SIA/MH/IND2/47635/2019, Category 'B'

EXECUTIVE SUMMARY
OF
Environmental Impact Assessment Report TCD, Expansion of Sugar unit from 4,900 TCD to 10,000 Cogeneration 13 MW to 28 MW and New 45 KLPD Molasses Based Distillery

M/s. SHARAD SAHAKARI SAKHAR KARKHANA LTD.
Narande, Tal. Hatkanagale, Dist. Kolhapur, Maharashtra

Prepared by

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March 2020

VSI/EIA/SSSKL/DR-01/20200318

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EXECUTIVE SUMMARY

1.0 INTRODUCTION

M/s. Sharad Sahakari Sakhar Karkhana Ltd. (SSSKL) is a cooperated sugar mill located at Narande village in Hatkanangale taluka of Kolhapur district in Maharashtra. The unit is registered and having registration number KPR/HFE/PRG(A)/S-65/96 dated 01/08/1996. The mill started its actual crushing from season 2002-03 with crushing capacity of 2,500 TCD. The management of SSSKL has taken efforts for increasing the sugar cane in its area of operation which resulted in increase in sugar cane availability. It was thus decided to increase crushing capacity from 2,500 TCD to 4,900 TCD. Due to further increase in sugar cane availability, it was decided to enhance the existing sugar cane crushing capacity to 10,000 TCD. The production of byproducts like bagasse and molasses will also increase with this expansion. The management has thus decided expand the co-generation unit from 13 MW to 28 MW and set up new 45 KLPD molasses-based distillery unit to utilize these by byproducts and to increase the profitability.

1.1 Features of the site

The proposed expansion and new distillery project requires around 257300 sq.m (63.5 acres) of land. The detailed break-up of land for different units of the sugar, cogeneration and distillery along with its allied units including storage of raw material, finished products and waste material (both existing and proposed) are already given in table 2.2 of chapter II of main EIA report. The existing site meets the industrial sitting guidelines of the Ministry of Environment, Forest and Climate Change (MoEFCC). This site location map is enclosed as Annexure I in the main EIA report. The other important aspects are highlighted in the following table.

Table 1: Highlights of the project

1.	**Name of the Industry**	**M/s. Sharad Sahakari Sakhar Karkhana Ltd. (SSSKL)**
2.	**Project**	Expansion of Sugar unit from 4,900 to 10,000 TCD, Co-generation from 13 to 28 MW and New 45 KLPD molasses-based distillery unit
3.	**Location of the project**	Survey no: 1178, 1180, 1171A, 1171B, 1153, 1159, 1170 Post Narande, Tal. Hatkanagale, Dist. Kolhapur, Maharashtra

<table>
<tr><td>4.</td><td>Working days</td><td colspan="4">Sugar and cogeneration: Average 160 days (Max. 180 days)
Distillery unit: Year around</td></tr>
<tr><td rowspan="11">5.</td><td rowspan="11">Product</td><td colspan="4">A. Sugar and cogeneration</td></tr>
<tr><td>Product</td><td>Existing</td><td>Proposed</td><td>Total</td></tr>
<tr><td>White Sugar (TPD)</td><td>612.5</td><td>637.5</td><td>1250</td></tr>
<tr><td>Cogeneration (MW)</td><td>13</td><td>15</td><td>28</td></tr>
<tr><td colspan="4">Byproducts</td></tr>
<tr><td>Bagasse (@ 28.6 %, TPD</td><td>1401.4</td><td>1458.6</td><td>2860</td></tr>
<tr><td>Molasses ‘C’ (@4%, TPD</td><td>196</td><td>204</td><td>400</td></tr>
<tr><td>Molasses ‘B’ (@6%, TPD</td><td>-</td><td>600</td><td>600</td></tr>
<tr><td>Press mud @3.7 %, TPD</td><td>181.3</td><td>188.7</td><td>370</td></tr>
<tr><td colspan="4">B. Distillery</td></tr>
<tr><td colspan="3">Rectified spirit followed by Anhydrous Alcohol (Fuel ethanol)</td><td>45 KLPD</td></tr>
<tr><td colspan="3">Fusel oil:</td><td>360 L/day</td></tr>
<tr><td>6.</td><td>Effluent Treatment System</td><td colspan="4">For sugar mill effluent: ETP and CPU
For spent wash: Evaporation followed by standalone multi-effect evaporation (MEE) followed by incineration
For spent lees, condensate and other effluent: Two stage biological treatment followed by tertiary treatment</td></tr>
<tr><td>7.</td><td>Air Pollution Control- flue gases CO_2 from fermentation</td><td colspan="4">New stack of 82 m (with inner diameter of 4 m) with ESP (Electrostatic precipitator)
CO_2 bottling plant</td></tr>
<tr><td colspan="6">INFRASTRUCTURE</td></tr>
<tr><td>8.</td><td>Land</td><td colspan="4">Total land available with project proponent: 25.73 Ha (2,57,300 sq. m.)
Land details are given in following table:</td></tr>
<tr><td></td><td></td><td>Description</td><td>Existing</td><td>Proposed</td><td>Total (sq.m)</td></tr>
<tr><td></td><td></td><td>Sugar &</td><td>217548.75</td><td>13651.25</td><td>231200</td></tr>
</table>

		cogeneration			
		Distillery Unit	-	26100	26100
		Greenbelt	22,374	62,535	87909
		Open plot near the sugar mill will be developed into a distillery; Available land is under the possession of the project proponent. No need of acquisition of new land.			
9.	**Main Raw Material**	**A. Sugar unit**			
		Raw Material	**Existing**	**Proposed**	**Total**
		Sugar cane (TPD)	4,900	5,100	**10,000**
		Lime (TPD)	9.31	9.69	**19**
		Sulphur (TPD)	2.35	2.45	**4.8**
		B. Co-generation unit: Bagasse 1,724 TPD			
		C. Distillery unit			
		Raw material	**Quantity**		
		Molasses (C-Type) OR Molasses (B-Type) OR Sugarcane juice	167 TPD 150 TPD 660 m^3 /day		
		Nutrient N,P	150 kg/d		
		Turkey Red Oil (TRO)	225 kg/d		
10.	**Steam**	Sugar and Cogeneration unit: 3,816 TPD (159 TPH) Source: 175 TPH boiler (existing 50 TPH + proposed 125 TPH) Distillery Unit: 324 TPD Source: Proposed 15 TPH incineration boiler with 1.5 MW TG set			
11.	**Fuel**	Cogeneration Unit: Bagasse: 1,735 TPD Distillery Unit: Conc. Spentwash 111.6 TPD + coal 32.18 TPD or bagasse 58.50 TPD			
12.	**Boiler**	Cogeneration: New boiler of 125 TPH and existing boiler of 50 TPH New incineration boiler of 15 TPH with pressure 45 kg/cm^2 will be used			

13.	**Power**	Sugar and cogeneration unit: 13.5 MW Source: Captive Distillery unit: 1.2 MW (Source: Captive proposed incineration boiler)
14.	**Total Water Requirement**	Sugar and cogeneration Unit: 300 m^3/day (300 x 160= 4800 m^3) Source: Warna river Distillery Unit: 410 m^3/day Source: Excess condensate from sugar unit 351 m^3/day therefore 59 m^3/day water will be required during crushing season and during off season 410 m^3/day water will be used from Warna river
15.	**Water Source**	Warana River through canal.
16.	**Manpower**	Existing: 741 Proposed: 105 **Total:846**
FINANCIAL ASPECTS		
17.	**Total Project Cost**	**14,308.5 lakh**
18.	**Capital expenses for environmental management**	**3050 Lakhs**

2.0 MATERIAL ANDINFRASTRUCTURE

Table 2: Availability of raw materials, finished good product and mode of transport

Particulars	Estimated quantity	Source market	Final product	Estimated quantity	Transport mode
Raw Material					
A. Sugar unit					
Sugar cane	10,000 TPD	Local farms	White Sugar	1250 TPD	By road
Lime	19 TPD	Maharashtra, Karnataka, Rajasthan	Molasses 'C'	400 TPD	
			Press Mud	300 TPD	
Sulphur	4.8 TPD	Mumbai, Pune	Bagasse	2860	Bullock cart
B. Co-generation Unit					
Bagasse	1,735 TPD	Own factory	Power	28	Closed conveyer
C. Distillery Unit					

Particulars	Estimated quantity	Source market	Final product	Estimated quantity	Transport mode
Molasses (C-Type)	167 TPD	Own sugar mill	Rectified spirit + Impure spirit (5%) or ENA + IS or Fuel Alcohol + IS	45 KLPD	By Road-through Tanker
Molasses (B-Type)	150 TPD				
Sugarcane juice	660 m^3/day				
Chemicals					
Nutrients N, P	150 Kg/day	Kolhapur, Pune etc.	-	-	By Road-Truck
Turkey Red Oil (TRO)	150 Kg/day				
Utilities					
Fuel					
A. Co-generation unit					
Bagasse	1,274 TPD	Own sugar unit	-	-	By truck
B. Distillery unit					
Spentwash + Coal/ Bagasse	111.6 TPD + 32.18 TPD/ 58.50 TPD	Distillery From market Own Mill	-	-	By Road/rail
Water (daily) A. Sugar & cogeneration B. Distillery unit	300 m^3/d 410 m^3/d	Warna river, Irrigation Dept.	-	-	Existing transport facility will be used
Steam					
A. Sugar and Co-generation	1724 TPD	175 TPH boiler (existing 50 + proposed 125)	-	-	-

Particulars	Estimated quantity	Source market	Final product	Estimated quantity	Transport mode
B. Distillery unit	324 TPD	Proposed 15 TPH incineration boiler			
Power A. Sugar and Co-generation B. A. Sugar and Co-generation	13.5 MW 1.2 MW	Captive proposed incineration boiler	-	-	-

2.1 Water

The sugar and cogeneration unit requires 300 m^3/day fresh water after recycling of process condensate and reuse of water whereas the distillery unit will require 410 m^3/day fresh water after recycling of process condensate and spentlees. Daily fresh water requirement for the after proposed expansion activity is given in table 3 & table 4.

Table 3: Water Balance Sugar and Cogeneration Unit

#	Particulars	Quantity, m^3
1) Boiler section		
	i. Water Input	
1	Boiler 50 +125 = 175 TPH	4200
2	Steam generation 158.3 TPH 3799.2 say 3800 @ boiler	3800
3	Boiler blow down	76
4	Over all process loss	114
5	Boiler input	3990
	Total	**3990**
	ii. Water and waste water Out put	
1	Steam generation	3800
2	Boiler blow down @ 2.0%	76
3	Over all process loss	114
	Total	**3990**
	iii. WTP balance	

#	Particulars	Quantity, m^3
1	Input of fresh water	300
2	Treated water send to (Boiler 190)	190
3	Reject water sent to GSR	110
Total fresh water requirement for cogent. and boiler		300
2) Sugar process		
	i. Water input (3843TPD)	
1	Mill imbibition @ 30% on cane	3000
2	Steam exhaust from boiler	3800
3	Water from cane @ 70% on cane	7000
	Total	**13800**
	ii. Hot water (Condensate) output from process	
1	Exhaust condensate from SK @38 % on cane	3800
2	condensate from CJ heating two numbers @2.8% on cane	280
3	Vapor condensate(Q. body 2)@16.7% on cane	1670
4	Vapour Condensate (SJ 1st& 2nd) @ 4.9 % on cane	490
5	Vapour Condensate of all pans @ 25% on cane	2500
6	Vapour Condensate(Q. body 3)@ 8.9% on cane	890
7	Vapour Condensate(Q. body 4)@ 0.7% on cane	70
8	Vapour Condensate(Q. body 5) @ 0.7% on cane	70
9	Vapour Condensate (RJ 1st) @ 2.8 % on cane	280
	Total	**10050**
	iii. Hot water (Condensate) consumption	
1	Required at boiler @ 150.41TPH of steam generation	3610
2	Required for imbibition's at mill @ 30 % on cane	3000
3	Required for MOL Preparation @ 3 % on cane	300
4	Required at vacuum filters @ 3 % on cane	300
5	Required at Pan &Molasses movement @ 5 % on cane	500
6	Required for sugar melting @ 3.0% on cane	300
7	Required at magma mixers. @ 1% on cane	100
8	Required at A C/F M/c-4 Nos @ 1.5 % on cane	150
9	Required for Cont. M/c-9 Nos @ 1.5 % on cane	150
10	Required for soda boiling at Evaporator, Pan soda Boiling, Cleaning of screen of centrifugal @ 1.01% on cane	101
	Total	**8511**

#	Particulars	Quantity, m^3
	Net excess condensate generation **10050 -8511 = 1539**	**1539**
Excess condensate is cooled by mist cooling technology and sent to distillery unit for molasses dilution		
	iv. Water loss in product and by-product	
1	Water in bagasse @ 50% moisture & @ 28.0% production on cane	1400
2	Water in press mud @ 70% moisture & @ 2.75 % production on cane	192.5
3	Water in final molasses @ 12% moisture & @ 4.0 % production on cane	48
	Total	**1640.5**
	v. Waste water generation	
1	From Sugar process as per CPCB norms 100 l/MT cane crush including boiler blow down	1000
2	From spray pond over flow as per CPCB norms 100 l/MT cane crush	1000
	Total	2000
vi.	Net water requirement	
1.	Hot water consumption in process	8461
2.	Water loss (Process + CT drift loss) 114 + 500	614
3.	Net effluent generation (Boiler Blow-down + Process Effluent + Spray pond over flow) = 2000	2000
4.	Excess condensate available from process sent to cooling tower	1539
5.	Condensate available after cooling tower @2% loss 31.78 say 32 cum per day =1539 -32 = 1507	1507
6.	Excess condensate consumption	
	i. Excess condensate sent to cogeneration cooling tower make water ii. Excess condensate sent to distillery unit cooling tower make up	500 351 **851**
7.	Net condensate availability 1507 – 851 = 656 Condensate sent to irrigation purpose after CPU	656
8.	Net fresh water requirement for WTP including boiler	300
Fresh water requirement for crushing season = 300 X 160 = 4800 m^3		

Table 4: Water Balance 45 KLPD Distillery Unit

Particulars	Quantity, m^3
A. Process Input Water	
For molasses dilution	528
For cooling tower makeup	351
For vacuum pump cooling	15
For fusel oil decanter & Alcohol scrubber	15
Boiler feed water (@15TPH)	360
Others (Domestic)	10
Total Water Input at start-up	1279
B. Output Water	
Spent Lees (PR & Rect.)	90
Process condensate	360
From vacuum pump cooling	15
Boiler steam condensate	324
Cooling tower blow down	75
Boiler blow down	5
WTP reject	15
Total Water Output	884
C. Water Loss	
Domestic loss	10
Cooling tower drift loss	276
For fusel oil decanter & Alcohol scrubber	15
Total Loss	301
D. Water Available For Recirculation	
Spent Lees (PR & Rect)	90
Process condensate recycle to process after CPU treatment	360
Boiler blow down	5
Boiler steam condensate recycle back to boiler as a feed water	324
Cooling tower blow down	75
WTP reject	15
Total water available for recirculation	869
Net fresh water requirement per lit of RS 1279 -869/= 410	9.11 L/L of RS

Water consumption per lit of alcohol 410/45= 9.11	
Summary of water balance	
Fresh water requirement	= Water input – water recycle
	= 1279 – 869
Net fresh requirement	= 410 m^3/day= 410/45 = 9.11 lit/lit RS

- Net fresh water requirement during running season: Excess condensate from sugar unit recycle to the distillery unit for cooling tower make up i.e. 351 cum per day during running crushing season hence the water requirement will be 410 -351 = 59 cum per day for boiler and domestic purpose only
- Net fresh water requirement during off season : Net fresh water requirement during off season will be 410 cum per day for cooling tower make, boiler and domestic purpose only
- Net fresh water requirement for year:
  - During seasonal operation = 59 X 160 days = 9440 m^3
  - During off seasonal operation = 410 X 170 = 69700 m^3

Total fresh water per year = 79140 m^3

2.2 Fuel

Bagasse will be used as a fuel in 175 TPH boiler for sugar and cogeneration project. Concentrated spent wash of >55^o brix up to 60^o brix will be incinerated along with coal or bagasse for distillery project. Spent wash available for incineration will be 90 m^3/day or 111.6 TPD. This quantity of spent wash will produce 15 TPH steam (GCV 1750K.cal). Along with spentwash, coal or bagasse will be used as supplementary fuel in 70:30 ratio.

2.3 Steam

For co-generation unit, during cane crushing season, the steam will be generated from boiler of 175 TPH capacity (existing 125 TPH + Proposed 50 TPH). The exhaust steam from cogeneration unit will be utilized in sugar factory. The distillery will require maximum 13.5 TPH steam. And it will be fulfilled from proposed 15 TPH boiler.

2.4 Power

The estimated power requirement for proposed expansion of sugar and co-generation unit will be 13.5 MW and 1.2 MW for distillery unit. The cogeneration unit will fulfill the power requirement for the sugar unit whereas the captive proposed incineration boiler will supply the power to the distillery. In case of shut down, power will be purchased from state

electricity grid.

2.5 Boiler

One new fluidized bed boiler of 125 TPH capacity, having 45 kg/cm² (g) pressure & 400 ± 5^0C temperature, proposed for the cogeneration project. It will comply IBR specifications.

The distillery will have an incineration boiler of 15 TPH having 45 kg/cm² (g) pressure & 400 ± 5^0C temperature. Boiler shall be as per latest IBR specifications.

2.6 Fuel HandlingSystem

Suitable bagasse handling slat conveyor is provided for the boiler plant. During season the bagasse generated is used as fuel in boiler of sugar plant. Hence, bagasse is supplied to boiler from elevated carriers and belt conveyors. Provision is made for conveying excess bagasse (not used in the boiler) to a storage area by belt conveyor.

Entire coal storage area/ yard will be covered with permanent weather shed roofing and walls on three sides. Mechanized fuel handling system as well as dust suppression system will be installed for this area. Coal handling will have a capacity of max. 5 TPH. The conveyors will be suitably covered with hood or enclosures. Crushed coal will be used, mainly of 3 to 8 mm size. In case of bagasse, the in-house bagasse will be used and it will be transport from bagasse yard to boiler section through conveyer belt or in covered trucks.

2.7 Ash handling system

The ash handling system envisages wet extraction of bottom ash & dry extraction for fly ash. The fly ash will be extracted in dry form from the electrostatic precipitator hoppers, economizer, air heater hoppers, stack hopper, and transported to storage silo as a measure for promoting ash utilization. For collecting fly ash in dry form, the system will be designed such that, the fly ash and conveying air mixture will be conveyed to storage silo with bag filters. Once in eight hours shift, the fly ash will be sequentially extracted from these hoppers. The fly ash handling system will be designed to collect ash in dry form in fly ash silos through pneumatic pressure conveying system.

2.8 Land

The proposed expansion and new distillery project requires around 2,57,300 sq.m (63.5 acres) of land The detailed break-up of land for different units of the sugar, cogeneration

and distillery (both existing and proposed) are already given in table 2.2 of chapter II in main EIA report.

2.9 Manpower

The project will be generating direct employment to 105 persons out of which ~35 will be skilled and others will be semi-skilled and unskilled. Apart from this, anticipated indirect employment opportunities will be from transportation, local service providers, shopkeeper and various facility providers such as schools, medical facilities, etc.

3.0 PROCESS DESCRIPTION

A. Sugar

The double sulphitation process manufacturing plantation white sugar will be used in this expansion. The process consists of the following steps. A flowchart of the process is given in figure 1.

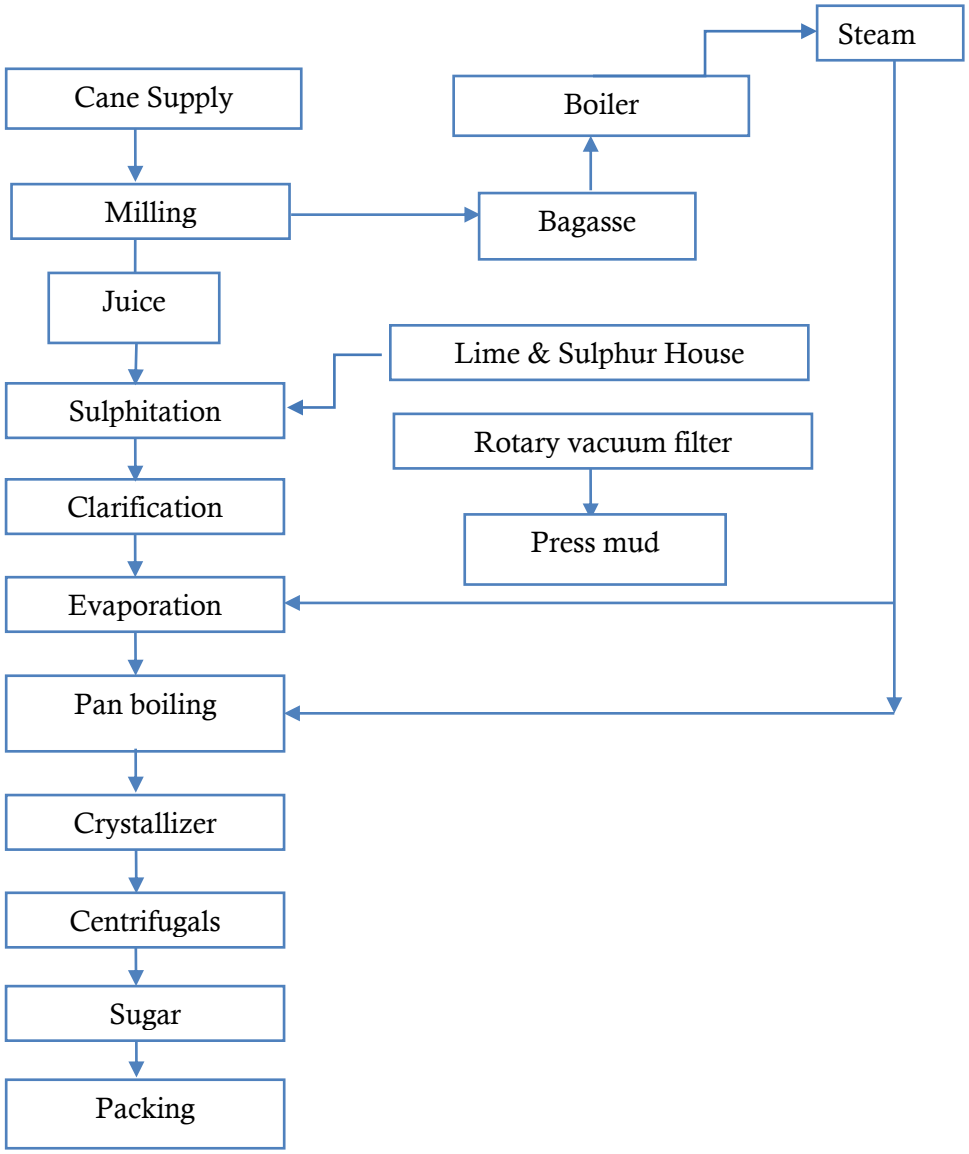

Figure 1: Flowchart Sugar Manufacturing Process

B. Co-generation

The proposed cogeneration, aims at improving the energy efficiency of the sugar factory significantly and enabling the plant to 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.

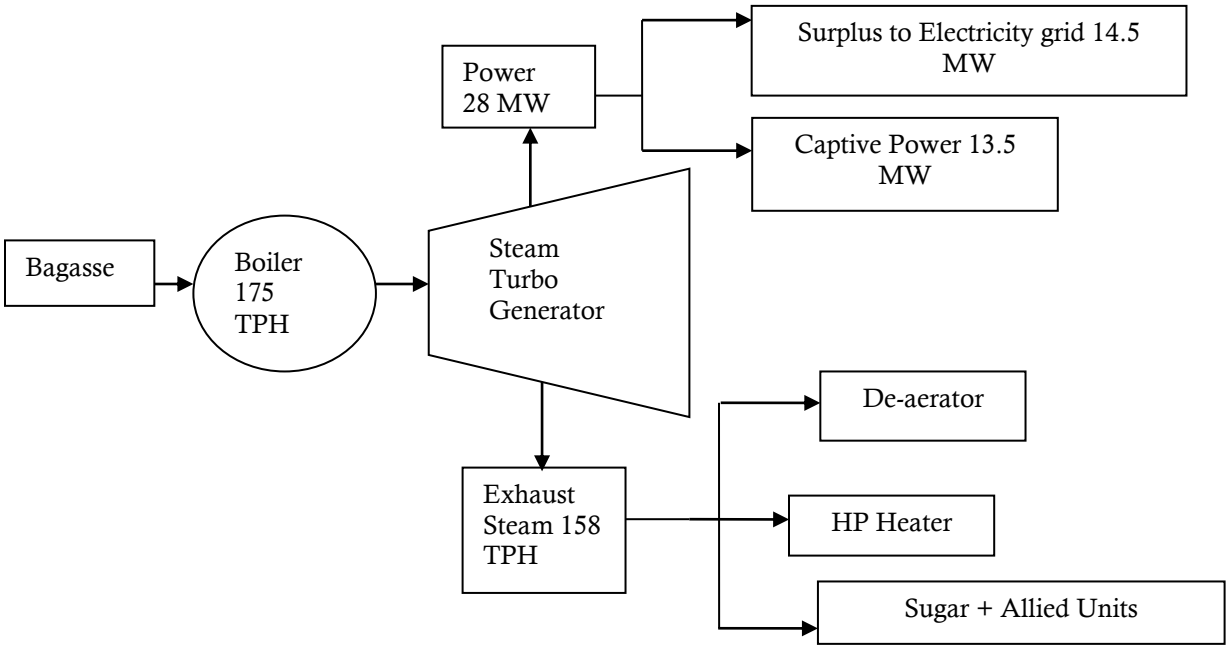

Figure 2: Schematic of Cogeneration process

C) Distillery

For the proposed project, the management has planned to adopt the latest technology for process as well as for effluent disposal. Overall objective of this is to achieve high efficiency of operations, save energy and water and achieve Zero Liquid Discharge (ZLD). The characteristic of manufacturing process is given below and a schematic is shown in figure 3

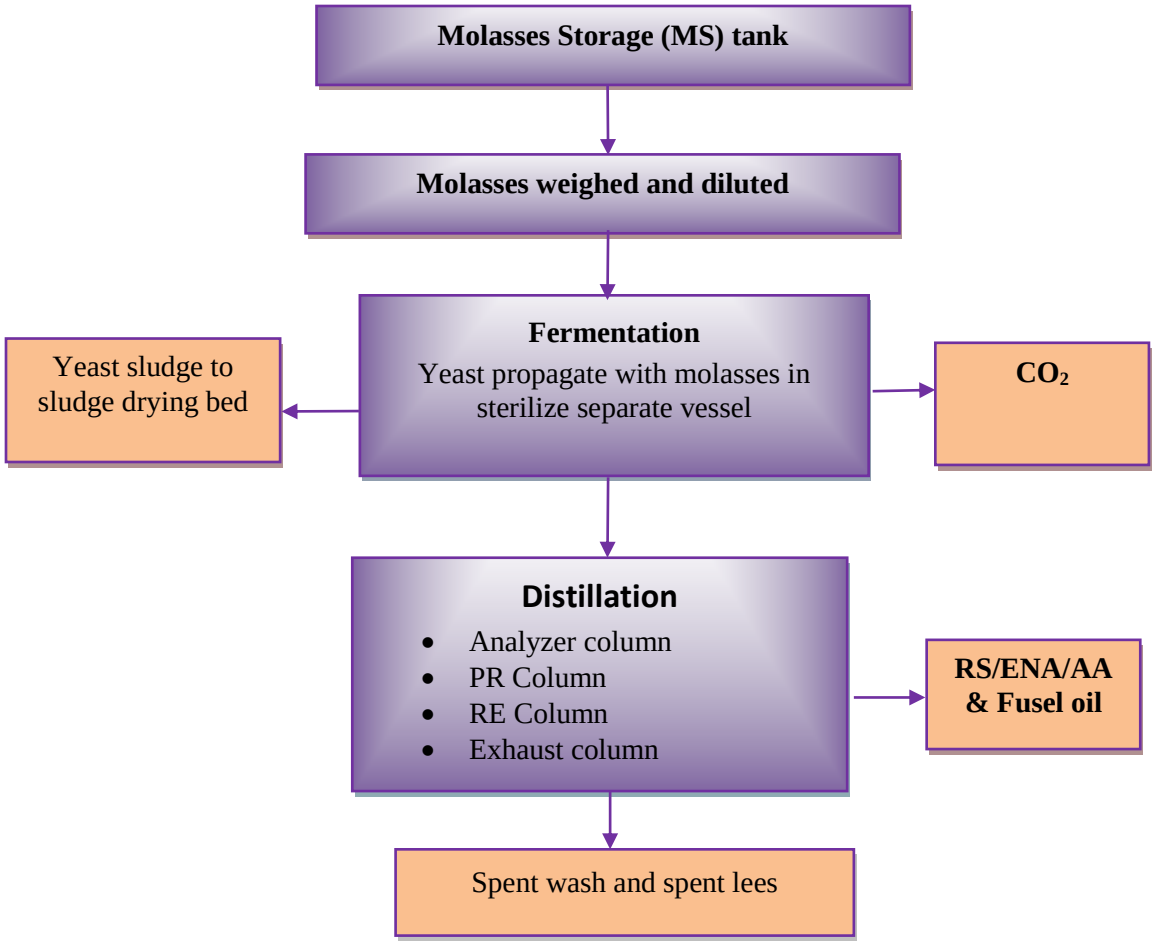

Figure 3: Schematic of Manufacturing Process

Details of molasses and product storage tanks are given in Table 5.

Table 5: Details of Storage Tanks

Specifications For Receivers & Storage Tanks – Thickness As Per Is-803-1976:			
#	**Particulars**	**Quantity**	**Capacity (in m^3)**
1.	Rectified spirit receivers	03	60
2.	Impure spirit receivers	02	10
3.	* Rectified spirit storage tanks	02	600
4.	* Impure spirit storage tank	01	200
5.	Fusel oil storage tank	01	10
6.	Molasses storage at distillery (Tons)	01	5,000 MT

4.0 BASELINE ENVIRONMENTALCONDITIONS

The guiding factors for the present baseline study are the requirements prescribed by the Ministry of Environment, Forestry and Climate Change (MoEFCC) for conducting Environmental Impact Assessment study published in the EIA notification 2006 and its subsequent amendments. Apart from this, the terms of reference for the EIA were also considered while planning and executing the monitoring. For baseline data collection sampling of air, water and soil was carried out from October 2019 to January 2020.

The baseline study begins with site visits and reconnaissance survey in the study area. During these visit the locations were fixed for the monitoring and collection of primary data.

Table 6: Summary of Environmental features of study area

#	Facet	In brief
1	General characteristics	Cool in the western hilly areas but as you move towards the eastern part of the district the weather becomes hotter and dry.
2	Rainfall	An average annual rainfall of 925 mm Rains are received mainly during June-September months
3	Temperature	Maximum temperature in summer is around 39°C and minimum temperature in winter is around 12°C.
4	Humidity	Relative maximum humidity between 70-89% and minimum 25-35%.
5	Wind	Predominantly wind direction East and North West during study period
6	Land use	Crop land area 90.12 %, Built up area- rural 3.08 %, Water bodies 0.78%, Scrub 3.18 %, Forest 3.50 %, 2.14 %
7	Air Quality	Complies NAAQ standards of Nov. 2009 at all monitored locations
8	Noise	Complies national standard on project site but exceeding in study area
9	Ground water	As per Central Ground Water Board report 2013- Slightly alkaline, suitable for both drinking and irrigation purposes
10	Soil	The soils of the district are the weathering products of Basalt and

		have various shades from brownish to reddish to black.
11	Nearest sanctuary	Nearest Sanctuary is Sagareshwar Deer Sanctuary at distance of 36 km

4.1 Land use

Satellite data of Rabi season was classified using supervised classification technique. Maximum likelihood algorithm classifier was used for the analysis. The scenes were individually classified and then were integrated to get a composite classified output where information from Rabi season is available. A truth table was generated taking 0.95 as the conversion threshold. After aggregation, the final classified output was converted in raster format. The image was then converted in raster format, which is understood by GIS software. Five landuse/ land cover classes were identified in 10 sq. km area around the Project Site. Area under each class has been calculated.

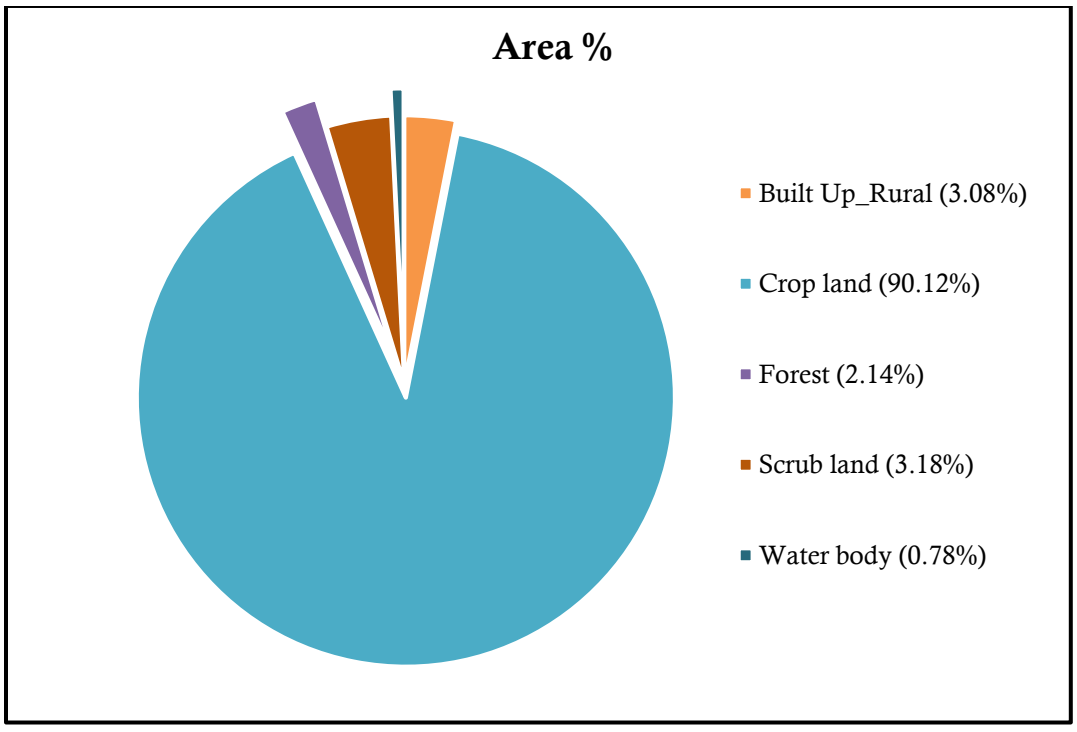

Figure 4: Details of Land use

5.0 IMPACT ASSESSMENT

5.1 Air Environment

Ambient air quality of the study area was assessed through a network of eight air monitoring stations, considering the wind pattern for the study area. Methods used for AAQ analysis: $PM_{2.5}$ & PM_{10}: CPCB, NOx: IS- 5182 (Part vi) 2006, SO_2: IS- 5182 (Part ii) 2001. The values for PM_{10}, $PM_{2.5}$, SO_2 and NOx for all monitored locations were well within National Ambient Air Quality (NAAQ) Standard limits.

5.1.1 Impact causing factors

1) **Emissions from process:** It will be due to incineration of spent wash along with coal.

2) **Transportation:** Vehicular pollution due to transportation activity, dust from roads, loading unloading of material and transportation of material will involve mainly transportation of coal, molasses to some extent and ethanol/spirit. Hence, this could cause minor increase mainly in NOx, particulate matter and HC.

3) **Fugitive Emissions and Other sources of air pollution:** Fugitive emissions from handling and storage of coal and ash; transportation activities and odour are also anticipated to cause significant negative impact. System for suppression of dust from handling of coal and ash will be installed. It includes mainly, use of pulse jet bag filters for coal loading-unloading on conveyors, foggers/dust suppressors in coal and ash storage yard, wind breakers for ash storage area.

5.1.2 Impact Assessment: Estimated incremental concentrations of PM and SO_x in the downwind direction of the site are minor, considering the baseline value. The baseline concentrations of these pollutants are well within the NAAQS. Therefore, after adding the incremental concentration to the baseline value at nearest downwind site will not exceed the NAAQS. So, it is anticipated that, the increase in the concentration of these air pollutants due to the burning of fuel, likely to cause minor negative impact on air environment.

5.1.3 Preventive, control and mitigation measures

- Mechanized handling of coal and ash
- Green belt development on 2.3 acres area for the proposed unit
- Plantation of 2500 trees is proposed for greenbelt
- Wind breaks will be developed to control PM generation from ash storage yard
- PPE will be provided to workers, working in dust prone areas

- The carbon dioxide emissions from fermentation process will be controlled by bottling the generated gas in a bottling plant
- Job rotation for workers, working in dust prone areas
- Use of economically affordable techniques for suppression of dust from handling and storage area
- Ash will be transported in closed/covered vehicles to the brick manufacturing unit
- Construction of permanent roads

5.1.3.1 Air Pollutant Dispersion Modeling

Prediction of impacts on air environment has been carried out employing mathematical model -AERMOD view dispersion model 9.2 software developed by Lakes Environment Software, Canada.

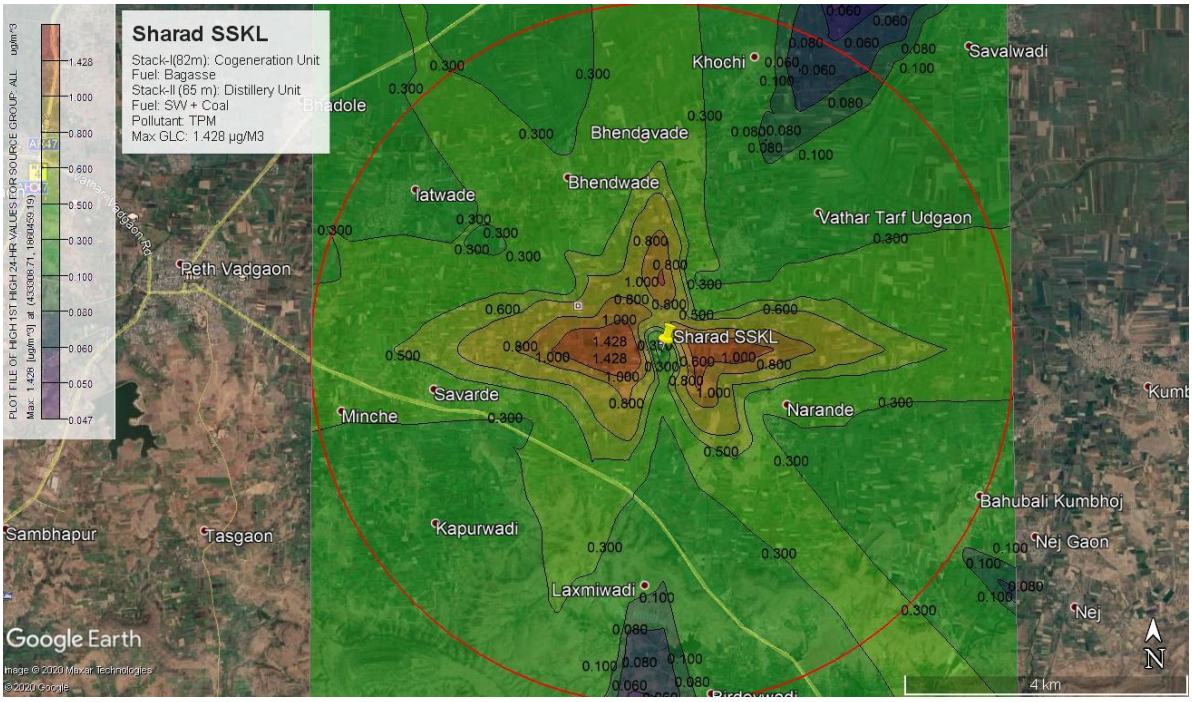

Figure 5: Isopleth showing GLC location and distance for PM (Short term 24 hourly)

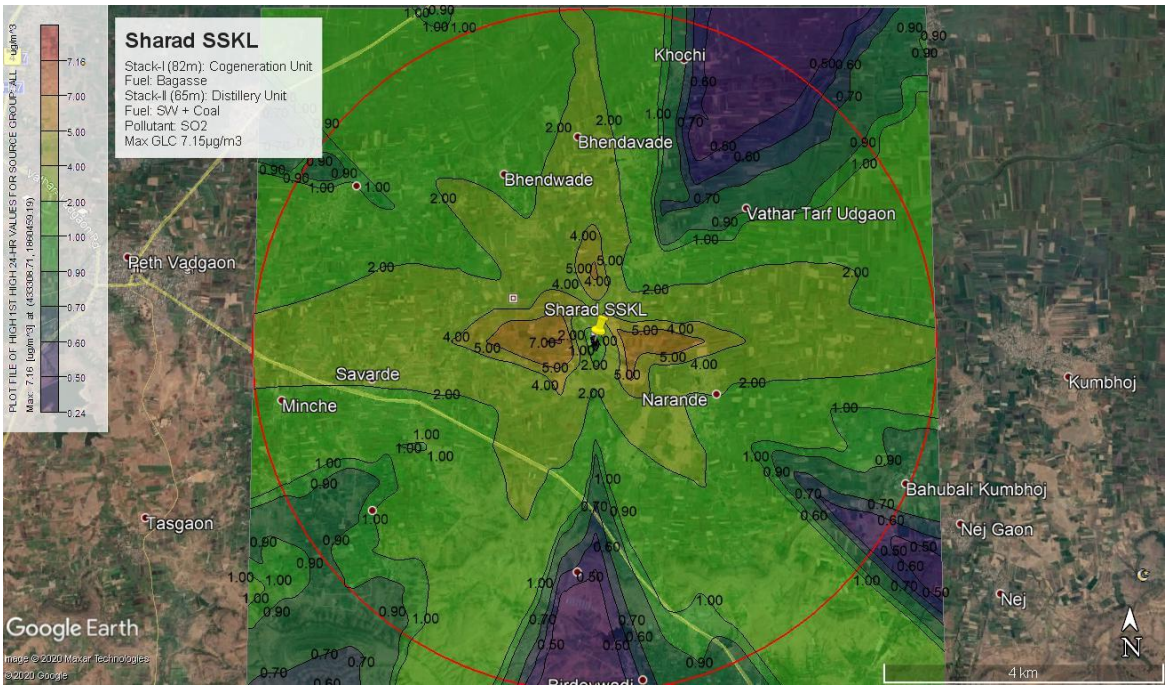

Figure 6: Isopleth showing GLC location and distance for SO_2 (Short term 24 hourly)

Observation

From the mathematical modeling of air pollutant dispersion study, it is observed that -

- Maximum increase in the concentration of PM and SO_2 is predicted at approx 0.52 km i.e. roughly 520 m west from the stack
- Agricultural vegetation is observed at this distance
- Village Savarde is the nearest ambient air quality (AAQ) monitored location to incremental GLC
- Considering the incremental load of operation phase of the project, the resulting concentration for PM10 and SO2 predicted to be well within national ambient air quality standards (NAAQS)
- Second highest increase is predicted towards the east at a similar distance
- Village Narande - nearest AAQ monitored place located at east of the site
- The maximum incremental load predicted at this point is 1.00 µg/m^3 for particulate matter (PM10) and 5.00 µg/m^3 for SO_2.
- Maximum concentration of PM10 and SO2 recorded at Narande village during monitoring period was 70.01 µg/m^3 and 21.91 µg/m^3
- Considering this incremental load, predicted GLC of PM 10 and SO2 for the said village will be 71.01 µg/m^3 and 26.91 µg/m^3

- From the mathematical modeling study, it is observed that resultant concentration of air pollutant PM 10 and SO2 in downwind directions will be well within the national ambient air quality standards prescribed by CPCB in Nov. 2009.

Table 7: Summary of Maximum 24-hour GLC due to proposed project

Description	**Concentration µg/m³**	
	PM	**SO_2**
Maximum rise in GLC	1.428	7.15
Direction of Occurrence and distance	W (0.52 km)	W (0.52 km)
Coordinates of maximum GLC	16⁰49'35" N 74ᵒ22'27" E	16⁰49'35" N 74ᵒ22'27" E
Baseline Concentration reported at monitored location nearest to the maximum incremental GLC (Village: Savarde)	67.18	17.17
Total Concentration (Post project scenario at Village: Savarde)	68.60	24.32
NAAQS	100 (PM_{10})	80
*The distance is measured from stack to the receptor of maximum GLC		

5.2 Water Environment

5.2.1 Impact causing factors: Drawl of fresh water in large quantity and its usage, water pollution, disposal of polluted water into nearby water bodies.

5.2.2 Impact Assessment: No negative impact on water environment and aquatic ecosystem is envisaged due to the proposed project. Minor negative impact is envisaged on soil within the premises. The project proponent has water drawl permission from Irrigation Department to lift the water from Warna River. Thus, water used in the project will be exclusively allocated for industrial activities.

5.2.3 Environment management plan: In order to reduce the fresh water intake, the management has planned to reuse of waste water after proper treatment. Wastewater from various sources will be collected and properly treated so as to reutilize it and thus conserve

the fresh water resource. The treated water shall be mainly reused in the sugar unit for auxiliary requirements and/or for gardening activity. The sanitary wastewater will be disposed by using sugar ETP unit. Thus, zero liquid discharge will be achieved. Boiler blow down and water from cooling tower will be stored in ponds and recycled thereafter. The management also proposed to install rainwater harvesting system to recharge the aquifer and partly fulfill the requirement during startup.

5.3 Land Environment

a) Impact of effluent discharge

As discussed earlier, highly polluted wastewater i.e. spent wash will be disposed by incineration process. It will be stored in impervious lagoons as per CPCB guidelines. Other polluted water will be treated in CPU and reused.

b) Solid waste

Table 8: Solid Waste and its Management

#	Waste	Quantity (TPA)	Disposal	Remark
Sugar and Cogeneration unit				
1.	Sugar ETP/ CPU sludge	3 TPD	Used for land application	Organic
2.	Boiler ash	34.48 TPD	Sold to brick manufacturers	Inorganic
Distillery unit				
3.	CPU sludge (dry)	1.5 TPD	Used for land application	Organic/Inorganic
4.	Fermenter sludge	1.5 TPD		
5.	Boiler ash	31.35 TPD	Sold to brick manufacturer	-

5.3.1 Impact causing factors: Disposal of solid and hazardous waste, disposal of effluent, change in topography

5.3.2 Impact Assessment: The project is not going to generate any hazardous waste. The only hazardous waste likely to be generated will be scrap oil from DG set, automobiles, gears etc. Since the DG set will run only in case of failure of regular power supply. The quantity of used or scrap oil will be low. Since, the solid waste is non-toxic and non-

hazardous, it is anticipated that the solid waste will have no negative impact on land but very negligible negative impact on air environment due to emissions from stack. Minor negative impact is also envisaging on the land environment of the site due to construction of the proposed unit.

5.3.3 Environmental management plan: The solid waste viz. ash will be generated due to burning of spent wash along with coal in the boiler and burning of bagasse in cogeneration boiler. Ash is estimated to be about 34.48 TPD from sugar & cogeneration boiler and 31.35 TPD from Incineration boiler. Sludge from CPU this sludge is usually bio-degradable, organic and nearly neutral in nature. It doesn't contain any toxic or hazardous elements. Therefore, this will be safely disposed by mixing into soil as manure. As an option, ash may be sold to the local bricks manufacturer.

5.4 Ecology

5.4.1 Impact causing factors: Discharge of air and water pollutants into environment, solid waste, change in land use, removal of vegetation cover, reclamation of wetland/water bodies, etc.

5.4.2 Impact assessment: In case of proposed project, the air dispersion modeling study reveals that the ground level concentration of PM (during operation phase) in ambient air will be an increase in the concentration of PM and SOx mainly towards west at approx. 520 m (0.51 km) from the stack towards Savarde village. Village Narande - nearest AAQ monitored place located at east of the site. The maximum incremental load predicted at this point is 1.00 μg/m3 for particulate matter (PM10) and 5.00 μg/m3 for SO2. Maximum concentration of PM10 and SO2 recorded at Narande village during monitoring period was 70.01 μg/m3 and 21.91 μg/m3. Considering this incremental load, predicted GLC of PM 10 and SO2 for the said village will be 71.01 μg/m3 and 26.91 μg/m3

- From the mathematical modeling study, it is observed that resultant concentration of this air pollutant in downwind direction will be well within the national ambient air quality standards prescribed by CPCB in Nov. 2009. The negative impact is anticipated due to following.
- Due to construction on the present open areas, land- foraging ground may get lost permanently for some of the birds, insects and reptiles; also this activity may cause negative impact on soil micro- fauna.

- In addition, the transmission lines may cause minor negative impact on soil and avian-fauna. Beneficial Impact is anticipated due to following factors.
- The effluent/wastewater generated will be treated and recycled/reused for greenbelt, which is anticipated as positive impact for the conservation of resource as well as efficient utilization of it.
- Solid waste generated in the project will be rich in potash. It will be added to soils. Thus, nutrient will get recycled and soil enrichment will take place. This is anticipated as another positive impact on the land and the surrounding eco-system.
- Greenbelt development will help in enhancing the biodiversity of the area. It will also help in improving the aesthetics. This is another positive impact anticipated due to the project.

5.4.3 Environmental management plan: ESP as an air pollution control device attached to stack of 82 m height for cogeneration unit & 65 m height for distillery unit; mechanized handling of bagasse and ash, etc. for air pollution prevention and control; Greenbelt development - for mitigation of air and noise pollution. Solid waste is organic and safely gets disposed-off by applying into soil.

5.5 Socio- economic environment

5.5.1 Impact Causing Factors: issues of rehabilitation; restoration; population flux; pressure on available resources and infrastructure.

5.5.2 Impact Assessment: Considering the long term benefits to the locals, the project will have positive impact on socio-economic environment.

5.5.3 Environment Management Plan: Project is agro-based – therefore, indirectly beneficial to local farmers; no issues of rehabilitation or restoration; local candidates will be employed – thus, migration of population to the site surrounding area and pressure on infrastructure and resources is anticipated to be negligible.

6.0 FIRE PROTECTION SYSTEM

Fire protection system shall be provided in accordance to PESO, OISD-117 and LPA regulations. The fire- fighting system will consist of a hydrant network, piping etc. Fire protection system will also include one electric driven pump, one diesel engine driven pump, one jockey pump, piping, basin etc. Water hydrants will be provided at all strategic points. A suitable Fire ring system as per the guidelines of TAC will be incorporated. Non-flame proof and flame proof area will be separated by minimum distance of 15 meters.

Portable fire extinguishers will also be provided in strategic locations viz., power house, control rooms, storage yard.

Automatic fire Sprinkler System (Water Hydrant) – Electro-magnetic dehydration system uses an electric fire detection system installed in the area as open sprinklers /spray nozzles. Upon sensing a hazard, the Electromagnetic valve opens.

6.1 Safety Aspects through Design and Engineering

- All design will be as per ISI standard specification and drawings are to be approved by factory/electrical inspectorate/safety inspectorate weights & measurement inspectorate etc.
- All distillation columns accessed from flooring (grating)
- The roof of the structures (fermentation, distillation, receivers) must be covered totally by pre- coated sheets (Pre-painted galvano loom sheet i.e. PPGL sheets) of 0.5 mm thickness.
- The layout will take into account the working space & safety requirement of Factory Inspectorate, Govt. of Maharashtra State.

6.2 Plant Lighting

a) The normal process area lighting will generally compromise of Fluorescent fittings & Mercury vapor fittings.

b) Flameproof light fittings conforming to IS 2148 shall be provided for hazardous areas, particularly in distillation & storage section, while non-flame proof fittings in other areas.

Plant building lighting will be as per norms & as per Electrical inspectorate/factory inspectorate norms.

7.0 ENVIRONMENT MANAGEMENT PLAN

Table 9: Summary of Environment Management Plan

Environmental Aspect	Impact causing factor	Control/Mitigation Measures
Air Environment	Generation of Particulate Matter (PM), SO_2, NO_x during cogeneration/ incineration	• ESP to control ash emission through stack with height 82 m for cogeneration boiler and 65 m for incineration boiler

Environmental Aspect	Impact causing factor	Control/Mitigation Measures
	Generation of Carbon dioxide from fermentation, Odour from spent wash storage Handling of bagasse, coal and ash	• CO_2 bottling plant after scrubbing • Mechanized system for coal and ash handling • Fugitive dust control/suppression for coal yard will be done properly • Wind breaks for ash storage area Development of greenbelt
Water Environment	Effluent generation from processes, cleaning, blow down water & condensate. Storage of spentwash, its treatment and disposal	Sugar effluent and spray pond overflow will be treated in upgraded ETP. Condensates will be treated in CPU and then recycled. 'Zero liquid discharge' will be achieved in distillery by implementing - • Integrated and stand-alone evaporation (using MEE) as a primary treatment to reduce the spentwash volume • Incineration of concentrated spentwash by burning with coal/bagasse in furnace • Spentlees, condensate of MEE and other effluents will be treated in condensate polishing unit (CPU) and treated water will be reused in distillery. • All the effluent will be properly treated/ utilized/disposed within the premises • Separate lagoons for storage of raw

Environmental Aspect	Impact causing factor	Control/Mitigation Measures
		and concentrated spentwash. • Lagoons will be made impervious as per CREP guidelines • Fresh water requirement will be reduced by recycling of water (treated water), using rain water during startup period • Piezometric well, in downstream area of spentwash storage to monitor ground water quality
Soil Environment	Boiler Ash	Sold to nearby brick manufacturing unit
	Sludge from Fermentation unit and CPU	Sludge is degradable, organic in nature hence, mixed into soil
	Excavated fertile soil	• Stacked separately and reused for greenbelt development Stones and excess soil will be used for foundation or internal roads or leveling purpose within premises
Noise	Increase in noise level due to operation of machines, motors, vehicular movement, DG set etc.	• Regular maintenance of machines and factory vehicles • provisions of separate parking for goods and other vehicles • Internal roads will be either asphalted or RCC, leveled, illuminated and will be maintained • Safety sign boards will be placed at strategic locations within premises

Environmental Aspect	Impact causing factor	Control/Mitigation Measures
		• Provision of adequate personal protective equipments for workers • Job rotation for high noise level work places, if required • Regular health checkup for workers • Acoustic enclosure will be provided to DG set
Ecology and Biodiversity	Air, water, soil and noise pollution Tree cutting failing, disturbance to wildlife due to project	• Adequate preventive, control and mitigation measures for air, water and soil pollutants • No tree cutting/ failing involved since project is on barren land • No wildlife sanctuary, national park or biosphere reserve within 10km radius, site is not in migratory route of any wildlife, no rare and endangered species of plants/animals reported from the region • Development of greenbelt will help to enhance the biodiversity and will provide habitat to many species
Socio-economic Environment	Rehabilitation and Restoration (RR), pressure on available manmade infrastructure/resource due to population flux	• No rehabilitation and restoration issue involved since site is already under the possession of project proponent • Local candidates will be preferred for employment. Skilled work force is available at nearby towns and cities

Environmental Aspect	Impact causing factor	Control/Mitigation Measures
Safety and Occupational health	Accidents, improper work practices	• Safety officer and safety committee will be formulated • Provision of adequate safety gears • Insurance policy for workers • Regular health check-up
Risk and disaster management	Fire, accidents, earthquake, etc.	• The entire premises will be declared as 'no smoking zone' • Lightening arresting system will be installed • Ethanol vapor condensing system will be installed at storage area • Proper storage of molasses, ethanol and coal • Ethanol storage as per PESO guidelines • Firefighting system as per OISD and local authority guidelines • Earthquake resistant construction

8.0 SAFETY, OCCUPATIONAL HEALTH MANAGEMENT

The goal of all occupational health and safety programs is to foster a safe work environment. In this project, aspects of Safety and Occupational Health are given with the due consideration, over and above applicable legislations such as Factories Act 1948. Extra attention will be paid to provide measures for ensuring safety and health of workers and as well integrity of plant. This will be done by applying following national or international standards.

- Use of flameproof electrics
- Standard operating procedures (SOP)will be developed as per the manual of respective equipment and machines. These SOP will be strictly implemented to ensure safety,

health and environment throughout the premises

- Smoking and igniting activities will be strictly prohibited in the entire unit
- Existing Firefighting system (of sugar & Cogeneration unit) will be modified suitably so as to make it suitable for proposed project (as per the statutory guidelines)
- Regular medical checkup of workers, contractual workers and employees

Facilities at existing sugar unit such as drinking water facility, canteen, toilet and bathrooms, petrol pump, first aid facility, safety gears and PPE will be made available to workers, as well as to the visitors and transporters.

Table 10: Financial provision for CER activities planned for next five years

CSR activity head	**Year**					**TOTAL**
	1st	**2nd**	**3rd**	**4th**	**5th**	
	Budgetary provision (Rs. in lakhs)					
Provision of rooftop solar system in local schools	20	20	20	20	20	**100**
Provision of toilets and sanitary fixtures in local schools	10	10	10	10	10	**50**
Provision of clean drinking water facility in local schools	10	10	10	10	10	**50**
Education						
Education/training to local youths, farmers, family members of employee's	5	5	5	5	5	**25**
Infrastructure Development/Maintenance (Eg. Road, canal maintenance, etc)	10	10	10	10	5	**45**
Other activities for maintaining social and cultural harmony	2	2	2.5	2.5	2	**11**
TOTAL BUDGETARY ALLOCATION FOR NEXT FIVE YEARS (2% of the capital budget)						**281**

Table 11: Estimated Capital & Recurring Expenses for Environment Management

#	Particulars	Amount (Rs. in Lakhs)
Capital Expenses		
1.	Standalone evaporator system	600.00
2.	Incineration boiler with ESP	1200.00
3.	ESP for sugar & cogeneration	100.00
4.	Fuel storage & handling system	120.00
5.	Ash handling system	40.00
6.	Spentwash storage tank	30.00
7.	Condensate polishing units for sugar & distillery	300.00
8.	ETP upgradation for sugar	100.00
9.	CO_2 bottling plant	450.00
10.	Environmental monitoring and management	50.00
11.	Greenbelt development	30.00
12.	Rainwater harvesting	30.00
TOTAL		**3050.00**
	Additional provision towards CER (2 % of capital investment)	**281.00**
Recurring Expenses/Annum		
1.	Salaries and wages	75.00
2.	Maintenance (@ 5% on capital investment of Rs. 3050 lakhs) of pollution control devices e.g. ESP, etc.	152.50
3.	Fuel (incineration activity) Electricity (in case of diesel generator operation)	192.0
4.	Miscellaneous	15.00
	TOTAL	**434.50**

9.0CONCLUSION

The project proposed by a progressive cooperative sugar mill from Kolhapur district of Maharashtra. The mill is having adequate capacity to produce >75% of required molasses in the form of B heavy type and remaining will get easily available from nearby sugar mills. The mill is having its own open land where the project will be developed. Hence, issues of rehabilitation and restoration of people is not involved in this case.

The potential environmental, social and economic impacts of the project have been assessed during the EIA study and given in EIA report. The proposed expansion of the sugar and cogeneration unit and establishment of new distillery unit will have certain levels of marginal impacts on the local environment. It has been endeavored to minimize the negative impacts by addressing them through environmental management plan. Necessary control measures have been suggested to meet with the norms and safeguard the environment. The implementation of this project will definitely improve the physical and social infrastructure of the surrounding area. Adequate financial provision is made by management of SSSKL for EMP and CER activities (i.e. for upliftment of the local people). The proposed project will contribute to economic growth of the region and also help in improving the power reliability and energy security.