October 2022

ENVIRONMENTAL MANAGEMENT PLAN

(ETHANOL PLANT TO PRODUCE 100 KLPD UNDER EBP PROGRAMME)

Subsequent amendment S.O. 2339 (E) Dated: 16.06.2021)

M/s. OBEL AGRO INDUSTRIES PRIVATE LIMITED

Location: Sy. No. 133/1, 2, 3, 4A, 4B, 4C, 4D & 4E

Tatiparthi Village, Thottambedu Mandal,

Tirupati District, Andhra Pradesh

Prepared & Submitted by

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NABET/EIA/2124/ RA 0240

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1.0 INTRODUCTION

M/s. OBEL AGRO INDUSTRIES PRIVATE LIMITED proposes to establish a Grain based Distillery at the site located at Sy. No. 133/1, 2, 3, 4A, 4B, 4C, 4D & 4E of Tatiparthi Village, Thottambedu Mandal, Tirupati District of Andhra Pradesh. The total site area of the proposed project is 20.13 Acres.

The Government of India approved the National Policy on Bio-fuels in 04th June 2018 stipulating Ethanol Blended with Petrol (EBP) Programme as its main component, offering indigenous and non-polluting renewable energy source and successful implementation of the programme would not only result in substantial reduction in air pollution but also saving of precious foreign exchange through import substitutions. This policy has laid out indicative targets of achieving 20% blending of ethanol in petrol in the whole country by 2030. The government of India has advanced the target for 20% ethanol blending in petrol (also called E20) from 2030 to 2025

Accordingly Ministry of Environment, Forest and Climate Change to give a further boost to the Ethanol Blending Program, Grain based distilleries, having Zero Liquid Discharge (ZLD) setup to produce only ethanol for the purposes of Ethanol Blending Program of the Government, and keeping in view overall environmental, social and economic benefits in production of ethanol from such distilleries including reduction in Green House Gas emissions in comparison to conventional fossil-fuel, less water and air pollution, potential boost to agricultural economy and reduced dependence on imported fossil fuel by equivalent amount, the Central Government deems it necessary to give a special dispensation as regards granting of Environmental Clearances (EC) to such category of projects [Manufacturing of ethanol by Grain Based distilleries with Zero Liquid Discharge, to be used for Ethanol Blended Petrol Programme of the Government], subject to certain conditions.

"According to latest MoEF & CC notification S.O. 2339 (E) Dated: 16.06.2021, the proposed project comes under Project/Activity "5 (ga)" with Category 'B' (Project with Zero Liquid Discharge) wherein for all applications made for Grain based distilleries with Zero Liquid Discharge producing ethanol; solely to be used for Ethanol Blended Petrol Programme of the Government of India shall be considered under B2 Category and appraised at Central Level by Expert Appraisal Committee (EAC) with condition that the project proponent shall file a notarized affidavit that ethanol produced from proposed project shall be used completely for EBP Programme"

Project Proposal

M/s. Obel Agro Industries Private Limited proposes to set up a Grain based Ethanol Project with a production capacity of 100 KLPD capacity based on broken rice as main feedstock. Rice can be easily procured from neighbouring districts like Krishna, Guntur, West Godavari, East Godavari and during the rest of the year form nearby states such as Odisha, Telangana, Tamil Nadu, Chhattisgarh and Karnataka.

The proposed distillery project shall also bring prosperity to nearby region by providing direct & indirect Job opportunities to local residents & shall contribute substantially in states economy.

The total site area of the project is 20.13 acres at Sy. No. 133/1, 2, 3, 4A, 4B, 4C, 4D & 4E, Tatiparthi Village, Thottambedu Mandal, Tirupati District of Andhra Pradesh.

Brief Description & Nature of the Project

1.	Item of Manufacturing	Ethanol for Blending with petrol
2.	Proposed Capacity	Ethanol – 100 KLPD
3.	By Products	
	Compressed CO_2	75 TPD
	DDGS	48 TPD
	Cogeneration Power	2.5 MW
4.	Employment	120 No.'s

2.0 JUSTIFICATION FOR THE PROJECT

In line with the ambitious Ethanol Blending programme of honourable prime minister and to become self-dependent on fuel within the country Company is proposing 100 KLPD Grain Based Ethanol Plant at Tatiparthi Village, Thottambedu Mandal, Tirupati District of Andhra Pradesh.

"According to latest MoEF & CC notification S.O. 2339 (E) Dated: 16.06.2021, the proposed project comes under Project/Activity "5 (ga)" with Category 'B' (Project with Zero Liquid Discharge) wherein for all applications made for Grain based distilleries with Zero Liquid Discharge producing ethanol; solely to be used for Ethanol Blended Petrol Programme of the Government of India shall be considered under B2 Category and appraised at Central Level by Expert Appraisal Committee (EAC) with condition that the project proponent shall file a

notarized affidavit that ethanol produced from proposed project shall be used completely for EBP Programme"

3.0 IDENTIFICATION OF PROJECT PROPONENT

M/s Obel Agro Industries Private Limited is incorporated as private limited company on 01.02.2022 under the Companies Act 2013. The company is registered under GST number 37AAPCM44135L1ZZ.

List of Promoters

1. Mr. Reddeppa Reddy Obulu
2. Mrs. Manjula Pendrue
3. Mr. KBVSN Raju
4. Mr. Pavan
5. Mr. Kumar Swamy Reddy
6. Mrs. Lavadi Suneetha

4.0 NEED FOR PROPOSED PROJECT

The proposed Ethanol project will contribute to country's energy security. The Government of India mandated blending of 5 per cent ethanol with petrol in 9 States and 4 Union Territories in the year 2003 and subsequently mandated 5 per cent blending of ethanol with petrol in 20 States and 8 Union Territories in November 2006 on an all-India basis except a few North-East states and Jammu & Kashmir. This project is a step in utilizing renewable and environment-friendly sources of energy like ethanol to supplement fossil fuels. The production of Bio-Ethanol for blending in gasoline can help the country reduce its dependence on crude oil imports and thus save on.

To reduce the crude import bill and emission from gasoline vehicle, GOI in June 2021 has issued the revised ROADMAP FOR ETHANOL BLENDING IN INDIA 2020-25 in June 2021.

As per the revised policy, Government has advanced the target of 20% ethanol blending in gasoline target from 2030 to 2025. At present total ethanol production in India is about 6 Billion Liters out of which 3.3 billion is available for ethanol blending with which 8.5%

ethanol blending has been achieved. To achieve 20 % blending in MS, total quantity of Ethanol required is 10 billion Liters /year (7.9 million Tons) by 2025 for the ethanol blending.

In view of above, M/s. Obel Agro Industries Private Limited wants to set an ethanol plant in Tirupati district of Andhra Pradesh of the rated capacity 100 KLPD.

5.0 PROJECT LOCATION

The proposed area of the project is 20.13 Acres located at Sy. No. 133/1, 2, 3, 4A, 4B, 4C, 4D & 4E of Tatiparthi Village, Thottambedu Mandal, Tirupati District of Andhra Pradesh.

Toposheet No. : 57 O/9 & 57 O/10

Latitude : 13°46'21.51"N

Longitude : 79°45'44.92"E

Environmental Setting Details of the Project

Nearest Habitation	Malligunta village at 0.45 km due NW Gummadigunta village at 0.75 km due SE
Nearest town	Srikalahasti at a distance of 6.25 km due SW
District headquarters	Tirupati at a distance of 40.30 km
Nearest railway station	Srikalahasti Railway Station at a distance of 8.90 km
Nearest Airport	Tirupati Airport at a distance of 27.95 km
Nearest Highway	SH - 71 (Puthalapattu – Naidupeta Road) at 1.95 km
Sanctuaries/National parks	None within 10 km radius
Nearest Reserved Forest	Anjuru Reserve Forest – 8.25 km – SE
Nearest Water bodies	Telugu Ganga Canal – 0.35 km – North Dry Tank – 0.6 km – NE Gumadigunta Cheruvu – 1.00 km – SE Punabaka Cheruvu – 3.65 km - NE Pedda Kanali Cheruvu – 2.00 km – SW Swarnamuki River – 6.55 km – North & West Kalangi River – 6.60 km – SE Chembedu Cheruvu – 6.60 km - NE Gundimagugu River – 6.80 km – SE

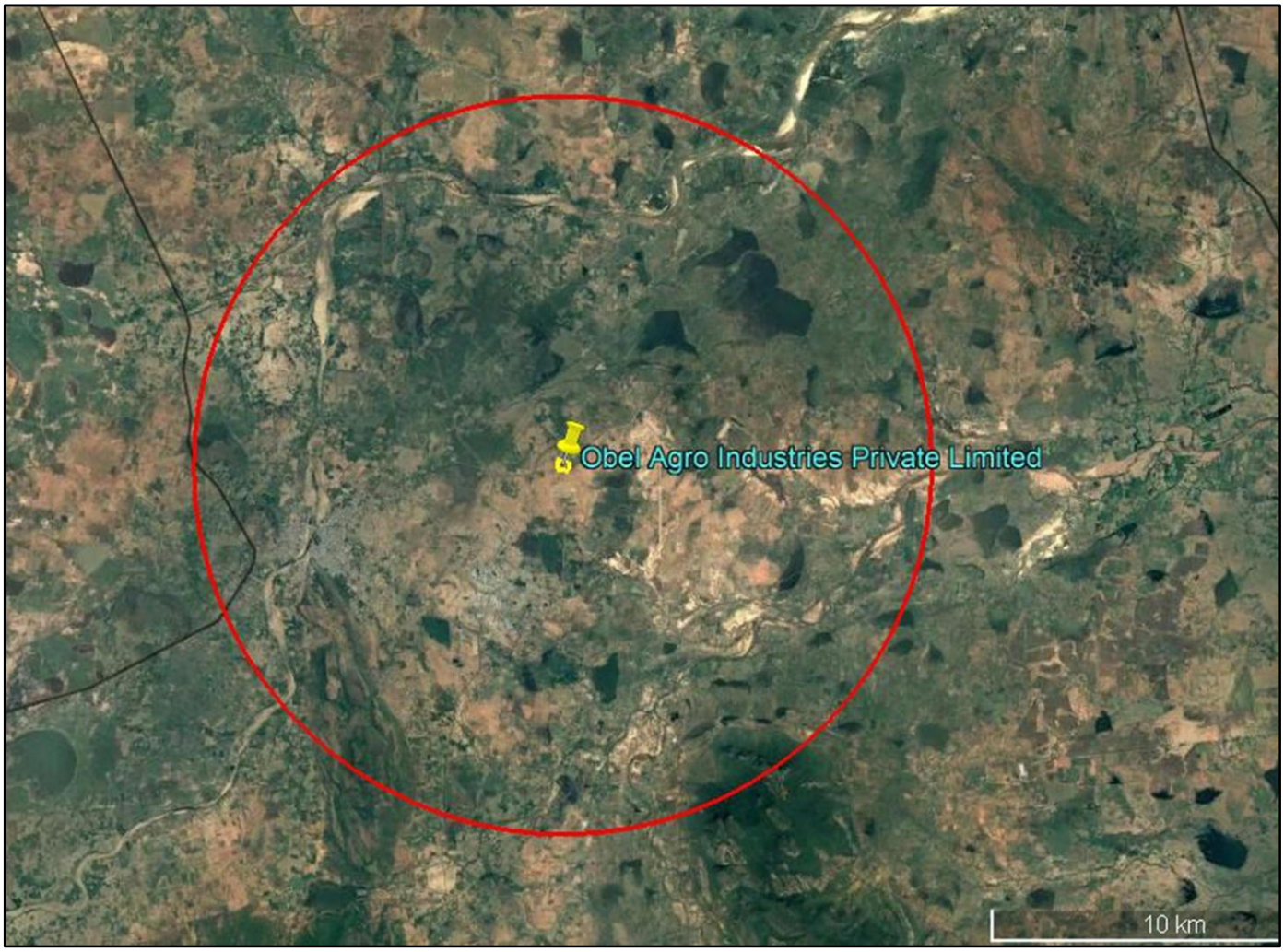


Fig. 1 – Google Map of 10 km Radius from the Project Site

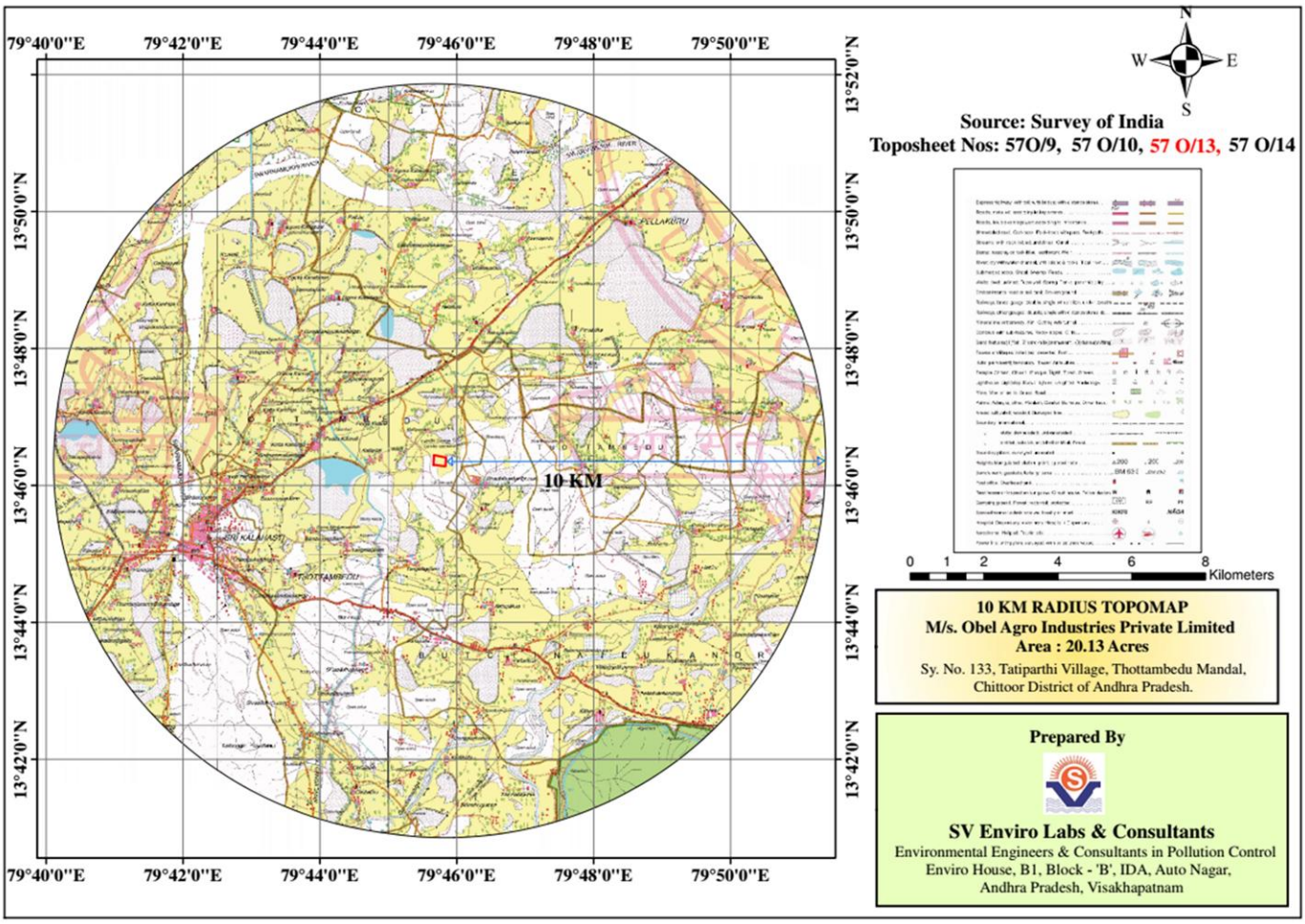


Fig. 2 - Topomap of 10 Km Radius from the Project Site

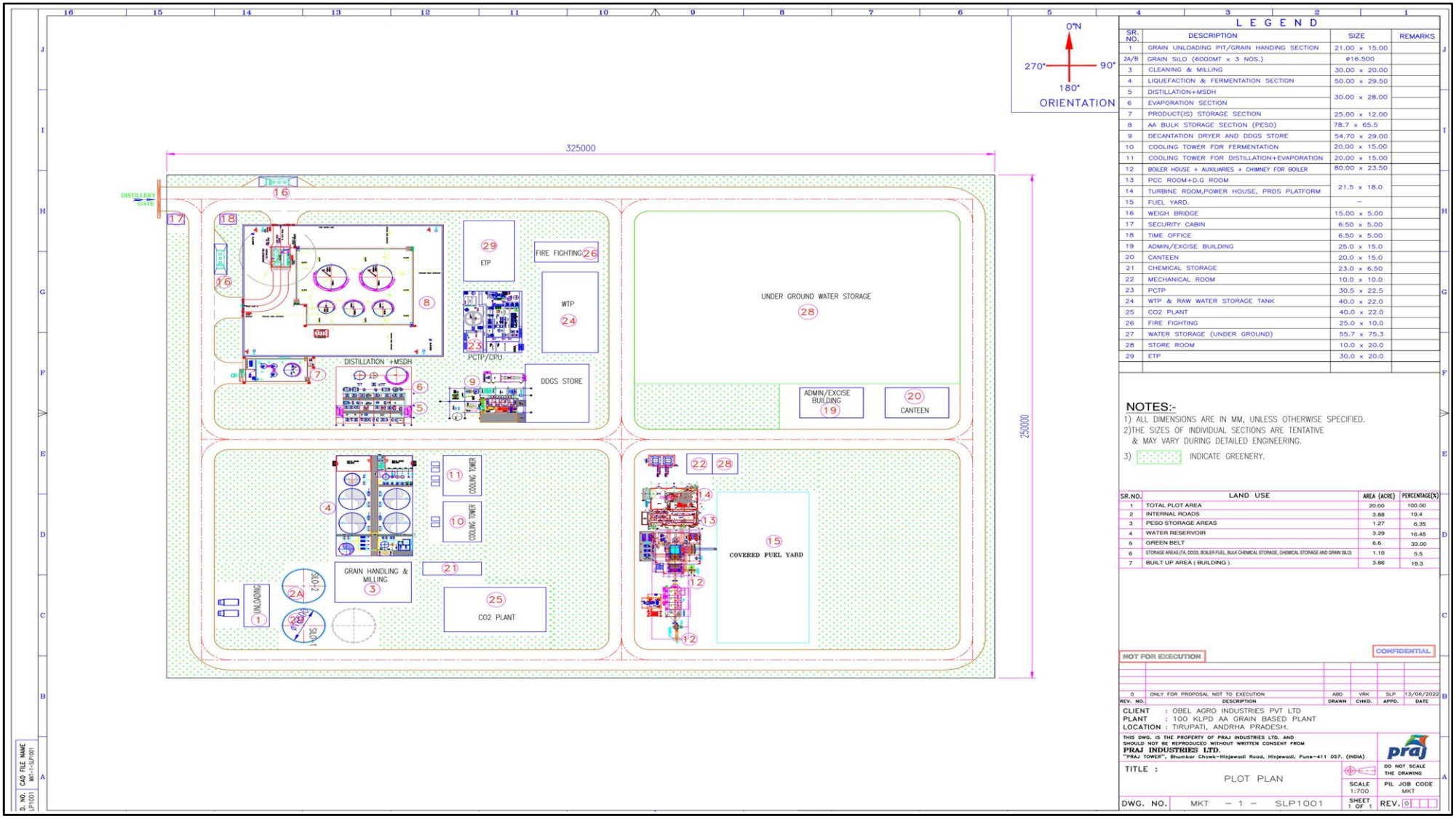


Fig. 3 – Site Layout

6.0 SUMMARY OF THE PROPOSED PROJECT

S. No.	Parameters	Description
1.	Proposed production	➢ 100 KLPD Grain based Ethanol plant **By Products** ➢ DDGS – 48 TPD ➢ CO2 – 75 TPD ➢ Co-generation power plant – 2.5 MW
2.	Total site area	20.13 Acres
3.	Project cost	Rs.102.0 Crores
4.	Water Requirement	2065 KLD (Fresh Water – 630 KLD & Recycled Water – 1435 KLD)
5.	Source of water	Ground water through bore wells Applied for CGWA Permission and is under progress
6.	Proposed Effluent treatment	Proposed ZLD System with CPU, RO & MEE system
7.	Steam requirement	For the proposed multi fuel based 25 TPH incineration boiler will be installed. The steam requirement will be sufficient as the system is Integrated Evaporator with Heat recovery system.
8.	DG Sets proposed	1 x 1000 KVA
9.	Air emissions	Emissions from Project will be Particulate matter, SO_2 and NOx Electro Static Precipitator (ESP) with Modern combustion technology will be provided to 25 TPH Boiler to bring down the particulate matter to below 50 mg/Nm^3. The exhaust gases from the boiler will be discharged into the atmosphere through a stack of 60 m height for effective dispersion of gases into the atmosphere.
10.	Noise levels	Ambient Noise levels are within the standards prescribed by MOEF&CC Notification and its amendments
11.	Solid & Hazardous Waste generation	Fly ash – 30.0 TPD Waste Oil – 2000 LPA DDGS – 48 TPD (which will be sold as cattle feed)

7.0 MANUFACTURING PROCESS

The proposed Grain Bio-Ethanol Project will be based on the most experienced and globally recognized Indigenous technology available in India. The plant will be design to produce 100 KLPD of Bio-Ethanol and will process/ consume per day of 220 MT of rice having a starch range of around 70 % w/w per day

Primary feedstock is Rice which is available as surplus currently in India, and, as per the latest DFPD notification would be routed through the nearby FCI go downs or through open market.

Grain Receiving, Storage and Milling:

Grain unloaded, is initially received by grain receiving hopper. From receiving hopper, grain is shifted to storage silo through screw conveyor and bucket elevator. The silo is well equipped with aeration facility so as to keep proper air circulation inside the silo. Some part of the dust that is carried along with the incoming grains is removed in this section.

Pre-cleaned Grains are fed in controlled rate to the hammer mill. In this unit operation, Grain is broken down into small particles (flour) of required size distribution. Oversized particles are segregated with the help of vibratory screen. They are then recycled back to the hammer mill through the coarse bin. Flour from Vibratory screen is collected in the Hopper and then fed to the Slurry Mixing tank at a controlled rate.

Liquefaction:

The starch from the slurry is liquefied for sugar production. This is done in three steps viz. Pre-liquefaction, continuous jet cooking and post-liquefaction. Heat stable enzymes are used for the process. The cooking process is done at high temperature to sterilize the slurry and to get high yields of sugar.

This process is designed to maximize product yields using minimum process water and is based on classical concept of Simultaneous Saccharification and Fermentation.

Hot Process water and recycled thin slop is added to Pre-masher to make slurry. The mixed slurry is taken to the Initial Liquefaction Tank where additional quantity of water is added as per requirement. Viscosity reduction Enzyme and stabilizing chemicals and a portion of liquefying enzyme are also added at this stage. This slurry is then “cooked” in the jet cooker. The slurry is continuously pumped to a steam jet cooker where high-pressure steam at 3.5 bar (g) / 147 °C rapidly raises the slurry temperature. The mixture of slurry and steam is then passed through the Retention vessel for desired retention time at a given flow rate. The cooked

mash is discharged to a Flash Tank. The cooking process, accomplished in the above manner, converts the slurry into a hydrated, sterilized suspension (as starch molecule is solubilized) and is therefore susceptible to enzyme attack for liquefaction.

The gelatinized mash from the Flash Tank is liquefied in the Final Liquefaction Tank where liquefying enzyme is added. The liquefied mash is cooled in Mash Coolers and transferred to Fermentation section for further action.

Fermentation:

During the fermentation, yeast strains of the species Saccharomyces Cerevisiae, a living microorganism belonging to class fungi converts sugar (Glucose, Fructose, Sucrose, Maltose or Maltotrioes) present in the Cane Syrup or sugar cane juice to alcohol. However, Saccharomyces Cerevisiae cannot use starch as such. To produce alcohol from starch-containing raw materials such as grains or cassava etc. by fermentation, the starch has to first hydrolyze to glucose. Industrially, this conversion is accomplished by the cooking of starch slurry and use of enzymes to breakdown the polymers of glucose (Amylose and Amylopectin), Transformation of starch to glucose consists of Gelatinization (Cooking), Liquefaction and Saccharification.

Chemically this transformation to alcohol can be approximated by the equation.

$$n\,(C_6H_{10}O_5) + n(H_2O) \xrightarrow{\text{Enzymes}} n(C_6H_{12}O_6)$$

Starch (162) Water (18) Glucose (180)

$$C_6H_{12}O_6 \xrightarrow{\text{Yeast}} 2\,C_2H_5OH + 2CO_2$$

Glucose (180) Ethanol dioxide (92) + Carbon (88)

As per the above reaction, 162 gm of starch produces 180 gm of glucose. Therefore, 1 MT of starch gives 1111.11 gm of glucose. 180 gm. of glucose on reaction gives 92 gm. of alcohol. Therefore, 1 MT of sugar gives 511.1 kgs of alcohol. The specific gravity of alcohol is 0.7934, therefore, 511.1 kg of alcohol is equivalent to 511.1/0.7934 = 644.19 liters of Alcohol. During fermentation, other by-products like glycerin, succinic acids, etc also are formed from sugars. Therefore, actually, 94.5% of total fermentable sugars are available for alcohol conversion. Thus, one MT of sugar will give only 644 x 0.945 = 608.6 liters of alcohol, under ideal conditions theoretically. Similarly, one MT of pure starch should give 715.0 liters of alcohol

under ideal conditions, theoretically (at 100 % efficiency and 100 % ethanol). Corn or sorghum contains about 62.0 % starch on a dry weight basis. Therefore, one MT of corn or sorghum can yield about 410 Liters of Rectified Spirit.

For bringing out above biochemical reaction, we require proper and careful handling of yeast, control of optimum parameters like pH and temperature and substrate concentration and enzyme dose, which results into the effective conversion of starch to sugars and then to alcohol.

The purpose of fermentation is to convert sugars into alcohol. Simultaneously Carbon dioxide is produced in Stoichiometric proportions and is scrubbed before being discharged.

There are closed top Fermentation tanks with adequate external cooling system to maintain optimum fermentation temperatures. Agitators are also provided to ensure mixing and suspension of substrate in the tank. Anaerobic conditions are maintained to For bringing out above biochemical reaction, we require proper and careful handling of yeast, control of optimum parameters like pH and temperature and substrate concentration and enzyme dose, which results into the effective conversion of starch to sugars and then to alcohol. The purpose of fermentation is to convert sugars into alcohol. Simultaneously Carbon ensure high reaction rates and CO2. Typically, 4 Nos. of fermenters are provided with Beer well of same capacity. After transfer process is complete, empty fermenters is put to CIP cycle.

Yeast seed material is prepared in water-cooled vessels by inoculating sterilized mash with active dry yeast. Optimum temperature is maintained by circulation of cooling water. The contents of the yeast vessel are then transferred to Pre-Fermenter.

The pre-fermenters are filled with mash and loaded with contents of the yeast vessel. The purpose of the aerated pre-fermentation is to allow time for the yeast cells to multiply and reduce the chances of contamination in fermenters. When the Pre-Fermenter contents are transferred to the main fermenters, the concentration of Yeast cells are high enough to substantially reduce the lag time associated with yeast growth in fermentation.

Saccharifying enzymes are added in the fermenters. These convert the starch into sugars. This is basically conversion of Dextrin into Dextrose. The purpose of fermentation is to convert the fermentable substrate into alcohol. To prepare the mash for fermentation, it has to be diluted with water.

The pH of the mash is adjusted primarily by recycled slops (which also provides for nutrients) or by the addition of acid. Yeast is available in sufficient quantity to initiate fermentation rapidly and complete it within 45 hours.

At the start of the cycle, the Fermenter is charged with mash and contents of the pre - fermenter. Significant heat release takes place during fermentation. This is removed by forced circulation cooling in external heat exchangers. The recirculating pumps also serve to empty the fermenters into beer well. After the fermenters are emptied, they are cleaned with water and caustic solutions and sterilized for the next batch. Six fermenters are provided for Grain operation.

CO_2 evolved during fermentation carries along with it some entrained alcohol. This CO_2 is taken to a CO_2 scrubber where it is washed with water to recover the entrained alcohol. The scrubbed CO_2 can then be taken to CO_2 recovery plant

Multi-Pressure Distillation for Wash to Rectified Spirit:

Multi - pressure distillation scheme has three distillation columns. These columns operate under different pressure conditions. Energy from column operating under high pressure is re-utilized by column operating under low pressure to conserve energy.

The columns in order of flow are:

1. Mash/Stripping Column
2. Rectification Column
3. Aldehyde cum Recover Column

Fermented wash is preheated in the Fermented Wash Pre heater and fed at the top of the Mash/Stripping column. This column is provided with Re-boilers. Top vapors of Mash/Stripping column containing all the alcohol in the wash are sent to Rectification column. Rest of the fermented wash flows down the Mash/Stripping column and is taken out as spent wash from column bottom.

In Rectification column, higher volatile ethanol component is separated from ethanol plus water binary mixture. Rectified Spirit draw is taken from the top of Rectification column, which is sent to Molecular Sieve Dehydration Fuel Ethanol Plant.

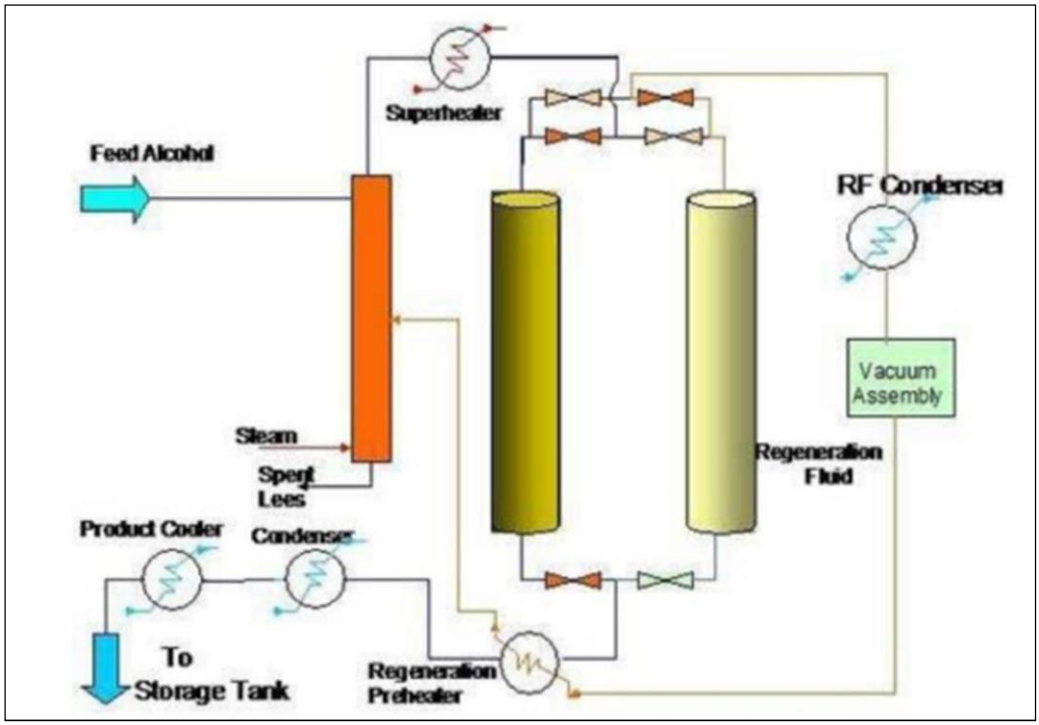
In the Aldehyde cum Recovery column, fusel oils are concentrated and then sent to decanter where these streams are diluted with water and fusel oil rich layer is separated. Technical alcohol cut is taken out and recycled into the system.

Molecular Sieve Dehydration (Fuel Ethanol Plant)

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

Molecular sieves are nothing but synthetic zeolites typically 3Ao zeolites. Zeolites are synthetic crystalline Alumino silicates. This material has strong affinity for water. They adsorb water in cold condition and desorb water when heated. This principle is used to dehydrate ethanol. The crystalline structure of zeolites is complex and gives this material the ability to adsorb or reject material based on molecular sizes. Water molecule can enter the sieve and be adsorbed, but larger alcohol molecule will not be retained and will go through the bed. There can be two to three beds in parallel. Once a particular bed is saturated with water, it is heated with steam so that adsorbed water is desorbed from the bed. Till that time, other bed is used for dehydration.

Vapour of Rectified Spirit at around 95% v/v are passes through a bed containing alumino-silicate adsorbent bed material. This removes extra amount of moisture from spirit and output is Fuel Ethanol or Absolute Anhydrous alcohol of more than 99.8% v/v which is suitable for blending in petrol and also pharmaceutical applications.



Decantation Section:

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. Spent wash/Thick Slops from Mash Column is pumped to Thick Slops Tank. Thick Slops is then fed to Decanter Centrifuge through Decanter Feed Pump. In Decanter suspended solids from Thick Slop are separated and removed as Wet Cake while Thin Slops is collected in Thin Slops Tank. Thin slops from this tank are then fed to Evaporator for further concentration.

Thin Slop Evaporation:

Thin slop evaporation plant is designed to concentrate thin slop coming out of decantation unit from 5% to 30% w/w solid concentration. This evaporation plant is multi-effect and combination of falling film & forced circulation type. Evaporation is integrated to distillation and DDGS dryer for energy conservation. The product at the desired concentration of 40% w/w total solid is obtained at the outlet of the final effect. Each effect is provided with recirculation cum transfer pumps. The condensate from surface condensers is collected in a common condensate pot. The condensate is transferred for further treatment / drain by using centrifugal pump. The system operates under vacuum. Water-ring vacuum pumps are used to maintain a desired vacuum. Cooling water from cooling tower is used in the surface condensers for condensing the vapours.

DDGS Dryer:

Wet cake with 30% w/w solids concentration from decantation section and Concentrated Syrup with 30% w/w solids concentration produced in evaporation section are mixed together & 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 vapours 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.

Colourless effluent such as spent lees, process condensate, washings, blow downs are treated in a Condensate Polishing Unit and recycled back to process.

Ethanol Storage:

Product streams from the various sections are initially collected in respective daily receivers and then transferred to bulk storage tanks. Separate vent condenser is provided for each bulk

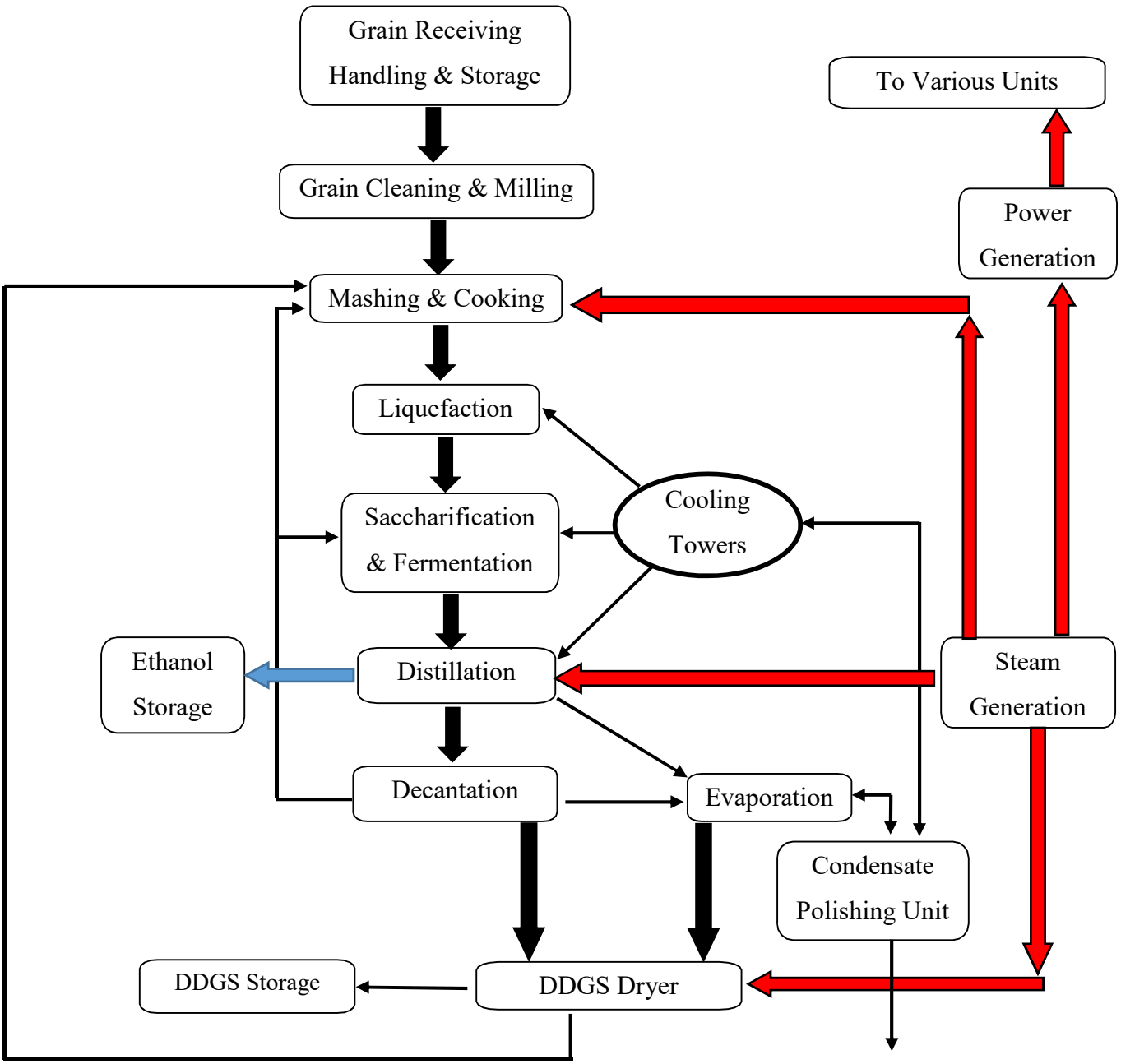
storage tank. Entire fuel ethanol receivers, bulk storage and dispatch system is installed according to PESO norms.

Storage Tank Capacities:

A. Ethanol Daily Receiver Tank - 100 KL (3 No.'s)

B. Ethanol Bulk Storage Tank - 1000 KL (3 No.'s)

C. Fusel Oil Storage Tank - 20 KL (1 No.)



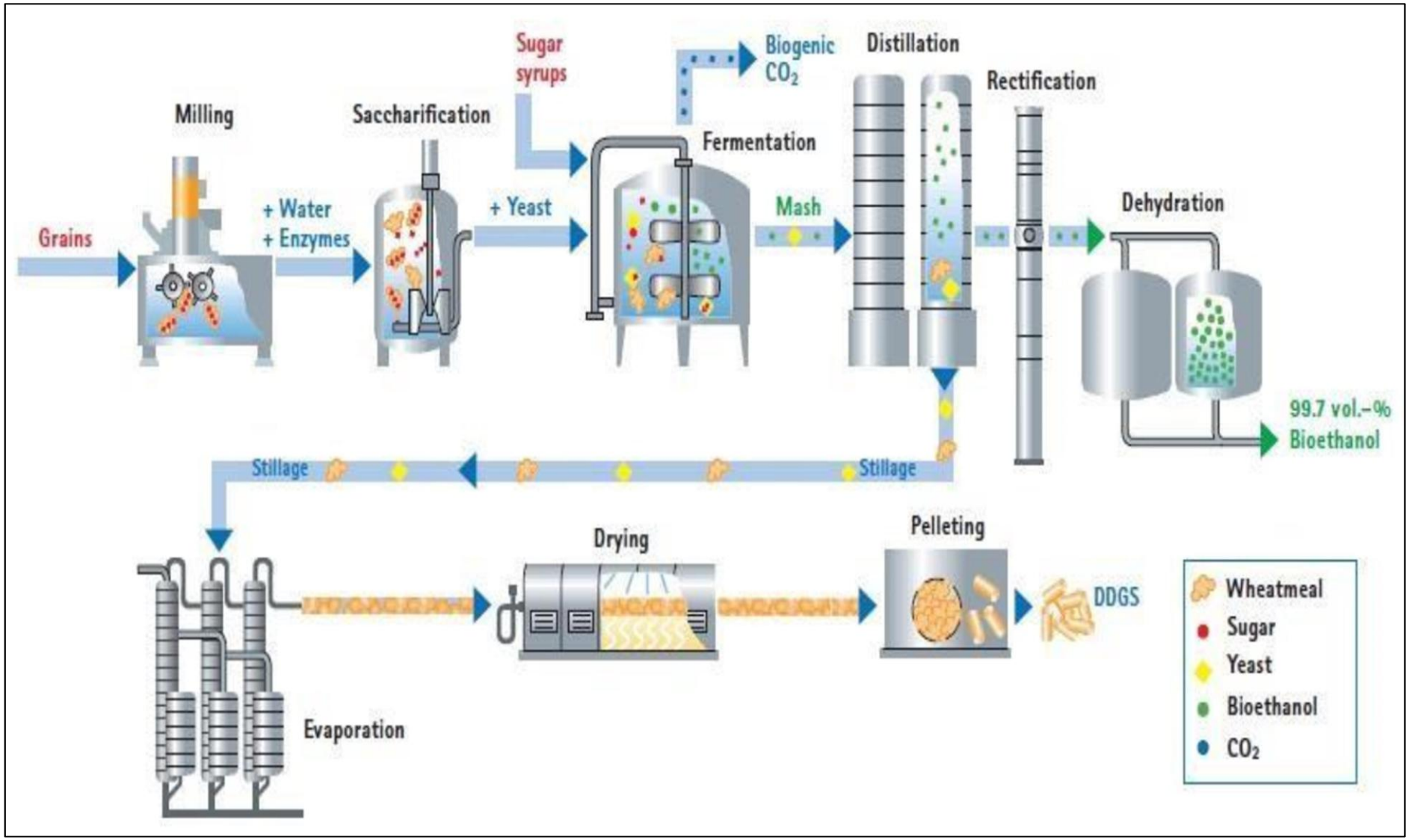


Fig. 4 - Process Flow Diagram

8.0 RESOUCRE REQUIREMENT

8.1 Land Requirement

The total site area for the proposed grain based distillery is 20.13 Acres which is a levelled land. Plantation will be started before commission activities of the proposed plant.

After installation of the plant, more than 33% of the total site area will be covered with greenbelt and plantation. The land use breakup is given below.

Table 1 – Land Use Statement

S. No.	Particulars	Area in Acres	%
1.	Ground Coverage Area	6.23	30.94
2.	Green Belt Area	6.73	33.43
3.	Internal Roads & Parking	3.88	19.27
5.	Water Reservoir	3.29	16.34
	Total Area	**20.13**	**100**

8.2 Raw Material Requirement

The basic raw material for the manufacturing of Ethanol will be Grain - Broken Rice, Maize etc. The broken rice is easily available in the nearby area. Details regarding quantity of raw materials required their source along with mode of transportation proposed project are given in table below

Table 2 – Raw Material Quantities

S. No.	RAW MATERIAL	QUANTITY (TPD)	MODE OF TRANSPORT
1.	Grain - Rice	220	Through grain suppliers by road
2.	Chemicals		
	Urea/DAP other nutrients	0.33	From the nearby markets through road
	Alfa Amylase	0.025	
	AMG 300L	0.065	
	Sulphuric acid	0.04	
	Sodium Hydroxide/Caustic	0.42	
	Yeast	0.075	
	Hydrochloric acid	0.42	

8.3 Man Power Requirement

There will be direct & indirect jobs and business opportunities to the local people such as daily wage labor, transporters and raw material suppliers. During operation phase, total manpower requirement for the proposed project will be **120 (Temporary and permanent both).** During construction phase, 100 people will be involved in the construction activities for construction of the plant

Table 3 – Employment Potential

Temporary employment during construction	85
Permanent employment during construction	15
Total	**100**
Temporary employment during construction	20
Permanent employment during construction	100
Total	**120**

8.4 Power Requirement

The estimated power requirement for the proposed project is 2.5 MW.

Initially the power will be sourced from the APSPDCL and after the operation of co-generation power plant the power requirement will be met from captive source.

The company proposes to set up a Co-generation Plant of 2.5 MW capacity based on renewable energy i.e. Agro-mass (Rice Husk/Rice Paddy Strew/ Bagasse/coal) plant to meet its steam and electrical energy requirement. If Additional power is produced by captive power plant will be diverted to grid.

The DG Set (1 x 1000 KVA) will be used for emergency backup purpose only.

8.5 Fuel Requirement

Coal/Biomass is being used as fuel for the 25 TPH boiler. The fuel requirements for 100 KLPD Ethanol production is as follows

Biomass – 130 TPD

Coal – 100 TPD

8.6 Steam Requirement

The steam requirement for the proposed project will be 570 TPD (24 TPH) will be sourced from the proposed **25 TPH Boiler.**

Table 4 – Steam Requirement

S. No.	Description	Quantity (TPD)
1	Liquefaction (@ 0.6 kg/lit)	60
2	Distillation (@ 1.8 kg/lit)	180
3	Dehydration (@ 0.6 kg/lit)	60
4	DDGS dryer (@ 1.4 kg/lit)	140
5	Evaporation (@ 0.6 kg/lit)	60
6	De-Aerator	57
7	Steam losses/Auxiliary use	13
	Total	**570**

8.7 Water Consumption

The total water requirement is **2065 KLD** (Fresh Water – 630 KLD & Recycled Water – 1435 KLD)

Source: Ground water through Bore wells (CGWA application is under progress) and Surface Water

Table 5 – Water Requirement

S. No.	Input (KLD)	Description	Fresh Water (KLD)	Recycled water (KLD)
1.	20	Domestic	20	--
2.	680	Process	195	485
3.	10	Washings	10	0
4.	600	Boiler Feed	90	510
5.	630	Cooling Tower (Make up)	280	350
6.	90	Green Belt/spraying in fuel and ash storage areas	--	90
7.	35	others	35	--
	2065	**Total**	**630**	**1435**

9.0 UTILITIES & SERVICES

This comprises cooling tower and its system, instrument air and process air system, water treatment system and steam generation facility. Instrument Air is dried air having due point (-) 40°C. Process air can be filtered air. The water treatment plant consists of sand filtration followed by softening unit. The design of softening plant is dependent upon quality of raw water. Boiler capacity is arrived considering a peak load requirement.

Boiler & Auxiliaries

The OAIPL plans to install a 25 TPH capacity Travelling Grate Boiler for the production of 2.5 MW of cogeneration of power with steam. The boiler would be having other auxiliaries like, drum, furnace, Super heater, De-Super heater, Draft System, Economizer, Water Wall /Evaporator, Support, Soot Blower, Air Heater, Primary Fluidising Air Fan, Forced Draft Fan, Induced Draft Fan, Ash Collection, Boiler Feed Pump

Turbine & Auxiliaries

The turbine shall be horizontal, single cylinder, Backpressure design coupled to a generator to generate the rated output of 2.5 MW of electricity with the steam inlet parameters as specified in these specifications. The Steam turbine, gear box, main oil pump with its interconnecting piping and its supports shall be assembled and aligned on a single skid and shall be delivered. All the cabling within the skid shall be laid in the metal conduits and shall be fixed to the base frame with respective junction boxes mounted on the skid. Main component & associated system of the Turbine are casing, rotor, Gland Sealing System, Condensate System, Condensate Pump, Air Ejector System, LP Heater, Deaerator, Turbine Oil System & Turbine Governing System.

Generator & Auxiliaries

The generator shall be of CACW, brush less design with horizontal shaft mounted AC exciter driven by a steam turbine through reduction gearing and fitted with one PMG on the extended shaft of alternator. Supplier shall clearly specify the excitation arrangement in case PMG is not applicable. The Generator shall be capable of delivering the maximum output obtainable from the steam turbine under any operating conditions at 0.8 power factor lag, 11 kv output with a frequency of 50 Hz. Main component & associated system of the generator are stator, rotor, Generator Bearing, Generator Cooling System, Generator Excitation System & Generator Protection.

A high-pressure steam is generated in boiler and passed through a Back pressure turbine to generate indigenous power. Turbine exhaust steam is utilized for process.

Water Treatment Plant:

The water quality will require pre-treatment to satisfy the quality required for boiler feed water, process requirement, and Domestic purpose. Treatment will involve sedimentation, sand filtration, activated carbon filtration, softening and ion exchange treatment (as required for different process requirements), suitable for quality of water required.

The raw water from tank is feed to filter feed tank. After DMF and ACF process, it is sent to process water tank. For Grain operation the raw water passes from Multi-grade Filter followed by Activated Carbon Filter. The Filter Water will be distributed in three streams like Process Water, Soft water & DM Water.

Cooling Water:

The capacity of Cooling Towers will be 200/650/700 & 430 m^3/hour for Liquefaction, Fermentation, Distillation and Ethanol Evaporation. The cooling tower will be counter /cross flow induced draft cooling tower. The cooling tower for Liquefaction, Distillation, De-hydration & Evaporation shall be designed for a cooling range of 8°C, and an approach of 5°C while operating under the atmospheric wet bulb temperature of about 28°C.

The cooling tower for fermentation shall be designed for a cooling range of 2°C

The cooling tower shall be carefully sited such that there is no re-entertainment of the vapours into the cooling tower. Evaporation and drift loss will depend on season and an average figure will be about 1.65 %. The cooling tower blow-downs will be approximately 0.1%. Whole of the quantity lost will be made-up by adding fresh water/treated condensate from the process

Feed Water & Boiler Water Quality

S. No.	Parameter	Feed Water (ppm)	Boiler Drum Water (ppm)
1.	Hardness	0	0
2.	Oxygen	0.007	Nil
3.	Silica	0.02	2.5
4.	TDS	0.1	100
5.	Copper	0.005	0.005
6.	Iron	0.01	0.01
7.	Suspended material	Nil	Nil

8.	Chloride	Nil	Nil
9.	Oil	Nil	Nil
10.	Detergent	Nil	Ni
11.	pH	8 to 8.5	9.5 to 10.9
12.	Residua Hydrazine	Nil	0.02
13.	Phosphate	Nil	20
14.	Residual Phosphate	0	20
1.	Specific EC @ 25°C	< 0.4 micro Siemens/cm	< 0.4 micro Siemens/cm

10.0 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

10.1 DURING CONSTRUCTION PHASE

The anticipated environmental impacts of the proposed project would be mainly due to construction & operational activities. Construction activities spread over pre-construction, machinery installation and commissioning stages, which ends with the induction of manpower and start-up. During the operation phase, impacts would be mostly permanent and irreversible in nature. The impacts during the construction phase will be temporary in nature. The process involved in the installation of ethanol production has various impacts on the different components of the environment. All these impacts will be considered for impact assessment and accordingly the mitigation measures will be adopted. The design basis for all process units will lay special emphasis on measures to minimize the impact at source itself.

10.1.1 Air Environment

The main sources of emission during the construction period are the movement of equipment at site and dust emitted during the levelling, grading, earthworks, foundation works and other construction related activities. The dust emitted during the above mentioned activities will be very less as the land within the installation premises is flat which does not require any major levelling. Therefore, the impact will be very less and for short duration

Exhaust emissions from vehicles and equipment deployed during the construction phase is also likely to result in marginal increase in the levels of SO2, NOx, PM, CO and un-burnt hydrocarbons. The impact of such activities would be temporary and restricted to the construction phase. The impact will be confined within the project boundary and is expected to be negligible outside the plant boundary.

Mitigation Measures:

Maintenance of vehicles, sprinkling of water on roads and construction site, proper coverage of tarpaulin of all construction material, proper PPE's etc., would greatly reduce the impacts during the construction phase.

10.1.2 Land Environment

The total plant area is 20.13 Acres is a levelled land. There is sparse vegetation in the proposed area. Plantation will be started before commissioning activities of the proposed plant.

Mitigation Measures

- Care will be taken for storage of materials such as pervious lining and other structural measures for prevention of contamination of land due to mixing of construction materials
- The top soil excavated will be stored in the designated areas and will be used for plantation.
- Fast growing species of greenbelt has been planned for the expansion project which will result in the overall considerable beneficial impacts on land use change.
- Reuse of the concrete waste, debris, excavated soil for various suitable construction activities like road & pavement and filling requirement etc.,

10.1.3 Noise Environment

The general noise levels due to construction activities such as working of construction machineries, transportation vehicles may go sometime up to 85-90 dB (A) at the work sites. Generation of noise during movement of vehicles carrying materials and loading & unloading activities. Generation of noise during the operation of DG sets. Generation of noise during concreting, hammering, mechanical operations, like drilling, fitting, installation of plant machineries etc. may be envisaged. The noise generated during the construction phase will be temporary and will be limited to the project site

Mitigation Measures

- Regular checking of vehicles, construction work will be restricted during day time
- Provision of protective devices like ear muff/ plugs to the workers.
- Regular maintenance of the machine/equipment will be carried out.

10.1.4 Soil Environment

During the construction activity the impact on soil will be limited to the construction site only. The impact on soil during the construction would be mainly due to the left out construction material. Due to Spillage of material, construction debris/waste, waste material containing metal and paint etc.

Mitigation Measures

- Proper segregation and storage of construction material within the premises.
- Construction waste will be reused within the site to the extent possible.
- Storm water will be properly channelized as per existing contours.

10.1.5 Water Environment

The Domestic and Construction water requirement during the construction phase of the project will be sourced from Ground water through bore wells.

The impacts includes Contamination of ground water and surface water due to improper management of construction wastes, improper discharge of sewage generated from the construction work force at the site, sediments transported to run-off from the construction site, runoff related to unpaved and excavated roads during the rainy season etc..,

Mitigation Measures

- Mobile toilets will be constructed at the construction site and waste water will be disposed through septic tank followed by soak pit.
- Storm water drains as per existing contours and drainage pattern
- Wash offs containing hazardous substances such as paints and varnishes and oil / grease should be drained into impervious trays/ barrels for disposal as hazardous waste.

10.1.6 Socio Economic Environment

The social impact during the construction stage will be of beneficial nature. More than 80 people will get employment on daily average basis. Proposed project will result in growth of the surrounding areas by increased direct and indirect employment opportunities in the region including ancillary development and supporting infrastructure. In addition to the opportunity of getting employment in construction work, the local population would also have employment opportunities in related activities like petty commercial establishments, small contracts and supply of construction materials etc.,

10.2 DURING OPERATION PHASE

10.2.1 Land Environment

The land use of the project area will be converted into an industrial which will be utilized for installation of distillery unit with developing green belt/plantation and mitigation of pollution. Land use will change permanently and in a positive manner. The plantation percentage of core zone will be modified. There will be a slight increase in the vehicular movement due to the proposed installation activity which may cover the nearby land in parking, temporary hutments, service shops; that would be indirect impact on open land. All changes are temporary and will be confined to plant site only.

There will not be any effluent discharge from the plant during the operation. The management will adopt best practices for 100% recycling of the effluent.

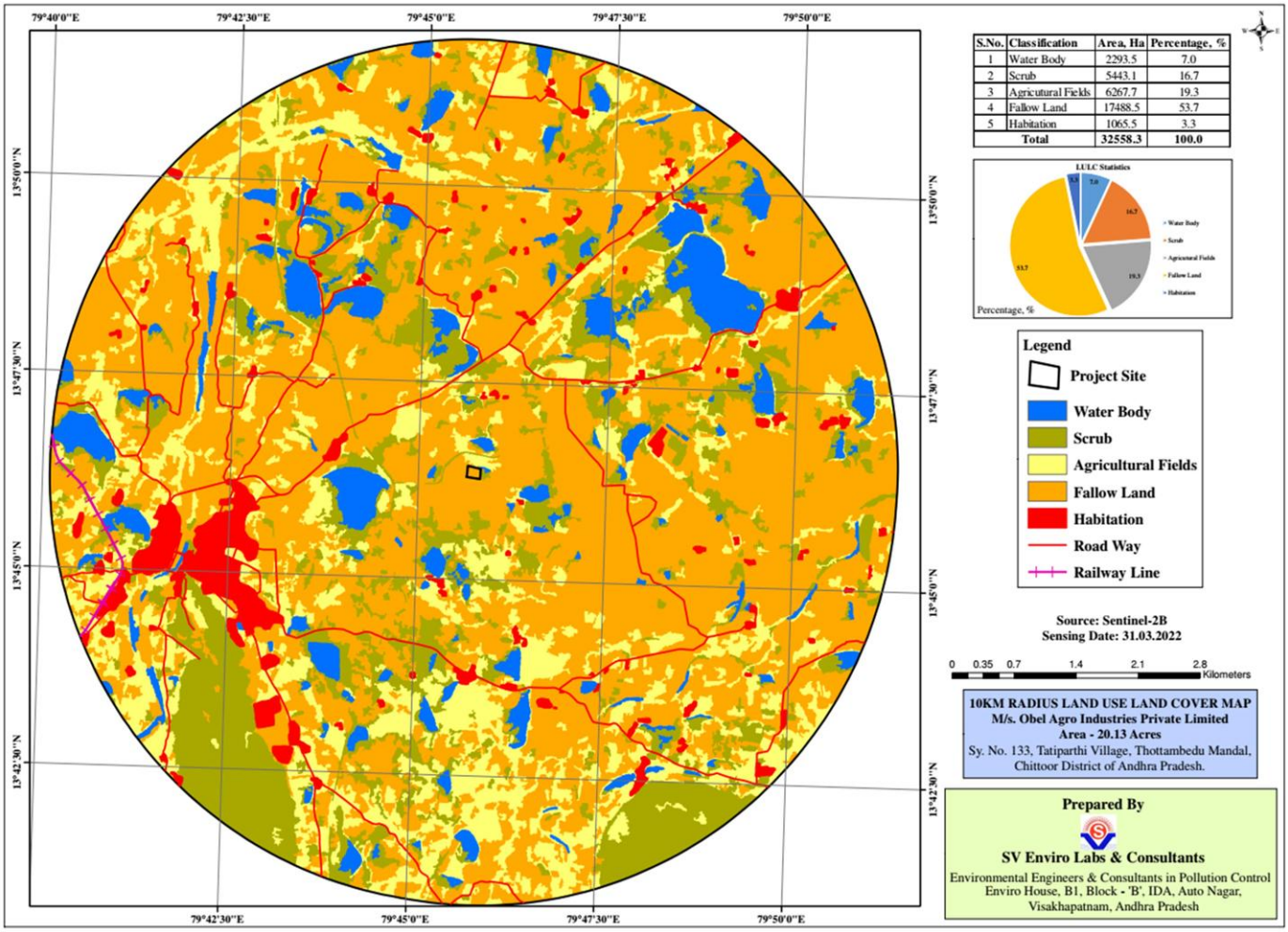


Fig. 5 - Land Use & Land Cover Map of 10 KM Radius from the Project Site

10.2.2 Air Quality

During the operation phase the major source of emissions from the Boiler & DG Sets stacks and fugitive emissions from handling and operation.

The industry will establish 25 TPH Boiler provided with Electro Static Precipitator and 1 x 1000 KVA DG sets. The boiler furnace will use Rice Husk/Coal as fuel. The proposed 1 x 1000 KVA DG Set standby arrangement is provided with adequate stack height as per the norms and being used only during power failure.

Table 6 – Stack Details with APCE

S. No.	Description	Stack – 1	Stack – 2
1.	Attached to	Boiler	DG set
2.	Capacity	1 x 25.0 TPH	1 x 1000 KVA
3.	Fuel	Biomass/Coal	Diesel
4.	Stack Height	60 m	7 m
5.	APCE	Electro Static Precipitator	Acoustic Enclosure

Air Pollution Modelling

In order to predict the Ground Level Concentrations (GLCs) at various distances from the source of the above mentioned pollutants, an air modelling exercise has been undertaken and is discussed in the impact prediction section below. In the present case, AERMOD dispersion model based on steady state Gaussian plume dispersion, designed for multiple point sources for short term and developed by United States Environmental Protection Agency [USEPA] has been used for simulations from point sources. Air quality dispersion modelling is done through AERMOD to predict the ground level concentration of emissions in 10 KM radius of project activity.

Model Inputs & Results

The air pollution modelling carried out represents the worst case and normal operating scenarios. The pollutants considered for modelling mainly include particulate matter (PM) sulphur dioxide and oxides of nitrogen. Meteorological data of 24 hour mean of one period considered in the study. Ambient air quality studies done during the baseline study were considered are considered as baseline to estimate the impact of the activity on post project air quality. The details of the stack and emission rates envisaged from the proposed operation of 25 TPH boiler are given in table below.

Table 7 – Sources & Emission Characteristics for Dispersion Modelling

S. No.	Particulars	Boiler stack (25 TPH)
1.	Type of fuel	Coal/Biomass
2.	Height of stack (m)	60
3.	Dia. of stack (m)	2.4
4.	Temperature (°C)	160
5.	Stack gas velocity (m/s)	15
6.	Flow (m^3/s)	67.82

Model for Prediction:

Point emission Source: Air dispersion modeling is done using AERMOD approved by USEPA. To predict the GLC (Ground Level Concentration) 10 KM radius from project site is considered in the prediction.

Model Considered:

During present study modeling for 25 TPH boiler emissions of PM was done using AERMOD model approved by MoEF &CC & USEPA for prediction of impacts. AERMOD is a steady state Gaussian plume model which is used for assess the predict the ground level concentration (GLC's) of pollutant in the study area due to various sources associated with the activity due point, area, volume etc sources. For modelling of pollutants in put parameters include pollutant – location, source dimension (point), source emission rate, meteorological data, terrain elevations etc. The model predict the GLC's due to proposed activity by considering the emission from sources by taking hourly meteorological data and for selected short term averaging period.

Modeling consideration for the present study:

In the present study modeling for 25 TPH boiler emissions of PM due point source emission was considered. Emission factors were taken from EPA final report on Estimating PM, missions from point source (EPA Contract No. 68-D7-0068). For the proposed activity having 25 TPH boiler emission factors were taken. The isopleths for PM concentrations are depicted as given below.

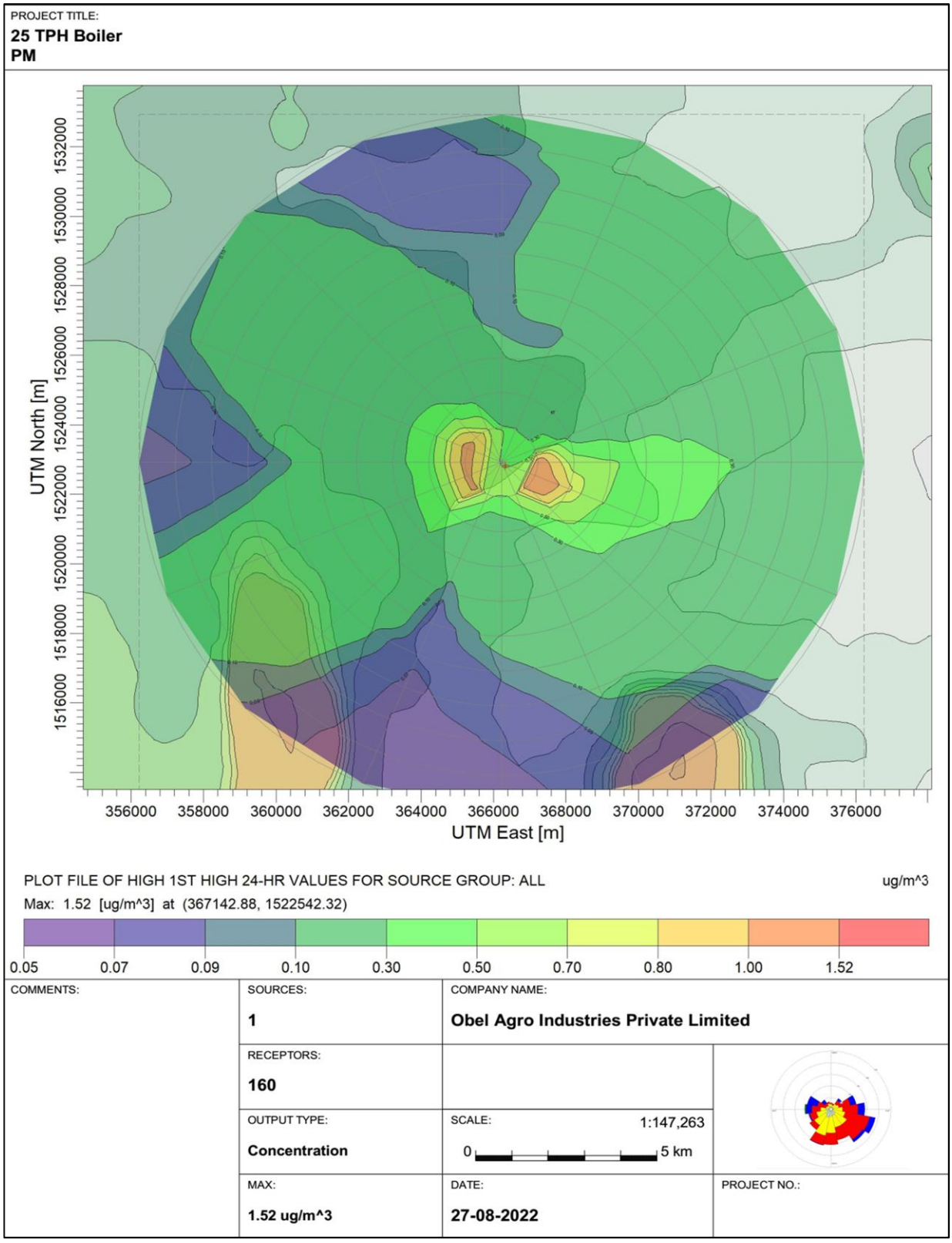


Fig. 6 – Isopleths for Maximum Ground Level Concentration (GLC) of PM

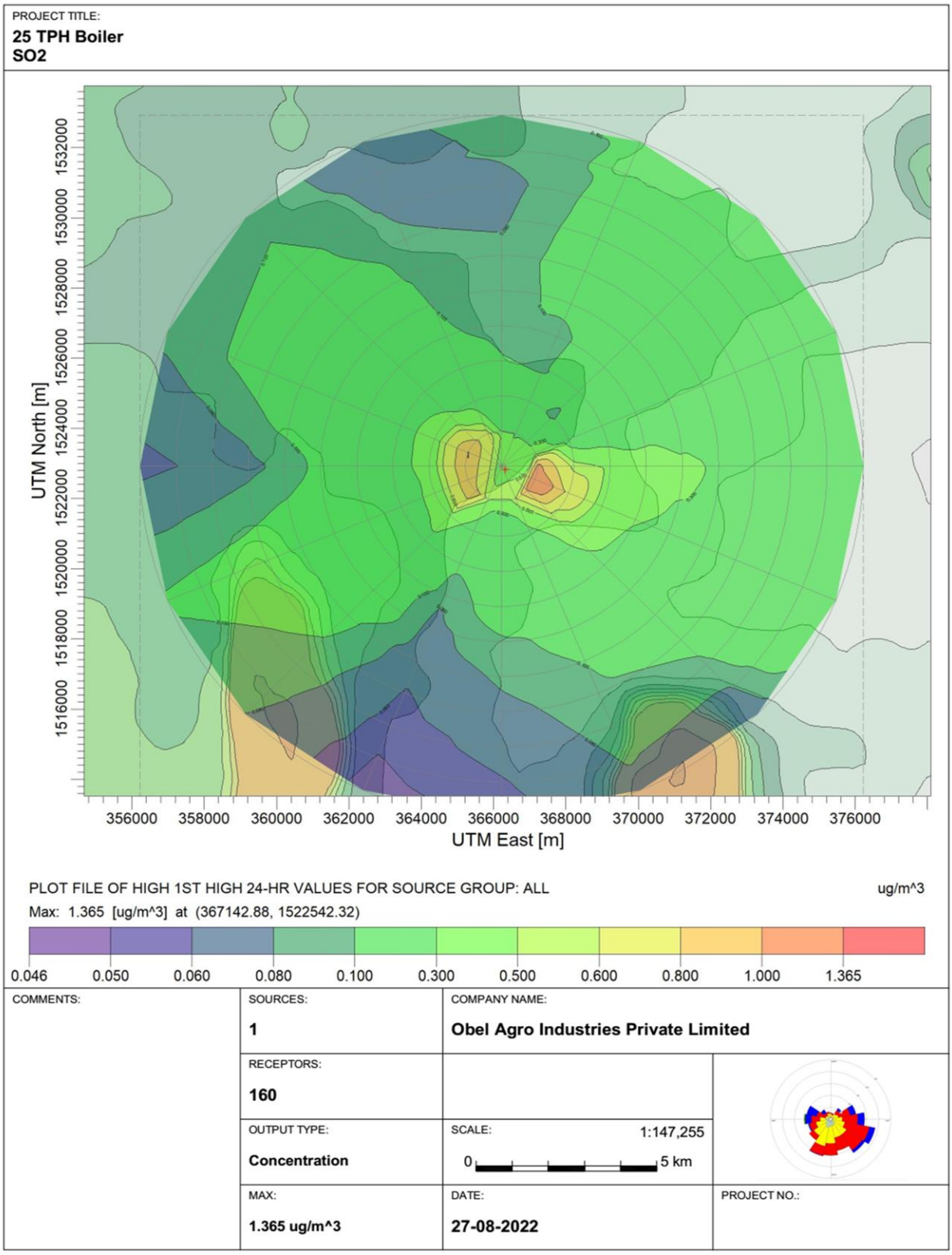


Fig. 7 – Isopleths for Maximum Ground Level Concentration (GLC) of SO2

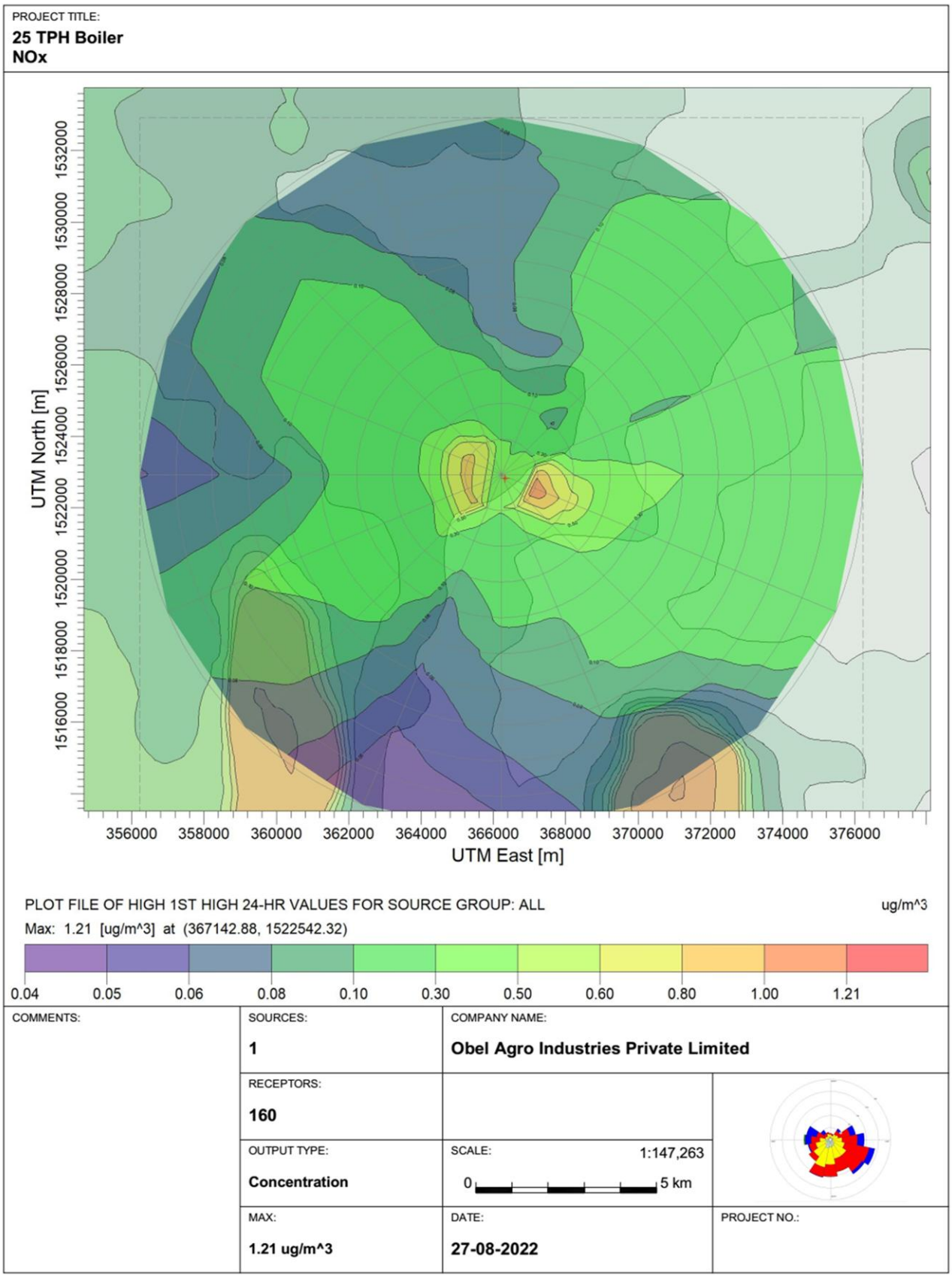


Fig. 8 – Isopleths for Maximum Ground Level Concentration (GLC) of NOx

Conclusions from the Model Study:

The maximum incremental concentration of PM10, SO2 and NOx due to the proposed project will be 1.52 g/m3, 1.365 µg/m3 and 1.21 µg/m3 at a distance of 810 meters in South East direction (150˚) from the project site.

Air Pollution Control System

- The boiler furnace will use a maximum of 5416 kg/hour of rice husk & 4166.66 kg/hour (when used singly) as fuel for the boiler furnace.
- The critical SPM levels will be less than 50 mg/Nm^3.
- Sufficient velocity will be maintained in the ducts/conduits in order to ensure that there is un-clogged flow.
- Due consideration has been accorded to the changes in gas properties and behaviour with changes in temperature.

Fugitive Emissions

Fugitive emission from distilleries includes volatilization of alcohol from process & storage tanks, dust from stock piles, spills and material handling and open vessel.

Mitigation Measures:

- All the conveyors are covered to prevent the fly-off of fugitive dust
- All internal roads are concreted to prevent the fugitive dust due to vehicular movement
- All material transfer points provided with dust extraction system
- The boiler stack will be provided with ESP and the DG sets will be provided with acoustics enclosures and mufflers.
- The raw material will be stored in silo and transferred through screw conveyor.
- Covered vehicle will be used for transportation of raw material and product.
- Designing the plant layout in such a way so as to virtually eliminate need of using heavy equipment for material handling in the main plant.
- The boundary wall of the plant will be as high as 6m so that the emission due to the ground activities will be settled within the plant premises.
- All the DG sets are standby arrangement and being used during power failure only.
- Adequate green belt will be developed in the plant area.

- Vehicles and machineries will be regularly maintained. Proper upkeep and maintenance of vehicles will be done.
- Regular monitoring of ambient air quality and emissions as per CPCB guidelines and compliance reports being submitted to MoEF & CC & SPCB.

10.2.3 Water Environment

The effluent generated Ethanol production process will be segregated as process effluent (spent wash and spent lees) and effluent from utilities like Boiler, Cooling Tower, vacuum pump, washings. The condensates from evaporation will be recycled and reused in Process & Make up water streams, green belt development etc..,

Table 7 – Waste Water Generation & Treatment

S. No.	Description	Quantity (KLD)	Treatment
1.	PRC Spent lees	105	Will be treated in Condensate Polishing unit (RO Stage 1 & 2). Permeate will be used for process & makeup waters, green belt development, sprinkling on coal & ash handling areas. RO Reject will be used for Ash Quenching or retuned back to MEE.
2.	Process Condensate from Evaporation & Drier	320	
3.	CT Blow Down	95	
4.	Boiler Blowdown	40	
5.	WTP Rejects	65	
6.	Process Washings	30	
Condensate & Blow down water to CPU Plant		**655**	
7.	Domestic	20	Treated in the STP and will be reused for greenbelt development
Total		**675**	

Waste Water Treatment System:

The Distillery effluent (Spent Wash) is sent to the decanter where the wet grain is separated. Further a part of the Thin Slop will be reused in the process and the remaining will go the Multiple Effect Evaporator (@ 700 KLD). In the MEE it will be concentrated up to (30 – 35%) solids and the concentrated solids are separated. The wet grain from the Decanter and MEE will be sent to the DWGS Unit. The MEE & Drier condensate, Spent leese, WTP Rejects, Boiler & Cooling tower blowdowns, washings etc.., will be sent to the 'Condensate Polishing Unit'.

Multiple Effect Evaporation Scheme:

- The suggested treatment scheme Effect working on the principle of falling film & Forced Circulation
- Simmering Column Vapours are fed to the first effect evaporator shell side and which in turn drives second and third effect. Vapours of PRC Column are used in fourth effect to drive further evaporation and Vapours from last effect are condensed in Surface Condenser. A Shell & tube type Multi- pass Surface condenser is employed for condensing the shell side vapours. The product at the desired concentration 30% is obtained at the outlet of Forced Circulation Evaporator,
- Each effect is provided with recirculation cum transfer pump.
- The condensate from surface condensers is collected in a common condensate pot. The condensate is transferred for further treatment / Recycle by using centrifugal pump.
- Highly efficient operating pumps have been provided for pumping the required fluid.
- The plant is having high level of automation to get consistent output at required concentration.
- The system operates under vacuum water-ring vacuum pumps are used to maintain a desired vacuum.
- Cooling water from cooling tower is used in the surface condensers for condensing the vapours.

Condensate Polishing Unit

The input to the CPU is 655 KLD will be will be from MEE & Drier condensate, spent lees, WTP Rejects, Boiler & Cooling tower blowdowns, washings etc.., will be treated in a CPU of Capacity 700 KLD and the output of the CPU will be 625 KLD.

The CPU treatment system consists of

- Cooling of Inlet waste water to less than 45 °C
- Equalization & pH adjustments
- Oil & Grease Trap
- UASB Reactor
- Degasification
- Extended Aeration thru fine bubble diffusers
- Secondary Tube Settler

- Flash mixing & Flocculation
- Lamella Clarifier
- Pressure Sand Filter
- Activated Carbon Filter

Finally the effluent is sent to RO Stage – 1, permeate – 1 will be reused in the process and reject – 1 sent to RO Stage – 2. Permeate – 2 will be reused in the process and the reject – 2 will be used for Ash Quenching or returned back to MEE for further treatment.

The CPU is designed on the basis of the following parameters.

S. No.	Parameter	Parameter
1.	pH	3.0 – 4.0
2.	Temperature	< 65°C
3.	BOD	< 2000 mg/l
4.	COD	< 3000 mg/l
5.	TDS	< 1000 mg/l
6.	Volatile Acids (VA)	< 1500 mg/l

The treated water (RO Plant Permeate) shall have following characteristics.

S. No.	Parameter	Parameter
1.	pH	7.0 – 8.0
2.	Temperature	Ambient
3.	TDS	< 200 mg/l

Reject Water (RO Reject) shall have following characteristics

S. No.	Parameter	Parameter
1.	pH	6.5 – 8.5
2.	Temperature	Ambient
3.	TDS	< 15000 mg/l

Domestic Waste water Treatment:

The domestic waste water generated from the plant is 20.0 KLD will be treated in STP and the treated water will be used for green belt development.

The company will adopt "Zero Liquid Discharge" Scheme. The treated water will be reused in the process, make up water streams, Green Belt Development, Spraying in fuel & ash storage areas etc..,

10.2.4 Solid & Hazardous Waste Generation & Disposal

The solid waste generation from the plant is DDGS, CPU Sludge and Flyash. The flyash shall be quenched, dried and used as infrastructure base fill material or for brick manufacturing. DDGS will be sold as cattle feed and CPU Sludge will be used as manure.

The hazardous waste generation from the plant is the spent oil from the DG sets, automobiles etc., this is stored in leak proof drums in storage yard and disposed to APPCB authorized agencies.

Table 9 - Solid & Hazardous Waste Generation & Disposal

S. No.	Type of Waste	Quantity	Storage	Utilization/Disposal
Solid Waste				
1.	DDGS	48.0 TPD	Covered Shed	Sold as cattle feed directly
2.	Fly Ash	30.0 TPD	Ash Silo	Brick Manufacturing Units
Hazardous Waste				
1.	Waste oil	2000 LPA	Sealed carboys	To the agencies authorized by APPCB

DDGS Drier (For Grain Section)

The concentrate from the Decanter and Evaporator are mixed and fed to the DDGS tube bundle dryer where it is dried using steam. The dried DDGS (Distillers Dried Grain Soluble) are bagged and sold off as animal feed.

DWGS Dryer with Cooling and Conveying System

- 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 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 on another end.
- During the course of rotation, these flights pick up the material and shower them on to the tube bundles. 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.
- Entire operation of the Dryer is controlled through Control panel.

10.2.5 Noise Environment

Various components of industrial operations such as running equipment (exhaust fans, compressors, pumps, motors etc..,) cause some amount of noise. The noise also generated form from the ancillary activities and movement of vehicles on the roads which shall be controlled by proper maintenance and compact technology. The major noise levels will be confined to the working zones of the plant activities. Community noise levels are not likely to be effected due to the thick green belt developed which is a physical barrier to attenuate the noise levels.

- Acoustic enclosures provided to all the DG sets
- Free flow of traffic movement shall be maintained
- Proper maintenance, oiling and greasing of machines at regular intervals being done to reduce generation of noise.
- Regular monitoring of noise level being carried out.
- Rotation of workers working in the noise prone areas
- PPE's will be provided for the workers

10.2.6 Odour Management

The main problem for production of Alcohol is the foul odour generated from various processes like fermentation, distillation, spent wash, skins of crop. Closed system is provided for the fermentation vessel so as to prevent the escape of hydrocarbons. Better housekeeping will maintain good hygiene condition by regular steaming of all fermentation equipment. Control of temperature during fermentation to avoid in-activation/ killing of yeast. Another source of odour will be DWGS, which is the by-product of this distillery which is being sold as cattle feed

10.2.7 Soil Environment

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

and allowed to decompose on soil

Mitigation Measures:

- Green belt will be developed to reduce the soil erosion and thereby increasing the soil quality.
- The industrial waste water will be treated properly and to be utilized in the plant premises to avoid the soil contamination
- Regular measure will be taken to improve the soil fertility

10.2.8 Green Belt Development

Development of greenbelt in and around industrial activity is an effective was to check pollutants and their dispersion in to surrounding areas. The degree of pollution attenuation by a green belt depends on its height and width, foliage surface area, density, dry deposition, velocity of pollutants and the average wind speed through the green belt. The main objective of green belt around the plant is:

- Mitigation of impacts due to fugitive emissions
- Attenuation of noise levels
- Ecological restoration
- Improvement in aesthetic environment quality
- Waste water reuse.
- Soil erosion prevention

Criteria for Selection for Green Belt

- Rapid growth and evergreen type of species.
- Tolerance to water stress and extreme climatic conditions.
- Difference in height and growth habits
- Aesthetic and pleasing appearance
- Large bio-mass to provide fodder and fuel

Plant species recommended by CPCB and as suited to the local environment will be used in belt and greenery development. The width of green belts and type of plant species to be developed in the premise will include the following.

- More than 33% (@ 6.9 acres) of the total industrial land area will be provided as green belt. An average of about 1100 plants will be maintained per hectare of the greenery area.

- 10 m width green belt all along the border of the site
- 10 m width green belt all along the border of tank yard
- Tree plantation on both sides of interior roads in the premise.
- Lawn with aesthetic plants in open space of buildings and other places

Keeping in view of the soil and water quality available in and around the project site and the topography of land, following species are considered for green belt development.

Botanical name	**Habit**	**Family**	**Local name**
Aeglemarmelos	T	Rutaceae	Maredu
Albizialebeck	T	Mimosaceae	Dirisena
Alstoniascholaris	T	Apocynaceae	Edakulapala
Areca catechu	T	Arecaceae	Vakka
Anthocephaluscadamba	T	Rubiaceae	Kadamba
Cassia fistula	T	Caesalpiniaceae	Rela
Bauhinia purpurea	T	Caesalpiniaceae	Peddari
Bauhinia variegata	T	Caesalpiniaceae	Devakanchanamu
Cassia siamea	T	Caesalpiniaceae	Cassod tree
Peltoferrumpterocarpum	T	Caesalpiniaceae	Kondachinta
Polyalthialongifolia	T	Annonaceae	Naramamidi
Azadirachtaindica	T	Meliaceae	Vepachettu
Mimusopselengi	T	Sapotaceae	Pogada
Nyctanthusarbortristics	T	Oleaceae	Parijathamu
Neriumodorum	S	Apocynaceae	Ganneru
Tecomastans	T	Bignoniaceae	Swarnaganneru
Tectonagrandis	T	Verbenaceae	Teku
Delonixregia	T	Caesalpiniaceae	Turai
Micheliachampaca	T	Magnoliaceae	Sampangi
Other Ornamental Plants			

10.2.9 Impact Due to Transportation of Raw Materials & Products

The proposed project site is located at Tatiparthi Village of Thottambedu Mandal, Tirupati District of Andhra Pradesh. The nearest road is Puthalapattu - Naidupeta (MDR – 71) Road is at a distance of 1.90 km from the project site. Nearest Railway Station is Srikalahasti at a distance of 8.90 km and nearest airport is Tirupati Airport at 27.90 km.

Additional vehicles due to the proposed project

The proposed project will have temporary impact on transportation due to movement of construction materials for a very short period. Proper arrangements for movement of vehicles and parking have been proposed in the plant site. Parking arrangement will be provided in

premises after installation also as very less transportation through road is envisaged for raw material as well as product.

The raw material required for the Ethanol unit will be Grains and alcohol will be primarily transported by road. Details regarding the additional traffic considering worst case scenario has also been calculated and given below.

Table 10 – Proposed Traffic

S. No.	Name of the material to be transported by road	Quantity of material required/ produced	Avg. Carrying Capacity	No. of trips/day
1.	Grain (Wheat/Maize)	220 TPD	Truck/30 Ton	8
2.	Ethanol	100.0 KLPD	Tankers/35 KL	3
3.	DDGS	48 TPD	Trucks/15 Ton	4
4.	CO2	--	--	1
			Total Trips per day	**16**

Anticipated Impacts

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

Mitigation Measures:

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

11.0 ENVIRONMENTAL MANAGEMENT PLAN:

- Environmental Management plan is planning and implementation of various pollution abatement measures for any proposed project.
- The EMP lists out all these measures for not only for the operational phase of the plant but also for the construction phase and planning phase.
- The EMP is prepared keeping in view all possible strategies oriented towards the impact minimization.
- The EMP for the proposed project is divided into two phases i.e, Construction and Operational Phase.
- The planning phase lists out the control strategies to be adopted during the design considerations.
- The construction and operational phase details the control/abatement measures to be adopted during these phases.
- EMP aims at controlling pollution at the source level to the possible extent with the best techno-economically feasible and available methodology before they are discharged.

11.1 Objectives of Environmental Management Plan

The main objectives in formulating this environmental management plan are

- To treat all the pollutants viz. liquid and gaseous those contribute to the degradation of the environment with appropriate technology.
- To comply with all regulations stipulated by the Central / State Pollution Control Boards related to air emission and liquid effluent discharge as per air and water pollution control laws.
- To handle hazardous wastes as per the Hazardous Waste (Management & Handling Rules) Rules 2016 and subsequent amendments.
- To create good working conditions (avoidance of air and noise pollution) for employees.
- Perspective budgeting and allocation of funds for environment management expenditure.
- Continuous development and search for innovative technologies for a cleaner and better environment.

Environment Management Cell:

A separate environmental management cell with suitable qualified personnel will be set-up under the control of a Senior Executive, who will report directly to the Head of the

Organization

11.2 Air Quality Management

- The boiler will be provided with ESP with an effective stack height of 60 meters and shall limit the PM emissions to 50 mg/Nm^3
- Online stack monitoring will be carried out for boilers stacks to keep check on the emissions and data will be transmitted to CPCB & SPCB servers.
- Workers will be trained regarding the emergency actions to be taken during the equipment failure.
- Regular Inspection and maintenance of APCE will be carried out.
- Regular sweeping & sprinkling of water in the dust generating areas
- Green belt will be developed along the periphery of the plant premises.
- Proper dust masks will be provided to the labors working in the dust prone areas.
- Ambient Air Quality will be monitored regularly to keep check on the different type of pollutants.

11.3 Water Quality Management

- The industry will adopt "Zero Liquid Discharge" scheme and will 100% recycle the treated water in the plant premises.
- Storage areas shall be made of concrete platform and provided with garland drains and pits to avoid seepage and contamination of ground water.
- Spillage of chemicals/oils/alcohol will be avoided.
- Process effluent/any waste water shall not be allowed to mix with storm waters.
- Record of waste water returned back for utilization in to process, gardening etc.., will be kept.
- Proper maintenance of MEE & CPU will be carried out.
- Storm water drainage system to collect surface runoff will be separately connected to rain water harvesting tank.
- Record of ground water being extracted will be kept with installation of flow meters.
- Water level data will be submitted to the concerned departments
- Regular monitoring of ground water will be carried out twice in a year.

11.4 Rain Water Harvesting

- Storm water drains are provided with recharge pits to collect the rain water from the roof tops, paved areas and green area etc.., Rain water harvesting potential is calculated based on the catchment area and its corresponding runoff coefficients.
- In the plant area rain water from roof tops, paved area and gardening will be collected into rain water harvesting tank and this water will be reused for the plant activities and for green belt development.

Table 11 – Rain Water Harvesting Potential

Type of Area	Area (Sq. m)	Coefficient of run - off	Peak Intensity during one hour of rainfall (in m)	Rain Water Harvesting Potential/Hour (M^3)
Green Area	27113.95	0.15	0.01	40.67
Roof Area	19263.05	0.90	0.01	173.37
Paved Area	18656.00	0.65	0.01	121.26
Total Storm Water load on the site per hour retention is				335.30
Considering 15 minutes retention time, total storm water load				83.82

Volume of RWH recharge pit (1.2 m x 1.2 m x 2.1 m) = 3.24 m^3

No. of pits required = Total storm water load considering 15 minutes retention time /volume of RWH Pit

Total no. of RWH pits required equals to 30 No's and the same will be provided.

11.5 Solid & Hazardous waste Management

- Maximum recycling and utilization of solid waste will be done as per the guidelines.
- The hazardous waste from the plant will be used oil will be used for the lubrication purposed and the excess will be given to the agencies authorized by APPCB.
- Record of the solid & hazardous waste generation and proper disposal will be carried out.
- A separate storage area shall be provided with sign boards for storage of hazardous wastes.
- Regular training of employees will be conducted for the persons engaged in solid & hazardous management works.

11.6 Noise Quality Management

- PPE's like earplugs & ear muffs will be provided to the workers exposed to high noise levels.
- Green belt will be developed along the periphery of the plant boundary to attenuate the noise levels.
- Acoustically Enclosed DG sets will be used.
- In regular intervals Lubrication and Maintenance of machinery will be carried out to reduce the generation of noise.
- Ambient noise levels in and around the plant area shall be kept with the standards of EPA 1986 rules.

11.7 Odour Management

- Closed system is provided for the fermentation vessel so as to prevent the escape of hydrocarbons.
- Control of temperature during fermentation to avoid in-activation/ killing of yeast.
- Better housekeeping will maintain good hygiene condition by regular steaming of all fermentation equipment.
- Green belt will be developed according to CPCB guidelines and odour reducing plants will be planted along the periphery of the site premises.

11.8 Occupational Health & Safety:

All precautionary methods will be adopted by the company to reduce the risk of exposure of hazards to employees.

- Pre-employment and periodical medical examinations is being carried out to assess the health status of the workers and medical records for the same will be maintained for each employee.
- Personal protective equipment like helmet, goggles, hand gloves, safety shoes, nose masks and ear protecting devices like ear plugs/ear muffs are provided to all the workers.
- Adequate numbers of firefighting equipment and extinguishers are installed as per requirement of the fire risk in the proposed plant
- Proper training is imparted to employees for use of safety appliances & first aid
- All workers are trained on respective Standard Operating Procedure (SOP) so as to enable them to prevent any possible mishaps.

- All loading/unloading are carried out under technical guidance as per the Standard Operating Procedure (SOP) generated for the particular raw materials/products
- All pollution control equipment are periodically checked and maintained.
- The work place area monitoring is being carried out for Particulate Matters (PM), VOCs & Noise on regular basis.
- Good housekeeping, proper and adequate ventilation and lighting is arranged for better workplace area as per guidelines of Factory Act.

11.9 Fire & Safety

- The proposed Distillery plant is claimed under non-hazardous industry and it is proposed to install the Fire Hydrant system with fire extinguishers located at various points of the plant.
- The components of the fire protection system shall be TAC approved and designed based on safety requirements and conforming to TAC and NFPA. The fire hydrant system consists of:-
- Jockey pump shall be provided to maintain the constant pressure in the system. The Jockey
- Pump is installed parallel to the motor and Diesel engine driven water pumps.
- The main ring header shall be of carbon steel pipe covered with proper anticorrosive wrapping and coating. The header is installed underground covering all the plant areas like Boiler house, TG house, switchyard, fuel handling yard, fuel storage yard, etc.
- Hydrants shall be installed at intervals of 30 m, along with hydrant valves, nozzles & hose boxes. The branch pipes for a hydrant and the main ring header wherever exposed to atmosphere shall be painted with two coats of paint.
- Fire extinguishers with sand buckets and water buckets shall be installed at various points in the plant.

12.0 WASTE MINIMIZATION & ENERGY CONSERVATION:

The company will consider environment as important element which can be impacted by the project activities. They believe in prevention than curing. They believe in concept of conservation & waste minimization

Waste Minimization (3 R's)

Reuse:

Broken grains will be used as raw material for grain based operations

Recycle:

- Process condensate from various streams will be recycled in the process. Spent lees will be reused in the process.
- Domestic waste water will be treated in septic tank followed by soak pit.
- Part of thin slops and decanter centrifuge in grain based process will be recycled back in to the process.

Recovery:

- Concentrated spent wash from the decanter and MEE concentrated will be used for recovery of DWGS and dried to obtain DDGS to be used for cattle feed.
- CO2 generated during the fermentation process will be recovered by CO2 scrubbers and sold to authorized vendors.
- Water conservation and recirculation system shall be installed for recovery of cooling water

Energy Conservation

The following measures will be adopted for reduction in energy consumption

- Installation of energy efficient lighting. Use of energy saving light fittings
- Optimizing loads and periodic preventive maintenance & lubrication
- Prevention of leakages of compressed air
- Training and awareness programs
- Use of energy efficient electric motors complying IEE standards
- Periodic energy audits

Natural Resource Conservation

- Water will be conserved by practising rain water harvesting and maximum recycling of water in the plant premises.
- Use of solar power will be explored

13.0 PROJECT COST & EMP BUDGET

The project cost for establishing a 100 KLPD Grain based Distillery Plant

Project Cost : 102.0 Crores

EMP Budget

Capital Cost : 1791.50 Lakhs

Recurring Cost : 180.65 Lakhs

Table 12 – EMP Budget

S. No.	Description	Capital Cost in Lakhs	Recurring Cost in Lakhs/Annum
1.	Air Pollution		
	Pollution Control Equipment for 30 TPH Boiler (ESP & Stack height – 60 meters)	150.0	12.0
	Dust Suppression	--	3.0
2.	Water Pollution		
	RWH Pits	10.0	2.0
	CPU, MEE & RO	1500.0	120.0
3.	Noise Pollution		
	PPE (Ear Plugs, Ear muffs, Insulations, Barriers)	30.0	3.0
4.	DWGS Handling, DDGS Drying, Handling, Storage, weighing bagging etc..,	40.0	5.0
5.	Environmental Monitoring & Management		
	Ambient Air, Stack, Noise, Soil, Water & Waste Water etc..,	--	20.0
6.	Landscaping/Green Belt Development		
	Plantation	15.0	5.0
7.	Occupational Health & Safety		
	Annual health Check-up, OHC, Fire Fighting	20.0	8.0
	Sub Total	1765	178
8.	CER Activities @ 1.5 % of the total project cost (as per OM Dt: 01.05.2018)	26.50	2.65
	Grand Total	**1791.50**	**180.65**

11.0 CSR ACTIVITIES

M/s. Obel Agro Industries Limited proposes Rs. 10.0 Lakhs towards CSR activities

Site Photographs