

PRE FEASIBILITY REPORT

Expansion of Molasses Based Distillery from 60 KLPD to 90 KLPD
M/s. Krantiagrani Dr. G. D. Bapu Lad Sahakari
Sakhar Karkhana Ltd.,

Kundal, Tal.: Palus, Dist.: Sangli

Maharashtra 416309

Prepared By



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August 2019

1.0 EXECUTIVE SUMMARY

The M/s. Krantiagrani Dr. G. D. Bapu Lad Sahakari Sakhar Karkhana Ltd. is a leading cooperative sugar mill from Western Maharashtra. It is located at village Kundal, Taluka Palus, Dist- Sangli. Presently, the sugar mill is having cane crushing capacity of 8500 TCD and a molasses based distillery unit of 60 KLPD. It has decided to expand distillery to 90 KLPD by making suitable modifications in the existing setup. The main objective of the expansion is to produce ethanol and support the ethanol blending programme of Government of India. However, it has plan to produce RS and ENA. The factory is having adequate infrastructure for the proposed expansion that includes, land, power, water, road connectivity and skilled manpower. The sugar factory is having ~126 acres of land out of that existing distillery has occupied 14.23 acres. Expansion will be within the existing setup hence, no additional land is required. Hence, there will not be any issue of rehabilitation or restoration involved in the project. Main raw material molasses is available to sizable extent and as an option, it has planned to produce ethanol from cane juice (as per requirement). The existing distillery is operated on continuous/fed batch fermentation and multi pressure distillation. For ethanol, molecular seive dehydration unit is installed. The same technology will be continued even after expansion. For disposal of spent wash and achieve ZLD it is having integrated followed by stand alone multi-effect evaporation (MEE) system. Concentrated spent wash is incinerated in the boiler using coal as fuel, in a ratio of 7:3. Other less polluting water such as spent lees and condensate from MEE will be treated in condensate polishing unit (CPU). Treated water will be reused in the process, for cooling tower make up and remaining will be used for greenbelt. Required power of 2 MW will be produced captive. ESP is installed as air pollution control device in the existing 60 KLPD unit. Coal and ash handling is done mechanically. Dust suppression systems have been installed in the areas of coal storage and handling. The distillery will be in operational year around. However, for calculations 330 days per annum have been considered. The total cost of the project will be Rs. 356.25 Lacs out of which Rs. 117.56 Lacs will be allocated for Environment management.

The project is placed under item 5 (g) - for distillery unit as 'B' category as per latest amendment (June 2019) in EIA Notification, 14th Sept. 2006; but due to proximity of proposed site to wildlife sanctuary less than 2 km, it is submitted and appraised at central level.

2.0 Introduction

2.1 Identification of project and project proponent

This project is proposed by M/s. Krantiagrani Dr. G. D. Bapu Lad Sahakari Sakhar Karkhana Ltd. It is a cooperative sugar mill, located at village Kundal, Tal.: Palus, Dist.: Sangli, of Maharashtra. Recently, the factory has increased cane crushing capacity of its sugar unit up to 8,500 TCD. Because of this, there is proportionate increase in the molasses generation of the mill. Another boosting factor for proposed distillery expansion is the ethanol blending programme (EBP) announced by government of India (GoI). Considering all these and to gain more financial stability, the management of sugar factory has decided to expand its distillery capacity from 60 KLPD to 90 KLPD. This will be achieved mainly by modifying the existing setup and addition of few required machines/equipment.

2.2 Project Setting

The factory is having adequate land for the proposed expansion. The site meets the guidelines prescribed by Ministry of Environment, Forest and Climate Change for sitting of an industry. It is located approximately 04 km off State Highway Tasgaon-Karad. The geographical coordinates of the site are 74°25'37.95" E longitude and 17°08'4.99" N latitudes and Altitude: 625m above MSL.

2.3 Project Brief

Table 2.1: Project Highlights

1	Name of the Proponent	Krantiagrani Dr. G. D. Bapu Lad Sahakari Sakhar Karkhana Ltd.
2	Location of the project	Within existing distillery unit located at village Kundal Tal.: Palus, Dist.: Sangli Maharashtra
3	Project	Expansion of existing molasses based distillery from 60 to 90 KLPD
4	Land	The sugar factory is having ~126 acres of land out of that existing distillery has occupied 14.23 acres. Expansion will be within the existing setup hence, no additional land is required.
5.	Product	Rectified Spirit, Extra Neutral Alcohol (ENA), Ethanol
6	Operation days per annum	Year around (considered 330 days per annum)
7.	ZLD scheme	For spent wash – Integrated evaporation followed by standalone multi-effect evaporation followed by incineration For spent lees and condensate - CPU – reuse of treated water
8.	Main Raw Material	Molasses 333 TPD – C type = 109,890 TPA OR 300 TPD – B heavy type = 99,000 TPA OR

		1500 m3 per day cane juice (10% solids)
9.	Water Requirement	Daily fresh water requirement 861 m3/day
10.	Project Cost	Rs. 356.25 Lacs
11.	EMP cost	Rs. 117.56 Lacs

2.4 Need of project and its importance to the country and region

India is one of the largest producers of sugarcane as well as sugar in the world. The sugar cane is a cash crop for farmers. There are about 564 installed sugar factories in India. Most of the sugar industries are located in rural areas providing employment to rural masses. Sugar factories from Maharashtra are the backbone of rural economy. These factories have contributed for the development of economy as well as infrastructure in rural areas, generated ample of employment opportunity to local people.

The products of the distillery i.e. rectified spirit (RS), extra neutral alcohol (ENA) and fuel ethanol are very important for the country. RS is used as a raw material for manufacturing of various industrial chemicals and it is having huge demand. ENA is a potable alcohol used to make liquor. Ethanol i.e. anhydrous alcohol is used for blending petrol. Thus, it is important for saving import of crude oil.

2.5 Demand-Supply Gap

Data for last four years on required and contracted quantities of fuel ethanol by oil manufacturing companies (OMCs) and supply for 10 % ethanol blending is given in following table

Table 2.2: Last four years required quantities of fuel ethanol, contracted by OMCs and Lifted by OMCs in India

Year	Ethanol quantity (million litre)			
	Government Tender	Distillery offers against tender	Sanctioned quantity by government	Lifted by OMCs
2017-18	3136	1763	1588	1300
2016-17	2809	1172	807	665
2015-16	2656	1473	1316	1110
2014-15	1559	1311	887	674

Source: May 21, 2018 compiled by B S Research Bureau

This data indicates that, there is a huge demand for fuel ethanol in the Indian market. Supply is not upto the demand and thus the ethanol production need to be increased. Thus, the project is beneficial to sugar cane growers, local community as well as the whole country.

2.6 Import vs. Indigenous production

The process of manufacturing for distillery is simple and straight line, available indigenously. The technologies even for the pollution control/disposal are also available indigenously.

2.7 Export Possibility

The finished goods Rectified Spirit (RS), Extra Neutral Alcohol (ENA) and Anhydrous Alcohol (AA or fuel ethanol) are having excellent potential of export.

2.8 Domestic / export markets

The finished goods Rectified Spirit (RS), Extra Neutral Alcohol (ENA) and Anhydrous Alcohol (AA or fuel ethanol) are having excellent potential of export.

2.9 Employment Generation

Proposed distillery project will provide new employment to 20 persons. However, it has a great potential to generate large number of indirect employment.

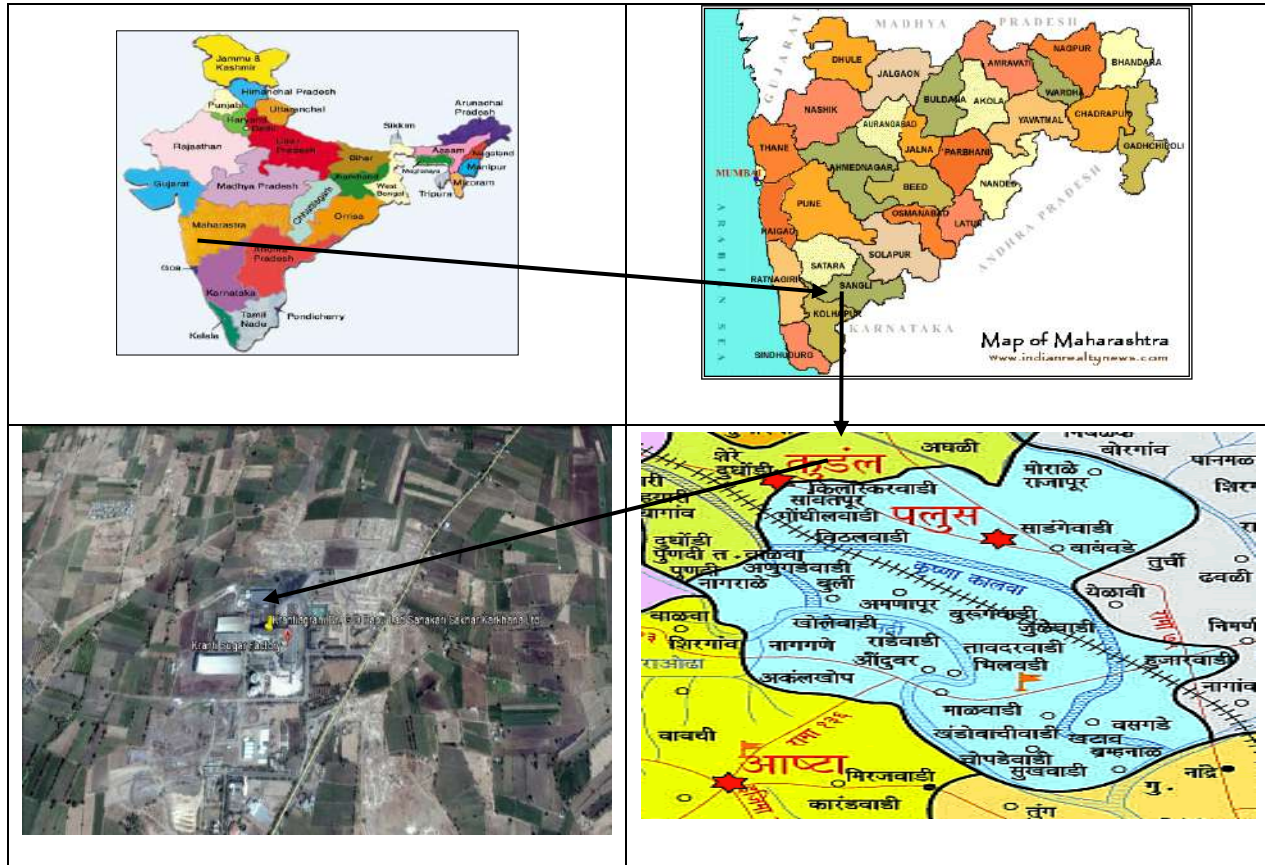
3.0 PROJECT DESCRIPTION

3.1 Type of project

Proposed project is an expansion of existing molasses based distillery. Molasses is a by-product from the sugar industry which will be used as a raw material in the proposed distillery. In addition, the project proponent has also planned to produce ethanol from sugar cane juice and thus, assessed the feasibility of the expansion.

The project is placed under sector 5 (g) of EIA Notification, 2006 as 'B' category project as per the latest amended of June 2019 of EIA notification 2006. However, it is submitted to the Ministry (MoEF&CC), because it is <2 km distance from Yashwantrao Chavan Sagarshwar Wildlife Sanctuary.

3.2 Location with coordinate



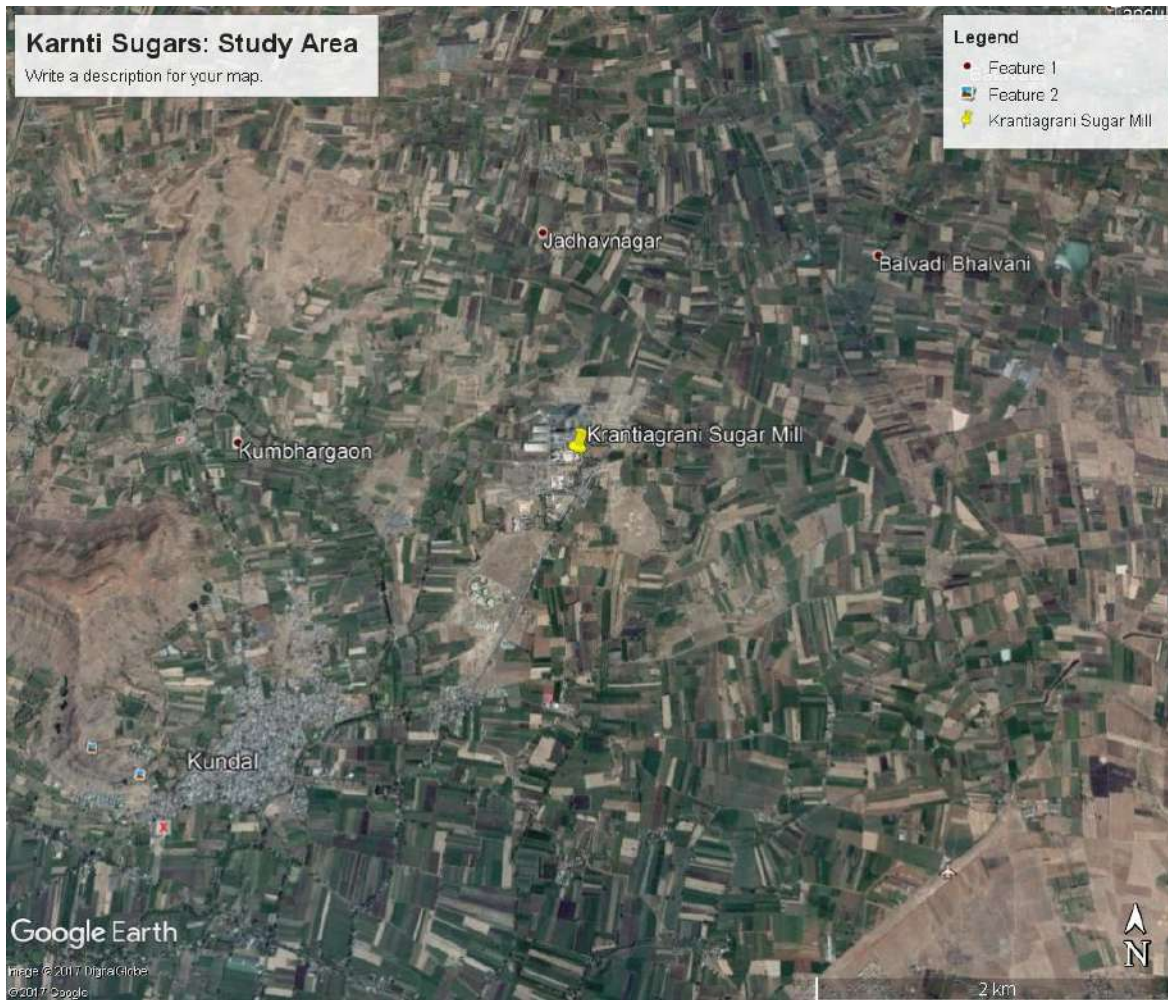


Figure 3.1: Location Map & Satellite Image of the project site and surrounding villages

Project coordinates:

Project lies between following co-ordinates (Coordinates of the corner) –

1. $17^{\circ}07'56''$ N, $74^{\circ}25'26''$ E
2. $17^{\circ}08'01''$ N, $74^{\circ}25'26''$ E
3. $17^{\circ}08'01''$ N, $74^{\circ}25'43''$ E
4. $17^{\circ}07'55''$ N, $74^{\circ}25'43''$ E

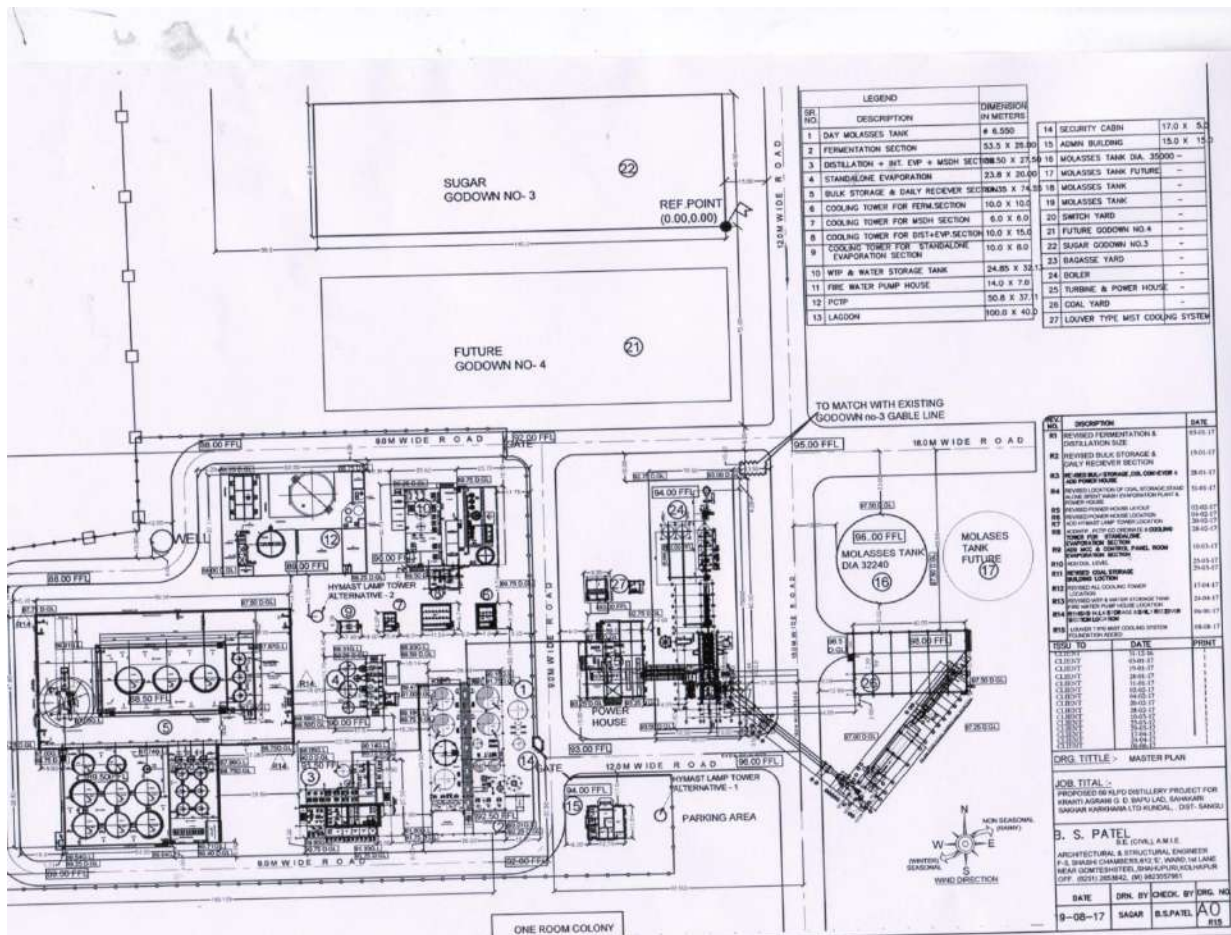


Figure 3.2: Project Layout (proposed expansion will be within the existing distillery unit)

3.3 Details of alternative site consider and basis of selecting the proposed site

Alternative sites for the proposed project are not considered, due to the following reasons.

- The proposed expansion will be carried out within the existing distillery unit, which is in sugar factory premises. It is having adequate land for the proposed expansion as well as ancillary units thereof such as storage, treatment, disposal units, etc.
- The present site meets the guidelines for sitting of an industry prescribed by MoEF&CC (Except for the sanctuary

3.4 Size or magnitude of operation

- Expansion of molasses based distillery from 60 to 90 KLPD – mainly by modification in the existing set up.

3.5 Project description with process details

Process: Distillery

The existing distillery is molasses based having continuous/fed batch fermentation, multi pressure distillation system. The same will be continued even after expansion.

Manufacturing Process

The production process involves the following stages

1. Fermentation
2. Distillation

- **Fermentation:** Molasses is the chief raw material used for production of alcohol. Molasses contains about 50% total sugars, of which 30 to 33% are cane sugar and the rest are reducing sugar. During the fermentation, yeast strains of the species *Saccharomyces cerevisiae*, a living microorganism belonging to class fungi converts sugar present in the molasses such as sucrose or glucose in to alcohol. The continuous fermentation process involves addition of fresh nutrients medium either continuously or intermittent withdrawal of portion of nutrient for recovery of fermentation products. In continuous process fermenter is in constant usage with little shut down and after initial inoculation of yeast culture, further inoculation is not necessary.
- **Distillation:** After fermentation the next stage in the manufacture is to separate alcohol from fermented wash and to concentrate it to 95% this is called Rectified Spirit(RS). For this purpose, method of distillation is employed. After separation of alcohol, the remaining part is the effluent of the process i.e. spentwash and spent lees.
- **Re-distillation to manufacture Extra Neutral Alcohol (ENA)**
- ENA is prepared by re-distillation of the rectified spirit (RS) for the removal of impurities like higher alcohols, aldehydes and methyl alcohol. This is done by, remixing rectified spirit with soft water and distilling it in the ENA column.
- **Anhydrous Alcohol (AA)**

Anhydrous alcohol is an important product required by industry. As per IS specification it is nearly 100% pure or water free alcohol. Alcohol as manufactured by Indian distilleries is rectified spirit, which is 94.68% alcohol. It is not possible to remove remaining water from rectified spirit by straight distillation as ethyl alcohol forms a constant boiling mixture with water at this concentration and is known as

azeotrope. Therefore, special process of molecular sieve de-hydration (MSDH) will be used for removal of water to manufacture anhydrous alcohol.

For the treatment of spent wash, the existing unit is having integrated followed by standalone evaporation (MEE) unit, to concentrate spent wash, which is finally incinerated in the boiler –furnace.

From the proposed capacity i.e. of 90 KLPD unit, spent wash of 900 m³/day having 12% solids will be generated. The spent wash will be treated in primarily integrated evaporation system, this evaporation system will utilize the heat of alcohol vapors from the distillation columns. It will consist of 3 or 4 effects and will be based on principles of falling film or forced circulation or combination of both working under vacuum. Concentration of spent wash in primary evaporation will not require any steam input and total volume of concentrated spent wash will be 450 m³/day with 24% solids.

Secondary stand alone evaporation system will be used to produce spent wash of 60% solids (from 24% solid) concentration. Its volume will be about 180 m³. It will be fired in an incineration boiler to achieve its zero discharge.

The existing unit is also having condensate polishing unit (CPU) to treat condensate of MEE, spent lees and other wastewater. Its capacity will be increased, so as to make it adequate for the proposed capacity.

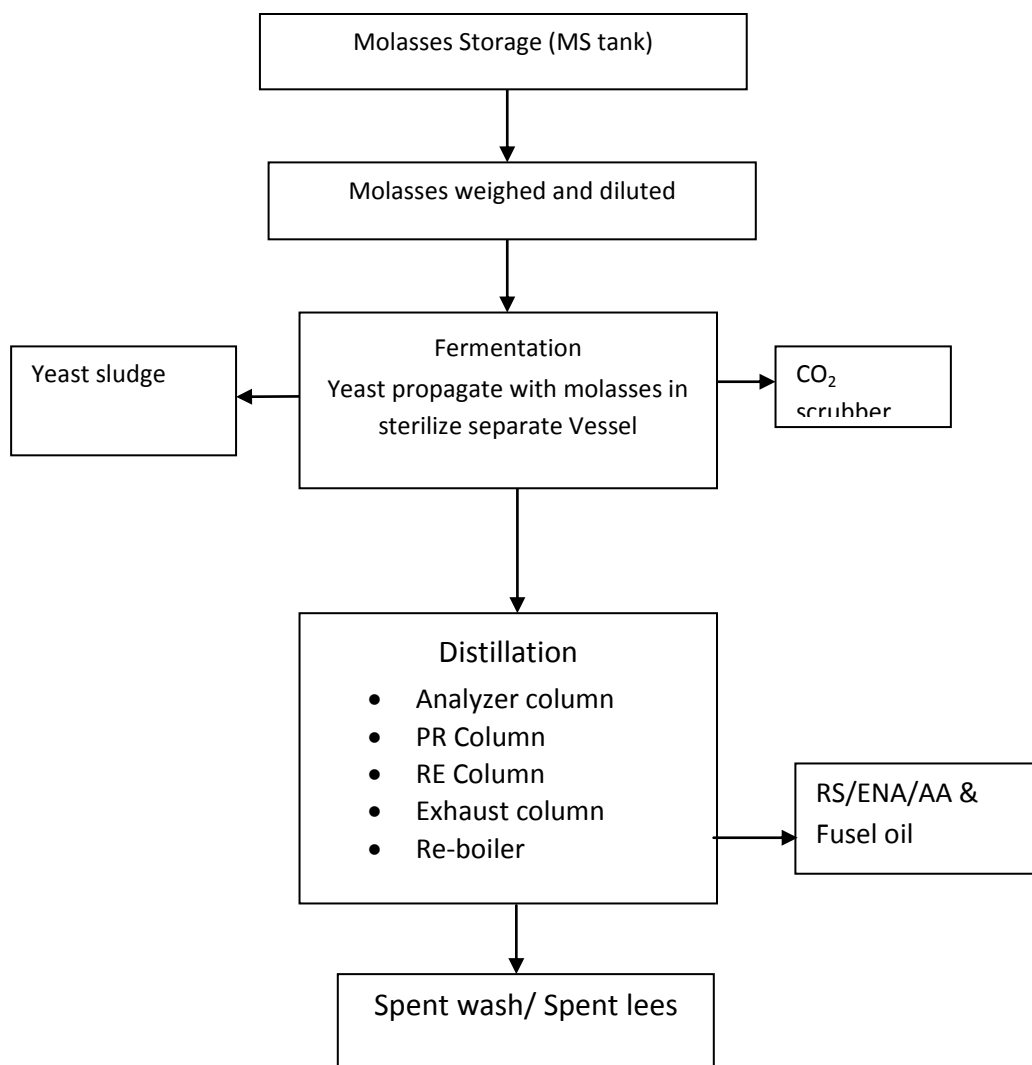


Figure 3.3: Schematic of RS/ENA/AA manufacturing process

3.6 Raw Materials for Finished Products

Raw materials for the proposed project will be available from the local market. Coal used as a fuel and molasses as raw material will be available from in-house only. Product wise raw material consumption is given below.

Molasses: Molasses availability is mainly depends upon the cane crushing rate of the sugar mill. Thus, indirectly it is dependent upon cane availability. The data of cane availability and cane crushing is provided in the following table so as to understand the feasibility of the project with respect to availability of raw material.

Table 3.1: Cane crushing and molasses availability for last five years

S. No.	Season	Sugarcane Area (Ha)	Actual Crushing (MT)	C heavy type Molasses generation
1	2014-15	9312	862,702.00	34,562
2	2015-16	8020	846,224.45	35,660
3	2016-17	6607	835,006.72	27,330
4	2017-18	7919	945,975.03	39,215
5	2018-19	8120	854,645.13	34,220

Table 3.2: Expected molasses availability for next five years

S. No.	Season	Estimated Crushing (MT)	Estimated molasses availability	
			C heavy type @4% on cane	B- heavy type @ 6% on cane
1	2019-20	900,000	36,000	54,000
2	2020-21	925,000	37,000	55,500
3	2021-22	950,000	38,000	57,000
4	2022-23	975,000	39,000	58,500

Based on the cane crushing data, it is evident that there will be approx 50 to 60% of own molasses available to operate the distillery at proposed capacity. Therefore, the management has also planned to operate the distillery on cane juice to ethanol mode.

Generally, juice of 10⁰brix is used for fermentation process. One cu.m. of cane juice gives minimum 60 L of alcohol. Thus, the distillery will require 1500 m³ per day of juice to produce 90 KLPD RS. One ton of cane usually gives minimum 550 L of juice. Thus, roughly 2727 tons of cane will fulfill the proposed juice requirement.

Table 3.3: Availability raw materials & finish good product and transport mode

Raw materials	Estimated quantity /day	Source market	Final product	Estimated quantity KL/day	Source market	Transport mode
Molasses	333 TPD for C heavy type = 1,09,890 TPA* (*required quantity for 330 days operation) and 300 TPD for B heavy type = 99,000 TPA* Juice = 1500 m ³ /day = 2727 TPD of sugar cane	C heavy type Max = 39,000 TPA B heavy type max. 58500 TPA from Own sugar factory Remaining molasses will be procured from market	Rectified spirit+ OR ENA OR Anhydrous Ethanol and Impure spirit	90 KLPD	Existing Sugar Unit Maharashtra India	By road through Tanker or pipeline existing sugar
Coal Conc Spent Wash	Coal = ~95.5 TPD = 223.2 TPD Sw : coal = 7:3	Coal from nearby market spent wash from own unit	Steam	558 TPD	-	By road through truck
Turkey Red Oil (TRO) (daily)	400 Kg/day	Pune, Kolhapur, Mumbai or Nagpur		-		By road - Truck Tempo
Nutrients N, P (daily)	50 Kg	Pune, Kolhapur, Mumbai or Nagpur		-		By road - Truck Tempo

3.7 Resource optimization / recycle and reuse envisaged in the project

In the proposed project, optimum utilization of the available resource is strived by the management, by using available land, molasses and infrastructure of existing distillery unit. Molasses is a by- roduct of sugar factory,

Coal will be used as a fuel to incinerate spentwash and produces process steam. Steam will be used twice – once for power generation (2 MW) and the exhaust steam will be used in distillery. Condensate water and other mild polluted water will be recycled/reused after treatment that will reduce the freshwater requirement.

3.8 Water Requirement and Its source

Necessary water requirement for the proposed project will be met from Krishna river. Water will be required for domestic, process and utility purpose. Daily fresh water requirement for the proposed distillery unit will be of 861 cu.m. Presently, the mill is having permission to take 510,000 m³ of water per annum from Krishna river.

Table 3.4: Water Balance: Distillery of 90KLPD (Quantities in cum/day)

Water Input	Cum/day
Process Water for Fermentation section and CO ₂ scrubber	1085
Boiler feed water	636
Soft Water For Vacuum Pump & Others	100
Soft Water Makeup For Cooling Towers	624
Other Domestic Usage	10
Total Water Input at start-up	2455
Water Output	
Spent Lees (PR & Rect.)	180
CT Evaporation & Drift Losses	624
Domestic Consumption loss	10
Soft Water For Vacuum Pump & Others	100
Boiler waste water as blow down & steam loss	42
Exhaust condensate	594
Process condensate	720
Water loss in RS	5
Over all process loss	180
Total Water Output	2455
RECYCLE STREAMS	
Lees Recycle For RS Dilution (after CPU)	180
Process Condensate (after CPU)	720
Steam condensate recycled to boiler	594
Soft Water For Vacuum Pump & Others cooling water	100
Total Recycling /Re-utilizations of water per day	1594
Total Daily Water requirement/Input = (2455 - 1594 = 861)	861
The fresh water requirements per lit of Alcohol including domestic water	9.56 lit/lit of RS

Note: Concentrated spent wash about 180 m³/day will be burnt in to incineration boiler with supplementary fuel coal in a ratio of 7:3

Table 3.5: Summary of water balance

Particulars	Intake	Consumption And Losses	Generated Effluent	Recycle and Reuse	Daily Net Requirement
Industrial Process	1085	5	180.0	900*	185
Boiler feed	636	30	12	594	42
Cooling Purpose	624	624	00	00	624
Pump and gland cooling	100	00	00	100	00
Domestic	10.0	3.00	7.00	00	10
Other	-----	-----	-----	-----	-----
Total	2455.0	662.0	199.0	1594.0	861

3.8.1 Power & Fuel requirement and Its source

Power requirement for the proposed expansion (@ 90 KLPD) will be approx. 2.0 MW. The existing power requirement is fulfilled from captive STG of 2 MW. The factory is presently having three DG set. of which two are of 320 KVA and one is of 1010 KVA. These DG sets are common and used for sugar as well as distillery, on need basis. Coal and concentrated spent wash (CSW) will be the main fuel proposed. CSW will be sourced from own unit. Coal will be procured from nearby market.

According to estimates, 90 KLPD distillery with MEE and incineration boiler requires approx 23.25 TPH steam (considered without losses). Therefore, existing 22 TPH boiler will be augmented at desired capacity so as to produce the required steam for the process.

Table 3.6: Steam requirement for proposed distillery expansion

Perticulars	Steam Requirement (TPH)
Distillation	12
Dehydration	2.25
Evaporation	3
Boiler	6
Total	23.25

Table 3.7: Power and Fuel requirement

Sr. No.	Particulars	Requirement		Source
		Existing	After Proposed expansion	
Power and Fuel (Distillery)				
1.	Power Requirement	1.6 MW	2.0 MW	In-house
2.	Coal	60 TPD	95.5 TPD	Market

3.9 Waste generation & disposal scheme

Quantity of waste to be generated & scheme for their disposal are given in following chart:

A. Liquid waste

Estimated daily water requirement of 90 KLPD will be 861 m³. Spent wash generation will be 900 cu.m. per day (12% solids). Spent wash will be initially treated through integrated evaporation system. Here, its solid percent will be increased upto 24%. Then, it will be sent to standalone evaporation plant where there will be further reduction in its volume, and at 60% solids its volume will be 180 cu.m. Usually, this spent wash is having specific gravity of 1.24, thus while converting this volume in to weight, it will be 223.2 Tons per day. This spent wash (with 60% solids) will be incinerated in specially designed boiler (already exist).

The unit will also produce wastewater in the form of spent lees of ~ 180 cu.m. per day and at the same time it will generate 720 cu.m. per day of process condensate. These wastewater streams are comparatively having less polluting potential than spent wash. It will be treated in polishing unit and recycled in the process. Schematic of CPU is given as figure 3.4.

Sewage of 15 m³/day will be sent to septic tanks and soak pit system.

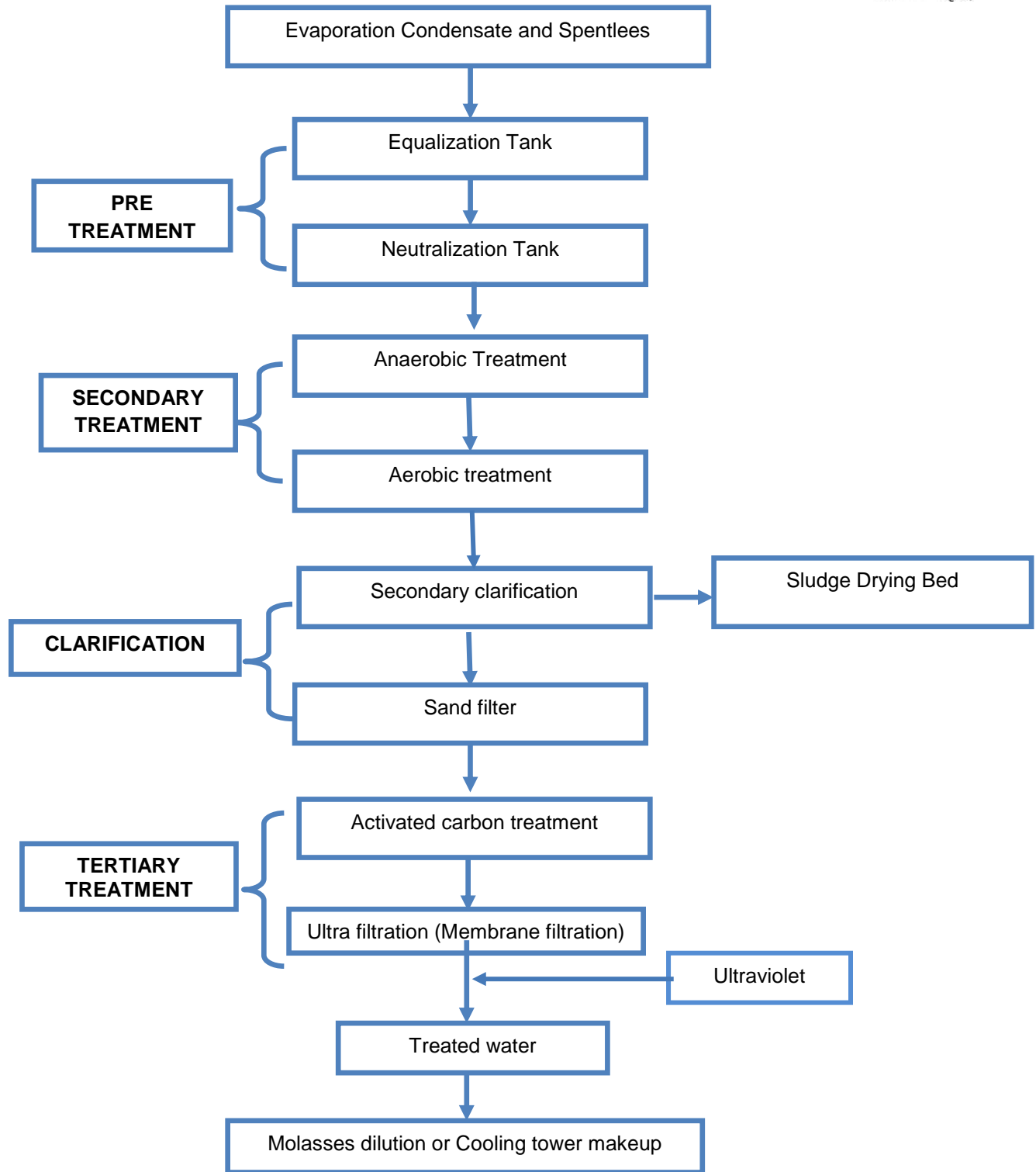


Figure 3.4: Schematic Diagram of CPU/ETP

B. Solid waste

Ash (bottom as well as fly ash) generated from incineration of spent wash with coal will be sold to nearby brick manufacturing unit. The quantity and disposal mechanism for the solid waste generation from the proposed unit is summarized in following table.

Table 3.8: Solid waste generation and disposal

#	Waste	Quantity/annum	Treatment	Disposal	Remark
1	Yeast sludge	175-200 tons/Annum	Dewatering and drying	Mixed into soil Sold as manure	Organic, and Non-Haz.
2	Incineration Boiler Ash Coal @40% Conc spent wash (@18%	= 12,606 TPA = 13,258 TPA	Storage	Sold to brick manufacturing unit	Due to presence of heavy metals in ash
3	Distillery Polishing unit Sludge & Lagoon sludge	150-170 TPA	Dewatering and drying	Mixed into soil Sold as manure	Organic, and Non-Haz.
4	Spent oil	2-3 Kilo L per annum	Storage	Burnt in boiler with fuel	

3.9.1 Air Emission & Control

ESP is installed for the particulate matter control from flue gasses. For coal handling and storage dust suppression systems such as foggers are used. Bag filters are installed for crushing area and conveyors. Mechanized system is installed for coal and ash handling. There are existing three DG set of which two are 320 kVA and one is 1010 kVA each with adequate stack height and acoustic enclosures. Greenbelt has been developed around the existing unit. This setup will be modified so as to control air emissions after proposed expansion.

3.9.2 Noise Control

For proposed project, steam turbine generator will be a major noise source. In addition, noise from pumps, engine drives, utilities, etc. is anticipated. The plant and equipment to minimize noise pollution will be specified and designed. The main equipment for the production of noise will be equipped with sound proof systems and silencers. Acoustic enclosures are provided to the DG set. Ear plugs and ear muffs in the utility segment will be given to the employees. Greenbelt is already developed.

3.9.3 Health and Safety Measures

KDGBLSSKL is committed to the health and safety of all its employees. It is having a separate environment and safety officers. Safety and environment related procedures are in place. It strives to provide hygienic & safe work place and continually improve the effectiveness of health & safety system.

To meet these objectives the KDGBLSSKL will;

- Comply all relevant laws, regulation, statutory requirements & codes of practice.
- Continually assess risks & hazards, so as to evolve establish & upgrade hazard control measures, emergency preparedness, & risks mitigation and correct the deficiency identified in timely manner.
- Ensure safe handling, storage, use and disposal of all substance & materials which are classified as hazardous to health & environment.
- Create awareness in employees by providing appropriate training, motivation information's so as to create individual sense of duty, responsibility & participations and an institutionalize culture of continually improvement in Safety , Health & Environment matters.
- Make head of the department/section responsible to communicate the safety policy to all concerned in his department.
- Make supervisors responsible or implementation of the safety precautions, use of safety devices, & the safety of the people.
- Empower employees at all levels to be responsible & accountable for their personal health & safety.
- Fire protection system in the existing unit is provided in accordance to the LPA regulations, as well as guidelines of PESO and other statutory authorities are complied.
- Factory is having a fire protection system including required pumps, hydrants, dedicated water tank, fire alarm, fire extinguishers, etc
- Portable fire extinguishers shall be provided in strategic locations in new construction area.
- Zero accident record in sugar unit for past several years as well as newly developed distillery unit for last one year.

3.10 Schematic representation of the feasibility drawing which give information of EIA purpose

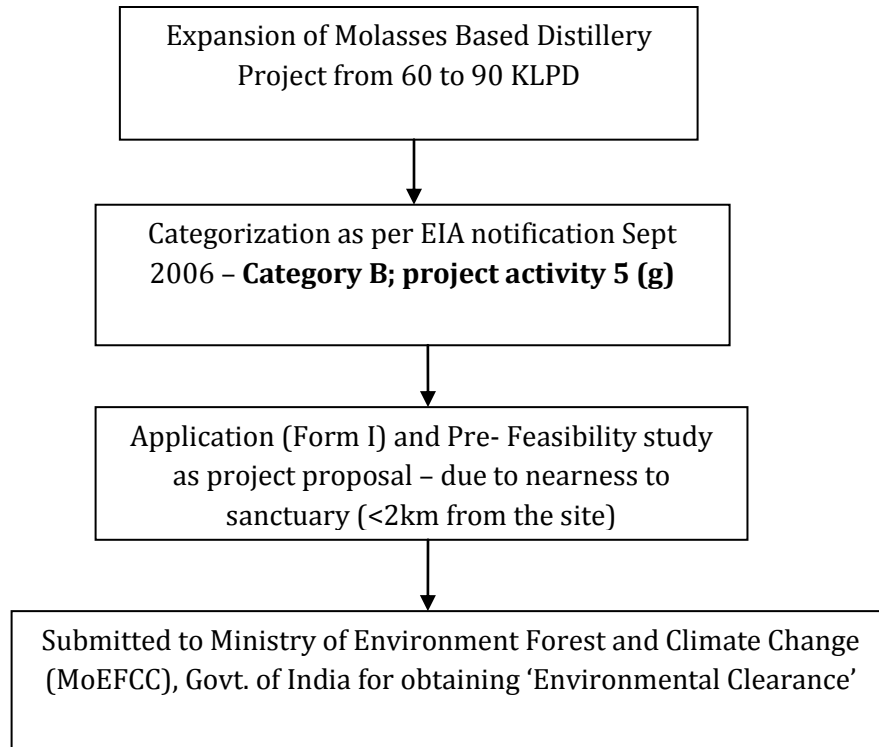


Figure 3.5: Procedure of Environmental Clearance

4.0 SITE ANALYSIS

4.1 Connectivity

The site is well connected by road, railway as well as air network. Pune- Bangalore national highway passes through the district (approx. 22 km from site). Project site is approx 04 km away from the state highway no. 75. Broad gauge railwayline of central railway connects the district from Pune-Mumbai. Miraj is connected by railway to Pune on the north, Kurduvadi via Pandharpur on north-northeast and Belgaum and Goa in the south. Kirloskarwadi railway station (on Mumbai-Miraj route of central railway) is approx. 4 km from the project site. Another station, Takari, is approx. 5 km from the site. Airport of Kolhapur as well as Karad airports (approx. 60km) are the nearest air ports to the site.

4.2 Land form, land use and ownership

The sugar factory is holding more than 126.4 acres of land. The land is flat and already under the industrial use (i.e. sugar factory and allied units). The existing distillery unit has occupied a land of 14.23 acres. Proposed expansion will be carried out mainly through minor modifications in the existing setup. Hence, it will not require any additional land. The proposed expansion will easily get accommodated in the existing land of 14.23 acres (for distillery unit).

4.3 Topography

The terrain is almost flat, no hills in the surroundings, up to 3 km. There is a small hillock range situated towards west of the site, at approx. 3 km onwards. The geographical coordinates of the area are 74°25'37.95" E longitude and 17°08'4.99" N latitudes. The proposed site is 625 meter above the mean sea level.

4.4 Salient Features

The proposed project requires no additional external land. Therefore, no social issues are involved. There won't be change in the land use pattern since the land is already used for industrial purpose. Yashwantrao Chavan Sagareshwar Wildlife (1.7km) Sanctuary is located within the 10 km radius area. The project surrounding land is either fallow land or used for agricultural purpose. There are 35 villages in the study area within 10 km radius. Nearest Water Bodies River Yerala and Krishna River are approx. 4 and 7 km away from project site.

Table 4.1: Salient features of the project location

Roads	State Highway No.75 is approx. 04 km from the site
Nearest settlement	Kumbhargaoon and Kundal is approx. 3 km from the project site.
Railway Station	Kirloskarwadi railway station approx.4 km from the site. Takari railway station approx. 5 km from the site.
Air Port	Kolhapur as well as Karad airport is the nearest airport approx. 60 km from the site. Pune approx. 170 km
River	River Yerala and Krishna are approx. 4 and 7 km away from project site.
Schools	Kranti International Public School approx. 2 km
Colleges	Bharati Vidyapeeth Institute of Technology and Navodaya Vidyalaya, Palus
Medical and health	Primary health centre (PHC) is available in village Kundal, hospital (Hospital Ashwini of ~ 10 beds). Orthopedic hospital is available at Palus

care centers	(at ~7 km).
Banks	Bank of Maharashtra, Union bank, Axis bank., HDFC, and many Co-operative Banks are available and they are also providing ATM facilities. Rajaram Babu Cooperative bank with ATM services is located in the factory premises.
Market places	Palus, Tasgaon, Vita, Sangli, Karad
Protected Area/ Sanctuaries/NP	Yashwantrao Chavan Sagareshwar Wildlife Sanctuary(1.7km)
CRZ applicability	Not applicable
Seismicity	Seismic Zone- III
<i>Note: All the above mentioned distances are the aerial distance from the project site.</i>	

4.5 Existing Infrastructure

The nearest residential area to the factory is at a distance of 1.5 km towards west. There is an agricultural and fallow land in the surrounding area of the site. Yashwantrao Chavan Sagareshwar Wildlife Sanctuary is the only protected area located approx. at 1.7 km from the project site towards west. This sanctuary is fenced and the eco-sensitive area of it, is restricted to 100 m from the existing boundary of the sanctuary.

Table 4.2: Existing Infrastructure

Land available	5, 05,900 sq.m. Area covered by existing 60 KLPD unit = approx. 57,200 sq.m. (14.23 acres)
Water	Requirement for existing 60 KLPD unit = 280 KLD Source: Krishna River permission for 510,000 cu.m per annum
Power	For existing 60 KLPD unit 1.6 MW - Captive power supply from 2.00 MW turbine
Road	State highway no.10 (Karad- Tasgaon road) approx. 4 km from the site Pune- Bangalore national highway approx 22 km
Fuel	Coal for existing 60 KLPD 60 TPD and Conc. Spent wash 148 TPD
Steam generator (boilers)	22 TPH incineration boiler with ESP connected to stack of 75 m

4.5.1 Raw Material

1. Molasses

1. Existing distillery unit requires C heavy type molasses = 34,220 TPA.
2. Nutrients: 160 kg per day
3. Turkey Red Oil (TRO)- 150kg/day

4.5.2 Irrigation and transportation facilities

The management has provided finance to set-up and operates irrigation system in this region. There are about 16 irrigation schemes in active operations. Of these, about three schemes covering an area of >350 acres are fully operating on drip system and converted into fully automated system for supply of fertilizers and chemicals (pesticides, insecticides, etc.).

There is a good network of road as well as railway in the neighboring area of the factory. Thus, transportation facilities are available in both the mode. Water-ways are not available in the area.

4.5.3 Fuel

For the existing unit, Concentrated spent wash is incinerated along with coal. Coal is required at 42 TPD. It is procured from nearby supplier and received by road in trucks.

4.5.4 Water

At present sugar factory draw water from Krishna River for its sugar as well as existing distillery unit. Water requirement for existing 60 KLPD unit is around 280 m³/day.

4.5.5 Power

Existing 60 KLPD unit is having 2 MW steam turbine generator to meet its own requirement of 1.6 MW.

4.6 Soil classification

The soils in the district can generally be classified into 2 groups, viz. silt loam and sandy loam. Soil formations in Sangli district have been predominantly influenced by the climate. The district has three distinct climatic zones. The western zone, which receives very heavy rainfall, has lateritic soils on up-gats and reddish brown soils on hill slopes, the latter being developed on parent material of trap rock. The transition zone of Krishna valley has deep black soils of alluvial origin. The third is the eastern drier zone, which consists largely of granular black soils and poor shallow soils. Saline-alkaline soils are met

with in the low lying patches in the areas of low rainfall. The study zone of the project is situated close to Krishna river belt, where soils are mainly deep black and medium-deep soil.

4.7 Climatic data

The climate of district is on the whole agreeable and is characterized by general dryness in the major part of the year. The cold season is from December to about the middle of February. The hot season which follows, lasts till the end of May. June to September is the south-west monsoon season and the two months, October and November, constitute the post-monsoon or retreating monsoon season.

(Source:https://cultural.maharashtra.gov.in/english/gazetteer/SANGLI/gen_climate.html)

4.8 Social Infrastructure available

The sugar factory has already initiated several activities for the development of the region. Some of the prime activities are as follows.

- The factory is providing support to different irrigation schemes from this region
- It is supporting school and colleges by providing different aid
- It has developed a setup for promoting wrestling and train wrestlers. This centre and facility is renowned in the entire western Maharashtra.
- The factory is providing medical aid to the employees and their dependents at very low cost
- It provides primary school educational facilities to the children of workers
- It helps member farmers by supplying fertilizers, press-mud and the developed cane seeds.
- The factory also arranges field demonstration to educate the farmers in sugarcane cultivation through application of scientific methods
- It provides drip irrigation facilities to the sugarcane growers on subsidized basis
- It provides insurance policy facilities for members, workers and cane transportation animals
- To facilitate better transport of sugarcane, the factory has undertaken major program to construct roads in its area of operation

5.0 PLANNING BRIEF

5.1 Planning concept

Expansion of molasses based distillery of 60 KLPD to 90 KLPD. It will be achieved mainly by making suitable modifications in the existing setup. The expansion is mainly focused to produce ethanol to support EBP of GoI. The space required for the modernization is minor and it is available within the existing setup.

5.1.1 Facilities for Transport

Main raw material molasses will be made available from own sugar unit (up to 58,000 TPA for B heavy type). Remaining requirement and fuel will be transported by road. The site is well connected by national and state highways. NH 4 (old Pune – Bangalore highway) is situated just 22 Km. It is reachable thro’ the State highway SH 75 that connects Karad and Tasgaon – two important towns of western Maharashtra. All the villages from the command area of the factory are accessible by asphalted (*pucca*) road, operational year around. Hence, public transportation is available. State transport (ST) buses ply on schedule and connect almost all the villages of the command area.

The site is also well connected by railway. The nearest railway station Kirloskar wadi at 4km and Takari at ~5 km from the site. It is located on Mumbai-Miraj-Bangalore route of central railway.

5.1.2 Town and country planning / Development authority classification

The project is located at village Kundal of Palus taluka. Grampanchyat Kundal is the local authority. The grampanchyat has issued “No Objection Certificates (NOC)” for this proposed expansion. The copy of the same is attached as an Annexure 1. Since, then the land is used for industrial purpose and will be used for the same purpose only.

5.2 Population projection

No population flux is projected because of proposed expansion of distillery. Required 20 people will be preferentially selected from local areas. Only for exceptional posts it may employ candidates from other areas. Existing infrastructure will easily accommodate the additional man power for the proposed activity.

5.3 Land use Planning

Total area of the plot is 126. acre. Existing distillery unit has occupied 14.23 acre area. The proposed unit will be in the same premises. Hence, there will not be any change in the existing industrial land use pattern.

The project is not required any new infrastructure such as road, railway or power supply line or similar activity. Hence, there is no scope of change in the land use in the surrounding area due to proposed expansion.

5.4 Assessment of infrastructure Demand (Physical & Social)

The basic infrastructure such as roads, electricity, transportation, drinking water supply, health centers and hospitals, school, colleges, sanitation facilities are available in the vicinity. The proposed project is not going to exert any unbearable load on any of these resources.

5.5 Amenities/ Facilities

Following amenities/facilities are available at sugar factory

- Guest house facility
- Petrol pump
- Drinking water and washroom facilities in the work premises
- Canteen
- First aid facility
- Fire fighting vehicle
- Fire extinguishing facilities
- Safety gears for workers
- Diesel generator as a backup facility
- Fresh water and wastewater treatment plants
- Separate dedicated parking facility for goods vehicle and personal vehicles at site
- Provision of street light within premises as well as on approach road
- Rest room
- Security check post and round the clock security persons on duty
- Housing colony for employees
- Drinking water, sanitation and power supply to housing colony

6.0 PROPOSED INFRASTRUCTURE

6.1 Industrial Area

The proposed project will be carried out in the existing distillery premises. Existing facility is adequate.

6.2 Residential Area

There is no need of expanding the existing residential colony area.

6.3 Greenbelt Area

Existing greenbelt is approx 41 acres, which is 33% of total plot area (126 acres) and no need of development of additional greenbelt.

6.4 Social infrastructure

Existing setup of Bank, School, road & transportation and hospital will be adequate. There is no need of development of such infrastructure.

6.5 Connectivity

State highway no. 75 is approx. 4 km from the site. Road infrastructure developed by zilla parishad is also prominent.

6.6 Drinking water management

The factory is having WTP. Treated water of the same is supplied for drinking purpose in the factory premises as well as to housing colony of the factory.

6.7 Industrial waste management

Spent wash generated from the unit will be concentrated using evaporation system and incinerated in the boiler. The wastewater generated from industrial activity will be treated in Condensate Polishing Unit (CPU). Treated water will be partly reused in the process and remaining will be used for irrigation purpose.

Table 6.1: Solid/ Hazardous waste generation, treatment & Disposal

#	Waste	Quantity/annum	Upshot
1	Yeast sludge	175-200 TPA	Mixed into soil due to organic nature
2	Ash considering Incineration Boiler ,coal and spentwash)	25,864 TPA	Sold to brick manufacturing units
3	Distillery Polishing unit Sludge	150-170 TPA	Mixed into soil due to organic nature

4	Spent oil from DG	2-3 KLA	Spent oil is burnt in boiler
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6.8 Power Requirement and Source

Power requirement for the proposed expansion (@ 90 KLPD) will be approx. 2.0 MW. The existing power requirement is fulfilled from captive STG of 2 MW. The factory is presently having three DG set. of which two are of 320 KVA and one is of 1010 KVA. These DG sets are common and used for sugar as well as distillery, on need basis.

7.0 Rehabilitation and Resettlement (R & R) Plan

There will be no any issue of rehabilitation and resettlement (R & R) for the proposed project, since the required land is available with the factory.

8.0 Project Scheduled & Cost Estimates

Table 7.1: Project scheduled & cost estimate

1.	Date of start of construction (Anticipatory)	June 2020
2.	Date of completion (Anticipatory)	January 2021
3.	Proposed Project cost	Rs. 356.25 Lacs
4.	EMP cost	Rs. 117.56 Lacs

9.0 Analysis of proposal (Final Recommendations)

- This is expansion of existing distillery unit.
- It is mainly focused on production of Anhydrous Alcohol (fuel ethanol) which is very useful product for the country, which will save foreign exchange as well as help in protecting the environment
- It is proposed by a cooperative sugar mill and local farmers are the shareholders of the mill. They are likely to get good benefitted due to the proposed expansion
- Expansion will enhance financial stability of the factory
- No external electricity required due to in house power generation in the proposed activity
- The evaporation condensate, spent lees and other less-polluting water will be recycled/reused in the process and/or cooling tower makeup water which will minimize the fresh water requirement sizably
- Solid waste like sludge from process and CPU are soil enriching materials

- Compatible architecture will be adopted and land is already under industrial use. Trees will be maintained and not razed down.
- No Rehabilitation or restoration is involved.
- The problematic liquid waste materials such as distillery spent wash will be disposed in the incinerator boiler to achieve ZLD
- The process is straight line and the technology even for the pollution control/disposal are available indigenously
- Indirect employment opportunities are many
- The aggregate effect of the project is likely to boost the local economy
- Direct employment opportunities preferably for local youths. The member farmers will get proper price to their sugar cane

I) Conclusion

- a) Expansion of distillery is very necessary for achieving long term financial stability as well as effective utilization of available molasses
- b) The local people including shareholder sugarcane growers are strongly willing for the project
- c) The site is suitable from general MoEFCC guidelines.
- d) Water, power, raw material and market is assured and found available with ease.
- e) Full precautions will be taken for pollution control, resource conservation and environmental protection.
- f) Distillery unit is agro-based and hence promote sustainable development in this rural area