

ENVIRONMENTAL MANAGEMENT PLAN

FOR

Amendment in EC

OF

**PROPOSED GRAIN BASED DISTILLERY OF 100 MW CAPACITY
WITH 2.7 MW CO-GENERATION POWER PLANT**

AT :

MOR,

MOKAMA

DIST. PATNA (BIHAR)

OF

BRAJENDRA KUMAR BUILDERS PRIVATE LIMITED

ACHUARA

BARH

PATNA - 803302 (BIHAR)

Prepared by :-



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ENVIRONMENTAL MANAGEMENT PLAN

1.0 Introduction

Brajendra Kumar Builders Pvt. Ltd. (BKBPL) is a company registered under The Companies Act' 2013 vide CIN No. U45200BR2005PIC011553 Dt: 19th Aug.'2005. Registered Office of BKBPL is at Achuara, Barh, Dist. Patna, State Bihar.

As per EBP Program of Govt. of India, BKBPL intends to establish a Ethanol Manufacturing Unit in the state of Bihar. BKBPL is proposing to establish a 100 KLD Grain Based Distillery project alongwith 2.7 MW Cogeneration Plant for production of Ethanol. BKBPL has acquired 4.67 Ha. (11.56 Acres) of land, under at Mauza Mor, Khata No. 930, 799, 874, 765, 895, 782, 839, 921, Khesra Nos. 3679, 3764, 3768, 3671, 3675, 3676, 3767, 3768, 3670, 3675, 3677, 3669, Mokama, Dist. Patna of Bihar State (Copy attached as Annex – I).

2.0 Brief description of nature of project

M/s BKBPL proposed to set up an Greenfield Grain based distillery of 100 KLD capacity along with 2.7 MW Power plant with latest technology of Multi Pressure Distillation and MSDH for dehydration to achieve good quality of Fuel grade Ethanol.

Proposed production of 100 KLPD distillery with 2.7 MW captive Power Generation plant will be based on grain such as Maize, Broken rice and the Spoiled Grain as basic raw materials. Other inputs will be water, antifoam agents, Urea, H₂SO₄ and enzymes. Rice husk/Biomass will be used as fuel in Boiler.

The Distillery proposes to achieve Zero Liquid Discharge by Decantation, Multi Effect Evaporation (MEE) followed by dryer to form Distiller's Grain Solids with Solubles (DDGS), which will be used as cattle feed/fish. The entire spent wash will be reused within premises to achieve Zero Liquid Discharge.

3.0 Need for the Project ;

The production capacity of ethanol in the country will be more than double of 710 crore litres contracted by the manufacturers /sugar mills with oil marketing companies (OMCs) for ethanol blending programme (EBP) in 2019-20.

However, the Government of India is targeting an ethanol production and supply target of 300-350 crore litres in 2020-21, and achieve 7.5-8 per cent ethanol blend levels with petrol, the ISMA said in a statement ;

"As laid down in the National Biofuels Policy, 2018, the government intends to achieve ethanol with petrol blend levels of 10 per cent by 2022 and 20 per cent by 2030, and therefore, efforts are being made to achieve the targets," the statement said.

The government of India has advanced the target for 20 per cent ethanol blending in petrol (also called E20) to 2025 from 2030. E20 will be rolled out from April 2023.

Against this, 92.5 crore litres of ethanol have already been supplied to the OMCs between December 1 2019 and June 22, 2020, achieving an average all-India blending of 5.09 per cent with petrol. The blending levels achieved in some states like UP, Haryana, Punjab, Uttarakhand, Bihar and Karnataka is much higher at 8.5 per cent to 9.8 per cent with petrol. B-heavy molasses and sugarcane juice have been diverted away from sugar, to manufacture and supply 58 crore litres of ethanol to OMCs from in the current ESY up to June 20. As per the contracts entered into by the sugar mills across the country, another 23 crore litres of ethanol will be manufactured from B-molasses and cane juice for supply in the balance period up to November 30, 2020.

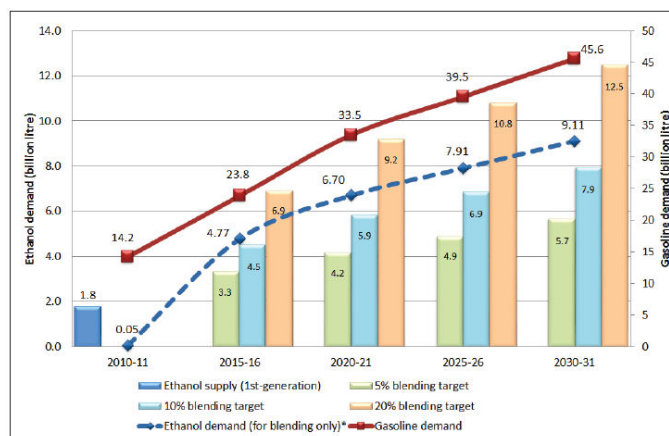
This use of B-molasses and cane juice in production of ethanol, and not for sugar production, will result in a diversion of sugar of around 8 lakh tonnes, the ISMA said.

The diversion will not only reduce surplus sugar availability in the country, but also reduce the carrying costs for the sugar mills. It will also give better returns to the mills because ethanol prices fixed by the government are more remunerative than sugar currently, besides giving them better cash flows because of immediate sale of ethanol as compared to delays in the sale of sugar, which could be stuck in the godowns for more than 10-12 months.

Despite the fall in petrol consumption/sales during the lockdown period, the supplies of ethanol were not too badly affected, and sugar mills have been able to supply as per the contracts during the lockdown too, said ISMA.

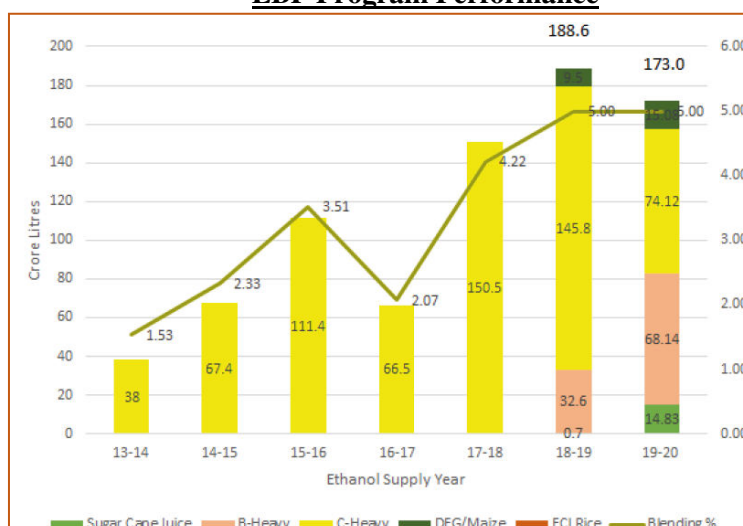
Accordingly, the blend levels have been maintained at an all-India average of 5 per cent for the country. This could happen because of the good understanding and cooperation between the OMCs and the sugar mills/ethanol manufacturers, when they together agreed to relocate ethanol supplies from depots that were full to other depots and even to distant states, where there was hardly any ethanol being supplied, and therefore there was tankage capacity to take the reallocated ethanol supplies, said the statement.

Total ethanol consumption in 2010 was 1.8 billion litres of molasses-derived ethanol, out of which only 50 million litres was used for blending (USDA, 2015). If India is to achieve the 20 percent blending targets set out in the NPB, the country will need to produce 6.7 billion litres of ethanol by 2020 and 9.1 billion litres by 2030. For 2017 alone, the year in which the 20 percent blending regime would start, over 7 billion litres of ethanol would be required to reach the target. Chart below shows the overall ethanol demand (including potable, industry, and other applications) with different blending targets.



Supply of ethanol under the EBP Programme has increased from 38 crore litres during 2013-14 to 173 crore litres during ESY 2019-20 resulting in increase in blend percentage from 1.53% to 5.00% respectively. Further, the allocation for the ongoing (2020-21) has surged to **332** crore litres, which is 91% more in comparison to the ethanol supplies received during preceding period (2019-20).

EBP Program Performance




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Ethanol Demand Projection:-

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	B1 = B X 141.1	C	D = B1*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.				

4.0 Location of the Project ;

BKBPL has proposed to establish a Grain Based Distillery alongwith cogeneration plant Project at Mauza Mor, Thana, Mokama, Khata No. 930, 799, 874, 765, 895, 782, 839, 921, Khesra Nos. 3679, 3764, 3768, 3671, 3675, 3676, 3767, 3768, 3670, 3675, 3677, 3669, Block Mokama, Dist. Patna in the State of Bihar, having Latitude 25°24'5.82"N & Longitude 85°50'43.60"E at elevation 42 m. above MSL. The Project Site is connected to NH-31 & NH 30A through Village PCC Road. It is about 75 kms. from district head quarter at Patna. BKBPL project site is about 8 Km. (W) from Mokama Railway Station on Howrah-Delhi Mainline Sec. of ECR.

Geo Coordinates of all four corners of project site is as under ;

Corner	Latitude	Longitude
NE	25°24'6.84"N	85°50'51.60"E
SE	25°24'1.49"N	85°50'51.31"E
NW	25°24'6.87"N	85°50'35.06"E
SW	25°24'4.04"N	85°50'34.59"E

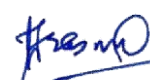
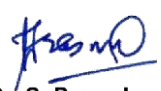

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 EIA Coordinator

Table No 1: Project Location and Environmental Settings Details are as under;

Components	Details
Location Details	
Locality	Mor
Tehsil	Mokama
District	Patna
State	Bihar
Latitude	25°24'6.84"N to 25°24'6.87"N
Longitude	85°50'34.59"E to 85°50'51.60"E
SOI Toposheet No.	72G/15
Environmental Setting Details	
Nearest Major Habitation	Vill. Daudpur (3 Km. S)
Nearest Town / City	Mokama (8 Km. E)
Nearest NH	NH 31 & NH 30A (4 Km. N)
Nearest Railway Station	Mokama Railway Station (8 Km. E)
Nearest Airport	Patna Airport (75 Km. W)
Nearest River	River Ganga (4.5 Km. N)
Environmental Sensitivity National Parks, Reserved Forests (RF) / Protected Forests (PF), Wildlife Sanctuaries, Biosphere Reserves, Tiger/ Elephant Reserves, Wildlife Corridors etc.	NIL (Not exists within 10 Km. radius)
Seismic Zone	Zone IV
Flood Hazard Category	Moderate
GW assessment category as per GWRA	Safe
Depth of Ground Water level	Pre Monsoon : 6.18 – 8.47 m. bgl Post Monsoon : 2.62 – 2.95 m. bgl


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LOCATION MAP

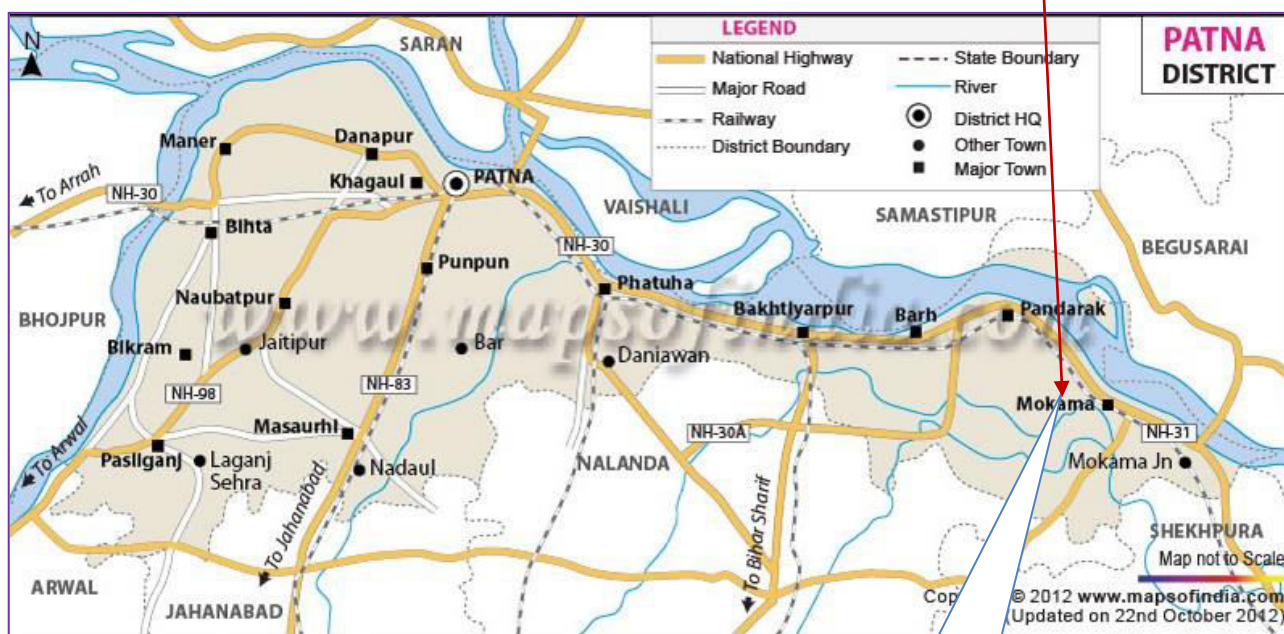


Fig No.1: Project Site of BKBPL
proposed Ethanol Project

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Dr. S. Prasad
EIA Coordinator

Fig. No. 2 : Google Earth Imagery of BKBPL Distillery Project



5.0 Project Description ;

5.1 Size / Magnitude of Project

Brajendra Kumar Builders Pvt. Ltd. (BKBPL) is establishing Grain based Distillery project having Manufacturing and production Details are as under ;

Table No 2: Manufacturing & Product Details

Manufacturing Facilities	Product	Production Capacity
Distillery	Ethanol	100 KLPD
Power Co-generation	Power	2.7 MW
No. Of Days Operation / Annum	350 days	
Distilleries Dry Grain with Solubles (DDGS), CO ₂ and Fusel Oil will be generated as by-product.		
By-Product		Generation Capacity
DDGS		Broken Rice : 34 TPD Maize : 42 TPD
CO ₂		63 TPD

Land Availability ;

BKBPL has acquired 4.67 Ha. (11.56 Acres) of land at Mauza Mor, Khata No. 930, 799, 874, 765, 895, 782, 839, 921, Khesra Nos. 3679, 3764, 3768, 3671, 3675, 3676, 3767, 3768, 3670, 3675, 3677, 3669, Mokama, Dist. Patna of Bihar State (Copy attached as Annex – I). (Copy attached as **Annex – I**).

5.2 Raw Materials and other Inputs

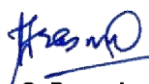
Proposed production of 100 KLPD distillery with 2.7 MW captive Power Generation plant will be based on grain such as Maize, Broken rice and the Spoiled Grain as basic raw materials. Other inputs will be water, antifoam agents, Urea, H₂SO₄ and enzymes. Rice husk/Biomass/Bagasse/Coal will be used as fuel in Boiler. Raw Material and Other input requirements are detailed as under ;

Table No 3: Raw Materials and other Inputs

S. No.	Particular	Requirements	Source	Mode of Transportation
1.	Grain (MT/day)	Broken Rice : 230 TPD Maize : 260 TPD	Bulk Supplier from all over Bihar	Through closed trucks by existing Road Network
2.	Fresh Water (KLPD)	665	Borewell	Pipeline
3.	Electricity	2500 KWh	Own	---
4.	Fuel			
	Rice husk / Biomass	140 TPD	Rice Mill from all over Bihar	Through closed / covered trucks by existing Road Network
5.	Enzymes -Alpha Amylase (1-4) -Amyloglucosidase(1-6)	75 Kg/day 100 Kg/day	From Suppliers at Kolkata	Through closed / covered trucks by existing Road Network
6.	Chemicals			
	Sulphuric Acid	65 Kg /day	From Suppliers at Kolkata	Through closed / covered trucks by existing Road Network
	Sodium Hydroxide	85 Kg /day		
	NH ₂ -CO-NH ₂ (Nutrients)	75 Kg /day		
	Antifoam Agent	125 Kg /day		
	Dry Yeast	1 Kg/KL of spirit production		

5.3 Fuel Requirement

Rice husk 140 TPD will be used as Fuel for proposed 30 TPH boiler for steam generation of 24 TPH.


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 EIA Coordinator

5.4 Water Requirement

Total Water requirement of proposed distillery project will be 1633 KLD. Fresh water requirement will be 665 KLD, out of which 650 KLD water will be used for (6.5 KL/KL of Product) for Industrial and allied purposes and balance 15 KLD will be used for domestic purposes. Water requirement for first run would be 1633 KLD, of which 983 KLD (~ 60 %) will be Recycled. Water requirement of 665 KLD will be fulfilled through proposed borewells inside premises. The permission for withdrawal of water will be taken the CGWA / CGWB. Water Consumption Input and Output is tabulated as under ;

Table No 4: Water Requirement

TOTAL WATER INPUT (KL)		TOTAL WATER OUTPUT (KL)	
Process water in fermentation	605	Steam condensate	227
DM water for boiler feed	468	Water in Spent wash	592
Soft water for vaccum pump and others	80	Thin Slope	385
Soft water makeup for cooling tower	440	CT evaporation and drift losses	281
Water in Grain	17	Boiler (Deaerator, Blowdown, drain) Losses	65
Miscellaneous Washing (Provisional)	23	Vaccum pump sealing / purge	60
TOTAL	1633	Miscellaneous Washing (Provisional)	23
		TOTAL	1633

RECYCLE and UTILIZATION STREAMS (KL)	
Steam Condensate recycle for boiler	157 KLD
Thin slop recycle Slurry preparation and Liquefaction section	127 KLD
Process condensate recycle to process and CT	109 KLD
Vaccum pump water recirculation	76 KLD
Steam Condensate	129 KLD
Treated WW	375 KLD
Total Recycling/ re-utilization of water per day	974 KLD
Fresh Water requirement for Distillery	573 KLD
Fresh Water for Cooling Tower Make-up Cogeneration Plant	77 KLD
Total Industrial Fresh Water Requirement	650 KLD
Domestic Use	15 KLD
Overall Fresh Water Requirement	665 KLD

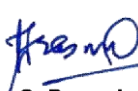
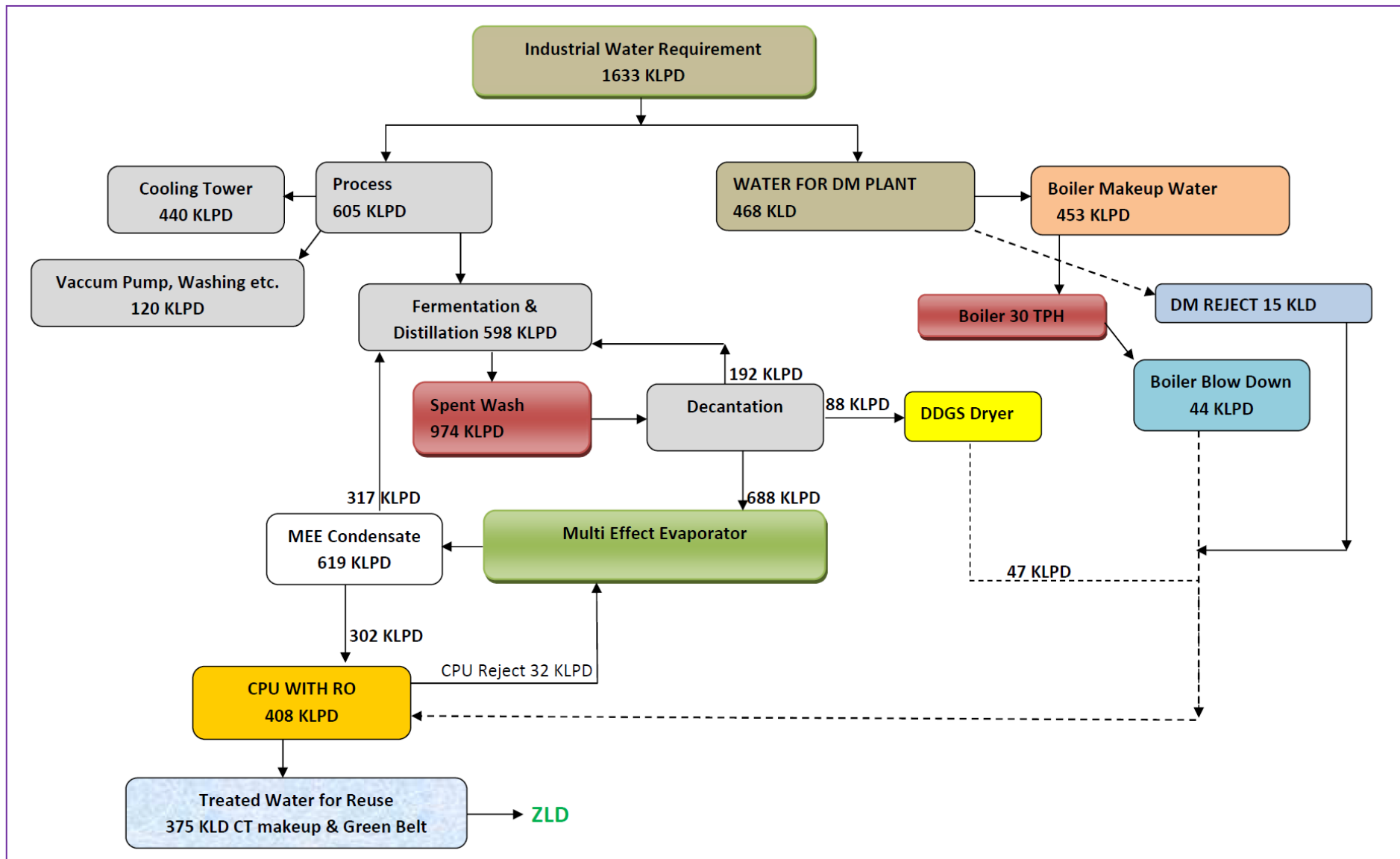

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Fig No.4: WATER BALANCE



5.5 Power Generation & Consumption

The Unit's own Power cogeneration will be 2.7 MW generation is envisaged from 2.7 MW back pressure turbine which will be used for meeting captive power requirement of 2.7 MW. DG sets will be used in case of emergency.

5.6 Manpower Requirement

The proposed BKBPL distillery project will generate employment opportunities both in direct and indirect manner. In direct mode people will get jobs in proposed distillery project and as well as in indirect mode in various forms. A well-structured manpower is essential for uninterrupted operation and proper maintenance of plant facilities. Employment will be generated during implementation of the project. There will be approx. 125 Nos. manpower deployment including, Managerial Staff, Technical Staffs and labours, will be employed / engaged temporarily during plant erection and commissioning in proposed BKBPL project.

5.7 Steam Requirement

Steam requirement is 24 TPH, which will be sourced from proposed 30TPH Boiler.

Table No 5: Steam Requirement

Steam Consumption (Dry Saturated)	Proposed Scheme
1. Cooking and Liquefaction	0.8 Kg/lit of TS
2. Distillation and Integrated Evaporation	2.8 Kg/lit of TS (With Multi effect integrated Evaporator)
3. DWGS Dryer	2.2 Kg/lit of TS
4. Total Steam Requirement	5.8 Kg/lit of TS (With Multi Effect Evaporator and dryer)

5.8 Boiler Details

Multi Fuel HP Boiler of 30 TPH capacity alongwith ESP (Electrostatic Precipitator) as Air Pollution Control Equipment followed by adequate Stack height will be installed as per CPCB & BSPCB guidelines. Details regarding proposed boiler are mentioned in the table given below :

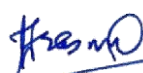

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Table No 6: PROPOSED BOILER DETAILS

S. No.	Boiler Particulars	Details
1.	Type of Fuel	Rice Husk
2.	Capacity of Boiler	30 TPH
3.	Stack Height	60 m
4.	Pollution Control Equipment	ESP

5.9 Proposed Project Schedule for approval and Implementation- Likely date of start of construction & likely date of completion.

3-5 months required for Environment Clearance from MoEFCC, Govt. of India and obtaining the No Objection Certificate from other Statutory Bodies. After that, 15 to 18 months will be required for plant and machinery procurement, Erection and commissioning. Tentatively project will be under operational stage by the 01st quarter of 2023.

5.10 Total Project Cost

The project cost of the unit will be as 140 Crores. The cost component will be as under:-

Table No 7: Total Project Cost

Components	Estimated Cost (in Crore Rs.)
1. Land, Environmental clearance and Licensing	7.0
2. Plant and Machinery with Structure and Electrical	80.0
3. Steam (Boiler)	13.0
4. Power (Turbine)	3.5
5. Civil Work, Infrastructure & utilities	25
6. Pollution Control & Environmental Management	9.0
7. Preoperative and contingencies	2.5
TOTAL	140

6.0 Technology and Manufacturing process description

I. Milling and flour handling

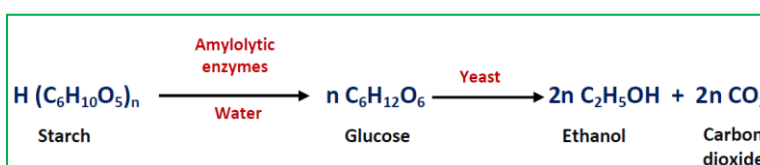
The incoming grain is first cleaned with the help of de-stoner and magnetic separator store move stones and other material which may damage the hammers during milling. The grain is fed to hammer mill in controlled manner. In milling grains are crushed to flour of uniform size. Oversized screening rejects are segregated with the help of vibratory screen. These are taken to coarse bin before sending it to mill again. Intermediate hopper is provided for


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 EIA Coordinator

buffer capacity for flour storage. The flour gets transferred to the mixing tank for slurry preparation process.

II. Slurry preparation/liquefaction

Slurry from pre-masher is taken to slurry cum liquefaction tank where both steam & liquefying enzyme are added. The mixture of slurry and steam is then provided with the desired retention time at a given flow rate. The cooking process, accomplished in the above manner, converts the slurry into a hydrated, sterilized suspension and is therefore susceptible to enzyme for liquefaction. Liquefied mash is cooled in slurry cooler and transferred to fermentation section. Chemical reactions during of conversion of starch into ethanol is shown as under;



III. Saccharification and fermentation

A. YEAST PROPOGATION

Yeast Propagation Yeast seed material is prepared in water cooled vessels by inoculating sterilized mash with active dry yeast. Optimum temperature is maintained by cooling water. The contents of the yeast vessel are then transferred to pre-fermentors. The pre-fermentors are filled with mash and loaded with contents of the yeast. The pre-fermentor contents are transferred to the main fermentor.

B. FERMENTATION

Fermentation The purpose of fermentation is to convert the fermentable substrate into alcohol. To prepare the mash for fermentation, it may have to be diluted with water. The pH of the mash is adjusted to about 5.0 accomplished primarily by recycled slops (which also provides for nutrients) and by the addition of acid. Yeast is available in sufficient quantity to initiate fermentation rapidly and complete it in 54 to 60 hours. Significant heat release takes place during fermentation. This is removed by forced circulation cooling in external heat exchangers to maintain an optimum temperature of 32°C. The re-circulating pumps also serve to empty the fermentors. After the fermentors are emptied, they are cleaned with water and caustic solutions and sterilized for the next batch. The carbon dioxide evolved during the process is scrubbed to prevent ethanol emissions by process water. Manufacturing Process Flow is as under ;


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IV. Distillation

Fermented wash to Rectified Spirit:

Multi-pressure vacuum distillation system for production of Rectified Spirit consists of distillation columns namely-

1. Degasifying-cum-analyzer column- Operation under vacuum
2. Rectifier-cum- Exhaust column- Operated under pressure
3. Recovery/Fusel Oil Column- Operated atmospheric

Pre-heated fermented wash is fed at the top of the Degasifier column. Analyzer Column is provided with reboiler. Top vapours of Analyzer column containing all the alcohol in the wash are sent to Rectifier column and are taken out as spent wash from Analyzer column bottom. Low strength alcohol is concentrated in Recovery column and Fusel Oil is separated. The vapour from Analyser is sent to Rectifier-cum-Exhaust column. The Rectifier/Exhaust Column concentrates the alcohol to 96% v/v. The high- grade spirit is drawn from upper trays of the rectification column. Fusel oil build up is avoided in the Rectifier-cum exhaust column by withdrawing side stream (Fusel Oil). Degasifier condensates and Fusel Oil drawn from Rectifier/Exhaust column are sent to Recovery column where these fusel oil is concentrated and then sent to Fusel Oil decanter where Alcohol and Fusel Oil mix are diluted with water to separate fusel oil.

Washings are sent back to the column to recover alcohol. The high spirit draw from the Rectifier column is sent to the MSDH Plant to produce Fuel Grade Ethanol.

Benefits of pressure vacuum distillation:

Following are the advantages of pressure vacuum distillation

- a) Since the analyzer column operates under vacuum, the formation of by-products such as Acetal may minimize there by improvement in quality of alcohol.
- b) The chances of scaling due to invert solubility of certain precipitating inorganic salts are minimized in vacuum distillation.
- c) Vacuum distillation requires low steam consumption with Reboiler i.e. 1.8 Kg/lit. of Rectified Spirit.

V. CO₂ Recovery

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

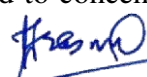

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purification followed liquefaction. Initially gas is taken to Foam trap to eliminate liquid particle carried over from fermentation section. Here process water is used to rinse down the foam. Clean gas from Foam trap is then fed to Low pressure organic 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 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 reboiler and reflux condenser. Oxygenates of nitrogen are removed through molecular sieve NOx 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.

VI. Distillation with integrated evaporation system:

Integrated evaporation or standalone evaporation systems are also use an intension to concentrate the spent wash as per their requirement. It helps to reduce the final quantity of spent wash generation. Integrated evaporation system uses alcohol vapours as heating media for heating the spent wash. Thus, good amount of steam saving can also be achieved in integrated evaporation systems. Integrated evaporation is expected to concentrate the spent

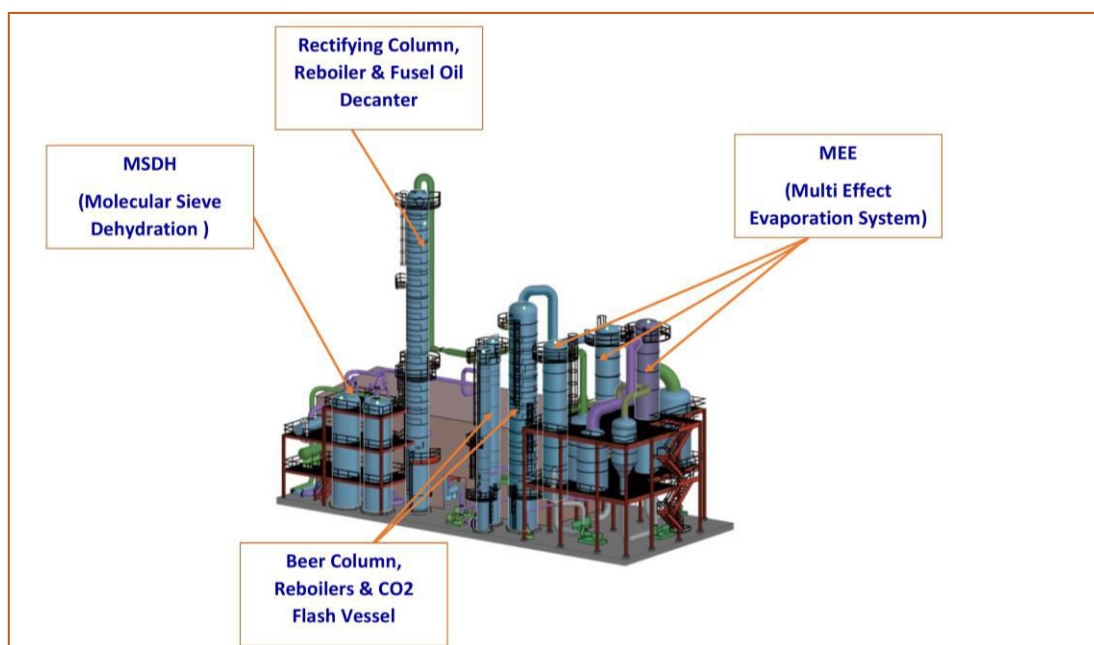
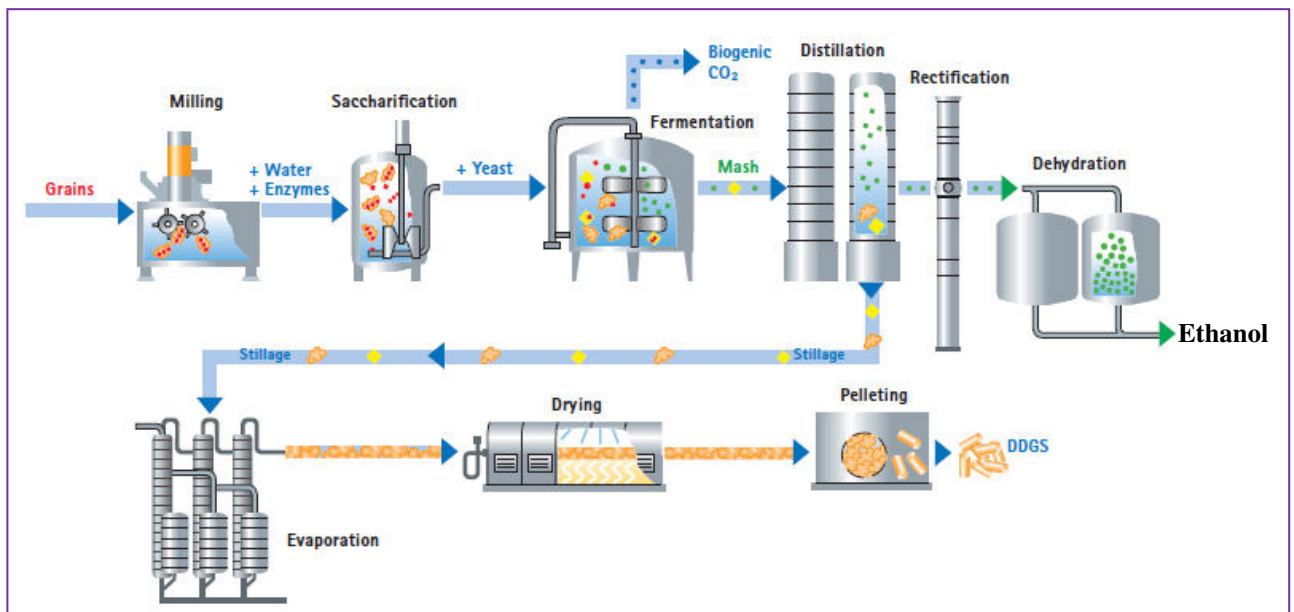

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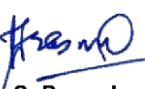
wash to about 22-30% solids concentration depending on the type of fermentation system used and final alcohol concentration in wash.

Dehydration of alcohol

As by simple distillation only 96.48% v/v alcohol strength is achievable, so for Ethanol production either Azeotropic distillation (using Benzene or Cyclohexane) or Molecular Sieve Dehydration is being used. However, at present the Molecular Sieve Dehydration is the Industry standard and by adopting this technology a better quality and strength of product i.e. Ethanol is maintained with comfort and confidence. It requires very little operator interface and can tolerate reasonable variations in feed rate or quality.

Fig No.6: 3-D Schematic View of Grain Based Distillery Operation for production of Ethanol ;




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7.0 Environmental Management Plan :

In view of the global concept of sustainable development, Environment Management is a crucial segment of Industrial Management. Apart from the social obligation, the industries are liable to meet a series of statutory norms laid by Government bodies. Better environment management means less waste generation, better resources management leading to cost savings. Further, it gives a better public image. Therefore, preparation of Environmental Management Plan is a must to fulfill bifocal aspect of the statutory compliance as well as that of social concern. Water needs for the proposed project is reasonably low, but generally this resource is declining. Thus, on one hand one should use it less and on the other the source should not be left polluted for others. Air environment needs to be continuously managed, because all human being needs inhalation every moment, so also is Flora and Fauna dependent on it. The biological aspects, soil and ground water are all interdependent.

Thus, there is a need of proper environmental management and a conscious plan for it.

Objectives of Environmental Management Plan

- a) To define the components of environmental management.
- b) To prepare an environmental hierarchy.
- c) To prepare a checklist for statutory compliance.
- d) To prepare environmental organization.
- e) To prepare a schedule for monitoring and compliance.

7.1 CORPORATE ENVIRONMENT POLICY ;

Brajendra Kumar Builders Pvt. Ltd. (BKBPL), will make all efforts for minimizing the environmental impact in all its activities and operations. BKBPL is committed to conduct all operations, with importance and significance to the environment, of which, we are a part of and make all possible efforts to safeguard it. Management reinforces the need to direct the collective endeavor of the employees at all levels towards sustaining and continuously improving standards of Environment, Health and Safety in a bid to attain and exceed

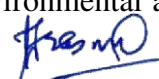

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benchmarked standards, whether regulatory or otherwise. BKBPL Corporate Environment policy adheres –

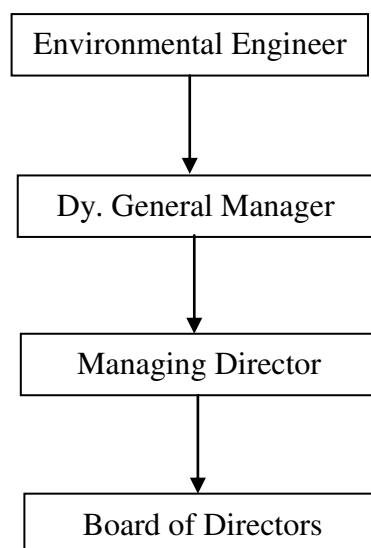
- To regular review the compliance related to relevant laws and regulations of EHS.
- To provide safety of workers, by providing personnel protective equipments (PPE) like Ear Muffs, Ear plugs, Safety Shoes, Safety Belts, Dust Mask, Wind Socks, Helmets, eye goggles, head bands etc. will be provided.
- To adopt 3R's Concept of Waste Minimization (Reuse, Recycle & Recover techniques) within premises for better resource utilization. To examine possibilities of efficient use of energy and its conservation
- To take account of environment, occupational health and safety aspects in planning and decision-making for operational activities, staffs & workers and surrounding communities.
- To establish and implementation of environment, health & safety standards that are scientifically tested and meet the requirement of relevant laws, regulations and codes of practice for employees and surrounding communities.
- To ensure safe handling, storage, use and disposal of all substances and materials that are classified as hazardous to health and environment.
- To provide and maintain facilities, equipment, operations and working conditions which are safe for employees, visitors and contractors at the Company's premises and also for surrounding communities as per their localized needs.
- Develop and maintain green belt and plantation in and around premises.
- To promote awareness on sound health and safe working practices among employees and surrounding communities through workshop, seminars, posters, slogans and personal meetings.
- To adopt system of regular health check-up of employees at different stages of employment, i.e. at the time of appointment, during promotions & regular check-ups as per statutory requirement.

7.2 Hierarchical system to deal with environmental issues ;

An environmental engineer (EE) will be appointed and designated to look after environmental issues and to ensure compliances of statutes under E (P) Act'1986 and E (P) Rules. EE will report to Dy. General Manager (DGM) and subsequently DGM will report to Managing Director, any type of non-compliances related to environmental aspects. The


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issue of non compliances will be discussed in Board of Directors Meeting for taking action to comply the statutes. Organization chart to deal with environmental issues is as under ;



7.3 Checklist of Statutory Obligations

There are a number of environmental statutes required to be attained by the industries. The proposed project will obey the provisions of all relevant Acts, Rules, Notifications and Orders.

The checklist of these obligations, which facilitates the obedience of the laws of land are given below:

- a) Water (Prevention and Control of Pollution) Act, 1974;
- b) Water (Prevention and Control of Pollution) Cess Act, 1977;
- c) Air (Prevention and Control of Pollution) Act, 1981;
- d) Environment (Protection) Act, 1986 and amendments thereof;
- e) Environment (Protection) Rules, 1986 and amendment thereof;
- f) Hazardous and Other Wastes (Management and Transboundary Movement) Rules 2016;
- g) All the conditions laid at consent under Water Act, 1974;
- h) All the conditions laid at consent under Air Act, 1981; and
- i) EIA Notification'2006 and amendments thereof.

7.4 Environment Management Cell (EMC)

An Environment Management Cell will be developed by an effective mix of a group of technical experts from various departments of the project to look after the all statutory & obligatory requirements and will be responsible for the effective implementation of all environmental pollution control measures and environmental management plan.


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The EMC will be headed by the Managing Director / General Manager as shown in **Figure below**. There would be three managers and three supervisors with nine workmen from different departments. A physician (to be appointed) would be a major team member. Besides, there would be a horticulturist.

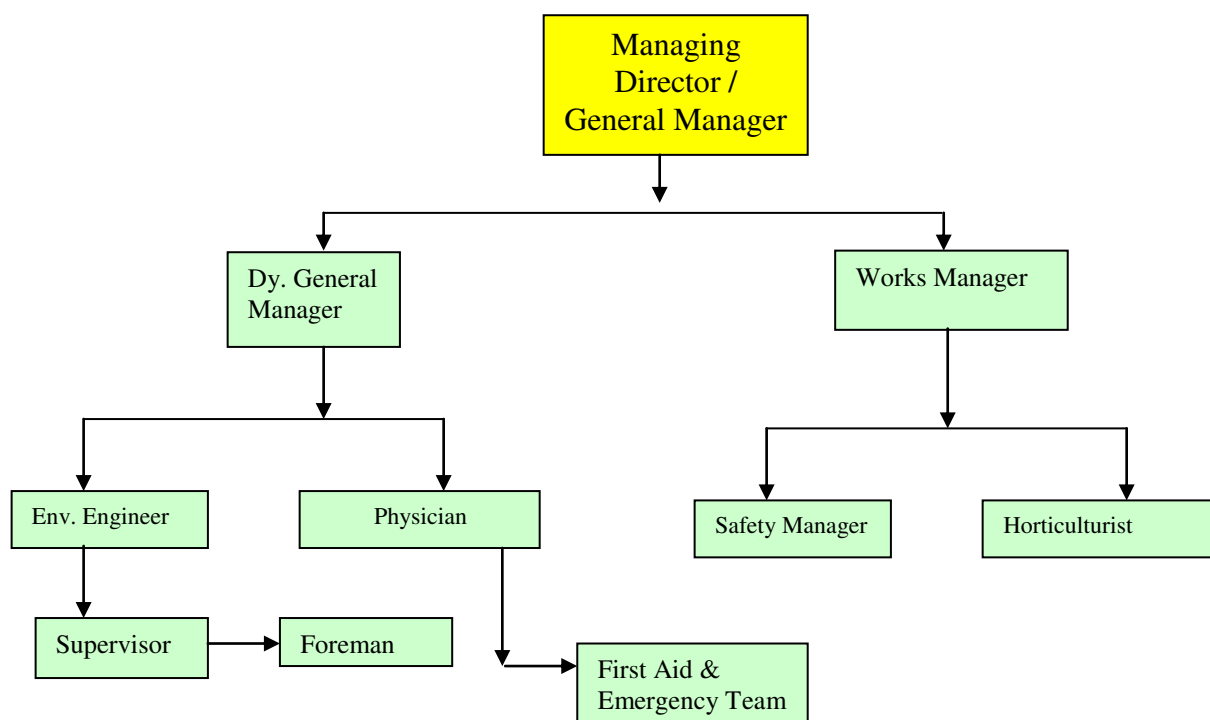


Figure No. 7 : Environment Management Cell

7.5 Construction Phase Environment Management

7.5.1 Site Preparation

The development of site for erections of plant structure, office building and other allied activities shall require careful management planning as the construction activities shall be located in plain barren land owned by the project proponent. Therefore, construction site development process should incorporate certain precautions.

It is necessary to control the dust nuisance that would be created by excavation, leveling and transportation activities so that impacts on the various components of environment would be minimized.

The Project involves setting up of 100 KLPD (Ethanol) Grain based Distillery along with 2.7 MW Power Generation and equipped with latest state of art technology


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“Multi Pressure Distillation” (MPR) and “Molecular Sieve Dehydration” (MSDH) for dehydration, to achieve good quality of Fuel grade Ethanol.

7.5.2 Sanitation

The construction area should be provided with proper and sufficient sanitation facilities in order to maintain adequate hygiene condition of working personnel.

7.5.3 Noise

Though noise level of construction activities shall not be very high, still some specific sources of noise like welding, transportation, movement of earth movers, tractors, concrete or asphalt mixing etc. will be carried out in a controlled manner. Neither the plant nor the construction workers would be exposed to excessive noise levels. However construction labour would be provided with noise protection devises like ear muffs, and occupational safety ware. It is recommended that all noise generating equipment to be stopped during night timings.

7.5.4 Construction Equipment and Waste

Transport vehicles as well as transport routes will be properly maintained during whole construction phase to minimize smoke / dust emission from vehicle exhausts and unpaved roads. Composite solid wastes including metal scrape, earthwork, other wastes, getting generated in construction process should be disposed off in safe manner.

7.5.5 Site Security

Construction site has a potential hazardous environment. To ensure that the local inhabitants and stray cattle are not exposed to these hazards, the site shall be secured by fencing and manned entry points. It will be fully illuminated during nighttime.

7.6 Operational Phase Environment Management

7.6.1 Air Environment

To minimize air pollution load due to operation of proposed boilers of BKBPL ESP with stack of adequate height (60 mtr.) will be installed with the boiler to control the particulate and gaseous emissions due to combustion of fuel. CO₂ produced during the fermentation process will be collected and utilized as an industrial gas. Diesel Generator (DG) Sets with acoustic enclosures will also have adequate stack height as

per Central Pollution Control Board (CPCB) Guidelines. All the internal roads will be asphalted. Development of Green Belt (in 1.54 Ha. 33 % of total project area) around the periphery and within the premises of the plant will help in attenuating the pollutants emitted by the plant.

Multi Fuel HP Boiler of 30 TPH capacity alongwith Electrostatic Precipitator (ESP) as Air Pollution Control Equipment followed by adequate Stack height will be installed as per CPCB & BSPCB guidelines. Details regarding proposed boiler are mentioned in the table given below :

PROPOSED BOILER DETAILS

S. No.	Boiler Particulars	Details
1.	Type of Fuel	Coal/Rice Husk/Biomass
2.	Capacity of Boiler	30 TPH
3.	Stack Height	60 m
4.	Pollution Control Equipment Measures	ESP

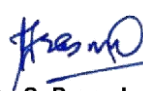
Table No 8: STACK & EMISSION DETAILS

Components	DETAILS
1. Stack attached to	30 TPH Boiler
2. Height of Stack (m.)	60.0
3. Diameter at the top of Stack (m.)	1.0
4. Flue gas Temperature (⁰ K)	398
5. Flue gas exit velocity (m/sec.)	10.0
6. Air Pollution Control Device (APCD)	Electrostatic Precipitator (ESP)

Moreover, BKBPL will install proper air pollution control device and ensure their effective operation and proper maintenance to minimize air pollution level. Proposed green belt will also act as damper for air & noise pollution. Mostly dust capturing species will be planted to further minimize the air pollution load due to operation of BKBPL project.

The sources of air emission from the plant are:

- A. Process Emissions
- B. Boiler and associated Emissions
- C. Vehicular Emissions


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C. Fugitive Emissions

A. Process Emissions

In the Fermentor, the evolved traces of CO₂ will be scrubbed with water and scrubbed water will be recycled in the process. Clean air will be discharged from the scrubber to the atmosphere. There are currently no control technologies for VOC emissions from Fermentor because the significant quantity of molasses that would be carried out of the Fermentor by air media could quickly render systems such as Carbon adsorption inoperable. Add-on air pollution control devices for aging warehouses are used because of potential adverse impact on the product quality. Distillers ensure that the barrel construction is of high quality to minimize leakage, thus reducing ethanol emissions. Ethanol recovery would require the use of a collection system to capture gaseous emissions in the warehouse and to process the gases through a recovery system prior to venting them into the atmosphere.

B. Boiler and associated Emissions – Control Measures

One of the main sources of air pollutants from proposed project is the use of fuels for energy requirement. For steam and power requirements of the plant, Multi Fuel HP Boiler of 30 TPH capacity alongwith ESP as Air Pollution Control Equipment followed by adequate Stack height will be installed as per CPCB & BSPCB guidelines. To minimize Particulate matter, ESP will be used for the boiler and for proper dispersion of PM, SO₂ and NO_x into surrounding environs; stack height (60 mtr.) will be installed as per the existing norms.

C Fugitive Emissions

Following precautionary measures will be adopted for controlling and minimizing fugitive dust emission ;

- Water spraying will be done inside and around the factory premises for dust suppression.
- Proper maintenance and clearing of the roads inside the plant to avoid excess fugitive dust generation
- Raw materials and product disposal trucks should be covered to stop dust emission
- Monitoring of the consented parameters at ambient station


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- Monitor the work zone at various stations to satisfy the corporate requirements for health and environment.

7.6.2 Air Pollution Dispersion Studies;

Prediction of impacts on air environment by proposed Distillery plant during operation phase has been carried out by using AERMOD 18.7.182 Flat terrain dispersion model based on a steady state Gaussian plume dispersion, designed for point sources for short-term and developed by United States Environmental Protection Agency [USEPA].

Prior to air quality modelling exercise, meteorological condition during one season over project site is extensively studied. Concentrations are estimated for the critical pollutants assessed over appropriate averaging times (i.e. 8 hours and 24 hours) based on the applicability of the National Ambient Air Quality Standards (NAAQS).

(i) Pollutants/Model Options Considered for Computations

The model simulations deal with major pollutant PM₁₀, PM_{2.5}, SO₂, & NO_x emitted from the proposed boilers.

(ii) Model Options used for Computations

The options used for short-term computations 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;
 - ❖ Flat terrain is used for computations;
 - ❖ It is assumed that the pollutants do not undergo any physico-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; and
- The model computations have been done for 20 km with 500-m interval.

Model input data

a) Meteorological data Meteorological inputs required are temperature, relative humidity, wind speed, wind direction, cloud cover etc. which was recorded at site during Post-monsoon season.

b) Stack emissions the emission details are given in table below:


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The continuous source of emissions in the proposed project will be from Boiler that would be used to generate steam and power. The Husk/Biomass Briquette/Coal fired boiler capacity will be 30 TPH. Emission from the boiler will be controlled by installation of efficient pollution control systems i.e. ESP and stack height of 60 m.

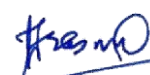
S.No.	Parameter	Details of Proposed Boiler
1	Major Pollutant	PM, SO ₂ , NO _x & CO
2	No. of Stack	01 No.
3	Stack attach to	Boiler Exhaust connected with ESP
4	Material of Construction	MS
5	Height of Stack	60 Meters
6	Capacity of Boiler	30 TPH
7	Boiler Fuel	Rice Husk/Biomass/Coal
8	Diameter at the top of Stack	1.9 meters
9	Temperature	125 °C
10	Flue Gas Exit Velocity	10.5 m/s
11	Rate of Emission (g/sec.)	
A	PM ₁₀	1.9
B	PM _{2.5}	2.3
C	SO ₂	2.1
D	NO _x	3.9

Impact on Air Environment;

During the operation phase Stack are the expected air pollution source (i.e. Point Source), in order to assess the air quality impact on the ambient air environment due to plant operation. However, site will be expected to run as on average 8 hours per day, but for the conservative impact assessment, it is assumed that all site will be run continuously for 24 hours.

PM₁₀, PM_{2.5}, SO₂, & NO_x emissions due to plant operations and the vehicular movement are expected as major pollutants. Emission Area Source characteristic used for atmospheric dispersion modelling is provided in the table below;

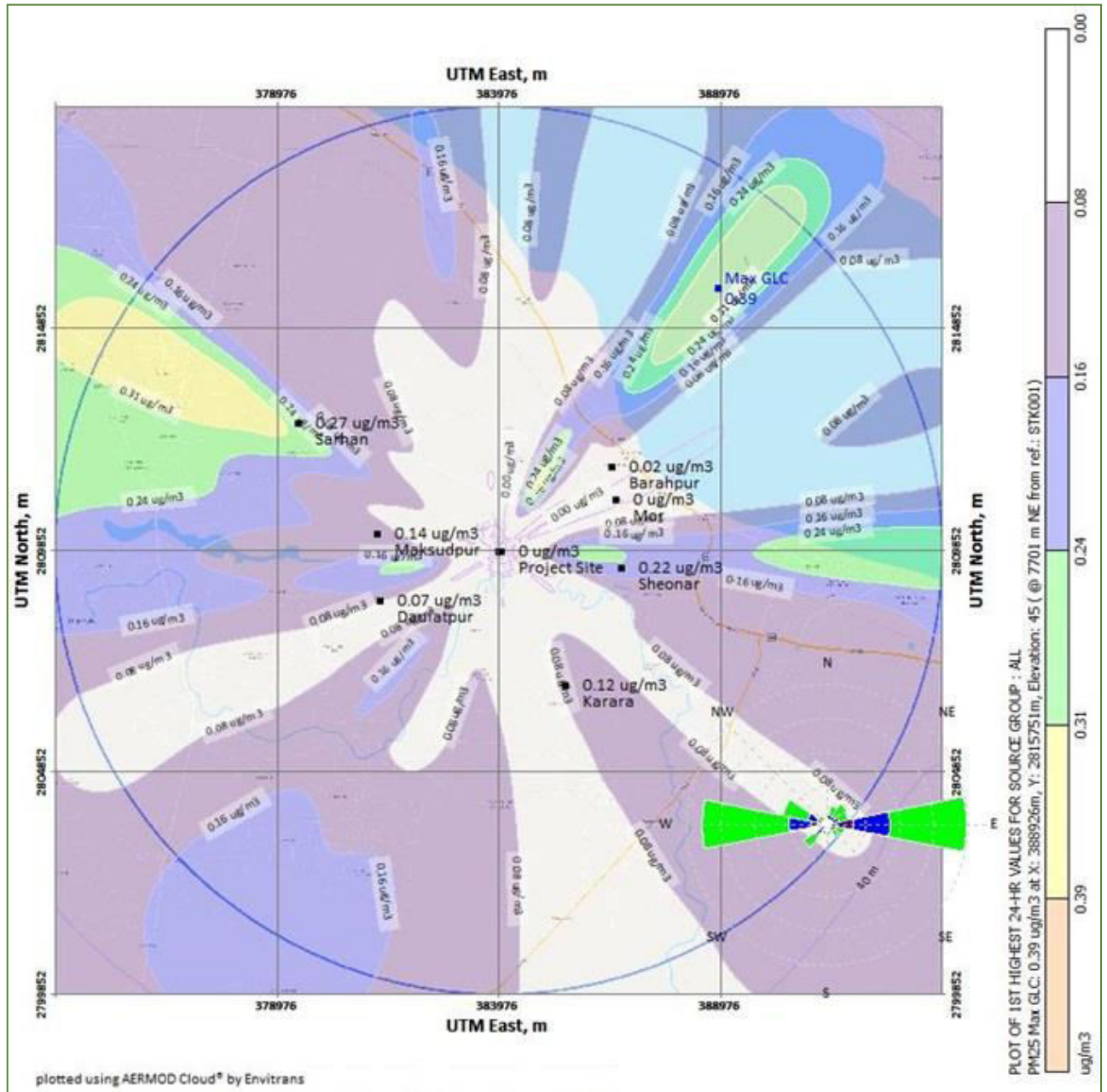
Pollutants	Incremental Emission due to operation of Proposed 60 TPH Boiler		
	Maxm. Incremental Value	Distance from Source	Direction
PM ₁₀	0.33 µg/m³	7701 m.	North East
PM _{2.5}	0.39 µg/m³		
SO ₂	0.44 µg/m³		
NO _x	0.47 µg/m³		



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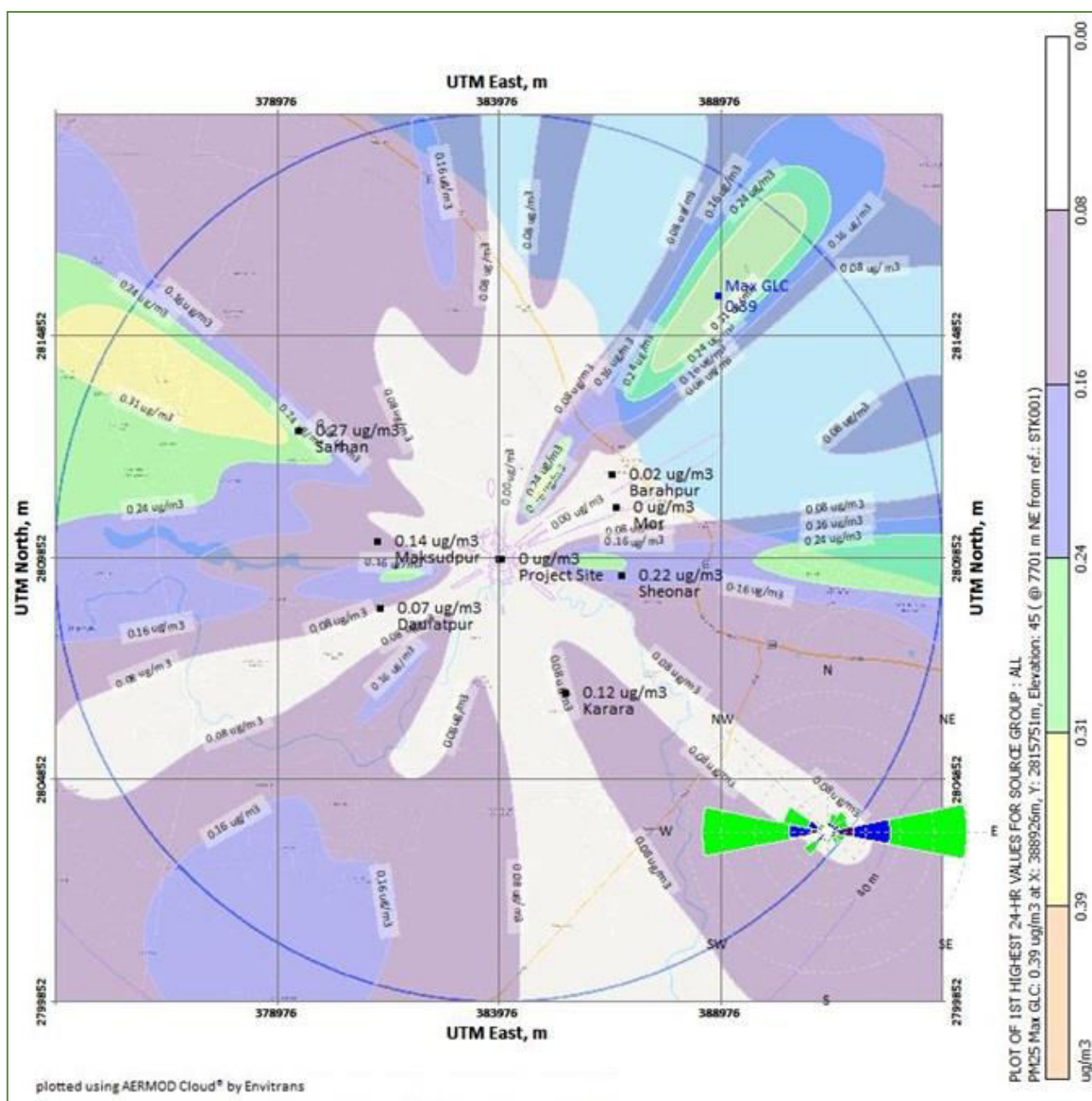
The maximum incremental GLC for the Emission from **Boilers** of measured pollutants PM₁₀, PM_{2.5}, SO₂, & NO_x predicted average over 24 hours are within NAAQS, 2009. The spatial distribution of ground level incremental concentrations of PM₁₀, PM_{2.5}, SO₂, & NO_x due to proposed site on the impact zone area of 10km x 10km on modelling grid size of 100mx100m around the proposed site are shown in figs. below. Modelling result envisages that incremental ground level concentrations of modeled pollutants due to operation of proposed boiler during the assumed aforesaid hours are negligible.

Figure 8 : Isopleth Showing Max^m Incremental PM₁₀ conc. (µg/M³)



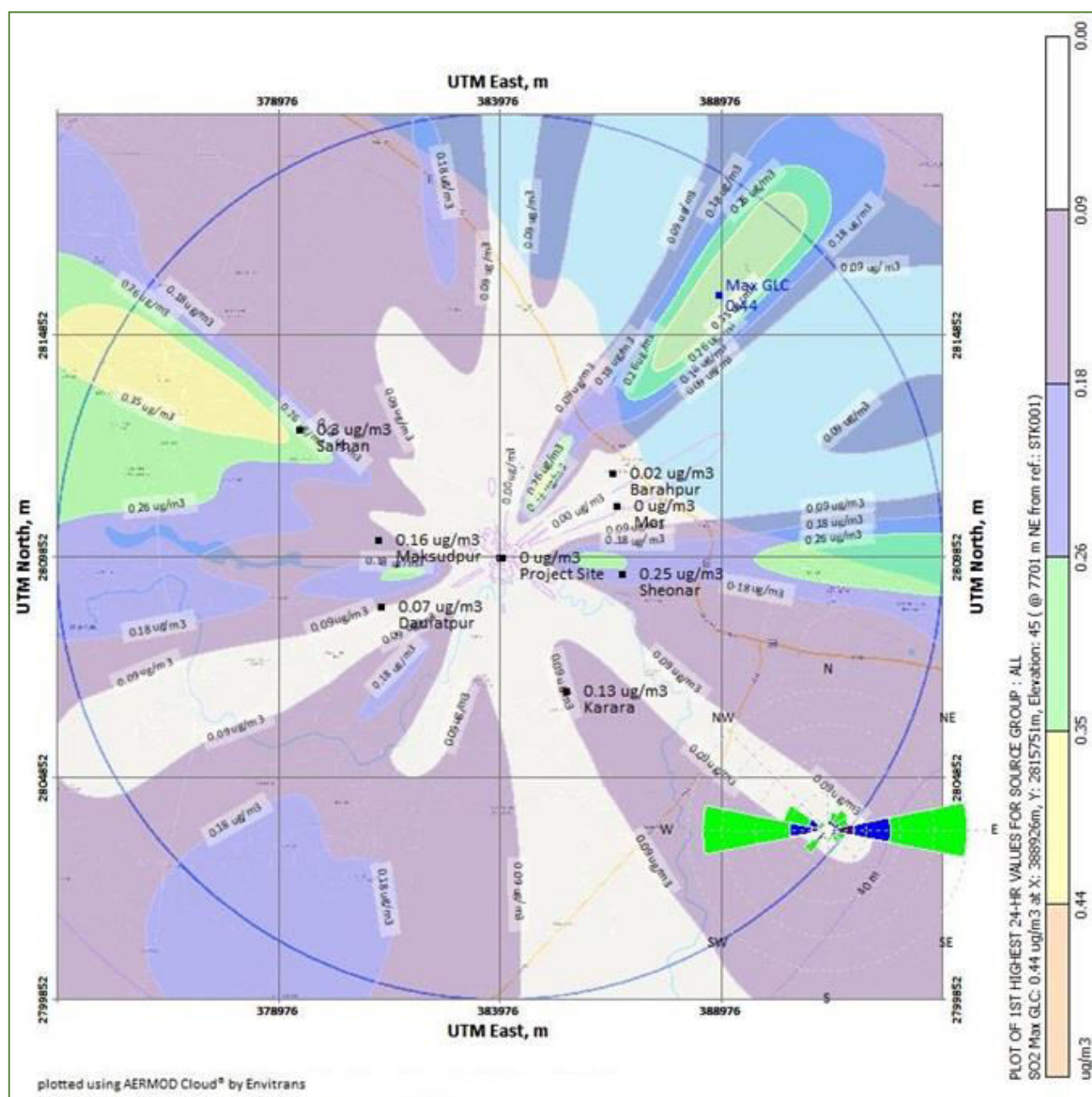
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Figure 9 : Isopleth Showing Max^m Incremental PM_{2.5} conc. (µg/M³)



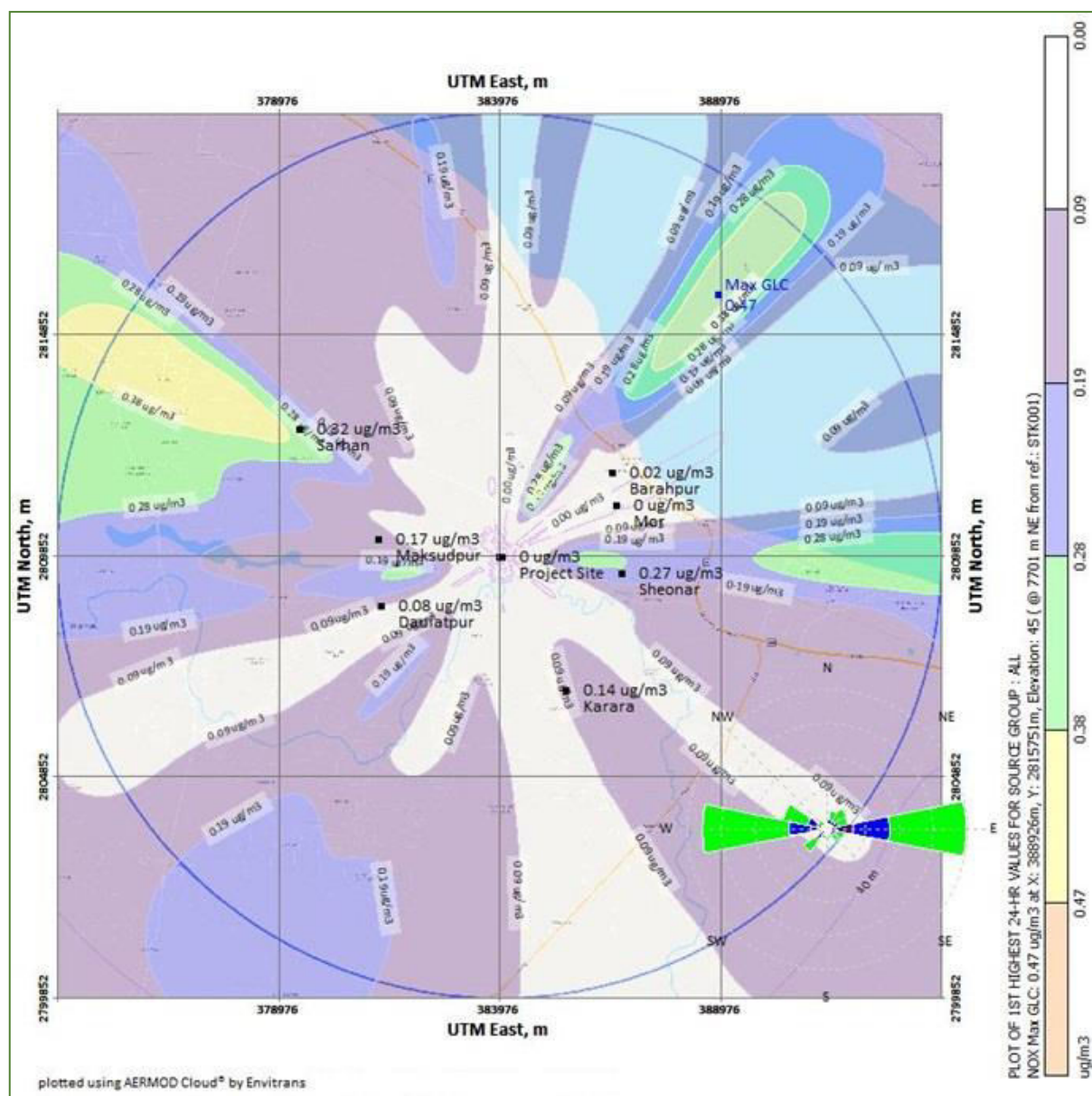
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Figure 10 : Isopleth Showing Max^m Incremental SO₂ conc. (µG/M³)



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Figure 11 : Isopleth Showing Max^m Incremental NO_x conc. (µG/M³)



7.6.2.1 Cumulative Impact on AAQ of the study area due to incremental pollution load ;

S. No.	Locations	PM ₁₀ (µg/m ³)			PM _{2.5} (µg/m ³)			SO ₂ (µg/m ³)			NO ₂ (µg/m ³)		
		Inc GLC	Max Baseline	Total	Inc GLC	Max Baseline	Total	Inc GLC	Max Baseline	Total	Inc GLC	Max Baseline	Total
1	A1 Project site	0.0	49.6	49.6	0.0	31.2	31.2	0.0	5.4	5.4	0.0	18.3	18.3
2	A2 Barahpur	0.0	55.8	55.8	0.02	33.5	33.5	0.02	11.8	11.8	0.02	24.2	24.2
3	A3 Mor	0.0	61.3	61.3	0.0	36.8	36.8	0.0	8.6	8.6	0.0	15.7	15.7
4	A4 Sheonar	0.19	52.3	52.5	0.22	31.6	31.8	0.25	7.7	8.0	0.27	15.8	16.1

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S. No.	Locations	PM ₁₀ (µg/m ³)			PM _{2.5} (µg/m ³)			SO ₂ (µg/m ³)			NO ₂ (µg/m ³)		
		Inc GLC	Max Baseline	Total	Inc GLC	Max Baseline	Total	Inc GLC	Max Baseline	Total	Inc GLC	Max Baseline	Total
5	A5 Karara	0.10	44.3	44.4	0.12	28.9	29.0	0.13	10.6	10.7	0.14	19.6	19.7
6	A6 Daulapur	0.06	50.3	50.4	0.07	30.1	30.2	0.07	9.9	10.0	0.08	24.4	24.5
7	A7 Maksudpur	0.12	48.5	48.6	0.14	29.4	29.5	0.16	9.1	9.3	0.17	18.7	18.9
8	A8 Sarhan	0.23	51.3	51.5	0.27	30.2	30.5	0.30	12.7	13.0	0.32	26.9	27.2

7.6.3 Water Environment

Total Water requirement of proposed distillery project will be 1634 KLD. Fresh water requirement will be 665 KLD, out of which 650 KLD water will be used for (6.5 KL/KL of Product) for Industrial and allied purposes and balance 15 KLD will be used for domestic purposes. Water requirement for first run would be 1633 KLD, of which 983 KLD (~ 60 %) will be Recycled. Water requirement of 665 KLD will be fulfilled through proposed borewells inside premises. The permission for withdrawal of water will be taken the CGWA / CGWB.

Water as a resource is recycled at each possible step of the process and latest technology and methodology will be adopted to conserve and reuse the resources.

The Distillery proposes to achieve Zero Liquid Discharge by Decantation, Multi Effect Evaporation (MEE) followed by dryer to form Distillers Dried Grains with Solubles (DDGS), which will be used as cattle feed/fish. The entire spent wash shall be used to achieve Zero Liquid Discharge.

7.6.4 Waste Water Generation and Treatment

The Distillery proposes to achieve Zero Liquid Discharge by Decantation, Multi Effect Evaporation (MEE) followed by dryer to form Distillers Dried Grains with Solubles (DDGS), which will be used as cattle feed/fish. The entire spent wash will be reused to achieve Zero Liquid Discharge.

The 974 KLD spent wash (9.74 KL/KL of product) from proposed grain based distillery will be subjected to decantation to separate out wet cake and 6-7% w/w solid thin slop will be fed to evaporator. The thick syrup @ 35-40 % solids after the evaporation would then fed to DWGS drier to produce DDGS at 88-90% w/w solids which will be sold as Cattle feed.


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The boiler blow down, DM plant, softener regeneration water will be treated in CPU and after treatment it will be used as cooling water makeup water.

No waste water will be discharged outside the project premises. Liquid effluent would be evaporated entirely and its process condensate utilized in fermentation process.

Spent Wash (SLOPS) Treatment --

- Decantation Section

Decantation section comprises of Centrifuge Decanter for separation of suspended solids from whole Stillage (Spent wash) coming out of Distillation Plant, Wet cake has 32-35% w/w solids as removed from bottom of Decanter and is directly loaded on the trolley parked below the centrifuge. Thin Slops coming out of Decanter are collected in a tank and transferred for further treatment and recycle.

- Evaporation Section

The system consists of 6 Effect Mixed Flow Evaporation. All six effects are falling film type. The Thin Slop at 65 °C from Distillation is first taken in to feed tank and then is fed to evaporation system in 6th effect Mixed feed mode through pre-heater and it flows from fourth to third to first to second.

The concentrated syrup with 28-30% w/w total solids is taken out from the second effect. The low pressure steam shall be supplied to the first effect shell side. Vapours generated in the First effect are used as a heating medium in the second effect & vapours generated in the second effect are used as a heating medium in the third effect vapours generated in third effect are used as heating medium in the fourth effect.

The Thin slop feed shall be concentrated from the initial concentration of 4% w/w TS to 28-30% w/w TS as it travels through all effects.

The vapors evolved from the final effect are condensed in surface condensers. Each effect is provided with recirculation pump. The first effect steam condensate can be recycled back to boiler as it is a fresh steam condensate. The condensate from second, third, fourth effect, surface condenser & Vent condenser condensate is collected in a condensate tank. The condensate is transferred to the further treatment / drain by using centrifugal pump.


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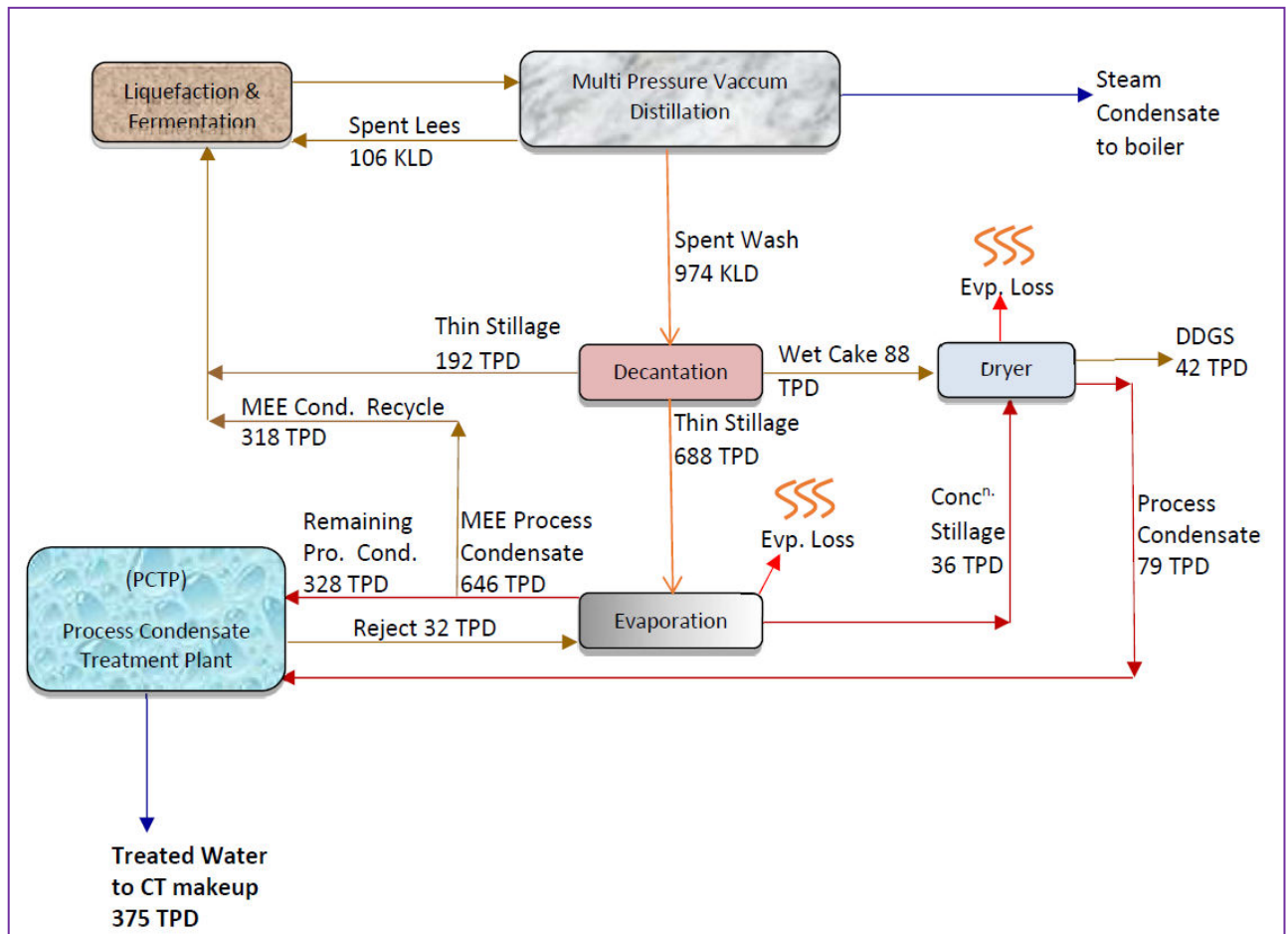
The system operates under pressure & vacuum. Water-ring vacuum pumps are used to maintain desired vacuum in the last effect. The last effect is at lowest temperature. Cooling water from cooling tower is used in the surface condensers for condensing the vapours from the last effect. The steam condensate from first effect shell is collected in Steam Condensate tank and is pumped back to the boiler.

Process condensate from evaporation section will be partly recycled and balance will be treated in process condensate treatment plant, treated water will be used as dilution water in slurry preparation and as cooling water makeup water and steam condensate will be recycled back to the boiler.

Sewerage System :

All the domestic waste water will be treated through STP based on MBBR Process and recycled and reused within premises for allied purposes.

Fig No 12 : Process Flow for Achieving ZLD (Spent Wash Management)



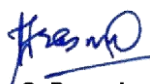
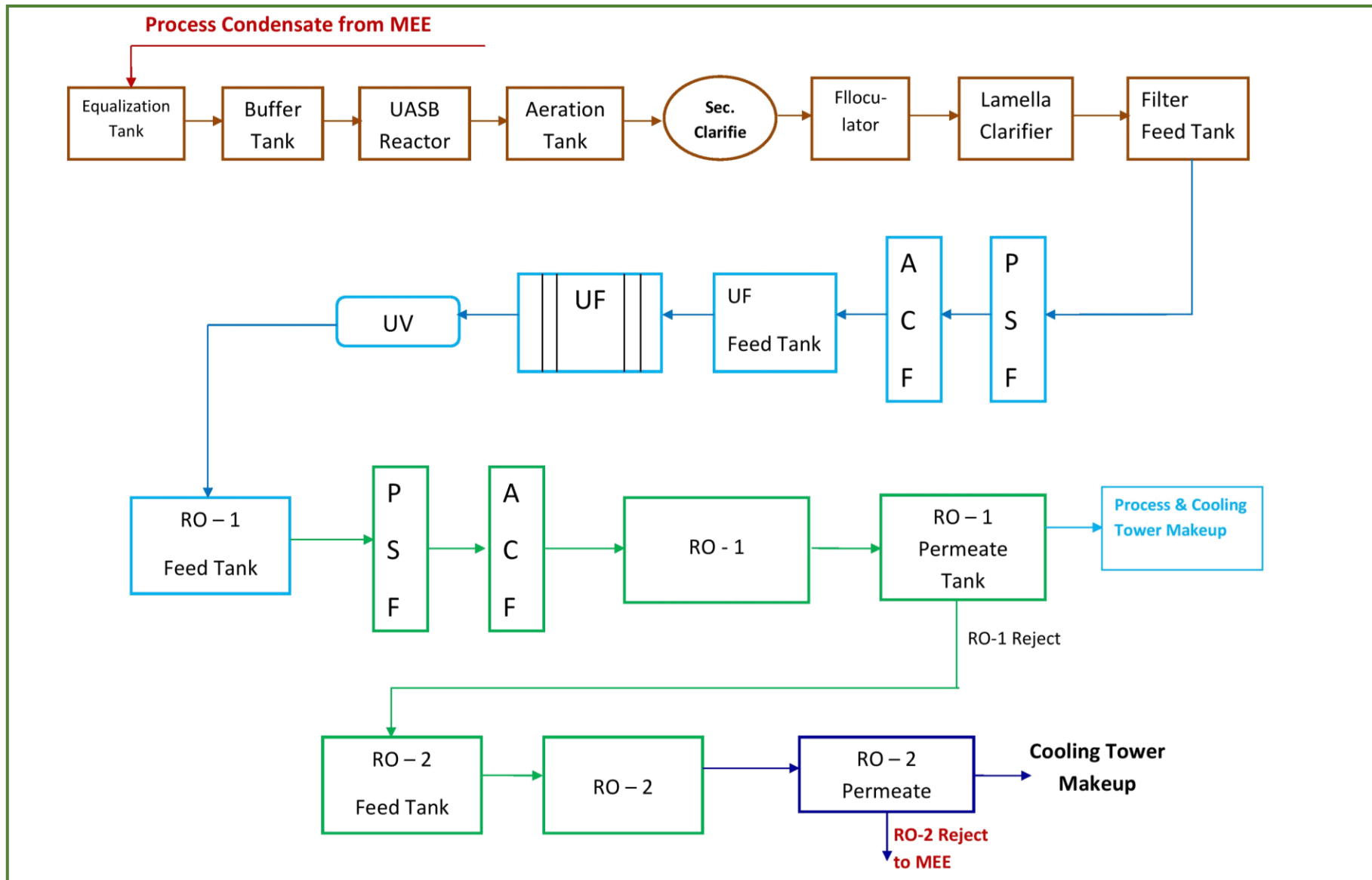

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FIG NO 13: SCHEMATIC DIAGRAM FOR TREATMENT OF MEE PROCESS CONDENSATE



7.6.5 Solid Waste Generation and Management

Table No 9: Solid Waste Generation & Management

Solid waste	Quantity	Disposal
ETP sludge	50 kg/day	Used as manure
Boiler ash	30 TPD	Coal ash will be sent to cement manufacturing unit Rice Husk Ash generated will be sold to brick manufacturers

7.6.6 Noise Environment

The major sources of noise pollution would be running of machineries. The plant machineries shall be maintained properly with regular oiling and greasing to reduce the noise pollution. Sound barriers and enclosures will be provided at major noise generating locations.

Noise Mitigation Measures

- By adopting smooth roads and yard.
- By adopting good foundation, good alignment, well lubricated machineries.
- Steam release, only occasional and for a small duration of time.
- Proper sturdy foundation provided for all the machines and equipments.

The following others precautionary measures are to be adopted in the proposed project ;

- While purchasing the major plant equipment or machines, these machineries and equipment must meet the CPCB and MoEFCC standards. Proper care must be taken at the time of installation to insulate/enclose all the noise sources to avoid occupational exposure to the workers and also to minimize the generation of excess noise level.
- Monitor the ambient noise level and work zone noise level as per the monitoring schedules to conform the stipulated norms.
- Noise attenuation devices such as ear mufflers must be provided to the workers in the high noise exposure areas.


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- Regular maintenance and greasing of equipment and machineries will further reduce the noise level inside the factory periphery.

7.6.7 Biological Environment

Special attention is required to maintain green belt in and around the factory premises.

- Adequate provisions are to be made to facilitate daily watering of all plants and lawns. Special attention provided during summer to ensure that the green belt does not suffer from water shortage.
- Development and maintenance of green belt to be considered as a priority issue.
- No outside soil is brought for any building developments.
- The emissions of particulate matter from the stacks are to be maintained within the limit of 50 mg/Nm³.

7.6.8 Socio-Economic Environment

- The operators and workers are to be trained in various aspects of ESH (Environment, Safety and Health). The managers and officers involved in Environment Management Cell shall undergo refresher workshop and up-gradation of information on various environmental issues.
- The project authorities will help in promoting the activities related to environmental awareness in nearby villages.
- The project authorities will help in promoting local people for livelihood commensurate with their will, skill and abilities.
- Project authorities have proposed to construct Dispensaries and will appoint a part time doctor for employees and to service the local people.
- Project authorities also intend to start a primary school for helping the children of the employees and surrounding village population.
- Many other welfare measures will be taken from time to time.
- BKBPL will uplift the socio economic condition of the area based on local needs as per direction of statutory authorities.


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7.7 3R's Concept of Waste Minimization, (Reuse, Recycle & Recover techniques)

7.7.1 Reuse

The boiler blow down, DM plant, softener regeneration water will be treated in a neutralization tank and after treatment it will be reused as cooling water makeup water.

7.7.2 Recycle

Process condensate from evaporation section will be partly recycled and balance will be treated in process condensate treatment plant (CPU), treated water will be used as dilution water in slurry preparation and as cooling water makeup water and steam condensate will be recycled back to the boiler.

7.7.3 Recover

The spent wash from proposed grain based distillery will be subjected to decantation to separate out wet cake and 6-7% w/w solid thin slop will be fed to evaporator. The thick syrup @ 35-40 % solids after the evaporation would then fed to DWGS drier to recover and produce DDGS at 88-90% w/w solids which will be sold as Cattle feed.

CO₂ generated (69 TPD) during the fermentation process will be recovered by CO₂ Scrubbers and sold to authorized vendors.

7.8 Energy Conservation

Moreover, following measures will be adopted to make the proposed project more energy efficient. Specific energy conservation measures proposed are as under:

- Installation of energy efficient lightings. Use of energy saving light fittings.
- Installing low watt tube lights
- Procurement of energy efficient machineries
- Minimizing idle running of vehicle, machines and electrical appliances.
- Optimizing loads and periodic preventive maintenance & lubrication
- Awareness training & motivational programmes
- Provision of Solar energy system


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7.9 Water Conservation ;

It is proposed to implement Rain water harvesting scheme for recharging the ground water aquifer. Properly designed recharge pits will be provided for recharging the ground water. It will help in water conservation.

7.10 Reduction in Carbon Footprint

- GHG emissions will be prevented and reduced by recovering CO₂ generated during fermentation process by way of CO₂ Scrubbers and sold to vendor.
- Solar lights will be installed along the plant boundary and road.
- 3-5 m. wide green belt all around the premises will enhance carbon sequestration.
- Use of electricity in optimum way.

7.11 Occupational Safety and Health

All precautionary methods will be adopted by the proponent to reduce the risk of exposure of employees to occupational safety and health hazards.

Pre and post medical check-ups will be done of all the employees. Employees will be regularly examined and the medical records will be maintained for each employee. Pulmonary function test and periodical medical check up will be done once in every year.

The following tests will be conducted for each worker :

- Lung Function Test
- Radiology – X-ray
- Pulmonary Function Test
- Audiometric Test
- General clinical examination with emphasis on respiratory system
- Pre employment examinations
- Periodical medical examinations at the time of employment and after completion of employment.

For the safety of workers, personnel protective appliances like hand gloves, goggles, aprons, ear mufflers, nose mask etc. will be provided. Nose mask will be provided at places, where there is possibility of dust generation.


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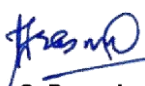
Proper ventilation system will be provided in the process area.

7.12 Risk Assessment and Damage Control

- Design, manufacture and construction of buildings, plant and machineries will be as per National and International Codes as applicable in specific cases and laid down by statutory authorities.
- Provision of adequate access ways for movement of equipment and personnel will be made.
- Minimum of two numbers of gates for escape during disaster will be provided.
- In the vicinity of main plant entrance, there will be an emergency assembly point where plant personnel will assemble in the event of any disaster.
- Adequate numbers of Fire Fighting equipment and Fire extinguishers will be installed in the work places for emergency purpose and the Supervisors / Workers will be trained to use the equipments.
- An ambulance will be provided in the factory premises.
- A qualified Doctor and a compounder will be employed for attending to any emergency.

7.13 Green Belt

As per Central Pollution Control Board (CPCB) Guidelines. All the internal roads will be asphalted. Development of Green Belt in 1.54 Ha. (33 % of total project area 4.67 Ha.) land area around the periphery and within the premises of the plant will help in attenuating the pollutants emitted by the plant so as to mitigate the effects of emissions from the plant. The treated waste water from the plant will be utilized for the greenbelt development. Roads for vehicular movement will be paved and adequate mitigation measures will be provided to prevent fugitive emissions. Approx. 4050 nos. of trees will be planted all around the periphery and within premises in phase wise manner for development of green belt.


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Plantation: Ecological Need and Location

Tree plantation is known for improving the aesthetic and climatological environment of the area. Properly designed green belt would help in abating air pollution up to a significant degree.

To make the proposed project complex verdant, healthy and hazard proof, requisite plantation at proper locations is needed with particular emphasis on aesthetics, protection against noise and fugitive emissions.

The locations in the proposed unit where vegetal covers are required to be provided are:

- Along the outermost boundary, wherever possible
- Along road and pathways
- On the all remaining vacant land inside the premises

Plantation Design and Plant Species

In view of the different functional requirements of the plant the pattern of plantation around the unit is discussed under curtain, avenue, field (vacant land) and ornamental plantations.

To help, restrict the movement of pollutants from inside to outside and *vice versa*, a thick green belt (5 m thickness) should be developed at the peripheral limits of the proposed units along the boundary wall. Essentially the peripheral plantation would act as a barrier to movement of pollutants and noise.

5 m thick curtain of plants, depending upon the space availability shall be planted along with the outermost boundary of the proposed units. Approx. 3850 Nos. of trees (@ 2500 Nos. per Ha.) of following species will be planted :

Common Name	Botanical Name	Nos. of Tree Proposed
1. Sheesham	<i>Dalbargia sisoo</i>	385
2. Neem	<i>Azadirachta Indica</i>	115
3. Amla	<i>Emblica officinalis</i>	85
4. Mahogany	<i>Swietenia mahagoni</i>	427



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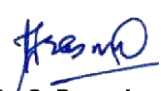
Common Name	Botanical Name	Nos. of Tree Proposed
5. Peepal	<i>Ficus religiosa</i>	38
6. Mango	<i>Mangifer Indica</i>	116
7. Kadamb	<i>Neolamarckia cadamba</i>	77
8. Jamun	<i>Syzygium cumini</i>	58
9. Ashoka	<i>Polyalthia pendula</i>	580
10. Imli	<i>Tamarindus indicus</i>	20
11. Sitafal	<i>Annona squamosa</i>	34
12. Mahanimb	<i>Ailanthus excelsa</i>	58
13. Cotton Tree	<i>Bombax ceiba</i>	38
14. Kachnaar	<i>Bauhinia acuminata</i>	84
15. Sal	<i>Shorea robusta</i>	270
16. Poplar	<i>Populus ciliata</i>	540
17. Bamboo	<i>Bambusa vulgaris</i>	925
Total Nos. of Trees		3850

7.14 Rain Water Harvesting Plan

It is proposed to collect all the Rain Water Falling on the Terrace through the Rain Water downtakes which shall be grouped and taken to a rain water harvesting tank with by pass arrangement for first wash rinse as well as to by pass into the storm water drain. The surface water of the Ground level shall be grouped to percolate into recharge pits all around the compound wall. The water shall recharge the ground water table.

For Harvesting the Rain Water falling on the Plot it is proposed to have Recharge Pits filled with aggregate media for percolation of Rain Water in the aquifer.

Part of this water is expected to percolate down to the groundwater table thus acting as a recharge system. The natural purification process (filtration and adsorption phenomena while percolation through soil) is expected to further enhance the water quality by the time the water reaches the groundwater table.


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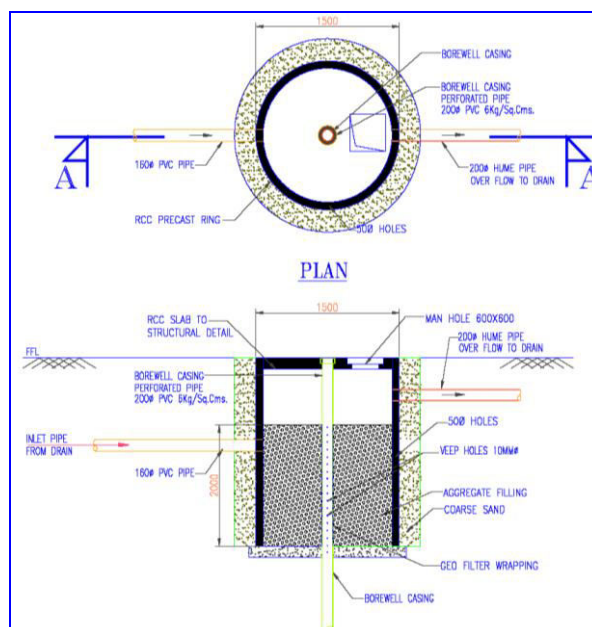


Figure No 14 : Typical Rain water Harvesting Structure

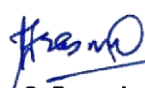
TABLE NO 10: RAIN WATER HARVESTING POTENTIAL OF THE BKBPL PROJECT

Type of Area	Area (Tentative) in M ²	Run-Off Coefficient	Annual Avg. Rainfall in m.	RWH Potential (m ³)
Roof Area	23000	0.85	0.95	18573
Roads & Paved Areas	2500	0.70	0.95	1663
Open Area	5800	0.30	0.95	1653
Green Belt Area	15400	0.35	0.95	5121
TOTAL				27009 M ³
Annual Rainwater Harvesting Potential				

8.0 Environmental Monitoring Schedule

Monitoring of the post project environment is of utmost importance and has legal requirements. Regular monitoring of the environment helps in assessing the benefits of implementation of environment management plan. Proposed Project will adopt an effective monitoring plan with proper schedule as a step forward to ensure better environment management practices.

This would be attained by collection of samples of water, stack emission, ambient air and work zone environment and analyzing the samples by various methods. Noise level would be monitored by a noise recorder and the data would be generated instantly.


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Stack emission would be monitored from stacks. Work zone environment would be monitored at sensitive points of manufacturing areas, where the fugitive emissions would be visibly more.

The ambient air quality may be monitored at four locations, with one at the proposed project as the center point and the remaining three at 120° to each other in down wind direction. The locations would change with the season and the wind pattern.

The environmental monitoring must be done as per the schedule summarized in Table below.

Table No 11: Environment Monitoring Schedule

Environmental Component	Frequency of Monitoring / Sampling & Location	Parameters to be covered
Ambient Air Quality Monitoring	104 samples as per NAAQS 2009 (Biweekly basis)	PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , & CO
Stack Emission Monitoring	Monthly for Stack/Exhaust	Flue Gas Temp., Velocity, Volumetric Flow Rate, PM ₁₀ , PM _{2.5} , SO ₂ & NO _x and VOC's
Ambient Noise Level Monitoring	Monthly at 5 different locations	Ambient Equivalent contains noise level in dB(A) / Sound Pressure Level (Leq) at Day and Night Time
Ground Water / Drinking Water Quality	Monthly from Borewell and Drinking Water tap	pH, Turbidity, Total Dissolved Solids, Total Hardness, Calcium, Magnesium, Iron, Total residual free Chlorine, Alkalinity, Chloride, Sulphate, Nitrate, Fluoride, Coliform (MPN Value) & E.Coli
Surface Water Quality	2 stations namely in River Ganga & River Falgu sample from upstream and one from downstream)	pH, Turbidity, Total Suspended Solids, Total Dissolved Solids, Chloride, DO, BOD, COD, Total Hardness, Total Alkalinity, Coliform (MPN Value), Faecal Coliform & E.Coli

9.0 Environmental Management Cost

The total fiscal estimation for EMP is indicated to be Rs. 900 lakhs (Capital Cost 740 Lakhs & Recurring Cost / Annum 160 Lakhs), details are given in **Table no..**

Table No 12: Cost of Environmental Protection Measures

Particulars	Amount in INR, Lakhs
One Time Installation Cost	
1. Installation of Air Pollution Control System	220.0 lakh



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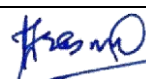
2. Installation of MEE, CPU & DWGS Dryer System	415.0 Lakh
3. Solid waste such as Garbage, process and ETP storage and odor management system	5.00 lakh
4. Green Belt Development	25.0 lakh
5. Installation of Tertiary Water Treatment Plant	20.0 lakh
6. Installation of Fire Safety System	25.0 lakh
7. Installation of Solar Power System	20.0 lakh
8. Rain Water Harvesting System	10.0 lakh
Total	740.0 lakh
Recurring Cost / Annum	
1. Environmental Monitoring	10.0 lakh
2. Maintenance Cost of Air Pollution Control System	30.0 lakh
3. Maintenance of MEE, CPU & DWGS Dryer System	100.0 Lakh
4. Greenbelt maintenance	10.0 lakh
5. Maintenance of ETP / STP / Water Treatment Plant	10.0 lakh
Total	160.0 lakh
Grand Total	900.0 lakh

10.0 Corporate Environmental Responsibility (CER)

CER is a voluntary activity of a enterprise/entity/project authorities which supports social interests and environmental issues. It is the activity to contribute to the welfare of the society. CER, in fact, is about business giving back to the society. CER is the commitment of businesses to contribute for sustainable economic development of the society by working with the employees, their families, local community to improve their lives in ways for overall development.

BKBPL has allocated an amount of Rs. 1.48 Crores (1.06 % of total project cost i.e. Rs. 140 Crores) towards Corporate Environment Responsibility as per MoEFCC OM vide F. No. 22-65/2017-IA.III Dt: 01.05.2018. All the above amount will be spend in phase wise manner as detailed under ;

CER Activities	Period with Budget allocation		
	Upto Dec. 2024	Upto Dec. 2025	Total
1. Financial assistance & Support to agriculture deptt. for implementation of PM Kusum Yojana for Harvesting of Solar Power and Installation of standalone solar powered agricultural pumps.	20	20	40


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CER Activities	Period with Budget allocation		
	Upto Dec. 2024	Upto Dec. 2025	Total
2. Support to Govt. Health Care agencies for improvement and upgradation of existing health infrastructure	35	35	70
3. Skill development for 100 nos. local youths (as per employability potential) from villages within 10 km. radius. Training Charges Rs. 7500/= plus Rs. 2500/= stipend per month for 3 months. (Rs. 15000 / youth)	7.5	7.5	15
4. Development of Rain Water Collection Pond in 2 nos. villages within 10 Km. radius	5	5	10
5. Tree Plantation within 10 Km. Radius in consultation with DFO	8	5	13
TOTAL CER AMOUNT (1.05% of Total Project Cost)	75.5	72.5	148

11.0 Conclusion

From the discussions in the above sections, regarding constitution, requirement, location, process description, environmental management etc., it can be sum up that establishment of proposed Grain based Distillery Project by BKBPL is an feasible and promising venture. Proposed project will help in ;

- a) Meeting the target of EBP of 20% blending by 2025
- b) Savings of foreign currency by reducing import of crude oil.
- c) Reduction in pollution load by producing cleaner fuel component.
- d) Employment Generation
- e) Socio Economic Development of surrounding area.
- f) Increasing the income of farmers by utilizing residual feed crop material (Broken Rice, Sorghum, Bajra, Maize, etc.) which is not suitable for human consumption and has nil value in open market.

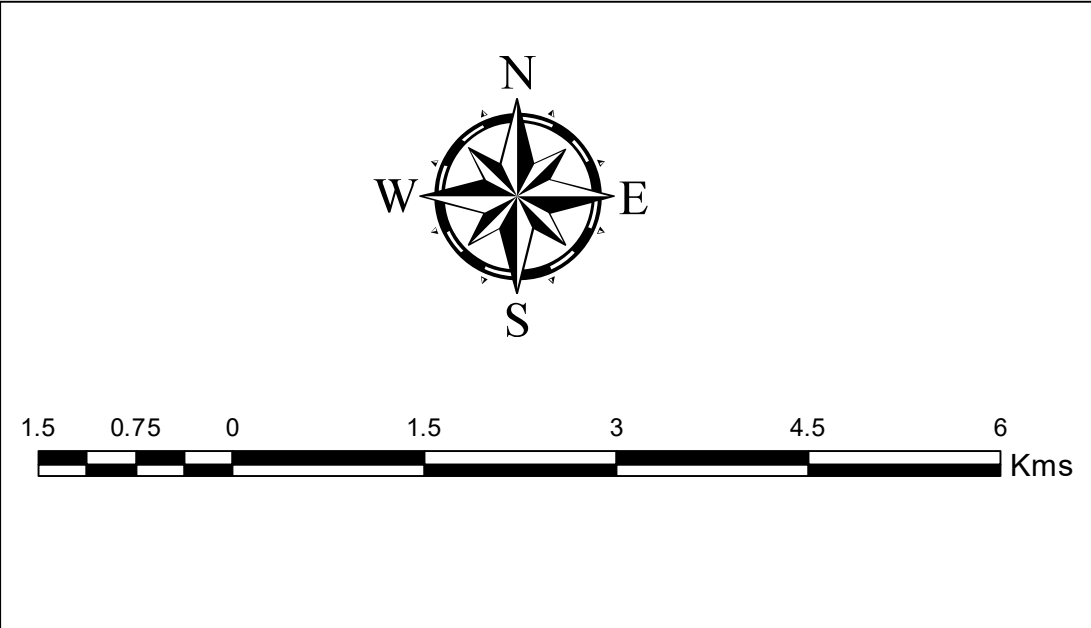
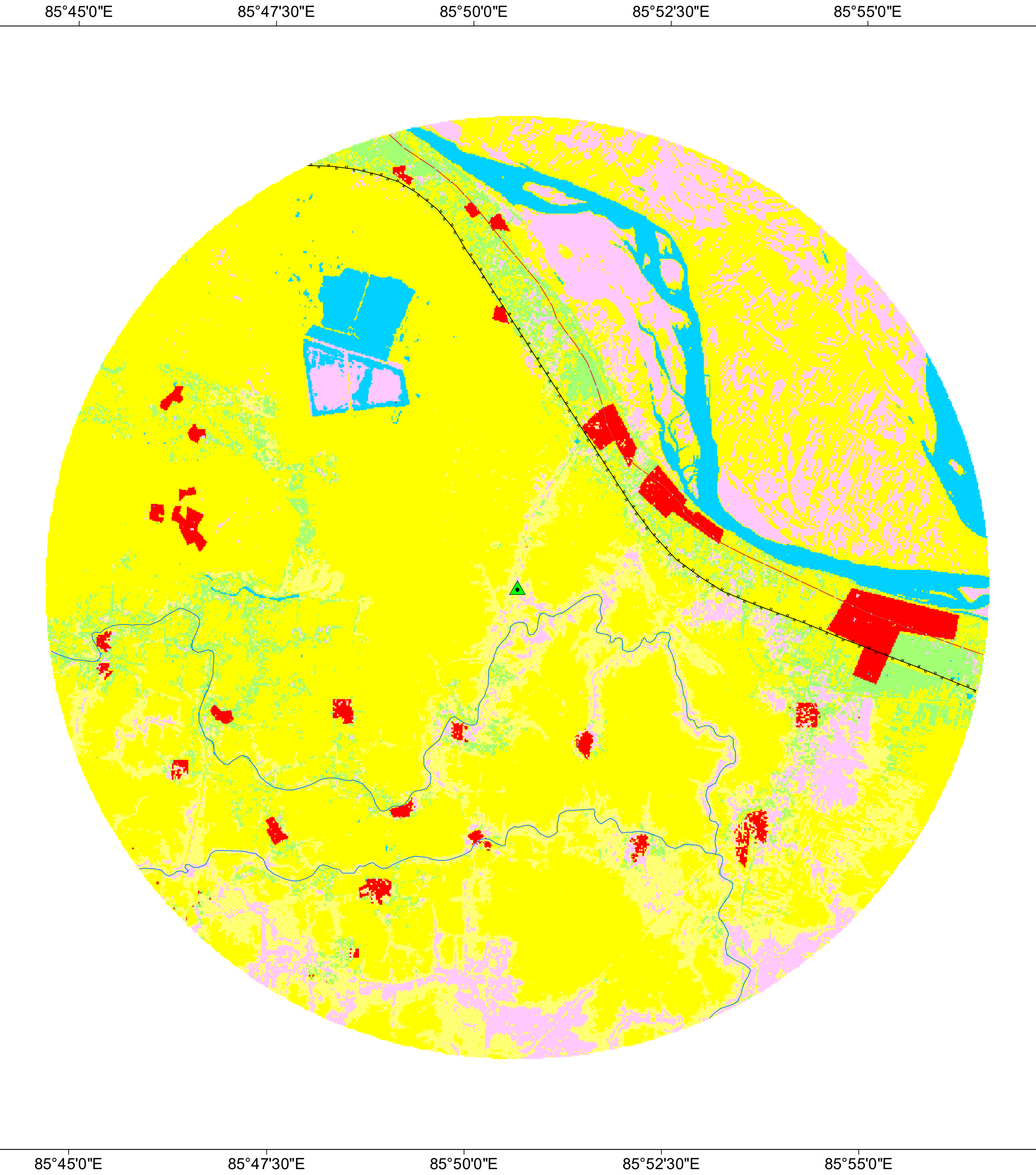
BKBPL Distillery project will strictly implement all mitigative measures to minimize and reduce environmental pollution load due to operation of proposed distillery project.

Therefore, it can be concluded that proposed distillery project is in national interest for biofuel production through sustainable development. Govt. will get revenues in terms of taxes and local people will get direct & indirect employment in form of transport of grains and alcohol, maintenance & house-keeping contract work etc.

Proposed project of BKBPL will not make any significant adverse impact on the ecology & environment of the area, as all preventive measures will be implemented.



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LANDUSE LANDCOVER MAP

Project

Brajendra Kumar Builders Pvt. Ltd.

100 KLD Ethanol Plant

Mauza : Mor, Block Mokama,

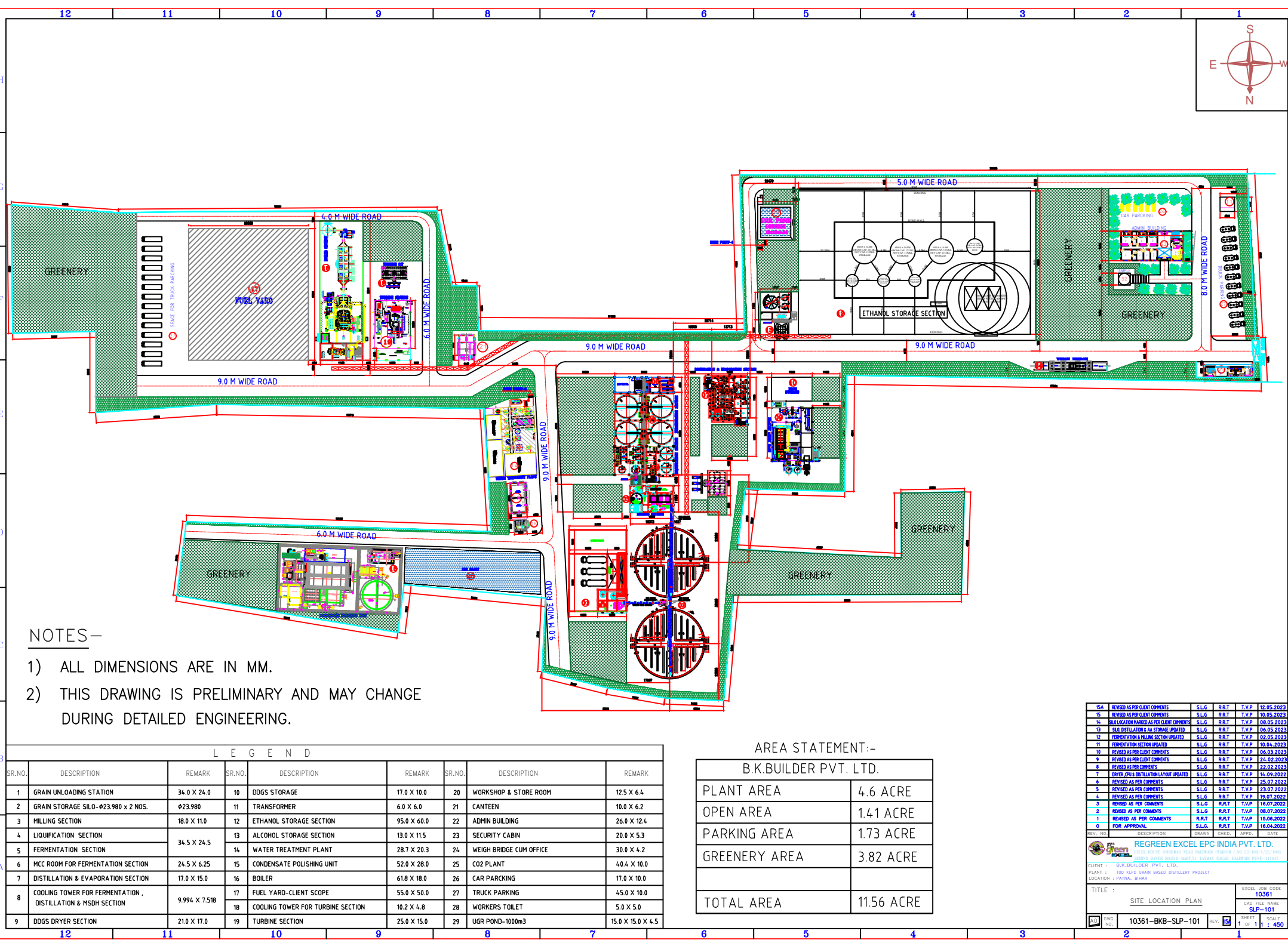
Dist. PATNA – 803302

Legend

- Project Location
- Road
- River
- Rail

landuse-map.img

Class_Names	Area in Ha.	Area in %
Agriculture Fallow Land	4327.89	13.75
Agriculture Land	19291.7	61.28
Agriculture Plantation	1912.35	6.07
Built up Land	698.23	2.22
Scrub/Barren Land	3777.57	11.99
Water Body	1476.49	4.69
TOTAL	31484.23	100



NOTES-

- 1) ALL DIMENSIONS ARE IN MM.
- 2) THIS DRAWING IS PRELIMINARY AND MAY CHANGE DURING DETAILED ENGINEERING.

LEGEND

SR.NO.	DESCRIPTION	REMARK	SR.NO.	DESCRIPTION	REMARK	SR.NO.	DESCRIPTION	REMARK
1	GRAIN UNLOADING STATION	34.0 X 24.0	10	DDGS STORAGE	17.0 X 10.0	20	WORKSHOP & STORE ROOM	12.5 X 6.4
2	GRAIN STORAGE SILO-#23.980 x 2 NOS.	#23.980	11	TRANSFORMER	6.0 X 6.0	21	CANTEEN	10.0 X 6.2
3	MILLING SECTION	18.0 X 11.0	12	ETHANOL STORAGE SECTION	95.0 X 60.0	22	ADMIN BUILDING	26.0 X 12.4
4	LIQUIFICATION SECTION	34.5 X 24.5	13	ALCOHOL STORAGE SECTION	13.0 X 11.5	23	SECURITY CABIN	20.0 X 5.3
5	FERMENTATION SECTION	24.5 X 6.25	14	WATER TREATMENT PLANT	28.7 X 20.3	24	WEIGH BRIDGE CUM OFFICE	30.0 X 4.2
6	MCC ROOM FOR FERMENTATION SECTION	24.5 X 6.25	15	CONDENSATE POLISHING UNIT	52.0 X 28.0	25	CO2 PLANT	40.4 X 10.0
7	DISTILLATION & EVAPORATION SECTION	17.0 X 15.0	16	BOILER	61.8 X 18.0	26	CAR PARKING	17.0 X 10.0
8	COOLING TOWER FOR FERMENTATION , DISTILLATION & MSDH SECTION	9.994 X 7.518	17	FUEL YARD-CLIENT SCOPE	55.0 X 50.0	27	TRUCK PARKING	45.0 X 10.0
9	DDGS DRYER SECTION	21.0 X 17.0	18	COOLING TOWER FOR TURBINE SECTION	10.2 X 4.8	28	WORKERS TOILET	5.0 X 5.0
			19	TURBINE SECTION	25.0 X 15.0	29	UGR POND-1000m3	15.0 X 15.0 X 4.5

AREA STATEMENT:-

B.K.BUILDER PVT. LTD.

PLANT AREA	4.6 ACRE
OPEN AREA	1.41 ACRE
PARKING AREA	1.73 ACRE
GREENERY AREA	3.82 ACRE
TOTAL AREA	11.56 ACRE

15A	REVISED AS PER CLIENT COMMENTS	SLG	R.T	T.V.P	12.05.2023
15	REVISED AS PER CLIENT COMMENTS	SLG	R.T	T.V.P	10.05.2023
14	SLG LOCATION MARKED AS PER CLIENT COMMENTS	SLG	R.T	T.V.P	08.05.2023
9	SLG DISTILLATION AS STORAGE UPDATED	SLG	R.T	T.V.P	06.05.2023
12	FERMENTATION & MILLING SECTION UPDATED	SLG	R.T	T.V.P	02.05.2023
11	FERMENTATION SECTION UPDATED	SLG	R.T	T.V.P	10.04.2023
10	REVISED AS PER CLIENT COMMENTS	SLG	R.T	T.V.P	06.03.2023
9	REVISED AS PER CLIENT COMMENTS	SLG	R.T	T.V.P	26.02.2023
8	REVISED AS PER CLIENT COMMENTS	SLG	R.T	T.V.P	23.02.2023
7	DRYER & DISTILLATION LAYOUT UPDATED	SLG	R.T	T.V.P	16.09.2022
6	REVISED AS PER COMMENTS	SLG	R.T	T.V.P	25.07.2022
5	REVISED AS PER COMMENTS	SLG	R.T	T.V.P	23.07.2022
4	REVISED AS PER COMMENTS	SLG	R.T	T.V.P	19.07.2022
3	REVISED AS PER COMMENTS	SLG	R.T	T.V.P	16.07.2022
2	REVISED AS PER COMMENTS	SLG	R.T	T.V.P	08.07.2022
1	REVISED AS PER COMMENTS	SLG	R.T	T.V.P	15.06.2022
0	FOR APPROVAL	SLG	R.T	T.V.P	18.04.2022
REV. NO.	DESCRIPTION	DRAWN	APPROVED	DATE	
0					
REGREEN EXCEL EPC INDIA PVT. LTD.					
CLIENT : B.K.BUILDER PVT. LTD.					
PLANT : 100 KUPA GRAIN BASED DISTILLERY PROJECT					
LOCATION : PATNA, BIHAR					
TITLE : SITE LOCATION PLAN					EXCEL JOB CODE 10361
10361-BKB-SLP-101					CAD FILE NAME SLP-101
REV. NO.	10361-BKB-SLP-101	REV. NO.	15	1 OF 1	SCALE 1 : 450