

Pre – Feasibility Report (PFR) FOR

Proposed establishment of Grain Based Ethanol Distillery of capacity 100 KLPD with 2.5 MW co-generation power plant

at Village – Nayagaon Kushahar, Khijirpura, Tehsil – Kesaria, District - East Champaran, Bihar, Pin - 845424 , India

Reference

- **National Policy on Biofuels,- 2018 on dated 04th June 2018 (Approved by the Cabinet on dated 16-05-2018) and Amendments to the National Policy on Biofuels - 2020**
- **MoEF&CC Notification S. O. 2339 (E) dated 16th June 2021**

Category: B2, 5(ga) as per MoEF&CC Notification & its amendment

Applicant



M/s Tirhut Udhyog Private Limited

Registered Office: Kalpana Residency, Satsang Nagar, Kolhua Paigamberpur, District – Muzaffarpur, Bihar - 843108

Consultant



PARAMARSH

SERVICING ENVIRONMENT AND DEVELOPMENT

QCI/ NABET Certificate No: NABET/EIA/2124/RA 0224

(Valid up to May 01, 2024)

Address: M.S.-1/10, Sector A, Sitapur Road Yojana (Near St. Antony School, Ram Ram Bank Chauraha), Aliganj, Lucknow-226024, UP



December 2023

PRE - FEASIBILITY REPORT

1.0 Executive Summary

(I) Introduction

It is a proposal for Establishment of Grain Based Ethanol Distillery capacity 100 KLPD with 2.5 MW co-generation power plant at Village – Nayagaon Kushahar, Khijirpura, Tehsil – Kesaria, District - East Champaran, Bihar, Pin - 845424 , India.

M/s. Tirhut Udhog Pvt Ltd. (TUPL) having its registered office at House No.84, Belwana, Mothihari, East Champaran, Bihar, India is a Private Limited Company registered under the Companies Act, 2013. Tirhut Udhog Pvt Limited was incorporated on the 14th day of January, 2021 in the name and style of Tirhut Udhog Private Limited.

Currently land is under the possession of Company. Sale deed has been made within the land owner and Director on dated 24.09.2022 for setting up Ethanol Plant. In continuation land conversion order issued under Bihar Agricultural Land (Conversion to non-agricultural purposes) Act 2010 on dated 24.04.2023.

Detail of land conversion is given below;

District	East Champaran, Motihari
Sub-division	Chakiya
Zone	Keasriya
Name of Village	Khijirpura
Khata No	249, 258, 257, 88, 278, 33, 103, 248, 172, 277, 208, 119, 184, 249, 218, 80, 155
Khasra Number	4229, 4224, 4265, 4263, 4266, 4219, 4255, 4288, 4253, 4251, 4252, 4275, 4254, 4247, 4248, 4220, 4230, 4230, 4225, 4226, 4227
Land Conversion area for non-agricultural purposes	48328.00 m ²

As per EIA Notification dated 14th Sep, 2006 and as amended on 16th June, 2021, the project falls under Category "B2", Project or Activity '5(ga)' "Grain based Ethanol Distillery based on Zero Liquid Discharge" and will be appraised as per B2 Category Project.

TABLE – 01: Salient Features of the Project

Sr No	Particulars	Details	
1	Name	M/s Tirhut Udhog Pvt Ltd	
2	Registered Office	Kalpana Residency, Satsangnagar, Kolhua – Paigamberpur ,District - Muzaffarpur, Bihar – 843108	
3	Name of Applicant	Mr. Harendra Kumar Bajpayee	
4	Designation	Managing Director	
5	Email ID	bajpayeehk@gmail.com	
6	Mobile No	9326899052	
7	Nature and Size of Project	Particulars	Quantity
		Distillery	100 KLD

Sr No	Particulars	Details				
		Power		2.5 MW		
		DDGS (Dried Distillers Grains with Soluble)		45 TPD at 10-12% W/W Moisture (14995 MT/annum)		
		CO ₂ Recovery		0.55 kg / per ltr(Recovery)		
		Theoretical CO ₂ generation during Fermentation		76.0 TPD		
8	Category of the Project	As per EIA Notification dated 14 th Sep., 2006 as amended from time to time; the project falls in Category 'B2' as the proposed Grain based distillery based on Zero Liquid Discharge (ZLD), Project or Activity - 5(ga).				
9	Locations Details					
	Plot No./Khasra No./Survey No.	Sr.no	Khata no	Khasra	Area(dismil)	
		1	249	4229	33.350	
			249	4229	40.66	
		2	258	4224	33	
		3	257	4265	98.310	
			257	4265	62.350	
			257	4265	31	
		4	88	4263	9.425	
		5	278	4266	93.960	
		6	119	4219	32	
			119	4219	31.19	
			119	4220	66.99	
		7	33	4255	46.400	
		8	234	4288	16.458	
		9	103	4253	12.180	
			103	4253	22.91	
			103	4275	14.79	
		10	248	4251	37.41	
		11	172	4252	20.44	
		12	277	4255	69.31	
			277	4254	6.96	
		13	208	4247	23.20	
			208	4248	23.20	
		14	184	4553	87	
		15	218	4230	46.40	
		16	80	4225	98.89	
		17	155	4226	80.91	
			155	4227	29.87	
			Total		1168.563	
			Village	Nayagaon Kushahar		
			PO	Khijirpura		

Sr No	Particulars	Details			
	Tehsil	Kesharia			
	District	East Champaran			
	State	Bihar			
	Pin code	845424			
	Coordinates of Proposed project	Pillar	Latitude	Longitude	
		A	26°22'33.65"N	84°49'35.86"E	
		B	26°22'38.99"N	84°49'37.56"E	
		C	26°22'38.38"N	84°49'39.61"E	
		D	26°22'40.09"N	84°49'40.09"E	
		E	26°22'38.24"N	84°49'46.95"E	
		F	26°22'37.21"N	84°49'46.59"E	
		G	26°22'37.30"N	84°49'45.52"E	
		H	26°22'31.83"N	84°49'43.73"E	
I		26°22'32.63"N	84°49'40.90"E		
J	26°22'32.19"N	84°49'40.77"E			
Toposheet No	72B/15				
10	Area Details				
	Total Plot Area	Description	Area in m ²	Percentage (%)	
		Green Belt Area	17311.00	35.80	
		Road Area	8936.00	18.60	
		Parking Area	7745.00	16.00	
		Open Area	2236.00	4.60	
		Ground coverage area	12100.00	25.0	
		Total Area	48328.00	100.00	
Greenbelt / Plantation Area	17311.00 m ²				
	35.80 % of the project area will be covered under green belt and plantation				
11	Cost Details				
	PARTICULARS				
	Total Project Cost	Rs. 137.50 Crore			
	Cost for Environment Management Plan	Capital Cost – Rs. 6.42 Crore Recurring Cost – Rs. 1.48 Cr/annum			
	CER	Rs. 206.0 Lakh (1.5% of total project cost as per the OM 2018 of MoEFCC)			
12	Basic Requirements for the project				
	Total Water Requirement	- One Time Total Water Requirement to run the distillery = 1495 KLD - Total Water Requirement for Distillery Process = 400 KLD (@4.0KL/ KL of Ethanol production) - Net water requirement including Co gen Power (Power Turbine Ct Make-Up Water) of 2.5 MW =			

Sr No	Particulars	Details
		65 KLD Domestic Water requirement: 15 KLD Total = 480KLD (@4.8 KL/KL of Ethanol)
	Source of Water	Ground water (Fresh water same will be sourced from ground water after obtaining permission from CGWA)
	Wastewater Discharge	Unit is based on Zero Liquid Discharge
	Power Requirement	2500 KWH
	Source of Power	Co Generation Power Plant: 2.5 MW (In House)
	Steam Requirement	25 TPH
	D.G. Set Capacity with stack height	1 × 750 KVA (6.0 Meter Stack Height)
	Man Power Requirement	- Total Employees Regular – 67 - Casual / Contractual employment - 27 - Total: 94 Workers
13	Product Mix	Ethanol (Absolute Alcohol with 99.85% v/v)
14	By Products	
	CO ₂	0.55 kg / per ltr (Recovery)
	DDGS	45.0 TPD
15	Working Days	330 days / Annum
16	Raw material	
	Major Raw Material	- Broken Rice Flour with minimum enzymatically convertible starch content of 68% w/w. - Corn flour with minimum enzymatically convertible starch content of 60% w/w. - Damaged Grain & Coarse grain (like broken rice, maize, jowar, bajra etc) which is not fit for human consumption
	Raw Material requirement	231.48 MT/day (76,388 MTPA)
	Source of Raw Materials	Bihar as State is rich in paddy & maize cultivation and crop pattern study in nearby Districts indicates that Rice has occupied a major place in the crops in these States. These states have advantage as to availability of Raw Material in the form of Broken Rice & Maize in Bihar and bordering state like UP is rich in paddy cultivation. The unit is situated in the sugar cane and food grains rich area of Bihar. The availability of grains is sufficient 100 KLPD grain distillery. In all there are about 400 rice mills currently operating in these States which can supply Broken Rice and ample

Sr No	Particulars	Details
		maize crop would ensure supply of basic raw material needed for the day to day operations.
	Storage of raw material	3500 MT X 2 Nos. (Grain Silo with all system for 30 days Storage with accessories)
17	Proposed Boiler Capacity	25.0 TPH, 45Kg/Cm ² (g) (Bagasse/Rice Husk Fired) Boiler has been proposed for 2.5 MW Captive power plant with fuel as Rice Husk.
	Fuel and its quantity used in boiler (Rice Husk)	Rice Husk 190 Ton/day
18	Steam Consumption	
	Liquefaction + MPR Distillation Section + Int Thin Slops Evaporation + DWGS Dryers @ 68% starch based feedstock (On Total Sprit)	Pressure 3.5 kg/cm ² (g) & 148°C for Liquefaction, Distillation & Evaporator 25 TPH (3.5 Kg /Liter of TS) OR (3.72 Kg/ Lt of Ethanol)
	Liquefaction + MPR Distillation Section + Int Thin Slops Evaporation + DWGS Dryers @ 60% starch based feedstock (On Total Sprit)	Pressure 3.5 kg/cm ² (g) & 148°C for Liquefaction, distillation & Evaporator 25 TPH (3.8 Kg / Liter of TS) OR (4.05 Kg/ Lt of Ethanol)
19	Domestic Solid Waste	40.0 Kg/day
20	Air pollution control devices	ESP with 60 Meter stack height
21	Spent wash treatment scheme	Grain based 100 KLPD distillery generated effluent / spent mash will be first decanted in centrifuge decanted where the wet cake will be get separated and balance mash will be concentrated in evaporators and generated syrup will mixed with wet cake, which will sold as DDGS to cattle feed manufacturers.
22	Other effluent treatment scheme	Other effluent like process condensate, spent lees will be treated by condensate polishing unit (CPU) comprises of Equalization Tank, Buffer Tank, Anaerobic Digester, Extended Aeration Tank I & II, Secondary Clarifier, High-rate solid contact clarifier, Ultra filtration then followed by two stage RO Plant.
23	Discharge from Distillery Unit	Zero Liquid Discharge (ZLD).

2.0 INTRODUCTION OF THE PROJECT/ BACKGROUND INFORMATION

(i) Identification of project

TUPL is planning to set up 100 KLPD Ethanol Biofuel plant at Village – Nayagaon Kushahar, Khijirpura, Tehsil – Kesaria, District - East Champaran, Bihar, Pin -845424, India. The feed stock proposed to be used would be mainly broken / damaged rice and alternatively maize can also be used for production of Bio- Fuel Ethanol. The factory is likely to operate 330 days a years with production capacity of 100 KLPD (i.e. 100,000 ltrs per day) at this rate annually TUPL is likely to produce 3.30 Crore liters of Ethanol (Bio-Fuel) and around 14995 MT of DDGS (By-product). Bio-Fuel Ethanol is to be used mainly for blending with petrol across Bihar/nearby States whereas DDGS is being sold as Cattle Feed across India mainly to farmers.

The estimated project cost of the Ethanol Project is around Rs.137.50 Crores.

Identification of project proponent

TUPL is led by Mr. Harendra Kumar Bajpayee, MD and he is currently operating two firms viz. M/s Vigilance Management & Personal Services (VMPS) and SSS Industrial Services (SSS) both the firms are based out of Vishrantwadi, Pune

Table 02: Details of project Proponent

Name of Director	Details
Mr. Harendra Kumar Bajpayee, Managing Director	He has rich experience of 30 years. He is also running two firms viz. M/s.Vigilance Management & Personal Services (VMPS) and SSS Industrial Services (SSS) both the firms are based out of Vishrantwadi, Pune. VMPS and SSI established in the year 1997 and 2009 respectively. Firms are engaged in providing Event Security Guard Services, Commercial Security Guard Services, Corporate Manpower Outsourcing Services, Technical Manpower, Outsourcing Services and Housekeeping Labour Services and Unskilled Labour Services. Firms are mainly engaged in the providing staff for various Govt Offices for providing basic maintenance services, skilled and unskilled personnel. Firms have established good reputation of providing need based and required man power to various Central Govt Departments and other Organizations. Firms ensures only well skilled and trained manpower is provided to clients who pass both practical and theoretical training classes before joining their duties. Further Firms train security experts who are abreast of handling latest equipment and guns.
Mr. Krishnaand Mishra, Director	He is aged about 31 years is Director on the Board. He is also partner in M/s.Vigilance Management & Personal Services, wherein he is also actively involved in the business of the firm. He has more than 10 years of experience

(ii) Brief description of the project

It is a proposal for Establishment of Grain Based Ethanol Distillery capacity 100 KLPD with 2.5 MW co-generation power plant at Village – Nayagaon Kushahar, Khijirpura, Tehsil – Kesaria, District - East Champaran, Bihar, Pin -845424, India.

The proposed plant unit is having 48328.0 m² of land is available for the industry which is sufficient for the proposed project. The project is placed under item no 5(ga) - As per EIA Notification dated 14th Sep., 2006 as amended from time to time; the project falls in Category 'B2' as the proposed Grain based distillery based on Zero Liquid Discharge (ZLD).

Currently land is under the possession of Company. Sale deed has been made within the land owner and Director on dated 24.09.2022 for setting up Ethanol Plant. In continuation land conversion order issued under Bihar Agricultural Land (Conversion to non-agricultural purposes) Act 2010 on dated 24.04.2023.

(iii) Need of project and its importance to the country and region

Ethanol Blended Petrol (EBP) Program is aimed at achieving multiple outcomes such as; addressing environmental concerns, reducing import dependency and providing boost to agriculture sector. Objective of 'Ethanol Blending Program' (EBP) is to:

1. Save foreign exchange by importing less petroleum
2. Support farmers by purchasing surplus produce
3. Promote industrialization to develop our country

Achieving energy security and the transitioning to a thriving low carbon economy is critical for a growing nation like India. 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. The Government of India notified the National Policy on Biofuels – 2018 (NPB-2018) on 4.06.2018 wherein, under the Ethanol Blended Petrol (EBP) Program, an indicative target of 20% blending of ethanol in petrol by 2030 was laid out. The policy allows production of ethanol from damaged food grains like wheat, broken rice etc. which are unfit for human consumption. The policy also allows conversion of surplus quantities of food grains to ethanol, based on the approval of National Biofuel Coordination Committee.

In 2020, based on the guidance of Cabinet Secretary GOI, an inter-ministerial committee under the Chairmanship of Additional Secretary, NITI Aayog was formed comprising representatives from MoP&NG, DHI, MoRT&H, DFPD, IOCL, and ARAI (Annexure A). Subsequently, the target year for achieving 20% ethanol blending in petrol was advanced to 2025 by CCEA in the meeting held on 21.12.2020.

In the year 2022, India achieved an average blend rate of 10% resulting in annual saving of 40,000 Crores in forex outgo. As much as 440 crore litre of ethanol was blended in petrol during the supply year ending November 30, 2022. The goal is raising the current production capacity from 700 to 1500 Crore litres by 2025 in order to achieve 20% blending under EBP.

Company is inspired with Hon'ble Prime Minister Initiative to make ATMA-NIRBHAR BHARAT. Government of India has set up target to blend 880 crore liter of Ethanol/Fuel Alcohol in petroleum by 2025. However, current supply of Ethanol is significantly less than half of the 2025 projected demand and therefore requires new manufacturers distributed throughout the country to cater to growing demand for next 5-10 years.

(iv) Demand and Supply gap

Ethanol production has emerged as a most promising sector due to Policy initiative of Govt of India at National Level and which is well supported and promoted by States like Andhra Pradesh which has overwhelmingly supportive State Industrial Policy which provides assistance to upcoming biofuel -ethanol plants in the State.

The projected requirement of ethanol based on petrol (gasoline) consumption and estimated average ethanol blending targets for the period ESY 2020-21 to ESY 2025-26 are calculated below:

Table 03: Demand and Supply gap

Ethanol Supply Year	Projected Petrol Sale (MMT)	Projected Petrol Sale (Cr. liters)	Blending (in %)	Requirement of ethanol for blending in Petrol (Cr. liters)**
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

As per recent tender (DT 15/05/2023) seeking Expression of Interest (EOI) from proposed Ethanol Plants-in the Andhra Pradesh State – the three OMCs (HPCL, IOCL & BPCL) had estimated requirement of bio-fuel ethanol in the State of Andhra Pradesh at 30 Crore liters for Ethanol Supply Year (ESY) starting from 1st Dec 2022 to 30th Nov-2023.

To reach the Centre’s ambitious target of 20 per cent in blending revise by 2025, a back of the envelope calculation with India’s current fuel consumption shows that there is the requirement of around 1016 crore litres of ethanol in a year. But current ethanol production capacity in India of 426 crore litres derived from molasses-based distilleries, and 258 cr. litres from grain-based distilleries is proposed to be expanded to 760 cr. litres and 740 cr. litres respectively to meet the target. (Source: Report of the Expert Committee - NITI Aayog Ministry of Petroleum and Natural Gas).

(v) Import vs. Indigenous production

India is self-sufficient in its requirement of ethanol hence there is no import requirement.

(vi) Export possibility

The proposed quantity is expected to be consumed in India only and no export potential is envisaged.

(vii) Domestic / Export markets

Apart from production of Ethanol the company shall also produce by-product from the grain waste generation in the Distillery. This is known as Distillers Dried Grains with Solubles (DDGS) – **An Effective and Affordable Livestock and Poultry Feed Ingredient.** Company would be producing DDGS about 45 TPD and annually at 100% capacity the DDGS production is expected to be around 14995 MT per annum. The expected price of DDGS is around Rs.26,000/- per MT. Market of the product is within the State of Bihar and other neighboring States.

(viii) Employment Generation

There will be direct & indirect jobs and business opportunities to the local people such as daily wage labour, transporters and raw material suppliers. During operation phase, It has been approximately assumed the employment generation of Both Skilled & Unskilled Personnel to be 96 constituting 90 Direct and 06 as Casual / Contractual employment.

3.0 PROJECT DESCRIPTION

(i) Type of Project including interlinked and independent projects, if any.

This is independent project. Proposed establishment of Grain based ethanol distillery capacity 100 KLD along with Co gen power 2.5 MW at Village – Nayagaon Kushahar, Khijirpura, Tehsil – Kesaria, District - East Champaran, Bihar, Pin -845424, India.

As per EIA Notification dated 14th Sep, 2006 and as amended on 16th June, 2021, the project falls under Category “B2”, Project or Activity ‘5(ga)’ “Grain based Ethanol Distillery based on Zero Liquid Discharge” and will be appraised as per B2 Category Project. The proposed project is not interlinked with any other project.

(ii) Location (map showing general location, specific location, and project boundary & project site layout) with coordinates

Village – Nayagaon Kushahar, Khijirpura, Tehsil – Kesaria, District - East Champaran, Bihar, Pin -845424, India falls between the Latitude 26°22'37.15"N and longitude 84°49'42.64"E. The proposed industry is situated on the right side of NH227A around 1.65 km.

The project site Location map, the project area map with geo-coordinates and the project site around 500 Meter radius from proposed project boundary and site layout, are given below:

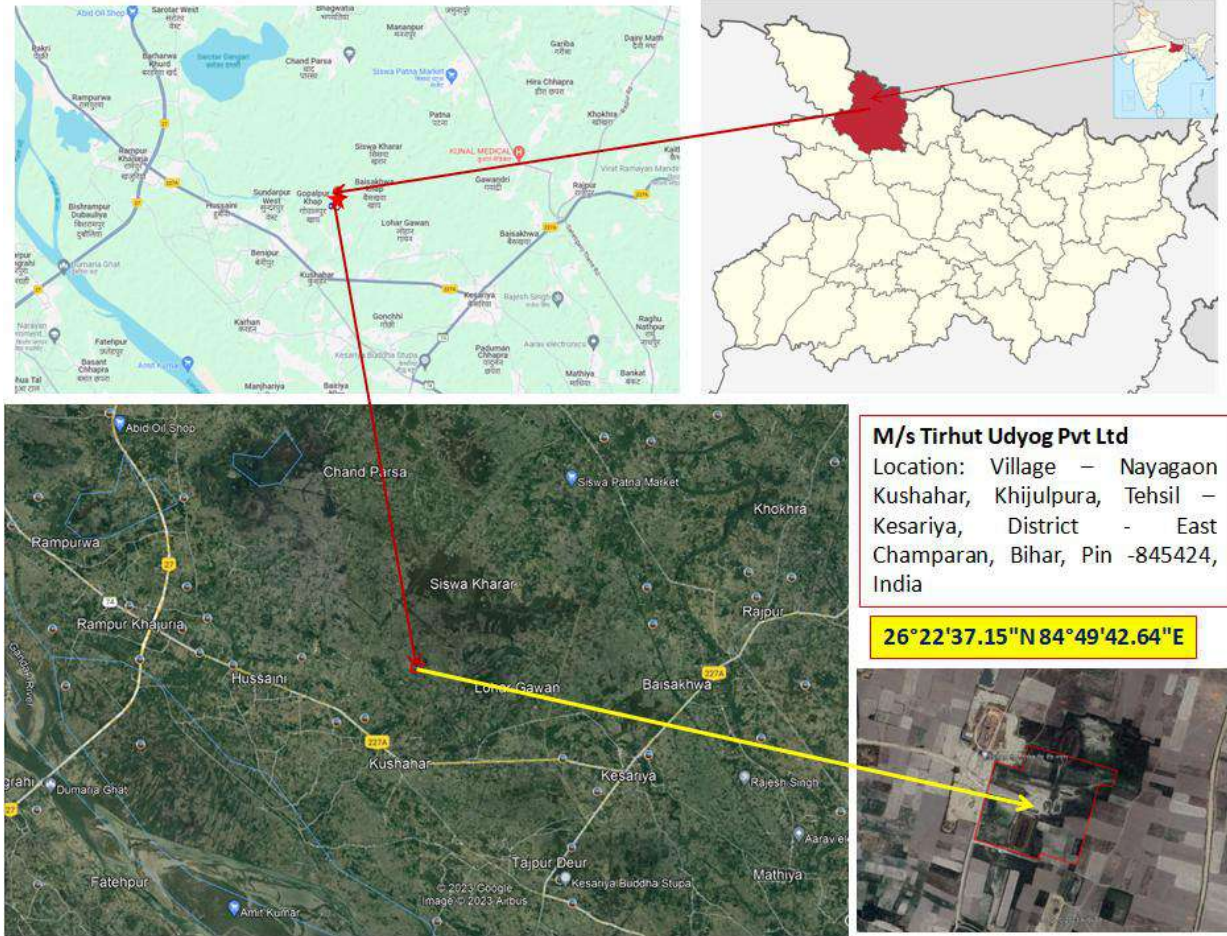


Figure 01: Location of Proposed Project Site

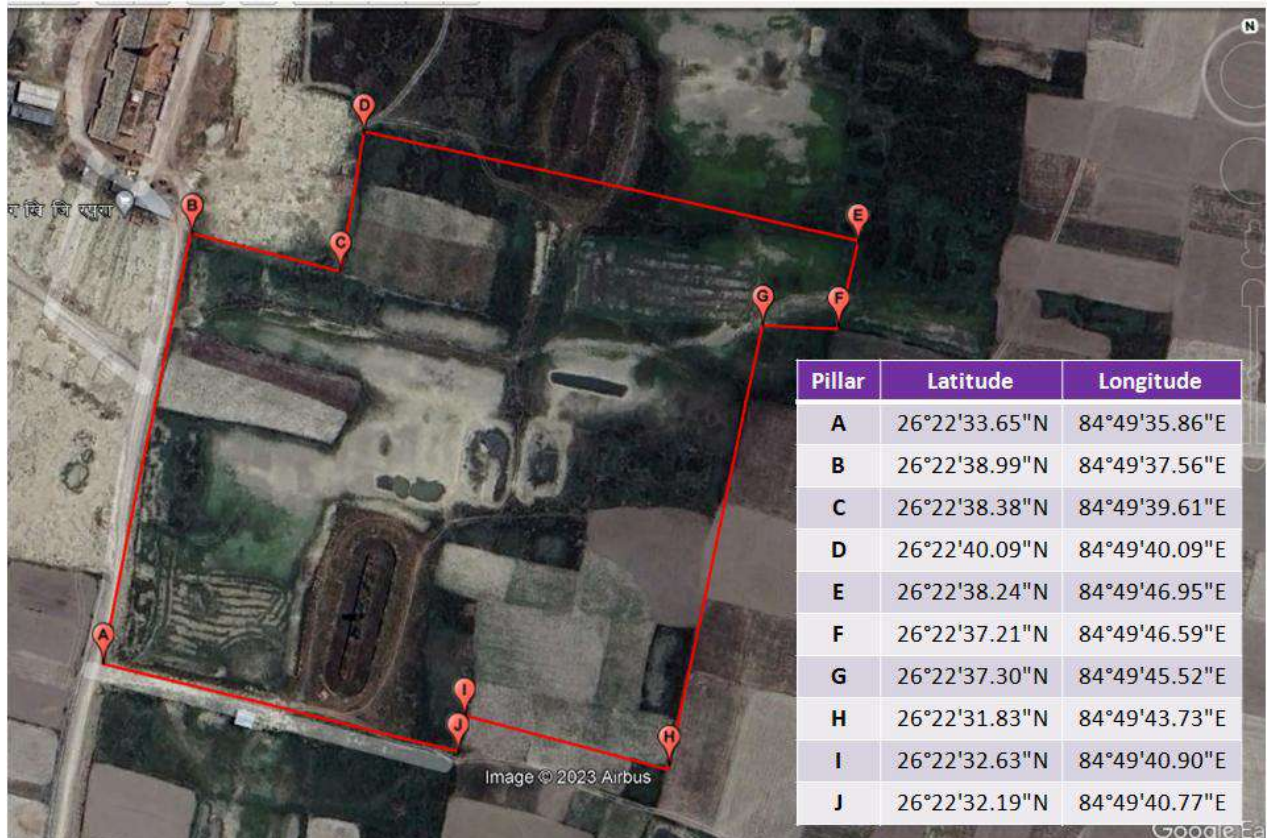


Figure 02: Google map showing geo-coordinated of Proposed Project Site



Figure 03: 500 Meter radius from project boundary

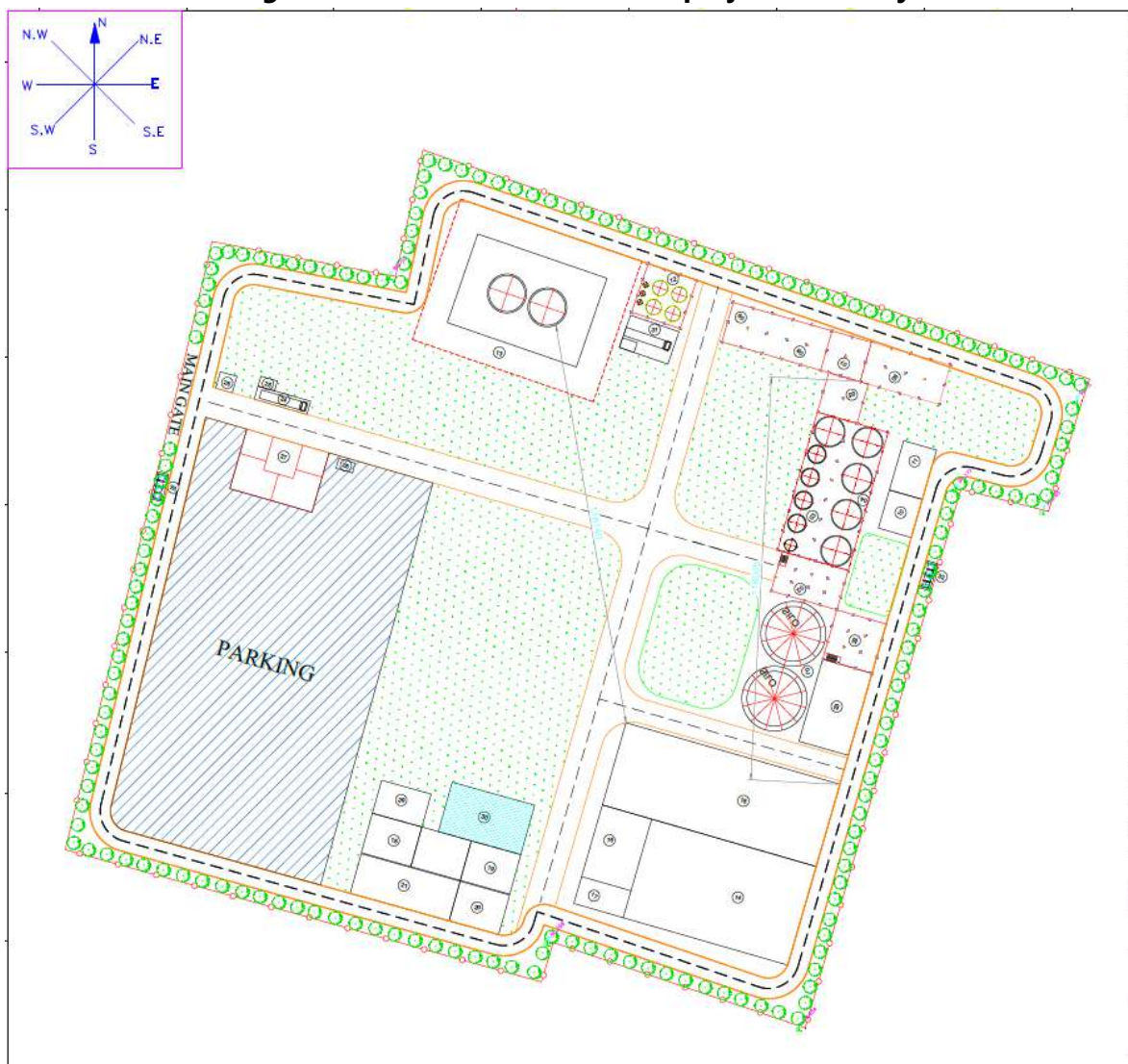


Figure 04: Site Layout plan

The layout of the plant has been developed taking into following considerations:

- a significant budget is allocated for plant proactive maintenance and upkeep to minimize downtime, failures, asset degradation and reportable
- Easy and long term cost effective availability of raw material and water,
- Sufficient space for storage of raw materials and finished products, Greenbelt, plantation,
- Adequate space for RWH & pollution control facilities. Process will be consolidated into comprehensive production units. The major utilities and service will be provided.

(iii) Details of alternative site considered and basis of selecting the proposed site:

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

- Availability of adequate flat land for the proposed plant and its rational future expansion.
- Raw material availability & markets for both products & by-products within the state.
- Proximity to finished goods market.
- Existence of road/ Rail connection in the vicinity for transportation of incoming & outgoing materials.
- No NP/WLS, Tiger reserve and elephant corridor present within study area.

Table 04: Environmental Setting Details (With approximate aerial distance & direction from plant site)

Particular	Detail
Lat. and Long.	
Elevation	82 - 84 m
Nearest Village Habitation	• Gopalpur Khap: 370 m (W) • Kushar: 1.80 Km (S) • Sarangpur: 3.60 Km (E) • Chand Parsa: 4.43 Km (N) • Rampur Khijuria – 5.35 Km (W) • Hussaini – 3.0 Km (W) • Khijirpura – 1.45 Km (SW)
Nearest Town & City	• Kesaria – 5.0 Km (SE) • Chakiya – 22.0 km (E)
Nearest National Highway / State Highway	• SH 74 (NH227A) – 1.65 Km (SW) • NH 27 – 5.50 Km (W) • Kunswa Road – 1.90 Km (S)
Nearest Railway station	• Pipra Railway Station – 20.0 Km (NE)
Nearest Airport	• Muzaffarpur Airport – 56.0 Km (SE)
National Parks, Reserved Forests (RF)/ Protected Forests (PF), Wildlife	• None in 15 Km radius

Particular	Detail
Sanctuaries, Biosphere Reserves, Tiger/ Elephant Reserves, Wildlife Corridors etc. within 10 km radius	
River / Water Body (within 10 km radius)	• Samohti River – 5.70 Km (E) • Gandak River – 5.20 Km (SW) • Indira Gandhi Canal – 10.0 Km (NE)
School/Hospital/Place of Worship	Schools: • Govt ITI Chakiya – 1.62 Km (SE) • R T Memorial Public School - Barharwa Khurd, - 5.35 Km (NW) Hospitals: • Primary School Loharganwa – 2.25 Km (SE) • Mahatma Buddh Public School – 1.70 Km (SW) • Government Middle School Mahamadpur, Kesaria – 2.10 Km (S) Temple: • Kesaria Buddha Stupa - Buddhist temple– 5.30 Km (S)
Seismic Zone	Zone-III of MM scale
Toposheet No	72B/15

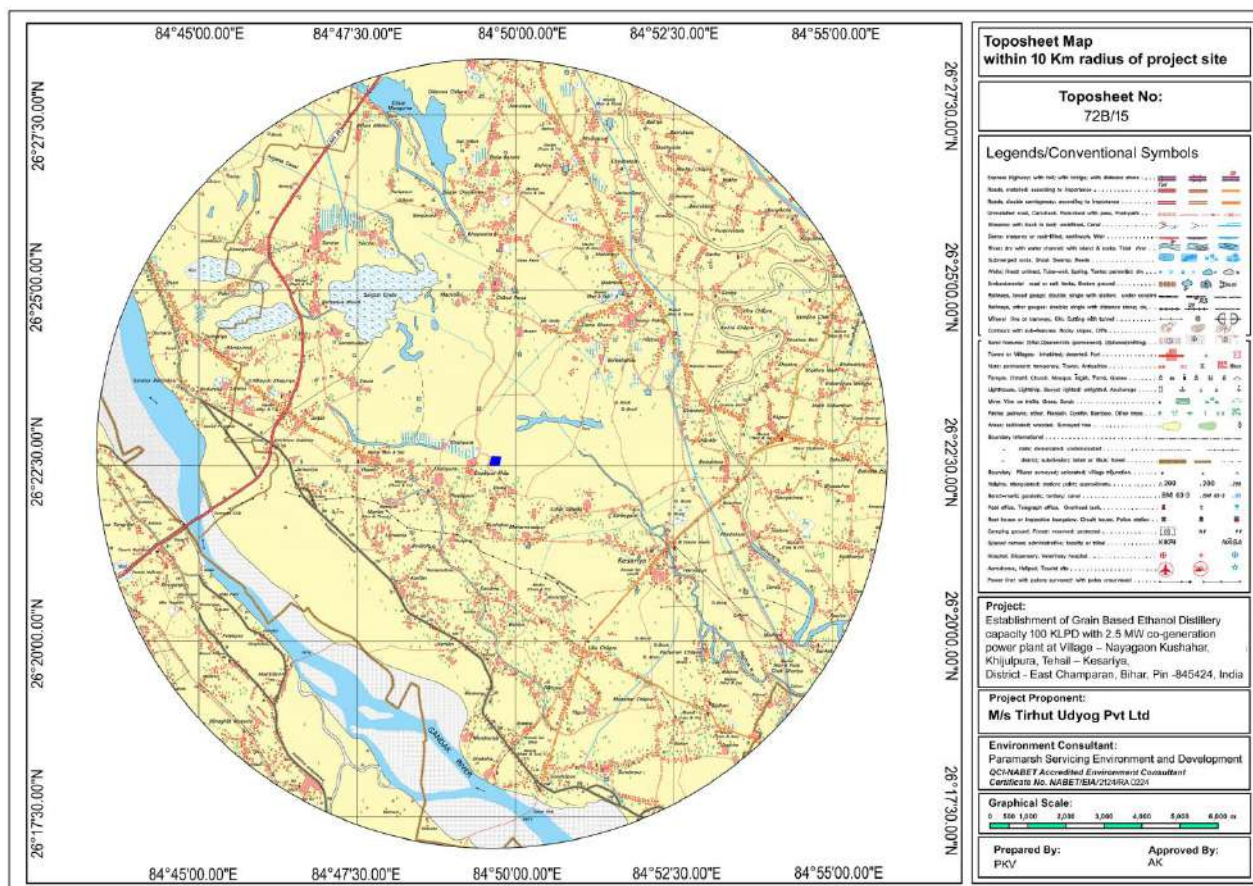


Figure 05: Topo sheet Map within 10.0 km radius

(iv) Size or magnitude of operation

Establishment of Grain Based Ethanol Distillery capacity 100 KLPD with 2.5 MW co-generation power plant at Village – Nayagaon Kushahar, Khijirpura, Tehsil – Kesaria, District - East Champaran, Bihar, Pin -845424, India. Proposed Plant will be 100 % Grain based.

The process includes basic raw material requirement, process equipment, raw material and product storage, utilities & services, infrastructure facilities & management of waste i.e., generation, their quantity, treatment & safe disposal. Environmental Control Units like bag filter and Effluent Treatment Plant based on zero liquid discharge will be part of the project.

Nature and Size of Project	Particulars	Quantity
	Distillery	100 KLD
	Power	2.5 MW
	DDGS	45 TPD at 10-12% W/W Moisture (14995 MT/annum)
	CO ₂ Recovery	0.55 kg / per ltr(Recovery)
	Theoretical CO ₂ generation during Fermentation	76.0 TPD

Table 05: PROJECT PROPOSAL WITH PRODUCT DETAILS

SL. No	Units	Proposed Capacity
1	Installed Capacity	100 KLD
2	Major Raw Material	Damaged Grain & Coarse grain (like broken rice, maize, jowar, bajra etc) which is not fit for human consumption
3	Final Product & By Product	- Ethanol (100KLPD) - By Product- DDGS – 45 TPD - CO₂-76.00 TPD
4	Co-Generation Power Plant (With 60 meter stack Height)	2.5 MW Captive power plant with Rice Husk Atmospheric Fluidized Bed Combustion (AFBC), 25.0 TPH, 67Kg/Cm ² (g) Boiler has been proposed

(v) Project description with process details

The proposed distillery plant will have manufacturing capacity of 100 KLD. The distillery plant will be operated using steam and power that will be generated from the separate boiler & turbine to be employed for the project.

Process, Special Features and Performance (Grain to Ethanol) Process Summary:

The distillery will have production of ETHANOL along with the main product the distillery will also produce animal feed called DDGS, which will fetch additional income and other buy products like Technical Alcohol, Fusel Oil and CO₂.

A) Grain Storage Silos, Cleaning, Handling and Milling Section

Grain is received from various sources and is pre-cleaned off stones, husk, etc. and then stored in specially designed storage silos or in bags in storage yard. Grains are continuously lifted from the bottom of the silos, screened and followed by removal of stones in de-stoner and iron matters in magnetic separators. Cleaned Grains are then milled using dry milling process in Hammer Mills. The flour is fed through the bucket elevator and conveyed to the flour silo.

B) Liquefaction Section

In liquefaction process, starch is hydrolyzed to dextrin. The Liquefaction is carried out in Liquefaction Tanks. Feedstock Flour is transferred to Pre-masher and mixed with Recycle Streams, thin stillage and liquefying enzyme. Slurry from Pre-masher is taken to Liquefaction tank where temperature is maintained by means of steam. Necessary retention time is maintained in the Liquefaction Tank. Contents in Slurry Tank are kept in suspension by Agitation. The Liquefied Slurry is then cooled in Slurry Cooler (wide Gap PHE) and transferred to Pre-fermentation and Fermentation section.

C) Fermentation Section

Yeast Activation:

Yeast seed material is prepared in Yeast Activation Vessel (Pre-fermenter) by inoculating sterilized mash with yeast. Optimum temperature is maintained by circulating cooling water. The contents of the Yeast Activation Vessel are then transferred to Fermenter.

The purpose of Fermentation is to convert the fermentable substrate into alcohol. To prepare the mash for Fermentation, it is diluted with water. Yeast is added in sufficient quantity to complete Fermentation to produce alcohol.

Significant heat release takes place during Fermentation. This is removed by passing the mash through heat exchangers to maintain an optimum temperature. The re-circulating pumps also serve to empty the Fermenters into Beer Well. CO₂ can then be taken to CO₂ vent line where it is vented out.

After emptying of Fermenter, it is cleaned with CIP using cleaning nozzles. After CIP, Fermenter is ready for next batch to be filled.

D) Distillation

Pre-heated fermented wash is fed into a series of Distillation Columns to increase the alcohol concentration and remove various impurities.

Distillation – (Wash to Ethanol Mode)

Following Columns will be under operation

1. Analyser Column
2. Degasifying Column
3. Rectifiercum Exhaust Column
4. Alcohol Scrubber

Molecular sieve dehydration plant (MSDH):

Rectified Spirit containing at least 95%v/v alcohol is pumped from RS feed tank to dehydration section.

Superheated hydrous alcohol vapors are sent to twin Adsorbent Beds. The twin Adsorbent Beds operate in cyclic manner. Twin beds are provided to allow for bed regeneration in continuous operation. While one bed is in dehydration mode, the other is in regeneration mode.

The Adsorbent Bed will absorb moisture present in feed vapors and dehydrated product alcohol vapors are obtained from bottom of the bed.

The Product alcohol vapors are then passed through Product Condenser where product vapors are condensed with the help of cooling water. Condensed product alcohol (@ 99.8 % v/v strength as required for fuel blending) is collected in product receiver.

The Product alcohol from Product Receiver is pumped to Product Cooler where it is cooled with the help of cooling water and then sent for anhydrous alcohol storage.

E) Decantation:

Decantation section comprises of a Centrifuge Decanter for separation of suspended solids from Spent Wash coming out of Grain Distillation Plant. Wet cake is removed from bottom of Decanter. Thin slops coming out of Decanter are collected in a tank and partly recycled into the process & Evaporation for further concentration. The concentrated thin slops called as Syrup is mixed with Wet cake and sold in wet form as cattle feed (DWGS) or as an option, the entire mixture can be dried in a DWGS Dryer and then sold in dry form as Cattle feed (DDGS).

F) Integrated Evaporation

The suggested treatments scheme is a FOUR EFFECT working on the principle of falling film Evaporation for Thin Slop Evaporation Plant. The following points will elucidate the basic working principle:

1. Shell & Tube type Evaporators working on the principle of Falling film Evaporation has been used.
2. Steam of medium pressure is fed to the first effect.
3. The product at the desired concentration is obtained at the outlet of the finisher.
4. The Pure steam condensate are collected in receiving vessels and can be pumped to desired battery limit
5. The plant is having high level of automation to get consistent output at required concentration.
6. The system operates under vacuum.

G) DWGS Dryer Section

- 2 sets of DGGS Dryers system To dry the combination of mixture of DWGS coming from the decanter and evaporation and convert it to Distillers Drier Grain soluble upto Packing m/c with piping, electrical, instrumentation.

- Wet distiller's grains shall be fed into the dryer housing at controlled rate through a suitable feeding system. The Rotary Tube Bundle is enclosed in an insulated dryer housing and on its outer flights are fixed. Dry, saturated steam is to be supplied to the tube bundle through rotary joint at one end & the condensate is discharged through rotary joint mounted of another end.
- The heat transfer is primarily by conduction. The water vapors are 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.

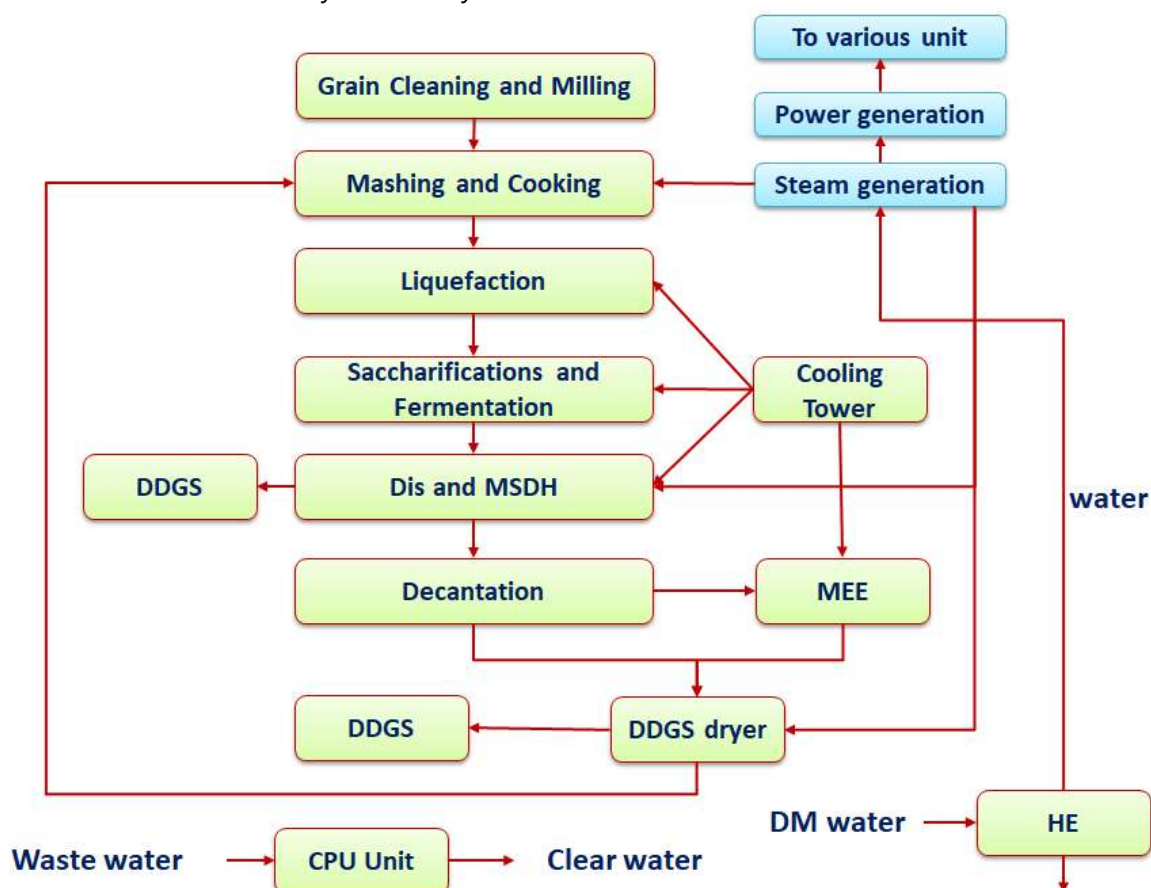


Figure 06: Manufacturing of Ethanol

H) Process Condensate Treatment Section

The process condensate from the evaporation section is treated in this unit and this treated condensate is then recycled back to process thus reducing the fresh water consumption.

The alcohol stripped whole stillage or spent mash or thick stillage coming out of distillation section is subjected to decantation by centrifugation to separate the suspended fibrous mass called wet cake and the thin stillage. Wet cake has about 30 % w/w solids as removed from the bottom of the decanter and can be directly loaded on the trolleys parked below. Wet cake can be used directly in the formulation of animal feed.

Table 06: Composition of Grains & Wet cake (after decantation)

Content	Rice / Broken rice	
	Grains	Wet cake
Total Solids (%)	88 – 90	28 – 30
Moisture (%)	10 – 12	70 – 72
Starch (%)	65 – 70	1.9 – 2.1
Proteins (%)	4 – 7.0	4 – 7.0
Oils/Fats (%)	0.4 – 1.0	0.4 – 1.0
Crude Fibres (%)	0.8 – 1.6	1.0 – 1.7
In-org. Ash (%)	0.4 – 1.2	0.45 – 1.3

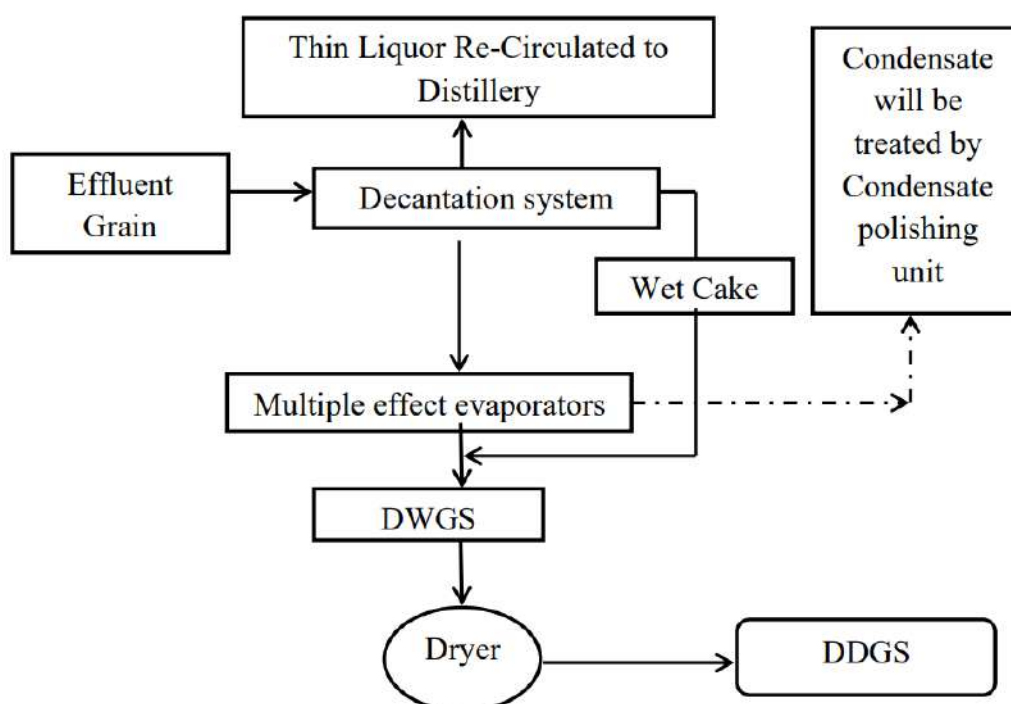


Figure 07: Flow sheet for primary treatment

a. Multiple Effect Evaporation Section

The thin slops from decantation section is first taken into a feed tank and then fed to the evaporation system through pre-heater in 1st effect feed mode and it flows from first to second to third to fourth to fifth effects. The concentrated syrup with 28 - 30 % w/w solids is taken out from the second effect. The low-pressure steam at 3.5 kg/cm² (g) is 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 and vapours generated in the third effect are used as a heating medium in the fourth effect. Vapours generated in the fourth effect are used as a heating medium in the fifth effect. The slop feed is concentrated from the initial concentration of 4 % w/w TS to 28 - 30 % w/w TS as it travels through the multi effect evaporator.

The vapours evolved from the fifth effect are condensed in the surface condensers. Each effect is provided with re-circulation 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, fifth and surface condensers is collected in a condensate tank. The condensate are transferred to further treatment (Secondary ETP) using a centrifugal pump. The system operates under pressure & vacuum. Water ring vacuum pumps are used to maintain 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.

b. Dryer

Dryers are usually based on conduction method of drying. The heated and dried products only contacts steam heated tubes and not directly steam. Tube bundles functions on the counter-flow principle and the dryers are widely designed based on the lump crust formation tendency, wet and dry product flow characteristics, and thermal sensitivity of the material in dry condition.

c. Secondary Effluent Treatment Plant

The effluent treatment system also includes the secondary effluent treatment section where various spent lees, CIP liquid, fermented washing water etc. are treated together. The pump & blower sealing water and boiler blow down etc. having lower COD values are taken directly to the secondary polishing reactor for final treatment. Process condensates and other moderately polluted sources are treated separately and the treated water is used for gardening (Greenbelt), sprinkling on dust generating roads, etc. The characteristics and quantities of influents for Secondary Effluent Treatment plant are as follows.

Table – 07: Inlet and Outlet characteristics of for secondary effluent treatment plant

Parameter	Combined effluent	Treated Effluent
pH	3.2 – 3.5	7.0 – 8.0
BOD (mg/lit)	1800 – 2000	< 30
COD (mg/l)	3500 - 4000	< 250
TSS	50	< 30
TDS	815	< 300

Process Condensate Polishing for Effluent

Condensate polishing unit is a unit in which all the liquid effluents of industry are treated. The detailed process to treat the wastewater generated from the Distillery Unit is given below:

(A) Bar Screen

Bar Screens are mechanical filter are normally installed as the first line of defense to remove large objects primarily, rags, woods, Plastics that manage to escape and find their way through the drainage systems. Usually these objects can be of extreme nuisance because if left around going to the main treatment plant, they pose a significant risk of damaging pumps and blocking valves.

The racks (of Bar Screen) require constant attention to clean it manually or mechanically and whatever collections of materials are stored in a waste bin before sent to sanitary landfill for disposal.

Bar screens come in many designs. Some employ automatic cleaning mechanisms using electric motors and chains, some must be cleaned manually by means of a heavy rake. Items removed from the influent are called screenings and are collected in dumpsters. As a bar screen collects objects, the water level will rise, and so they must be cleared regularly to prevent overflow.

(B) Oil and grease pit (Oil Skimmers)-

Organic toxic waste (oil and grease (O&G)) causes ecology damages for aquatic organisms, plant, animal, and equally, mutagenic and carcinogenic for human being. They discharge from different sources to form a layer on water surface that decreases dissolved oxygen. O&G layer reduces biological activity of treatment process where oil film formation around microbes in suspended matter and water. This lead to decrease dissolved oxygen levels in the water. Then oxygen molecules are difficulty to be oxidative for microbial on hydrocarbon molecules and cause ecology damages to water bodies.

The conventional techniques remove oil and grease using skimming tanks with skimmer and oil and grease traps in treatment plants.

The skimmer is a rotating cylindrical device design to remove the surface oil layer. It consists of using cohesive force between the oil and the surface of the material to be move up. The metal part must be immersed in 1cm to 3cm of the free oil layer floating on the top of the water. The oil catches in the rotary device drop in a conveyor which evacuates oil in a container for oil recovery. After bar screen waste water will move to Oil and grease pit. Here all the oil and grease will be removed from the waste water.

The remaining oil has the potential of clogging of pipes in treatment units that need cleaning and sometimes replacement of pipes. We plan to take a biochemical route (enzymes and lipases) to slow down clogging and impact. Microbial activity will play significant role in performance, strength purification process, and elimination of pretreatment process in wastewater treatment plant utilizing enzymes. Environmental studies described prevention of fat blockage or filming in waste systems before discharging wastewater into sewage system. The use of lipase enzymes will clean holding tanks, septic tanks, grease traps, and other systems.

(C) Equalization Tank

An equalization tank providing consistent flow and loading to a biological process is important to maintain optimal treatment. Equalization (EQ) Basins are designed to provide consistent influent flow to downstream processes by retaining high flow fluctuations. Due to the additional retention time, aeration and mixing is required in equalization basins to prevent the raw wastewater from becoming septic and to maintain solids in suspension. We plan to use equipment to mix EQ Basin to keep suspended solids

in solution, add fine bubble aeration to minimize odors, and also ensure predictable and constant flow equalization.

Effluent from the oil and grease pit comes to the equalization tank in wastewater treatment. The main function is to act as buffer and to collect the incoming raw effluent that comes at widely fluctuating rates and position to the rest of the ETP at steady (Average) flow rate. During the peak hours ETP comes at high flow rate. The equalization tank stores this effluent and lets it out during the non-peak time when there is no /little incoming effluent.

(D) **Aeration Tank**

Aeration is the most critical component of a treatment system using the activated sludge process. A well designed aeration system has a direct impact on the level of wastewater treatment it achieves. Aeration provides oxygen to bacteria for treating and stabilizing the wastewater.

Microorganism such as bacteria and protozoa can use the small particles and dissolved organic matter, not removed in primary treatment, as food. Biological treatment is performed in a tank containing a "soup" of starved microbes called activated sludge. These microbes require air to live (they are aerobic organisms) and thus air is pumped into the tank via diffused aeration system. Microorganisms in this aeration tank use the dissolved and particulate organic matter as food, producing more organisms. Thus the waste materials that left the primary clarifier are changed into microorganisms which can be collected and separated from the next step.

Oxygen is needed by the bacteria to allow biodegradation to occur. The supplied oxygen is utilized by bacteria in the wastewater to break down the organic matter containing carbon to form carbon dioxide and water. Without the presence of sufficient oxygen, bacteria are not able to biodegrade the incoming organic matter in a reasonable time.

In the absence of dissolved oxygen, degradation must occur under septic conditions which are slow, odorous, and yield incomplete conversions of pollutants. During this process a mass of biologically active flocks called Activated Sludge is formed.

(E) **Secondary Clarifier:**

A circular basin in which effluent from the activated sludge process is held for a period of time during which the heavier biomass (microorganisms) settles to the bottom as "activated sludge." This sludge, teaming with hungry microorganisms, can be returned to the aeration basin to begin the activated sludge treatment process all over again.

Secondary clarifier built with mechanical means for continuous recycling of Activated Sludge. Clarifiers work on the principle of gravity settling. The heavier suspended solids settle in the clarifier due to the quiescent conditions provided in the Clarification zone. Settled culture from secondary tank will be recycling to Aeration to maintain the Mixed Liquor Suspended Solids (MLSS) in aeration tank.

(F) Sludge drying Beds:

Sludge is a residual, semi-solid by-product left from industrial or refining processes. It is a separated solid suspended in a liquid, typically containing major quantities of interstitial water between its solid particles.

A sludge drying bed is a common method utilized to dewater sludge via filtration and evaporation. Perforated drains situated at the bottom of the bed are used to drain seepage water or filtrate. A reduction of about 35% or less in moisture content is expected after drying. Sludge drying beds are provided to allow surplus sludge that is withdrawn from the process to dry for easier handling. Sludge drying relies on an underground drainage system as well as sunshine.

Liquid from the under drains should be returned to the effluent treatment process for further treatment. Sludge drying beds are usually situated beside treatment plants to readily receive and treat incoming sludge coming from primary or secondary treatment facilities. A sludge drying bed usually consists of a bottom layer of gravel of uniform size over which is laid a bed of clean sand. Open jointed the under drains are laid in the gravel layer to provide positive drainage as the liquid passes through the sand and gravel. Under drains are made of vitrified clay pipes or tiles, laid with open joint.

The sludge should be deposited evenly to a depth of not greater than 20 cm. when digested sludge is deposited on a well-drained bed of sand. The major portion of liquid drains off in a few hours after which drying commences by evaporation. This produces cracks in sludge cake. In about 2 to 3 weeks sludge cake dries up completely with 20% to 40% volume reduction and can be removed. Dried or treated sludge offers a wide range of applications, mainly including agricultural land application. When the drying is completed to produce bio-solids, these bio-solids act as a fertilizer for crop harvesting.

The organic nitrogen and phosphorous found in bio-solids are used quite efficiently by crops as these plant nutrients are released slowly throughout the growing season. This allows the crop to absorb these nutrients as the crop grows. Besides the application of crop harvesting, the treated sludge can also be used as top dressing on golf course fairways, soil conditioner for construction of parks, and other athletic fields, a soil substitute in final landfill cover, etc.

(H) Tertiary Treatment Plant:

1- Pressure Sand Filter

To remove TSS and any other pollutants in the form of particle. This filter is also useful to protect the Activated Carbon Filter (ACF) from overloading by pollutants such as particulates, organics.

2- Activated Carbon Filter

Carbon adsorption is a proven process in tertiary treatment for the processing biologically treated wastewaters and is one of the many processes used in the advanced treatment of wastewaters. The ACF is used to remove relatively small quantities of refractory organics,

as well as inorganic such as sulfides and heavy metals remaining in an otherwise well-treated wastewater.

(I) Ultra Filtration Unit –

In wastewater treatment, ultra-filtration (UF) devices are used to recycle and reuse water that contains virtually no physical solids. Ultra-filtration (UF) is a variety of membrane filtration in which forces like pressure or concentration gradients lead to a separation through a semi-permeable membrane. Suspended solids and solutes of high molecular weight are retained in the so-called retentate, while water and low molecular weight solutes pass through the membrane in the permeate.

(J) Reverse Osmosis Unit –

Reverse osmosis (RO) is a water purification process that uses a partially permeable membrane to remove ions, unwanted molecules and larger particles from drinking water. Reverse osmosis can remove many types of dissolved and suspended chemical species as well as biological ones (principally bacteria) from water and is used in both industrial processes and the production of potable water.

Co-Generation Power Plant (2.5 MW) operations

This Boiler (1 x 25TPH) will operate mainly to feed steam to Distillery and 2.5 MW power generations from Turbine. Proposed 2.5 MW co-generation plant consists of a high pressure water tube steam boiler 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 ESP where the dust particles are collected. The dust is collected from here.

High pressure superheated steam from boiler is passed through a steam turbine, which is used for distillery 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 boiler auxiliaries etc. Surplus power will be exported to Grid.

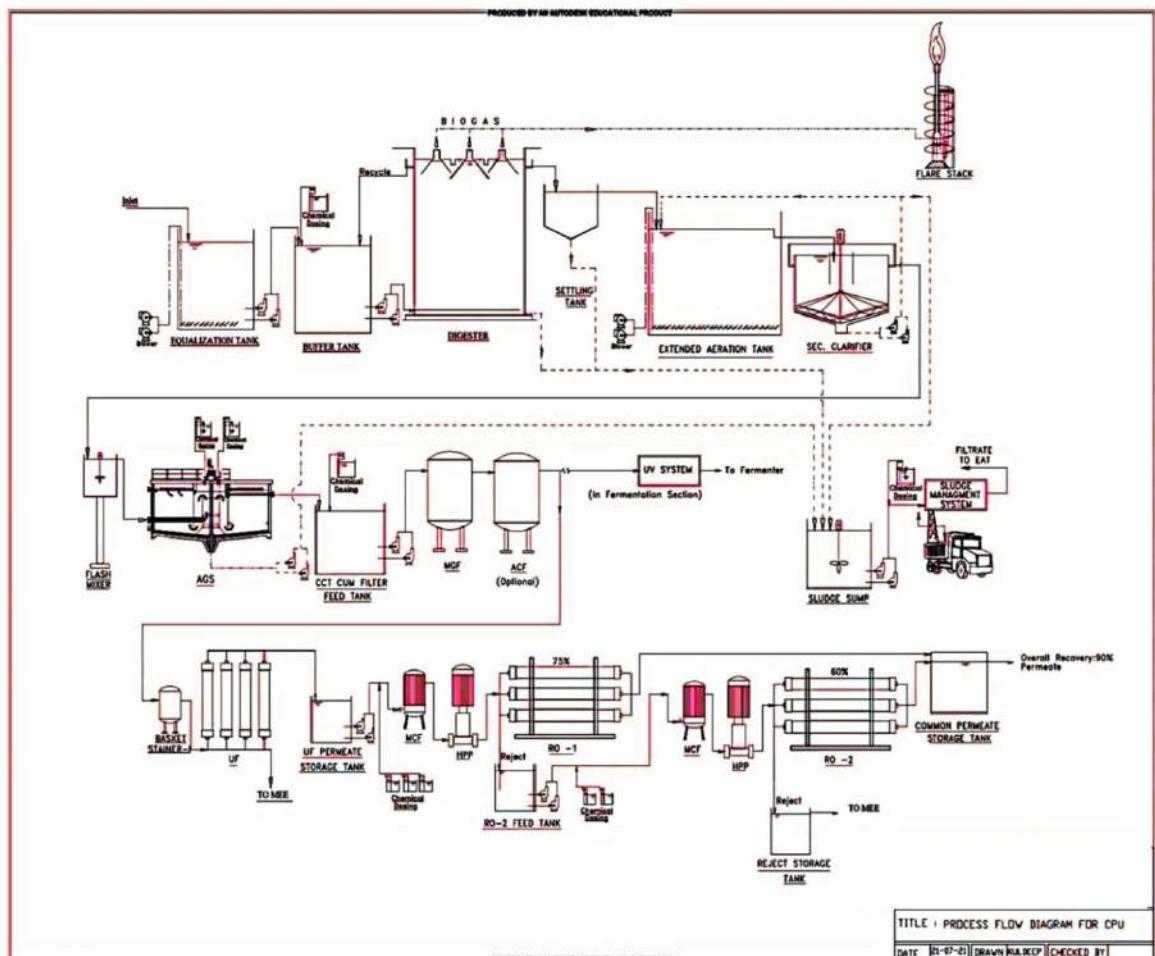


Figure 08: Condensate Polishing Unit

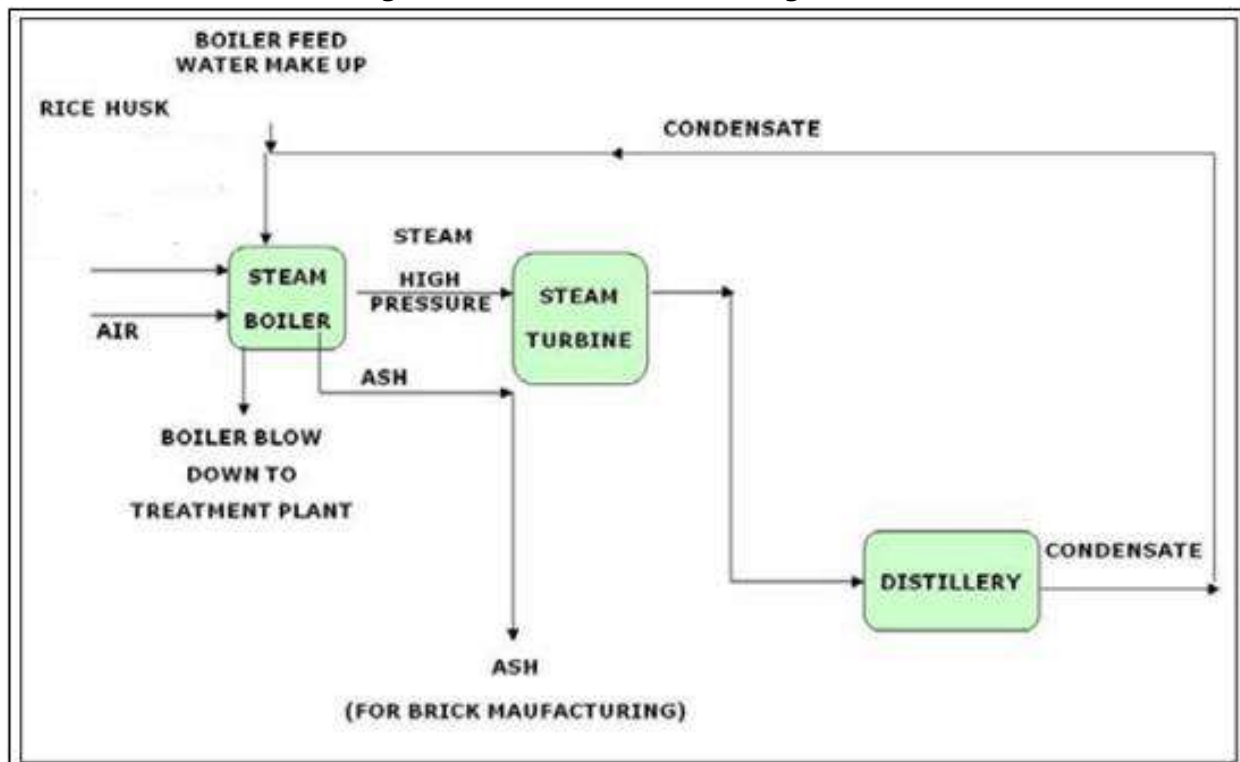


Figure 09: Process flow chart for Proposed Co-generation Power Plant

Description of Mitigation Measures

The mitigation measures given in this section are for management of the emissions, effluents, solid and hazardous waste generation from the project to meet the environmental standards and environmental operating conditions:

Table 08: Mitigation Measures

Sr. No.	Environment Aspects	Potential source of Impact	Proposed mitigation measures
1.	Air Environment	Stack emissions, vehicular movement, raw material handling	• ESP will be installed which has 99.9 % efficiency. • PUC of the vehicles shall be checked periodically • Periodical maintenance of vehicles • If required spraying of water on the road to suppress the dust emission.
2.	Odor	Fermentation, spent wash, Spent wash lagoon, DDGS dryer area.	• Fermentation process will be in closed container • Spent wash will use quickly • Spent wash storage lagoon not more than 7 days.
3.	Water Environment	Exploitation of ground Water	• Proposed distillery project will be based on ZLD system • Process condensate treated water will be recycled back into process. • Domestic effluent will be treated in STP (MBBR based)
4.	Land	Land use	• Currently, land does not have any agricultural uses • It is open land and without any human settlement
5.	Soil	Disposal of waste on the land	• Fly / bottom ash will be provided to Cement Manufacturer. • Yeast and ETP sludge will be used as a in green belt • Effluent will be treating in process condensate treatment plant. • Hence no effluent disposal on the land or in water body
6.	Noise	During Operation of equipments	• Acoustic enclosure will be provided. • Sound from the machineries or from other operation shall be restricted within plant boundary
7.	Ecology	Release of pollutant in environment and loss of vegetation during construction	• No vegetation clearance is required • All required pollution control equipment will be provided to ensures the control of pollution

(vi) **Raw materials required along with estimated quantity, likely source, marketing area of final products, mode of transport of raw material and finished product.**

1. Raw Material

The basic raw material for the manufacturing of Ethanol Damaged Grain & Coarse Grain like Broken Rice, Jwar, Bajra, Maize, etc which is not fit for human consumption. In the present scenario, damaged grain & coarse grain (not fit for human consumption) like broken rice is easily available in the nearby area. Product wise raw material consumption is given below:

Table 09: Raw Material

Particular	Proposed	Storage	Source of raw material & Mode of Transportation
Damaged Grain & Coarse Grain like Broken Rice, Jwar, Bajra, Maize, etc which is not fit for human consumption	231.48 MT/day (76,388 MTPA)	3500 MT X 2 Nos	Local supplier via road
Rice Husk	Rice Husk 190 Ton/day		
Other Chemicals			
Sulphuric Acid	50 Kg/day	8MT	Nearby Market by Truck. 30 Days storage will be provided after the proposed establishment.
Antifoam (TFM – 60 %)	20 kg/day	1500Kg	
Urea	220 kg / Day	4MT	
Sodium Hydroxide: For pH Adjustment	3.0 Kg/ KL	80 MT	
Sodium Hydroxide For CIP (Liquefaction & Fermentation):	10 Kg/ KL		
Enzyme: Alpha Amylase Enzymes Consumption	0.80 Kg / Ton of Starch	2500 Kg	
Enzyme: Gluco Amylase Enzymes Consumption	1.30 Kg / Ton of Starch	4000 Kg	
Yeast Consumption	0.50 Kg / KL of Alcohol	500 Kg	

Fuel Requirement

Rice husk, also widely known as rice hull, is an available agricultural waste in numerous rice-producing countries (Rice husk is composed of 15% carbon, 18% ash, and 67% volatile matter It is formed from two polyphenolic compounds, silica When rice husk is burned, it generates heat.

Biomass like Rice husk / Biomass will be used as fuel for boiler (proposed 25 TPH, 01 number each). Proposed Rice Husk/ Biomass requirement of plant will be 190 TPD. Details regarding quantity of fuel required, their source along with distance & mode of transportation for proposed project are given in **Table – below.**

Fuel	Details
Rice Husk (80% to 20% Mix)	190 Ton/day
Source	Open market by road.

Rice Husk Utilization

The conversion of rice husk into fuel is one of the most important uses of rice husk. Rice husk, once removed from the kernel, can be a source of energy because of the organic compounds present. In countries, such as India where large rice production occurs annually, industries process the husk to produce fuel

(vii) Resources optimization/ recycling and reuse envisaged in the project, if any, should be briefly outlined.

In order to reduce the water requirement, it is also proposed to use harvested rainwater in the plant. From the use of collected rain water, the total water requirements are reduced ~ 9%. The basis for this reduction and quantity estimation are given below:

Rain Water Harvesting:

Runoff Calculation = Rain Water Harvesting:

Average rainfall intensity of the area is considered as 1241.60 mm or 1.24m. The runoff coefficients for rooftop, green area and paved are 0.9, 0.2 and 0.7 respectively.

Rooftop area available for rain water harvesting: 12100.0m²

Runoff Water from roof top = 12100.0 x 1.24 x 0.9 = **13503.60 m³**

Total Rainwater can be harvested in Monsoon season (60days)= **13503.60 m³** say 100 % of this rain water will be used during distillery process.

Total water consumption of distillery in normal operation = 500 KLPD or 165000 m³/year
Thus total water saved by the company in year = 13503.60 /165000 * 100 = 8.18 % per year

Hence, total percentages saving due to rainwater use~ 9.0 % per year and total water will be reused in distillery process.

(viii) Availability of water it's source, energy /power requirement and source should be given.

One Time Total water requirement for the project will be 1495 KLD. Total fresh water demand for distillery operation is 400 KLD @ 4.00 KL of water / KL of Ethanol.

Net fresh water requirement including domestic 15 KLD and power plant of 2.5 MW (65 KLD) is 480 KLD @4.8 KL/KL of ethanol production, which will be sourced from ground water augmented with rain water. Permission of withdrawal of ground water shall be taken from CGWA before commencement of operation.

The water demand and balance of the distillery is shown below in Table 10.

Table 10: Water Balance & Fresh Water Requirement

Total Water Inputs - First Run	1495 KLD
Total Water Outputs - First Run	1495 KLD
Total Water Recycle	1095 KLD
Net Fresh Treated Water / Day – Distillery	400 KLD
Additional for Power Plant	
Power Turbine Ct Make-Up Water	65 KLD
Domestic Use - Drinking Water & Toilets	15 KLD
Total Daily Fresh Water	480 KLD

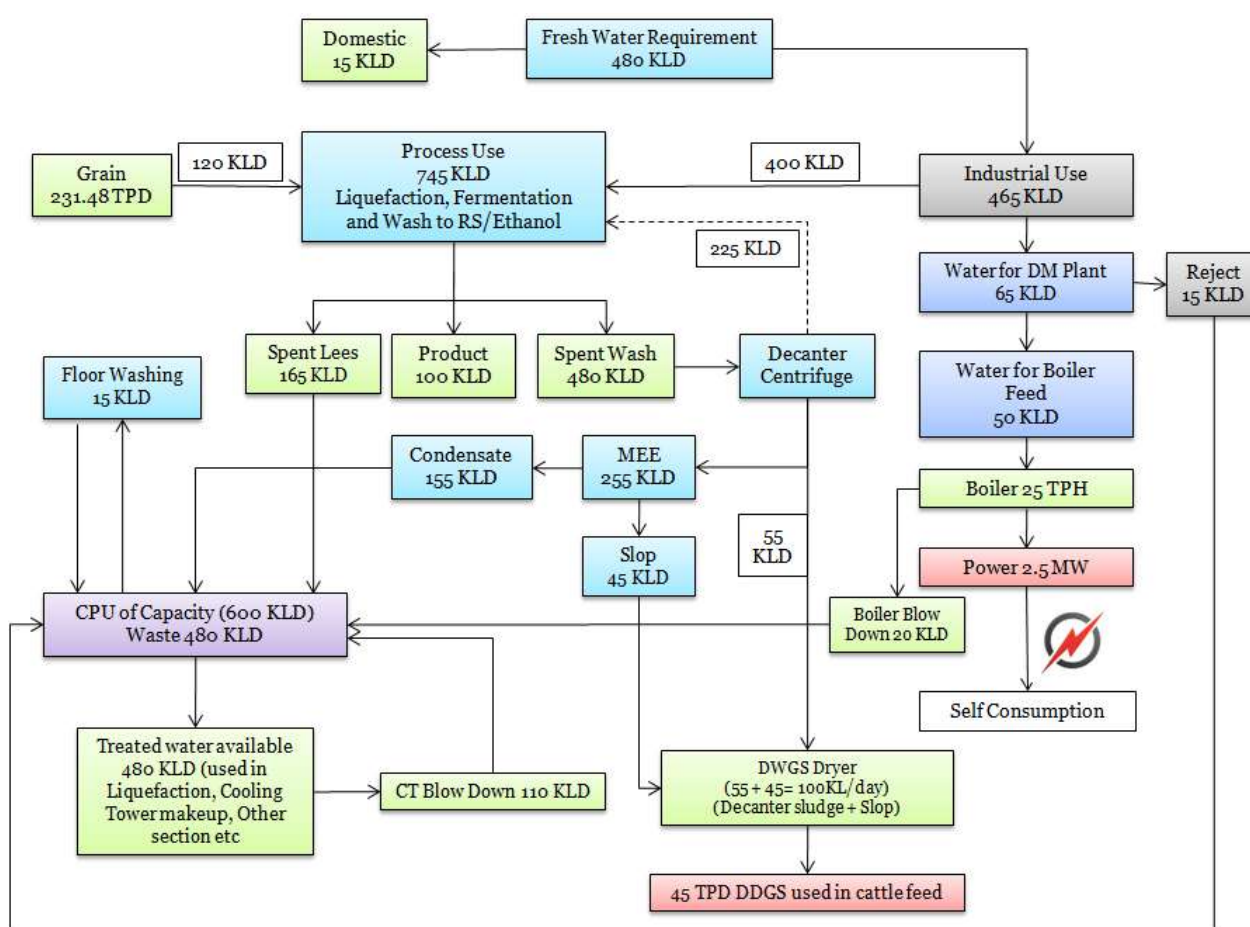


Figure 10: Water Balance

Effluent of 480 m³/day quantity will be treated through Condensate Polishing Unit of capacity 600 m³/day. Raw stillage (480m³/day) will be sent to decanter followed by MEE and dryer to produce DDGS. STP of capacity 30 m³/day will be installed to treat sewage generated from factory premises. The plant will be based on Zero Liquid discharge system and no effluent/treated water will be discharged outside factory premises.

Power demand:

During operation, phase power requirement will be 2500 KWH and will be fulfilled by 2.5 MW Co- generation power plant within the project site. Surplus power will be connected to State Grid. For emergency, D. G. Set of 750 KVA × 1no with 6 m stack height will be proposed will be installed within the plant area.

Table 3.7: Details of Power requirement

Particulars	Details
Source of supply	Steam turbine (cogeneration) & Power Corporation Limited
Power demand	2.5 MW
Power backup	DG Set capacity 750 KVA
	Fuel for DG Set – HSD
	Fuel consumption – 150 Lt/hr

Stack height calculation for D.G Set

Effective Stack Height (H) = Height of the building (h) + $0.2\sqrt{\text{Capacity of DG SET in kVA}}$
 $= h + 0.2 \times (\sqrt{750})$
 $= h + 0.2 \times 27.4 = 5.48 \text{ m}$
 $= h + 5.48 \text{ m}$

However, safe stack height of h+ 6 m will be provided as per the directions of CPCB.

(ix) Quantity of waste to be generated (liquid and solid) and scheme for their management / disposal:

The project will be based on “ZERO LIQUID DISCHARGE”.

- Fresh water requirement of the project will be met by Ground Water. Permission of withdrawal of ground water shall be taken from CGWA before commencement of operation.
- Efforts will be made to conserve as much water as possible by recycling and reusing waste water.
- DWGS will be fed to Dryers operating on steam and is dried to make it DDGS – Distillers Dried Grain with Soluble.
- Process condensate will be cooled and collected into an equalization tank with sufficient residence time. After equalization, this process condensate will be fed for Ecophotox and after treatment; it will be used for greenbelt development within the complex.
- Solid waste from the grain based operations generally comprises of fibres and proteins in the form of DDGS, which will be ideally used as cattle feed.
- We will establish briquette manufacturing unit for utilization of boiler ash generated from Project
- Company will establish briquette manufacturing unit for utilization of boiler ash generated from Project. Ash from the boiler will be given to own brick manufacturing unit.
- Used oil & grease generated from plant machinery/gear boxes & D. G. Set will be partly used in oiling & greasing gas lubrication of external parts of machinery & partly will be sold to the CPCB authorized recycler.

Table: - 11: Details of solid and hazardous waste generated along with their method of collection and mode of disposal

S. No.	Solid waste / Hazardous waste	Quantity /day	Method of collection	Mode of disposal
1.	Boiler fly Ash	40.0 TPD	Mechanical conveyor into common silo for further disposal.	Sold to bricks manufacturers
2.	DDGS	45 TPD	Mechanical Conveyor	Sold as Cattle Feed, Poultry & Fisheries
3.	Domestic solid waste	30.0 kg/day	Labour force. Domestic organic solid waste will be composted, while the inorganic solid waste will be handed over to municipality.	Segregated in separate colored bins at designated places. Disposed to authorized vendors.
4.	Used oil from DG set.	1.0 KL/A	Stored in leak proof sealed barrels	Disposed to SPCB authorized recyclers.
5.	Steam turbine oil waste	1.0 KL/A		
	Spent Resin from DM Plant	0.6 KL/A	HDPE drums in covered shed	Given to authorized re-cycler

(x) Schematic representations of the feasibility drawing which give information of EIA purpose

Environment Impact Assessment and Environment Management Plan is an important tool in achieving the sustainable development of the project. The process is depicted below:-

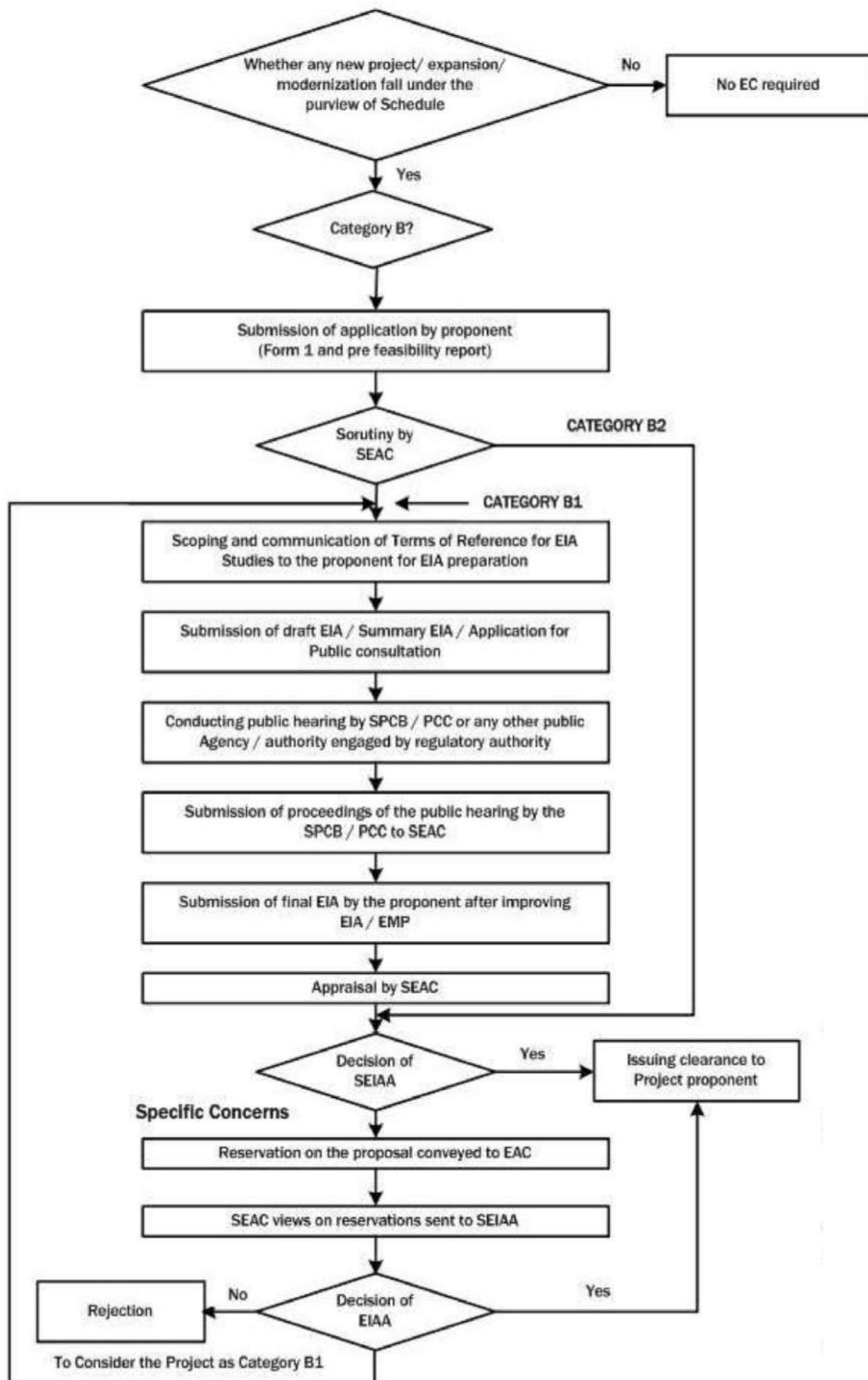


Figure 11: Schematic representations

4.0 Site Analysis

(i) Connectivity

The proposed site has good connectivity with the rail and road.

Nearest National Highway / State Highway	- SH 74 (NH227A) – 1.65 Km (SW) - NH 27 – 5.50 Km (W) - Kunswa Road – 1.90 Km (S)
Nearest Railway station	Pipra Railway Station – 20.0 Km (NE)
Nearest Airport	Muzaffarpur Airport – 56.0 Km (SE)

(ii) Land form, land use and ownership

Currently land is under the possession of Company. Sale deed has been made within the land owner and Director on dated 24.09.2022 for setting up Ethanol Plant. In continuation land conversion order issued under Bihar Agricultural Land (Conversion to non-agricultural purposes) Act 2010 on dated 24.04.2023.

(iii) Topography

The topography of the area is fairly even and has fertile alluvial plains. These alluvial plains are divided into two tracts by the river Burhi Gandak (Little Gandak) with both the plains having remarkably different characteristics. The river Sikaraha (Burhi Gandak) divides the tract from North West to South East. The northern portion of the tract is of older alluvium and has low land area which is suited for cultivation of kharif but is unsuitable for rabi crops.

The southern portion of the tract has recent alluvium deposits of the river Gandak which has changed its course moving further west. This southern portion is suited for cultivation of both Kharif and Rabi crops. The area of this region is characterized by stretches of upland varying in places by large marshy depressions known as 'Chauras'. The major slope of the area is due south-east.

The most remarkable feature of the district is presence of a chain of nearly 40 lakes running through the centre of the district covering an area of around 350 sq. km. The important lakes are located at Sugaon, Talsaraiya, Turkaulia, Motihari, Pipra, Siraha, Nawada and Tetaria. The depth of the lakes varies from 1-5 m and remains mostly filled up with water during summers.

(iv) Land use pattern

The proposed project requires land approx 48328.0 m², which is situated Village – Nayagaon Kushahar, Khijirpura, Tehsil – Kesaria, District - East Champaran, Bihar, Pin - 845424, India and under ownership of M/s Tirhut Udhog Pvt Ltd. Therefore, no social issues are involved. Land conversion order issued under Bihar Agricultural Land (Conversion to non-agricultural purposes) Act 2010 on dated 24.04.2023.

(v) Existing Infrastructure

The plant area is as per revenue detail is non-agricultural land and conversion has already been done. There is no village or human settlement in the plant area. No existing

infrastructure within the plant area. The proposed site is an undeveloped land which does not include forestry, water bodies (including CRZ) etc.

(vi) Soil Classification

The prevalent soil is older alluvial type which is characteristic feature of the Gangetic plain. The soil is lighter in texture. In the northern region the soil is strong clay known locally as 'Bangar' covering an area of about two-fifth of the district. In this area, paddy crops are cultivated during sufficient rainfall seasons. In the Southern region of the river, the soil is mainly light sandy loam not suitable for kharif but yields good crops of wheat, mustard linseed etc.

Major soil types found in the area are Paleustalfs, Haplaquents and Udifluvents soils.

(vii) Climatic data from secondary sources

Flood and drought has remained a regular feature of the area. The district of East Champaran is known for its hot summers and severe winters. The summer season starts from the end of March with average temperature of about 35° C and maximum temperature of 46° C in the months of May and June. In winter season the temperature goes down to 4 - 5° C. Lowest temperature is reported from the end of December to January.

The rainfall in the region is received through South West Monsoon during June to end of September in the area. During the rest of the period the rainfall is sporadic or scanty. The average rainfall reported from the area is 1241.6 mm. Very heavy rainfall is reported in the month of July to September. Winter rains along with pre monsoon showers are common in the district.

(Source: Ground Water Information Booklet, East Champaran District, Bihar State by CGWB Patna)

(viii) Social Infrastructure available

Infrastructure such as school, colleges, market, banks, hospitals, public transport, road, drinking water, electricity, post, telecommunication, cinema halls, radio, etc are easily available to the local people because of proposed project will be located within the 5 -10 Km surrounding town and village area .

The Distillery factory will initiate activities for the development of the region after establishment. Some of the prime activities are as follows.

- ❖ The factory will provide medical aid to the employees and their dependents
- ❖ It will provide primary school educational facilities to the children of workers
- ❖ Regular tree plantation with development will be done every year through the separate tree plantation cell in their campus and surrounding area. For nearby schools, hospitals free of cost plants are provided.

5.0 PLANNING BRIEF

5.1 Planning concept

(i) Planning Concept (type of industries, facilities, transportation etc.) Town and country Planning/ Development authority classification

The proposed project is Grain based Ethanol distillery. Facilities required for the proposed project will be provided as per requirement. Transportation of raw material and final product will be done via existing road network and metalled road will be developed within the proposed project area.

(ii) Population Projection

Temporary influx of people will be there as the managerial and supervisory staff will generally be outsider. A projection may be made by a governmental organization, or by those unaffiliated with a government.

(iii) Assessment of infrastructure demand (Physical & Social)

The Company will assess the additional demand of infrastructure (Physical & Social) in nearby area of the site and will be developed in under corporate social responsibilities programs.

(iv) Amenities/Facilities

The Company will develop the Amenities/Facilities in nearby area of the project site as per requirement of local people under corporate social responsibilities programs.

6.0 PROPOSED INFRASTRUCTURE

(i) Industrial Area (Processing Area)

The total area for the project is 48328.0 m². Currently land is under the possession of Company. Sale deed has been made within the land owner and Director on dated 24.09.2022 for setting up Ethanol Plant. In continuation land conversion order issued under Bihar Agricultural Land (Conversion to non-agricultural purposes) Act 2010 on dated 24.04.2023 for setting up Ethanol Plant. The proposed establishment of project will be carried out in the area owned by the company.

(ii) Residential area (Non-Processing area)

Residential colony is not proposed for proposed project. The local labour will be preferred to provide employment opportunities.

(iii) Greenbelt Area

Approx 35.80 % of total area i.e. 17311.00 m² will be provided as Green Belt and same will be maintained after establishment also.

(iv) Social infrastructure

The physical infrastructures such as land, roads, power, water, transportation etc are easily available for the proposed unit. Raw materials are also available with factory adequately. Very minor influx of population is anticipated due to the project. Available social infrastructure such as schools, colleges, market, medical facilities, etc. is adequate to support the probable minor population increase.

(v) Connectivity

Nearest National Highway / State Highway	• SH 74 (NH227A) – 1.65 Km (SW) • NH 27 – 5.50 Km (W) • Kunswa Road – 1.90 Km (S)
Nearest Railway station	• Pipra Railway Station – 20.0 Km (NE)
Nearest Airport	• Muzaffarpur Airport – 56.0 Km (SE)

(vi) Industrial Waste management

Proposed distillery will be based on “**ZERO LIQUID DISCHARGE**”.

(vii) Solid Waste Management

- Apart from production of Ethanol the company shall also produce by-product from the grain waste generation in the Distillery. This is known as Distillers Dried Grains with Solubles (DDGS) – An Effective and Affordable Livestock and Poultry Feed Ingredient. Company would be producing DDGS about 45 TPD and annually at 100% capacity the DDGS production is expected to be around 14995 MT per annum
- DDGS as Animal Feed Supplement (AFS)/ Wet Cake/DWGS will be sold as by-products for Cattle/Poultry/Fish or Prawn feed.
- Fly ash from the Boiler will be given to brick manufacturers/Cement Plant.

(viii) Power requirement and source

The total power requirement for proposed project will be 2500 KWH, which will be sourced from 2.5 MW Cogeneration Power Plant. Construction power / standby power connection shall be taken from state grid.

7.0 Rehabilitation and Resettlement (R & R) Plan

((i) Policy to be adopted (Central/State) in respect of the project affected persons including home oustees, land oustees and landless labourers (a brief outline to be given).

Any rehabilitation and resettlement plan is not applicable in this case since the proposed project will be done within the Non-Agricultural land.

8.0 Project Schedule and Cost Estimates

(i) Likely date of start of construction and likely date of completion (time schedule for the project to be given).

The project will start only after obtaining Environmental Clearance and all other required clearance and will complete within 1 years of commencement.

(ii) Estimated project cost along with analysis in term of economic viability of the project.

- ❖ Total cost of the Project: Rs. 137.50 Crore for proposed distillery.
- ❖ **Cost for Environment Protection Measures:**
 - Capital Cost: Rs 6.42 Crore.
 - Recurring Cost/annum: Rs 1.48 Cr/Annum.
- ❖ CER cost: Rs. 206 Lakh (1.5% of total project cost as per the OM 01st May 2018 of MoEF&CC and as per OM 30th September 2020 of MoEF&CC)

9.0 Analysis of Proposal

(i) Financial and social benefits with special emphasis on the benefit to the local people including tribal population, if any, in the area.

Proposed project will result in growth of the surrounding areas by increasing ancillary development and supporting infrastructure. Special emphasis on Financial and Social benefits will be given to the local people including tribal population, if any, in the area.

Development of social amenities will be in the form of medical facilities, education to underprivileged and creation of self-help groups.

Bihar state will get revenues in terms of taxes. Business opportunities for local community will be available like transport of raw material/product to market, fly ash transport to Brick manufactures, maintenance & house-keeping contract work etc.

