EXECUTIVE SUMMARY

PROPOSED 110 KLPD MOLASSES /SYRUP BASED ETHANOL DISTILLEY UNIT, PROPOSED EXPANSION IN EXISTING SUGAR UNIT FROM 2500 TCD TO 5000 TCD AND CO-GENERATION UNIT FROM 10 MW TO 18 MW

AT

Gat No.
798/1,798/2,780/2/1,795/2,797/2,797/3,793/1,793/2,794/1,794/2,785/1, 25,
KHARDI, TAL. - PANDHARPUR, DIST.- SOLAPUR

BY

SITARAM MAHARAJ SAKHAR KARKHANA (KHARDI) LIMITED
PROPOSAL FOR
ENVIRONMENT CLEARANCE

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EXECUTIVE SUMMARY

1 INTRODUCTION

Sitaram Maharaj Sakhar Karkhana (Khardi) Ltd. (SMSKL), At Gat no. 798/1,798/2,780/2/1,795/2,797/2,797/3,793/1,793/2,794/1,794/2,785/1,25 Khardi, Tal-Pandharpur, Dist-Solapur Was registered vide registration no. U15424PN1999PLC013656

The command area of the factory has excellent cane potential and the sugarcane grown in this area is rich in sucrose content. The industry proposes to expand sugarcane crushing capacity from 2500 TCD to 5000 TCD, Co-generation power plant from 10 MW to 18 MW and establishment of 110 KLPD distillery unit to produce 110 KLPD RS/ENA/Ethanol based on "C" / "B Heavy" molasses/ syrup. Sugarcane potential of SMSKL from its command area is high. The raw material required for distillery unit shall be taken from own sugar.

The proposed distillery envisages to utilize own syrup/ "C"/"B" Heavy Molasses during season & off-season depending on the market demand and as per the availability of raw materials for production of Rectified Spirit/ENA/Ethanol. The command area has adequate irrigation facilities/ potential for sustained cane supply to the proposed establishment.
The effluent generated from proposed distillery unit shall be treated in CPU and recycled into process. Distillery effluent (i.e. Spentwash) shall be treated based on Anaerobic Digestion followed by Concentration in MEE followed by drying in order to make valuable by-product (i.e. Potash rich manure) and to achieve Zero Liquid Discharge (ZLD)

The aggregated capital investment for the proposed project is estimated at **Rs. 319.19 Crores**

The promoters have extensively and carefully analyzed the present and future scenario of central Govt. policies for promotion of ethanol addition in the petroleum fuels. They have also studied carefully the present irrigation facilities and surplus cane availability, as well as future potential of irrigation and additional cane availability.

1.1 PROJECT LOCATION

The salient features of the project site are

Table 1-1 Salient features of the project site

Sr. No.	Features	Description
1.	latitude	17°33'8.92"N
2.	Longitude	75°17'8.44"E
3.	Elevation above MSL	483 m
4.	Nearest highway	SH 161 (2 km)
5.	Nearest railway station	Pandharpur railway station (14 km)
6.	Nearest air port	Solapur (69 Km)
7.	Nearest village	Khardi (3.02 km)
8.	Nearest human settlement	Khardi (3.02 km)
9.	Protected Area	None within 10 km

Sr. No.	Features	Description
10.	Reserved Forests	None within 10 km
11.	Wildlife Sanctuary	None within 10 km
12.	Archeological site	None within 10 km
13.	State boundary	None within 10 km
14.	Defense installations	None within 10 km
15.	Average Rainfall	679 mm

2 PROJECT DESCRIPTION

The details about the maufacturing capacity of the exisitng and proposed establishment are given in table below

Table 2-1 Proposed Products manufacturing quantities

Sr. No.	Description	Unit	Existing Capacity	Proposed Capacity	Total	Remark
1.	**Sugar Unit**	TCD	**2500**	**2500**	**5000**	
2	**Co-generation Power**	MW	**10**	**8**	**18**	
3.	**Distillery Unit**	KLPD	**0**	**110**	**110**	
	Rectified Spirit or	KLPD	0	110	110	Only one product at a time
	Extra Neutral Alcohol or		0	110	110	
	Ethanol		0	110	110	

2.1 RESOURCE REQUIREMENT AND INFRASTURE FACILITIES

A) Land use Details

The total area available with the factory is **15.78 Ha** Out of which, **33% (5.20 Ha)** shall be utilized for green belt development. A detailed area breakup is given below

Table 2-2 Landuse breakup

Sr. No.	Description	Area in Hectares	% of Area
1	Built Up		
2	Area Under Road		
3	Green Belt Area		
4	Parking Area		
5	Vacant Area		
	Total Plot Area	**15.78**	100.00

B) Power requirement

The power requirement for sugar, co-generation and distillery unit shall be 14.5 MW which will be met from 18 MW Co-gen plant

C) Water Consumption details

Industrial Purpose:

The Manganga River is the nearest water body of 3.5 km away from the factory site, which is the main source of water.

Sugar Division - The sugar unit works on zero water requirements and co-generation power plant water requirement met from excess condensate available from sugar unit and another 140 m3/day of fresh for boiler make up purpose. Detailed water budget of the Sugar division is shown in **Table 2.3**

Distillery Division – water requirement for distillery division shall be 331 m3/day only due to recycle of evaporator condensate. Detailed water budget of the distillery unit is shown in **Table 2.4 to Table 2.6**

Domestic Purpose:

At present water requirement is 30 m3/day, no additional water requirement after the proposed expansion

Thus, the net fresh water requirement of the industry is 501 KLD (Industrial 471 KLD, Domestic 30 KLD). The required water is sourced from Manganga River. The necessary permission from the state irrigation department is already obtained.

Water balance calculations: Sugar and Co-generation Division

Table 2-3 Water budget for sugar and co-generation unit

Sr. No.	Details	Water Requirement (m3/day)			Consumption/Losses (m3/day)			Reuse / Recovery (m3/day)			Waste Generation (m3/day)		
		E	P	T	E	P	T	E	P	T	E	P	T
Domestic Purpose													
1	Domestic	30	--	30	6	--	6	--	--	--	24	--	24
Industrial Purpose													
1	Boiler 1*68 TPH	1570	--	1570	80	--	80	1470	--	1470	20	--	20
2	Proposed 1*17 TPH	--	393	393	--	20	20	--	365	365	--	8	8
3	Proposed 1*25TPH	--	575	575	--	30	30	--	535	535	--	10	10
4	DM Plant	80	60	140	65	50	115	--	--	--	15	10	25
5	Process water	90	90	180	11	11	22	--	--	--	79	79	158
6	Washing of equipment	30	30	60	--	--	0	--	--	--	30	30	60
7	Air compressors & pumps	40	40	80	05	05	10	35	35	70	--	--	--
8	Condenser Water	--	--	--	--	--	0	500	500	1000	All the condenser water shall be treated in proposed CPU and recycled as process water.		
9	Spray pond blow-down	500	500	1000	250	250	500	--	--	--	250	250	500
10	Cooling tower blow-down	150	150	300	80	80	160	--	--	--	70	70	140
11	Colony fire-fighting & Gardening	50	50	100	50	50	100	--	--	--	--	--	--
12	Recycling of Excess Condensate	--	--		--	--		500	500	1000	--	--	--
Total		**2510**	**1888**	**4398**	**541**	**496**	**1037**	**2505**	**1935**	**4440**	**464**	**457**	**921**

Where,

E – Present 2500TCD and 10 MW Co-gen
P – Expansion of 2500 TCD & 8 MW Co-gen
T - Total 4000 TCD & 18 MW.

Note:

1. At present there is one boilers of 60 TPH capacity has installed which shall be upgraded to 68 TPH
2. After proposed expansion 1*17 TPH and 1*25 TPH boiler shall be installed
3. The fresh water requirement for DM plant only 140 m3/day and 30 m3/day for domestic purpose. Thus total fresh water requirement would be 170 m3/day.

- The consumption/losses and final wastewater generated is amounting (1037+921) = 1958 m3/day
- The excess condensate and condensers water available is 2000 m3/day. Thus the excess water available for reuse would be around 1958 – 2000 = -42 m3/day.

Net Water saving would be:

i) Industrial Purpose: 4398-4440 = -42 m3/day.

Due to excess condensate available from Sugar unit, there shall not be any water requirement for sugar unit. For Co-generation 140 m3/day fresh water shall be taken as DM plant water for boiler make-up. Fresh water requirement for domestic purpose shall be 30 m3/day. Thus the total requirement of fresh water would be 170 m3/day for sugar and cogeneration unit.

Excess amount 42 m3/day is saved, which shall be used for gardening, irrigation and in distillery operation etc.

ii) Domestic Purpose: At present water requirement is 30 m3/day, no additional water requirement after the proposed expansion.

Effluent Generation:

i. Industrial - 921 m3/day out of which sugar effluent - 218 m3/day, spray pond effluent – 500 m3/day and co-generation power plant effluent 203 m3/day (out of which 38 m3/day boiler blow-down, 140 m3/day cooling tower blow –down and 25 m3/day of DM plant reject).

ii. Domestic – 24 m3/day.

Distillery division

I. Based on "C" Molasses

Table 2-4 Water Budget for Distillery Division (based on "C" Molasses)

Sr. No.	Details	Water Requirement (m3/day)	Consumption/Losses (m3/day)	Reuse / Recovery (m3/day)	Waste Water Generation and treatment		
					Waste water Generation	Wastewater treated in CPU	Wastewater
1	Process Water	1100	--	**Evaporator Condensate**	Spentwash - 176	--	176
					Spentlees – 220	220	00
2	Cooling Tower Make-up Water	210	155	--	55	55	00
3	Fermenter Washing	40	--	--	40	40	00
4	Evaporator Condensate	--	--	704	--	--	--
5	Condensate Polishing Unit	--	--	315	--	--	--
Total		**1350**	**155**	**1019**	**491**	**315**	**176**

Note:

Steam shall be taken from sugar unit.

Remark: 176 m3/day of concentrated spentwash shall be generated after anaerobic digester followed by MEE. (Raw spentwash quantity - 880)

Solids content in raw spentwash shall be around 12 – 14 % by its weight, hence convert to 5% to 6% in anaerobic digester and finally it's converted to 30% by its weight after MEE.

Note:

The consumption/losses and final wastewater generated is amounting (155+176) = 331 m3/day.

Net Water Requirement: 1350-1019 = 331 m3/day.

Effluent Generation: 491 m3/day out of which spentwash - 176 m3/day, Spentlees – 220 m3/day, fermenter washing waste- 40 m3/day, and cooling tower wastewater generation – 55 m3/day.

All the effluent except concentrated spentwash and boiler blow-down shall be treated in proposed CPU and treated effluent shall be recycled in process.

Concentrated spentwash shall be treated based on Biomethanation followed by MEE followed by drying and converted to dry powder/granules (potash rich powder/manure).

Based on "B" Heavy Molasses

Table 2-5Water Budget for Distillery Division (based on "B" Heavy Molasses)

Sr. No.	Details	Water Requirement (m3/day)	Consumption/Losses (m3/day)	Reuse / Recovery (m3/day)	Waste Water Generation and treatment		
					Waste water Generation	Wastewater treated in CPU	Wastewater
1	Process Water	880	--	**Evaporator Condensate**	Spentwash - 110	--	110
					Spentlees – 220	220	00
2	Cooling Tower Make-up Water	210	155	--	55	55	00
3	Fermenter Washing	40	--	--	40	40	00
4	Evaporator Condensate	--	--	550	--	--	--
5	Condensate Polishing Unit	--	--	315	--	--	--
Total		**1130**	**155**	**865**	**425**	**315**	**110**

Remark: 110 m3/day of concentrated spentwash shall be generated after anaerobic digester followed by MEE. (Raw spentwash quantity - 660)

Solids content in raw spentwash shall be around 8 – 10 % by its weight, hence convert to 4% to 5% in anaerobic digester and finally it's converted to 30% by its weight after MEE.

Note:

The consumption/losses and final wastewater generated is amounting (155+110) = 265 m3/day.

Net Water Requirement: 1130-865 = 265 m3/day.

Effluent Generation: 425 m3/day out of which spentwash - 110 m3/day, Spentlees – 220 m3/day, fermenter washing waste- 40 m3/day, and cooling tower wastewater generation – 55 m3/day.

All the effluent except concentrated spentwash and boiler blow-down shall be treated in proposed CPU and treated effluent shall be recycled in process.

Concentrated spentwash shall be treated based on Biomethanation followed by MEE followed by drying and converted to dry powder/granules (potash rich powder/manure).

II. Based on Sugar syrup

Table 2-6 Water Budget for Distillery Unit (based on sugar syrup

Sr. No 2.	Details	Water Requirement (m3/day)	Consumption/Losses (m3/day)	Reuse / Recovery (m3/day)	Waste Water Generation and treatment		
					Waste water Generation	Wastewater treated in CPU	Wastewater
1	Process Water	715	--	**Evaporator Condensate**	Spentwash - 77	--	77
					Spentlees – 143	143	00
2	Cooling Tower Make-up Water	150	110	--	40	40	00
3	Fermenter Washing	40	--	--	40	40	00
4	Evaporator Condensate	--	--	495	--	--	--
5	Condensate Polishing Unit	--	--	223	--	--	--
Total		**905**	**110**	**718**	**300**	**223**	**77**

Remark: 77 m3/day of concentrated spentwash shall be generated after MEE. (Raw spentwash quantity - 572)

Note:
The consumption/losses and final wastewater generated is amounting (110+77) = 187 m3/day.

Net Water Requirement: 905-718 = 187 m3/day.

Effluent Generation: 300 m3/day out of which spentwash - 77 m3/day, Spentlees – 143 m3/day, fermenter washing waste- 40 m3/day and cooling tower wastewater generation – 40 m3/day.
All the effluent except concentrated spentwash shall be treated in proposed CPU and treated effluent shall be recycled in process.

Concentrated spentwash shall be treated based on Biomethanation followed by MEE followed by drying and converted to dry powder/granules (potash rich powder/manure).

Table 2-7 Water Requirement and wastewater generation of the factory

<table>
<tr><th>Sr. No.</th><th>Water Requirement m3/day</th><th colspan="3">Wastewater generation m3/day</th></tr>
<tr><td>1.</td><td colspan="4">Sugar Division</td></tr>
<tr><td rowspan="4"></td><td rowspan="4">Zero water requirement for sugar division except DM plant water requirement of 140 and domestic water requirement of 30. Thus total water requirement shall be 170
Water Saved – 42 (due to excess condensate from sugarcane juice)</td><td colspan="3">921</td></tr>
<tr><td>Sugar effluent</td><td colspan="2">218</td></tr>
<tr><td>Spray-pond effluent</td><td colspan="2">500</td></tr>
<tr><td>Co-generation power plant effluent</td><td colspan="2">203</td></tr>
<tr><td>2.</td><td colspan="4">Distillery Division</td></tr>
<tr><td rowspan="5">A.</td><td colspan="4">Based on “C” Molasses</td></tr>
<tr><td>331</td><td colspan="3">491</td></tr>
<tr><td rowspan="3"></td><td>Concentrated spentwash-176</td><td colspan="2">1.6 Liters of Conc. Spentwash/liter of RS Production</td></tr>
<tr><td>Spentlees</td><td colspan="2">220</td></tr>
<tr><td>Other dilute effluent</td><td colspan="2">95</td></tr>
<tr><td></td><td colspan="4">OR</td></tr>
<tr><td rowspan="5">B.</td><td colspan="4">Based on “B” Heavy Molasses</td></tr>
<tr><td>265</td><td colspan="3">425</td></tr>
<tr><td rowspan="3"></td><td>Concentrated spentwash-110</td><td colspan="2">1 Liters of Conc. Spentwash/liter of RS Production</td></tr>
<tr><td>Spentlees</td><td colspan="2">220</td></tr>
<tr><td>Other dilute effluent</td><td colspan="2">95</td></tr>
<tr><td></td><td colspan="4">OR</td></tr>
<tr><td rowspan="5">C.</td><td colspan="4">Based on “Sugarcane Juice/Syrup”</td></tr>
<tr><td>187</td><td colspan="3">300</td></tr>
<tr><td rowspan="3"></td><td>Concentrated spentwash-77</td><td colspan="2">0.7 Liters of Conc. Spentwash/liter of RS Production</td></tr>
<tr><td>Spentlees</td><td colspan="2">143</td></tr>
<tr><td>Other dilute effluent</td><td colspan="2">80</td></tr>
<tr><td colspan="5">Note:
A. Other diluted effluent consist of DM plant wastewater, fermenter washing waste, boiler blow-down wastewater and cooling tower wastewater generation.
B. Spentwash Storage Ponds:
1. - Concentrated Spentwash (176m3/day) - 30 days storage capacity i. e. 176*30 = 5280 say 5300 m3.
2. – Raw Spentwash (880m3/day) – 7 days storage capacity i.e. 880*7 = 6160 say 6200 m3.</td></tr>
</table>

D) Air Emission Management

Bagasse will be used as fuel for 1*68 TPH and 1*17 TPH boiler and the bagasse requirement will be 927.5 MT/D. Bagasse and Biogas shall be used as fuel for proposed 1*25 TPH boiler. Bagasse of 242 MT/D and biogas of 14300 m^3 shall be used during season.

A common stack of 55 meters height and ESP as APC equipment shall be provided for proposed 1*17 TPH and 1*25 TPH boiler to control air emissions..

Table 2-8 Details of boilers and its APC equipment for existing as well as proposed

Sr. No.	Stack attached to	Types of Fuel	Height in meter	APC System	Remark
Present Installation after up gradation					
1	Boiler 1*68 TPH	Bagasse	60	ESP	Already provided
Proposed Installation					
1	1* 17 TPH Boiler	Bagasse	Common stack of 55 m	ESP	ESP shall be provided
2	1*25 TPH Boiler	Bagasse and biogas			

E) Solid waste Management

a) Non Hazardous solid wastes details

Table 2-9 Details of non-hazardous waste generated and its disposal

Sr. No.	Description of waste	Quantity	Mode of Collection and Disposal
	Bagasse as fuel for all the boilers during season		
1.	Fly/ Boiler Ash	68TPH Boilers- 267.12 MT/M	Ash generated shall be sold to brick manufacturer/ Mixed with Pressmud and sold as manure
		17 TPH Boiler- 66.78 MT/M	
		25 TPH boiler- 87.12 MT/M	
2	Bottom Ash	68TPH Boilers- 66.78 MT/M	
		17 TPH Boiler- 16.69 MT/M	
		25 TPH boiler- 21.78 MT/M	
	Bagasse as fuel for 25 TPH Boiler during off season		
	Fly/ Boiler Ash	83.52 MT/M	Ash generated shall be sold to brick manufacturer/ Mixed with pressmud and sold as manure.
	Bottom Ash	20.88 MT/M	
3.	ETP Sludge	300 MT/A	ETP Sludge and Pressmud shall be sold as manure.
4.	Pressmud	200 MT/D	
Other Solid Wastes			
1.	Paper waste	0.01 MT/M	Manually collected and stored in a designated area and sold to scrap vendors
2.	Plastic waste	0.01 MT/M	
3.	Municipal Solid waste		

Sr. No.	Description of waste	Quantity	Mode of Collection and Disposal
	Non-Biodegradable	3 MT/M	Manually collected and sold to scrap vendors
	Bio-degradable	5 MT/M	Used as manure.

b. Hazardous Waste

Table 2-10 hazardous waste generated and its disposal

Sr. No.	Category	Description of waste	Quantity	Mode of Collection and Disposal
1.	5.1	Used Oil	1.01 KL/A	Shall be collected in Leak Proof Containers and utilized as lubricant for bullock carts

3 BASELINE ENVIRONMENTAL STATUS

3.1 AIR ENVIRONMENT

Ambient air monitoring was carried out at 8 locations, 24 hours a day, twice a week at each location over/for a period of three months (March 2022 to May 2022) to determine background concentrations. The Maximum concentrations of each pollutant observed are considered as a background concentration of the respective location, the summary of the results is given below.

1. Particulate Matter (PM_{10})

The maximum, minimum, average and 98th percentile concentrations for PM_{10} were recorded in the study area in the range of 45.3 to 67.9 µg/ m^3. The maximum 98th Percentile concentration is 67.62 µg/ m^3. were recorded at Project Site (location -1). The concentrations of PM_{10} are well below the CPCB standard of 100µg/ m^3.

2.Particulate Matter ($PM_{2.5}$)

The maximum, minimum, average and 98th percentile concentrations for Particulate Matter ($PM_{2.5}$) monitored in the study area were 21.1-39.7 µg/m^3. Highest 98th percentile value is 39.19 µg/m^3 which was observed at Project Site (location -1). The concentration of $PM_{2.5}$ is well below the prescribed limit of 60µg/m^3.

3. Sulfur Dioxide (SO_2)

The Minimum, maximum, average and 98th percentile value of Sulphur dioxide in the study area from the monitored data was in the range of 11.1-24.2 µg/ m^3. Maximum 98th Percentile value of Sulfur dioxide is 23.97 µg/ m^3obtained at Project Site (location -1). The concentration of SO_2 is well below the prescribed limit of 80µg/m3.

4.Oxides of Nitrogen (NOx)

The Minimum, maximum, average and 98th percentile value of Oxides of Nitrogen (NOx) in the study area from the monitored data was in the range of 17.4-28.7 µg/ m^3. Maximum 98th Percentile value of Oxides of Nitrogen (NOx) is 26.21 µg/ m^3obtained at Project Site (location -1). The concentration of NOx is well below the prescribed limit of 80µg/m^3.

5. Carbon Monoxide (CO)

The Minimum, maximum, average and 98th percentile value of Carbon Monoxide (CO) in the study area from the monitored data was in the range of 0.03-0.8 mg/ m^3. Maximum 98th Percentile value of Carbon Monoxide (CO) is 0.8 µg/ m^3 .The concentration of CO is well below the prescribed limit of 4.0 mg/m^3

The ambient air quality monitoring results indicates that the overall air quality in the study area is within permissible standards prescribed by NAAQ Standards.

3.1.1 IMPACT ON AIR QUALITY DUE TO PROPOSED ACTIVITY

At present bagasse quantity of 1169.5 MT/day is required as a fuel for during season and during offseason 14300 m3/day bio-gas and 1159.5 MT/day of bagasse is required, hence air quality predictions are done considering the fuel quantity of proposed scenario, results of which are indicated in the following tables. Emission data is collected through Source emission monitoring according to IS 11255 (Part-1 to 3 and Part-7). Results of the same as described below. These pollutant emission rates are used in AERMOD software to compute incremental GLCs for these receptors

Table 3-1 Stack Inventory

Sr. No.	Particulars	Description		
A. Point Source (Stack attached to boiler)				
1	Stack attached to	Sugar and Co-generation unit		
2	Capacity	68 TPH	17 TPH	25 TPH
3	Fuel type	Bagasse	Bagasse	Bagasse or Biogas
4	Total fuel quantity requirement	742MT/day	185.5 MT/day	Bagasse -242 MT/day or Biogas 14300 m3/day
5	Stack height	60 m.		55 m
6	Stack diameter	4.0 m.		
7	Flue gas temp.	120^0 - 135^0C		
8	Flue gas velocity	7.5 – 11.0 m/s		
9	Controlling equipment	ESP – 99% removal efficiency		
10	Emission rate	(g/sec)		
	i. TPM	0.2671		
Based on Observed Conc.& Fuel				
	ii. NOx	based on observed concentrations – 7.6		
	iii. SO_2	Based on Fuel - Bagasse - 0.02%		
		based on observed concentrations – 7.121		
		based on fuel characteristics - Bagasse – 1.9791		
11	Ash content	6.4125 MT/day		
12	Ash below grate	1.2825 MT/day (20 % of the total ash)		
13	Remaining Ash	5.13 MT/day (80 % of the total ash)		
14	Ash going to stack, QPM (with ESP removal efficiency of 99%)	0.0513 MT/day (Consider 99% ESP Efficiency)		
15	Ambient temperature	30^0C		
B. Line Source (Vehicular emission)				
	Average time of movement of vehicle inside the premises	5 min		
	Distance travelled by the vehicles inside premises	0.2 km		
	Q_{PM} (g/sec)	0.1045		
	Q_{NOx} (g/sec)	1.1349		
	Q_{CO} (g/sec)	0.5857		

3.2 WATER ENVIRONMENT

Water sampling and subsequent analysis was carried out to determine both the groundwater and surface water quality of the study area. Ground water & Surface water samples were collected at 8 locations & 7 locations respectively within study area. These samples were analyzed for physical and chemical parameters to ascertain the Baseline status in the existing surface water and ground water bodies.

Table 3-2 Water Analysis Results

Sr. No	Parameters	Ground water		Surface water	
		Min	Max	Min	Max
1.	pH	7.30	7.50	7.30	7.44
2.	Dissolved Solids (mg/l)	416.2	478.6	314.6	391.4
3.	Total Hardness (mg/l)	156.8	197.6	134.6	151.4
4.	Chlorides (mg/l)	86.4	111.9	78.9	90.2
5.	Fluoride (mg/l)	<1	<1	<1	<1
6.	Sulphates (mg/l)	62.4	76.7	43.2	62.3

Ground water and surface water samples were collected and analyzed as per the Standard methods and the water quality of the study area is found within the permissible limits of IS: 10500- 2012. Except Fluoride concentrations observed are lower than the required concentration.

Groundwater quality is found to be good, which can be directly used for irrigation purpose. However, ground water used for drinking purpose after the appropriate treatment.

Surface water quality is found to be good, which can be directly used for irrigation purpose. However, for drinking purpose, conventional treatment suggested.

3.3 SOIL ENVIRONMENT

The soil monitoring was carried out at 8 locations in the study area, and analyzed for chemical and physical characteristics; the summary of the results is as under

- The finding of the study reveals that pH of soil in the area ranged between **7.20** to **7.50** which is an indicative of the **neutral** to **slightly alkaline** soil.
- The values for Nitrogen at all locations varied between **187.9** to **324.9 mg/kg.** Maximum concentration of nitrogen was observed at location S-1, while the lowest concentration can be observed at location S-6.
- It is important to note that the concentration of potassium was found to be high at all locations ranging between **64.2** to **124.9 mg/kg.**

Based on the above findings it can be concluded that the soil samples can be classified as per soil classification given by Tondon H.L.S. (2005). The samples fall under **medium to high** fertile soils.

3.4 NOISE ENVIRONMENT

Daytime Noise Levels $(Leq)_{day}$

Residential Zone: The daytime noise levels in all the locations were observed to be in the range of 49.74 dB (A) to 51.23 dB (A), which is well below the permissible limit of 55 dB (A).

Industrial Zone: The daytime noise level 53.08 dB (A) is observed at project site

Night time Noise Levels (Leq) $_{night}$

Residential Zone: The night time noise levels in all the residential locations were observed to be in the range of 41.94 dB (A) –43.40 dB (A), which is well below the permissible limit of 45 dB (A).

Industrial Zone: The night time noise level 43.18 dB (A) is observed at project site

The industry is making all efforts to control the noise levels within the limits by providing acoustic measures and silencer pads etc. all the employees in these work places shall be provided with ear plugs / muffs for the proposed establishment and expansion

3.5 LAND USE/LAND COVER OF THE STUDY AREA

Table 3-3 Change in General Land use/ Land cover of Study Area (2009 to 2019)

Land use	Area in km2	% of Study Area
Built up	521	1.66
Agriculture land	19697	21.53
Forest	155	0.49
Wasteland	10999	35.01
Water Bodies	44	0.14
Total	**31416**	**100**

3.6 ECOLOGY AND BIODIVERSITY

- The existing biodiversity in the study area was observed to be very low mainly due to the semi-rural and agrarian setting of the location. The project is well connected to major and minor roads.
- During project implementation, monitoring of the existing biodiversity and its improvement or degradation with respect to project activities should be monitored periodically.
- Proper sanitary conditions should be provided to all workers working within the premises to avoid open defecation as it poses not only a health hazard but can also allow unwanted weeds to grow within the premises. The staff and workers should also be educated and sensitized about the same.
- The efficiency of the waste treatment facilities should also be periodically with proper maintenance of records for auditability. Also the recycled water being supplied for agriculture should be checked for its pathogenic activity.
- The project activities should be carried out only after considering all possible secondary and tertiary impacts on the environment and mitigation measures should be incorporated such as to reduce any possibility of impact on the existing environment.

3.7 DEMOGRAPHIC OR SOCIO-ECONOMIC PROFILE

The proposed project has a positive response from the public. The willingness to pay and the willingness to accept the project has positive outcome. The losses due to the polluting agents can be diluted through

various methods. The unit has recycled waste water after treatment. The social and cultural vulnerability index responds a very less and level of resilience is at the higher side. The families dwelling around could get more facilities due to the industry during the corresponding period.

4 IDENTIFICATION, PREDICTION AND MITIGATION MEASURES

Approx. 100 nos. of labours shall be employed during installation phase for the project which includes installing new machinery and units of the plant.

Table 4-1 Anticipated environment impacts its effect and mitigation measures during construction phase

Sr. No.	Impacts	Effects	Mitigation Measures
1	Dust	Respiratory diseases	All the internal Roads are tar felted Dust separation sprinkling water, use machinery meeting
2	Noise	Impairing, Hearing, Fatigue related Health issues	Provide acoustic measures and silencer pads to reduce noise level. Provide personal protective equipment to the workers.
3	Land	Reduction of vacant land	Utilize the existing infrastructures and adopt vertical expansion and maximize the operation schedules.
4	Top soil	Loss of fertility	Utilize for Green belt development.
5	Water	Additional water is required for construction activities and Drinking	Minimize the water requirements by adopting mechanical mixing and Drinking water in Bottles instead of Taps.
6	Wastewater	Improper disposal of waste water leads to contamination of water sources and soil	Domestic wastewater shall be treated based on Root zone technology and treated wastewater shall be used for gardening.

Anticipated environment impacts its effect and mitigation measures during operational phase is given in chapter 4.

5 ANALYSIS OF ALTERNATIVE (TECHNOLOGY AND SITE)

Sitaram Maharaj Sakhar Karkhana (Khardi) Ltd. (SMSKL), At Gat no. 798/1,798/2,780/2/1,795/2,797/2,797/3,793/1,793/2,794/1,794/2,785/1,25 Khardi, Tal-Pandharpur,Dist-Solapur Was registered vide registration no. U15424PN1999PLC013656

The command area of the factory has excellent cane potential and the sugarcane grown in this area is rich in sucrose content. The industry proposes to expand sugarcane crushing capacity from 2500 TCD to 5000 TCD, Co-generation power plant from 10 MW to 18 MW and establishment of 110 KLPD distillery unit to produce 110 KLPD RS/ENA/Ethanol based on "C" / "B Heavy" molasses/syrup. Sugarcane potential of SMSKL from its command area is high. The raw material required for distillery unit shall be taken from own sugar.

- 65 km away from Solapur, which is a District place.
- Other important towns nearby are
    - Khardi, at a distance of 3.02 km
    - Pandharpur is nearest Railway station 14 km away from the factory site in North Direction
    - Solapur airport is nearest airport 69 km away from the factory site in ENE Direction
- Environmental Setting-
    - Location –17°33'8.92"N and 75°17'8.44"E
    - Nearest Village – Khardi- 3.02 km in NE Direction
    - Nearest National Highway – SH161 –Miraj-Sangola-Pandharpur Road- 2 km in west direction
    - Nearest Railway Station – Pandharpur railway station at 14 km in North Direction
    - Nearest Airport –Solapur – 69 Km in ENE direction
    - Nearest River – Mnganga River – 3.5 Km in SE Direction from plot boundary
    - Seismicity – Seismic Zone III

The industry has sufficient land for proposed expansion and establishment. The minimum quantity of water is required, which can be obtained from the irrigation department. There are no negative impacts due the proposed expansion. Thus, the existing site is suitable for the proposed expansion.

6 ENVIRONMENT MONITORING PROGRAMME

Table 6-1 Environment management programme

SR.NO	ITEM	PARAMETERS	FREQUENCY OF MONITORING	LOCATION
1.	Ambient Air quality at appropriate location for PM_{10}, $PM_{2.5}$, SO_2,andNO_x,	PM_{10}, $PM_{2.5}$, SO_2,andNO_x	24 hourly, Quarterly	5 Locations 1 @ Upwind and 2@ downwind directions from stack @ 120^0 to each other Near entry and exit gates
2.	Stationary Emission from Stack PM, SO_2, NOx	PM, SO_2, NOx	Monthly	1 DG set Stack, 2 Boiler Stack
3.	Water	Water quality parameters as per 10500:2012	Monthly	Drinking water locations
	Waste water quality (treated and Untreated)	pH, BOD, COD, TSS, Flow, TDS etc.	Monthly	ETP inlet and Outlet
4.	Noise	Day and Night levels Equivalent noise level- dB (A)	Quarterly or as often as required	6 Locations Upwind and downwind directions Near boilers and near main gate and ETP.
5.	Soil (Qualitative and quantitative testing/analysis to check the soil fertility,)	pH, Cation Exchange Capacity, Total Nitrogen, Phosphorous, Potassium, moisture, Permeability, Conductivity, Texture & structure, Organic carbon	Quarterly or as often as required	1 near Greenbelt 1 near ETP Composite sample shall be taken at each location
6.	Solid waste generation monitoring / Record Keeping	Manual record keeping	To be updated daily	
7	Greenbelt and plantation monitoring	Type of species shall be decided based on soil & climatic conditions. The number of trees would be 1500 per hectare, however; the number of trees would	Six Monthly	

SR.NO	ITEM	PARAMETERS	FREQUENCY OF MONITORING	LOCATION
		vary depending on the typeof soil		
8	Carbon and Water foot Print Monitoring	Maintain the data of raw materials consumption, steam consumption, vehicle frequency for transport of raw materials, effluent generation, air emissions, hazardous waste generation, and raw material recovery	Daily and Monthly	

7 ADDITIONAL STUDIES

7.1 RISK ASSESSMENT

HAZOP and Quantitative Risk Assessment studies are carried out for each product, disasters management plan, onsite and offsite emergency plan are prepared and given in Chapter 7 of the EIA Report

Project proponent will implement all preventive measures to tackle all type of emergencies arising out of operation or malfunction of individual unit's. The required resources for Onsite and Offsite emergency management plan will be properly planned and provided to implement the plan effectively. The factory shall give highest priority towards Health and safety of the employees and people residing nearby areas. Management shall conduct the training to the nearby villagers to appraise them about their role during emergency. All nearby people shall be given training on do's and don'ts during emergency situation.

Distillery Industry (Ethanol Plant) is associated with potential hazards to the employee and environment**.** As the hazards involved during operation and production activities will be known to the Management, all required mitigation measures shall be implemented in time to avoid the emergency situation from the arising. Unfortunately, if there is any emergency onsite of offsite, it will be tackled effectively due to availability of required resources at the site. Similarly, all the concern staff and members of the Teams shall be trained appropriately to tackle the emergencies in the plant. By knowing the type of emergency situation that may arise during operation of the plant, appropriate control measures will be implemented to reduce the gravity of the emergencies. Similarly, to avoid the emergency situation, all required mitigation measures will be implemented as recommended.

8 BUDGETARY PROVISIONS TOWARDS ENVIRONMENTAL MANAGEMENT PLAN:

The costs involved in environmental monitoring and management to mitigate the adverse effects will be put on account for the proposed project. The capital cost for the EMP will be Rs. 2915 Lakhs. And recurring cost will be Rs.314 Lakhs. The detailed EMP budget is given in table below

Table 8-1EMP Budget

Sr. No.	Component	Particulars		Capital investment in Lakhs	Recurring Cost in Lakhs
1	Air	Construction of new stack for boiler and ESP		400	30
2	Water	• Distillery CPU. • MEE and Drier • WTP		2200	200
3	Noise	Acoustic enclosures, Silencer pads, ear plugs etc.		50	10
4	Environment monitoring and Management	Monthly Environment Monitoring (Per Year)		0	10
		Ambient air monitoring	PM_{10}, $PM_{2.5}$, SO_2, NOx		
		Boiler & DG Set Monitoring	TPM, SO_2, NOx		
		Effluent (Distillery CPU) (Treated & Untreated)	pH, COD, BOD, TSS, TDS, Oil & Grease		
5	Occupational Health	Glares, Breathing Masks, Gloves, Boots, Helmets, Ear Plugs etc. & annual health-medical checkup of workers, Occupational Health (training, OH center)		60	10
6	Greenbelt	Green belt development activity		10	3.0
7	Solid and hazardous Waste Management	Solid and hazardous waste management		50	10
8	Rain water harvesting	Rain water harvesting		15	3
9	Storm water drainage	Storm water drainage design and construction		25	5
10	Carbon and Water Foot Print	Maintain the data of raw materials consumption, steam consumption, vehicle frequency for transport of raw materials, effluent generation, air emissions, hazardous waste generation, and raw material recovery		--	10

Sr. No.	Component	Particulars	Capital investment in Lakhs	Recurring Cost in Lakhs
11	Solar Power & Energy Conservation	Street lights installation with Solar Systems	60	10
12	Fire and Safety	Fire and Safety Management	30	8
13	Laboratory	Testing and Analysis	15	5
Total Cost (In Lakhs)			**2915**	**314**

9 CORPORATE ENVIRONMENT RESPONSIBILITY PLAN

The capital cost of the proposed expansion project is Rs. 319.19 Crores. The industry has reserved **Rs. 2.3939 Crores** (0.75 % of the cost of the project as per Office Memorandum Vide F. No. 22-65/2017-IA.III Dated 01.05.2018) which will be spent on the activities like sanitation and health, education, and educational facilities as a cost towards corporate environment responsibility (CER).

10 RAINWATER AND STORMWATER HARVESTING PLAN

The industry is making efforts to conserve natural resources by adopting green technologies and as such industry proposes to adopt rain water harvesting system. With the annual rainfall of 679 mm there is good potential to harvest rainwater. The rainwater harvesting system is installed at various buildings and about 2000 m^3 per year water is harvested. This shall be shall be stored in storage tank and shall be utilized for greenbelt development/gardening purpose

Stormwater management system is also adopted by the industry. Separate drains of minimum 0.45 m * 0.60 m are provided for the collection and disposal of storm water from the industry premises. The rainwater harvesting design details are given in Annexure-III of the EIA Report.

11 CONCLUSIONS

As the industry has provided all the necessary pollution control measures for water, Air and Solid and hazardous waste disposal, the negative impacts on the environment would be minimal/ negligible. The expansion programme would help the farmers to crush their produce in time which would help to minimize the loss of sugarcane tonnage and yield maximum financial benefits.