PRE - FEASIBILITY REPORT

Proposed Expansion of Sugar unit from 2500 TCD to 6000 TCD, Co-generation Unit from 14 MW to 26 MW and Distillery unit from 30KLPD to 55KLPD

M/S. Udagiri Sugar and Power Ltd.,

Bamani (Pare), Tal. Khanapur, Dist.: Sangli

Maharashtra- 415311

Prepared By

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Recognized R & D Center by Department of Scientific and Industrial Research (DSIR), Ministry of Science and Technology, Government of India and P.G. and Doctoral Research Center by 'University of Pune'

October 2018

1.0 INTRODUCTION

1.1 Identification of project and project proponent

This project is proposed by **M/s. Udagiri Sugar and Power Ltd.**, (USPL). The sugar located in Sangli district of Maharashtra. It is one of the progressive private sugar factories in Maharashtra, set up in the year 2012-13. The factory is registered as 1138/SIA/IMO/2013 New Delhi dated 03/06/2013. Dr. Rahul Kadam is Executive Chairman and Managing Director of the factory. The present installed capacity of the sugar factory is 2,500TCD along with 14 MW cogeneration unit and having 30 KLPD distillery unit. Existing unit is following bio-methanation followed by multi-effect evaporation (MEE) followed by composting for disposal of spent wash. In the proposed scheme, bio-methanation and MEE steps will be followed and disposal process will be partly drying of spent wash and partly through existing bio-composting.

The Management of the factory has undertaken extensive cane development activities in its command area (i.e. area of operations), hence sugarcane area has increased over a period of time. Considering the increased availability of sugarcane, the factory has decided to expand its crushing capacity from 2,500 TCD to 6,000 TCD (operating capacity).Because of increase in the crushing capacity, the production of byproduct like bagasse and molasses will also increase. Considering this, the management of USPL has decided to enhance the capacity of existing cogeneration unit from 14 to 26 MW distillery unit from 30 KLPD to 55 KLPD. This will help to improve its financial viability.

1.2 Project Setting

For any industrial project availability of raw materials, water, power as well as adequate land is considered as key elements. In case of the proposed expansion, the management checked the above factors and planned to set up the proposed activity within the existing industrial premises. The site meets the guidelines prescribed by Ministry of Environment, Forest and Climate Change (MoEFCC) for setting of an industry. The project is located at village Bamani (Pare), Bamani road is 2 km far from site and Sangali-Vita state highway (SH136) just 12 km. **Project coordinates of four corners of the site:**

1) 17^{0}12’09.07”N, 74^{0}35’28.74”E
2) 17^{0}12’14.09”N, 74^{0}35’55.76”E
3) 17^{0}11’58.59”N, 74^{0}35’49.06”E
4) 17^{0}12’01.66”N, 74^{0}35’28.69”E

Average elevation of the site is 673 m above mean sea level.

1.3 Highlights of the Project

Table 1.1: Project Highlights

1	**Name of the Proponent**	**M/s. Udagiri Sugar and Power Ltd., (USPL)**
2	**Project**	Expansion of cane crushing capacity of existing sugar unit from 2,500 to 6,000 TCD along with expansion of cogeneration unit from 14 to 26 MW and existing molasses distillery unit from 30 to 55KLPD
3	**Location of the project**	Within the existing premises at village Bamani (Pare), Tal. Khanapur, Dist. Sangli, Maharashtra Email: distillery.udagirisugar@gmail.com Ph.9970900400, Fax: 08956334700
4	**Land**	Total land available with the factory = 85acres Of which ~50 to 55 acres is allocated/reserved for industrial activities Land occupied for existing sugar & cogeneration unit (including ancillary units such as storage, ETP, cane and bagasse yard, etc.)= ~ 20 acres Land occupied by existing distillery (including its ancillary units such as storage, compost yard, etc.)= ~ 10.5 Existing Greenbelt: 12 acres Land allocated for proposed expansion of Sugar & cogeneration unit = ~1.50 acres Distillery expansion = ~ 3.0 acre (Considering all the requirements), etc. Greenbelt will be increased by 2.0 acre (33% of proposed land for expansion) Total 6.5 acres of land allocated for proposed expansion activity • No need of acquisition of additional land as the proposed project will be established within existing factory premises only – No rehabilitation/restoration issues involved
5.	**Product**	**Sugar Unit (Considering crushing capacity of 6000 TCD)** i) White Sugar: ~690 TPD (considering 11.50% on cane) ii) Bagasse (generation 28.50 % on cane): ~1710 TPD iii) Molasses (4.5% on cane): 270 TPD iv) Press mud (4% on cane): 240 TPD **Cogeneration Unit** i) Electricity: 26 MW **Distillery Unit:** i) Rectified Spirit – 55 KLPD OR ii) ENA – 55 KLPD OR iii) Ethanol – 55 KLPD
6	**Operation days per**	• Sugar: Average 160 days and Maximum 220 days • Cogeneration: Throughout cane crushing season and 50 days after

	annum	end of the season • Distillery – Maximum 300 days
7.	**Main Raw Material**	**Sugar Unit** (based on operational capacity) • Sugarcane: 6,000 TPD • Lime: 8.40 TPD (0.140% Cane) • Sulphur: 2.4 TPD (0.04% Cane) **Cogeneration Unit :** • Bagasse as a fuel: 45.45 TPH (40 % on cane) considering requirement for cogeneration and sugar (@36 % steam on cane) and distillery operations (including requirement for MEE and dryer) **Distillery** • Molasses: 205 TPD (Considering C heavy type of molasses) • Fuel: Bagasse and Biogas will be used as a fuel (generated from own bio-digester) Power Source: Captive during season and as well as 50 days of off-season and from state electricity board during remaining days
8.	**Water Requirement**	**Sugar and cogeneration unit** • 60m^3/day for process and 43 m3/day for domestic activities = Total 103 m^3/day (**Source**: Krishna river with permission from Irrigation Dept.) • 25 m^3/day during off-season (for domestic purpose) **Distillery unit** • 417 m^3/day (**Source**: Krishna river with permission from Irrigation Dept.) • 10 m^3/day during off-season
9.	**ZLD scheme for distillery**	**For spent wash:** Bio-methanation followed by MEE – concentrated spent wash will be partly sent to existing bio-composting and partly to new dryer For Condensate, spent lees and other minor effluent – CPU; treated water will be reused in the process (dilution water), for cooling tower make and/or for irrigation
10.	**ZLD scheme for Sugar unit**	Existing ETP will be modified to treat water of 600 cu.m per day; treated water is sent to irrigation Sugar condensate is recycled to maximum extent the same will be continued after expansion Water conservation is also achieved through fan-less cooling towers for sugar condensate It has also adopted 3R scheme i.e. Reduce, recycle and reuse for water
11.	**Project cost**	For distillery unit: Rs. 5489.00 lakhs For sugar unit: Rs. 3600.00 lakhs and Cogeneration: Rs. 5100.00 Lakhs **TOTAL** = **Rs. 14,189.00 Lakhs**
12.	**EMP cost**	Rs. 446.70 lakhs

1.4 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 sugarcane 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 project proponent is one of a private sugar factory from western region of Maharashtra. The cultivation of sugarcane is increasing every year in the command area of the factory and it is anticipated to grow gradually for next few seasons. In addition, the sugar factory is having plans to promote and support the cane development programme, in its command area.

Table 1.2: Expected cane availability for next five years

S. No.	Season	Sugarcane Area (Ha)	Yield (MT)	Sugarcane Production (Tons – rounded)	Expected Crushing (T)	Expected Sugar Recovery (%)	Molasses production @4.5% on cane MT	Bagasse production @ 28.5
1.	2018-19	10,050	90	9,04,500	7,40,000	12.00	33,300	2,10,900
2.	2019-20	10,500	90	9,45,000	9,00,000	12.00	40,500	2,56,500
3.	2020-21	10,700	85	9,09,500	9,20,000	12.12	41,400	2,62,200
4.	2021-22	10,250	80	8,20,000	8,00,000	11.90	36,000	2,28,000
5.	2022-23	10,000	95	9,50,000	9,25,000	12.11	41,625	2,63,625

Expected average molasses production is around 41,625 tons per season and bagasse production around 2,63,000 tons per season (considering average days of 160 per season). In case of bumper season production of molasses and bagasse may increase. The proposed distillery unit will require molasses of around 61,500 TPA. Therefore, required molasses (considering average season of 160days) approx. 19,000 -20,000T will be procured from nearby sugar mills.

1.5 Steam and Power

Steam required for the proposed activity i.e. sugar unit of 6000 TCD and distillery of 55KLPD will be the max.100 TPH and power requirement will be 6.5 MW (sugar + distillery). Existing sugar industry has one bagasse fired boiler of 75TPH mill is going install a new 45 TPH. Thus, the industry

will fulfill its steam requirement for proposed sugar as well as distillery unit from own sugar factory boiler, during seasonal operation. During off-season, Distillery unit will use the proposed 45 TPH boiler. The proposed boiler will be multi-fuel based which will mainly use bagasse and biogas as a fuel. The existing and proposed (75 + 45 TPH) boiler will fulfill the requirement of distillery and its ancillary units such as MEE and dryer during season as well as off seasonal operations. Proposed cogeneration unit will be operational for 50 days after end of crushing season. It will fulfill the power of distillery. For remaining days, power demand of distillery will be fulfilled from State Electricity Board.

1.6 Imports vs. Indigenous Production

The processes of manufacturing for sugar as well as spirit/alcohol are well set. These processes are simple and straight and the technology for the same is available indigenously. The technologies for pollution control/disposal are also available indigenously.

1.8 Export Possibility

The finished goods from proposed sugar and distillery activity viz. Sugar, Press mud, Rectified Spirit (RS), Extra Neutral Alcohol (ENA) and Anhydrous Alcohol (AA or fuel ethanol) are having excellent potential of export.

1.9 Domestic /Export Markets

Domestic market for Sugar, electricity, RS, AA and ENA are Sangli, Pune, Mumbai, Solapur, Hyderabad, Bangalore, entire state of Maharashtra and its neighboring states such as Karnataka, Goa, Andhra, Telangana as well as the other states of the country.

For fuel ethanol, petro-chemical industries are the major buyers.

1.10 Employment Generation

Proposed expansion activity of sugar, Co-generation and distillery unit is expected to provide direct employment to 75 persons from which 40-45 will be skilled and 30 will be semiskilled and unskilled. The project has a great potential to generate large number of indirect employment particularly for unskilled labours (for cane cultivation, harvesting and its transportation, etc.).

2.0 PROJECT DESCRIPTION

2.1 Type of project

This is an agro-based industry. In the proposed project, capacity of sugar unit will be enhanced from 2,500 TCD to 6,000 TCD (operational capacity), cogeneration unit from 14 to 26 MW and capacity of distillery from 30 KLPD to 55 KLPD.

Presently, the mill is having 75 TPH capacity boiler which is connected to a stack of 75 m in height. This boiler is having ESP as air pollution control equipment. Bagasse and ash is handled mechanically through closed conveyor system. Existing sugar unit is having capacity of 2500 TCD and cogeneration unit is of 14 MW. The molasses based distillery is of 30 KLPD capacity.

In the proposed expansion, it has planned to install additional new boiler of 45 TPH capacity along with new steam turbine of 12 MW. New boiler will be connected to a new stack of suitable height along with ESP as air pollution control equipment.

In case of sugar unit, proposed 6000 TCD capacity will be achieved by adding one or two mill drives and make suitable changes in the pan boiling section. Thus, it will be more or less modernization of existing unit.

Cogeneration unit operation: During season 14+12 MW STG will be operational – captive power requirement will be 7.8 MW and remaining 18.2 MW will be exported to grid. During off-season only 14 MW STG will be used. Power of 4.8 MW will be used for captive activities and remaining 9.2 MW will be exported to grid.

For distillery unit, the proposed capacity of 55 KLPD will be achieved by modernizing and adding few units in the existing 30 KLPD set-up.

In the case of proposed project, sugar industry is placed under 5 (j), Cogeneration unit 1(D)– 'B' category and for distillery it is placed in 5 (g) - as 'A' category as per EIA Notification, 2006 (as amended till the date). Both the projects are clubbed/integrated for the environmental clearance process and therefore, the proposed activity will be appraised at central level.

2.2 Location with coordinates

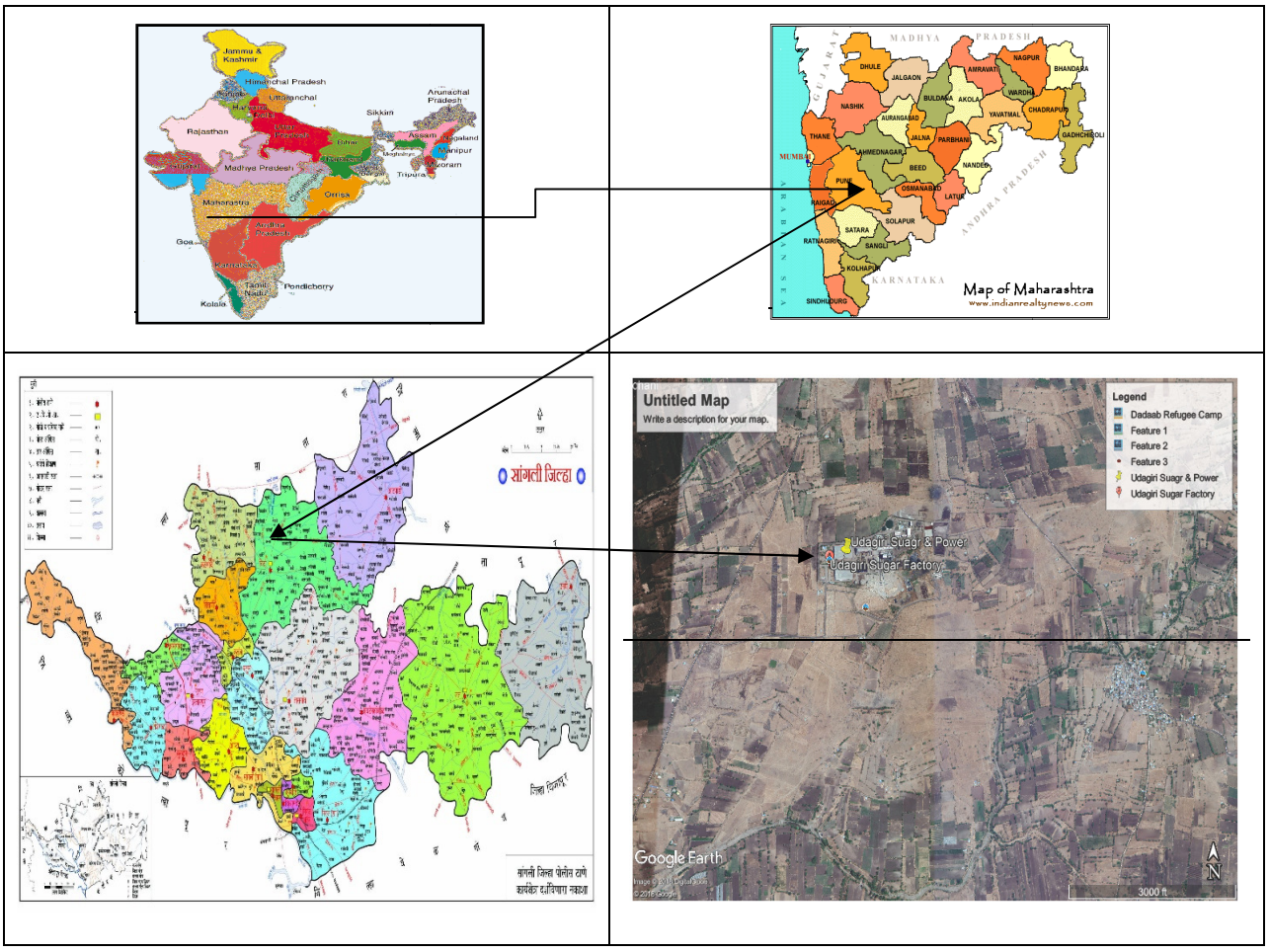

Figure 2.1: Location Map

Project coordinates of four corners of the site:

I. 17°12’09.07”N, 74°35’28.74”E

II. 17°12’14.09”N, 74°35’55.76”E

III. 17°11’58.59”N, 74°35’49.06”E

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Average elevation of the site is 673 m above mean sea level.

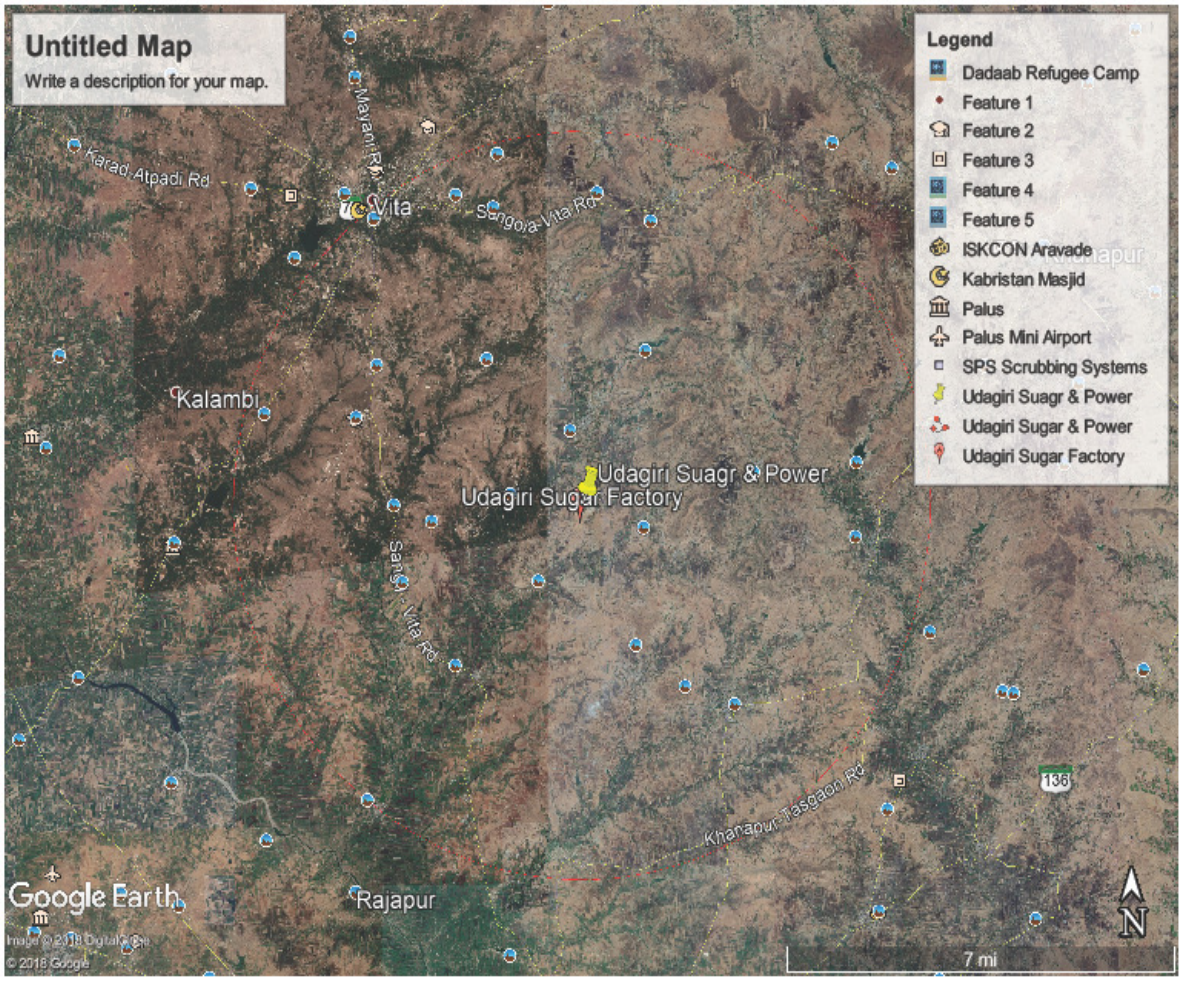


Figure 2.2: Satellite Image of the project sit

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

Alternative sites for the proposed project are not considered, because of the following reasons.

i) The proposed project is expansion of existing units

ii) Adequate land for the proposed units as well as ancillary units thereof such as storage, treatment, disposal units, etc. is available with project proponent

iii) The present site meets the guidelines for sitting of an industry prescribed by MoEF&CC.

2.4 Size or magnitude of operation

For sugar unit: Capacity Enhancement of existing unit of 2,500 to 6,000 TCD

For cogeneration unit: Capacity enhancement of existing unit of 14 to 26 MW

For distillery: capacity enhancement from 30 to 55 KLPD.

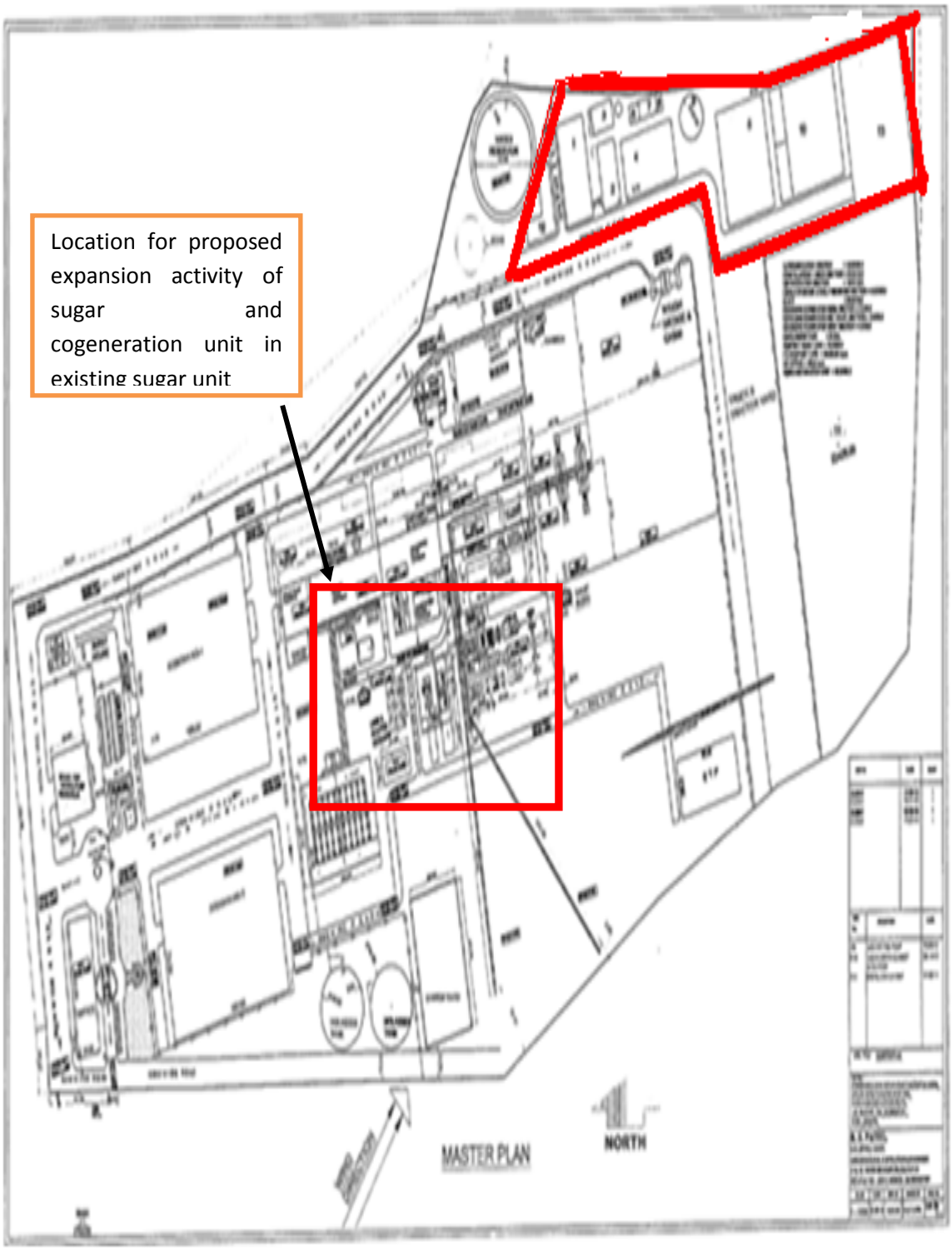


Figure 2.3: Project Layout (Red coloured mark area allocated for proposed activity)

Figure 2.4: project Layout: Distillery Unit

2.5 Project description with process details

Process: Distillery

USPL decided to adopt the latest technology to achieve Zero Liquid Discharge (ZLD) for the proposed 55 KLPD unit. The peculiarities of manufacturing process are as follows:

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 cerevisieae*, a living microorganism belonging to class fungi converts sugar present in the molasses 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 manufacturing process is to separate alcohol from fermented wash and to concentrate it to 95%. This is called Rectified Spirit(RS). For this purpose, distillation method is employed. After separation of alcohol, the remaining part is the effluent of the process i.e. spentwash and spent lees.

- **Manufacture Extra Neutral Alcohol (ENA)**

  ENA is prepared by wash to ENA. After fermentation the next stage in the manufacturinf process is to separate alcohol from fermented wash and to concentrate it to 95%. This is called Rectified Spirit(RS) &by dilutingrectified spirit with soft water for the removal of impurities like higher alcohols, aldehydes and methyl alcohol. This process is done 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. Molecular Sieves process will be adopted for dehydration of alcohol.

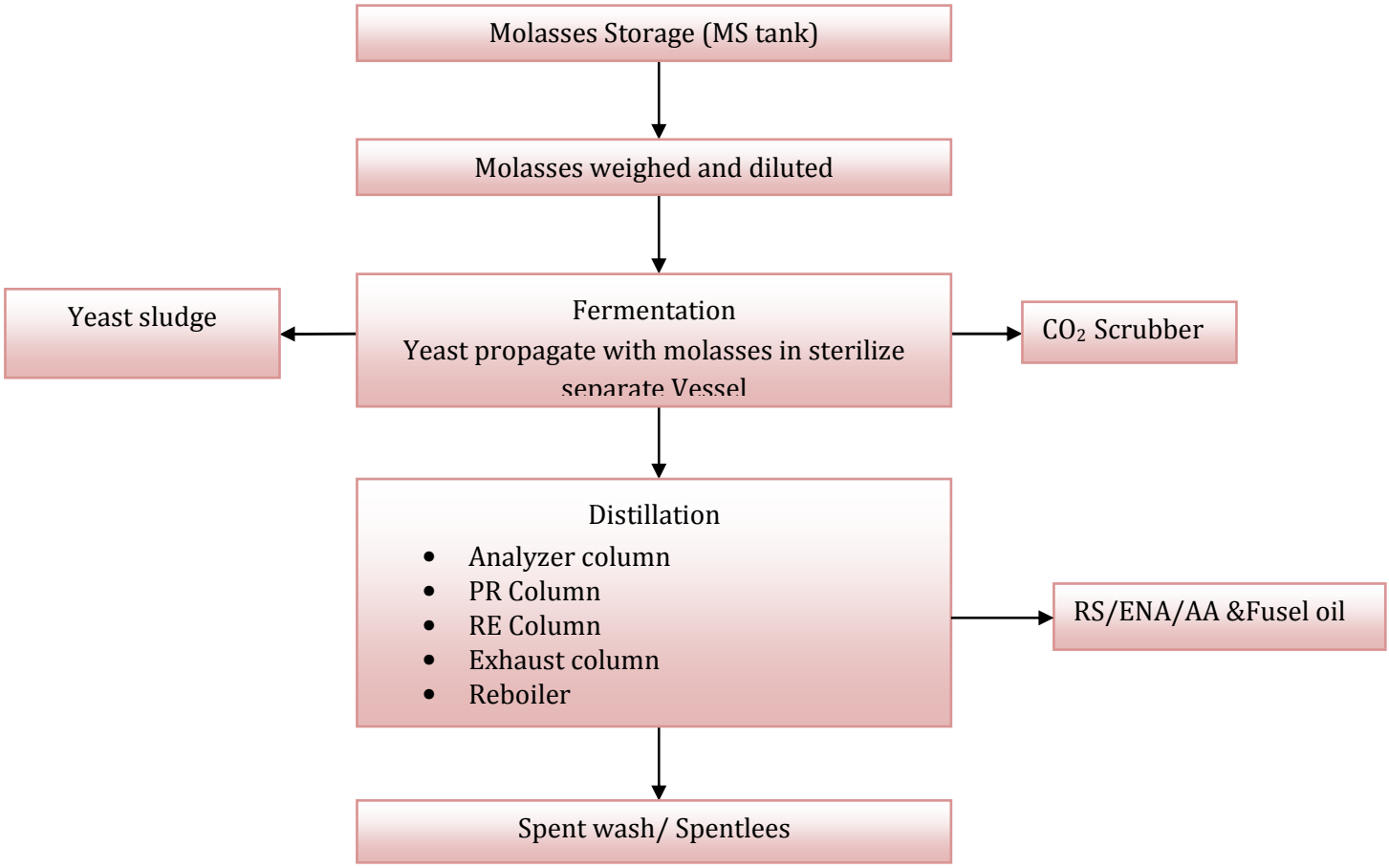


Figure 2.5: Schematic of RS/ENA/AA Manufacturing Process

A) Process: Sugar

- **Extraction of Juice**

  Sugarcane is passed through preparatory devices like knives for cutting the stalks into fine chips before being subjected to crushing in a milling tandem comprising 4 to 6 roller mills. In the best milling practice, more than 95% of the sugar of cane gets extracted into the juice.

- **Clarification**

  The treated juice on boiling fed to continuous clarifier from which the clear juice is decanted while the settled impurities known as mud is sent to rotary drum vacuum filter for removal of unwanted stuff called filter cake. It is discarded or returned to the field as fertilizer.

- **Evaporation**

  Clear Juice is evaporated from 15^{o} Bx. to 60^{o} Bx. in evaporator

- **Pan boiling**

  The syrup is again treated with sulphur dioxide before being sent to the pan station for crystallization of sugar. Crystallization takes place in single-effect vacuum pans, where the syrup is evaporated until saturated with sugar. At this point "seed grain" is added to serve as a nucleus for the sugar crystals, and more syrup is added as water evaporates.

- **Centrifugation**

  The massecuite from crystallizer is drawn into revolving machines called centrifuges. The perforated lining retains the sugar crystals, which may be washed with water, if desired. The mother liquor "molasses" passes through the lining because of the centrifugal force exerted and after the sugar is "purged" it is cut down leaving the centrifuge ready for another charge of massecuite.

- **Gradation & Packing**

  The final product in the form of sugar crystal is dropped through pan section and this sugar is graded and picked. Gradation of sugar depends on the size of crystal viz. Small (S), Medium (M) and Large (L).

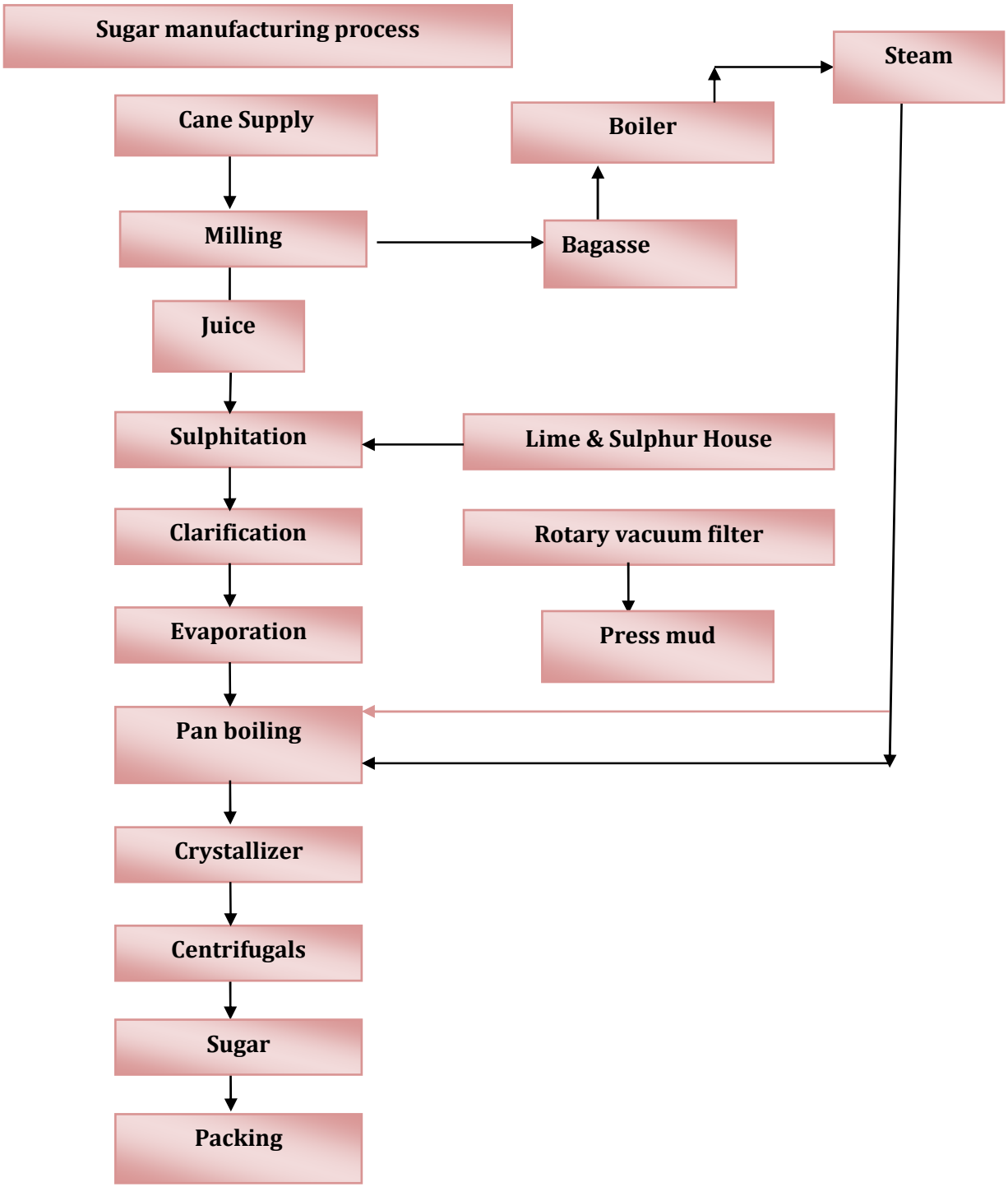


Figure 2.6: Flowchart of Sugar Manufacturing Process

B. Cogeneration Unit

The proposed cogeneration, aims at improving the energy efficiency of the sugar factory significantly and enabling the plant t o generate surplus power from its cane crushing operation. This surplus power will be exported to the state electricity grid. Energy efficiency and the export of power to the grid are made feasible due to the availability of high pressure and high temperature steam and by the utilization of the available bagasse. The flow chart for generation of the power in cogeneration as shown in following figure

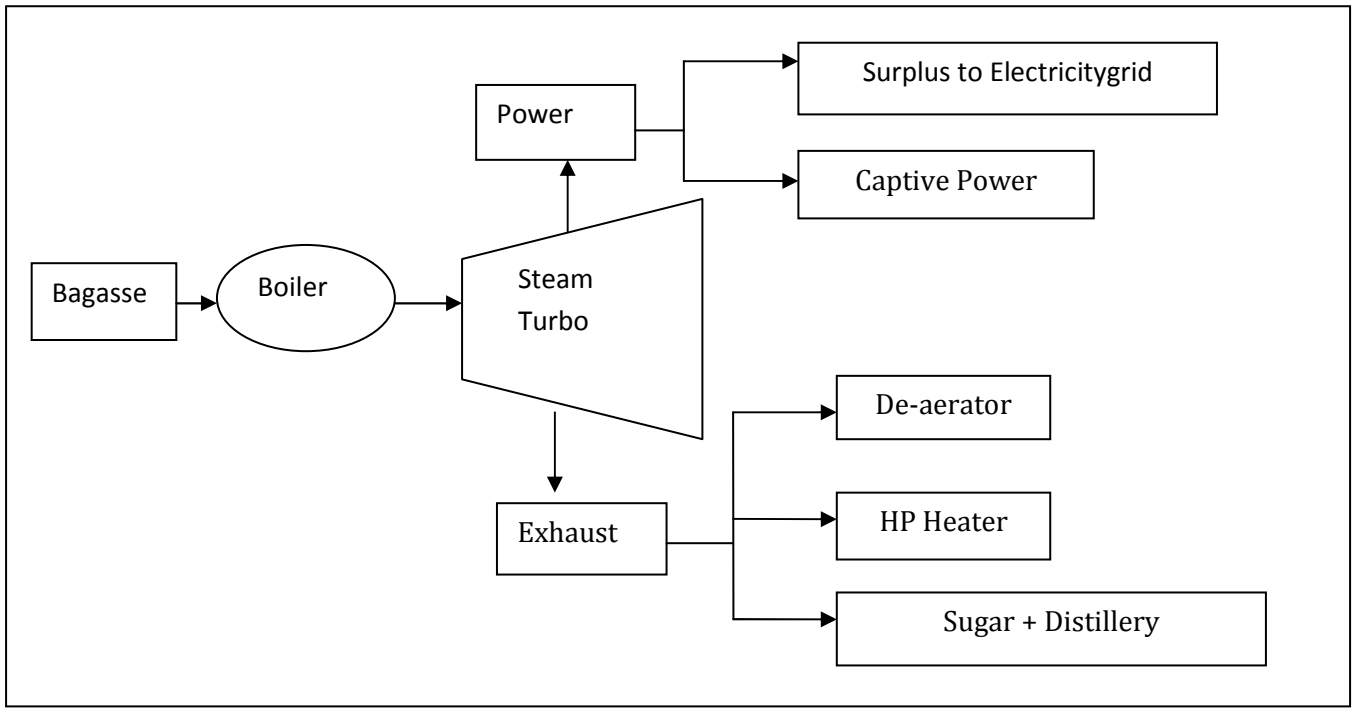


Figure 2.7: Flowchart of Cogeneration Process

2.6 Raw Materials for Finished Products

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

Table 2.1: Availability of raw materials, finished goods/product and mode of transport

Raw materials	Estimated quantity	Source market	Final product	Estimated quantity KL/day	Source market	Transport mode
A. Distillery						
Molasses	205TPD	Own factory max. 41,500 tons remaining 19000 to 20000 from nearby sugar mills	Rectified spirit + Impure spirit (5%) **OR** ENA + Impure spirit (6 %) **OR** Fuel Alcohol + Impure spirit (5%)	55 KLPD 55 KLPD 55 KLPD	Maharashtra India	Surface transport through Tanker
Nutrients N, P (daily)	50 Kg	Pune, Ahmednagar, Mumbai	-	-	-	By road - Truck Tempo
Turkey Red Oil (TRO) (daily)	150 Kg	Pune, Ahmednagar, Mumbai	-	-	-	By road - Truck Tempo
B. Sugar and Cogeneration Unit						
Sugar cane	6000 MT	Command area	Sugar	690 TPD	Maharashtra	By road - Truck Tempo
Bagasse as a fuel	Seasonal operation 1090 MT /day	Own sugar factory	Electricity	26 MW	Local electricity grid	By electric cable
	Off seasonal operation 490MT/day	Own sugar factory (Saved bagasse)	Electricity	12 MW	Local electricity grid	By electric cable

2.7 Resource optimization / recycle and reuse envisaged in the project

In the proposed project, optimum utilization of the available resource is strived by using a renewable energy source i.e. bagasse as a fuel. Bagasse will be used as a fuel for boilers that produces process steam. Distillery project is an effort for efficient use of available steam (bagasse) and molasses. Steam will be used twice – once for power generation and the exhaust steam will be used in sugar mill as welll as distillery. Condensate water will be recycled/reused, that will reduce the freshwater requirement.

2.9 Water Requirement and Its source

Necessary water requirement for the proposed project will be met from Bhima River. Water will be required for domestic, process and utility purpose. Daily fresh water requirement for the proposed project will be as follows.

Table 2.2: Water Balance: Sugar and cogeneration

A) Sugar & Cogeneration unit at seasonal operation

A) WATER INPUT (Daily requirement)	**m^3/day**
RO Water For Boiler feed (@100 TPH)	2,400
Milling section (including washing@ 30% on cane crush)	1,800
Water For condenser/boiler parts cooling, Vacuum Pump & Others	900
Other Domestic Usage	43
Total Water Input	**5,143**
B) WATER OUTPUT	
Steam Condensate	2,160
Cooling water from turbine and boiler parts pump and gland	900
Domestic Consumption	9
Excess condensate water from cane @70% on cane crushing	4,200
Effluent (from process)	600
Spray pond over flow water	600
Total Water Output	**8,469**
Domestic waste will not be available for recycle/reuse	
Net water available for recycle	**8460**

C) Recycle water streams (for sugar and cogeneration unit)

Water Recycled	
Steam Condensate	2,160
Water For condenser/boiler parts cooling, Vacuum Pump & Others	900
TOTAL	**3,060**
Excess condensate water will be used to fulfil requirement of (8460 - 3060)	**5,400**
Water in product , by-product and effluent	
Water loss in bagasse@ 50% moisture	855
Water loss in ,press mud @ 70% moisture on production @ 4% on cane crushed	168
Water loss in molasses @ 12% moisture on production @ 4% on cane crush	29
TOTAL	**1,052**

D) Water recycle streams

Condensate water for imbibition (including washing@ 30% on cane crush)	1,800
Condensate water recycle for vacuumed filter @5% on cane crush	300
Molasses movement water @ 6% on cane crush	360
Milk of lime preparation @ 3% on cane crush	180
Centrifugal section for sugar washing @ 5% on cane crush	300
Excess condensate recycle to boiler make up water	240
TOTAL	**3180**
Excess condensate available for proposed unit m^3/day (5400 – 1052 - 3180)	1168

After recycle of excess condensate water from sugar mill, available 1168cu.m. which will be partially recycled in process (of distillery) and remaining condensate will be utilized for irrigation after necessary treatment/s.

Therefore, fresh water will be required mainly for drinking purpose and in minor quantity for process, which is as follows.

- **For domestic purpose: 43m³/day**
- **Overall for plant: 60m³/day**
- **TOTAL (day-to-day fresh water requirement) = 103 m³/day**

B) Cogeneration unit at off seasonal operation

A. WATER INPUT (requirement at start-up)	m³/day
DM Water For Boiler feed (@45TPH)	1,080
Other Domestic Usage 42 people @110 lit/day/person	5
Water for cooling of cogeneration auxiliary (Air cool condenser will be used)	-
Total Water Input	**1085**
B. WATER OUTPUT	
Steam Condensate	1026
Water for cooling of cogeneration auxiliary (Air cool condenser will be used)	-
Total	1026
C. WATER OUTPUTS AS A WASTEWATER	**m³/day**
Waste water output from boiler	54
Domestic wastewater (Loss + effluent)	5
Total water output from process	**59**
D. WATER LOSSES IN EVAPORATION	**m³/day**
Water loss in boiler house by steam leakages and evaporation	21
Total Water loss	**80**
Net water requirement (C + D) i.e. 59 + 21 = 80	**80**

B) Distillery unit

Table 2.3: Distillery: Water Requirement (in m³/day)

Particulars	Intake	Consumption And Losses	Generated Effluent	Recycle and Reuse	Daily Net Requirement
Industrial Process	550.0	55.0	160.0	335.00*	215.0
Cooling Purpose	192.00	100.0	92.0	00	192.0
Domestic	10.0	03.00	7.00	00	10.0
Other	-----	-----	-----	----	----
Total	**752.00**	**158.00**	**259.00**	**335.00**	**417.0**

Net fresh water requirement for distillery unit = 417 m^3/day
***condensate of MEE + treated water from CPU will be recycled**

Sr. No	Activity	Net fresh water requirement cum /day
1	Sugar and cogeneration unit during season	103
2	cogeneration unit during off season	80
3	Distillery unit	417
	Total	600

2.9.1 Power & Fuel requirement and Its source

Power requirement after proposed expansion for sugar, cogeneration and distillery unit during season will be 7.8 MW. As stated earlier, the factory is having TG sets of 14 MW and proposed to add a new12 MW TG set. It will fulfill this demand.

During off-season, power requirement for cogeneration and distillery unit will be 4.8 MW. The factory is going to operate 14 MW STG for 50 days after end of crushing season. Thus, power for distillery will be made available from this STG. For remaining days power will be purchased from state electricity board.

Fuel: In case of the proposed project, bagasse will be used as main fuel. It will be sourced from own sugar mill. In addition to bagasse, biogas generated through primary treatment of spent wash will be used as an auxiliary fuel. Fuel availability is adequate to fulfill the steam requirement of sugar and distillery unit at enhanced capacities.

Table 2.4: Power balance seasonal and off seasonal operation

Particular	Seasonal operation	Off season
Total Generation of power from T.G set of 26 MW (14 MW + 12 MW)	**26**	**12 (From 14 MW)**
Sugar and cogeneration power consumption MW	6.8	1.8
Distillery unit MW	0.85	0.85
Misc. use MW	0.15	0.15
Total Captive consumption MW	7.8	2.8
Surplus power to be exported to state grid MW	**18.2**	**9.2**

Table 2.5: Bagasse Balance

A.	**Bagasse balance for crushing season (Tonne per season)**	
	• Bagasse to the cogeneration plant from sugar plant @28.5% on cane crushed	2,73,600
	Less Bagacillo used for process	7,680
	Less bagasse required to generate 100TPH steam @ 42.83 TPH (1028 Tons per day) for 160 days	1,64,480
	Add bagasse saving due to use of biogas = 42.50 TPD x 120 days (Biogas available 1000 m3 of biogas = 2.36 Tons of bagasse)	5,100
	Cane trash required @2.35 TPH = 56.40 TPD x 160 days	9,024
	Total Bagasse saved during season	1,15,564
B.	**Bagasse balance for non-crushing season for cogeneration unit (50 days) and distillery**	
	• Bagasse reqd. to generate 45.0 TPH steam @ 20.45 TPH for 50 days	**24,546**
	• Number of operational days for off-season (Bagasse saved/daily bagasse requirement)	50
	• Bagasse saving due to use of biogas = 42.5 tons per day x 50	2,125
	Saved bagasse available for 90 days of distillery operations	93,143
C.	**Bagasse requirement for distillery unit during non-crushing season (90 days after closing of cogeneration activity)**	
	Steam requirement for distillery 341 T/Day	13,950
	Therefore bagasse requirement will be 155 TPD x 90 days	Tons

The above table indicates that the sugar mill is having adequate amount of fuel i.e. bagasse to operate cogeneration and distillery unit in off-season for 50 days and in addition only distillery unit for remaining 90 days.

2.10 Waste generation & Disposal scheme

Quantities of wastes likely to be generated & scheme for its disposal are given in following chart:

Table 2.6: Estimated Solid waste Generation and Disposal

#	Waste	Quantity (per season)	Treatment	Disposal	Remark
1	Sugar ETP sludge	35-40 MT	Disposal into land/soil	Sold to member farmer/own plot	Organic
2	Ash (considering 160 days of season)	3495 MT	Disposal into land/soil	Used as a soil enriching material (bagasse ash is rich in potash)	Inorganic
3	Oil & grease/spent oil	4 - 5 KL	Remove by oil skimmer	Use for boiler	

2.10.1 Liquid waste

Sugar and cogeneration Unit

Effluent generation from sugar and cogeneration will be about 600m^3 per day. It will be sent to sugar ETP and utilized for gardening/irrigation after treatment. Existing ETP will be upgraded to treat the proposed quantity of effluent and achieve the standard norms.

Sugar condensate water will be recycled/reused in sugar as well as proposed distillery unit to minimize the fresh water intake (as described in the water budget). Hot water from various sources will be cooled in cooling pond and recycled to respective activity after reaching to ambient temperature. The factory is having ~ 25 acres cane plantation area (seed plot) and ~ 12 acres of greenbelt where treated water will be utilized.

2.10.2 Distillery Unit

Spent wash generated from distillery will be treated through bio-methanation followed by evaporation (multi-effect) followed by dryer process. Effluent such as spent lees, cleaning water and condensate (of MEE) will be treated in condensate polishing unit (CPU). Treated water will be recycled/reused within the premises and thus, zero liquid discharge (ZLD) will be achieved.

- **Spent wash storage lagoons**

In the existing unit, spent wash storage lagoon of five days capacity (one in number) and Two lagoon of maximum 30 days capacity has been provided. These lagoons will be modified so as to achieve the proposed storage capacity i.e. five and thirty day.

- **Spent wash treatment and disposal method**

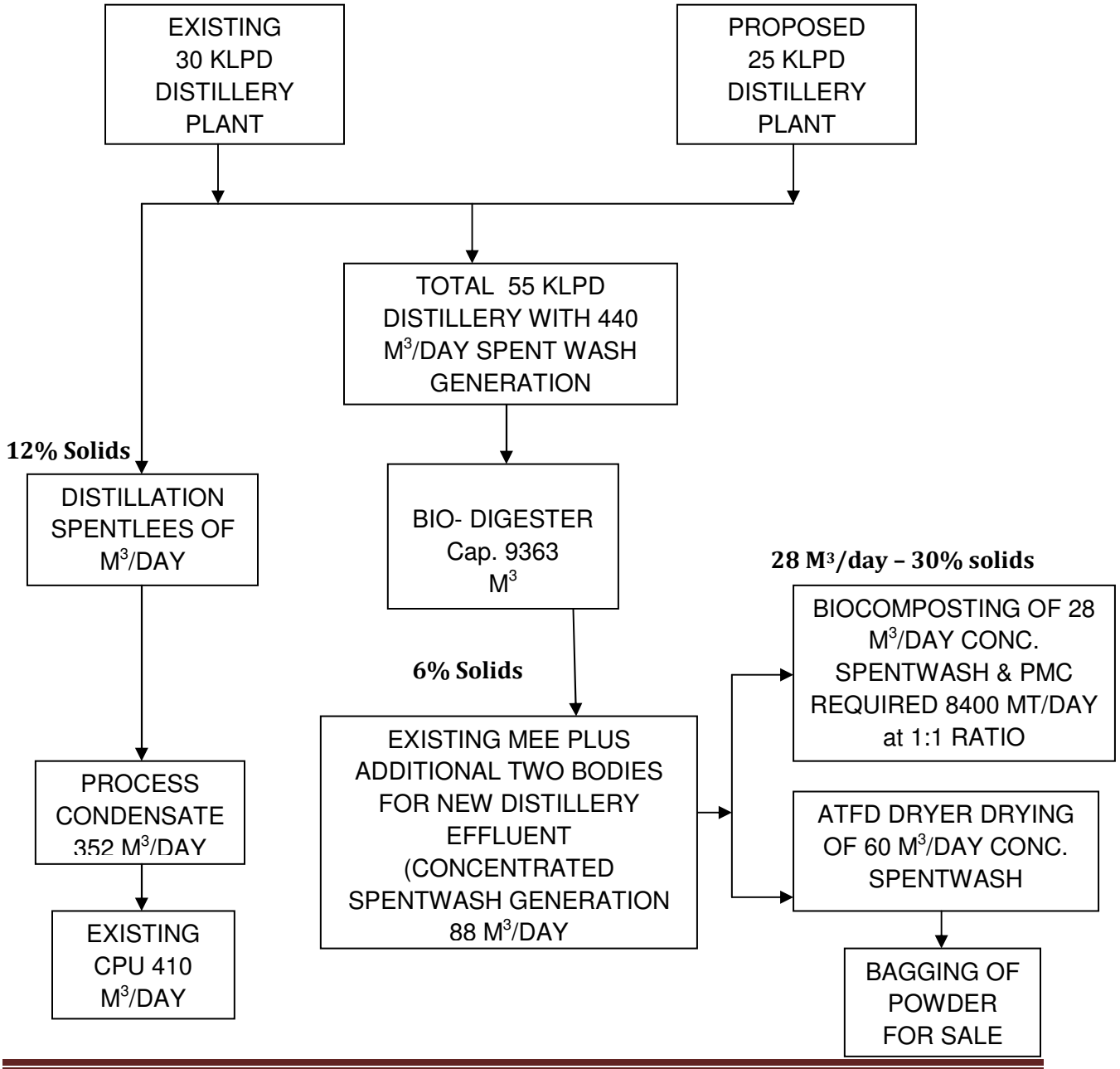
Spent wash generation rate will be 8 L/L of alcohol. Therefore, spent wash generation will be 440 m^3 per day (with 5^0 brix) from the 55 KLPD unit. Spent wash volume will be reduced through multi-

effect evaporation (MEE) treatment and it will be 88 m3/day at 30^0 brix. Part of this spent wash will be sent to dryer i.e. about 60 tons per day and part of it i.e. 28 tons will be sent to composting, which is practiced in the existing project. Dryer will produce powder containing high potash which will be sold as a potash rich manure.

- **Condensate and spent lees**

Moderately polluted effluent due to spent lees 165 cum per day and evaporating condensate 335 cum per day will be treated in CPU/ETP and recycled in the same unit to achieve "Zero Liquid Discharge" as per CPCB norms

Figure 2.8: block diagaram for proposed 55 klpd distillery to produce anhydrous alcohol and modernization of effluent treatment plant



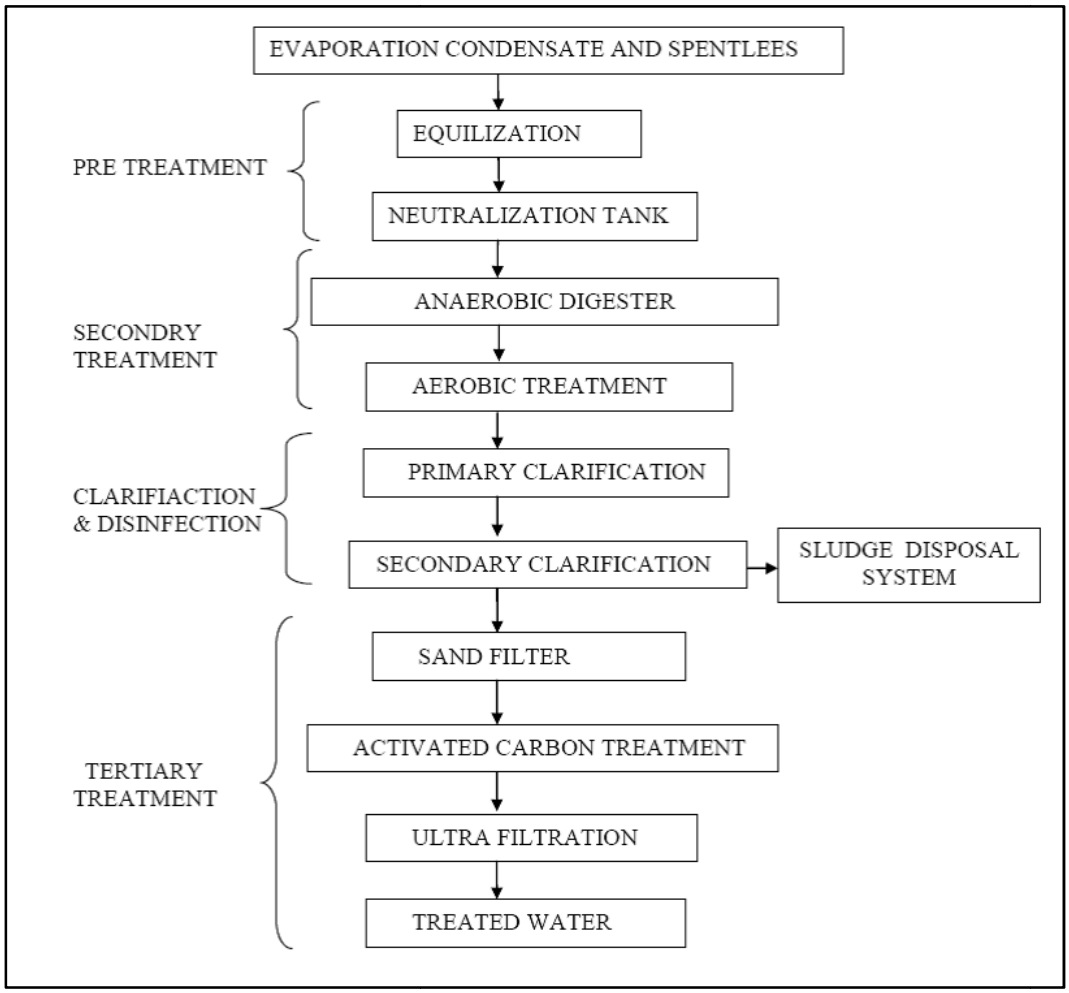


Fig. no 2.9: Existing Condensate Polishing Unit

2.10.3 Solid wastes

Sugar Unit

The proposed industrial activity at USPLwill generates solid waste in the form of ETP sludge which is biodegradable and boiler ash. The quantity and disposal method is given below-

Table 2.5: Estimated Solid waste Generation and Disposal

#	Waste	Quantity (per season)	Treatment	Disposal	Remark
1	Sugar ETP sludge	35-40 MT	Disposal into land/soil	Sold to member farmer/own plot	Organic

2	Ash (considering 160 days of season)	3495 MT	Disposal into land/soil	Used as a soil enriching material (bagasse ash is rich in potash)	Inorganic
3	Oil & grease/spent oil	4 - 5 KL	Remove by oil skimmer	Use for boiler	

DISTILLERY UNIT

The proposed industrial activity will generates solid waste in the form of fermentation sludgewhich is biodegradable. The quantity and disposal technique is given briefly in the following table.

Table 2.6: Solid waste Generation and Disposal

#	Waste	Quantity TPA	Upshot
1	Yeast sludge (dry)	50-60	Given to farmer to mix into soil as a soil enriching material
2	Powder from dryer	60	Sold to farmer as soil enriching material
3	Boiler Ash (off-season of sugar)	790-825	Sold to farmer as soil enriching material OR sold to brick manufacturing units
4	Distillery CPU Sludge	70-75	Used as a soil enriching material
5	Spent oil from DG	0.1-0.2 KL	Spent oil is burnt in boiler

2.10.4 Air Emission & Control

In the existing unit ESP system is in place. It is attached to existing boilers of 75 TPH It is connected to a stack of 75m height. Mill has decided to install new 45 TPH boiler along with stack of adequate height. ESP will be installed for proposed boiler. Bagasse and ash will be handled mechanically through closed conveyors to control fugitive dust. Enhancement of greenbelt by ~1.5 acres is an additional measure for air emissions.

Composting is done in aerobic conditions. Biogas produced in Bio-methanation unit is utilized as a fuel for boiler. Adequate parking has been provided for all types of vehicles. The transportation of material is done through authorized transport contractors.

There are three DG set available in the existing unit. These are three number of DG set with capacity 625 KVA of two numbers and 320 KVA of one number capacity with adequate stack height and acoustic enclosures.

2.10.5 Noise Control

Steam turbine generator will be a major noise source from the existing project. Apart from that, noise is anticipated from pumps, motor drives, utilities etc. The plant and equipment will be specified and designed with a view to minimize noise pollution. The major noise producing equipment will be provided with soundproof devices and silencers. DG set will be provided with acoustic enclosures. Ear Plugs and ear muffs will be provided to the workers in utility section. Greenbelt will be developed.

2.10.6 Health and Safety Measures

USPL is committed to the Health and Safety of its all employees. It strives to provide hygienic & safe work place and continually improve the effectiveness of health &safety system.

To meet these objectives the USPL will;

- Comply all relevant laws, regulation, statutory provisions & codes of practice
- Continually asses 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 amongst 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 HOD 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 shall be provided in accordance to the LPA's regulations. The firefighting system will consist of a hydrant network
- Factory has already a fire protection system including electric driven pump, one diesel engine pump, and one jockey pump, etc.

- Portable fire extinguishers shall be provided in strategic locations in new unit.

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

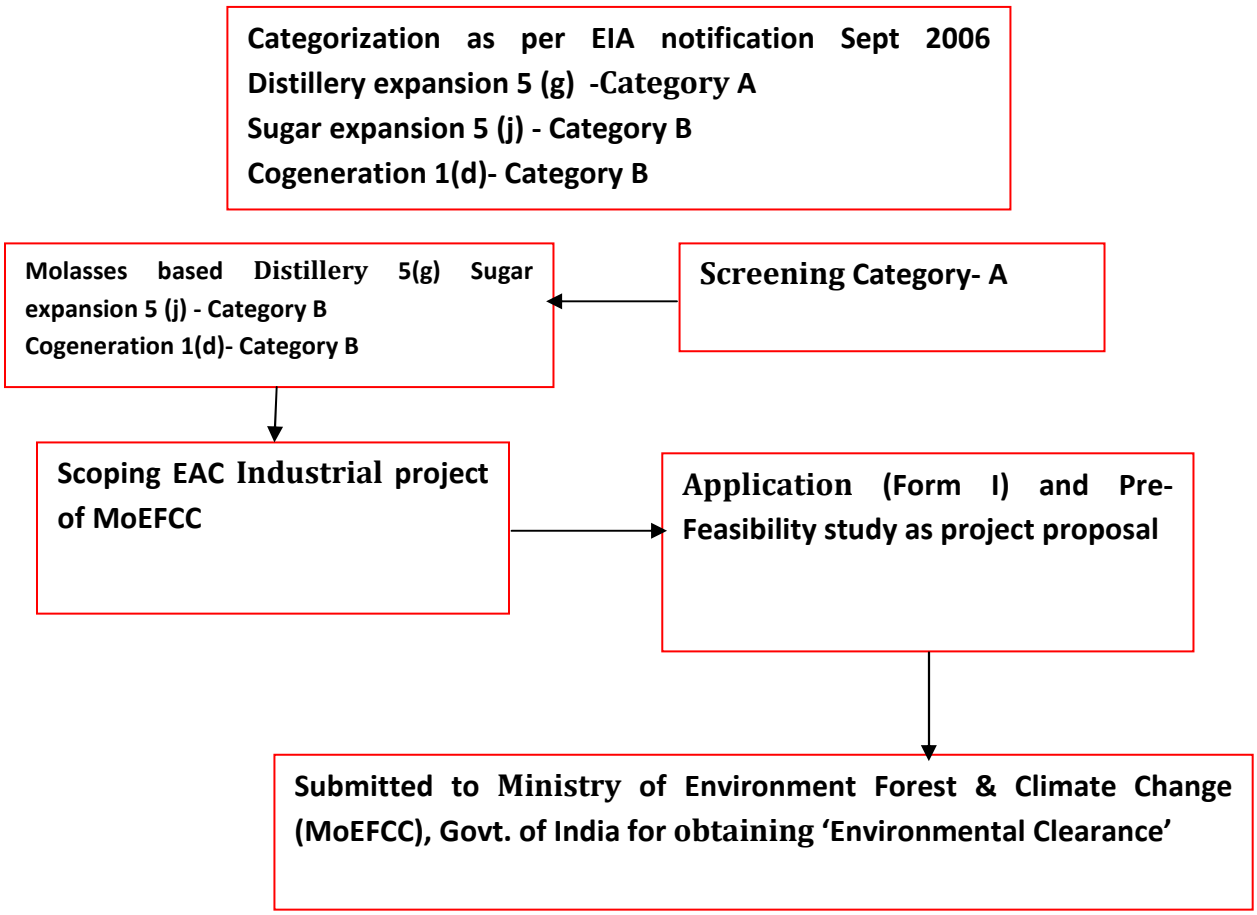


Figure 2.10: Categorization of Proposed Project as per EIA Notification

3.0 SITE ANALYSIS

3.1 Connectivity

Location of the project	Within existing sugar factory premises at **M/s. Udagiri Sugar and Power Ltd, village** Bamani (Pare), Tal. Khanapur, Dist: Sangli, Maharashtra.
Nearest City/Town	Vita12 Km
Road	Sangli -Vita state highway- 136 is 12 km far from Karkhana site
Railway Station and	Karad: ~ 50 Km from the site
Air Port	Karad about 50Km from the site and Pune ~180 km from the site

3.2 Land form, land use and ownership

The sugar factory is holding approx 85 acres of total land. The land of existing sugar, cogeneration and distillery unit is flat, open and already under the industrial use (i.e. sugar factory and allied units). Out of available, a provision is made of approx.6.5 acre for the proposed expansion of sugar, Co-generation and Distillery unit. As per the guidelines, 33% of land of proposed development is allocated for green belt i.e. approx. 1.5 acres. The land is owned by the project proponent.

Topography

The terrain is almost flat, no hills in the surroundings.

Project coordinates of four corners of the site:

1) 17^{0}12'09.07"N, 74^{0}35'28.74"E
2) 17^{0}12'14.09"N, 74^{0}35'55.76"E
3) 17^{0}11'58.59"N, 74^{0}35'49.06"E
4) 17^{0}12'01.66"N, 74^{0}35'28.69"E

Average elevation of the site is 673 m above mean sea level.

Salient Features

The proposed project requires no additional land. Therefore, no issues of rehabilitation and restoration are involved. There won't be change in the land use pattern since the land is already used for industrial purpose. There is no sanctuary, biosphere reserve or national park within the 10km radius area. The project surrounding land is either fallow land or used for agricultural purpose. There are 25villages in the study area of 10 km radius. Krishna river is approx. 15 km away from the project site.

Table 3.1: Salient features of the project location

Roads	Sangli -Vita (state highway- 136) road is 12 km far from Karkhana site
Nearest Residential area (village)	Bamni is approx. 2.0 km from the project site.
Railway Station	Karad railway station is approx.50km from site
Air Port	Karad airport is the nearest airport approx. 50 km from the site.

River	Krishna river is approx. 15 km.
Schools	Zila-Parishad, High school Bamni& Pare approx. 2 & 3 km from site respectively
Colleges	Adarsha Collage is approx. 12km from the project site at Vita
Banks	Bank of Maharashtra, SBI is approx. 12km far from the project site
Market places	Vita is a nearest market place at approx. 12 km from the project site
Protected Area/ Sanctuaries/NP	No
CRZ applicability	Not applicable
Seismicity	Seismic Zone- III

Note: All the above mentioned distances are the aerial distance from the project site

3.3 Existing Infrastructure

Table 3.2: Existing Infrastructure

Land	Total plot area available with the industry is 76 acre. Land required for the proposed expansion is about 7.5 acre. The greenbelt area is 12 acre additional 2.5 acre of green belt will be developed.
Water	Source: Krishna River –Permission of Irrigation Dept is available for water drawl
Power	Captive power supply
Road	State highway no.136 approx. 12 km from the site, No new roads proposed or required
Fuel	Fuel required for steam generation will be bagasse & Biogas, which will be obtained from own sugar& Distillery unit
Steam generator	Existing 75 TPH boiler will be used for steam generation and one new boiler of 45 TPH is proposed along with new ESP and stack of appropriate height

3.4 Raw Material: Sugarcane

The viability of the proposed distillery unit depends on the availability of raw material i.e. sugar cane, molasses. **Table 3.3**, shows the cane production from the operational/command area of the factory and its cane crushing performance for last five years.

Table 3.3: Production & Crushing Performance for last five years

Sr. No.	Particulars	2013-14	2014-15	2015-16	2016-17	2017-18
1	Gross operational days	142	169	143	95	154
2	Cane crushed (MT)	402363.422	452518.155	447843.458	305369.637	473168.595
3	Sugar produced (Qtls)	491924.07	530627.31	526626.07	359241.60	561821.62
4	Sugar recovery (%)	12.23	11.73	11.76	11.76	11.87
5	Bagasse generation on cane (%)	28.47	27.93	27.75	28.00	27.69
6	Molasses (MT)	17,900	21,850	17,357	12,240	18,374

3.4.1 Irrigation and transportation facilities

The USPL is located in the vicinity of Krishna river (approx. 15 km from project site). Cane is usually grown by using well, bore well water. In some parts water from river and canal is used for irrigation. Very good road network is available in the vicinity of the site.

3.4.2 Fuel

Fuel required for steam generation will be bagasse& biogas, it will be obtained from own sugar factory and distillery.

3.4.3 Water

At present sugar factory draws water from river Krishna with permission of irrigation department. The water requirement for proposed project will be around 600m^3/day for sugar, cogeneration and distillery. Water conservation will be achieved by recycling of water and reuse of treated water.

3.4.4 Power

As stated earlier, USPL is having cogeneration unit of 14 MW and they have planned to install a new 12 MW STG set in the proposed expansion of cogeneration unit (Total operating capacity will be 26 MW). Thus, the required power will be sourced from this captive power station during cane crushing season. During off-season, 14 MW TG set will be operated for 50 days. And for remaining period of 90 days power will be taken from state electricity board.

3.5 Soil classification

The soil varies from deep black soil in the river valleys to shallow murum red or gray in the hilly areas. Laterite soil exists on the ghats in the extreme western parts of the district.

3.6 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 medical aid to the employees and their dependents at very low cost
- It provides primary school educational facilities to the children of workers
- 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 and workers
- To facilitate better transport of sugarcane, the factory has undertaken major program to construct roads in its area of operation

4.0 PLANNING BRIEF

4.1 Planning concept

This is an agro-based industry. Sugar cane which is a main raw material of the industry is available easily and adequate amount. It is a renewable source. The project is a vertical integration. Due to expansion of sugar mill, the proponent has planned to expand distillery.

4.2 Facilities for Transport

USPL is situated approx. 12 Km off the State highway 136. All the villages from the command area of USPL 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.

4.3 Town and country planning / Development authority classification

The project is located at Village Bamani–Pare taluka Khanapur of Sangli district. Local Grampanchayat is the authority for planning. The Grampanchayat has issued 'No Objection Certificates (NOC)' for this expansion project. The land is used for industrial purpose and will be used for the same purpose only.

4.4 Population projection

No major population flux is anticipated due to expansion. In the proposed project candidates from local areas will be preferred for employment. Only for exceptional posts it may employ candidates

from other areas. In that case existing colony have the facilities to accommodate the additional man power for the new activity.

4.5 Land use Planning

Total land available with sugar industry is 85 acre. Land required for proposed expansion of sugar unit is about 1.5 acre and 6.00 acres for distillery. Existing greenbelt area is 12 acre additional 2.5acre of green belt will be developed.

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 infrastructure and resources.

4.6 Amenities/ Facilities

Following amenities/facilities are available at existing sugar factory

- Guest house facility
- Petrol pump
- Canteen
- Medical facility
- Separate dedicated parking facility for goods vehicle and personal vehicles at site
- Provision of street light within premises as well as on approach road
- Security check post and round the clock security persons on duty
- Fire extinguishing facilities
- Drinking water and power supply to housing colony
- Diesel generator as a backup facility
- Fresh water and wastewater treatment plants

5.0 PROPOSED INFRASTRUCTURE

5.1 Industrial Area

The proposed project will be carried out in the existing factory premises only. The total allocated land for the proposed project is 10 acres (including greenbelt).

5.2 Greenbelt Area

Proposed greenbelt area is ~2.5 acre.

5.3 Social infrastructure

Only existing/available infrastructure will be used. No new roads or water/air routes will be developed.

5.4 Connectivity

The site is well connected by road, railway and air way. The same is described earlier.

5.5 Drinking water management

USPL draws water from Krishna River. It operates a special water treatment plant to supply drinking water to factory as well as the staff colony.

5.6 Industrial waste management

Distillery spent wash is a major source of liquid waste which will be disposed through bio-methanation (biogas generation) followed by evaporation (MEE), concentrated spent wash will be partly sent to existing bio-composting (~28 m3/day) and remaining 60 m3/day will be sent to proposed dryer unit. Process condensate from evaporators and spent lees from the process will be treat in Condensate Polishing Unit (CPU) and used for process and cooling tower make up water, etc.. The existing ETP will upgrade to treat the effluent of 600 cum per day to treat sugar and cogeneration unit effluent. The sanitary wastewater will be disposed by using septic tank and soak pit system. Thus, due to proper treatment of effluent, disposal of treated water within the factory premises and recycling of it, the issue of wastewater is envisaged to be insignificant.

Table 5.1: Solid/ Hazardous waste generation, treatment & Disposal

#	Waste	Quantity (per season)	Treatment	Disposal	Remark
1	Sugar ETP sludge	35-40 MT	Disposal into land/soil	Sold to member farmer/own plot	Organic
2	Ash (considering 160 days of season)	3495 MT	Disposal into land/soil	Used as a soil enriching material (bagasse ash is rich in potash)	Inorganic
3	Oil & grease/spent oil	4 - 5 KL	Remove by oil skimmer	Use for boiler	

Table 5.2: Solid waste Generation and Disposal

#	Waste	Quantity TPA	Upshot
1	Yeast sludge (dry)	50-60	Given to farmer to mix into soil as a soil enriching material
2	Powder from dryer	60	Sold to farmer as soil enriching material
3	Boiler Ash (off-season of sugar)	790-825	Sold to farmer as soil enriching material OR sold to brick manufacturing units
4	Distillery CPU Sludge	70-75	Used as a soil enriching material
5	Spent oil from DG	0.1-0.2 KL	Spent oil is burnt in boiler

5.7 Power Requirement and Source

Table 5.3: Power Requirement and Source

Particular	Seasonal operation	Off season
Total Generation of power from T.G set of 26 MW (14 MW + 12 MW)	**26**	**12 (From 14 MW)**
Sugar and cogeneration power consumption MW	6.8	1.8
Distillery unit MW	0.85	0.85
Misc. use MW	0.15	0.15
Total Captive consumption MW	7.8	2.8
Surplus power to be exported to state grid MW	**18.2**	**9.2**

5.8 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.

5.9 Project Scheduled & Cost Estimates

Table 5.4: Project scheduled & Cost Estimate

1.	Date of start of construction (Anticipatory)	April 2019
2.	Date of completion (Anticipatory)	March 2020
3.	Proposed Project cost	Rs. 14,189.00 lakhs
4.	EMP cost	Rs. 446.70 lakhs (rounded figure)

5.10 Analysis of proposal (Final Recommendations)

I) Benefits

- This industry will produce RS, ENA and Anhydrous Alcohol (fuel ethanol) which are useful products for the country. It will earn & save foreign exchange in the potable alcohol cadre as well blending in petrol
- Cane growers are likely to get good rates for their crop
- Bagasse is a renewable source of energy and carbon neutral in nature
- No external electricity required (during cane crushing season) due to in-house power generation in the proposed activity
- The evaporation condensate, spent lees and other non-polluting water will be recycled into process and cooling tower makeup water which will minimize the fresh water requirement
- Solid waste like sludge from process and CPU and boiler ash are also a 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 is involved.
- Distillery spent wash is a major source of liquid waste which will disposed through bio-methanation (biogas generation) followed by evaporation (MEE), concentrated spent wash will be partly sent to existing bio-composting (~28 m3/day) and remaining 60 m3/day will be sent to proposed dryer unit
- The process is straight line and the technologies are available indigenously
- Indirect employment to many since, the project is agro-based
- The aggregate effect of the project is likely to boost the local economy
- Direct employment opportunities for local youths.

II) Conclusion

a) Expansion of sugar, cogeneration and distillery is very necessary for effective utilization of land, bagasse, steam, and molasses

b) The local sugarcane growers are strongly willing for the expansion of project

c) The candidate site is suitable from general MoEFCC expectations.

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) All the units are agro-based and hence promote sustainable development