Locations of monitoring
1	Ambient Air Quality	As per EC/CTO condition	Within and outside plant area at least 4 locations (1 within and 3 outside the plant area at an angle of 120 ⁰ each) covering upwind and downwind directions
2	Stack Emission Monitoring	Continuous monitoring (Online)	Plant Site (Boiler stacks)
3	Performance Guarantee (PG) test of pollution control equipment	Yearly	All pollution control devices
4	Fugitive emission	As per EC/CTO condition	In the plant site
5	Noise level monitoring	As per EC/CTO condition	Plant boundary & nearby areas
6	Ground water quality	Twice a year (Pre & Post monsoon)	In & around the plant site
7	Effluent quality	Daily (In house laboratory)	CPU or ETP/STP Outlet
8	Soil Quality	Yearly	In & around the plant site
9	Medical checkup of employees	Yearly	Nearby hospitals/dispensary/on-site

11.7 PROJECT BENEFITS

The distillery installation of Piccadily Agro Industries Ltd. will result in growth of the surrounding areas by increasing direct and indirect employment opportunities in the region including ancillary development and supporting infrastructure. Development of social amenities will be in the form of medical facilities, education to underprivileged and creation of self-help groups. Chhattisgarh will get revenues in terms of taxes and local people will get direct & indirect employment. Business opportunities for local community will be available. No adverse effect on environment is envisaged as proper mitigation measures will be taken up for the same. Projects will be implemented based on community needs and with significant local contributions. Important areas identified through socio-economic survey and public hearing will be considered for social welfare activities covered under EMP. This approach will strengthen the groups, empower the members.

11.8 ENVIRONMENT MANAGEMENT PLAN

The environment management plan is as given below: -

Particulars	Details
<p>Air quality management</p>	<ul style="list-style-type: none"> • For proposed 60 TPH boiler, ESP as Air pollution control equipment will be installed with stack height of 60 m to control the particulate and gaseous emissions in accordance with CPCB guidelines. • CO₂ generated (154 TPD) during the fermentation process will be collected and sold to authorized vendors. • DG Set (1 x 1500 KVA) will be provided with adequate stack height as per CPCB Guidelines. • Adequate measures for control of fugitive dust emissions will be taken. • All the internal roads will be asphalted and regular sweeping & sprinkling of water in dust generating areas. • Greenbelt development around the periphery & within the premises of the plant will help in attenuating the pollutants emitted and maintaining air quality. • Online Continuous Emission Monitoring System will be installed with the proposed stack and data will be transmitted to CPCB/SPCB servers. • Regular monitoring will be done to ensure ambient air quality standards.
<p>Water quality management</p>	<ul style="list-style-type: none"> • The Grain based distillery will be based on “Zero Effluent Discharge”. • For Grain based operation: Grain Slops (1163 TPD) will be taken through Centrifuge Decanters for separation of Suspended Solids separated as Wet Cake and which goes as cattle, poultry and fish feed as it contains high protein. (Also known as DWG – Distillers Wet Grains). Thin Slops from the Decanter Centrifuge will be partly recycled back to process and balance portions shall be taken to Thins Slops Evaporation Plant for concentration of remaining solids to form Syrup. This Syrup will be also mixed into the Wet Cake coming out of Centrifuge and forms part of Cattle, poultry and fish Feed. DWGS Drier: The Wet Cake (DWGS) and Syrup mixture will be dried in Steam Tube Bundle Dryer for producing DDGS with 8-10% moisture (max.). DDGS (88 TPD) will be utilized as Cattle, poultry and fish feed ingredients. • During Malt Spirit Process: Malt Spirit Slops will be passed through centrifuge decanters for separation of suspended solids separated as Wet Cake (also known as DWG – Distillers Wet Grains). • Process condensate, boiler Blowdown, DM plant reject & washing, CT

	<p>blowdown will be treated in CPU/ETP of capacity 1200 KLPD and treated water will be reused in process activities.</p> <ul style="list-style-type: none"> • Domestic waste water will be treated in Sewage Treatment Plant of Capacity 30 KLPD. • Regular monitoring of ground water quality will be carried out.
Noise Management	<ul style="list-style-type: none"> • Personal Protective Equipment like earplugs and earmuffs will be provided to the workers exposed to high noise level. • Proper maintenance, oiling and greasing of machines at regular intervals will be done to reduce generation of noise. • Greenbelt inside the plant premises and at the plant boundary will be developed& maintained. • Regular monitoring of noise level will be carried out in and around plant premises to find out any high noise level zones and measures will be implemented accordingly. • Regular auditing of process area to find out any loosened nuts/bolts/joints to avoid unnecessary noise.
Solid & Hazardous Waste Management	<ul style="list-style-type: none"> • Solid waste from the Grain based distillery operations generally comprises of fibers and proteins in the form of DDGS (88TPD), which will be ideally used as Cattle, poultry and fish feed ingredients. • Boiler ash (116 TPD) generated during coal-based operations will be given to cement/brick manufactures & during biomass (62 TPD) based operations will be given to brick manufacturers in covered vehicles. • Spent resin from DM plant (500 kg/annum) will be supplied to authorized recyclers. • Used oil & grease (0.5 KL/annum) generated from plant machinery/gear boxes as hazardous waste will be given to the CPCB authorized recyclers or used as in-house lubricant.
Odour management	<ul style="list-style-type: none"> • Boiler will be installed which is based on an eco-friendly and odourless technology. • Adequate greenbelt all around the periphery of the plant and in odour prone areas will be developed. Species like Azadirachta indica (Neem), Millingtonia

	<p>hortensis (Indian cork tree), Pongamia pinnata (karanj) will be given preference to minimize odour in every possible way.</p> <ul style="list-style-type: none"> • Efficient CO₂ collection to avoid carryover of alcohol vapours & other fumes. • Regular steaming of all fermentation equipment. • Longer storages of any product/by-products will be avoided & use of efficient biocides to control bacterial contamination. • Regular use of eco-friendly disinfectants in the drains to avoid generation of putrefying micro-organisms.
<p>Greenbelt development & plantation</p>	<ul style="list-style-type: none"> • Out of the total Plant area of 9.0 ha (22.24 acres), 33% of project area will be developed under greenbelt & plantation i.e., 2.97 ha (7.34 acres). • Native/Indigenous wild plant species will be planted in consultation with local DFO. • Greenbelt will be developed as per Central Pollution Control Board (CPCB) guidelines. • Greenbelt & plantation development will begin simultaneously with the initiation of construction activities of the proposed unit.
<p>Occupational health and safety</p>	<ul style="list-style-type: none"> • Occupational health surveillance program will be taken as a regular exercise for all the employees and their records maintained. • Proper storage and handling precautions will be taken. The storage area will be kept cool, dry and well-ventilated and away from the source of heat, flame or oxidizers. • Use of Personal Protective Equipment (PPEs) will be encouraged. Proper training program on use of PPEs, characteristics of the material handled and safety precautions will be arranged. • Fire safety measures will be incorporated within the factory premises. All the fire extinguishing media such as water, dry chemicals, CO₂, sand, dolomite, foam, etc. will be kept in vital locations. • Mock drill will be arranged for the workers to test the effectiveness of the training program time to time and the way to react in case of emergency, • Safety precautions will be displayed in the premises on the banners, boards, etc.

11.9 CONCLUSION

The proposed project will be beneficial to the local people as more infrastructure development, improvement in education and health facilities, roads, availability of drinking water, etc. in nearby villages will be done. There will be no significant impact on the area, as adequate preventive

measures will be adopted to maintain the various pollutants within permissible limits. Regular monitoring of all the components of environment will be done. Increased social welfare measures taken by the company that will bring development in the near-by villages. Greenbelt development around the area will be also taken up as an effective pollution mitigation technique, as well as to control the pollutants.



CHAPTER–XII

DISCLOSURE OF CONSULTANTS ENGAGED

The consultant engaged with this project is **J.M. EnviroNet Pvt. Ltd. (JMEPL)**, established in the year 1993. JM—in the name of company—is Jharkhand Mahadev, derived from the name of ‘Lord Shiva’ temple located at Queens Road, Vaishali Nagar, Jaipur, Rajasthan.

The company’s registered office is at 503, 5thFloor, Jaipur Centre, Jaipur, Rajasthan and corporate office is at Unit No. 1517, Tower B, Emaar Digital Greens, Golf Course Extension Road, Sector 61, Gurugram (Haryana).

The company is accredited by National Accreditation Board for Education and Training (NABET)-Quality Council of India. J.M. EnviroNet Pvt. Ltd. is listed at serial no. “113” of the List of Accredited EIA Consultant Organization displayed on MoEFCC website (http://eia.nabet.qci.org.in/Accredited_EIA_Consultant.aspx), updated as on 02nd August, 2023. NABET Certificate along with extension letter is enclosed as **Annexure 7**.

JMEPL is offering Environmental Consultancy Services in various sectors viz. Chemical Industries / Cement Plants/Thermal Power Plant/Mining Projects/Coal Washery Project/Real Estate Projects/Distilleries/Steel Plants/Chemical Fertilizers/Mineral Beneficiation etc. In the mining sector, JMEPL is covering mines of minerals viz. Limestone, Bauxite, Chromite, Coal, Zinc, Copper, Gypsum, Soapstone, Iron and Manganese ore, Clay, Silica Sand, Feldspar, Quartz etc.

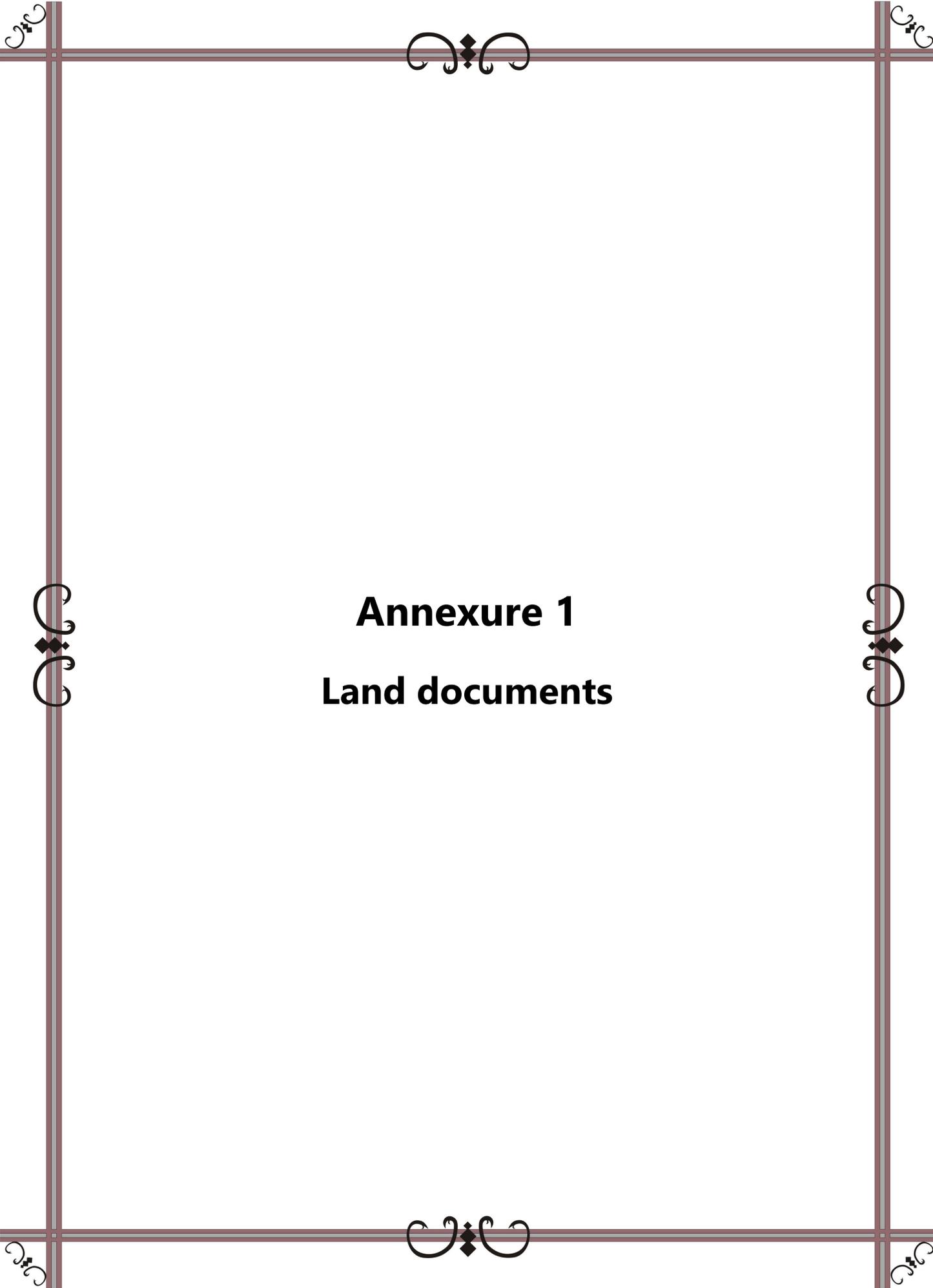
JMEPL has a highly qualified team of Subject Experts. As senior executives/Heads of the EIA Division, we have Former General Managers of the Reputed Cement Companies, Ex-Head EIA Division of big Business Group, STP and ETP Designing Experts, Senior Mining and Geology Experts with vast experience in their respective fields.

The company’s services are spread over 22 States viz.: Andhra Pradesh, Kerala, Gujarat, Maharashtra, Orissa, Tamil Nadu, Goa, Jammu and Kashmir, Himachal Pradesh, Punjab, Haryana, Delhi, Rajasthan, Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Assam, West Bengal, Karnataka, Jharkhand, Bihar and Uttarakhand.

JMEPL outsources its laboratory services from J.M. EnviroLab Pvt. Ltd., an Environmental Laboratory at Gurgaon (Haryana) approved under EPA (Environment Protection Act) from the Ministry of Environment, Forest and Climate Change, Govt. of India, New Delhi and by the National Accreditation Board for Testing and Calibration Laboratories, Government of India (NABL). This MoEFCC and NABL approved Environmental Laboratory of JM Group is also providing Analytical Laboratory Services of various elements and environmental parameters. NABL Certificate is enclosed as **Annexure 8**.

Annual monitoring as per MoEFCC/CPCB/SPCB guidelines, Risk Assessment and Disaster Management Plan, consultancy for Rain Water Harvesting Plan, detailed Hydro-geological Study, preparation of Environmental Statement Reports (Environmental Clearance Compliance Conditions) etc. are amongst the various other consultancy services offered by the Company.





Annexure 1
Land documents



फॉर्म पी-II खसरा पांचसाला खण्ड-1 (भूमिस्वामी का विवरण)

कृषि वर्ष: 2022-2023

ग्राम : बेलदकरी

हल्का : 00054

रा नि : तुमगाँव

तहसील : महासमुंद

जिला : महासमुंद

20230812580100078

भूमि का ब्योरा हेक्टेयर में एवं करो का ब्योरा रुपये पैसे में है ।

क्रमांक	क्षेत्रफल (और यदि भूमि खातो में सम्मिलित न हो तो उसका वर्णन)	कब्जेदार का विवरण				प्रयोजन जिसके, लिए भू-राजस्व निर्धारण किया गया है तथा नियत भूराजस्व	अधिकार जिसके अंतर्गत भूमि धारण की गई हो	किसी भूमि स्वामी या पट्टेदार या किसी मौरुषी कास्तकार के उपपट्टेदार का नाम, पिता का नाम, लगान या पट्टे की रकम और उप-पट्टे पर दिया गया भाग का क्षेत्रफल	कैफियत
		नाम	पिता या पति का नाम	जाति	निवास स्थान				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
388/2	0.1900	पिकाडली एग्री इन्डस्ट्रिज लिमिटेड अधिकृत अधिकारी स्वतंत्र कुमार शुक्ला	पिता कमला पति शुक्ला	ब्राह्मण	मोतीलाल नेहरू नगर भिलाई दुर्ग	कृषि ₹ 0.46	भूमिस्वामी - कृषि भूमि		
426	0.1500	खसरा नंबर - 388/2 के अनुसार	खसरा नंबर - 388/2 के अनुसार	खसरा नंबर - 388/2 के अनुसार	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.36	भूमिस्वामी - कृषि भूमि		
428	0.2700	खसरा नंबर - 388/2 के अनुसार	खसरा नंबर - 388/2 के अनुसार	खसरा नंबर - 388/2 के अनुसार	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.50	भूमिस्वामी - कृषि भूमि		
429	0.0400	खसरा नंबर - 388/2 के अनुसार	खसरा नंबर - 388/2 के अनुसार	खसरा नंबर - 388/2 के अनुसार	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.10	भूमिस्वामी - कृषि भूमि		


फॉर्म पी-II खसरा पांचसाला खण्ड-1 (भूमिस्वामी का विवरण)

कृषि वर्ष: 2022-2023

ग्राम : बेलदूकरी

हल्का : 00054

रा नि : तुमगाँव

तहसील : महासमुंद

जिला : महासमुंद

20230812580100078

भूमि का ब्यौरा हेक्टेयर में एवं करो का ब्यौरा रूपये पैसे में है।

क्रमांक	क्षेत्रफल (और यदि भूमि खातो में सम्मिलित न हो तो उसका वर्णन)	कब्जेदार का विवरण				प्रयोजन जिसके, लिए भू-राजस्व निर्धारण किया गया है तथा नियत भूराजस्व	अधिकार जिसके अंतर्गत भूमि धारण की गई हो	किसी भूमि स्वामी या पट्टेदार या किसी मौरूषी कास्तकार के उपपट्टेदार का नाम, पिता का नाम, लगान या पट्टे की रकम और उप-पट्टे पर दिया गया भाग का क्षेत्रफल	कैफियत
		नाम	पिता या पति का नाम	जाति	निवास स्थान				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
430	0.0900	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.21	भूमिस्वामी - कृषि भूमि					
431	0.0600	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.14	भूमिस्वामी - कृषि भूमि					
432	0.1100	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.26	भूमिस्वामी - कृषि भूमि					
433	0.3600	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.86	भूमिस्वामी - कृषि भूमि					
434	0.2400	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.57	भूमिस्वामी - कृषि भूमि					



फॉर्म पी-II खसरा पांचसाला खण्ड-1 (भूमिस्वामी का विवरण)

कृषि वर्ष: 2022-2023

ग्राम : बेलदकरी

हल्का : 00054

रा नि : तुमगाँव

तहसील : महासमुंद

जिला : महासमुंद

20230812580100078

भूमि का ब्यौरा हेक्टेयर में एवं करो का ब्यौरा रूपये पैसे में है ।

क्रमांक	क्षेत्रफल (और यदि भूमि खातो में सम्मिलित न हो तो उसका वर्णन)	कब्जेदार का विवरण				प्रयोजन जिसके, लिए भू-राजस्व निर्धारण किया गया है तथा नियत भूराजस्व	अधिकार जिसके अंतर्गत भूमि धारण की गई हो	किसी भूमि स्वामी या पट्टेदार या किसी मौरूबी कास्तकार के उपपट्टेदार का नाम, पिता का नाम, लगान या पट्टे की रकम और उप-पट्टे पर दिया गया भाग का क्षेत्रफल	कैफियत
		नाम	पिता या पति का नाम	जाति	निवास स्थान				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
441	0.1700	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.41	भूमिस्वामी - कृषि भूमि					
467/1	0.1200	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.25	भूमिस्वामी - कृषि भूमि					
467/2	0.1000	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.22	भूमिस्वामी - कृषि भूमि					
468	0.1500	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.33	भूमिस्वामी - कृषि भूमि					
472	0.2200	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.49	भूमिस्वामी - कृषि भूमि					


फॉर्म पी-II खसरा पांचसाला खण्ड-1 (भूमिस्वामी का विवरण)

कृषि वर्ष: 2022-2023

ग्राम : बेलदकरी

हल्का : 00054

रा नि : तुमगाँव

तहसील : महासमुंद

जिला : महासमुंद

20230812580100078

भूमि का ब्यौरा हेक्टेयर में एवं करो का ब्यौरा रुपये पैसे में है।

क्रमांक	क्षेत्रफल (और यदि भूमि खातो में सम्मिलित न हो तो उसका वर्णन)	कब्जेदार का विवरण				प्रयोजन जिसके, लिए भू-राजस्व निर्धारण किया गया है तथा नियत भूराजस्व	अधिकार जिसके अंतर्गत भूमि धारण की गई हो	किसी भूमि स्वामी या पट्टेदार या किसी मौरूषी कास्तकार के उपपट्टेदार का नाम, पिता का नाम, लगान या पट्टे की रकम और उप-पट्टे पर दिया गया भाग का क्षेत्रफल	कैफियत
		नाम	पिता या पति का नाम	जाति	निवास स्थान				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
474	0.0400	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.09	भूमिस्वामी - कृषि भूमि					
476/2	0.4000	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.25	भूमिस्वामी - कृषि भूमि					
477	0.2000	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.38	भूमिस्वामी - कृषि भूमि					
478	0.1300	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.30	भूमिस्वामी - कृषि भूमि					
479	0.0400	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.04	भूमिस्वामी - कृषि भूमि		- खरीदी से ना.क्र. 02 दि18/10/11			


फॉर्म पी-II खसरा पांचसाला खण्ड-1 (भूमिस्वामी का विवरण)

कृषि वर्ष: 2022-2023

ग्राम : बेलदकरी

हल्का : 00054

रा नि : तुमगाँव

तहसील : महासमुंद

जिला : महासमुंद

20230812580100078

भूमि का ब्यौरा हेक्टेयर में एवं करो का ब्यौरा रूपये पैसे में है।

क्रमांक	क्षेत्रफल (और यदि भूमि खातो में सम्मिलित न हो तो उसका वर्णन)	कब्जेदार का विवरण				प्रयोजन जिसके, लिए भू-राजस्व निर्धारण किया गया है तथा नियत भूराजस्व	अधिकार जिसके अंतर्गत भूमि धारण की गई हो	किसी भूमि स्वामी या पट्टेदार या किसी मौरूबी कास्तकार के उपपट्टेदार का नाम, पिता का नाम, लगान या पट्टे की रकम और उप-पट्टे पर दिया गया भाग का क्षेत्रफल	कैफियत
		नाम	पिता या पति का नाम	जाति	निवास स्थान				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
481	0.0800	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.20	भूमिस्वामी - कृषि भूमि					
482	0.1100	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.25	भूमिस्वामी - कृषि भूमि					
483	0.2400	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.68	भूमिस्वामी - कृषि भूमि					
484	0.0800	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.23	भूमिस्वामी - कृषि भूमि					
485	0.0400	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.13	भूमिस्वामी - कृषि भूमि					



फॉर्म पी-II खसरा पांचसाला खण्ड-1 (भूमिस्वामी का विवरण)

कृषि वर्ष: 2022-2023

ग्राम : बेलदकरी

हल्का : 00054

रा नि : तुमगाँव

तहसील : महासमुंद

जिला : महासमुंद

20230812580100078

भूमि का ब्यौरा हेक्टेयर में एवं करो का ब्यौरा रूपये पैसे में है ।

क्रमांक	क्षेत्रफल (और यदि भूमि खातो में सम्मिलित न हो तो उसका वर्णन)	कब्जेदार का विवरण				प्रयोजन जिसके, लिए भू-राजस्व निर्धारण किया गया है तथा नियत भूराजस्व	अधिकार जिसके अंतर्गत भूमि धारण की गई हो	किसी भूमि स्वामी या पट्टेदार या किसी मौरूबी कास्तकार के उपपट्टेदार का नाम, पिता का नाम, लगान या पट्टे की रकम और उप-पट्टे पर दिया गया भाग का क्षेत्रफल	कैफियत
		नाम	पिता या पति का नाम	जाति	निवास स्थान				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
487	0.1000	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.35	भूमिस्वामी - कृषि भूमि					
489	0.2200	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.62	भूमिस्वामी - कृषि भूमि					
490/1	0.4000	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 1.13	भूमिस्वामी - कृषि भूमि					
491	0.1100	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.38	भूमिस्वामी - कृषि भूमि					
492	0.1200	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.25	भूमिस्वामी - कृषि भूमि					


फॉर्म पी-II खसरा पांचसाला खण्ड-1 (भूमिस्वामी का विवरण)

कृषि वर्ष: 2022-2023

ग्राम : बेलदूकरी

हल्का : 00054

रा नि : तुमगाँव

तहसील : महासमुंद

जिला : महासमुंद

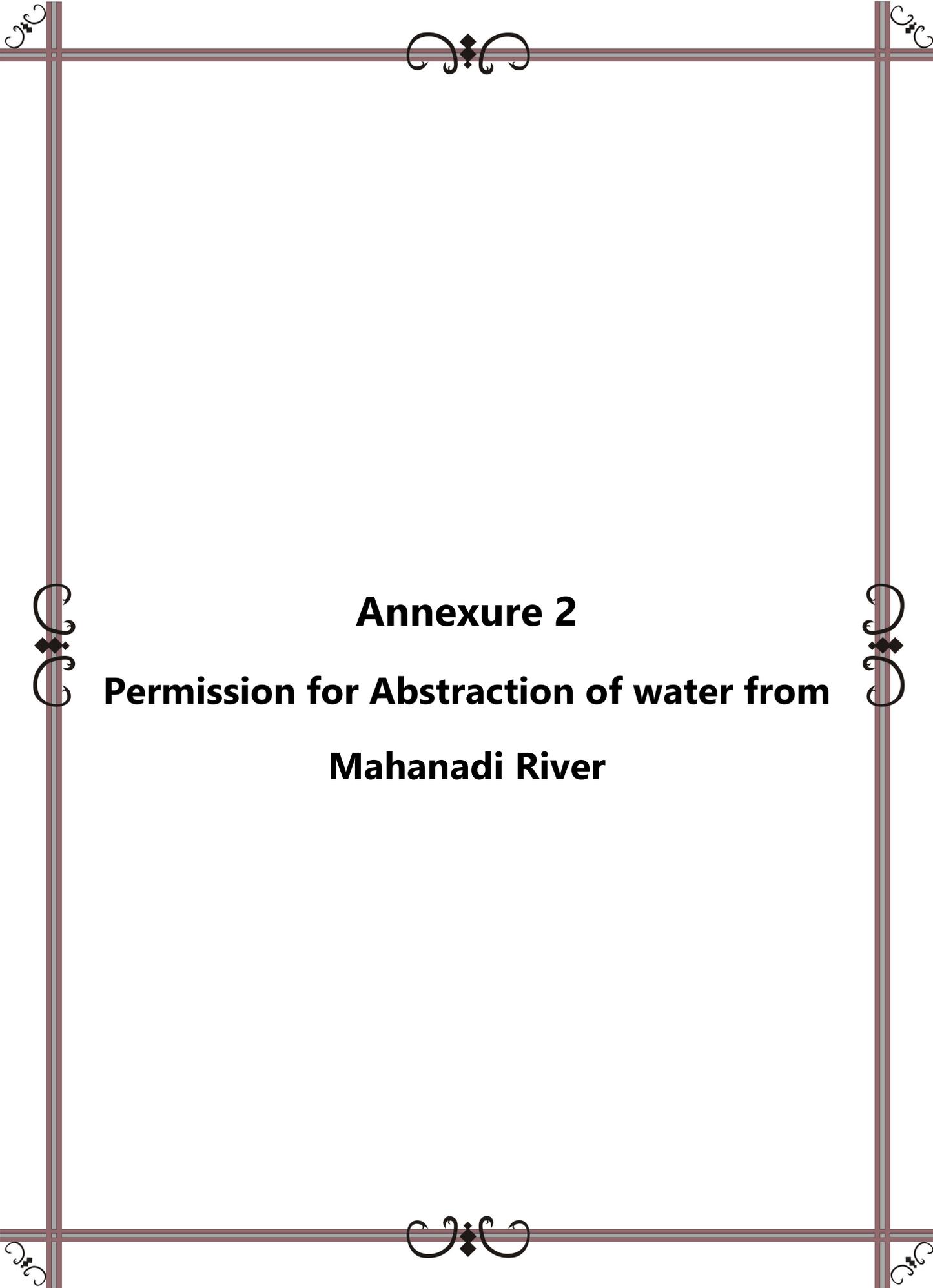
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भूमि का ब्यौरा हेक्टेयर में एवं करो का ब्यौरा रुपये पैसे में है।

क्रमांक	क्षेत्रफल (और यदि भूमि खातो में सम्मिलित न हो तो उसका वर्णन)	कब्जेदार का विवरण				प्रयोजन जिसके, लिए भू-राजस्व निर्धारण किया गया है तथा नियत भूराजस्व	अधिकार जिसके अंतर्गत भूमि धारण की गई हो	किसी भूमि स्वामी या पट्टेदार या किसी मौजूबी कास्तकार के उपपट्टेदार का नाम, पिता का नाम, लगान या पट्टे की रकम और उप-पट्टे पर दिया गया भाग का क्षेत्रफल	कैफियत
		नाम	पिता या पति का नाम	जाति	निवास स्थान				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
493	0.1000	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.35	भूमिस्वामी - कृषि भूमि					
496	0.0600	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.05	भूमिस्वामी - कृषि भूमि					
1346	0.1600	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.75	भूमिस्वामी - कृषि भूमि		1346/488 उड़ान खसरे को विपर्यय कर खसरा नंबर 1346 दिनांक Dec 3 2019 11:18AM को बनाया गया।			
1349	0.2600	खसरा नंबर - 388/2 के अनुसार	कृषि ₹ 0.62	भूमिस्वामी - कृषि भूमि		1349/434 उड़ान खसरे को विपर्यय कर खसरा नंबर 1349 दिनांक Dec 3 2019 11:15AM को बनाया गया।			

Digitally signed by Dhanesh Kumar Dhruw
Date: 2023.08.12 08:39:29 +05:30

Reason: Certified to be TRUE COPY of the digitally published ROR



Annexure 2

Permission for Abstraction of water from Mahanadi River



एक ही धरती, एक ही भविष्य, एक ही भविष्य
ONE EARTH - ONE DREAM - ONE FUTURE

छत्तीसगढ़ शासन राज्य निवेश प्रोत्साहन बोर्ड

उद्योग भवन, भू-तल, रिंग रोड नं. 1, तेलीबांधा, रायपुर, छत्तीसगढ़ - 492006
दूरभाष (0771)-4066351, 4066352, फैक्स- 4066315, ई-मेल sipb.cg@gov.in; sipbchhattisgarh@gmail.com

क्रमांक 1073/एसआईपीबी/2021/
प्रति,

रायपुर, दिनांक /05/2023

सचिव,
छत्तीसगढ़ शासन,
जल संसाधन विभाग,
मंत्रालय, महानदी भवन,
नया रायपुर (छत्तीसगढ़)

विषय :- सेसर्स पिकाडली एग्री इण्डस्ट्रीज लिमिटेड को सतही जल उपयोग की अनुमति बाबत ।

संदर्भ :- इकाई का ऑनलाईन जल आबंटन आवेदन क्रमांक WA00435

सेसर्स पिकाडली एग्री इण्डस्ट्रीज लिमिटेड द्वारा ग्राम-बेलदुकरी, तहसील व जिला-महासमुन्द में प्रस्तावित एथेनाल संयंत्र की स्थापनार्थ महानदी (समोदा डेम) से 0.53363 एमसीएम वार्षिक सतही जल आबंटन का आवेदन प्रस्तुत किया गया है ।

उक्त संयंत्र के लिए निवेशक को 0.5544 एमसीएम वार्षिक पात्रता के विरुद्ध कम मात्रा में जल आबंटन की मांग की गई है ।

अतएव इकाई की महानदी (समोदा डेम) से 0.53363 एमसीएम वार्षिक सतही जल आबंटन का ऑनलाईन आवेदन अनुमति/स्वीकृति दिये जाने बाबत अनुसंशा की जाती है ।

संलग्न:-उपरोक्तानुसार
(सचिव, सह संयोजक, राज्य निवेश प्रोत्साहन बोर्ड द्वारा अनुमोदित)

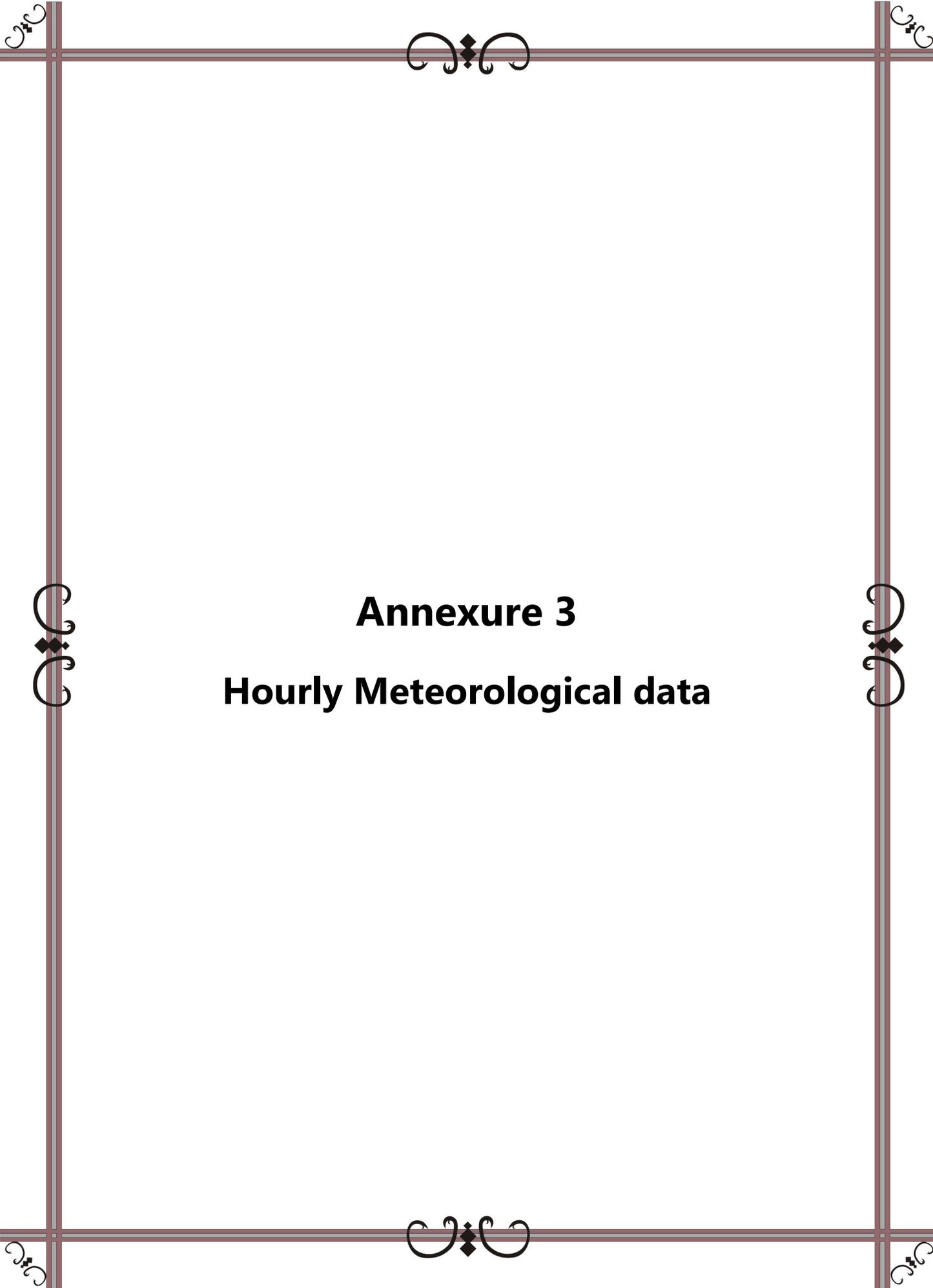
(आलोक त्रिवेदी)
अपर संचालक

पृ. क्रमांक / 1073/एसआईपीबी/2021/९६४
प्रतिलिपि :-

रायपुर, दिनांक : 10 / 05 / 2023

प्रबंध संचालक, मे0 पिकाडली एग्री इण्डस्ट्रीज लिमिटेड, ग्राम-भदसन, उमरी रोड,
तहसील-इन्द्री, जिला-करनाल (हरियाणा)-132117 छत्तीसगढ़ शासन

अपर संचालक



Annexure 3
Hourly Meteorological data

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_ Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	1	1	53.19	18.12	1.89	240
2023	3	1	2	51.06	18.19	1.94	240
2023	3	1	3	38.25	18.25	1.98	240
2023	3	1	4	27.56	18.29	1.99	240
2023	3	1	5	20.62	18.33	0.25	240
2023	3	1	6	18.44	20.26	1.73	240
2023	3	1	7	17.62	23.63	1.7	240
2023	3	1	8	17.12	28.17	1.54	240
2023	3	1	9	16.88	31.96	1.79	240
2023	3	1	10	17.12	33.69	1.67	240
2023	3	1	11	18.12	34.23	1.72	240
2023	3	1	12	31.25	34.63	1.89	240
2023	3	1	13	35.25	34.67	0.25	240
2023	3	1	14	37.06	34.26	0.25	240
2023	3	1	15	38.69	33.36	0.25	240
2023	3	1	16	40.12	30.58	1.67	260
2023	3	1	17	41.31	27.38	0.25	260
2023	3	1	18	42.25	25.79	0.25	260
2023	3	1	19	42.94	24.73	0.25	260
2023	3	1	20	43.94	23.84	0.25	260
2023	3	1	21	45	23.17	0.25	260
2023	3	1	22	45	22.62	0.25	260
2023	3	1	23	44.5	22.19	0.25	260
2023	3	1	24	43.44	21.69	0.25	260
2023	3	2	1	43.19	21.25	0.25	260
2023	3	2	2	47.19	21.23	0.25	260
2023	3	2	3	37.62	21.42	1.58	260
2023	3	2	4	30.88	21.36	0.77	260
2023	3	2	5	24.5	21.37	0.63	260
2023	3	2	6	21.75	21.62	1.37	260
2023	3	2	7	21.06	23.66	0.25	260
2023	3	2	8	21.19	26.53	2.88	260
2023	3	2	9	21.62	29.89	0.3	260
2023	3	2	10	22.5	32.01	3	260
2023	3	2	11	23.62	33.22	2.85	260
2023	3	2	12	33.5	33.93	2.78	260
2023	3	2	13	39.56	34.23	2.8	260
2023	3	2	14	40.12	33.94	2.68	260

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_ Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	2	15	40.62	33.21	2.46	260
2023	3	2	16	41.25	31.14	1.57	260
2023	3	2	17	42.06	28.23	1.71	260
2023	3	2	18	42.25	27.11	1.88	260
2023	3	2	19	42.19	26.3	2.05	260
2023	3	2	20	41	25.53	2.17	260
2023	3	2	21	40.81	24.9	2.17	260
2023	3	2	22	42.44	24.49	2.08	260
2023	3	2	23	45.94	24.3	1.84	260
2023	3	2	24	51.06	24.47	1.29	260
2023	3	3	1	54.88	24.4	0.47	260
2023	3	3	2	50.81	23.87	0.53	260
2023	3	3	3	41	22.29	1.43	260
2023	3	3	4	31.5	20.69	2.07	260
2023	3	3	5	25.19	19.42	2.42	260
2023	3	3	6	22.69	21.06	2.54	260
2023	3	3	7	20.81	23.68	2.88	260
2023	3	3	8	19.38	27.89	0.25	260
2023	3	3	9	18.44	31.65	0.25	260
2023	3	3	10	17.94	33.42	0.25	260
2023	3	3	11	18.06	34.62	0.25	260
2023	3	3	12	25.56	35.26	0.25	260
2023	3	3	13	35.5	35.36	0.25	260
2023	3	3	14	36.94	35.01	0.25	260
2023	3	3	15	38.12	34.08	0.25	260
2023	3	3	16	38.94	31.56	2.46	260
2023	3	3	17	39.31	27.08	2.68	260
2023	3	3	18	39.12	25.56	2.86	260
2023	3	3	19	39	24.64	2.91	260
2023	3	3	20	38.69	24.01	2.89	260
2023	3	3	21	37.88	23.5	2.79	260
2023	3	3	22	37.88	23.18	2.66	260
2023	3	3	23	38.5	22.89	2.49	260
2023	3	3	24	39.94	22.77	2.21	260
2023	3	4	1	42.06	22.75	1.77	260
2023	3	4	2	42.56	22.44	1.19	260
2023	3	4	3	32.75	21.77	0.75	260
2023	3	4	4	24.44	21.08	0.82	260

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_ Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	4	5	18.44	20.28	1.11	260
2023	3	4	6	16.44	21.53	1.3	260
2023	3	4	7	15.19	24.38	1.54	260
2023	3	4	8	14.25	28.76	2.14	260
2023	3	4	9	13.69	32.78	2.34	260
2023	3	4	10	13.5	34.44	2.4	260
2023	3	4	11	13.88	35.39	2.59	260
2023	3	4	12	22.62	35.94	2.83	260
2023	3	4	13	31.19	35.99	0.25	260
2023	3	4	14	31.81	35.66	0.25	260
2023	3	4	15	32.56	34.76	0.25	260
2023	3	4	16	32.88	32.19	2.07	260
2023	3	4	17	33.25	27.83	2.36	260
2023	3	4	18	34.25	26.32	2.57	260
2023	3	4	19	35.75	25.4	2.67	260
2023	3	4	20	36.75	24.7	2.7	260
2023	3	4	21	36.81	24.08	2.74	260
2023	3	4	22	36.31	23.28	2.86	260
2023	3	4	23	34.69	22.38	2.95	260
2023	3	4	24	35.31	21.83	2.85	260
2023	3	5	1	40.56	21.7	2.39	260
2023	3	5	2	42.69	21.68	1.51	265
2023	3	5	3	30.62	21.66	0.65	265
2023	3	5	4	23	21.11	1.26	265
2023	3	5	5	16.88	19.38	2.04	265
2023	3	5	6	15.62	20.65	2.24	265
2023	3	5	7	15.12	23.89	0.25	265
2023	3	5	8	14.94	28.48	0.25	265
2023	3	5	9	14.94	32.7	0.25	265
2023	3	5	10	15.38	34.37	1.66	265
2023	3	5	11	16.19	35.14	1.4	265
2023	3	5	12	25.06	35.54	1.41	265
2023	3	5	13	27.44	35.56	1.49	265
2023	3	5	14	28	35.08	1.59	265
2023	3	5	15	30.06	34.19	1.57	265
2023	3	5	16	33.56	32.17	1.05	265
2023	3	5	17	34.19	29.65	1.15	265
2023	3	5	18	36.56	28.17	1.57	265

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_ Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	5	19	35.31	26.8	2	265
2023	3	5	20	34.88	25.62	0.25	265
2023	3	5	21	34.12	24.69	0.25	265
2023	3	5	22	37.06	24.12	0.25	265
2023	3	5	23	40.94	24.09	1.81	265
2023	3	5	24	44.69	24.15	1.01	265
2023	3	6	1	47.56	23.82	0.25	265
2023	3	6	2	47.38	22.68	1.09	265
2023	3	6	3	36.44	21.23	1.64	265
2023	3	6	4	28.25	20.1	1.91	265
2023	3	6	5	22.38	19.36	1.95	265
2023	3	6	6	20.56	20.85	1.76	265
2023	3	6	7	19.38	23.58	1.73	265
2023	3	6	8	18.56	28.07	0.25	265
2023	3	6	9	18.12	31.76	0.25	265
2023	3	6	10	17.94	33.34	1.85	265
2023	3	6	11	18.38	34.37	1.45	265
2023	3	6	12	25.06	34.9	1.22	265
2023	3	6	13	29.56	34.96	1.16	265
2023	3	6	14	29.62	34.66	1.17	265
2023	3	6	15	30.62	33.89	1.09	265
2023	3	6	16	33.75	32.22	0.63	265
2023	3	6	17	37.25	29.77	0.57	265
2023	3	6	18	38.44	28.49	1.04	265
2023	3	6	19	38.69	27.3	1.57	265
2023	3	6	20	37.69	26.01	2	265
2023	3	6	21	37.62	24.82	0.25	265
2023	3	6	22	37.75	24.09	2.2	265
2023	3	6	23	39.44	23.83	1.96	265
2023	3	6	24	42.12	23.83	1.49	265
2023	3	7	1	43.88	23.64	0.88	265
2023	3	7	2	44.19	23.4	0.27	265
2023	3	7	3	35.5	22.76	0.32	265
2023	3	7	4	26.81	21.75	0.76	265
2023	3	7	5	21.56	20.86	0.97	265
2023	3	7	6	19.56	21.6	1.13	265
2023	3	7	7	18.44	24.11	1.18	265
2023	3	7	8	17.94	28.22	1.57	265

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	7	9	18	31.35	1.78	265
2023	3	7	10	18.56	33.01	1.64	265
2023	3	7	11	19.56	34.09	1.37	265
2023	3	7	12	26.81	34.68	1.13	265
2023	3	7	13	31.38	34.7	0.89	265
2023	3	7	14	31.69	34.12	0.53	265
2023	3	7	15	32.88	33.19	0.57	265
2023	3	7	16	33.81	31.5	0.72	265
2023	3	7	17	36	29.15	1	265
2023	3	7	18	38.69	28.02	1.14	265
2023	3	7	19	41.94	27.08	1.33	265
2023	3	7	20	43.62	26.19	1.54	265
2023	3	7	21	44.5	25.12	1.81	265
2023	3	7	22	45	23.83	2.17	265
2023	3	7	23	46.31	22.5	2.51	265
2023	3	7	24	48.25	21.46	2.74	265
2023	3	8	1	49.44	20.59	2.83	265
2023	3	8	2	42.81	20.3	2.68	265
2023	3	8	3	35.06	19.89	2.47	265
2023	3	8	4	27.56	19.51	2.25	265
2023	3	8	5	22.44	19.37	2.06	265
2023	3	8	6	20.88	20.94	2.15	265
2023	3	8	7	20.12	22.77	1.97	265
2023	3	8	8	19.75	26.76	2.03	265
2023	3	8	9	19.5	30.08	1.97	265
2023	3	8	10	19.81	32.01	1.93	265
2023	3	8	11	20.69	33.19	1.96	265
2023	3	8	12	27.81	33.8	1.92	265
2023	3	8	13	32.12	33.99	1.91	265
2023	3	8	14	30.44	33.52	2.04	265
2023	3	8	15	30.94	32.63	2.06	265
2023	3	8	16	33.19	30.94	1.38	265
2023	3	8	17	33.88	28.52	0.85	265
2023	3	8	18	34.31	28.01	0.36	265
2023	3	8	19	33.5	27.3	0.56	265
2023	3	8	20	36.44	26.15	0.79	265
2023	3	8	21	40.62	25.58	0.73	265
2023	3	8	22	45.19	25.23	0.39	265

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	8	23	47.62	24.9	0.6	265
2023	3	8	24	50.69	23.52	1.38	265
2023	3	9	1	53.94	21.79	2.11	265
2023	3	9	2	46.88	20.22	2.47	265
2023	3	9	3	39.06	18.94	2.54	265
2023	3	9	4	27.75	17.94	2.53	265
2023	3	9	5	20.06	17.24	2.4	265
2023	3	9	6	17.62	19.25	2.65	265
2023	3	9	7	16.5	22.05	1.91	265
2023	3	9	8	15.88	27.37	2.36	330
2023	3	9	9	15.69	31.21	1.97	330
2023	3	9	10	15.88	33	0.91	330
2023	3	9	11	16.56	33.92	0.65	330
2023	3	9	12	23.75	34.4	1.03	330
2023	3	9	13	32.38	34.42	1.26	330
2023	3	9	14	33.12	34.05	1.55	330
2023	3	9	15	34.31	33.19	1.76	330
2023	3	9	16	35.5	31.31	1.32	330
2023	3	9	17	36.5	28.1	1.61	330
2023	3	9	18	37.25	26.68	1.86	330
2023	3	9	19	38.25	25.65	2.15	330
2023	3	9	20	39.62	24.81	2.32	330
2023	3	9	21	41.44	24.22	2.38	270
2023	3	9	22	43.56	23.8	2.32	270
2023	3	9	23	45.56	23.33	2.24	270
2023	3	9	24	47.19	22.73	2.18	270
2023	3	10	1	48.06	21.99	2.13	270
2023	3	10	2	47.12	21.23	2.03	270
2023	3	10	3	33.81	20.62	1.89	270
2023	3	10	4	22.56	20.23	1.73	270
2023	3	10	5	18.88	20.23	1.5	270
2023	3	10	6	17.25	21.87	1.12	270
2023	3	10	7	16.38	25.18	0.92	270
2023	3	10	8	15.75	29.85	0.62	270
2023	3	10	9	15.5	32.35	0.19	270
2023	3	10	10	15.5	33.8	0.34	270
2023	3	10	11	16.19	34.69	0.58	270
2023	3	10	12	22.81	35.24	0.89	270

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_ Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	10	13	29.88	35.3	1.09	270
2023	3	10	14	34.19	34.94	1.07	270
2023	3	10	15	36.62	34.08	0.82	270
2023	3	10	16	38.69	32.35	0.67	270
2023	3	10	17	41.31	29.23	1.49	270
2023	3	10	18	43.75	26.69	2.45	270
2023	3	10	19	45.94	25.18	0.25	270
2023	3	10	20	48.25	24.26	0.25	270
2023	3	10	21	50.38	23.44	0.25	270
2023	3	10	22	51.81	22.72	0.25	270
2023	3	10	23	52.25	22.05	0.25	270
2023	3	10	24	52.44	21.38	0.25	270
2023	3	11	1	52.56	20.8	2.66	270
2023	3	11	2	50.25	20.33	2.12	270
2023	3	11	3	40.44	20.11	1.59	270
2023	3	11	4	30.38	19.9	1.2	270
2023	3	11	5	24.25	19.71	0.94	270
2023	3	11	6	20.25	21.09	0.94	270
2023	3	11	7	18.12	23.77	0.95	270
2023	3	11	8	17.06	28.51	0.64	270
2023	3	11	9	16.75	31.53	0.1	270
2023	3	11	10	16.75	33.24	0.21	270
2023	3	11	11	17.31	34.3	0.49	270
2023	3	11	12	22.25	34.93	0.79	270
2023	3	11	13	28	35.05	1.04	270
2023	3	11	14	27.56	34.76	1.26	270
2023	3	11	15	27.19	33.87	1.32	270
2023	3	11	16	28.38	32.18	0.94	270
2023	3	11	17	29.5	29.82	0.63	270
2023	3	11	18	31.25	28.58	0.32	270
2023	3	11	19	34.69	28.17	0.46	270
2023	3	11	20	37.5	27.34	0.87	270
2023	3	11	21	40.31	26.19	1.24	270
2023	3	11	22	42.75	25.27	1.56	270
2023	3	11	23	44.94	24	1.82	270
2023	3	11	24	46.12	22.74	1.98	270
2023	3	12	1	47.31	21.46	2.01	270
2023	3	12	2	45.5	20.51	1.86	270

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	12	3	35.62	19.79	1.54	270
2023	3	12	4	24.56	19.44	1.14	270
2023	3	12	5	20.12	19.28	0.74	270
2023	3	12	6	18.38	20.95	0.35	270
2023	3	12	7	17.44	23.98	0.4	270
2023	3	12	8	16.81	28.72	0.46	270
2023	3	12	9	16.56	31.9	0.49	270
2023	3	12	10	16.62	33.72	0.92	270
2023	3	12	11	17	34.75	1.17	270
2023	3	12	12	23.62	35.32	1.26	270
2023	3	12	13	29.38	35.44	1.33	270
2023	3	12	14	28.25	35.1	1.39	270
2023	3	12	15	28.31	34.28	1.37	270
2023	3	12	16	28.06	32.44	1	270
2023	3	12	17	29	29.83	1.09	270
2023	3	12	18	29.81	28.76	1.03	270
2023	3	12	19	30.12	27.9	0.95	270
2023	3	12	20	32.38	27.21	0.98	270
2023	3	12	21	34.75	26.54	1.07	270
2023	3	12	22	37.69	25.96	1.21	270
2023	3	12	23	41.19	25.29	1.35	270
2023	3	12	24	44.19	24.54	1.51	270
2023	3	13	1	45.81	23.4	1.76	270
2023	3	13	2	43.75	22.08	2	270
2023	3	13	3	32.06	20.9	2.13	270
2023	3	13	4	24.88	20.04	2.12	270
2023	3	13	5	19.06	19.59	1.99	270
2023	3	13	6	17.5	21.72	1.65	270
2023	3	13	7	16.75	24.55	1.64	270
2023	3	13	8	16.06	28.55	1.13	270
2023	3	13	9	15.75	32.55	0.79	270
2023	3	13	10	15.94	34.25	0.67	270
2023	3	13	11	16.5	35	0.55	270
2023	3	13	12	23.12	35.51	0.47	270
2023	3	13	13	27.19	35.52	0.47	270
2023	3	13	14	25.94	35	0.59	270
2023	3	13	15	25.75	34.09	0.65	270
2023	3	13	16	27.31	32.58	0.56	270

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	13	17	25.69	30.67	0.7	270
2023	3	13	18	26.44	29.88	0.65	270
2023	3	13	19	26.75	29.37	0.53	270
2023	3	13	20	29.75	28.45	0.41	270
2023	3	13	21	31.81	28	0.31	270
2023	3	13	22	34.12	27.39	0.16	270
2023	3	13	23	35.62	27.04	0.26	270
2023	3	13	24	36.62	25.93	0.36	270
2023	3	14	1	38.88	24.77	0.35	270
2023	3	14	2	38.56	23.43	0.61	270
2023	3	14	3	29.75	22.65	1.03	270
2023	3	14	4	23.06	22.24	1.3	270
2023	3	14	5	18.25	21.62	1.41	270
2023	3	14	6	16.56	22.71	1.68	270
2023	3	14	7	15.94	25.23	1.86	270
2023	3	14	8	15.81	29.21	1.93	270
2023	3	14	9	15.81	32.91	1.44	270
2023	3	14	10	16	34.58	1.35	270
2023	3	14	11	16.62	35.32	1.23	270
2023	3	14	12	23.75	35.56	1.21	270
2023	3	14	13	26.12	35.55	1.21	270
2023	3	14	14	24.94	35.21	1.4	270
2023	3	14	15	24.94	34.47	1.56	270
2023	3	14	16	24.81	32.71	1.13	270
2023	3	14	17	27.25	30.75	0.94	270
2023	3	14	18	29.25	30.02	0.57	280
2023	3	14	19	30.69	29.5	0.4	225
2023	3	14	20	32.44	28.74	0.75	200
2023	3	14	21	33.81	27.44	1.21	200
2023	3	14	22	36.06	26.29	1.53	200
2023	3	14	23	38.44	25.51	1.64	211
2023	3	14	24	40.31	24.76	1.64	227
2023	3	15	1	40.75	24.01	1.67	247
2023	3	15	2	39.25	23.06	1.79	277
2023	3	15	3	29.88	22.09	1.92	282
2023	3	15	4	22.19	21.44	1.83	230
2023	3	15	5	17.88	21.18	1.5	230
2023	3	15	6	16.81	22.9	1.04	230

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	15	7	16.25	25.69	0.81	230
2023	3	15	8	15.75	30.45	0.86	230
2023	3	15	9	15.56	34.02	0.7	230
2023	3	15	10	15.75	35.33	0.57	230
2023	3	15	11	16.38	35.98	0.79	230
2023	3	15	12	22.19	36.33	0.92	230
2023	3	15	13	26.88	36.3	0.74	230
2023	3	15	14	26.56	35.67	0.8	230
2023	3	15	15	25.31	34.65	0.85	230
2023	3	15	16	26	33.04	0.73	230
2023	3	15	17	26.44	30.91	0.88	230
2023	3	15	18	26.56	30.01	0.85	230
2023	3	15	19	29.12	29.4	0.72	230
2023	3	15	20	31.56	28.82	0.41	230
2023	3	15	21	34.25	28.57	0.17	230
2023	3	15	22	34.19	27.94	0.65	230
2023	3	15	23	36	26.9	1.21	230
2023	3	15	24	38.5	25.94	1.6	230
2023	3	16	1	41.56	25.23	1.68	230
2023	3	16	2	39.06	24.87	1.61	230
2023	3	16	3	30.44	24.19	1.78	230
2023	3	16	4	24.94	23.21	2.15	230
2023	3	16	5	22.75	22.29	2.44	230
2023	3	16	6	21.94	23.97	2.55	230
2023	3	16	7	22	26.74	0.25	230
2023	3	16	8	22.75	29.87	4.5	230
2023	3	16	9	23.38	31.95	4.95	230
2023	3	16	10	23.69	33.24	0.2	230
2023	3	16	11	24.62	33.89	0.2	230
2023	3	16	12	27.5	33.74	4.9	230
2023	3	16	13	38.12	33.48	4.1	230
2023	3	16	14	40.38	33.31	0.25	230
2023	3	16	15	41.25	32.64	0.25	230
2023	3	16	16	42.38	31.21	0.25	230
2023	3	16	17	42.75	27.81	2.22	230
2023	3	16	18	45.25	26.5	2.21	230
2023	3	16	19	55.31	26.05	1.96	230
2023	3	16	20	65.44	25.65	1.98	230

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_ Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	16	21	71.62	25.23	2.43	230
2023	3	16	22	73.81	24.83	4.27	230
2023	3	16	23	73.88	23.51	0.2	230
2023	3	16	24	74.56	22.23	0.2	230
2023	3	17	1	75.94	21.47	0.25	230
2023	3	17	2	74.81	21.15	2.27	260
2023	3	17	3	68.38	21.17	1.57	260
2023	3	17	4	55.94	21.15	1.19	230
2023	3	17	5	48.19	21.05	0.81	236
2023	3	17	6	44.25	21.23	0.9	230
2023	3	17	7	41.62	22.34	0.81	260
2023	3	17	8	39.88	24.73	0.74	180
2023	3	17	9	39.81	27.06	1.21	230
2023	3	17	10	41.19	28.58	1.78	233
2023	3	17	11	43	29.6	2.31	230
2023	3	17	12	47.81	30.19	2.74	230
2023	3	17	13	59.25	30.03	0.25	230
2023	3	17	14	62.5	29.38	0.25	230
2023	3	17	15	64.38	28.73	0.4	220
2023	3	17	16	66	27.63	2.88	220
2023	3	17	17	68.38	25.47	2.27	220
2023	3	17	18	71.19	24.48	2.66	220
2023	3	17	19	73.44	23.96	0.25	220
2023	3	17	20	76	23.52	0.4	220
2023	3	17	21	78.19	22.94	0.4	220
2023	3	17	22	80.75	22.24	0.4	220
2023	3	17	23	82.94	21.65	0.25	220
2023	3	17	24	84.62	21.12	0.25	220
2023	3	18	1	85.69	20.68	0.25	220
2023	3	18	2	78.62	20.22	0.25	220
2023	3	18	3	65.75	19.84	1.99	220
2023	3	18	4	54.19	19.58	1.82	220
2023	3	18	5	52.62	19.46	1.73	220
2023	3	18	6	52.56	20.93	0.25	220
2023	3	18	7	53.06	23.44	0.25	220
2023	3	18	8	53.19	25.54	0.25	220
2023	3	18	9	51.75	26	0.25	220
2023	3	18	10	50.19	26.12	0.25	220

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	18	11	50.25	26.08	0.25	220
2023	3	18	12	52.88	26.11	0.25	220
2023	3	18	13	62.62	26.57	0.25	220
2023	3	18	14	66.94	26.97	1.99	220
2023	3	18	15	67.44	26.75	1.79	220
2023	3	18	16	68.25	25.81	1.31	220
2023	3	18	17	69	24.29	0.24	220
2023	3	18	18	69.56	22.98	0.8	220
2023	3	18	19	71.19	22.51	1.21	220
2023	3	18	20	72.81	22.21	1.43	220
2023	3	18	21	71.19	21.77	1.6	220
2023	3	18	22	71.62	21.31	1.86	220
2023	3	18	23	72.75	20.55	0.25	220
2023	3	18	24	75	19.93	1.81	220
2023	3	19	1	77.19	20.75	0.76	220
2023	3	19	2	73.94	20.68	0.66	220
2023	3	19	3	68.31	20.44	0.71	220
2023	3	19	4	59.94	19.73	1.31	220
2023	3	19	5	53.56	19.41	1.45	220
2023	3	19	6	49.12	20.33	1.71	220
2023	3	19	7	45.06	21.69	0.25	220
2023	3	19	8	39.25	23.51	0.25	220
2023	3	19	9	34.94	24.8	0.25	220
2023	3	19	10	33.31	25.64	0.25	220
2023	3	19	11	32.62	26.47	0.25	220
2023	3	19	12	34.44	28.28	0.25	230
2023	3	19	13	42.56	29.5	0.25	230
2023	3	19	14	44.75	29.51	1.9	230
2023	3	19	15	49.44	29.31	1.65	230
2023	3	19	16	52	28.4	1.21	230
2023	3	19	17	53.94	26.78	0.54	230
2023	3	19	18	56.12	25.26	1.35	230
2023	3	19	19	60.81	23.98	1.87	230
2023	3	19	20	66	23.22	2.17	230
2023	3	19	21	70.94	22.63	2.45	230
2023	3	19	22	75.62	22.07	2.84	230
2023	3	19	23	79.69	21.23	0.25	230
2023	3	19	24	83.19	20.37	0.25	230

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	20	1	85.75	19.51	0.25	230
2023	3	20	2	77.44	18.69	0.25	230
2023	3	20	3	59.38	17.98	2.75	220
2023	3	20	4	42.75	17.35	2.44	220
2023	3	20	5	36.62	16.98	2.33	220
2023	3	20	6	32.81	18.78	2.95	220
2023	3	20	7	30.12	22.87	2.69	220
2023	3	20	8	28.06	27.32	0.3	220
2023	3	20	9	26.81	29.32	0.3	220
2023	3	20	10	26.25	30.7	0.3	220
2023	3	20	11	26.06	31.69	0.25	220
2023	3	20	12	27.25	32.32	0.25	220
2023	3	20	13	39.31	32.58	0.25	220
2023	3	20	14	43.25	32.49	0.25	220
2023	3	20	15	44.81	31.96	0.25	220
2023	3	20	16	46.69	30.8	0.25	220
2023	3	20	17	48.19	27.69	2.31	220
2023	3	20	18	50.44	26.55	2.32	220
2023	3	20	19	53.75	26.12	2.2	220
2023	3	20	20	57.88	25.74	2.12	220
2023	3	20	21	61.81	25.21	2.2	220
2023	3	20	22	65.88	24.48	2.31	220
2023	3	20	23	68.88	23.67	2.42	220
2023	3	20	24	72.69	23.06	2.42	220
2023	3	21	1	73.25	22.54	2.35	220
2023	3	21	2	68.94	21.91	1.96	220
2023	3	21	3	63.62	21.45	1.49	230
2023	3	21	4	55.19	20.75	1.34	230
2023	3	21	5	49.12	20.86	1.24	230
2023	3	21	6	45.19	22.1	1.92	230
2023	3	21	7	41.44	23.98	2.08	230
2023	3	21	8	38.94	26.56	2.42	230
2023	3	21	9	38.88	28.14	2.02	260
2023	3	21	10	40	29.02	1.48	260
2023	3	21	11	41.25	29.88	1.31	260
2023	3	21	12	45.44	30.37	1.4	260
2023	3	21	13	57.44	30.03	1.47	260
2023	3	21	14	59.12	29.49	1.3	260

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	21	15	60.06	28.98	1.03	260
2023	3	21	16	61.81	28.19	0.41	220
2023	3	21	17	62.69	26.79	0.64	230
2023	3	21	18	63.19	25.69	1.39	230
2023	3	21	19	63.94	24.98	1.88	230
2023	3	21	20	64.69	24.3	2.25	230
2023	3	21	21	66	23.61	2.54	230
2023	3	21	22	67.31	23.19	2.61	230
2023	3	21	23	68.62	22.86	2.51	230
2023	3	21	24	70.19	22.63	2.36	230
2023	3	22	1	71.06	22.31	2.23	230
2023	3	22	2	64	21.94	2.11	220
2023	3	22	3	55.25	21.54	2.03	220
2023	3	22	4	50.19	21.01	2.06	220
2023	3	22	5	45.94	20.76	2.04	220
2023	3	22	6	41.56	22.6	2.9	220
2023	3	22	7	38.5	25.67	2.07	220
2023	3	22	8	36.5	27.93	1.54	220
2023	3	22	9	35.56	29.37	1.89	220
2023	3	22	10	35.88	30.62	2.36	220
2023	3	22	11	36.31	31.27	2.82	220
2023	3	22	12	38.44	31.58	0.3	220
2023	3	22	13	48	31.53	0.3	220
2023	3	22	14	48.94	31.07	2.96	220
2023	3	22	15	52.06	30.73	2.34	220
2023	3	22	16	54.06	29.86	1.56	230
2023	3	22	17	55.94	28.22	0.8	230
2023	3	22	18	57.81	27.37	0.96	230
2023	3	22	19	60	26.68	1.11	230
2023	3	22	20	61.88	26.07	1.19	230
2023	3	22	21	63.06	25.26	1.32	230
2023	3	22	22	63.69	24.44	1.49	230
2023	3	22	23	64.69	23.73	1.62	230
2023	3	22	24	66.62	23.25	1.67	230
2023	3	23	1	66.31	22.93	1.66	230
2023	3	23	2	57.69	22.68	1.58	230
2023	3	23	3	45	22.36	1.42	230
2023	3	23	4	34.94	21.99	1.24	230

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	23	5	30.88	21.66	1.09	230
2023	3	23	6	28.31	23.33	0.93	230
2023	3	23	7	26.94	26.18	0.55	230
2023	3	23	8	25.88	29.05	0.34	230
2023	3	23	9	25.38	31.07	0.96	230
2023	3	23	10	25.31	32.55	1.7	230
2023	3	23	11	25.75	33.24	2.27	230
2023	3	23	12	27.38	33.6	2.61	230
2023	3	23	13	36.88	33.69	2.56	230
2023	3	23	14	37.94	33.44	2.37	230
2023	3	23	15	38.06	32.88	2.07	230
2023	3	23	16	39.62	31.83	1.6	230
2023	3	23	17	42.12	29.96	0.89	230
2023	3	23	18	44.44	29.18	0.72	230
2023	3	23	19	46.06	28.72	0.93	230
2023	3	23	20	48.31	27.99	1.08	230
2023	3	23	21	50.38	27.15	1.25	230
2023	3	23	22	52.88	26.19	1.44	230
2023	3	23	23	54.94	25.41	1.56	230
2023	3	23	24	56.69	24.65	1.61	230
2023	3	24	1	58.12	24.12	1.59	230
2023	3	24	2	50.31	23.39	1.71	230
2023	3	24	3	41.56	22.77	1.93	230
2023	3	24	4	32.81	22.47	2.1	230
2023	3	24	5	29.31	22.37	2.18	230
2023	3	24	6	27.19	24.51	0.25	230
2023	3	24	7	26	27.44	2.85	230
2023	3	24	8	25.06	30.65	2.3	230
2023	3	24	9	24.62	32.5	1.7	230
2023	3	24	10	24.69	33.98	1.38	230
2023	3	24	11	25.19	34.81	1.39	230
2023	3	24	12	26.88	35.29	1.61	230
2023	3	24	13	35.69	35.37	1.62	230
2023	3	24	14	37.5	35.1	1.53	230
2023	3	24	15	40.19	34.48	1.42	230
2023	3	24	16	43.06	33.29	1.03	230
2023	3	24	17	45.38	31.44	0.15	230
2023	3	24	18	46.75	30.23	0.87	230

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	24	19	48	28.76	1.7	230
2023	3	24	20	49.31	27.33	2.28	230
2023	3	24	21	50.69	26.26	2.71	230
2023	3	24	22	52.62	25.58	2.95	230
2023	3	24	23	54.44	24.9	2.97	230
2023	3	24	24	56.62	24.24	2.94	230
2023	3	25	1	58.31	23.59	2.91	230
2023	3	25	2	49.69	22.9	2.85	230
2023	3	25	3	39.75	22.37	2.78	230
2023	3	25	4	30.31	21.83	2.72	230
2023	3	25	5	26.25	21.6	2.58	230
2023	3	25	6	23.75	24.58	0.25	230
2023	3	25	7	22.12	28.46	2.5	230
2023	3	25	8	21	32.64	1.98	230
2023	3	25	9	20.38	34.58	1.69	230
2023	3	25	10	20.31	35.84	1.57	230
2023	3	25	11	20.75	36.66	1.47	230
2023	3	25	12	22.31	37.1	1.34	230
2023	3	25	13	31.62	37.08	1.22	230
2023	3	25	14	34.06	36.65	1.19	230
2023	3	25	15	35.88	35.84	1.11	230
2023	3	25	16	36.69	34.51	0.82	230
2023	3	25	17	37.19	31.9	0.56	230
2023	3	25	18	38.5	30.35	0.75	230
2023	3	25	19	41	29.28	1.17	230
2023	3	25	20	43.44	28.43	1.53	230
2023	3	25	21	45.75	27.8	1.8	230
2023	3	25	22	46.94	26.99	2.03	230
2023	3	25	23	48.5	26.1	2.2	230
2023	3	25	24	51	25.16	2.36	230
2023	3	26	1	54.06	24.44	2.51	230
2023	3	26	2	51.88	24.22	2.53	230
2023	3	26	3	47.94	24.05	2.45	230
2023	3	26	4	41.62	23.87	2.43	230
2023	3	26	5	35.94	23.85	2.52	230
2023	3	26	6	31.81	25.64	0.25	233
2023	3	26	7	28.94	28.8	4.95	230
2023	3	26	8	27.19	31.42	0.2	260

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	26	9	26.19	33.19	0.3	260
2023	3	26	10	25.75	34.46	4.07	230
2023	3	26	11	26	35.37	0.25	260
2023	3	26	12	27.5	35.94	0.25	260
2023	3	26	13	38.38	36.09	2.85	260
2023	3	26	14	41.31	35.92	2.81	260
2023	3	26	15	42.62	35.3	2.91	260
2023	3	26	16	44.38	34.12	2.91	230
2023	3	26	17	46.5	30.99	1.96	230
2023	3	26	18	48.81	29.43	2.04	230
2023	3	26	19	50.75	28.68	2.12	230
2023	3	26	20	52.69	27.86	2.29	230
2023	3	26	21	55	26.98	2.5	230
2023	3	26	22	56.88	26.2	2.67	230
2023	3	26	23	58.5	25.73	2.67	230
2023	3	26	24	60.31	25.37	2.48	230
2023	3	27	1	62.56	24.86	2.23	230
2023	3	27	2	54.94	24.48	1.94	230
2023	3	27	3	41.69	24.28	1.64	220
2023	3	27	4	31.12	23.95	1.49	230
2023	3	27	5	25	23.5	1.53	208
2023	3	27	6	21.19	25.76	2.2	193
2023	3	27	7	19.06	29.26	1.74	190
2023	3	27	8	17.81	32.4	1.54	194
2023	3	27	9	17.12	34.44	1.52	230
2023	3	27	10	16.81	35.98	2.03	250
2023	3	27	11	16.5	37.01	2.6	260
2023	3	27	12	17.06	37.52	2.98	260
2023	3	27	13	27.69	37.61	0.25	270
2023	3	27	14	30.38	37.26	0.25	270
2023	3	27	15	30.69	36.52	0.25	270
2023	3	27	16	30.81	35.13	0.25	270
2023	3	27	17	31	30.94	2.38	270
2023	3	27	18	32	29.01	2.51	270
2023	3	27	19	33.56	28.05	2.57	270
2023	3	27	20	35.5	27.26	2.6	270
2023	3	27	21	37.44	26.59	2.58	270
2023	3	27	22	39.25	25.7	2.6	270

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	27	23	40.38	24.63	2.65	270
2023	3	27	24	40.75	23.49	2.61	270
2023	3	28	1	40.56	22.49	2.47	270
2023	3	28	2	35.25	21.66	2.15	270
2023	3	28	3	28.25	21.15	1.74	270
2023	3	28	4	18.94	20.96	1.3	270
2023	3	28	5	15.69	21.1	0.74	270
2023	3	28	6	14.38	23.46	0.28	50
2023	3	28	7	13.56	26.76	0.63	50
2023	3	28	8	13.19	32.55	0.48	50
2023	3	28	9	13.19	35.26	0.84	260
2023	3	28	10	13.38	36.66	1.87	260
2023	3	28	11	13.88	37.63	2.58	260
2023	3	28	12	15.19	38.08	0.25	270
2023	3	28	13	23.75	38.1	0.25	274
2023	3	28	14	22.62	37.72	0.25	277
2023	3	28	15	23.12	36.92	2.71	278
2023	3	28	16	24.5	35.5	2.05	260
2023	3	28	17	24.44	32.62	0.98	50
2023	3	28	18	27.94	31.69	0.62	180
2023	3	28	19	32.56	30.69	0.77	50
2023	3	28	20	38.75	29.73	0.82	180
2023	3	28	21	45.44	29.24	0.83	50
2023	3	28	22	52.38	27.69	1.29	180
2023	3	28	23	57.12	25.84	1.95	180
2023	3	28	24	59.62	24.21	2.38	180
2023	3	29	1	60.75	23.22	2.5	180
2023	3	29	2	52.5	22.7	2.41	220
2023	3	29	3	42.5	22.4	2.22	230
2023	3	29	4	35.75	22.3	1.95	180
2023	3	29	5	30.94	22.4	1.65	50
2023	3	29	6	27.31	25.15	1.88	50
2023	3	29	7	24.94	29.55	2.61	50
2023	3	29	8	23.38	32.73	2.78	50
2023	3	29	9	22.69	34.74	2.63	50
2023	3	29	10	22.5	36.3	2.7	230
2023	3	29	11	22.94	37.38	2.95	230
2023	3	29	12	24.25	38.08	0.25	50

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_ Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	29	13	32.31	38.25	0.25	50
2023	3	29	14	36.88	37.98	0.25	50
2023	3	29	15	38.69	37.29	0.25	50
2023	3	29	16	40.44	36.09	0.25	50
2023	3	29	17	42.38	32.81	2.4	50
2023	3	29	18	44.31	30.83	2.52	50
2023	3	29	19	46.62	29.95	2.62	50
2023	3	29	20	49.06	29.28	2.64	230
2023	3	29	21	51.62	28.55	2.72	220
2023	3	29	22	54.62	27.9	2.87	180
2023	3	29	23	57.38	27.24	0.25	180
2023	3	29	24	60.31	26.69	0.25	180
2023	3	30	1	62.44	26.19	0.25	180
2023	3	30	2	56.06	25.57	0.25	180
2023	3	30	3	41.88	25.06	0.25	180
2023	3	30	4	31.56	24.55	0.25	180
2023	3	30	5	27.62	24.24	0.25	180
2023	3	30	6	25	26.31	0.25	180
2023	3	30	7	23.19	30.45	0.2	180
2023	3	30	8	21.88	33.73	4.66	180
2023	3	30	9	21.12	35.61	0.25	180
2023	3	30	10	21	37.11	2.92	180
2023	3	30	11	21.19	38.04	2.77	180
2023	3	30	12	22.12	38.64	2.83	180
2023	3	30	13	30.31	38.87	2.96	230
2023	3	30	14	33.69	38.56	0.25	230
2023	3	30	15	34.62	37.89	0.25	230
2023	3	30	16	35.5	36.65	0.25	180
2023	3	30	17	36.94	33.36	2.04	180
2023	3	30	18	39.25	31.87	2.09	180
2023	3	30	19	42.31	31.3	2.25	230
2023	3	30	20	45.69	30.6	2.54	220
2023	3	30	21	49.25	29.83	0.3	220
2023	3	30	22	52.75	29.1	0.3	220
2023	3	30	23	56.5	28.32	0.3	220
2023	3	30	24	60	27.42	0.3	220
2023	3	31	1	61.69	26.53	4.24	230
2023	3	31	2	56.19	25.73	0.25	230

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	3	31	3	47.19	24.96	0.3	220
2023	3	31	4	39	24.31	2.84	220
2023	3	31	5	33.38	24.15	2.87	230
2023	3	31	6	28.75	26.02	4.46	180
2023	3	31	7	25.25	29.12	0.2	180
2023	3	31	8	23.12	31.73	0.2	50
2023	3	31	9	22.12	33.63	0.2	230
2023	3	31	10	21.94	35.24	0.2	180
2023	3	31	11	22.38	36.52	0.2	180
2023	3	31	12	23.75	37.22	0.2	180
2023	3	31	13	29.81	37.49	0.25	230
2023	3	31	14	34.25	37.26	0.25	230
2023	3	31	15	35.06	36.65	0.25	230
2023	3	31	16	35.75	35.45	4	230
2023	3	31	17	36.94	32.54	2.7	220
2023	3	31	18	38.44	30.53	2.71	220
2023	3	31	19	40.38	30.08	2.86	220
2023	3	31	20	43.19	29.74	2.96	230
2023	3	31	21	47.06	29.26	2.86	180
2023	3	31	22	50.94	28.7	2.77	260
2023	3	31	23	53.44	27.94	0.25	180
2023	3	31	24	55.12	26.94	0.51	50
2023	4	1	1	56.81	25.89	0.25	180
2023	4	1	2	50.75	24.93	0.25	180
2023	4	1	3	38.56	24.43	0.5	40
2023	4	1	4	31.5	24.06	2.9	50
2023	4	1	5	28	23.62	2.22	50
2023	4	1	6	26	25.06	0.25	30
2023	4	1	7	24.81	28.06	0.3	40
2023	4	1	8	24.31	30.65	0.3	40
2023	4	1	9	24.38	32.55	0.3	40
2023	4	1	10	24.44	33.92	0.3	40
2023	4	1	11	24.38	34.85	2.94	40
2023	4	1	12	25.12	35.3	0.3	40
2023	4	1	13	30.31	35.22	0.25	270
2023	4	1	14	34.56	34.91	4.33	270
2023	4	1	15	35.12	34.4	4.27	270
2023	4	1	16	35	33.44	0.25	270

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_ Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	4	1	17	34.94	31.21	2.2	270
2023	4	1	18	35.88	29.66	1.76	270
2023	4	1	19	36.75	29.18	1.54	40
2023	4	1	20	37.5	29.12	1.3	40
2023	4	1	21	37.62	28.98	1.07	40
2023	4	1	22	39.88	28.77	0.79	40
2023	4	1	23	42.62	28.39	0.56	40
2023	4	1	24	45.19	27.49	0.54	40
2023	4	2	1	45.75	26.4	0.77	40
2023	4	2	2	37.81	25.01	1.2	40
2023	4	2	3	27.94	23.64	1.65	40
2023	4	2	4	22.31	22.28	1.91	40
2023	4	2	5	19.56	21.63	1.83	40
2023	4	2	6	17.88	24.28	2.04	40
2023	4	2	7	16.88	28.44	2	40
2023	4	2	8	16.25	31.77	2.08	40
2023	4	2	9	16.19	33.76	2.11	40
2023	4	2	10	16.38	35.13	2.37	50
2023	4	2	11	16.75	36.11	2.74	50
2023	4	2	12	17.69	36.69	3.08	50
2023	4	2	13	24.56	36.82	3.26	50
2023	4	2	14	27	36.53	3.4	50
2023	4	2	15	27.69	35.9	3.35	50
2023	4	2	16	28.56	34.74	3.11	50
2023	4	2	17	29.06	31.68	1.92	280
2023	4	2	18	30.06	30.1	1.84	270
2023	4	2	19	31.81	29.23	1.84	270
2023	4	2	20	33.38	28.3	1.78	270
2023	4	2	21	34.81	27.58	1.72	270
2023	4	2	22	36	26.66	1.87	270
2023	4	2	23	37.12	25.34	2.08	270
2023	4	2	24	38.06	24.22	2.24	270
2023	4	3	1	38.25	23.26	2.4	50
2023	4	3	2	30.81	22.57	2.49	40
2023	4	3	3	23.75	22.04	2.55	40
2023	4	3	4	19.38	21.65	2.6	40
2023	4	3	5	17.81	21.74	2.58	40
2023	4	3	6	16.81	25.32	3.3	40

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	4	3	7	16.19	29.56	3.3	40
2023	4	3	8	15.94	33.13	2.71	40
2023	4	3	9	15.88	34.96	1.53	40
2023	4	3	10	16.25	36.31	0.85	40
2023	4	3	11	17	37.26	1.05	40
2023	4	3	12	18.38	37.83	1.52	40
2023	4	3	13	25.19	38.01	2	40
2023	4	3	14	27.25	37.65	2.33	40
2023	4	3	15	27.56	36.91	2.44	40
2023	4	3	16	28.56	35.65	2.31	40
2023	4	3	17	31.38	33.02	1.38	40
2023	4	3	18	34.25	31.79	1.06	40
2023	4	3	19	37.31	31.39	0.88	40
2023	4	3	20	40.75	30.83	1.06	40
2023	4	3	21	44.31	29.9	1.47	40
2023	4	3	22	47.31	28.83	1.91	40
2023	4	3	23	50.19	27.79	2.22	40
2023	4	3	24	52.75	26.92	2.4	40
2023	4	4	1	53.69	26.19	2.53	40
2023	4	4	2	47.06	25.62	2.67	40
2023	4	4	3	36.12	25.08	2.78	40
2023	4	4	4	30	24.68	2.85	40
2023	4	4	5	27	24.78	3.12	40
2023	4	4	6	24.81	27.33	0.25	40
2023	4	4	7	23.19	31.5	0.2	40
2023	4	4	8	22.06	34.33	0.2	40
2023	4	4	9	21.38	36.05	0.2	40
2023	4	4	10	20.88	37.4	0.2	40
2023	4	4	11	20.56	38.4	0.2	40
2023	4	4	12	20.5	38.99	0.2	40
2023	4	4	13	24.19	39.07	0.2	40
2023	4	4	14	27.31	38.73	0.2	40
2023	4	4	15	28	37.92	0.2	40
2023	4	4	16	28.44	36.73	3.5	40
2023	4	4	17	29.12	33.69	2.9	40
2023	4	4	18	30	31.34	2.77	40
2023	4	4	19	30.88	30.22	2.86	40
2023	4	4	20	32.06	29.3	2.89	40

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	4	4	21	33.75	28.37	2.83	40
2023	4	4	22	35.31	27.43	2.72	40
2023	4	4	23	36.31	26.62	2.65	40
2023	4	4	24	37.06	25.83	2.57	40
2023	4	5	1	37.44	25.01	2.43	40
2023	4	5	2	33.94	24.33	2.16	40
2023	4	5	3	27.06	24	1.81	40
2023	4	5	4	23.25	23.81	1.47	40
2023	4	5	5	20.31	23.95	0.99	40
2023	4	5	6	18.25	26.03	0.84	40
2023	4	5	7	17.06	29.98	2.31	40
2023	4	5	8	16.25	32.87	2.71	40
2023	4	5	9	15.88	35.15	2.27	40
2023	4	5	10	15.81	36.8	1.75	40
2023	4	5	11	16.31	37.84	1.47	40
2023	4	5	12	17.25	38.46	1.54	40
2023	4	5	13	23.5	38.61	1.77	40
2023	4	5	14	26.19	38.31	2.05	40
2023	4	5	15	27.5	37.53	2.23	40
2023	4	5	16	29.19	36.28	2.24	40
2023	4	5	17	30.75	33.23	1.64	40
2023	4	5	18	32.38	31.21	1.94	40
2023	4	5	19	33.81	30.13	2.19	40
2023	4	5	20	35.31	29.05	2.45	40
2023	4	5	21	36.69	28.16	2.66	40
2023	4	5	22	38	27.33	2.77	40
2023	4	5	23	39.19	26.58	2.78	40
2023	4	5	24	40.56	25.9	2.74	40
2023	4	6	1	40.69	25.25	2.66	40
2023	4	6	2	33.88	24.65	2.6	40
2023	4	6	3	26.88	24.16	2.55	40
2023	4	6	4	21.56	23.65	2.53	40
2023	4	6	5	19.25	23.62	2.42	40
2023	4	6	6	17.94	26.81	0.3	40
2023	4	6	7	17.12	30.87	0.3	40
2023	4	6	8	16.69	34.36	2.78	40
2023	4	6	9	16.56	36.18	1.94	40
2023	4	6	10	16.75	37.54	1.62	40

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	4	6	11	17.25	38.51	1.67	40
2023	4	6	12	18.38	39.09	1.86	40
2023	4	6	13	23.62	39.23	2.17	40
2023	4	6	14	27	38.9	2.38	40
2023	4	6	15	28.12	38.1	2.59	40
2023	4	6	16	29.38	36.8	2.71	40
2023	4	6	17	30.44	33.91	1.91	40
2023	4	6	18	31.62	31.75	2.14	40
2023	4	6	19	32.56	30.78	2.22	40
2023	4	6	20	33.62	29.83	2.4	40
2023	4	6	21	34.62	28.99	2.6	40
2023	4	6	22	35.62	28.16	2.7	40
2023	4	6	23	36.25	27.51	2.72	40
2023	4	6	24	36.88	26.87	2.69	40
2023	4	7	1	37.25	26.26	2.6	40
2023	4	7	2	32	25.68	2.39	40
2023	4	7	3	25.31	25.32	2.07	40
2023	4	7	4	20.25	24.98	1.8	40
2023	4	7	5	17.56	24.82	1.64	40
2023	4	7	6	15.75	27.49	1.87	40
2023	4	7	7	14.69	31.59	1.8	40
2023	4	7	8	14.06	35.05	1.52	40
2023	4	7	9	13.81	36.95	1.57	40
2023	4	7	10	13.94	38.4	1.54	40
2023	4	7	11	14.38	39.33	1.49	40
2023	4	7	12	15.19	39.84	1.46	40
2023	4	7	13	20.5	39.9	1.62	40
2023	4	7	14	23.12	39.49	1.89	40
2023	4	7	15	24.12	38.62	2.17	40
2023	4	7	16	25.12	37.33	2.32	40
2023	4	7	17	26.19	34.38	1.78	40
2023	4	7	18	27.31	32.12	2.12	40
2023	4	7	19	28.12	30.94	2.34	40
2023	4	7	20	28.38	29.87	2.53	40
2023	4	7	21	28.94	28.95	2.6	40
2023	4	7	22	29.69	28.15	2.52	40
2023	4	7	23	30.56	27.62	2.22	40
2023	4	7	24	31.25	27.39	1.78	40

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	4	8	1	32.12	26.99	1.32	40
2023	4	8	2	29	26.47	1	40
2023	4	8	3	21.69	25.91	0.88	40
2023	4	8	4	18.5	25.48	0.88	40
2023	4	8	5	16.94	25.18	0.77	40
2023	4	8	6	16.06	26.96	0.64	40
2023	4	8	7	15.56	31.47	0.33	40
2023	4	8	8	15.31	34.26	0.34	40
2023	4	8	9	15.62	36.13	0.5	40
2023	4	8	10	16.81	37.55	0.73	250
2023	4	8	11	17.94	38.59	1.15	250
2023	4	8	12	19.62	39.19	1.66	260
2023	4	8	13	22	39.16	2.05	270
2023	4	8	14	24.31	38.08	2.57	280
2023	4	8	15	26	37.14	0.25	290
2023	4	8	16	27.69	35.76	0.51	50
2023	4	8	17	29.62	34.04	3.3	50
2023	4	8	18	31.06	32.48	0.5	50
2023	4	8	19	32.06	31.4	0.2	50
2023	4	8	20	32.81	30.39	3.3	50
2023	4	8	21	33.5	29.27	3.01	50
2023	4	8	22	34.38	28.38	2.6	50
2023	4	8	23	35.31	27.76	2.4	50
2023	4	8	24	35.94	27.24	2.28	50
2023	4	9	1	36	26.7	2.2	50
2023	4	9	2	31.5	26.08	2.11	50
2023	4	9	3	25.81	25.5	1.97	50
2023	4	9	4	22.56	25.09	1.79	50
2023	4	9	5	20.5	25.06	1.52	50
2023	4	9	6	18.75	27.27	1.4	50
2023	4	9	7	17.5	30.93	0.74	50
2023	4	9	8	16.56	33.8	0.71	50
2023	4	9	9	16.19	35.64	1.62	270
2023	4	9	10	16.12	37.09	2.27	280
2023	4	9	11	16.38	38.14	2.67	285
2023	4	9	12	17.19	38.84	2.83	290
2023	4	9	13	21.75	39.01	2.79	290
2023	4	9	14	23.25	38.74	2.87	290

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	4	9	15	24.12	37.99	2.79	290
2023	4	9	16	25.19	36.79	0.5	291
2023	4	9	17	26.38	34.19	1.42	260
2023	4	9	18	27.75	32.74	1.32	250
2023	4	9	19	29.06	31.83	1.49	230
2023	4	9	20	30.38	30.9	1.66	233
2023	4	9	21	31.88	30.01	1.77	235
2023	4	9	22	33.69	29.05	1.89	240
2023	4	9	23	35.56	28.16	1.92	250
2023	4	9	24	37	27.36	1.88	260
2023	4	10	1	37.06	26.52	1.9	280
2023	4	10	2	31.19	25.57	1.98	300
2023	4	10	3	24.44	24.6	2.08	250
2023	4	10	4	20	23.84	2.16	300
2023	4	10	5	18.38	23.73	2.01	300
2023	4	10	6	17.12	26.57	2.2	300
2023	4	10	7	16.5	30.78	2.04	350
2023	4	10	8	16.06	34.69	2.21	335
2023	4	10	9	16	36.52	2.27	305
2023	4	10	10	16.19	37.94	2.44	40
2023	4	10	11	16.75	38.68	2.58	40
2023	4	10	12	17.88	39.21	2.71	40
2023	4	10	13	22.44	39.3	2.71	50
2023	4	10	14	23.62	39.09	2.75	50
2023	4	10	15	24.12	38.37	2.7	300
2023	4	10	16	25.12	37.23	2.42	290
2023	4	10	17	26.25	34.67	1.45	290
2023	4	10	18	27.62	33.49	1.16	270
2023	4	10	19	28.88	32.87	1.05	249
2023	4	10	20	30.5	32	1.3	236
2023	4	10	21	32.25	31.08	1.63	239
2023	4	10	22	33.56	30.15	1.93	246
2023	4	10	23	34.62	29.33	2.14	255
2023	4	10	24	35.06	28.42	2.31	257
2023	4	11	1	34.25	27.46	2.44	280
2023	4	11	2	27.56	26.59	2.47	289
2023	4	11	3	20.38	25.73	2.33	298
2023	4	11	4	16.12	25.02	2.11	308

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	4	11	5	15.31	24.87	1.91	321
2023	4	11	6	14.88	27.76	2.33	335
2023	4	11	7	14.5	31.71	2.36	351
2023	4	11	8	14.25	36.37	2.89	350
2023	4	11	9	14.25	38.33	2.75	350
2023	4	11	10	14.44	39.48	2.33	350
2023	4	11	11	14.94	40.27	1.86	350
2023	4	11	12	16	40.71	1.48	340
2023	4	11	13	20	40.77	1.27	335
2023	4	11	14	21.62	40.47	1.24	314
2023	4	11	15	22.5	39.72	1.32	305
2023	4	11	16	23.62	38.53	1.24	297
2023	4	11	17	24.56	36.43	0.57	280
2023	4	11	18	24.81	35.19	0.45	260
2023	4	11	19	25.25	33.87	1.09	160
2023	4	11	20	26.06	32.59	1.44	160
2023	4	11	21	26.94	31.71	1.41	170
2023	4	11	22	27.69	31.25	1.04	187
2023	4	11	23	28.44	30.6	0.57	237
2023	4	11	24	28.94	29.55	0.77	300
2023	4	12	1	29	28.4	1.3	350
2023	4	12	2	24.62	27.39	1.65	10
2023	4	12	3	18.5	26.44	1.79	24
2023	4	12	4	13.44	25.77	1.84	40
2023	4	12	5	12.38	25.54	1.78	50
2023	4	12	6	12.06	28.23	2.21	70
2023	4	12	7	11.88	32.5	2.29	80
2023	4	12	8	11.75	37.12	2.57	75
2023	4	12	9	11.81	39.12	2.02	60
2023	4	12	10	11.94	40.46	1.85	37
2023	4	12	11	12.12	41.33	2.03	30
2023	4	12	12	12.81	41.84	2.32	11
2023	4	12	13	16.94	41.84	2.61	10
2023	4	12	14	18.5	41.44	2.75	10
2023	4	12	15	18.56	40.65	2.68	355
2023	4	12	16	18.88	39.3	2.44	355
2023	4	12	17	19.81	36.29	1.41	350
2023	4	12	18	20.44	34.46	0.92	357

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	4	12	19	20.75	33.99	0.22	40
2023	4	12	20	21.31	33.61	0.56	150
2023	4	12	21	21.81	32.82	1.11	170
2023	4	12	22	22.44	31.63	1.42	170
2023	4	12	23	23.31	31.08	1.55	180
2023	4	12	24	24.12	30.52	1.49	180
2023	4	13	1	25.19	30.07	1.28	270
2023	4	13	2	22.56	29.51	1.01	190
2023	4	13	3	17.88	28.84	0.77	190
2023	4	13	4	14.81	28.19	0.65	190
2023	4	13	5	13.69	27.57	0.77	190
2023	4	13	6	12.94	29.65	1.18	190
2023	4	13	7	12.5	33.61	1.32	220
2023	4	13	8	12.38	37.66	1.68	260
2023	4	13	9	12.56	39.76	1.63	290
2023	4	13	10	13	41.07	1.74	318
2023	4	13	11	13.44	41.83	1.93	80
2023	4	13	12	14.12	42.21	2.15	342
2023	4	13	13	18.06	42.1	2.35	347
2023	4	13	14	19.75	41.57	2.55	350
2023	4	13	15	20.69	40.79	2.5	357
2023	4	13	16	21.38	39.63	2.24	10
2023	4	13	17	22.06	36.77	1.48	40
2023	4	13	18	22.69	34.73	1.81	75
2023	4	13	19	23	33.6	2.15	100
2023	4	13	20	23.44	32.8	2.33	123
2023	4	13	21	24.31	31.99	2.35	80
2023	4	13	22	25.69	31.27	2.26	30
2023	4	13	23	26.81	30.77	2.09	155
2023	4	13	24	28.62	30.28	1.94	170
2023	4	14	1	30.38	29.58	1.93	199
2023	4	14	2	26.25	28.69	2.27	222
2023	4	14	3	20.44	28.31	2.59	230
2023	4	14	4	15.31	27.8	2.76	257
2023	4	14	5	13.25	27.4	2.66	270
2023	4	14	6	12.19	30.19	3.31	278
2023	4	14	7	11.62	33.99	3.12	328
2023	4	14	8	11.31	37.94	4.57	358

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	4	14	9	11.19	40.21	0.51	40
2023	4	14	10	11.38	41.8	0.25	10
2023	4	14	11	11.81	42.65	0.25	360
2023	4	14	12	12.5	43.19	3.52	350
2023	4	14	13	16.12	43.26	3.25	350
2023	4	14	14	16.94	42.82	2.96	350
2023	4	14	15	17.94	41.91	2.68	350
2023	4	14	16	19.19	40.76	2.29	350
2023	4	14	17	22.81	38.11	1.25	350
2023	4	14	18	29.38	36.96	0.69	350
2023	4	14	19	40.62	35.94	0.3	350
2023	4	14	20	45.62	35.12	0.72	350
2023	4	14	21	46.94	33.31	3.79	350
2023	4	14	22	48.12	32.1	0.3	350
2023	4	14	23	48.62	30.06	0.3	350
2023	4	14	24	49.38	28.85	0.2	350
2023	4	15	1	49.62	28.19	2.27	350
2023	4	15	2	42.19	27.48	1.3	350
2023	4	15	3	31.5	27.09	1.08	292
2023	4	15	4	21.56	26.71	1.24	250
2023	4	15	5	18.31	26.63	1.67	180
2023	4	15	6	16.38	29.09	2.92	180
2023	4	15	7	15.06	32.62	2.67	270
2023	4	15	8	14.44	36.82	2.71	320
2023	4	15	9	14.31	38.98	2.89	320
2023	4	15	10	14.5	40.48	0.25	320
2023	4	15	11	14.62	41.58	0.25	270
2023	4	15	12	15.31	42.04	0.25	270
2023	4	15	13	17.81	41.82	0.3	320
2023	4	15	14	20.31	41.33	0.2	320
2023	4	15	15	21.25	40.77	0.2	320
2023	4	15	16	22.12	39.57	0.2	320
2023	4	15	17	23.25	36.89	2.67	320
2023	4	15	18	24.69	34.33	2.8	320
2023	4	15	19	26.94	33.1	0.2	320
2023	4	15	20	29.75	32.15	3.59	320
2023	4	15	21	32.25	31.33	0.2	320
2023	4	15	22	35.06	30.67	0.2	320

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	4	15	23	37.12	30.05	0.2	320
2023	4	15	24	38.62	29.33	0.2	320
2023	4	16	1	38.94	28.66	0.3	320
2023	4	16	2	35.25	27.68	2.81	320
2023	4	16	3	25.94	27.01	2.23	320
2023	4	16	4	17	26.58	2.02	320
2023	4	16	5	14.94	26.59	1.95	320
2023	4	16	6	14	28.46	2.4	320
2023	4	16	7	13.56	32.22	2.16	320
2023	4	16	8	13.25	36.67	2.62	320
2023	4	16	9	13.12	38.79	1.82	320
2023	4	16	10	13.19	40.3	1.32	320
2023	4	16	11	13.56	41.33	1.28	320
2023	4	16	12	14.38	42.05	1.5	320
2023	4	16	13	17.88	42.29	1.77	320
2023	4	16	14	19.38	42.08	2.07	320
2023	4	16	15	20.25	41.31	2.17	260
2023	4	16	16	21.5	40.08	2.1	270
2023	4	16	17	23.25	37.55	1.44	270
2023	4	16	18	25.31	35.85	1.5	270
2023	4	16	19	27.31	34.92	1.63	270
2023	4	16	20	29.19	33.87	1.83	270
2023	4	16	21	31.06	32.62	2.08	290
2023	4	16	22	32.88	31.34	2.34	320
2023	4	16	23	34.75	30.32	2.52	350
2023	4	16	24	36.12	29.56	2.61	320
2023	4	17	1	35.94	28.85	2.67	320
2023	4	17	2	31.19	28.19	2.59	320
2023	4	17	3	24.5	27.57	2.41	320
2023	4	17	4	19.06	27.15	2.14	350
2023	4	17	5	17.19	27.42	1.69	350
2023	4	17	6	15.81	30.08	1.4	332
2023	4	17	7	14.81	34.15	1.06	320
2023	4	17	8	14	37.99	1.12	320
2023	4	17	9	13.56	39.62	0.79	320
2023	4	17	10	13.44	40.84	0.93	350
2023	4	17	11	13.5	41.69	1.27	270
2023	4	17	12	14	42.18	1.66	280

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	4	17	13	17.25	42.26	2.01	280
2023	4	17	14	18.81	41.73	2.32	280
2023	4	17	15	19.5	40.91	2.48	280
2023	4	17	16	20.25	39.83	2.48	280
2023	4	17	17	21.25	37.32	1.71	280
2023	4	17	18	22.5	35.65	1.89	280
2023	4	17	19	23.81	34.79	2.09	280
2023	4	17	20	25.25	33.91	2.32	270
2023	4	17	21	26.44	32.98	2.56	280
2023	4	17	22	27.5	32.09	2.82	270
2023	4	17	23	28.75	31.38	2.99	299
2023	4	17	24	30.12	30.74	3.06	350
2023	4	18	1	30.69	30.27	3.12	350
2023	4	18	2	27.5	29.76	3	350
2023	4	18	3	22.06	29.11	2.79	350
2023	4	18	4	15.19	28.44	2.63	350
2023	4	18	5	13	28.3	2.55	350
2023	4	18	6	11.88	30.35	0.2	350
2023	4	18	7	11.31	33.76	0.2	350
2023	4	18	8	11.12	38.43	0.2	350
2023	4	18	9	11.19	40.69	0.2	350
2023	4	18	10	11.5	42.17	2.6	350
2023	4	18	11	11.81	43.07	2.2	350
2023	4	18	12	12.44	43.56	1.99	350
2023	4	18	13	15.62	43.58	1.9	350
2023	4	18	14	16.5	43.16	1.9	350
2023	4	18	15	17.12	42.38	1.97	350
2023	4	18	16	18	41.2	1.95	350
2023	4	18	17	19.19	38.71	1.38	350
2023	4	18	18	20.31	37.25	1.36	350
2023	4	18	19	21.25	36.27	1.49	270
2023	4	18	20	21.94	34.97	1.81	350
2023	4	18	21	22.75	33.42	2.22	350
2023	4	18	22	23.81	31.9	2.58	350
2023	4	18	23	25.19	30.65	2.8	350
2023	4	18	24	26.38	29.69	2.89	350
2023	4	19	1	26.75	28.8	2.86	350
2023	4	19	2	23.38	28.11	2.79	350

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	4	19	3	19.38	27.45	2.61	350
2023	4	19	4	13.06	27.07	2.33	350
2023	4	19	5	11.19	27.28	1.99	350
2023	4	19	6	10.5	29.96	2.12	350
2023	4	19	7	10.19	33.01	2.45	310
2023	4	19	8	10.06	37.9	0.5	310
2023	4	19	9	10.12	40.39	0.25	310
2023	4	19	10	10.44	41.9	0.2	310
2023	4	19	11	10.81	42.81	0.2	310
2023	4	19	12	11.5	43.38	2.88	310
2023	4	19	13	14.56	43.49	2.59	310
2023	4	19	14	15.25	42.98	2.27	310
2023	4	19	15	16.12	42.29	1.93	310
2023	4	19	16	16.81	41.09	1.62	310
2023	4	19	17	17.62	38.67	1.03	310
2023	4	19	18	18.88	37.53	0.83	310
2023	4	19	19	20.06	36.68	0.98	310
2023	4	19	20	21.19	35.33	1.32	230
2023	4	19	21	22.44	34.27	1.65	310
2023	4	19	22	24	32.99	1.93	310
2023	4	19	23	25.94	31.85	2.12	310
2023	4	19	24	27.94	30.9	2.19	310
2023	4	20	1	28.88	30.02	2.18	310
2023	4	20	2	25.5	29.04	2.29	310
2023	4	20	3	20.69	28.13	2.44	310
2023	4	20	4	16.12	27.39	2.51	310
2023	4	20	5	14.56	27.4	2.43	280
2023	4	20	6	13.5	30.02	0.2	310
2023	4	20	7	12.88	33.63	4.02	310
2023	4	20	8	12.69	37.81	4.3	310
2023	4	20	9	12.94	39.93	0.2	310
2023	4	20	10	13.44	41.44	0.2	310
2023	4	20	11	14.19	42.45	0.2	310
2023	4	20	12	15.38	42.98	0.2	310
2023	4	20	13	17.19	42.81	0.2	310
2023	4	20	14	19.88	42.22	0.2	310
2023	4	20	15	21.56	41.23	0.2	270
2023	4	20	16	23.19	39.73	0.2	270

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_ Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	4	20	17	24.88	37.73	0.2	260
2023	4	20	18	26.56	35.25	0.2	260
2023	4	20	19	28.38	33.85	0.2	260
2023	4	20	20	29.75	32.62	2.94	260
2023	4	20	21	30.75	31.54	2.76	260
2023	4	20	22	31.81	30.53	2.56	260
2023	4	20	23	33.38	29.55	2.31	260
2023	4	20	24	35.62	28.91	1.95	260
2023	4	21	1	35.69	28.57	1.6	270
2023	4	21	2	29.94	28.16	1.41	270
2023	4	21	3	24.56	27.49	1.61	270
2023	4	21	4	22	26.5	2.11	270
2023	4	21	5	20.38	26.61	2.5	270
2023	4	21	6	18.62	29.83	4.45	270
2023	4	21	7	17.31	33.44	0.2	270
2023	4	21	8	16.44	35.49	0.2	270
2023	4	21	9	16.25	36.87	0.2	270
2023	4	21	10	16.31	38.39	4.57	270
2023	4	21	11	16.56	39.62	4.33	270
2023	4	21	12	17.44	40.48	4.22	270
2023	4	21	13	20	40.73	4.22	270
2023	4	21	14	23.31	40.49	4.31	270
2023	4	21	15	24.75	39.83	4.45	270
2023	4	21	16	26.25	38.6	4.51	270
2023	4	21	17	27.88	36.16	0.2	270
2023	4	21	18	29.38	33.48	2.65	270
2023	4	21	19	30.75	32.49	2.72	270
2023	4	21	20	32.12	31.6	2.71	270
2023	4	21	21	33.75	30.73	2.66	270
2023	4	21	22	35.31	29.9	2.6	270
2023	4	21	23	37.12	29.19	2.57	270
2023	4	21	24	38.81	28.5	2.56	270
2023	4	22	1	38.31	27.72	2.59	270
2023	4	22	2	32.19	27.05	2.57	180
2023	4	22	3	24.44	26.36	2.55	180
2023	4	22	4	20.69	25.8	2.58	240
2023	4	22	5	19	26.28	2.58	240
2023	4	22	6	17.88	29.48	0.2	240

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	4	22	7	17.06	33.49	4.91	240
2023	4	22	8	16.94	35.97	0.2	270
2023	4	22	9	17.31	37.44	4.61	280
2023	4	22	10	17.88	38.61	4.07	280
2023	4	22	11	18.94	39.54	0.2	280
2023	4	22	12	20.38	39.85	0.2	280
2023	4	22	13	22.56	39.65	0.2	280
2023	4	22	14	25.31	39.26	0.2	260
2023	4	22	15	28.12	38.46	0.2	260
2023	4	22	16	31.94	37.4	0.2	260
2023	4	22	17	36	35.94	2.45	260
2023	4	22	18	40.62	34.44	1.95	260
2023	4	22	19	43.81	33.71	2.75	260
2023	4	22	20	46	32.38	4.42	320
2023	4	22	21	48.19	30.51	0.2	320
2023	4	22	22	50.5	28.5	0.2	320
2023	4	22	23	52.5	26.88	0.2	320
2023	4	22	24	54.44	25.71	0.2	320
2023	4	23	1	55.25	24.79	0.2	320
2023	4	23	2	50.56	24.08	0.2	320
2023	4	23	3	43.88	23.57	0.25	320
2023	4	23	4	36.31	23.15	0.25	320
2023	4	23	5	31.31	23.08	0.5	40
2023	4	23	6	27.75	24.76	0.2	40
2023	4	23	7	25.19	27.57	0.3	260
2023	4	23	8	23.69	31.05	2.91	40
2023	4	23	9	22.62	33.39	2.01	40
2023	4	23	10	22.12	35.05	1.58	197
2023	4	23	11	22.5	36.21	1.44	270
2023	4	23	12	23.56	36.71	1.5	40
2023	4	23	13	26.06	37.02	1.57	40
2023	4	23	14	31	36.82	1.56	40
2023	4	23	15	33	36.05	1.3	40
2023	4	23	16	35.06	35.12	1.02	40
2023	4	23	17	36.12	34.03	0.87	176
2023	4	23	18	36.75	32.8	1.01	167
2023	4	23	19	38.62	32.16	1.14	165
2023	4	23	20	39.38	31.4	1.35	151

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	4	23	21	40.31	30.58	1.66	126
2023	4	23	22	42	29.75	2.19	105
2023	4	23	23	42.69	28.44	2.74	98
2023	4	23	24	44.44	27.83	0.2	98
2023	4	24	1	46.31	27.34	0.2	100
2023	4	24	2	44.69	26.79	0.2	100
2023	4	24	3	38.62	26.9	0.2	100
2023	4	24	4	33.19	26.75	0.2	100
2023	4	24	5	29.81	26.62	0.2	100
2023	4	24	6	27.19	28.12	0.5	100
2023	4	24	7	25.25	30.92	2.9	100
2023	4	24	8	24	33.25	2.36	100
2023	4	24	9	23.81	34.83	2.12	100
2023	4	24	10	24.44	35.98	1.94	210
2023	4	24	11	24.5	36.59	1.83	210
2023	4	24	12	25.31	36.91	1.68	230
2023	4	24	13	27.75	36.44	1.48	230
2023	4	24	14	33.38	35.74	0.98	230
2023	4	24	15	33.06	35.43	0.56	260
2023	4	24	16	33.38	34.72	0.2	290
2023	4	24	17	34.19	33.73	0.43	50
2023	4	24	18	35.62	32.35	1.17	100
2023	4	24	19	37.62	31.64	1.81	123
2023	4	24	20	40.06	31.07	2.58	129
2023	4	24	21	42.44	30.51	3.52	260
2023	4	24	22	44.06	29.87	0.3	260
2023	4	24	23	46.12	29.11	4.29	128
2023	4	24	24	48.44	28.3	0.5	80
2023	4	25	1	49.69	27.6	0.5	80
2023	4	25	2	46.38	27.33	0.5	80
2023	4	25	3	40.44	26.9	0.5	80
2023	4	25	4	35.31	26.36	0.5	80
2023	4	25	5	31.19	26.18	0.51	80
2023	4	25	6	28.62	27.7	0.51	80
2023	4	25	7	27.69	30.05	0.51	80
2023	4	25	8	27.12	32.23	3.16	80
2023	4	25	9	26.81	34.32	2.29	80
2023	4	25	10	26.56	35.59	1.69	80

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	4	25	11	26.62	35.83	1.25	109
2023	4	25	12	27.19	35.9	0.75	90
2023	4	25	13	30.56	35.83	0.52	51
2023	4	25	14	33.19	35.58	0.55	310
2023	4	25	15	33.56	35.15	0.77	310
2023	4	25	16	34.38	34.58	0.85	310
2023	4	25	17	35.81	33.62	0.68	310
2023	4	25	18	37.38	32.62	0.74	310
2023	4	25	19	38.94	31.87	0.88	310
2023	4	25	20	40.44	31.16	1.07	310
2023	4	25	21	41.25	30.33	1.33	310
2023	4	25	22	41.81	29.36	1.56	310
2023	4	25	23	44	28.44	1.69	310
2023	4	25	24	47	27.68	1.7	40
2023	4	26	1	49.25	27.32	1.34	50
2023	4	26	2	46.94	27.16	0.92	121
2023	4	26	3	41.88	26.48	1.68	175
2023	4	26	4	37.69	25.82	2.07	190
2023	4	26	5	33.5	25.94	2.9	214
2023	4	26	6	29.31	27.62	0.3	220
2023	4	26	7	26.31	29.59	0.3	220
2023	4	26	8	24.19	31.47	0.3	220
2023	4	26	9	22.81	33.42	0.3	220
2023	4	26	10	22.38	35.4	0.3	220
2023	4	26	11	22.5	36.86	0.3	220
2023	4	26	12	23.44	37.82	0.5	220
2023	4	26	13	26.62	38.29	2.86	230
2023	4	26	14	31.56	38.05	2.73	230
2023	4	26	15	33.31	37.43	2.73	230
2023	4	26	16	35.31	36.4	2.71	230
2023	4	26	17	37.62	34.69	2.01	230
2023	4	26	18	40.5	32.46	1.84	230
2023	4	26	19	43.06	31.49	1.99	230
2023	4	26	20	44.81	30.64	2.12	230
2023	4	26	21	46.56	29.8	2.25	230
2023	4	26	22	48.56	28.9	2.37	230
2023	4	26	23	49.88	28.13	2.41	230
2023	4	26	24	50.94	27.65	2.38	230

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	4	27	1	49.69	27.17	2.3	230
2023	4	27	2	43.5	26.57	2.12	250
2023	4	27	3	32.81	26.2	1.85	270
2023	4	27	4	27.69	25.86	1.56	270
2023	4	27	5	24.31	26.21	1.36	314
2023	4	27	6	21.5	28.23	1.72	320
2023	4	27	7	19.75	31.98	2.49	80
2023	4	27	8	18.69	34.24	2.19	322
2023	4	27	9	18.25	36.01	2.08	310
2023	4	27	10	18.38	37.51	2.39	310
2023	4	27	11	19.06	38.43	2.87	310
2023	4	27	12	20.25	38.96	0.2	310
2023	4	27	13	23.56	39.23	0.25	320
2023	4	27	14	28.19	39.04	0.25	320
2023	4	27	15	29.12	38.29	0.25	320
2023	4	27	16	30.5	37.12	2.76	320
2023	4	27	17	32	35.17	1.79	320
2023	4	27	18	33.31	32.8	1.66	320
2023	4	27	19	34.5	31.98	1.71	320
2023	4	27	20	35.69	30.99	1.91	320
2023	4	27	21	36.75	29.98	2.18	320
2023	4	27	22	36.75	29.08	2.34	350
2023	4	27	23	37.25	28.33	2.39	320
2023	4	27	24	37.81	27.53	2.36	320
2023	4	28	1	36.94	26.8	2.3	320
2023	4	28	2	32.06	26.55	2.01	320
2023	4	28	3	26.38	26.08	1.75	320
2023	4	28	4	22.81	25.63	1.56	320
2023	4	28	5	20.62	25.92	1.54	50
2023	4	28	6	19.19	28.19	1.97	50
2023	4	28	7	18.31	32.56	0.86	50
2023	4	28	8	17.88	35.47	1.4	50
2023	4	28	9	17.81	37.46	2.46	50
2023	4	28	10	18.62	38.9	2.96	50
2023	4	28	11	19.38	39.83	3.38	50
2023	4	28	12	20.31	40.3	3.82	50
2023	4	28	13	22.44	40.32	0.5	50
2023	4	28	14	26.19	39.51	0.5	50

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	4	28	15	27.19	38.62	0.5	50
2023	4	28	16	28.5	37.58	0.5	50
2023	4	28	17	29.88	35.69	0.5	50
2023	4	28	18	31.19	33.15	0.5	50
2023	4	28	19	32.44	32.34	0.25	225
2023	4	28	20	33.75	31.44	3.62	250
2023	4	28	21	35.12	30.42	3.37	250
2023	4	28	22	36.75	29.48	3.16	260
2023	4	28	23	38.19	28.63	2.96	270
2023	4	28	24	39.38	27.88	2.81	270
2023	4	29	1	38.94	27.12	2.7	270
2023	4	29	2	33.81	26.38	2.49	290
2023	4	29	3	26.06	25.82	2.21	310
2023	4	29	4	21.5	25.4	1.94	320
2023	4	29	5	19.44	25.69	1.61	310
2023	4	29	6	18.25	28.16	1.74	310
2023	4	29	7	17.62	31.94	1.15	320
2023	4	29	8	17.75	34.43	1.74	310
2023	4	29	9	18.62	36.22	2.55	310
2023	4	29	10	19.62	37.62	3.04	320
2023	4	29	11	20.69	38.63	3.37	250
2023	4	29	12	22	38.93	3.64	260
2023	4	29	13	24	38.44	3.92	260
2023	4	29	14	27.88	37.81	0.3	260
2023	4	29	15	29.75	37.01	4.17	270
2023	4	29	16	30.94	36.03	0.25	270
2023	4	29	17	32.56	34.64	0.25	280
2023	4	29	18	34.5	32.45	2.06	287
2023	4	29	19	36.44	31.33	2.09	290
2023	4	29	20	38.44	30.65	2.08	290
2023	4	29	21	40.19	29.94	2.11	290
2023	4	29	22	41.94	29.14	2.2	290
2023	4	29	23	42.75	28.45	2.29	290
2023	4	29	24	44.69	27.83	2.27	320
2023	4	30	1	44.19	27.33	2.1	320
2023	4	30	2	37.19	26.84	1.7	320
2023	4	30	3	30.94	26.59	1.24	40
2023	4	30	4	28.19	25.89	1.46	90

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	4	30	5	26.75	26.08	1.66	120
2023	4	30	6	25.38	29.19	2.16	30
2023	4	30	7	24.56	32.75	3.11	180
2023	4	30	8	24.44	34.94	4.11	210
2023	4	30	9	24.62	36.4	0.3	220
2023	4	30	10	24.62	37.49	0.2	230
2023	4	30	11	26.38	37.95	0.2	230
2023	4	30	12	28.81	37.91	0.2	230
2023	4	30	13	31.81	37.79	0.2	230
2023	4	30	14	34.88	37.64	0.2	230
2023	4	30	15	37	36.39	0.2	270
2023	4	30	16	38.94	35.06	4.77	280
2023	4	30	17	41.38	33.76	4.1	293
2023	4	30	18	44.56	32.64	0.25	270
2023	4	30	19	50.75	31.83	2.69	270
2023	4	30	20	58.88	31.02	0.25	270
2023	4	30	21	70	30.11	0.25	270
2023	4	30	22	81.25	29.29	0.25	270
2023	4	30	23	88.62	27.89	0.2	270
2023	4	30	24	91.31	26.29	0.2	270
2023	5	1	1	91.69	24.48	4.83	270
2023	5	1	2	88.06	22.94	0.3	320
2023	5	1	3	83.38	22.18	2.84	310
2023	5	1	4	76.19	21.99	1.73	40
2023	5	1	5	64.44	22.02	1.95	40
2023	5	1	6	53.44	22.58	2.83	40
2023	5	1	7	46.31	23.44	3.77	40
2023	5	1	8	41.81	24.73	3.5	40
2023	5	1	9	38.81	27.03	0.2	40
2023	5	1	10	36.94	29.23	0.2	40
2023	5	1	11	36.19	30.9	0.2	180
2023	5	1	12	36.81	32.21	4.41	190
2023	5	1	13	42.81	33.15	3.54	196
2023	5	1	14	53.38	33.55	2.75	190
2023	5	1	15	62.44	33.4	2.08	190
2023	5	1	16	62.62	32.66	1.4	200
2023	5	1	17	62	31.54	0.53	160
2023	5	1	18	64.12	29.87	1.04	70

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_ Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	1	19	66.75	28.23	1.89	70
2023	5	1	20	69.44	27.27	2.41	70
2023	5	1	21	70.12	26.66	0.5	70
2023	5	1	22	71.44	25.95	0.5	110
2023	5	1	23	73.38	25.4	0.5	120
2023	5	1	24	75.12	24.83	0.5	120
2023	5	2	1	73.31	24.56	0.25	30
2023	5	2	2	64.19	24.11	2.95	150
2023	5	2	3	57.69	23.65	2.37	170
2023	5	2	4	53.25	23.44	1.95	190
2023	5	2	5	49.44	24.07	1.61	190
2023	5	2	6	45.62	25.5	1.87	220
2023	5	2	7	41.62	27.09	2.38	180
2023	5	2	8	38.81	28.23	2.35	260
2023	5	2	9	37.81	29.3	2.26	180
2023	5	2	10	37.31	30.44	2.32	230
2023	5	2	11	37.75	31.8	2.31	230
2023	5	2	12	38.94	32.86	2.19	230
2023	5	2	13	46.94	33.22	1.93	230
2023	5	2	14	59.5	33.32	1.67	230
2023	5	2	15	59.19	32.94	1.49	230
2023	5	2	16	59.94	32.22	1.32	260
2023	5	2	17	60.88	30.62	1.01	260
2023	5	2	18	60.12	28.53	1.22	260
2023	5	2	19	60.12	27.93	1.48	260
2023	5	2	20	62	27.44	1.51	260
2023	5	2	21	64.62	27.04	1.29	260
2023	5	2	22	66.69	26.95	0.91	260
2023	5	2	23	68.19	26.76	0.69	50
2023	5	2	24	70.25	26.26	0.91	110
2023	5	3	1	70.75	25.59	1.19	80
2023	5	3	2	59.06	24.94	1.4	180
2023	5	3	3	51.56	24.4	1.44	150
2023	5	3	4	47	24.02	1.34	180
2023	5	3	5	43.94	24.34	1.5	220
2023	5	3	6	41.19	26.25	2.67	250
2023	5	3	7	38.25	28.41	0.25	277
2023	5	3	8	35.19	30.05	0.25	277

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	3	9	33.31	31.38	0.25	277
2023	5	3	10	32.88	32.55	0.25	277
2023	5	3	11	33.12	33.47	4.22	225
2023	5	3	12	34.38	34.16	4.48	277
2023	5	3	13	44.5	34.41	4.43	230
2023	5	3	14	56.88	34.22	4.15	230
2023	5	3	15	58.44	33.66	0.25	230
2023	5	3	16	59.06	32.61	0.25	230
2023	5	3	17	59.19	30.4	2.2	230
2023	5	3	18	59.25	27.86	1.97	230
2023	5	3	19	59.06	27.01	1.96	260
2023	5	3	20	58.75	26.3	1.94	260
2023	5	3	21	59.44	25.77	1.88	260
2023	5	3	22	60.94	25.35	1.79	260
2023	5	3	23	63.69	25.04	1.68	260
2023	5	3	24	66.5	24.8	1.54	230
2023	5	4	1	67.69	24.37	1.43	260
2023	5	4	2	53.25	23.86	1.38	210
2023	5	4	3	41.81	23.11	1.48	190
2023	5	4	4	35.19	22.38	1.69	280
2023	5	4	5	31.25	22.69	1.76	170
2023	5	4	6	28.75	25.67	2.56	170
2023	5	4	7	27.38	29.33	2.42	180
2023	5	4	8	26.56	31.71	2.05	220
2023	5	4	9	26.56	33.4	1.9	210
2023	5	4	10	26.88	34.69	2.18	275
2023	5	4	11	27.44	35.59	2.49	275
2023	5	4	12	28.75	36.21	2.77	275
2023	5	4	13	39.5	36.37	2.96	275
2023	5	4	14	52	36.23	0.25	275
2023	5	4	15	53.44	35.74	0.25	275
2023	5	4	16	54.62	34.69	0.25	275
2023	5	4	17	56	32.33	2.02	275
2023	5	4	18	57.19	29.69	1.93	275
2023	5	4	19	59.5	28.9	1.97	310
2023	5	4	20	61.75	28.21	2.01	310
2023	5	4	21	63.69	27.61	2.03	310
2023	5	4	22	65.19	27.08	2.08	310

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	4	23	67.81	26.34	2.17	310
2023	5	4	24	69.81	25.65	2.28	310
2023	5	5	1	67.5	25.12	2.26	310
2023	5	5	2	55.88	24.94	2.07	310
2023	5	5	3	42.12	24.34	1.94	310
2023	5	5	4	37.56	23.8	1.77	310
2023	5	5	5	34.38	24.44	1.55	310
2023	5	5	6	32.06	26.73	1.41	320
2023	5	5	7	30.38	31.02	1.12	320
2023	5	5	8	29.56	33.05	1.65	320
2023	5	5	9	29.31	34.48	2.26	320
2023	5	5	10	29.5	35.61	2.75	320
2023	5	5	11	30.62	36.41	0.25	320
2023	5	5	12	32.69	36.77	0.25	320
2023	5	5	13	40.69	36.89	0.25	320
2023	5	5	14	54.06	36.65	0.25	320
2023	5	5	15	55.75	35.89	0.25	300
2023	5	5	16	56.88	34.77	0.25	300
2023	5	5	17	58.19	32.92	2.45	300
2023	5	5	18	59.44	30.65	1.88	300
2023	5	5	19	61	30.08	1.88	270
2023	5	5	20	62.94	29.45	2.01	270
2023	5	5	21	64.5	28.73	2.15	300
2023	5	5	22	66	27.94	2.28	300
2023	5	5	23	67.5	27.23	2.35	300
2023	5	5	24	68.56	26.46	2.37	280
2023	5	6	1	66.25	25.82	2.32	280
2023	5	6	2	53.06	25.26	2.24	280
2023	5	6	3	39.19	24.73	2.16	280
2023	5	6	4	34.06	24.31	2.08	280
2023	5	6	5	31.25	24.96	2.04	280
2023	5	6	6	28.94	27.65	2.27	280
2023	5	6	7	27	31.76	2.46	280
2023	5	6	8	25.69	34.07	2.57	320
2023	5	6	9	24.75	35.56	2.65	320
2023	5	6	10	24.38	36.75	2.78	320
2023	5	6	11	24.5	37.68	2.89	320
2023	5	6	12	25.56	38.23	2.99	320

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	6	13	34.38	38.4	0.25	320
2023	5	6	14	40.44	38.18	2.88	320
2023	5	6	15	40.62	37.5	2.51	320
2023	5	6	16	42.62	36.37	1.92	320
2023	5	6	17	44.31	34.37	0.77	320
2023	5	6	18	46.75	32.8	0.14	320
2023	5	6	19	48.25	32.01	0.94	320
2023	5	6	20	50.31	31.01	1.43	170
2023	5	6	21	52.69	30.22	1.68	280
2023	5	6	22	55.19	29.35	1.85	170
2023	5	6	23	57.38	28.52	2.02	170
2023	5	6	24	59.69	27.69	2.18	170
2023	5	7	1	60.62	26.87	2.34	170
2023	5	7	2	47.25	26.17	2.44	170
2023	5	7	3	34.94	25.55	2.48	170
2023	5	7	4	27.44	25.03	2.49	170
2023	5	7	5	25.25	25.58	2.24	170
2023	5	7	6	23.81	28.63	0.25	170
2023	5	7	7	22.88	32.63	2.83	170
2023	5	7	8	22.25	35.57	2.43	170
2023	5	7	9	22.06	36.98	2.14	170
2023	5	7	10	22.38	38.08	2.07	170
2023	5	7	11	23.12	38.86	2.09	170
2023	5	7	12	24.56	39.33	2.1	170
2023	5	7	13	34.25	39.4	2.05	170
2023	5	7	14	43.56	39.01	2.07	170
2023	5	7	15	46.19	38.28	2.13	350
2023	5	7	16	45.56	37.12	2.01	350
2023	5	7	17	43.75	34.91	1.19	350
2023	5	7	18	43.31	32.78	1.22	350
2023	5	7	19	44.06	31.91	1.28	350
2023	5	7	20	45.31	31.44	1.2	350
2023	5	7	21	47.5	31.26	1.07	350
2023	5	7	22	49.75	30.92	1.11	350
2023	5	7	23	52.62	30.41	1.29	350
2023	5	7	24	54.94	29.79	1.52	350
2023	5	8	1	55.06	29.03	1.74	210
2023	5	8	2	41.75	28.2	2	210

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_ Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	8	3	33.31	27.32	2.24	210
2023	5	8	4	27.12	26.66	2.39	210
2023	5	8	5	25.19	27.11	2.3	210
2023	5	8	6	23.88	30.26	0.25	210
2023	5	8	7	23.06	33.67	2.79	210
2023	5	8	8	22.5	36.57	1.88	210
2023	5	8	9	22.44	37.98	1.21	210
2023	5	8	10	22.5	39.08	1.13	210
2023	5	8	11	23	39.75	1.35	210
2023	5	8	12	24.19	40.19	1.64	320
2023	5	8	13	32.69	40.2	1.84	333
2023	5	8	14	41.31	39.96	1.91	320
2023	5	8	15	38.69	39.26	1.75	320
2023	5	8	16	39.44	38.11	1.37	320
2023	5	8	17	40.75	36.08	0.67	320
2023	5	8	18	40.75	34.12	0.4	320
2023	5	8	19	41.88	33.72	0.38	320
2023	5	8	20	43.12	33.14	0.54	320
2023	5	8	21	44.44	32.5	0.68	320
2023	5	8	22	45.44	31.96	0.87	320
2023	5	8	23	46.31	31.33	1.09	320
2023	5	8	24	48.25	30.78	1.27	320
2023	5	9	1	50.12	30.12	1.4	320
2023	5	9	2	40.5	29.67	1.36	320
2023	5	9	3	32	29.29	1.21	320
2023	5	9	4	26.88	28.82	1.09	250
2023	5	9	5	24.44	28.83	1.01	180
2023	5	9	6	22.69	30.83	1.49	180
2023	5	9	7	21.31	34.42	0.91	180
2023	5	9	8	20.31	37.16	0.97	180
2023	5	9	9	19.88	38.69	1.32	180
2023	5	9	10	19.88	39.86	1.67	180
2023	5	9	11	20.12	40.71	2	180
2023	5	9	12	21.12	41.31	2.36	180
2023	5	9	13	29.5	41.47	2.66	180
2023	5	9	14	36.44	41.16	2.65	340
2023	5	9	15	39	40.5	2.3	270
2023	5	9	16	39.12	39.33	1.87	340

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	9	17	39.56	37.16	1.24	230
2023	5	9	18	40.25	34.76	1.84	180
2023	5	9	19	41.5	33.41	2.49	180
2023	5	9	20	43.06	32.67	2.86	200
2023	5	9	21	44.69	32.14	0.25	200
2023	5	9	22	46.94	31.67	0.25	200
2023	5	9	23	49.38	31.12	0.25	200
2023	5	9	24	51.88	30.51	2.94	200
2023	5	10	1	51.75	29.91	2.85	200
2023	5	10	2	39.19	29.16	2.72	200
2023	5	10	3	29.31	28.39	2.6	200
2023	5	10	4	19.81	27.55	2.49	200
2023	5	10	5	16.44	27.98	2.15	260
2023	5	10	6	14.56	30.94	2.52	260
2023	5	10	7	13.38	34.62	2.3	260
2023	5	10	8	12.69	38.1	0.25	260
2023	5	10	9	12.31	39.82	0.25	260
2023	5	10	10	12.31	40.96	0.25	260
2023	5	10	11	12.44	41.71	0.25	260
2023	5	10	12	13	42.11	0.25	260
2023	5	10	13	26	42.15	2.9	260
2023	5	10	14	27.88	41.76	2.68	180
2023	5	10	15	30.75	41.02	2.35	180
2023	5	10	16	31.81	39.88	1.86	180
2023	5	10	17	32.31	36.89	1.2	180
2023	5	10	18	31.88	34.33	1.89	180
2023	5	10	19	31.75	32.53	2.4	180
2023	5	10	20	33.69	31.38	2.55	180
2023	5	10	21	35.38	30.86	2.36	180
2023	5	10	22	36.69	30.74	1.97	180
2023	5	10	23	37.44	30.35	1.69	180
2023	5	10	24	37.81	29.12	1.78	180
2023	5	11	1	36.44	27.65	2.09	180
2023	5	11	2	23.88	26.24	2.39	180
2023	5	11	3	19.31	24.88	2.67	180
2023	5	11	4	11.25	23.75	2.71	180
2023	5	11	5	8.81	24.12	2.49	180
2023	5	11	6	8.56	27.04	0.25	180

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_ Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	11	7	8.69	30.4	0.25	180
2023	5	11	8	8.81	35.96	0.25	180
2023	5	11	9	8.75	39.01	0.25	180
2023	5	11	10	8.69	40.39	0.25	180
2023	5	11	11	8.56	41.16	2.86	180
2023	5	11	12	8.88	41.59	2.7	180
2023	5	11	13	20.19	41.65	2.84	180
2023	5	11	14	18.81	41.34	2.97	180
2023	5	11	15	20.75	40.58	2.81	180
2023	5	11	16	23.69	39.36	2.28	180
2023	5	11	17	25.06	36.42	0.98	180
2023	5	11	18	25.62	34.46	1.11	180
2023	5	11	19	26	32.64	1.97	180
2023	5	11	20	26.38	30.59	2.58	180
2023	5	11	21	26.88	29.3	2.83	40
2023	5	11	22	27.25	28.62	2.78	40
2023	5	11	23	26.5	28.14	2.61	40
2023	5	11	24	25.62	27.73	2.46	40
2023	5	12	1	26.31	27.26	2.34	40
2023	5	12	2	22.69	26.94	2.11	40
2023	5	12	3	17.06	27.01	1.68	225
2023	5	12	4	11.38	26.93	0.99	40
2023	5	12	5	9.81	27.04	0.28	310
2023	5	12	6	9.25	28.65	1.17	310
2023	5	12	7	8.94	31.84	2.16	310
2023	5	12	8	8.81	36.33	2.33	310
2023	5	12	9	8.88	38.61	2.12	310
2023	5	12	10	9.06	40.01	2.29	310
2023	5	12	11	9.44	40.88	2.56	310
2023	5	12	12	10.19	41.29	2.75	310
2023	5	12	13	21	41.25	2.69	310
2023	5	12	14	24.75	40.86	2.44	310
2023	5	12	15	25.12	40.05	2.09	310
2023	5	12	16	26	38.81	1.83	310
2023	5	12	17	26.88	35.48	1.62	310
2023	5	12	18	27.12	32	2.53	260
2023	5	12	19	26.62	30.65	2.87	260
2023	5	12	20	26.31	29.67	2.89	310

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	12	21	27.88	28.94	2.79	310
2023	5	12	22	30.44	28.53	2.61	310
2023	5	12	23	32.75	28.44	2.25	310
2023	5	12	24	34.62	28.27	1.95	310
2023	5	13	1	35.56	27.19	1.98	310
2023	5	13	2	24.62	25.75	2.16	310
2023	5	13	3	19.06	24.51	2.29	310
2023	5	13	4	13.38	23.57	2.3	310
2023	5	13	5	10.94	23.83	2.15	310
2023	5	13	6	10.62	27.35	2.62	310
2023	5	13	7	10.56	30.95	2.45	310
2023	5	13	8	10.75	35.94	0.25	310
2023	5	13	9	11.19	39.2	0.25	310
2023	5	13	10	11.75	40.5	0.25	310
2023	5	13	11	12.25	41.41	0.51	20
2023	5	13	12	13.12	41.98	0.51	24
2023	5	13	13	22.25	42.06	0.51	24
2023	5	13	14	27	41.73	0.51	24
2023	5	13	15	27.56	40.97	0.51	24
2023	5	13	16	26.69	39.76	0.25	24
2023	5	13	17	25.81	36.3	2.09	24
2023	5	13	18	24.94	33.19	2.48	24
2023	5	13	19	25.94	32.52	2.27	24
2023	5	13	20	26.31	32.73	1.56	24
2023	5	13	21	28.31	32.65	0.81	24
2023	5	13	22	29.06	32.15	0.43	60
2023	5	13	23	29.25	31.25	0.83	30
2023	5	13	24	30.62	30.01	1.27	30
2023	5	14	1	31.19	28.91	1.58	30
2023	5	14	2	25.62	28.16	1.56	30
2023	5	14	3	19.5	27.67	1.35	30
2023	5	14	4	12.75	27.11	1.15	30
2023	5	14	5	11	27.32	1.02	30
2023	5	14	6	10.31	29.9	1.13	30
2023	5	14	7	10	33.9	1.78	30
2023	5	14	8	9.88	39.25	0.25	30
2023	5	14	9	9.94	41.37	4.49	30
2023	5	14	10	10.19	42.66	0.3	260

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_ Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	14	11	10.5	43.61	0.3	260
2023	5	14	12	11.25	44.15	0.3	260
2023	5	14	13	20.75	44.23	0.3	260
2023	5	14	14	23.5	43.84	0.25	260
2023	5	14	15	23.12	43.07	2.88	260
2023	5	14	16	23.62	41.94	2.22	260
2023	5	14	17	25.12	38.69	1.55	260
2023	5	14	18	26.75	35.29	2.59	260
2023	5	14	19	28.25	33.99	3.23	260
2023	5	14	20	29.75	33.05	3.39	260
2023	5	14	21	30.88	32.11	3.35	260
2023	5	14	22	31.94	31.15	3.29	260
2023	5	14	23	32.69	30.23	3.22	260
2023	5	14	24	33.56	29.26	3.14	260
2023	5	15	1	31.88	28.55	3.02	260
2023	5	15	2	25.25	27.91	2.91	260
2023	5	15	3	20.19	27.46	2.83	260
2023	5	15	4	16.88	26.95	2.83	260
2023	5	15	5	14.62	27.78	3.15	260
2023	5	15	6	13.31	30.92	0.3	260
2023	5	15	7	12.81	34.44	0.2	260
2023	5	15	8	12.62	37.51	0.2	260
2023	5	15	9	12.62	40.03	0.3	260
2023	5	15	10	12.88	42.05	0.2	260
2023	5	15	11	13.19	43.17	0.3	260
2023	5	15	12	13.81	43.89	0.3	260
2023	5	15	13	17.38	44.05	0.3	260
2023	5	15	14	23	43.7	0.2	260
2023	5	15	15	24.19	42.9	0.2	260
2023	5	15	16	25.25	41.71	0.2	260
2023	5	15	17	26.81	39.07	3.51	260
2023	5	15	18	28.56	35.76	2.98	260
2023	5	15	19	30.56	34.88	3.05	260
2023	5	15	20	32.38	34.13	3.15	260
2023	5	15	21	34.06	33.38	3.23	260
2023	5	15	22	35.12	32.61	0.25	220
2023	5	15	23	36.06	31.9	0.25	220
2023	5	15	24	37.06	31.3	0.25	220

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	16	1	35.88	30.77	0.25	220
2023	5	16	2	31.12	30.48	0.25	220
2023	5	16	3	24.69	30.13	0.25	280
2023	5	16	4	18.56	29.63	2.81	220
2023	5	16	5	15.56	29.96	0.25	270
2023	5	16	6	13.81	31.69	0.25	220
2023	5	16	7	12.56	34.89	0.25	220
2023	5	16	8	11.69	38.6	0.25	220
2023	5	16	9	11.19	41.02	0.25	220
2023	5	16	10	11.12	42.54	0.25	220
2023	5	16	11	11.56	43.42	3.15	220
2023	5	16	12	12.69	43.93	3.1	220
2023	5	16	13	16.75	44.05	3.13	50
2023	5	16	14	22.25	43.72	3.37	50
2023	5	16	15	23.62	43.08	0.51	50
2023	5	16	16	25.56	41.9	0.51	50
2023	5	16	17	27.81	39.3	0.51	50
2023	5	16	18	29.19	36.12	0.51	50
2023	5	16	19	31.25	35.62	0.61	50
2023	5	16	20	32.94	35.13	0.61	50
2023	5	16	21	34.5	34.41	0.61	50
2023	5	16	22	36.12	33.93	4.85	280
2023	5	16	23	38.06	32.98	0.61	50
2023	5	16	24	40.44	32.2	4.51	289
2023	5	17	1	39.44	31.58	0.61	50
2023	5	17	2	33.69	30.94	0.61	50
2023	5	17	3	24.31	30.21	0.61	50
2023	5	17	4	18.88	29.33	2.67	50
2023	5	17	5	16.31	29.83	2.78	50
2023	5	17	6	14.75	32.51	0.25	50
2023	5	17	7	13.69	37.03	0.25	50
2023	5	17	8	13.12	39.72	0.61	50
2023	5	17	9	13	41.28	0.61	50
2023	5	17	10	13.25	42.4	0.61	50
2023	5	17	11	14	43.19	0.61	50
2023	5	17	12	15.31	43.67	0.61	50
2023	5	17	13	18.19	43.75	0.61	50
2023	5	17	14	23.19	43.4	0.61	50

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	17	15	23.56	42.63	0.61	50
2023	5	17	16	23.75	41.33	0.61	50
2023	5	17	17	23.81	39.22	0.25	50
2023	5	17	18	23.88	36.25	2.76	50
2023	5	17	19	24.44	35.34	0.25	310
2023	5	17	20	25.56	34.59	0.25	310
2023	5	17	21	26.81	34.05	0.25	310
2023	5	17	22	28.19	33.49	0.25	310
2023	5	17	23	29.69	32.77	0.25	310
2023	5	17	24	31.25	31.98	0.25	310
2023	5	18	1	32	31.26	0.25	225
2023	5	18	2	30.56	30.72	0.25	310
2023	5	18	3	26.25	30.27	0.25	310
2023	5	18	4	21.81	29.87	0.25	310
2023	5	18	5	19.56	30.15	4.65	310
2023	5	18	6	18.5	31.93	0.2	310
2023	5	18	7	17.81	35.26	0.2	310
2023	5	18	8	17.38	38.47	0.2	310
2023	5	18	9	17.31	40.42	0.2	310
2023	5	18	10	18.19	41.73	0.2	310
2023	5	18	11	18.94	42.51	0.25	310
2023	5	18	12	19.88	42.97	0.25	310
2023	5	18	13	22	43.06	0.25	310
2023	5	18	14	27	42.24	0.25	310
2023	5	18	15	28	41.59	4.68	280
2023	5	18	16	28.75	40.8	0.25	310
2023	5	18	17	29.75	39.15	0.25	310
2023	5	18	18	30.62	36.43	2.56	310
2023	5	18	19	31.62	35.57	2.68	310
2023	5	18	20	32.56	34.76	2.77	310
2023	5	18	21	33.88	33.85	2.81	310
2023	5	18	22	35.31	32.94	2.81	310
2023	5	18	23	36.75	32.05	2.79	310
2023	5	18	24	38.12	31.3	2.72	310
2023	5	19	1	36.81	30.51	2.62	310
2023	5	19	2	30.75	29.82	2.52	180
2023	5	19	3	23	29.23	2.43	180
2023	5	19	4	19.12	28.75	2.31	180

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	19	5	17.5	29.68	2.15	180
2023	5	19	6	16.56	32.76	2.95	180
2023	5	19	7	15.88	37.52	0.25	180
2023	5	19	8	15.5	40.25	0.25	180
2023	5	19	9	15.12	41.72	0.25	180
2023	5	19	10	15	42.75	0.25	180
2023	5	19	11	15.25	43.33	0.25	180
2023	5	19	12	15.56	43.51	0.25	180
2023	5	19	13	20.31	43.54	3.26	180
2023	5	19	14	23.31	43.14	3.07	180
2023	5	19	15	22.31	42.35	2.92	180
2023	5	19	16	23.06	41.56	2.66	180
2023	5	19	17	25.62	39.68	1.52	180
2023	5	19	18	27.12	38.1	1.05	180
2023	5	19	19	27.19	37.76	0.67	280
2023	5	19	20	27.5	36.87	0.97	180
2023	5	19	21	28.25	35.34	1.67	180
2023	5	19	22	29.25	33.92	2.31	180
2023	5	19	23	30.81	33.06	2.74	350
2023	5	19	24	32.56	32.39	3.07	350
2023	5	20	1	32	31.72	0.25	350
2023	5	20	2	27.38	31.19	0.25	350
2023	5	20	3	21.5	30.5	0.25	350
2023	5	20	4	18.19	29.74	0.25	350
2023	5	20	5	16.31	30.23	0.25	350
2023	5	20	6	15.19	32.84	0.25	350
2023	5	20	7	14.5	36.9	0.25	350
2023	5	20	8	14.12	39.8	0.25	350
2023	5	20	9	13.88	41.56	2.93	350
2023	5	20	10	14	42.67	2.53	318
2023	5	20	11	14.19	43.33	2.21	350
2023	5	20	12	14.69	43.67	2.04	350
2023	5	20	13	17.12	43.63	1.93	350
2023	5	20	14	21.75	43.09	1.77	350
2023	5	20	15	23.25	42.39	1.6	350
2023	5	20	16	23.56	41.33	1.2	350
2023	5	20	17	24.25	39.9	0.48	350
2023	5	20	18	25.12	38.07	1	350

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	20	19	26.06	36.51	1.81	350
2023	5	20	20	27	35.43	2.21	350
2023	5	20	21	27.94	34.44	2.42	350
2023	5	20	22	28.88	33.37	2.59	350
2023	5	20	23	29.94	32.24	2.75	350
2023	5	20	24	31.38	31.3	2.83	350
2023	5	21	1	31.44	30.45	2.84	350
2023	5	21	2	27.88	29.77	3.03	350
2023	5	21	3	21.25	29.21	3.4	350
2023	5	21	4	17.06	28.74	0.25	350
2023	5	21	5	14.81	29.34	4.62	350
2023	5	21	6	13.25	31.98	0.2	90
2023	5	21	7	12	36.4	0.2	90
2023	5	21	8	11.06	39.8	0.51	90
2023	5	21	9	10.38	41.81	0.51	90
2023	5	21	10	10.06	43.11	2.85	90
2023	5	21	11	10.06	43.91	2.4	90
2023	5	21	12	10.56	44.3	2.11	90
2023	5	21	13	15.25	44.37	1.9	90
2023	5	21	14	18.44	43.98	1.58	90
2023	5	21	15	19.44	43.23	1.12	90
2023	5	21	16	20.62	42.05	0.72	270
2023	5	21	17	22.25	39.76	1	90
2023	5	21	18	23.62	36.67	1.99	90
2023	5	21	19	25.12	35.07	2.63	90
2023	5	21	20	26.5	34.05	2.97	90
2023	5	21	21	27.56	33.23	3.14	90
2023	5	21	22	28.62	32.82	3.2	90
2023	5	21	23	29.81	32.31	3.24	90
2023	5	21	24	31.62	31.74	0.15	90
2023	5	22	1	34.12	31.18	3.32	90
2023	5	22	2	35.12	30.68	0.51	90
2023	5	22	3	32.31	30.28	0.51	90
2023	5	22	4	27.19	29.98	0.51	90
2023	5	22	5	23	30.05	0.2	90
2023	5	22	6	20.06	32.15	0.3	130
2023	5	22	7	18.38	35.2	0.2	130
2023	5	22	8	17.44	37.85	0.2	130

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	22	9	17	40.12	0.3	130
2023	5	22	10	16.81	41.85	0.2	130
2023	5	22	11	16.75	42.88	0.2	130
2023	5	22	12	17.19	43.41	0.2	130
2023	5	22	13	19.5	43.55	0.51	130
2023	5	22	14	24.31	43.3	0.51	130
2023	5	22	15	24.75	42.69	4.19	280
2023	5	22	16	25.25	41.65	0.25	280
2023	5	22	17	25.56	39.65	2.66	130
2023	5	22	18	26.44	36.6	2.45	130
2023	5	22	19	27.62	35.78	2.76	130
2023	5	22	20	28.94	35.22	2.89	130
2023	5	22	21	29.88	34.98	2.84	130
2023	5	22	22	30.38	34.33	2.9	130
2023	5	22	23	31.62	33.52	3.05	130
2023	5	22	24	33.56	32.76	2.99	130
2023	5	23	1	35.25	32.16	2.99	130
2023	5	23	2	33.25	31.88	3.36	130
2023	5	23	3	28	31.32	0.15	230
2023	5	23	4	23.88	30.75	0.5	130
2023	5	23	5	21.44	30.8	0.2	130
2023	5	23	6	20.19	32.82	0.2	130
2023	5	23	7	19.5	36.07	0.3	130
2023	5	23	8	19	38.35	0.2	130
2023	5	23	9	18.75	40.01	0.2	130
2023	5	23	10	18.62	41.2	0.2	130
2023	5	23	11	18.69	42.01	0.51	130
2023	5	23	12	19.25	42.55	4.44	280
2023	5	23	13	21	42.66	0.25	280
2023	5	23	14	25.62	42.54	0.25	270
2023	5	23	15	26.56	41.99	0.25	270
2023	5	23	16	27.75	40.99	0.25	270
2023	5	23	17	29	39.37	0.25	270
2023	5	23	18	29.5	36.59	2.64	270
2023	5	23	19	30.44	35.94	0.25	270
2023	5	23	20	31.81	35.32	0.25	270
2023	5	23	21	33.19	34.71	4.04	270
2023	5	23	22	35.25	34.51	4.67	230

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_ Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	23	23	37.06	34.04	0.2	230
2023	5	23	24	38.88	33.32	0.2	230
2023	5	24	1	39.31	32.65	0.2	230
2023	5	24	2	34.75	31.77	4.9	230
2023	5	24	3	27.75	31.12	4.77	230
2023	5	24	4	22.38	30.56	4.8	230
2023	5	24	5	19.38	30.75	0.2	230
2023	5	24	6	17.5	33.24	0.3	230
2023	5	24	7	16.38	36.77	0.2	230
2023	5	24	8	15.69	39.58	0.2	230
2023	5	24	9	15.31	41.5	0.2	260
2023	5	24	10	15.19	42.9	0.3	260
2023	5	24	11	15.44	43.83	0.3	260
2023	5	24	12	16.06	44.3	0.2	260
2023	5	24	13	18.06	44.42	0.2	280
2023	5	24	14	22.5	44	0.2	280
2023	5	24	15	23.56	43.14	4.75	280
2023	5	24	16	24.44	41.98	4.47	280
2023	5	24	17	25.62	40.11	0.25	280
2023	5	24	18	26.94	37.07	2.67	280
2023	5	24	19	28.06	36.17	2.91	280
2023	5	24	20	29.12	35.54	0.3	240
2023	5	24	21	30.12	34.85	0.3	240
2023	5	24	22	31.31	34.15	0.3	240
2023	5	24	23	32.56	33.55	0.3	240
2023	5	24	24	34.06	32.95	0.3	240
2023	5	25	1	33	32.37	0.3	240
2023	5	25	2	29.69	31.73	0.3	240
2023	5	25	3	23.56	31.15	0.3	240
2023	5	25	4	19.44	30.58	0.3	240
2023	5	25	5	17	31.26	0.3	240
2023	5	25	6	15.5	33.21	0.2	240
2023	5	25	7	14.94	36.52	0.2	250
2023	5	25	8	15	38.93	0.2	270
2023	5	25	9	15.62	40.87	0.2	280
2023	5	25	10	16.38	42.6	0.2	290
2023	5	25	11	16.56	43.58	0.2	300
2023	5	25	12	16.81	43.77	0.2	300

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	25	13	18	43.26	0.2	290
2023	5	25	14	21.25	42.53	0.2	290
2023	5	25	15	22.25	42.05	0.2	280
2023	5	25	16	22.81	41.29	0.2	270
2023	5	25	17	23.75	39.73	4.88	270
2023	5	25	18	24.88	37.17	0.25	270
2023	5	25	19	26.56	36.33	0.25	270
2023	5	25	20	28.62	35.79	4.01	270
2023	5	25	21	30.31	34.97	4.46	270
2023	5	25	22	32.25	33.98	4.5	270
2023	5	25	23	34.31	32.59	0.25	270
2023	5	25	24	36.19	31.15	0.25	270
2023	5	26	1	34.56	30.1	0.25	270
2023	5	26	2	29.5	29.21	2.82	270
2023	5	26	3	20.81	28.54	2.7	270
2023	5	26	4	17.06	28.01	2.73	270
2023	5	26	5	14.88	29.2	3.64	250
2023	5	26	6	13.88	32.2	4.58	225
2023	5	26	7	13.62	37.11	0.2	270
2023	5	26	8	13.75	39.48	0.2	280
2023	5	26	9	14.06	41.08	0.2	270
2023	5	26	10	14.56	42.27	0.2	290
2023	5	26	11	15.44	42.98	0.2	290
2023	5	26	12	16.5	43.37	0.2	290
2023	5	26	13	17.81	43.4	0.2	290
2023	5	26	14	21.44	42.93	0.2	290
2023	5	26	15	22.69	41.89	0.2	280
2023	5	26	16	23.62	40.68	0.2	280
2023	5	26	17	25.12	39.26	0.2	280
2023	5	26	18	26.62	36.39	0.25	270
2023	5	26	19	27.88	35.36	0.25	270
2023	5	26	20	29.12	34.58	4.01	270
2023	5	26	21	30.38	33.43	0.25	270
2023	5	26	22	31.69	32.26	0.25	280
2023	5	26	23	33.19	31.21	0.25	270
2023	5	26	24	34.62	30.26	2.96	298
2023	5	27	1	33.12	29.47	2.83	303
2023	5	27	2	28.5	28.74	2.76	310

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	27	3	22.44	28.07	2.64	318
2023	5	27	4	19.25	27.47	2.45	326
2023	5	27	5	16.94	28.5	2.04	334
2023	5	27	6	15.19	31.26	1.59	335
2023	5	27	7	14.06	35.89	2.44	303
2023	5	27	8	13.44	38.49	0.25	270
2023	5	27	9	13.25	40.22	0.25	286
2023	5	27	10	13.56	41.58	4.03	284
2023	5	27	11	14.31	42.51	4.24	286
2023	5	27	12	15.56	43.14	4.34	288
2023	5	27	13	18.69	43.26	0.25	290
2023	5	27	14	23.38	42.94	4	270
2023	5	27	15	24.62	42.19	0.25	290
2023	5	27	16	25.62	41.03	2.87	230
2023	5	27	17	26.62	39.22	1.89	230
2023	5	27	18	27.81	36.91	1.57	230
2023	5	27	19	29.19	35.98	1.78	230
2023	5	27	20	30.5	35.52	1.86	230
2023	5	27	21	31.75	35.1	1.85	230
2023	5	27	22	32.88	34.66	1.84	230
2023	5	27	23	33.81	34.07	1.93	230
2023	5	27	24	34.06	33.48	1.99	230
2023	5	28	1	33.62	32.87	2.02	230
2023	5	28	2	28.31	32.3	1.91	230
2023	5	28	3	23.69	31.77	1.65	230
2023	5	28	4	21	31.58	1.27	230
2023	5	28	5	19.25	31.88	0.83	230
2023	5	28	6	17.88	34.27	0.99	230
2023	5	28	7	17	36.71	1.91	230
2023	5	28	8	16.44	38.58	2.51	230
2023	5	28	9	16.19	40.07	2.78	230
2023	5	28	10	16	41.27	2.75	230
2023	5	28	11	16	42.01	2.6	230
2023	5	28	12	16.38	42.43	2.47	230
2023	5	28	13	18.25	42.48	2.43	348
2023	5	28	14	23	42.22	2.42	350
2023	5	28	15	23.38	41.54	2.33	2
2023	5	28	16	23.44	40.44	2.1	11

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

Annexure 3_ Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	28	17	23.38	38.82	1.51	28
2023	5	28	18	23.62	36.29	1.51	63
2023	5	28	19	24.12	35.2	1.98	85
2023	5	28	20	25.06	34.31	2.33	95
2023	5	28	21	25.81	33.57	2.53	100
2023	5	28	22	26.69	32.73	2.61	107
2023	5	28	23	27.69	31.82	2.6	113
2023	5	28	24	28.62	30.75	2.6	119
2023	5	29	1	27.25	29.93	2.55	123
2023	5	29	2	22.88	29.18	2.46	260
2023	5	29	3	18.94	28.58	2.37	141
2023	5	29	4	16.44	28.01	2.29	150
2023	5	29	5	15.38	29.04	2.13	165
2023	5	29	6	14.81	31.95	2.41	200
2023	5	29	7	14.5	36.02	0.89	260
2023	5	29	8	14.31	38.8	1.3	260
2023	5	29	9	14.19	40.41	1.67	280
2023	5	29	10	14.19	41.63	1.84	280
2023	5	29	11	14.31	42.3	1.94	288
2023	5	29	12	14.75	42.77	2.02	225
2023	5	29	13	17.25	42.83	2.12	225
2023	5	29	14	20.69	42.47	2.03	225
2023	5	29	15	21.25	41.8	1.78	225
2023	5	29	16	21.75	40.76	1.47	225
2023	5	29	17	22.25	39.09	0.87	225
2023	5	29	18	22.75	36.99	0.97	225
2023	5	29	19	23.38	35.78	1.38	225
2023	5	29	20	24.44	34.87	1.66	225
2023	5	29	21	25.62	34.13	1.78	225
2023	5	29	22	26.75	33.52	1.8	225
2023	5	29	23	28.31	32.87	1.84	225
2023	5	29	24	30.31	31.9	2.04	225
2023	5	30	1	30.44	30.85	2.34	225
2023	5	30	2	28.69	30.08	2.51	225
2023	5	30	3	27.19	29.4	2.59	225
2023	5	30	4	27.5	28.86	2.79	225
2023	5	30	5	27.38	30.02	0.25	225
2023	5	30	6	25.81	32.97	0.2	225

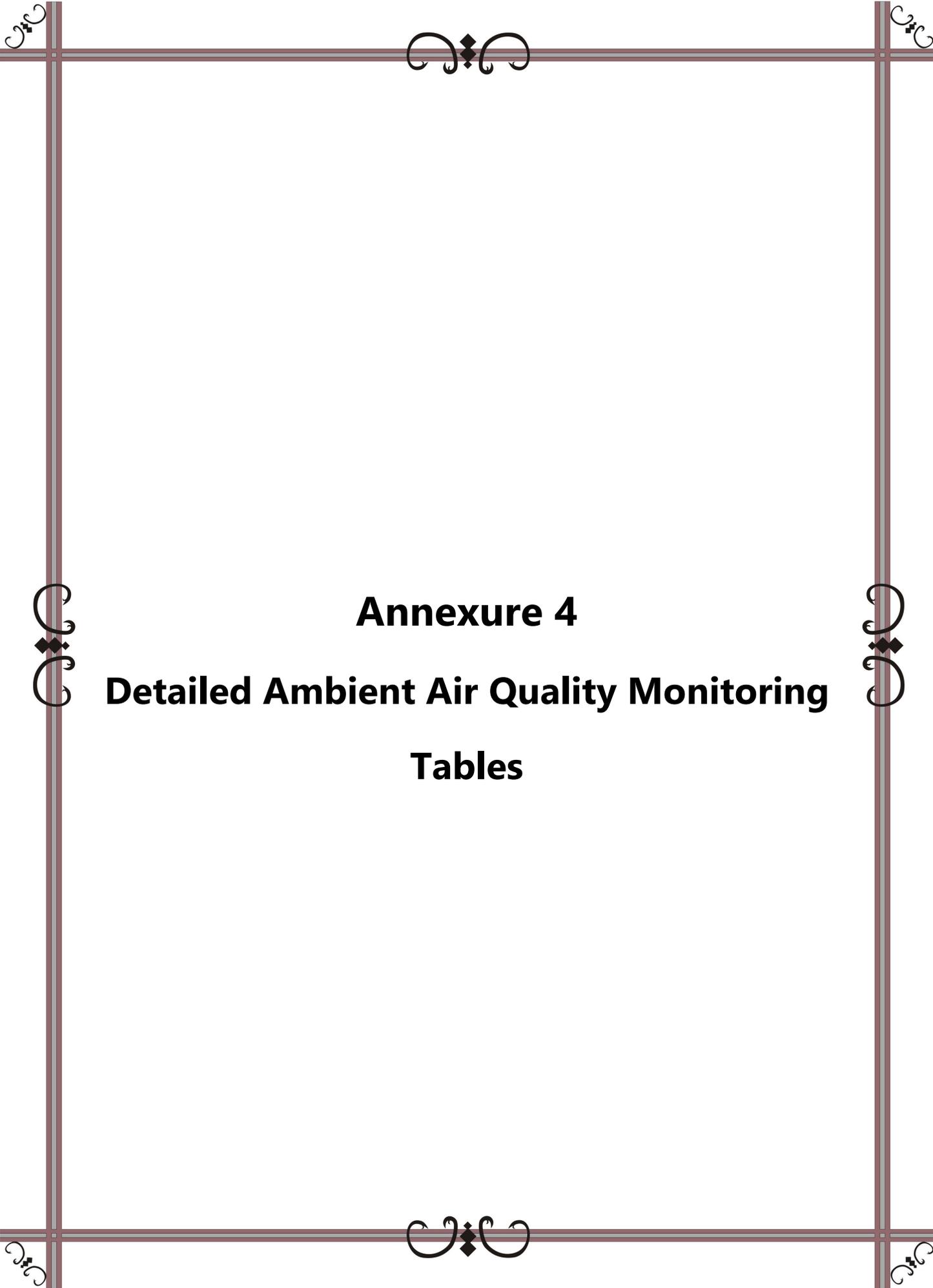
**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 3_ Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	30	7	23.88	36.16	0.2	225
2023	5	30	8	22.5	37.91	0.3	225
2023	5	30	9	21.88	39.16	0.2	225
2023	5	30	10	21.69	40.32	0.2	225
2023	5	30	11	21.81	41.23	0.2	225
2023	5	30	12	22.5	41.8	0.2	225
2023	5	30	13	24	41.95	4.95	225
2023	5	30	14	28.12	41.77	4.78	225
2023	5	30	15	29.69	41.24	4.59	225
2023	5	30	16	30.88	40.29	4.29	225
2023	5	30	17	31.94	38.87	0.25	225
2023	5	30	18	33.06	36.33	2.19	225
2023	5	30	19	34.38	35.32	2.34	225
2023	5	30	20	35.88	34.57	2.47	225
2023	5	30	21	37.38	33.92	2.61	225
2023	5	30	22	38.62	33.29	2.73	225
2023	5	30	23	39.75	32.65	2.81	225
2023	5	30	24	40.88	32	2.83	225
2023	5	31	1	40	31.4	2.81	225
2023	5	31	2	34.44	30.98	2.97	225
2023	5	31	3	25.69	30.54	0.25	225
2023	5	31	4	20.5	30.01	0.25	225
2023	5	31	5	18.06	30.28	0.5	220
2023	5	31	6	16.94	32.21	4.48	230
2023	5	31	7	16.38	35.44	0.2	230
2023	5	31	8	16.12	38.15	0.2	230
2023	5	31	9	16.12	40.12	4.91	230
2023	5	31	10	16.25	41.58	4.64	230
2023	5	31	11	16.31	42.55	4.44	230
2023	5	31	12	16.62	43.2	4.29	230
2023	5	31	13	18.56	43.33	4.12	230
2023	5	31	14	22.25	43.03	0.25	230
2023	5	31	15	22.38	42.59	0.25	230
2023	5	31	16	22.88	41.62	0.25	230
2023	5	31	17	24.25	39.82	2.13	230
2023	5	31	18	25.81	37.61	1.47	230
2023	5	31	19	27.31	37.22	1.18	230
2023	5	31	20	27.94	36.68	0.9	230

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh
Annexure 3_Hourly Meteorological Data

Year	Month	Date	Hour	Relative Humidity (%)	Temperature (°C)	Wind Speed (m/s)	Wind Direction (°)
2023	5	31	21	29.44	35.94	0.7	230
2023	5	31	22	30.62	35.29	0.54	230
2023	5	31	23	31.12	34.65	0.62	230
2023	5	31	24	31.62	33.55	1.11	230



Annexure 4
Detailed Ambient Air Quality Monitoring
Tables

AMBIENT AIR QUALITY

LOCATION S1 : Project site

(Unit $\mu\text{g}/\text{m}^3$)

DATE OF MONITORING	CLOCK HOURS								
	00 – 08		08 – 16		16-24		24 HOURS		
	SO ₂	NO ₂	SO ₂	NO ₂	SO ₂	NO ₂	PM ₁₀	PM _{2.5}	CO(mg/m ³)
01.03.2023	8.5	15.7	7.4	17.7	5.4	19.3	54.3	27.6	BDL (DL-0.50)
02.03.2023	8.4	15.7	8.3	18.7	5.9	19.5	54.2	29.9	
08.03.2023	8.7	18.4	9.6	16.3	6.1	14.5	52.9	26.2	
09.03.2023	6.0	19.2	7.1	18.6	9.0	19.0	54.6	27.9	
15.03.2023	9.5	17.2	8.7	18.2	7.7	15.6	51.3	30.1	
16.03.2023	7.0	16.3	6.3	15.0	8.8	18.3	55.9	27.7	
22.03.2023	7.3	14.7	9.8	16.9	7.8	15.7	53.7	26.4	
23.03.2023	6.0	16.7	8.4	15.9	6.2	16.3	54.6	24.7	
29.03.2023	9.1	19.2	7.4	18.9	7.3	19.0	56.6	27.9	
30.03.2023	5.4	14.0	8.9	14.0	5.5	18.9	56.8	30.5	
05.04.2023	8.4	15.8	7.4	17.8	6.0	15.2	54.4	29.0	
06.04.2023	8.9	16.4	7.1	17.2	9.7	14.6	54.7	24.1	
12.04.2023	8.2	19.1	8.1	16.3	6.0	16.5	52.6	29.1	
13.04.2023	8.0	16.6	9.9	19.4	9.9	19.5	55.4	28.0	
19.04.2023	8.4	18.9	6.4	18.7	7.6	17.1	55.3	30.0	
20.04.2023	5.6	16.1	9.5	14.9	7.4	15.8	55.7	25.8	
26.04.2023	5.4	18.0	6.7	19.6	5.3	13.9	54.6	29.2	
27.04.2023	8.8	18.1	10.0	15.4	6.7	18.4	59.2	25.4	
03.05.2023	7.4	18.4	9.4	16.8	5.2	15.5	55.1	24.0	
04.05.2023	7.2	18.5	7.6	18.4	8.6	19.4	53.6	26.0	
10.05.2023	8.7	18.7	9.8	19.1	5.9	15.2	57.0	26.9	
11.05.2023	9.6	16.5	8.4	15.9	7.7	16.3	58.0	23.8	
17.05.2023	8.3	17.5	5.9	19.0	8.7	19.2	58.1	26.3	
18.05.2023	9.8	14.7	6.2	16.5	7.4	14.5	57.1	28.4	
24.05.2023	7.1	14.2	10.1	14.3	8.0	17.8	56.1	28.4	
25.05.2023	7.3	17.3	7.6	17.6	7.5	16.9	55.4	24.0	

	NO ₂	SO ₂	PM 10	PM 2.5	CO
Max.	19.6	10.1	59.2	30.5	BDL (DL-0.50)
Min.	13.9	5.2	51.3	23.8	
Avg.	17.1	7.7	55.3	27.2	
98% tile	19.5	10.0	58.7	30.3	

AMBIENT AIR QUALITY

LOCATION S2 : Village Bargaon

(Unit $\mu\text{g}/\text{m}^3$)

DATE OF MONITORING	CLOCK HOURS								
	00 – 08		08 – 16		16-24		24 HOURS		
	SO ₂	NO ₂	SO ₂	NO ₂	SO ₂	NO ₂	PM ₁₀	PM _{2.5}	CO (mg/m^3)
01.03.2023	9.2	17.8	7.2	20.3	8.6	16.9	58.7	29.3	BDL (DL-0.50)
02.03.2023	6.1	19.9	9.0	16.2	8.1	17.8	62.0	30.2	
08.03.2023	8.0	17.5	7.1	16.7	9.6	14.6	63.8	34.6	
09.03.2023	7.5	16.7	6.9	18.0	10.0	19.9	61.8	29.7	
15.03.2023	11.0	19.8	9.1	17.8	10.3	16.4	64.0	35.6	
16.03.2023	9.1	18.5	10.8	17.4	10.8	19.0	57.9	35.1	
22.03.2023	11.3	17.9	9.2	18.8	7.9	15.8	62.5	34.7	
23.03.2023	7.2	14.3	9.3	19.3	10.9	16.2	61.4	29.8	
29.03.2023	6.4	17.8	9.2	19.7	10.5	16.7	58.3	30.5	
30.03.2023	7.3	15.4	7.7	19.3	11.3	16.8	62.5	33.5	
05.04.2023	8.5	18.4	8.6	19.0	8.8	18.0	64.4	28.8	
06.04.2023	8.9	15.9	10.1	15.3	9.2	19.8	61.6	29.9	
12.04.2023	9.3	17.6	11.7	18.6	10.1	14.9	63.1	28.1	
13.04.2023	8.9	17.5	6.5	19.1	6.7	17.0	57.7	32.0	
19.04.2023	6.5	15.7	6.3	17.8	9.9	16.0	64.1	35.3	
20.04.2023	6.4	19.8	11.2	17.3	8.7	15.0	63.9	29.6	
26.04.2023	7.7	18.4	9.3	16.0	6.8	19.0	62.5	29.6	
27.04.2023	8.4	15.3	8.9	20.1	7.3	17.0	58.8	35.8	
03.05.2023	7.3	15.5	7.3	15.6	10.1	16.5	59.5	33.4	
04.05.2023	9.5	15.9	9.8	14.9	8.4	15.5	63.5	35.0	
10.05.2023	7.6	16.5	6.3	15.2	8.6	18.6	61.8	30.3	
11.05.2023	7.8	19.2	10.7	19.5	8.6	16.6	64.9	34.4	
17.05.2023	8.7	17.7	10.1	16.7	11.0	17.6	61.0	31.8	
18.05.2023	8.1	17.8	11.5	19.6	8.5	19.6	58.6	28.6	
24.05.2023	8.4	16.9	9.8	18.4	11.0	18.1	61.6	33.2	
25.05.2023	7.1	16.3	6.4	18.7	10.5	16.4	61.0	30.8	

	NO ₂	SO ₂	PM 10	PM 2.5	CO
Max.	20.3	11.7	64.9	35.8	BDL (DL-0.50)
Min.	14.3	6.1	57.7	28.1	
Avg.	17.5	8.8	61.6	31.9	
98% tile	20.0	11.4	64.7	35.7	

AMBIENT AIR QUALITY

LOCATION S3 :0.5 km from the project site

(Unit µg/m³)

DATE OF MONITORING	CLOCK HOURS								
	00 – 08		08 – 16		16-24		24 HOURS		
	SO ₂	NO ₂	SO ₂	NO ₂	SO ₂	NO ₂	PM ₁₀	PM _{2.5}	CO(mg/m ³)
01.03.2023	5.9	16.7	5.8	14.3	8.5	14.6	56.8	30.8	BDL (DL-0.50)
02.03.2023	9.6	14.9	6.0	18.0	6.4	16.1	55.1	29.2	
08.03.2023	6.4	14.0	9.8	19.0	7.2	15.1	53.3	22.9	
09.03.2023	9.9	15.9	9.8	16.5	7.0	19.1	57.8	30.0	
15.03.2023	8.7	16.2	10.5	17.2	9.4	16.2	54.6	26.1	
16.03.2023	6.4	13.8	7.2	16.0	10.1	14.0	54.0	31.4	
22.03.2023	8.5	17.9	6.7	13.8	8.0	18.7	52.4	29.3	
23.03.2023	10.9	19.1	7.1	14.2	9.4	16.7	56.6	30.2	
29.03.2023	7.2	18.1	8.0	18.6	7.7	16.3	55.9	24.9	
30.03.2023	8.4	18.6	7.7	16.8	6.9	15.5	55.4	27.4	
05.04.2023	8.6	14.7	6.9	19.2	7.5	14.0	59.5	28.7	
06.04.2023	7.6	19.2	8.2	14.0	6.0	15.0	54.4	29.8	
12.04.2023	9.1	14.9	7.4	16.4	6.5	16.6	55.9	32.1	
13.04.2023	7.7	14.2	7.2	18.0	6.4	14.9	56.0	25.1	
19.04.2023	6.7	18.4	8.2	18.2	9.2	19.1	59.6	32.2	
20.04.2023	6.6	18.6	10.4	18.2	6.3	14.2	52.2	29.8	
26.04.2023	9.5	17.6	6.0	16.0	5.7	16.6	59.0	27.1	
27.04.2023	10.2	13.9	7.9	17.1	8.6	15.6	53.2	24.1	
03.05.2023	8.4	18.6	7.9	17.5	9.7	18.7	56.0	26.6	
04.05.2023	7.6	19.0	6.6	18.8	9.6	13.9	53.8	31.6	
10.05.2023	8.8	14.2	5.7	15.8	8.2	13.8	57.3	24.9	
11.05.2023	6.8	16.9	8.9	17.0	9.7	15.8	54.2	26.8	
17.05.2023	9.9	13.7	9.6	18.7	7.4	17.8	56.9	24.8	
18.05.2023	6.8	18.4	10.7	13.9	7.5	16.6	53.7	31.5	
24.05.2023	8.7	14.1	10.8	19.2	8.2	18.9	54.2	27.0	
25.05.2023	5.8	16.9	10.4	14.9	7.9	19.0	61.0	29.2	

	NO ₂	SO ₂	PM 10	PM 2.5	CO
Max.	19.2	10.9	61.0	32.2	BDL (DL-0.50)
Min.	13.7	5.7	52.2	22.9	
Avg.	16.5	8.0	55.7	28.2	
98% tile	20.1	9.6	60.3	32.1	

AMBIENT AIR QUALITY

LOCATION S4 : 2.5 km from the project site

(Unit $\mu\text{g}/\text{m}^3$)

DATE OF MONITORING	CLOCK HOURS								
	00 – 08		08 – 16		16-24		24 HOURS		CO
	SO ₂	NO ₂	SO ₂	NO ₂	SO ₂	NO ₂	PM ₁₀	PM _{2.5}	
03.03.2023	10.0	21.0	9.1	15.0	8.2	14.9	58.3	32.5	
04.03.2023	8.0	17.2	10.5	21.0	11.9	15.7	56.6	31.2	
10.03.2023	8.4	19.7	10.8	16.0	8.7	19.0	54.9	31.5	
11.03.2023	10.7	20.4	11.9	14.6	11.3	14.9	55.4	31.1	
17.03.2023	7.3	21.5	8.8	17.3	9.3	19.6	55.1	29.4	
18.03.2023	8.5	15.9	8.5	21.0	11.3	20.0	56.3	33.5	
24.03.2023	10.2	17.9	7.0	22.1	8.0	19.5	56.0	30.6	
25.03.2023	9.6	17.0	7.6	19.4	10.7	15.0	62.4	29.2	
31.03.2023	7.5	15.1	11.3	21.5	9.8	19.4	58.3	34.3	
01.04.2023	7.2	16.3	10.4	15.4	9.3	15.1	62.4	32.1	
07.04.2023	7.3	21.7	10.1	15.1	11.8	17.0	64.1	32.4	
08.04.2023	9.4	19.5	8.7	17.2	9.3	19.5	60.3	32.2	
14.04.2023	8.5	18.4	10.7	22.1	7.2	21.3	56.7	32.5	
15.04.2023	7.3	15.0	9.8	21.4	11.5	20.6	55.9	34.1	
21.04.2023	8.1	18.9	9.3	20.6	7.1	15.6	53.9	32.2	
22.04.2023	10.3	20.9	12.0	22.2	9.3	20.3	60.6	32.9	
28.04.2023	7.4	20.9	11.3	14.5	9.7	20.2	63.5	34.4	
29.04.2023	7.3	22.1	8.0	22.6	10.3	20.6	57.2	34.0	
05.05.2023	10.4	19.0	8.4	20.7	8.3	17.2	62.1	32.0	
06.05.2023	11.6	16.1	12.2	21.1	10.5	17.5	61.4	33.3	
12.05.2023	10.5	15.3	9.1	15.8	10.5	15.9	58.7	31.4	
13.05.2023	10.4	19.9	12.0	19.2	11.2	21.8	60.6	34.2	
19.05.2023	11.9	21.5	9.6	15.0	8.3	19.0	56.1	33.1	
20.05.2023	12.0	21.8	8.5	14.3	6.4	15.1	56.8	32.9	
26.05.2023	9.3	20.1	8.6	17.3	10.4	17.7	60.6	32.2	
27.05.2023	7.2	16.5	7.0	21.2	11.8	21.2	60.6	34.7	

BDL
(DL-0.50)

	NO ₂	SO ₂	PM 10	PM 2.5	CO
Max.	22.6	12.2	64.1	34.7	BDL (DL-0.50)
Min.	14.3	6.4	53.9	29.2	
Avg.	18.5	9.5	58.6	32.5	
98% tile	22.2	12.0	63.8	34.5	

AMBIENT AIR QUALITY

LOCATION S5 : Village Bhorng

(Unit µg/m³)

DATE OF MONITORING	CLOCK HOURS								
	00 – 08		08 – 16		16-24		24 HOURS		
	SO ₂	NO ₂	SO ₂	NO ₂	SO ₂	NO ₂	PM ₁₀	PM _{2.5}	CO(mg/m ³)
03.03.2023	12.2	20.8	11.1	21.9	12.0	17.4	66.0	31.8	0.74
04.03.2023	8.7	22.4	10.9	16.5	7.8	16.3	62.3	36.8	0.58
10.03.2023	11.4	21.4	9.2	18.5	10.1	19.1	65.1	31.2	0.63
11.03.2023	7.3	15.6	7.0	15.1	9.8	17.4	63.2	33.9	0.56
17.03.2023	8.8	18.4	11.1	15.6	11.7	19.5	67.4	31.7	0.67
18.03.2023	10.2	18.4	8.3	20.9	10.6	22.8	62.3	31.9	0.59
24.03.2023	9.1	17.4	10.0	17.8	10.5	17.7	67.0	33.4	0.70
25.03.2023	7.8	17.8	7.0	19.1	12.2	20.0	61.2	34.0	0.60
31.03.2023	11.7	19.3	7.3	16.0	9.3	22.0	70.6	31.9	0.59
01.04.2023	11.1	17.9	11.0	17.2	9.8	18.7	62.8	38.2	0.76
07.04.2023	11.6	22.5	9.0	23.1	9.2	16.7	67.4	31.0	0.72
08.04.2023	11.8	20.5	7.1	16.2	9.3	17.9	66.4	31.2	0.63
14.04.2023	11.4	17.9	8.6	22.8	7.0	16.2	67.9	35.0	0.57
15.04.2023	9.4	20.5	7.6	15.8	11.2	17.7	63.4	38.0	0.71
21.04.2023	8.0	22.9	9.0	17.1	12.4	17.8	66.2	33.3	0.64
22.04.2023	11.5	14.9	10.2	21.7	9.8	18.5	64.6	35.5	0.58
28.04.2023	11.3	19.2	10.3	19.5	9.9	15.1	67.9	32.0	0.58
29.04.2023	10.7	20.1	10.7	23.0	9.4	19.4	64.4	37.7	0.71
05.05.2023	11.9	21.9	9.9	19.3	9.3	20.1	69.1	33.6	0.60
06.05.2023	12.6	20.2	10.0	17.6	9.7	17.4	65.4	37.8	0.54
12.05.2023	12.3	16.2	8.1	16.4	8.6	18.3	68.6	38.2	0.60
13.05.2023	8.2	17.4	12.0	17.0	10.4	23.3	62.5	30.0	0.63
19.05.2023	10.3	18.2	9.6	15.5	10.4	23.1	68.9	32.1	0.57
20.05.2023	10.6	20.4	7.5	17.1	12.2	14.8	67.6	31.6	0.72
26.05.2023	7.6	19.9	10.7	18.3	11.6	23.0	62.9	39.0	0.66
27.05.2023	9.3	20.5	8.4	21.6	8.3	20.7	68.2	33.1	0.7

	NO ₂	SO ₂	PM 10	PM 2.5	CO
Max.	23.3	12.6	70.6	39.0	0.76
Min.	14.8	7.0	61.2	30.0	0.54
Avg.	18.9	9.9	65.7	34.0	0.64
98%tile	23.1	12.3	69.9	38.6	0.75

AMBIENT AIR QUALITY

LOCATION S6:Nr. Village Barbaspur

(Unit µg/m³)

DATE OF MONITORING	CLOCK HOURS								
	00 – 08		08 – 16		16-24		24 HOURS		
	SO ₂	NO ₂	SO ₂	NO ₂	SO ₂	NO ₂	PM ₁₀	PM _{2.5}	CO(mg/m ³)
03.03.2023	10.2	20.1	7.1	18.2	8.1	22.6	64.4	32.0	BDL (DL-0.50)
04.03.2023	8.4	18.3	12.3	19.0	9.3	16.3	60.5	28.7	
10.03.2023	11.3	23.6	11.1	16.9	10.8	23.6	58.1	29.1	
11.03.2023	10.5	23.7	11.1	22.6	7.1	21.6	60.3	33.8	
17.03.2023	7.9	15.8	6.9	15.7	10.0	16.6	60.0	36.0	
18.03.2023	7.3	19.6	8.6	22.0	9.6	22.7	60.3	34.5	
24.03.2023	10.3	21.5	8.8	15.7	8.5	23.6	63.3	36.1	
25.03.2023	7.4	16.0	12.1	19.3	10.3	19.5	56.5	30.9	
31.03.2023	9.2	23.2	8.1	17.8	12.1	16.2	62.4	36.0	
01.04.2023	8.9	19.8	6.6	16.3	10.8	17.1	56.9	30.2	
07.04.2023	11.1	23.9	9.2	19.5	9.7	19.8	62.5	36.4	
08.04.2023	9.5	23.7	8.3	19.7	8.1	18.6	67.3	36.8	
14.04.2023	7.0	17.4	9.5	19.3	8.7	22.5	58.1	30.2	
15.04.2023	12.3	23.8	11.7	19.1	11.6	22.6	59.2	33.5	
21.04.2023	12.1	17.2	9.1	17.6	8.9	18.0	59.4	31.8	
22.04.2023	10.9	16.2	8.7	18.4	9.4	15.5	65.7	35.6	
28.04.2023	9.1	19.9	10.5	15.9	9.3	15.8	64.8	32.2	
29.04.2023	10.6	21.4	7.9	21.6	8.4	22.7	59.9	29.4	
05.05.2023	11.7	18.0	12.3	16.2	8.4	15.4	57.7	31.2	
06.05.2023	9.7	15.2	9.4	19.2	7.4	23.6	64.4	31.6	
12.05.2023	9.9	20.8	10.9	21.9	9.4	17.3	61.3	29.6	
13.05.2023	7.4	16.1	8.2	23.1	8.9	17.3	65.9	34.6	
19.05.2023	8.9	18.3	8.8	16.2	11.5	18.9	58.5	36.3	
20.05.2023	7.8	19.7	12.0	20.4	11.3	23.1	66.7	29.5	
26.05.2023	12.9	21.2	11.1	21.0	8.2	19.9	64.1	29.9	
27.05.2023	12.0	18.8	9.7	17.1	12.2	21.3	63.2	31.1	

	NO ₂	SO ₂	PM 10	PM 2.5	CO
Max.	23.9	12.9	67.3	36.8	BDL (DL-0.50)
Min.	15.2	6.6	56.5	28.7	
Avg.	19.4	9.6	61.6	32.6	
98%tile	23.8	12.3	67.0	36.6	

AMBIENT AIR QUALITY

LOCATION S7 : Village Achholi

(Unit $\mu\text{g}/\text{m}^3$)

DATE OF MONITORING	CLOCK HOURS								
	00 – 08		08 – 16		16-24		24 HOURS		
	SO ₂	NO ₂	SO ₂	NO ₂	SO ₂	NO ₂	PM ₁₀	PM _{2.5}	CO(mg/m ³)
05.03.2023	7.1	20.1	11.7	20.5	7.4	21.7	61.9	34.3	0.57
06.03.2023	8.4	18.0	7.7	19.2	10.8	19.7	66.4	35.5	0.56
12.03.2023	8.6	20.3	9.8	20.9	6.9	15.2	64.5	28.9	0.69
13.03.2023	9.6	17.8	11.5	22.1	11.3	22.3	66.8	30.5	0.69
19.03.2023	8.5	21.6	10.4	14.8	12.1	20.3	65.4	33.9	0.57
20.03.2023	8.0	20.6	8.4	20.0	9.0	18.6	57.7	37.3	0.66
26.03.2023	6.5	18.9	6.3	19.5	12.7	14.7	57.9	31.8	0.67
27.03.2023	12.3	21.4	12.7	15.1	11.9	20.1	60.9	36.2	0.62
02.04.2023	9.0	15.4	11.0	17.5	6.4	21.8	67.4	35.8	0.72
03.04.2023	12.8	20.4	10.0	15.1	7.6	21.2	68.4	32.3	0.64
09.04.2023	8.9	19.6	9.0	22.9	11.5	19.4	57.4	33.3	0.60
10.04.2023	7.6	22.3	12.6	21.1	6.4	21.4	56.2	35.9	0.58
16.04.2023	7.6	19.2	8.3	19.7	6.7	14.7	58.3	35.8	0.59
17.04.2023	9.5	19.4	11.4	21.7	6.4	21.0	63.0	37.1	0.67
23.04.2023	8.1	17.8	10.5	15.8	8.6	15.3	67.0	38.2	0.64
24.04.2023	10.9	21.0	9.2	16.0	11.7	15.1	62.0	30.8	0.70
30.04.2023	10.7	19.2	12.3	18.3	8.3	19.6	65.1	29.2	0.59
01.05.2023	7.0	23.0	12.1	20.7	11.9	16.1	61.5	33.6	0.59
07.05.2023	11.9	15.5	9.5	21.0	12.0	16.9	66.2	33.6	0.64
08.05.2023	8.3	21.9	7.1	18.5	9.8	17.9	65.5	35.4	0.65
14.05.2023	9.7	15.9	7.3	21.9	11.9	19.0	59.3	34.3	0.67
15.05.2023	7.8	15.4	12.6	19.0	12.5	20.4	58.7	32.0	0.58
21.05.2023	9.9	15.4	12.7	15.2	9.9	19.6	66.0	35.9	0.59
22.05.2023	10.7	17.8	7.2	19.2	10.4	22.5	61.6	33.6	0.59
28.05.2023	12.4	22.0	12.4	22.5	8.6	18.5	60.4	34.4	0.60
29.05.2023	8.0	14.5	7.2	19.1	7.8	23.1	62.2	35.9	0.68

	NO ₂	SO ₂	PM 10	PM 2.5	CO
Max.	23.1	12.8	68.4	38.2	0.72
Min.	14.5	6.3	56.2	28.9	0.56
Avg.	19.1	9.6	62.6	34.1	0.63
98% tile	23.0	12.7	67.9	37.8	0.71

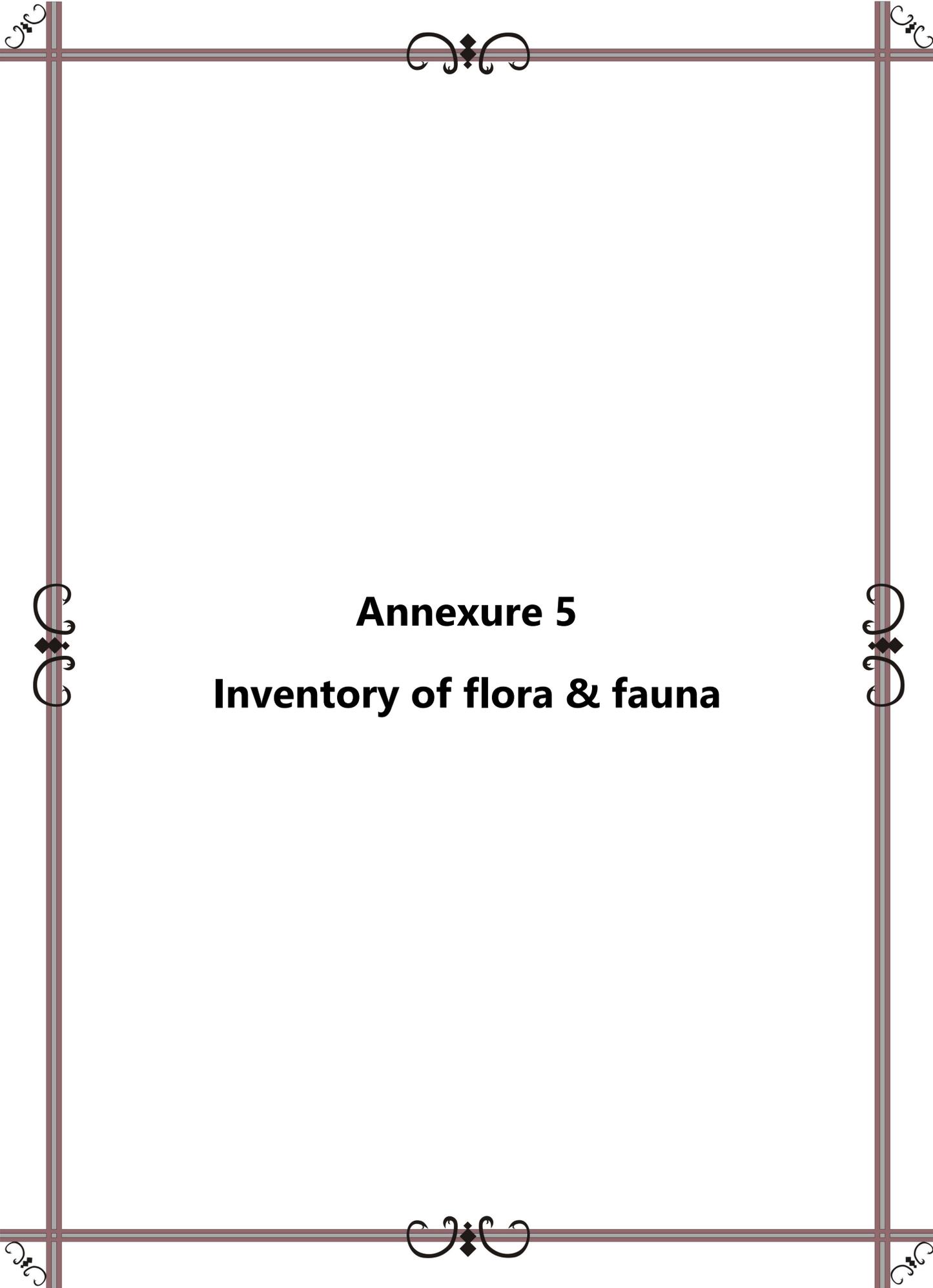
AMBIENT AIR QUALITY

LOCATION S8 : Village Beltukri

(Unit µg/m³)

DATE OF MONITORING	CLOCK HOURS								
	00 – 08		08 – 16		16-24		24 HOURS		
	SO ₂	NO ₂	SO ₂	NO ₂	SO ₂	NO ₂	PM ₁₀	PM _{2.5}	CO(mg/m ³)
05.03.2023	10.8	19.6	11.0	21.4	11.0	20.9	61.3	36.3	0.60
06.03.2023	11.3	16.7	9.3	17.7	7.7	17.7	60.4	36.7	BDL
12.03.2023	10.7	15.6	9.7	19.5	6.1	19.2	59.5	33.4	
13.03.2023	9.4	21.0	7.9	16.7	11.2	17.1	63.4	32.7	0.57
19.03.2023	10.2	19.8	8.1	18.5	8.7	17.7	65.1	32.0	BDL
20.03.2023	7.2	21.0	6.5	21.2	8.2	15.7	62.4	34.0	0.52
26.03.2023	10.7	15.4	7.4	15.6	9.9	19.0	58.1	32.4	BDL
27.03.2023	8.5	20.5	9.3	20.6	9.8	16.8	62.2	32.0	0.59
02.04.2023	8.6	15.5	11.5	15.3	11.3	17.4	59.3	34.7	BDL
03.04.2023	11.6	15.8	11.7	18.6	8.7	17.6	59.9	35.7	
09.04.2023	9.5	18.7	8.9	20.6	11.4	18.6	63.0	30.1	0.60
10.04.2023	7.3	21.0	8.2	20.5	10.1	21.7	63.5	35.8	BDL
16.04.2023	8.8	15.3	8.3	17.9	8.5	19.6	62.6	31.0	
17.04.2023	6.7	21.0	9.9	20.1	11.0	16.5	56.4	33.5	0.58
23.04.2023	10.4	16.8	7.9	17.3	6.0	16.2	61.2	30.9	0.59
24.04.2023	6.2	21.1	11.1	18.5	9.7	16.3	61.9	34.1	0.60
30.04.2023	7.2	15.5	7.1	15.1	8.8	19.5	62.4	29.8	0.52
01.05.2023	9.3	17.1	10.8	16.9	10.3	18.6	63.7	34.7	BDL
07.05.2023	7.6	16.8	7.5	16.2	10.6	16.5	63.3	34.2	0.53
08.05.2023	8.7	17.8	8.6	15.6	10.6	14.6	62.1	37.5	0.59
14.05.2023	6.8	21.2	9.2	16.3	9.3	16.9	62.7	36.4	BDL
15.05.2023	11.6	19.3	8.2	20.7	9.8	18.7	63.7	32.1	0.55
21.05.2023	6.9	18.2	9.0	16.1	6.4	19.4	64.8	32.5	BDL
22.05.2023	8.9	16.5	10.9	16.4	7.1	21.9	58.3	33.1	0.63
28.05.2023	10.8	20.8	6.6	18.6	6.1	15.9	60.4	32.2	0.52
29.05.2023	10.8	17.7	9.3	17.3	6.7	16.6	65.8	34.7	BDL

	NO ₂	SO ₂	PM 10	PM 2.5	CO
Max.	21.9	11.7	65.8	37.5	0.63
Min.	14.6	6.0	56.4	29.8	BDL (DL-0.50)
Avg.	18.1	9.0	61.8	33.6	0.51
98% tile	21.5	11.6	65.5	37.1	0.62

A decorative border in a dark brown color frames the page. It consists of four horizontal and vertical lines. At each of the four corners, there is a small floral motif. In the center of each side of the border, there is a larger, more intricate floral motif.

Annexure 5
Inventory of flora & fauna

Inventorization of Flora and Fauna

List of flora observed in the study area as well as core zone is as mentioned in the list given below:

INVENTORYOFFLORAL DIVERSITY INCORE&BUFFER ZONEOF THEPLANTSITE

Based on Actual Sighting, inputs from local sand Secondary Data

Habitat: Tree (T), Shrub (S),Herb(H), Grass(G), Climber(C)and Aquatic (Aq.)

S. No.	Scientific name	Common name	Family	IUCN
1.	<i>Acalyphawilkesiana</i>	Copperleaf	Euphorbiaceae	Not listed
2.	<i>Achyranthesaspera</i>	Apamarga	Amaranthaceae	Not listed
3.	<i>Aervajavanica</i>	Desertcotton	Amaranthaceae	LC
4.	<i>Ageratumconyzoides</i>	Goatweed	Asteraceae	LC
5.	<i>Albizialebeck</i>	Siris	Mimosaceae	LC
6.	<i>Alysicarpus vaginalis</i>	AlyceClover	Fabaceae	Not listed
7.	<i>Amaranthusspinosus</i>	SpinyAmaranth	Amaranthaceae	Not listed
8.	<i>Amaranthusviridis</i>	SlenderAmaranth	Amaranthaceae	Not listed
9.	<i>Barleriarepens</i>	Red barleria	Acanthaceae	Not listed
10.	<i>Blepharismolluginifolia</i>	Creepingblepharis	Acanthaceae	Not listed
11.	<i>Carissa carandas</i>	Kakronda	Asteraceae	Not listed
12.	<i>Buteamonosperma</i>	Palas	Fabaceae	LC
13.	<i>Calotropisgigantea</i>	CrownFlower	Asclepiadaceae	Not listed
14.	<i>Calotropisprocera</i>	Apple of Sodom	Asclepiadaceae	LC
15.	<i>ChlorisbarbataCyperales</i>	Swollenfingergrass	Poaceae	Not listed
16.	<i>Eupatorium odoratum</i>	Siamweed	Asteraceae	Not listed
17.	<i>Chrysopogonfulvus</i>	Guriagrass	Poaceae	Not listed
18.	<i>Crotalariaverrucosa</i>	Blue rattlepod	Fabaceae	Not listed
19.	<i>Crotonbonplandianum</i>	Bantulsi	Euphorbiaceae	Not listed
20.	<i>Cynodondactylon</i>	Turf gaddi	Poaceae	Not listed
21.	<i>Cyperusrotundus</i>	Nutgrass	Cyperaceae	LC
22.	<i>Dactylocteniumaegyptium</i>	Crow footgrass	Poaceae	Not listed
23.	<i>Dichanthiumannulatum</i>	Marvelgrass	Poaceae	Not listed
24.	<i>Ecliptaprostrata</i>	Mayweed	Asteraceae	Not listed
25.	<i>Emiliasonchifolia</i>	RedTasselflower	Asteraceae	Not listed
26.	<i>Eragrostis amabilis</i>	Featherylovegrass	Poaceae	Not listed
27.	<i>Conyza bonariensis</i>	Flaxleaffleabean	Asteraceae	Not listed
28.	<i>Euphorbiahirta</i>	Asthmaweed	Euphorbiaceae	Not listed
29.	<i>Euphorbia hirta L.</i>	Hairyspurge	Euphorbiaceae	Not listed
30.	<i>Evolvulusalsinoides</i>	DwarfMorningglory	Convolvulaceae	Not listed
31.	<i>Gomphrenaglobosa</i>	GlobeAmaranth	Amaranthaceae	Not listed
32.	<i>Mentha spicata</i>	Bushmint	Lamiaceae	Not listed
33.	<i>Indigofera linnaei</i>	Birdsvilleindigo	Fabaceae	Not listed

34.	<i>Ipomoeacarnea</i>	Besharam/ Bushmorning glory	Convolvulaceae	Not listed
35.	<i>Indigoferalinifolia</i>	Narrowleaf Indigo	Fabaceae	LC
36.	<i>Indigoferaprostrata</i>	ProstrateIndigo	Fabaceae	Not listed
37.	<i>Iseilemaprostratum</i>	Musalgrass	Poaceae	Not listed
38.	<i>Justicia americana</i>	Water Willow	Acanthaceae	LC
39.	<i>Lecucaenaleucocephala</i>	Subabul	Mimosaceae	Not listed
40.	<i>Merremiaganetica</i>	Kidneyleafmorningglory	Convolvulaceae	LC
41.	<i>Ocimumbasilicum</i>	SweetBasil	Lamiaceae	Not listed
42.	<i>Oldenlandiacorymbosa</i>	Diamondflower	Rubiaceae	Not listed
43.	<i>Oldenlandiaumbellata</i>	Choyroot	Rubiaceae	Not listed
44.	<i>Oryzasativa</i>	Paddy	Poaceae	Not listed
45.	<i>Partheniumhysterophorus</i>	Congressgrass	Asteraceae	Not listed
46.	<i>Phoenixsylvestris</i>	Wild datePalm	Arecaceae	Not listed
47.	<i>Prosopis cineraria</i>	Kejdi	Mimosaceae	Not listed
48.	<i>Tectonagrandis</i>	Teak	Verbenaceae	EN
49.	<i>Tephrosia cinerea</i>	CreepingTephrosia	Fabaceae	Not listed
50.	<i>Tephrosiapurpurea</i>	CommonTephrosia	Fabaceae	Not listed
51.	<i>Tridaxprocumbens</i>	Coatbuttons	Asteraceae	Not listed
52.	<i>Ziziphusnummularia</i>	Ber	Rhamnaceae	LC

Source: Field Survey

Note: Categories as per IUCN Red List refers Data Deficient (DD), Least Concern (LC), Near Threatened (NT), Vulnerable(VU), Endangered (EN), Critically Endangered (CR), Extinct in the Wild (EW) & Extinct (EX), Not Evaluated (NE).

Status of RET Species

According to Botanical Survey of India, no Endemic, Rare, Endangered and Threatened (RET) species of flora were found in the study area.

List of flora in study area

S. No.	Scientific name	Common/local name	Family
1.	<i>Abrusprecatorius</i>	Gumachi/ gunj/ ratthi	Fabaceae
2.	<i>Mimosa hamata</i>	Chilati	Mimosaceae
3.	<i>Senegalia catechu</i>	Khair	Mimosaceae
4.	<i>Vachellianilotica</i>	Babul	Mimosaceae
5.	<i>Acaciaconcinna</i>	Sheekakai	Mimosaceae
6.	<i>Aeglemarmelos</i>	Bel	Rutaceae
7.	<i>Ailanthusexcelsa</i>	Mahaneem/Maharukh	Simaroubaceae
8.	<i>Alangiumsalvifolium</i>	Akol	Cornaceae
9.	<i>Albizia lebbeck</i>	Kala Siris	Mimosaceae
10.	<i>Albizia procera</i>	Safed Siris	Mimosacea

11.	<i>Albizia odoratissima</i>	Chichwa	Mimosaceae
12.	<i>Alstoniascholaris</i>	Saptaparni	Apocynaceae
13.	<i>Anogeissus pendula</i>	Dhok / Dhonk	Combretaceae
14.	<i>Annona reticulata</i>	Ramphal	Annonaceae
15.	<i>Annona squamosa</i>	Seetaphal, sareefa	Annonaceae
16.	<i>Anogeissus acuminata</i>	Pasi	Combretaceae
17.	<i>Anogeissus latifolia</i>	Dhavada / Dhaora	Combretaceae
18.	<i>Anthocephaluscadamba</i>	Cadamb	Rubiaceae
19.	<i>Antidesmadiandrum</i>	Khatuaa / katama	Euphorbiaceae
20.	<i>Araucaria aracauna</i>	Monkey's puzzle	Araucariaceae
21.	<i>Asparagus racemosus</i>	Satavar/ dasmur	Liliaceae
22.	<i>Azadirachta Indica</i>	Neem	Meliaceae
23.	<i>Balanites aegyptiaca</i>	Hingate / hinghan	Simaroubaceae
24.	<i>Bauhinia malabarica</i>	Amata	Caesalpiniaceae
25.	<i>Bauhinia purpurea</i>	Ke-olar	Caesalpiniaceae
26.	<i>Bauhinia racemosa</i>	Asta/ Astara / Bosaa	Caesalpiniaceae
27.	<i>Bauhinia vahlii</i>	Mahul	Caesalpiniaceae
28.	<i>Bauhinia variegata</i>	Kachanar	Caesalpiniaceae
29.	<i>Boswellia serrata</i>	Salai	Burseraceae
30.	<i>Bougainvillea spectabilis</i>	Bougainvillea	Nyctaginaceae
31.	<i>Bridelia retusa</i>	Kasai / saaja	Euphorbiaceae
32.	<i>Buchanania lanzan</i>	Achar /Char	Anacardiaceae
33.	<i>Butea monosperma</i>	Palas	Fabaceae
34.	<i>Butea superba</i>	Palasbel	Fabaceae
35.	<i>Careya arborea</i>	Kumbhi	Myrtaceae
36.	<i>Carissa spinarum</i>	Karonda	Apocynaceae
37.	<i>Casearia graveolens</i>	Safed karai / Chilla	Salicaceae
38.	<i>Casearia tomentosa</i>	Tondi / Leaf Chilla	Salicaceae
39.	<i>Cassia fistula</i>	Amaltas	Caesalpiniaceae
40.	<i>Cassia siamea</i>	Siamese Cassia	Caesalpiniaceae
41.	<i>Celastruspaniculata</i>	Maalakhamgani	Celastraceae
42.	<i>Chamaedorea elegans</i>	Bamboo palm	Arecaceae
43.	<i>Chloroxylon swietenia</i>	Bhirra / Ceylon Satin Wood	Rutaceae
44.	<i>Cissus quadrangularis</i>	Hadjodi	Vitaceae
45.	<i>Cissus repanda</i>	Pani bel / Dokarbe	Vitaceae
46.	<i>Cleistanthuscollinus</i>	Garari / Karra	Euphorbiaceae
47.	<i>Clematis triloba</i>	Morbel / Murhar	Ranunculaceae
48.	<i>Cochlospermumreligiosum</i>	Galgal	Bixaceae
49.	<i>Cordia sebestena</i>	Lasora	Boroginaceae
50.	<i>Colebrookiaoppositifolia</i>	Kalabansa	Lamiaceae

51.	<i>Combretum decandrum</i>	Pivar bel	Combretaceae
52.	<i>Scientific name</i>	Common / local name	Family
53.	<i>Cordia macleodii</i>	Dahivas	Boraginaceae
54.	<i>Cryptolepisbuchanani</i>	Karbel / nagabel	Asclepiadaceae
55.	<i>Dalbergia latifolia</i>	Seesam	Fabaceae
56.	<i>Dalbergia paniculata</i>	Dhobin	Fabaceae
57.	<i>Dalberig sissoo</i>	Shisham	Fabaceae
58.	<i>Dodonaeviscosa</i>	Karantha / Sanatta	Sapindaceae
59.	<i>Dendrocalamusstrictus</i>	Bamboo / Bans	Poaceae
60.	<i>Desmodiumpulchellum</i>	Chipti / Jatsalpan	Fabaceae
61.	<i>Dilleniapentagyna</i>	Kalla / Karmal	Dilleniaceae
62.	<i>Dioscoreabulbifera</i>	Kadhadhu/ kanda	Dioscoreaceae
63.	<i>Diospyros melanoxylon</i>	Thendu	Ebenaceae
64.	<i>Dolichandrone falcata</i>	Medsing	Bignoniaceae
65.	<i>Durantaerecta</i>	Golden Dew drops	Verbenaceae
66.	<i>Elaeodendron glaucum</i>	Lamarasi/ arn	Celastraceae
67.	<i>Erythrina suberosa</i>	Panjara / gadhapalas	Fabaceae
68.	<i>Eugenia heyneana</i>	Katjamun	Myrtaceae
69.	<i>Euphorbia neriifolia</i>	Ghur	Euphorbiaceae
70.	<i>Euphorbia tirucalli</i>	Thuar	Euphorbiaceae
71.	<i>Limoniaacidissima</i>	Kaith	Rutaceae
72.	<i>Ficus benghalensis</i>	Bud / Banyan	Moraceae
73.	<i>Ficus benjamina</i>	Weeping Fig	Moraceae
74.	<i>Ficus glomerata</i>	Gular	Moraceae
75.	<i>Ficus racemosa</i>	Cluster Fig / Gular	Moraceae
76.	<i>Ficus religiosa</i>	Peepal	Moraceae
77.	<i>Flacourtia indica</i>	Kakayi / gorghati	Salicaceae
78.	<i>Flacourtiaramontchi</i>	Kakai / Bilangada	Salicaceae
79.	<i>Flemingiasemialata</i>	Ban rahar / Bara Solpan	Fabaceae
80.	<i>Gardenia latifolia</i>	Papra	Rubiaceae
81.	<i>Gardenia resinifera</i>	Dikamali	Rubiaceae
82.	<i>Gardenia turgida</i>	Pheda / kharhar	Rubiaceae
83.	<i>Garuga pinnata</i>	Kekad / kekar	Burseraceae
84.	<i>Gmelima arborea</i>	Khamer / Gamari	Verbenaceae
85.	<i>Grevillea robusta</i>	Silver Oak	Proteaceae
86.	<i>Grewia hirsuta</i>	Gurasukadi	Tiliaceae
87.	<i>Grewia asiatica</i>	Phalsa	Tiliaceae
88.	<i>Grewia tilliifolia</i>	Dhaman	Tiliaceae
89.	<i>Haldina cordifolia</i>	Haldu	Rubiaceae
90.	<i>Hardwickiabinata</i>	Anjan	Caesalpiaceae

91.	<i>Helicteresisora</i>	Marorphali	Sterculiaceae
92.	<i>Hemidesmus indicus</i>	Anantamul	Asclepiadaceae
93.	<i>Holarrhenaantidysenterica</i>	Karchi /Dhudhi	Apocynaceae
94.	<i>Hymenodictyonexcelsum</i>	Bhamvarsaal / bormal	Rubiaceae
95.	<i>Ixora parviflora</i>	Lokhandi	Rubiaceae
96.	<i>Jasminum arborescens</i>	Chameli	Oleaceae
97.	Scientific name	Common / local name	Family
98.	<i>Kydiacalycina</i>	Poola / barang	Malvaceae
99.	<i>Lagerstroemia parviflora</i>	Senha / lendiya	Lythraceae
100.	<i>Lanneacoromandelica</i>	Gunga / Mohin	Anacardiaceae
101.	<i>Lantana camara</i>	Raimunia	Verbenaceae
102.	<i>Lawsoniainermis</i>	Henna	Lythraceae
103.	<i>Leucaena leucocephala</i>	Subabul	Mimosaceae
104.	<i>Litseaglutinosa</i>	Medh / Chandna	Lauraceae
105.	<i>Madhuca indica</i>	Mahua	Sapotaceae
106.	<i>Mangifera indica</i>	Aam / Mango	Anacardiaceae
107.	<i>Maytenusemarginata</i>	Red spike thorn	Celastraceae
108.	<i>Miliusa tomentosa</i>	Kaari / Hoom	Annonaceae
109.	<i>Miliusavelutina</i>	Choparchilla / domsal	Annonaceae
110.	<i>Millettia auriculata</i>	Gurar / gaaj	Fabaceae
111.	<i>Mimusopselengi</i>	Ponna / Khirani	Sapotaceae
112.	<i>Mimusopsheaxandra</i>	Khirani	Sapotceae
113.	<i>Mitragyna parviflora</i>	Kem / mundi	Ruviaceae
114.	<i>Mucuna pruriens</i>	Kewanch	Fabaceae
115.	<i>Murraya exotica</i>	Madukamani	Rutaceae
116.	<i>Murrayapaniculata</i>	Madhukamani	Rutaceae
117.	<i>Musa sapientum</i>	Kela	Musaceae
118.	<i>Nerium odorum</i>	Oleander	Apocynaceae
119.	<i>Nyctanthusarbortristis</i>	Harsingar	Oleaceae
120.	<i>Ougeiniaoojeinensis</i>	Tinsa / Sandan	Fabaceae
121.	<i>Peltaphorumpterocarpum</i>	Copper pod	Caesalpinaceae
122.	<i>Phoenix acaulis</i>	Kuchachinda	Arecaceae
123.	<i>Phyllanthus emblica</i>	Amla / Aamvala	Phyllanthaceae
124.	<i>Polyalthia longifolia</i>	Ashok	Annonaceae
125.	<i>Pongamia pinnata</i>	Karanj / karanji	Fabaceae
126.	<i>Pterospermumacerifolium</i>	Kanak Champa	Sterculiaceae
127.	<i>Randiadumatorium</i>	Mainphal	Rubiaceae
128.	<i>Randiauliuginosa</i>	Katul	Rubiaceae
129.	<i>Roystonea regia</i>	Royal Palm	Arecaceae
130.	<i>Salmaliamalabarica</i>	Semal	Malvaceae

131.	<i>Samanea saman</i>	Rain Tree	Mimosaceae
132.	<i>Embeliarobusta</i>	Baibirang	Primulaceae
133.	<i>Schleicheraoleosa</i>	Kusum	Sapindaceae
134.	<i>Schreberaswietenioides</i>	Mhoka / Banpalas	Oleaceae
135.	<i>Semecarpus anacardium</i>	Bhilwa / Marking nut	Anacardiaceae
136.	<i>Shorearobusta</i>	Saal	Depterocarpaceae
137.	<i>Smilax macrophylla</i>	Ramadataun	Liliaceae
138.	<i>Soymidafebrifuga</i>	Rohan / rohani	Meliaceae
139.	<i>Spoidias pinnata</i>	Amera	Anacardiaceae
140.	<i>Sterculia urens</i>	Kullu	Streculiceae
141.	<i>Stereopermumpersonatum</i>	Padar / Paral	Bignoniaceae
142.	<i>Syzygiumcumini</i>	Jamun	Myrtaceae
143.	<i>Scientific name</i>	Common / local name	Family
144.	<i>Tabernaemontanadivaricata</i>	Chandri	Apocynaceae
145.	<i>Tamarindus indica</i>	Imali	Leguminosae
146.	<i>Tectona grandis</i>	Sagaun / saaga / Teak	Verbenaceae
147.	<i>Terminalia arjuna</i>	Arjun	Combretaceae
148.	<i>Terminalia arjuna</i>	Arjun / kahu/ koha	Combretaceae
149.	<i>Terminalia bellerica</i>	Baheda	Combretaceae
150.	<i>Terminalia catappa</i>	Almond	Combretaceae
151.	<i>Terminalia chebula</i>	Harra	Combretaceae
152.	<i>Terminalia tomentosa</i>	Saaja	Combretaceae
153.	<i>Thespeciapopulnea</i>	Portia tree	Malvaceae
154.	<i>Thuja occidentalis</i>	Thuja	Cupressaceae
155.	<i>Ventilagocalyculata</i>	Kevati	Rhamnaceae
156.	<i>Ventilagomadraspataana</i>	Khairabel / kaalibel	Rhamnaceae
157.	<i>Vitex negundo</i>	Nirgudi	Verbenaceae
158.	<i>Vitex trifoliata</i>	Nirgudi	Verbenaceae
159.	<i>Wendlandiaexserta</i>	Tilwah	Rubiaceae
160.	<i>Woodfordiafruticosa</i>	Dhawai	Lytharaceae
161.	<i>Wrightia tinctoria</i>	Dhudhi	Apocynaceae
162.	<i>Ziziphus oenoplia</i>	Makkay / Wild Jujube	Rhamanaceae
163.	<i>Ziziphus mauritiana</i>	Ber, bor	Rhamnaceae
164.	<i>Ziziphus rugosa</i>	Irni, churani	Rhamanaceae
165.	<i>Ziziphus xylopyrus</i>	Ghont / Ghoti	Rhamanaceae

INVENTORY OF FAUNAL DIVERSITY IN CORE & BUFFER ZONE OF PLANT SITE

Based on Field Survey, based on inputs from locals and Perused from Secondary Data

Scientific Name	Common name	Status According to IWPA- 1972	IUCN Status
<i>Bandicootabengalensis</i>	Lesserbandicoot	NA	LC
<i>Bandicotaindica</i>	GreaterBandicoot	NA	LC
<i>Cynopterusphinx</i>	ShortnosedFruitBat	NA	LC
<i>Funambuluspalmarum</i>	ThreestripedSquirrel	NA	NT
<i>Lepusnigricollis</i>	CommonIndianHare	Sch II	LC
<i>Macacamulatta</i>	Rhesusmacaque	NA	LC
<i>Semnopithecusentellus</i>	Commonlangur	Sch II	LC
<i>Rattusrattus</i>	Rat	NA	LC
<i>Suncusmurinus</i>	Asianmuskshrew	NA	LC
<i>Susscrofa</i>	Wildpig	Sch II	LC
<i>Vulpesbengalensis</i>	Indianfox	Sch IV	LC
Reptiles			
<i>Oxybelisfulgidus</i>	Greenvinesnake	NA	LC
<i>Amphiesmastolatatum</i>	Buffstripedkeelback	NA	LC
<i>Bungaruscaeruleus</i>	CommonIndianKrait	NA	LC
<i>Calotesversicolor</i>	Gardenlizard	NA	LC
<i>Cnemaspisindica</i>	IndianDayGecko	NA	VU
<i>Dendrelaphistrictis</i>	TreeSnake	NA	LC
<i>Echiscarinatus</i>	Saw scaledviper	Sch II	LC
<i>Eutropiscarinata</i>	Indaingrass Skink	NA	LC
<i>Lampropholisguichenoti</i>	Commonskink	NA	LC
<i>Hemidactylusflaviviridis</i>	Indianwalllizard	NA	LC
<i>Cynopterus sphinx</i>	Short nosed Fruit Bat	NA	LC
<i>Funambulus palmarum</i>	Three striped Squirrel	NA	LC
<i>Macaca mulatta</i>	Rhesus macaque	NA	LC
<i>Rattus rattus</i>	Rat	NA	LC
<i>Suncus murinus</i>	Asian musk shrew	NA	LC
<i>Vulpes bengalensis</i>	Indian fox	Sch IV	LC
<i>Hemidactylusleschenaultii</i>	Marbledtreegecko	NA	LC
<i>Lycodon</i>	Wolf snake	NA	LC
<i>Typhlopidae</i>	GiantBlindSnake	Sch II	LC
<i>Typhlopidae</i>	SlenderBlindSnake	Sch II	LC
Amphibians			
<i>Duttaphrynusmelanostictus</i>	CommonIndianToad	NA	LC
<i>Hoplobatrachustigerinus</i>	TigerFrog	Sch IV	LC
<i>Polypedatesmaculatus</i>	TreeFrog	Sch IV	LC

<i>Euphlyctishexadactylus</i>	GreenPondFrog	Sch IV	LC
<i>Acridotheres tristis</i>	Common myna	Sch II	LC
<i>Aegithinia tiphia</i>	Common Iora	NA	LC
<i>Alcedoatthis</i>	Common kingfisher	Sch II	LC
<i>Ardeola</i>	Pond heron	NA	LC
<i>Apus nipalensis</i>	Nepal House swifts	Sch II	LC
<i>Bubo bengalensis</i>	Great horned Owl	NA	LC
<i>Bubulcus ibis</i>	Cattle Egret	Sch II	LC
<i>Caprimulgus asiaticus</i>	Indian Nightjar	Sch II	LC
<i>Cerylerudis</i>	Lesser pied Kingfisher	Sch II	LC
<i>Columba livia</i>	Blue rock pigeon / Kabotar	NA	LC
<i>Coracias benghalensis</i>	Nilkanth / Indian Roller	Sch II	LC
<i>Corvus splendens</i>	House crow	NA	LC
<i>Dendrocittavagabunda</i>	Indian tree pie	NA	LC
<i>Dendrocopusmarhatensi</i>	Maratha Woodpecker	NA	LC
<i>Dicrurusmacrocercus</i>	Black drongo	NA	LC
<i>Egrettazarzetta</i>	Little egret	Sch II	LC
<i>Eudyanamysclopaeus</i>	Asian Koel	Sch II	LC
<i>Francolinus Pictus</i>	Painted Francolin / Teetar	Sch II	LC
<i>Ortygornisponcierianus</i>	Grey Francolin/ SafedTeetar	Sch II	LC
<i>Gallus gallus</i>	Red jungle fowl / Murgijungli	Sch II	LC
<i>Gallus sonneratii</i>	Grey jungli fowl / Murgijungli	Sch IV	LC
<i>Halcyon smyrnensis</i>	White-Throated King fisher	Sch II	LC
<i>Hierococyxvarius</i>	Common hawk-cuckoo	NA	LC
<i>Meropsorientalis</i>	Little Green Bee Eater	NA	LC
<i>Milvus migrans</i>	Black Kite	Sch II	LC
<i>Motacilla alba</i>	White wagtail	Sch II	LC
<i>Oriolusoriolus</i>	Golden Oriole	NA	LC
<i>Passer domesticus</i>	House sparrow	Sch II	LC
<i>Phalacrocorax carbo</i>	Great Cormorant	Sch II	LC
<i>Microcarboniger</i>	Little cormorant	Sch II	LC
<i>Ploceidae</i>	Weaver bird	NA	LC
<i>Psittacularoseata</i>	Blossom headed Parakeet	Sch II	NT
<i>Pycnonotus barbatus</i>	Common Bulbul	NA	LC
<i>Pycnonotuscafer</i>	Red-vented bulbul	Sch II	LC
<i>Pycnonotusjocosus</i>	Red whiskered Bulbul	Sch II	LC
<i>Copsychusfulicatus</i>	Indian robin	Sch II	LC
<i>Spilopelia chinensis</i>	Spotted Dove / Chittafakata	NA	LC
<i>Sturnus contra</i>	Pied myna	NA	LC
<i>Sturniapagodarum</i>	Brahminy myna	NA	LC

<i>psittacines</i>	Parrot / JunglyTota	NA	LC
<i>Treronphoenicoptera</i>	Green pigeon / Harial	NA	LC
<i>Turdoidescaudata</i>	Common babbler	NA	LC
<i>Upupa epops</i>	Common hoopoe	Sch II	LC
Butterflies			
<i>Pseudocoladeniadan</i>	Fulvouspied flat	NA	Not listed
<i>Junonialemonias</i>	Lemonpansy	NA	Not listed
<i>Junoniahierta</i>	YellowPansy	NA	Not listed
<i>Pachlioptaaristolochiae</i>	Commonrose	NA	LC
<i>Aracaviolae</i>	Tawnycostar	NA	Not listed
<i>Tirumalalimniace</i>	BlueTiger	NA	Not listed
<i>Corvus brachyrhynchos</i>	CommonCrow	NA	LC
<i>Ideopsis vulgaris</i>	GlassyBlue Tiger	NA	Not listed
<i>Junoniaoenone</i>	Bluepansy	NA	LC
<i>Hypolimnasmisippus</i>	Danaid eggfly	Sch II	LC
<i>Neptishylas</i>	Commonsailor	NA	Not listed
<i>Papiliodemoleus</i>	Limebutterfly	NA	Not listed
<i>Catopsiliacrocale</i>	Commonemigrant	NA	Not listed
<i>Danaus chrysippus</i>	Plaintiger	NA	LC
Otherinsects			
<i>Brachytronpratense</i>	HairyDragonfly	NA	LC
<i>Anaximperator</i>	EmperorDragonfly	NA	LC
<i>Tettigoniaviridissima</i>	Grasshopper	NA	Not listed
<i>Hieroglyphus banian</i>	Rice grasshopper	NA	Not listed
<i>Nephotettixapicalis</i>	Paddy Jassids	NA	Not listed
<i>Hybleapurea</i>	Skeletonizer	NA	Not listed
<i>Hepaliamauritia</i>	Defoliators	NA	Not listed
<i>Spodoptera mauritia</i>	Swarming caterpillar	NA	Not listed
Scientific name	Common name	IUCN	
<i>Ailiacoila</i>	Gangeticailia	Not listed	
<i>Amblypharyngodonmola</i>	MolaCarplet	LC	
<i>Bagariusbagarius</i>	Goonch	Not listed	
<i>Bariliusvagra</i>	Khoksa	Not listed	
<i>Bariliusvagra</i>	VagraBaril	Not listed	
<i>Catlacatla</i>	Catla	Not listed	
<i>Chandanama</i>	Elongateglass-perchlet	LC	
<i>Channagachua</i>	DwarfSnakehead	LC	
<i>Channamarulius</i>	GreatSnakehead	LC	
<i>Channaorientalis</i>	WalkingSnakehead	VU	
<i>Channapunctatus</i>	SpottedSnakehead	LC	

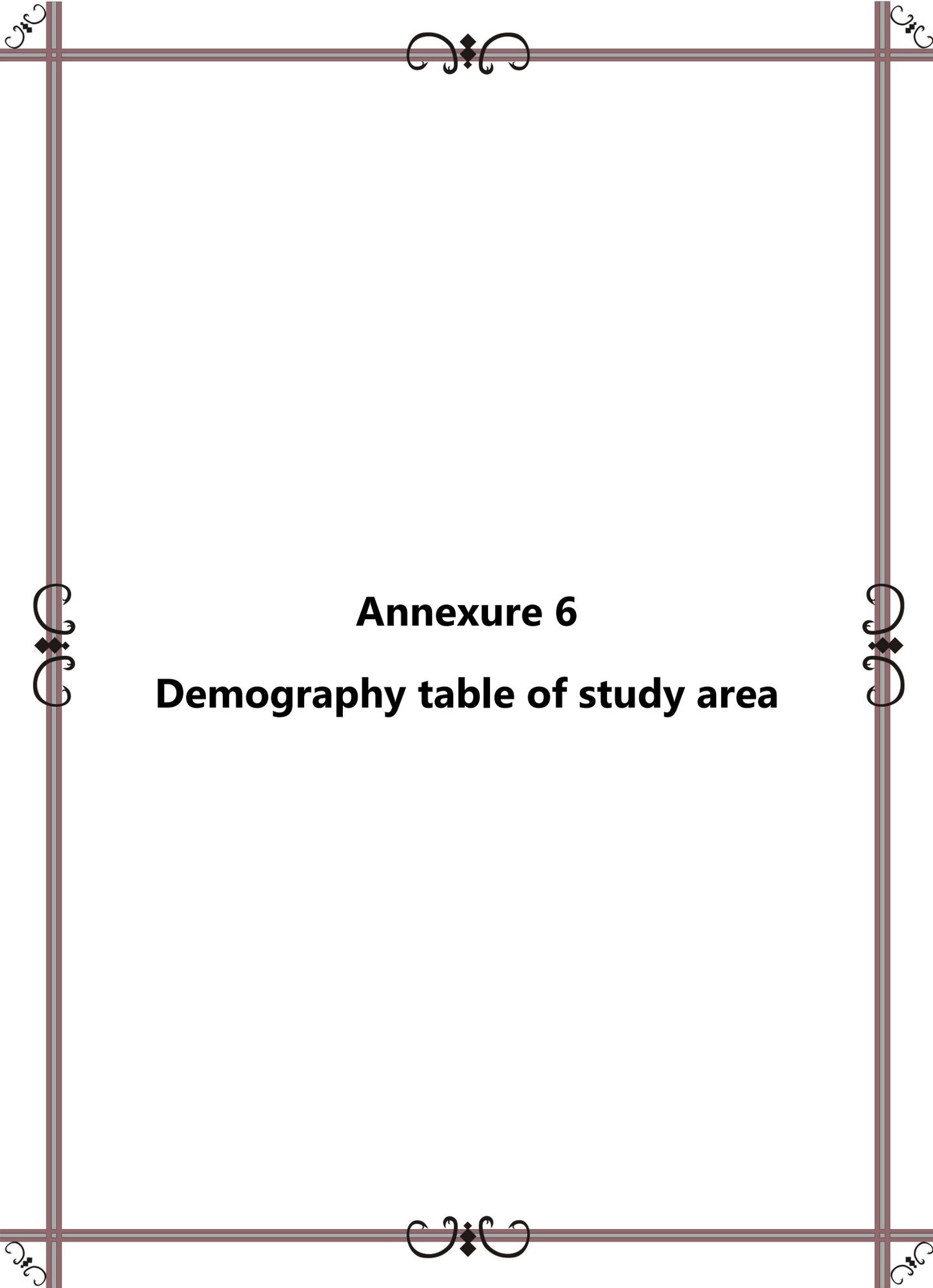
<i>Channa striatus</i>	StripedSnakehead	LC	
<i>Chitalachitala</i>	ClownKnifefish	LC	
<i>Cirrhinus reba</i>	RebaCarp	LC	
<i>Cirrhinus cirrhosus</i>	Mrigal	VU	
<i>Clarias batrachus</i>	PhilippineCatfish	Not listed	
<i>Clarias gariepinus</i>	NorthAfricanCatfish	Not listed	
<i>Ctenopharyngodon idella</i>	GrassCarp	Not listed	
<i>Gagata acenia</i>	IndianGagata	Not listed	
<i>Gagata gagata</i>	Gangeticgagata	Not listed	
<i>Glossogobius giuris</i>	TankGobi	Not listed	
<i>Heteropneustes fossilis</i>	StingingCatfish	Not listed	
<i>Hypophthalmichthys molitrix</i>	SilverCarp	NT	
<i>Hypophthalmichthys nobilis</i>	BigheadCarp	DD	
<i>Labeo angra</i>	AngraLabeo	Not listed	
<i>Labeo bata</i>	Bata	Not listed	
<i>Labeo boga</i>	Boga labeo	Not listed	
<i>Labeo boggut</i>	BoggutLabeo	Not listed	
<i>Labeo calbasu</i>	Calbasu	LC	
<i>Labeo rohita</i>	Rohu	LC	
<i>Laubuca laubuca</i>	IndianGlass Barb	Not listed	
<i>Lepidocephalichthys guntea</i>	GunteaLoach	Not listed	
<i>Mastacembelus armatus</i>	Zig-zageel	Not listed	
<i>Mystus bleekeri</i>	Day'sMystus	Not listed	
<i>Mystus cavasius</i>	GangeticMystus	Not listed	
<i>Mystus tengara</i>	TengaraCatfish	Not listed	
<i>Mystus vittatus</i>	StripedDwarfCatfish	LC	
<i>Ompok bimaculatus</i>	ButterCatfish	LC	
<i>Oreochromis mossambicus</i>	MozambiqueTilapia	VU	
<i>Oreochromis niloticus</i>	Nile Tilapia	LC	
<i>Pangasius pangasius</i>	PangasCatfish	LC	
<i>Rita rita</i>	Rita Catfish	LC	
<i>Systemus sarana</i>	Olive Barb	LC	
<i>Wallago attu</i>	River Catfish / Wallago	VU	

Source: Field survey

Note: Categories as per IUCN Red List refers Data Deficient (DD), Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Extinct in the Wild (EW) & Extinct (EX)

Status of Fauna

No Schedule- I fauna as per (IWPA) Indian Wildlife Protection Act, 1972 was recorded in the study area during field survey.



Annexure 6

Demography table of study area

Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh

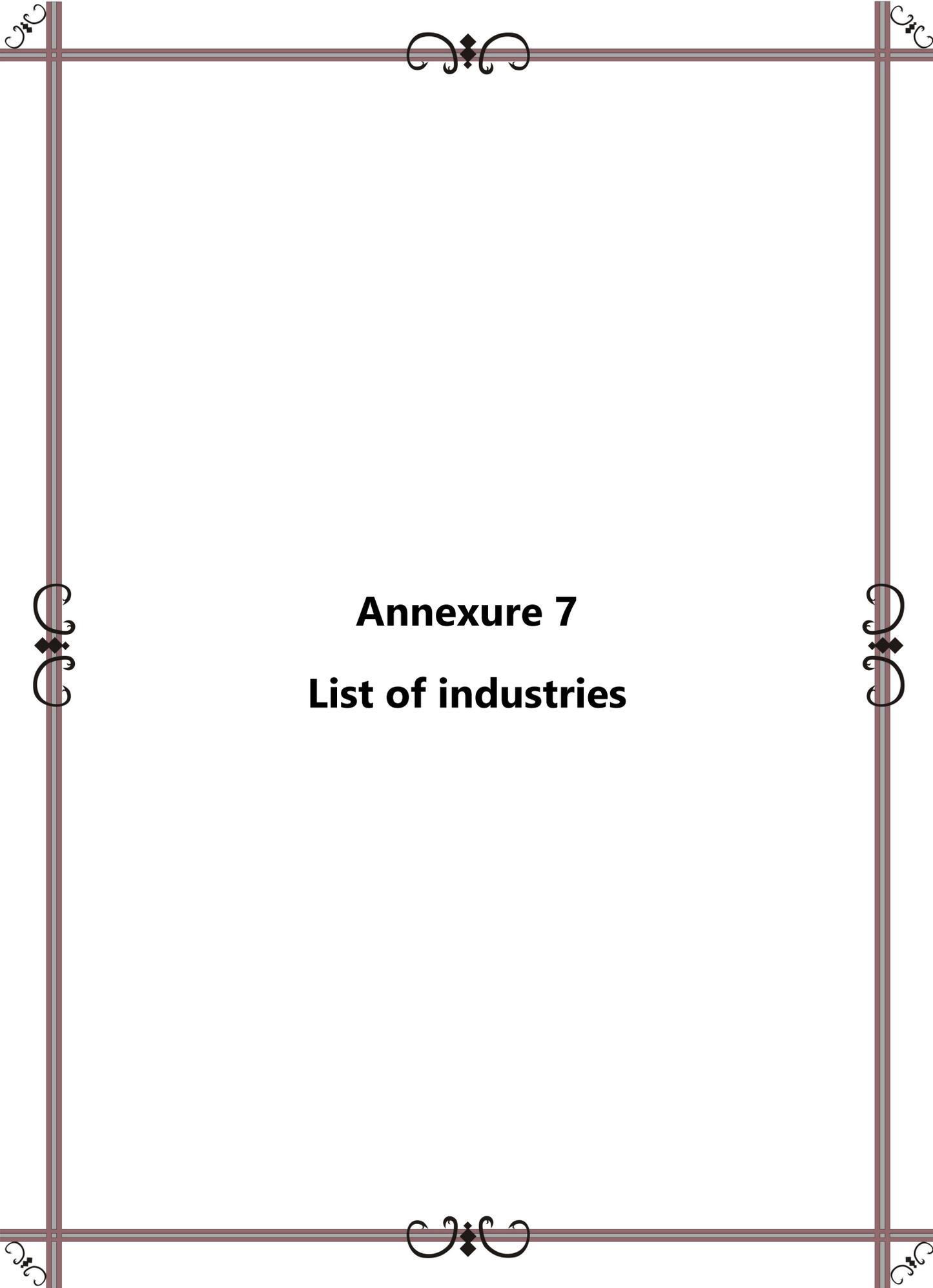
Annexure 6. Detailed demography of study area

S. No.	Name	Total House holds	Total Pop.	Total Male	Total Female	Sex Ratio	Pop. below 6	Male below 6	Female below 6	Child Sex Ratio	SC Pop.	ST Pop.	Lit. Pop.	Lit. Rate	Lit. Male	Male Lit. Rate	Lit. Female	Female Lit. Rate	Total Workers	Main Workers	Marginal Workers	Non-Workers
0-3km																						
1	Achholi	441	2228	1102	1126	1022	300	157	143	911	150	30	1367	70.90	796	84.23	571	58.09	576	663	462	1103
2	Beltukri	399	1687	852	835	980	275	138	137	993	569	90	38	2.69	929	561	368	52.72	878	476	402	809
3	Khattidih	133	606	305	301	987	94	45	49	1089	0	296	409	79.88	232	89.23	177	70.24	336	147	147	189
4	Bhoring	1162	4798	2357	2441	1036	637	323	314	972	1424	11	3011	72.36	1707	83.92	1304	61.31	2295	1509	786	2503
5	Achharidih	485	2416	1194	1222	1023	405	193	212	1098	893	62	1405	69.87	821	82.02	584	57.82	1232	157	1075	1184
6	Amawash	184	727	393	334	850	121	74	47	635	584	17	346	57.10	223	69.91	123	42.86	391	389	2	336
SUB TOTAL		2804	12462	6203	6259	1009.028	1832	930	902	970	3620	506	6576	61.86	4708	89.29	3127	58.37	5708	3341	2874	6124
3-7 km																						
1	Muski	92	401	213	188	883	66	34	32	941	47	96	196	58.51	124	69.27	72	46.15	218	150	68	183
2	Kanpa	480	2188	1095	1093	998	375	200	175	875	710	12	1289	71.10	741	82.79	548	59.69	921	864	57	1267
3	Badgaon	329	1827	911	916	1005	293	141	152	1078	16	45	1091	71.12	652	84.68	439	57.46	912	464	448	915
4	Gopalpur	136	664	337	327	970	103	55	48	873	14	15	352	62.75	210	74.47	142	50.90	361	151	210	303
5	Nawapara	59	277	138	139	1007	43	22	21	955	0	207	157	67.09	98	84.48	59	50.00	155	155	0	122
6	Birkoni	1101	4903	2441	2462	1009	697	354	343	969	606	135	3070	72.99	1742	83.47	1328	62.67	2155	1841	314	2748
7	Achhola	676	3369	1666	1703	1022	449	207	242	1169	606	64	1992	68.22	1155	79.16	837	57.29	1791	929	862	1578
8	Joba	371	1734	872	862	989	279	146	133	911	609	297	1029	70.72	576	79.34	453	62.14	954	482	472	780
9	Kukaradih	187	876	428	448	1047	99	38	61	1605	212	211	351	45.17	318	81.54	233	60.21	500	66	434	376
10	Garhasiwani	579	2822	1419	1403	989	356	179	177	989	188	245	1703	69.06	1025	82.66	676	55.14	1446	1130	316	1376
11	Tenduwahi Alias Nawagao	207	932	442	490	1109	138	65	73	1123	644	0	532	67.00	287	76.13	245	58.75	464	113	351	468
12	Khajihiti	410	1896	894	1002	1121	303	133	170	1278	577	155	1018	63.90	583	76.61	435	52.28	851	704	147	1045
13	Malidih	243	1056	536	520	970	155	69	86	1246	206	232	620	68.81	368	78.80	252	58.06	512	495	17	544
14	Pirda	136	670	322	348	1081	86	48	38	792	20	325	405	69.35	219	79.93	186	60.00	385	575	10	285
15	Barbaspur	289	1427	686	741	1080	234	115	119	1035	485	0	771	64.63	431	75.48	340	54.66	652	297	355	775
16	Paraswani	149	746	373	373	1000	92	35	57	1629	8	24	481	73.55	284	84.02	197	62.34	407	175	232	339
17	Benidih	224	1207	599	608	1015	185	93	92	989	57	62	769	75.24	447	88.34	322	62.40	645	564	81	562
18	Chaparid (Chaprid)	634	3113	1579	1534	972	467	227	240	1057	112	56	2067	78.12	1186	87.72	881	68.08	1716	1536	180	1397
19	Samoda	632	3003	1509	1494	990	484	256	228	891	107	82	1866	74.08	1059	84.52	807	63.74	1385	1253	132	1618
SUB TOTAL		6934	33111	16460	16651	1012	4904	2417	2487	1029	5224	2263	19759	70.05	11505	81.93	8452	59.67	16430	11944	4686	16681
7-10km																						

**Proposed 210 KLPD Grain based Distillery along with 6.25 MW Co-generation Power Plant
At Village Beltukri, Tehsil & District Mahasamund, Chhattisgarh**

Annexure 6_ Detailed demography of study area

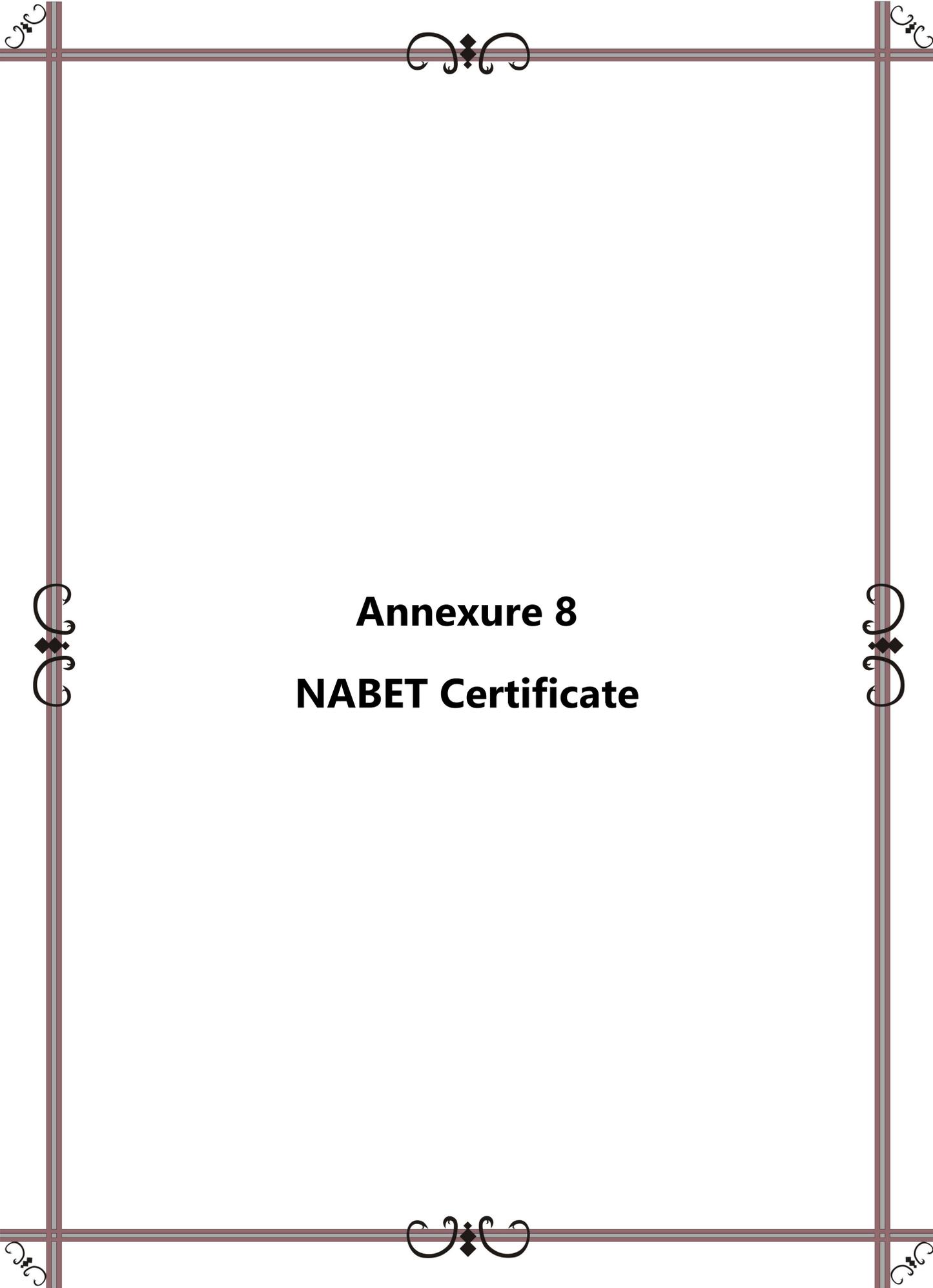
1	Gurudih	184	804	401	403	1005	128	69	59	855	0	669	489	72.34	286	86.14	203	59.01	473	417	56	331
2	Kauwajahr	369	1516	765	751	982	212	119	93	782	231	541	904	69.33	524	81.11	380	57.75	803	583	220	713
3	Parsadih	238	1182	577	605	1049	175	84	91	1083	89	765	756	75.07	433	87.83	323	62.84	553	118	435	629
4	Belsonda	790	3741	1838	1903	1035	506	248	258	1040	292	390	2498	77.22	1422	89.43	1076	65.41	1602	1151	451	2139
5	Sorid	252	1253	620	633	1021	177	79	98	1241	26	565	777	72.21	451	83.36	326	60.93	591	436	155	662
6	Kaundkera	197	907	440	467	1061	116	60	56	933	51	120	565	71.43	321	84.47	244	59.37	429	410	19	478
7	Nawapara Kalan (Nawapara)	208	829	429	400	932	121	69	52	754	5	549	426	60.17	268	74.44	158	45.40	476	442	34	353
8	Parasada	785	376	409	94	230	46	48	51	1063	27	306	483	146.36	271	75.07	212	493.02	376	328	48	409
9	Banseoni	241	1066	511	555	1086	166	76	90	1184	234	508	567	63.00	334	76.78	233	50.11	520	414	106	546
10	Ghodari	574	2784	1425	1359	954	377	195	182	933	1181	45	1802	74.86	1084	88.13	718	61.00	1289	1139	150	1495
11	Bemcha	1227	5596	2903	2693	928	713	354	359	1014	882	451	3359	68.79	1989	78.03	1370	58.70	2804	2157	647	2792
12	Kagdehi	360	1741	869	872	1003	265	132	133	1008	518	9	1070	72.49	616	83.58	454	61.43	890	669	221	851
13	Hardi	42	220	116	104	897	35	19	16	842	0	0	143	77.30	86	88.66	57	64.77	99	64	35	121
14	Paragaon-1 (Paragaon)	551	2801	1360	1441	1060	495	257	238	926	447	83	1453	63.01	833	75.52	620	51.54	1295	1026	269	1506
15	Ratakat	227	1200	609	591	970	200	103	97	942	0	19	634	63.40	374	73.91	260	52.63	537	303	234	663
16	Amethi	281	1365	699	666	953	242	130	112	862	950	23	841	74.89	487	85.59	354	63.90	594	361	233	771
17	Gullu	1102	4922	2441	2481	1016	747	357	390	1092	922	199	2872	68.79	1630	78.21	1242	59.40	2357	1371	986	2565
18	Deori-1 (Deori)	263	1276	646	630	975	153	79	74	937	0	0	857	76.31	487	85.89	370	66.55	766	676	90	510
19	Ranisagar	353	1703	861	842	978	216	110	106	964	69	57	1122	75.45	646	86.02	476	64.67	728	686	42	975
20	Gudguda	154	738	391	347	887	129	68	61	897	603	0	448	73.56	266	82.35	182	63.64	289	74	215	449
21	Kusmund	282	1643	834	809	970	266	135	131	970	285	0	973	70.66	573	81.97	400	59.00	593	485	108	1050
SUB TOTAL		8680	37663	19144	18646	974	5485	2791	2747	984	6812	5299	23039	71.60	13381	81.83	9658	60.75	18064	13310	4754	20008
GRAND TOTAL		18418	83236	41807	41556	994	12221	6138	6136	1000	15656	8068	49374	69.53	29594	82.97	21237	59.96	40202	28595	12314	42813



Annexure 7
List of industries

List of Industries

S. No.	Name of the Industries	Type of industries	Direction from Project site	Distance from project site (Km)
1.	Shivnath Industries	Construction	SW	6.01
2.	Jatashankar Food Industry	Food	SW	5.87
3.	Bhagwati Petrochem	Manufacturing	S/SW	5.94
4.	Parijat Company Aran	Trading	S/SW	5.78
5.	Zenith Agrizone PVT Ltd	Agricultural	SW	5.45
6.	Ori-Plast Ltd.	Pipe Manufacturer	SW	5.42
7.	Nutrikraft India PVT Ltd	Animal Feed Store	SW	5.34
8.	Vedansh Food Industries	Food Manufacturer	SW	5.31
9.	Manorama Industries Ltd	Manufacturing	SW	5.36
10.	Shri RG Industries	Aluminum Supplier	SW	5.54
11.	Ratusaria Udyog Private Limited	Food	SW	5.38
12.	Veer Thermopfoaming Pvt LTD	Manufacturing	SW	4.61
13.	Shivalik Power & Steel Pvt. Ltd	Steelwork design	S/SW	9.25
14.	Anushka Stone Industry	Wholesaler	SW	8.31
15.	Anil Stone Industry	Stone Supplier	SW	7.32
16.	Shri Bajrang Chemical distillery LLP Arang	Organisation	W	8.49
17.	Shree Renuk Dev Agrotech	Rice Mill	NW	9.72
18.	Kisan Mouldings Ltd	Manufacturer	SW	5.51
19.	Birkonee ind Factory	Organisation	SW	5.22
20.	RG Organics	Manufacturing & Industrial Consultant	SW	5.16
21.	Fortune Tiles Belsonda	Manufacturing	S/SW	8.42
22.	Goyal Steels	Wholesaler	S/SW	8.35
23.	SS Stone industry	Manufacturing	N	0.28
24.	RK Stone Industry	Contractor	N	0.84
25.	Krishna Black Stone	Wholesaler	N	0.76
26.	Maa Gauri Stone Industry		N	1.17
27.	Chandrakar Stone		N	1.38



Annexure 8
NABET Certificate



National Accreditation Board for Education and Training



Certificate of Accreditation

JM EnviroNet Pvt. Ltd.

Unit No. 1517, Tower – B, Emmar Digital Greens, Golf Course Ext. Road, Sector – 61, Gurugram-122011

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/ underground mining	1	1 (a) (i)	A
2	Thermal power plants	4	1 (d)	A
3	Mineral beneficiation	7	2 (b)	A
4	Metallurgical industries (ferrous & nonferrous)- both primary & secondary	8	3 (a)	A
5	Cement Plants	9	3(b)	A
6	Coke oven plants	11	4 (b)	A
7	Chlor- Alkali Industry	13	4 (d)	A
8	Chemical fertilizers	16	5 (a)	A
9	Petro-chemical complexes	18	5 (c)	A
10	Manmade fibers manufacturing	19	5 (d)	A
11	Petrochemical based processing	20	5 (e)	A
12	Synthetic organic chemicals industry	21	5 (f)	A
13	Distilleries	22	5 (g)	A
14	Pulp & paper industry excluding manufacturing of paper from wastepaper and manufacture of paper from ready pulp without bleaching	24	5(i)	A
15	Sugar Industry	25	5 (j)	B
16	Industrial estates/ parks/ complexes/areas, export processing Zones(EPZs), Special Economic Zones(SEZs), Biotech Parks, Leather Complexes	31	7(c)	A
17	Building and construction projects	38	8 (a)	B
18	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in SAAC minutes dated May 13, 2022 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/22/2483 dated August.16, 2022. The accreditation needs to be renewed before the expiry date by JM EnviroNet Pvt. Ltd., Gurugram following due process of assessment.

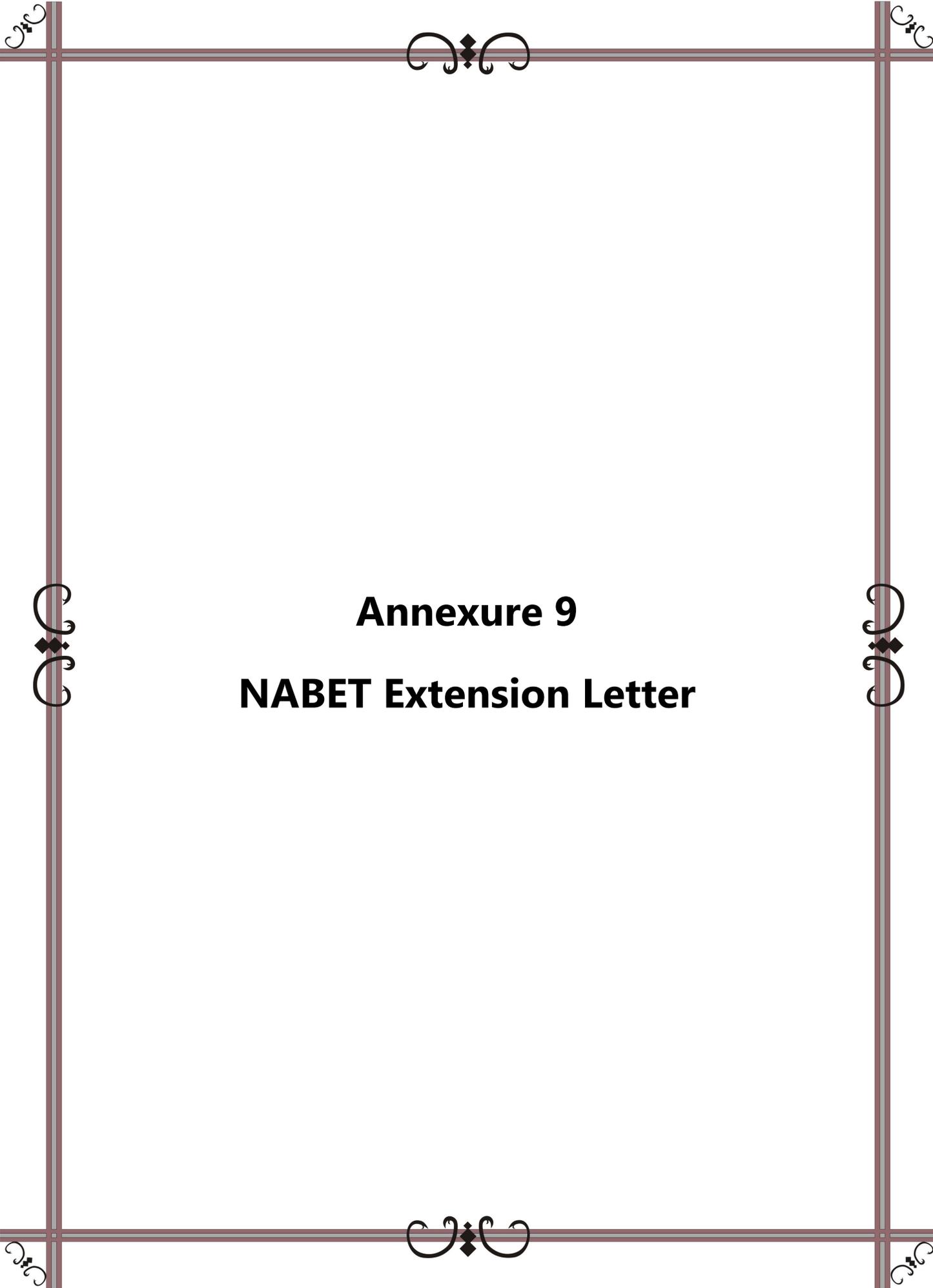


Sr. Director, NABET
Dated: August. 16, 2022

Certificate No.
NABET/EIA/2023/SA 0172

Valid up to
Aug. 07, 2023

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



Annexure 9
NABET Extension Letter

QCI/NABET/ENV/ACO/23/2809

Aug 01, 2023

To

JM EnviroNet Pvt. Ltd.

Unit No. 1517, Tower – B, Emmar Digital Greens,
Golf Course Ext. Road, Sector – 61,
Gurugram (Haryana)

Sub.: Extension of Validity of Accreditation till Oct 31, 2023 – regarding
Ref.. 1. Certificate no NABET/EIA/2023/SA 0172
2. Request e-mail dated July 28 2023

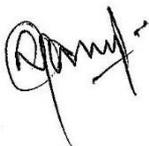
Dear Sir/Madam

This has reference to the accreditation of your organization under QCI-NABET EIA Scheme, the validity **JM EnviroNet Pvt. Ltd** is hereby extended till Oct 31, 2023 or completion of assessment process, whichever is earlier.

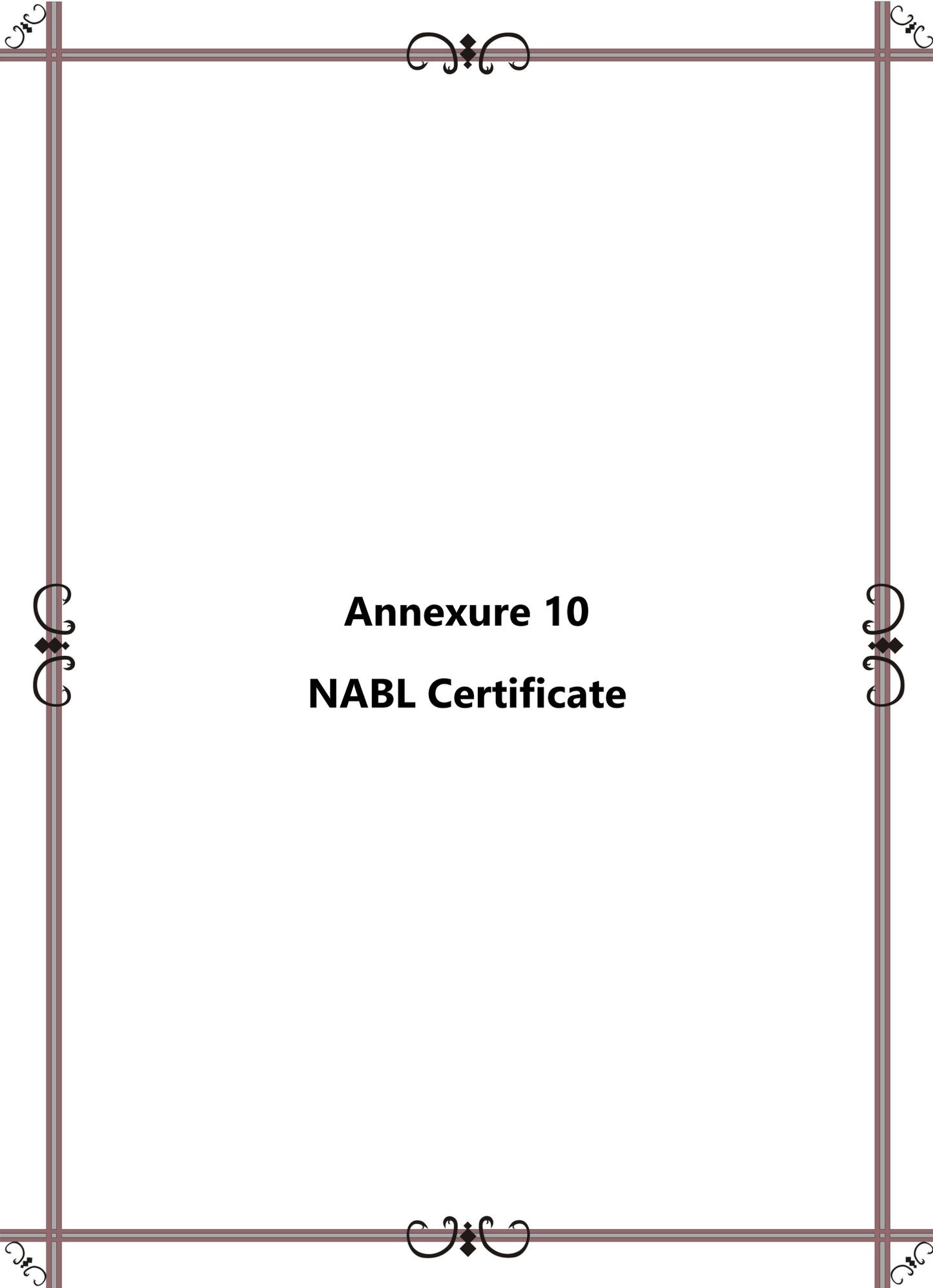
The above extension is subject to the submitted documents/required information with respect to your application and timely submission and closure of NC/Obs during the process of assessment.

You are requested not to use this letter the after expiry of the above-stated date.

With best regards.



(A K Jha)
Sr. Director, NABET



Annexure 10
NABL Certificate



**National Accreditation Board for
Testing and Calibration Laboratories**

CERTIFICATE OF ACCREDITATION

J.M. ENVIRO 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

424, GROUND FLOOR, UDYOG VIHAR, PHASE-IV, GURGAON, HARYANA, INDIA

in the field of

TESTING

Certificate Number: TC-6821

Issue Date: 24/05/2021

Valid Until: 23/05/2023

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 Identity : J.M. ENVIRO LAB PRIVATE LIMITED

Signed for and on behalf of NABL



**N. Venkateswaran
Chief Executive Officer**