EXECUTIVE SUMMARY

PROPOSED EXPANSION OF SUGARCANE CRUSHING CAPACITY FROM 2500 TO 4800 TCD AND DISTILLERY CAPACITY FROM 30 KLPD TO 45 KLPD (RS/ENA/ETHANOL) BASED ON "C"/"B" HEAVY MOLASSES/ SUGARCANE SYRUP /SUGARCANE JUICE AS RAW MATERIAL"

AT

SHAHUNAGAR, SHENDRE, TALUKA AND DISTRICT SATARA, MAHARASHTRA STATE

BY

AJINKYATARA SAHAKARI SAKHAR KARKHANA LIMITED

Report Prepared By:

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1 INTRODUCTION

Ajinkyatara Sahakari Sakhar Karkhana Limited (ASSKL), is a registered as a co-operative society Vide No.SAT/PRG(A) 6 (5) dated 28th October 1970 under the Maharashtra State Society Act 1960. The project site is located at Shahunagar, Shendre, Taluka and District- Satara, Maharashtra and is adjacent to Pune- Bangalore National Highway (NH-4).

ASSKL established a sugar unit of 1250 TCD in the year 1984-85. The industry expanded its sugarcane crushing capacity from 1250 to 2500 TCD in the year 1991-92 and established 30 KLPD distillery. The Sugar expansion do not attract Environment Clearance as the capacity of the Sugar unit is below 2500 TCD and the Distillery unit is established before the prior EIA Notification of 1994.

The industry now proposes the expansion of sugarcane crushing capacity from 2500 to 4800 TCD and distillery capacity from 30 KLPD to 45 KLPD (RS/ENA/Ethanol)based on sugarcane juice /sugarcane syrup/ "B" Heavy Molasses /"C" Molasses.

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	Directions w.r.t. site
1.	latitude	170 37' 28.61" N	
2.	Longitude	740 01' 17.31" E	
3.	Elevation above MSL	667 m	
4.	Nearest highway	NH 4 (0 km)	SW
5.	Nearest railway station	Satara(9 km)	NE
6.	Nearest air port	Pune (107 Km)	N
7.	Nearest town	Satara (6 km)	N
8.	Nearest human settlement	Shendre (1 km)	W
9.	Nearest port	Jawaharlal Nehru Port (190 km)	NW
10.	Nearest water body	a) Urmodi River (2 Km)	W
		b) Krishna River (7 Km)	NE
11.	Protected Area	None within 10 km	
12.	Reserved Forests	None within 10 km	
13.	Wildlife Sanctuary	None within 10 km	
14.	Archeological site	None within 10 km	
15.	State boundary	None within 10 km	
16.	Defense installations	None within 10 km	
17.	Average Rainfall	1023 mm	
18.	Seismicity:	Seismic Zone III	

2 PROJECT DESCRIPTION

The details about the maufacturing capacity of existing unit as well as after the proposed expansion are given in table below

Table 2.1 Existing and Proposed Products manufacturing quantities

Sr. No.	Description	Unit	Existing Capacity	Proposed Capacity	Total	Remark
1.	Sugar Unit	TCD	2500	2300	4800	
2	Co-generation Power	MW	19	0	19	**(Operated on Boot Principle)**
3.	Distillery Unit	KLPD	30	15	45	
	Rectified Spirit or	KLPD	30	15	45	Only one product at a time
	Extra Neutral Alcohol or		30	15	45	
	Ethanol		30	15	45	

2.1 RESOURCE REQUIREMENT AND INFRASTURE FACILITIES

A) Land use Details

The total area available with the factory is **85.42 Hectares** Out of which, **29.81 Hectares** will b**e** utilized for green belt development. A detailed area breakup is given below.

Table 2.2 Landuse breakup

Description	Area in Sq. meters	% area
Built-up area	45939.94	5.37
Parking area	125225.72	14.66
Effluent treatment facility area	8916.53	1.04
Internal roads	69795.74	8.17
Area under open space	237169.36	27.79
Greenbelt	298111.07	34.90
Pressmud storage area	62413.03	7.30
MSEB Substation	6628.61	0.77
Total	**854200**	**100**

B) Power requirement

At present, the power requirement for Sugar and Distillery unit is 5.2 MW. Additional 3.3 MW of power will be required after the proposed expansion. Thus, the total power requirement after the proposed expansion will be 8.5 MW. At present, the steam and power required by the Sugar and Distillery unit is taken from Co-generation power plant which is operated on BOOT principle.

C) Water Consumption details

Industrial Purpose:

The Urmodi River is the nearest water body of 2 km away from the factory site, which is the main source of water.

Sugar Division - The sugar unit and co-generation power plant works on zero water requirements detailed water budget of the Sugar division is shown in **Table 2.3.**

Distillery Division – The distillery unit works on zero water requirements. Detailed water budget of the distillery unit is shown in **Table 2.5 to Table 2.7.**

Note: 1) All the excess condensate and treated effluent shall be recycled into process.

2) Saved water from sugar unit shall be used for distillery operation during season and remaining shall be stored.

Domestic Purpose:

At present water requirement is 8.5m3/day, no additional water requirement after the proposed expansion

Water balance calculations:

Sugar division

Table 2.3 Water Budget -Sugar Unit

Sr. No.	Details	Water Requirement (KLD)			Consumption/Losses (KLD)			Reuse / Recovery (KLD)			Waste Generation (KLD)		
		E	P	T	E	P	T	E	P	T	E	P	T
Domestic Purpose													
1	Domestic	51.5	8.5	60	8	2	10	--	--	--	43.5	6.5	50
Industrial Purpose													
1	Process water	85	80	165	10	8	18	--	--	--	75	72	147
2	Washing of equipment	30	25	55	0	--	--	--	--	--	30	25	55
3	Air compressors & pumps	40	30	70	5	4	9	35	26	61	--	--	--
4	Condenser Water	--	--	--	--	--	--	500	460	960	All the condenser water shall be treated in proposed CPU of capacity 1000 KLD and recycled as process water.		
5	Spray pond blow-down	500	460	960	250	230	480	--	--	--	250	230	480
6	Cooling tower blow-down	--	80	80	--	45	45	--	--	--	--	35	35
7	Colony fire fighting& Gardening	200	--	200	200	--	200	--	--	--	--	--	--
8	Recycling of Excess Condensate	--	--	--	--	--	--	500	460	960	--	--	--
Total		**855**	**675**	**1530**	**465**	**287**	**752**	**1035**	**946**	**1981**	**355**	**362**	**717**

Where,

E –Existing 2500TCD
P –Proposed 2300 TCD
T - Total 4800 TCD

Note: Fresh water requirement shall be 60m3/day, which is for Domestic purpose.

- The consumption/losses and final wastewater generated is amounting (752 + 717) = 1469m3/day
- The excess condensate and condensers water available is 1920 m3/day. Thus the excess water available for reuse would be around 1920 –• 1469 = 451 m3/day.

Net Water Requirement:

i) Industrial Purpose: 1530 – 1981 = -451 m3/day

(The total save water = **-451 m3/day**)
Due to excess condensate available from Sugar unit, there shall not be water requirement for sugar unit. In fact an excess amount 451 m3/day is saved, which shall be used for gardening 80 m^3/day, irrigation 188 m^3/day, in distillery 122 m^3/day operation etc. and remaining water 61m^3/day shall be stored in proposed tank to be used during off season.

ii) Domestic Purpose: At present water requirement is 60 m3/day.

Effluent Generation:

i. Industrial - 717 m3/day out of which sugar effluent - 237 m3/day, spray pond effluent – 480 m3/day which shall be treated in proposed CPU and shall be used as process water.

ii. Domestic – 60 m3/day

Note: The sugar effluent shall be treated in ETP followed by RO and recycled into process. Remaining saved quantity of 451 KLD, out of which 80 KLD used for greenbelt purpose, 188 KLD used for irrigation purpose and 122 KLD shall be used for distillery operation and the remaining 61KLD shall be stored for use in Distillery operations during Off-Season. Sugar and Distillery units operate on Zero Water requirement. However, initially 555 KL of water is taken for Distillery Boilers and daily 8.5 KLD for Domestic use.

Table 2.4 Zero water requirement for distillery unit

Sr. No	Description	Daily water requirements/save	No. of working days	Total (m3/annum)		Final (m3/annum)
1	45 KLPD Distillery water requirements During Season	122	180	21960	32940	**32940** (Water Requirement)
2	45 KLPD Distillery water requirements During Off season	122	90	10980		
	Total water saved during season from sugar division	183 (Saved)	180	32940		**32940**(Water Saved)

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Calculations:

Daily water saved from sugar unit = 451 KLD out of which 80 KLD used for greenbelt purpose and 188 KLD for irrigation purpose.

Daily water required for distillery is met from saved water from sugar unit = 371 – 122 - 188
= 61 KLD

Water stored for distillery operation during off season = 61*180
= 10980 KLD

Distillery division

I. Based on "C"Molasses

Table 2.5 Water Budget for Distillery Division (based on "C"Molasses)

Sr. No.	Details	Water Requirement (m^3/day)			Consumption/Losses (m^3/day)			Reuse / Recovery (m^3/day)			Waste Generation (m^3/day)			Recycle / Reuse (after CPU)
		E	P	T	E	P	T	E	P	T	E	P	T	
Domestic														
1	Domestic	8.5	--	8.5	5	--	5	--	--	--	3	--	3	--
Industrial														
1	Process Water	300	150	450	--	--	--	Raw Spentwash			240	120	360	72 To Composting
								Dried/ Conc. Spentwash			48	24	72	
								MEE Condensates			192	96	288	288To CPU
								Spentless			60	30	90	90 to CPU
3	Cooling Tower Make-up Water	45	15	60	35	15	50	--	--	--	10	--	10	10To CPU
4	Fermenter Washing	15	5	20	--	--	--	--	--	--	15	5	20	20 To CPU
5	Miscellaneous such as pump and gland cooling etc.	15	10	25	--	--	--	15	10	25	--	--	--	--
6	Excess condensate taken from sugar unit	--	--	--	--	--	--	--	122	122	--	--	--	--
7	Treated effluent from Distillery CPU	--	--	--	--	--	--	277	131	408	--	--	--	--
Total		**375**	**180**	**555**	**35**	**15**	**50**	**292**	**263**	**555**	**325**	**155**	**480**	**408**

Where,
E: Existing –30 KLPD
P: Proposed – 15 KLPD
T: Total – 45 KLPD

Note:

The effluent streams are separated as Strong Stream (Raw Spentwash- 360 m^3/day) and weak stream (Spentless and Non-process effluents- 120 m^3/ day)

The raw spentwash (240 m^3/day) from existing 30 KLPD Distillery shall be treated based on composting (240 m^3/day is concentrated to 48 m^3/day in MEE and MEE Condensates of 192 m^3/day shall be sent to Distillery CPU).

After the proposed expansion the quantity of raw spentwash (360 m^3/day) shall be concentrated in MEE followed by "Composting". The raw spentwash is concentrated to 72 m^3/day in MEE, and treated in existing "Composting" Unit and MEE Condensates of 288 m^3/day shall be sent to CPU for further treatment along with weak stream effluent (120m^3/day) therefore the total quantity of wastewater that may be treated in CPU shall be 408 m^3/day, which shall be treated based on primary, Secondary and tertiary treatment and the entire treated effluent shall be recycled back to process.
Net water requirement:

Industrial: 555– 555 =0m^3/day

The net water requirement of the proposed distillery shall be 0m^3/day.

II. Based on "B" Heavy Molasses

Table 2.6Water Budget for Distillery Division (based on "B" Heavy Molasses)

Sr. No.	Details	Water Requirement (m^3/day)			Consumption/Losses (m^3/day)			Reuse / Recovery (m^3/day)			Waste Generation (m^3/day)			Recycle / Reuse (after CPU)
		E	P	T	E	P	T	E	P	T	E	P	T	
Domestic														
1	Domestic	8.5	--	8.5	5	--	5	--	--	--	3	--	3	--
Industrial														
1	Process Water	240	120	360	--	--	--	Raw Spentwash			180	90	270	45 To Composting
								Dried/ Conc. Spentwash			30*	15*	45*	
								MEE Condensates			150*	75*	225*	225 To CPU
								Spentless			60	30	90	90 to CPU
3	Cooling Tower Make-up Water	45	15	60	35	15	50	--	--	--	10	--	10	10To CPU
4	Fermenter Washing	15	5	20	--	--	--	--	--	--	15	5	20	20 To CPU
5	Miscellaneous such as pump and gland cooling etc.	15	10	25	--	--	--	15	10	25	--	--	--	--
6	Excess condensate taken from sugar unit	--	--	--	--	--	--	--	122	122	--	--	--	--
7	Treated effluent from Distillery CPU	--	--	--	--	--	--	230	115	345	--	--	--	--
Total		**315**	**150**	**465**	**35**	**15**	**50**	**245**	**247**	**492**	**265**	**125**	**390**	**345 To CPU**

Where,

E: Existing –30 KLPD

P: Proposed – 15 KLPD

T: Total – 45 KLPD

The effluent streams are separated as Strong Stream (Raw Spentwash- 270 m^3/day) and weak stream (Spentless and Non-process effluents- 120 m^3/ day)

The raw spentwash (180 m^3/day) from existing 30 KLPD Distillery shall be treated based on composting (180 m^3/day is concentrated to 30 m^3/day in MEE and MEE Condensates of 150 m^3/day shall be sent to Distillery CPU).

After the proposed expansion the quantity of raw spentwash (270 m^3/day) shall be concentrated in MEE followed by. The raw spentwash is concentrated to 45 m^3/day in MEE and MEE Condensates of 225 m^3/day shall be sent to CPU for further treatment along with weak stream effluent (120m^3/day) therefore the total quantity of wastewater that may be treated in CPU shall be 345 m^3/day, which shall be treated based on primary, Secondary and tertiary treatment and the entire treated effluent shall be recycled back to process.

Net water requirement:

Industrial: 465– 492 = - 27m^3/day

The net water requirement of the proposed distillery shall be 0m^3/day. Water saved shall be 27 m^3/day, which shall be utilized additionaly for gardening purpose.

III. Based on Sugarcane juice / concentrated sugarcane juice

Table 2.7Water Budget for Distillery Unit (based on Sugarcane juice / concentrated sugarcane juice)

Sr. No.	Details	Water Requirement (m^3/day)			Consumption/Losses (m^3/day)			Reuse / Recovery (m^3/day)			Waste Generation (m^3/day)			Recycle / Reuse (after CPU)
		E	P	T	E	P	T	E	P	T	E	P	T	
Domestic														
1	Domestic	8.5	--	8.5	5	--	5	--	--	--	3	--	3	--
Industrial														
1	Process Water	210	105	315	--	--	--	Raw Spentwash			150	75	225	25 To Composting
								Dried/ Conc. Spentwash			15*	10*	25*	
								MEE Condensates			135*	65*	200*	200 To CPU
								Spentless			60	30	90	90 to CPU
3	Cooling Tower Make-up Water	45	15	60	35	15	50	--	--	--	10	--	10	10To CPU
4	Fermenter Washing	15	5	20	--	--	--	--	--	--	15	5	20	20 To CPU
5	Miscellaneous such as pump and gland cooling etc.	15	10	25	--	--	--	15	10	25	--	--	--	--
6	Excess condensate taken from sugar unit	--	--	--	--	--	--	--	122	122	--	--	--	--
7	Treated effluent from Distillery CPU	--	--	--	--	--	--	210	110	320	--	--	--	--
Total		**285**	**135**	**420**	**35**	**15**	**50**	**225**	**242**	**467**	**235**	**110**	**345**	**320 To CPU**

Where,

E: Existing –30 KLPD

P: Proposed – 15 KLPD

T: Total–45 KLPD

The effluent streams are separated as Strong Stream (Raw Spentwash- 225 m^3/day) and weak stream (Spentless and Non-process effluents- 120 m^3/ day)

The raw spentwash (180 m^3/day) from existing 30 KLPD Distillery shall be treated based on composting (150 m^3/day is concentrated to 15 m^3/day in MEE and MEE Condensates of 135 m^3/day shall be sent to Distillery CPU).

After the proposed expansion the quantity of raw spentwash (225 m^3/day) shall be concentrated in MEE followed by. The raw spentwash is concentrated to 25 m^3/day in MEE and MEE Condensates of 200 m^3/day shall be sent to CPU for further treatment along with weak stream effluent (120m^3/day) therefore the total quantity of wastewater that may be treated in CPU shall be 320 m^3/day, which shall be treated based on primary, Secondary and tertiary treatment and the entire treated effluent shall be recycled back to process.

Net water requirement:

Industrial: 420– 467 = - 47m^3/day

The net water requirement of the proposed distillery shall be 0m^3/day. Water saved shall be 47 m^3/day, which shall be utilized additionally for gardening purpose.

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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 composting.

Table 2.8 Water Requirement and wastewater generation of the factory

<table>
<tr><th>Sr. No.</th><th>Water Requirement KLD</th><th colspan="2">Wastewater generationKLD</th></tr>
<tr><td>1.</td><td colspan="3">Sugar Division</td></tr>
<tr><td rowspan="3"></td><td rowspan="3">Zero water requirement for sugar unit and domestic water requirement of 60. Water Saved – 451(due to excess condensate from sugarcane juice)</td><td colspan="2">717</td></tr>
<tr><td>Sugar effluent</td><td>237</td></tr>
<tr><td>Spray-pond effluent</td><td>480</td></tr>
<tr><td>2.</td><td colspan="3">Distillery Division</td></tr>
<tr><td rowspan="5">A.</td><td colspan="3">Based on “C” Molasses</td></tr>
<tr><td>0</td><td colspan="2">480</td></tr>
<tr><td rowspan="3"></td><td>Concentrated spentwash</td><td>72</td></tr>
<tr><td>Spentlees</td><td>90</td></tr>
<tr><td>Other dilute effluent</td><td>120</td></tr>
<tr><td></td><td colspan="3">OR</td></tr>
<tr><td rowspan="5">B.</td><td colspan="3">Based on “B” Heavy Molasses</td></tr>
<tr><td>0</td><td colspan="2">390</td></tr>
<tr><td rowspan="3"></td><td>Concentrated spentwash</td><td>45</td></tr>
<tr><td>Spentlees</td><td>90</td></tr>
<tr><td>Other dilute effluent</td><td>120</td></tr>
<tr><td></td><td colspan="3">OR</td></tr>
<tr><td rowspan="5">C.</td><td colspan="3">Based on “Sugarcane Juice/Syrup”</td></tr>
<tr><td>0</td><td colspan="2">345</td></tr>
<tr><td rowspan="3"></td><td>Concentrated spentwash-</td><td>25</td></tr>
<tr><td>Spentlees</td><td>90</td></tr>
<tr><td>Other dilute effluent</td><td>120</td></tr>
<tr><td colspan="4">Note: Other diluted effluent consist of DM plant wastewater, fermenter washing waste, boiler blow-down wastewater and cooling tower wastewater generation.</td></tr>
</table>

D) Air Emission Management

Bagasse will be used as fuel in Co-generation plant which is operated in Boot principle. Sugar complex fulfilled the requirement by taking steam and power from co-generation plant. Stack of 72 meters height and electrostatic precipitator (ESP) as APC equipment will be provided to control the dispersion of pollutants releasing due to combustion of fuel.

Table 2.9 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					
1	Boiler 1*100 TPH	Bagasse	72	ESP	NA

E) Solid waste Management

a) Non Hazardous solid wastes details

Table 2.10 Details of non-hazardous waste generated and its disposal

Sr. No.	Description of waste	Quantity	Mode of Collection and Disposal
1.	ETP Sludge	300 MT/A	ETP Sludge and Pressmud shall be sold as manure.
2.	Pressmud	5760 MT/M	
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		
	Non-Biodegradable	3 MT/M	Manually collected and sold to scrap vendors
	Bio-degradable	5 MT/M	Used as manure.

b. Hazardous Waste

Table 2.11 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 9 locations (2 inside the factory premise and 7 within study area) 24 hours a day, twice a week at each location over/for a period of three months (December 2020 to February 2021) 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 40.1 to 72.5µg/ m^3. The maximum 98th Percentile concentration is 68.82µg/ m^3 were recorded at Factory (Near Quarters) (AAQ-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 21.30– 42.50µg/m^3. Highest 98th percentile value is 41.72µg/m^3 which was observed at Factory (Near ETP) (AAQ-2). 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 13.20 – 31.20µg/ m^3. Maximum 98th Percentile value of Sulfur dioxide is 30.88 µg/ m^{3}obtained at Shahunagar (AAQ -5). 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 12.10– 32.40µg/ m^3. Maximum 98th Percentile value of Oxides of Nitrogen (NOx) is 30.33 µg/ m^{3}obtained at Shahunagar (AAQ -5). The concentration of NOx is well below the prescribed limit of 80µg/m^3.

5. Carbon Monoxide (CO)

The maximum, minimum, average and 98th percentile concentrations for Carbon Monoxide (CO) monitored in the study area were 0.2 – 1.2 mg/m^3 respectively. Highest 98th Percentile value is 1.15 mg/ m^3 was recorded at Factory (Near Quarters) (AAQ-1). The concentration of CO is well below the prescribed limit of 4 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.

Table 3.1 Receptor Summary

Sr. No.	Description of Receptor	Receptor/Village	Latitude	Longitude	Distance (in meter) from stack	Angle w. r. t. stack-
Factory Location			17°37'28.56"N	74° 1'10.68"E	--	--
1	--	Stack	17°37'34.90"N	74° 1'21.91"E	--	--
2	AAQ-1	Factory (Near Quarters)	17°37'40.86"N	74° 1'20.19"E	192.00	345.47
3	AAQ -2	Factory (Near ETP)	17°37'18.84"N	74° 1'20.77"E	491.61	183.93
4	AAQ -3	Pogarwadi	17°38'38.61"N	73°57'6.76"E	7772.75	284.69
5	AAQ -4	Songaon	17°38'46.50"N	73°59'34.62"E	3853.14	305.02
6	AAQ -5	Shahunagar	17°40'47.97"N	74° 0'12.24"E	6281.74	341.02
7	AAQ -6	Degaon	17°38'11.60"N	74° 3'21.75"E	3708.48	72.19
8	AAQ -7	Jadhavwadi	17°37'16.90"N	74° 6'28.22"E	9047.39	93.52
9	AAQ -8	Apshinge	17°34'17.99"N	74° 4'0.96"E	7658.82	142.40
10	AAQ -9	Padali	17°35'1.51"N	74° 1'4.07"E	4745.87	186.33

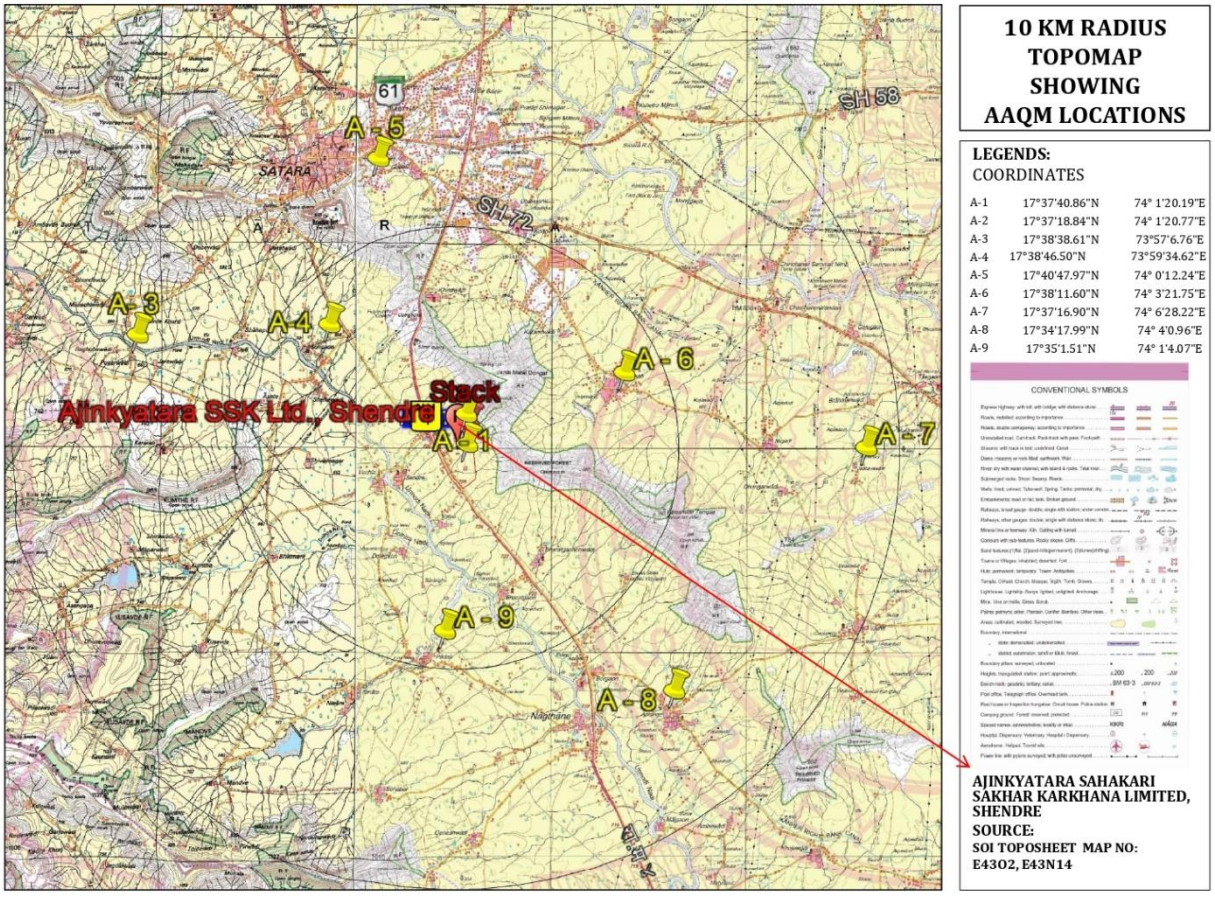


Figure 3.110 km. radius study area map indicating air quality monitoring locations

3.1.1 IMPACT ON AIR QUALITY DUE TO PROPOSED ACTIVITY

At present, 1*100 TPH for co-generation power plant which is operated on boot basis and supplies Power and steam required for Sugar Complex. Air quality predictions are done considering the bagasse as a fuel and total quantity of fuel used after the proposed expansion shall be 1000 MT/day of bagasse during season. The results of which are indicated in the following tables. Emission data is calculated based on fuel characteristics and Source emission monitoring according to IS 11255 (Part-1 to 3 and Part-7). Results of the same are described below. These pollutant emission rates are used as an input to AERMOD software to compute incremental GLCs for all the receptor locations

Table 3.2 Stack Inventory

Sr. No.	Particulars	Description
A. Point Source (Stack attached to boiler)		
1	Stack attached to	Co-generation Plant Boiler
2	Capacity	1*100 TPH
3	Fuel type	Bagasse
4	Total fuel quantity requirement	1000 MT/day
5	Stack height	72 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	1.74
Based on assumed maximum standards concentrations & Fuel characteristics		
	ii. NOx	based on assumed maximum emission standards concentrations – 5.30
	iii. SO_2	Based on Fuel - Bagasse - 0.02%
		based on assumed maximum emission standards concentrations – 4.97
		based on fuel characteristics - Bagasse – 2.31
11	Ash content	15 MT/day
12	Ash below grate	3 MT/day (20 % of the total ash)
13	Remaining Ash	12 MT/day (80 % of the total ash)
14	Ash going to stack, QPM (with ESP removal efficiency of 99%)	0.15 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)	0.1708
	Q_{NOx} (g/sec)	1.8761
	Q_{CO} (g/sec)	0.9274

3.1.1.1 Results of the AERMOD software for air quality predictions for proposed expansion of the factory

The proposed expansion of Sugarcane crushing capacity from 2500 TCD to 4800TCD, distillery capacity from 30 KLPD to 45 KLPD.The AERMOD software was developed by US-EPA and American Meteorological Society (AMS) to compute dispersion of air pollutants in the ambient air due to the various sources. In this study, emissions from proposed stack are coupled with the subsequent meteorological data by using AERMOD 8.0.5 air quality model. Also, dispersion patterns are studied by the output of concentration isopleths plotted by the software. Incremental concentration values for selected receptors are added in the background concentration values.

Table 3.3 PM_{10}& $PM_{2.5}$- 24 hr. Concentrations, computed by AERMOD 8.0.5

Sr. No.	Receptor /Village	PM_{10}- 24 hour concentration (µg/m3)			$PM_{2.5}$- 24 hour concentration(µg/m3)		
		Background	Incremental	Total	Background	Incremental	Total
1	Factory (Near Quarters)	67.1	0.01	67.11	38.6	0.01	38.61
2	Factory (Near ETP)	72.5	0.05	72.55	42.5	0.04	42.54
3	Pogarwadi	55.8	0.01	55.81	36.2	0.01	36.21
4	Songaon	56.2	0.01	56.21	35.8	0.01	35.81
5	Shahunagar	61.8	0.01	61.81	39.4	0.00	39.4
6	Degaon	57.9	0.01	57.91	41.5	0.00	41.5
7	Jadhavwadi	53.3	0.01	53.31	28.3	0.01	28.31
8	Apshinge	63.6	0.01	63.61	38.3	0.01	38.31
9	Padali	64.7	0.01	64.71	39.7	0.00	39.7
NAAQ Standards (24 hr)		100 (µg/m^3)			60 (µg/m^3)		

Table 3.4SO_2& NO_X-24 hr. Concentrations, computed by AERMOD 8.0.5

Sr. No.	Receptor /Village	SO_2 - 24 hour concentration (µg/m3)			NOx - 24 hour concentration (µg/m3)		
		Background	Incremental	Total	Background	Incremental	Total
1	Factory (Near Quarters)	26.7	0.22	26.92	23.1	0.24	23.34
2	Factory (Near ETP)	27.5	0.91	28.41	24.6	0.97	25.57
3	Pogarwadi	28.3	0.18	28.48	22.9	0.20	23.1
4	Songaon	27.9	0.25	28.15	19.5	0.26	19.76
5	Shahunagar	31.2	0.12	31.32	32.4	0.12	32.52
6	Degaon	29.1	0.21	29.31	22.5	0.22	22.72
7	Jadhavwadi	19.6	0.15	19.75	19.3	0.16	19.46
8	Apshinge	25.8	0.13	25.93	24.7	0.13	24.83
9	Padali	25.3	0.12	25.42	24.1	0.12	24.22
NAAQ Standards (24 hr)		80 (µg/m^3)			80 (µg/m^3)		

From the results, it can say that,

- At the selected 9 receptor locations, surrounded in 10 km radius around Ajinkyatara Sahakari Sakhar Karkhana Ltd., Shendre, Tal and Dist. Satara, GLCs are well within the limits of AAQS. Results of the Ambient Air monitoring are enclosed in the **Annexure III.**
- Under the working conditions of 1*100 TPH boiler, PM_{10}GLCs at all the 9 receptor locations are in the range of **53.31µg/m3**to**72.55µg/m3** which are within the limits of AAQS.
- Similarly, $PM_{2.5}$ GLCs for those receptors are in the range of **28.31µg/m3**to**42.54µg/m3** which is within the limits of AAQS.
- For SO_2, GLCs are in the range of **19.75 µg/m3**to**31.32 µg/m3**which is within the limits of AAQS.
- NO_x GLCs are in the range of **19.46 µg/m3**to **32.52 µg/m3**which is within the limits of AAQS.

It can be inferred that there shall not be any adverse effect on Ambient Air Quality due to the proposed expansion/establishment project.

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 3.5Details of the ground water quality monitoring sampling locations

Sr. No.	Description of samples	Sampling location Village Name	Latitude	Longitude
Ground Water				
1	GW-1	Well – Sonegaon	17°38'42.87"N	73°59'47.68"E
2	GW-2	Well – Pogarwadi	17°38'37.65"N	73°57'5.76"E
3	GW-3	Borewell – Shahunagar	17°40'47.88"N	74° 0'12.43"E
4	GW-4	Borewell – Degaon	17°38'11.41"N	74° 3'21.95"E
5	GW-5	Well – Jadhavwadi	17°37'25.87"N	74° 6'44.80"E
6	GW-6	Well – Apshinge	17°34'17.33"N	74° 4'25.71"E
7	GW-7	Well – Padali	17°35'3.88"N	74° 1'13.90"E
8	GW-8	Well – Vechale	17°36'54.12"N	74° 0'12.41"E

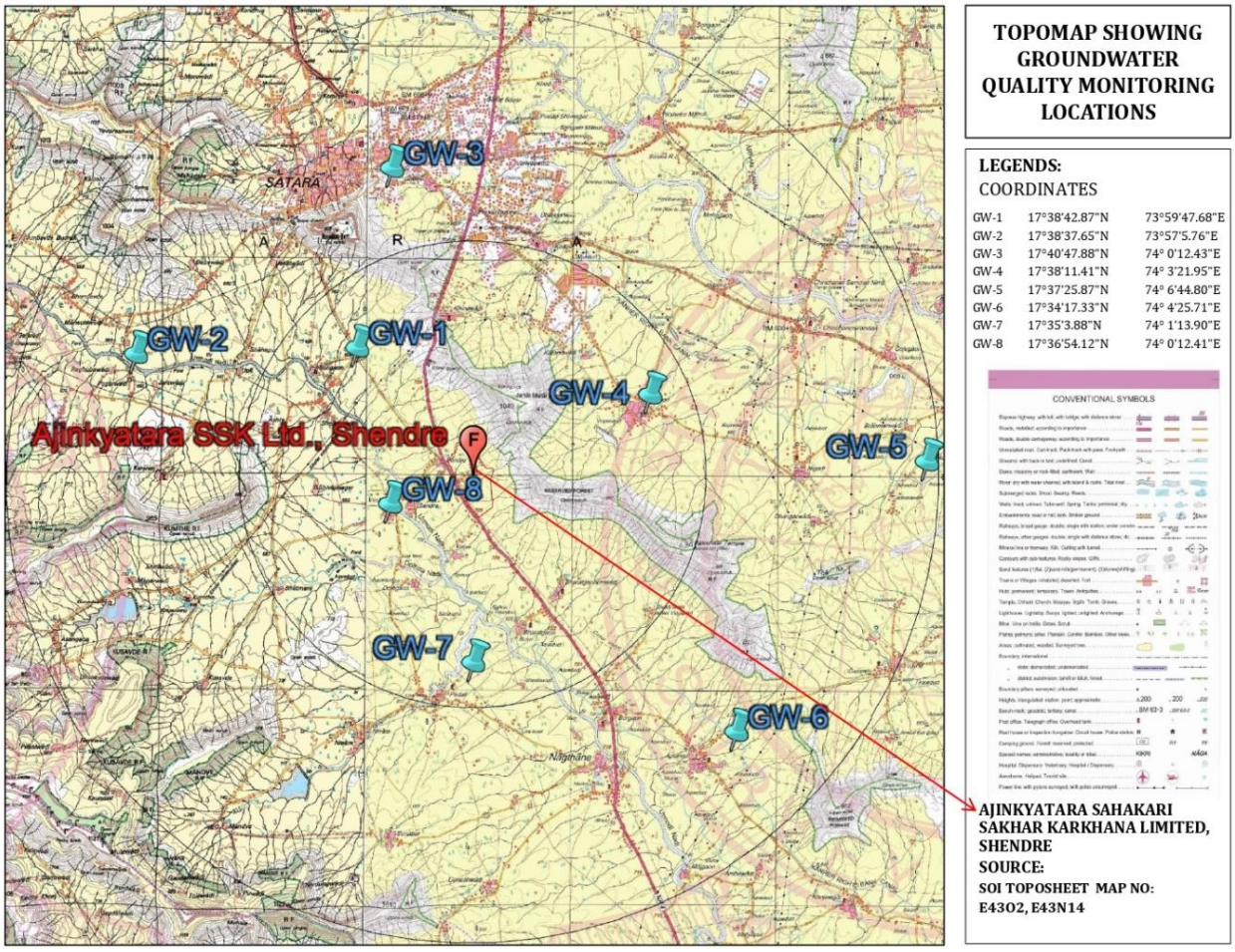


Figure 3.2 10 km. radius study area map indicating groundwater sampling location

Table 3.6 Details of the surface water quality monitoring sampling locations

Sr. No.	Description of samples	Sampling location Village Name	Latitude	Longitude
Surface Water				

1	SW-1	River Water- Urmodi River Upstream	17°38'40.11"N	73°59'16.16"E
2	SW-2	River Water- Urmodi River Downstream	17°36'32.16"N	74° 0'58.16"E
3	SW-3	River Water- Venna River	17°41'34.58"N	74° 2'58.74"E
4	SW-4	River water- Krishna River	17°41'20.50"N	74° 2'59.61"E
5	SW-5	Lake water - Mahapariwadi	17°36'3.78"N	73°57'1.43"E
6	SW-6	Lake water - Kusawade	17°34'35.21"N	73°57'28.97"E
7	SW-7	Lake water – Jyotirling Nagar	17°34'0.17"N	73°59'11.94"E

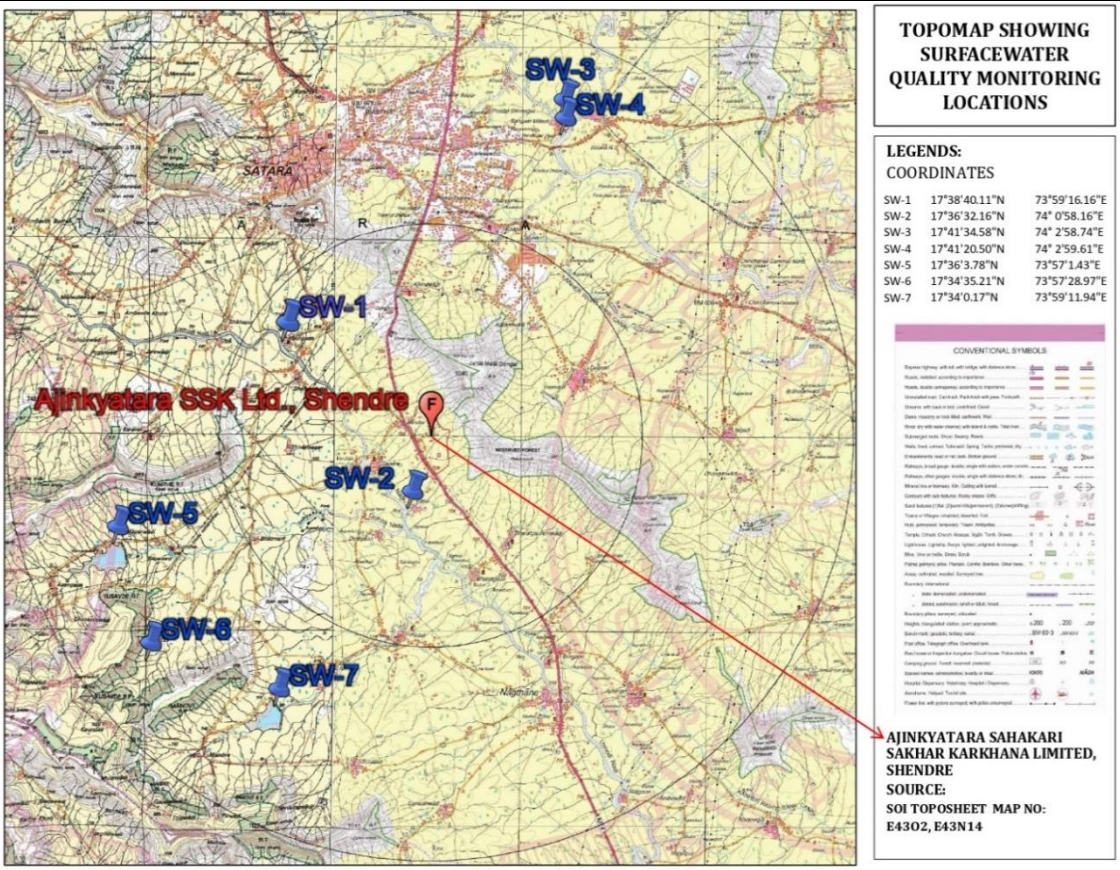


Figure 3.3 10 km. radius study area map indicating surfacewater sampling location

Table 3.7 Water Analysis Results

Sr. No	Parameters	Ground water		Surface water		Desirable	Permissible
		Min	Max	Min	Max	IS 10500:2012 Standards	
1.	pH	7.65	8.16	6.94	7.90	**6.5-8.5**	**No relaxation**
2.	Dissolved Solids (mg/l)	381	1906	261	514	**500**	**2000**
3.	Total Hardness (mg/l)	167	961	422	498	**200**	**600**
4.	Chlorides (mg/l)	101	575	50	162.4	**250**	**1000**
5.	Fluoride (mg/l)	0.20	0.40	0.40	0.61	**1**	**1.5**
6.	Sulphates (mg/l)	20	184	23	41	**200**	**400**

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

Table 3.8Details of the soil sampling locations

Sr. No.	Description of samples	Sampling location Village Name	Latitude	Longitude
Soil				
1	S-1	Soil – Factory	17°37'27.00"N	74°1'7.38"E
2	S-2	Soil - Pogarwadi	17°38'38.18"N	73°57'7.23"E
3	S-3	Soil– Songaon	17°38'45.47"N	73°59'36.98"E
4	S-4	Soil – Sangam Mahuli	17°41'26.25"N	74° 2'54.79"E
5	S-5	Soil – Degaon	17°37'57.78"N	74° 3'34.25"E
6	S-6	Soil – Jadhavwadi	17°37'16.12"N	74° 6'29.36"E
7	S-7	Soil– Apshinge	17°34'11.48"N	74° 4'10.50"E
8	S-8	Soil– Padali	17°35'3.47"N	74° 1'13.73"E

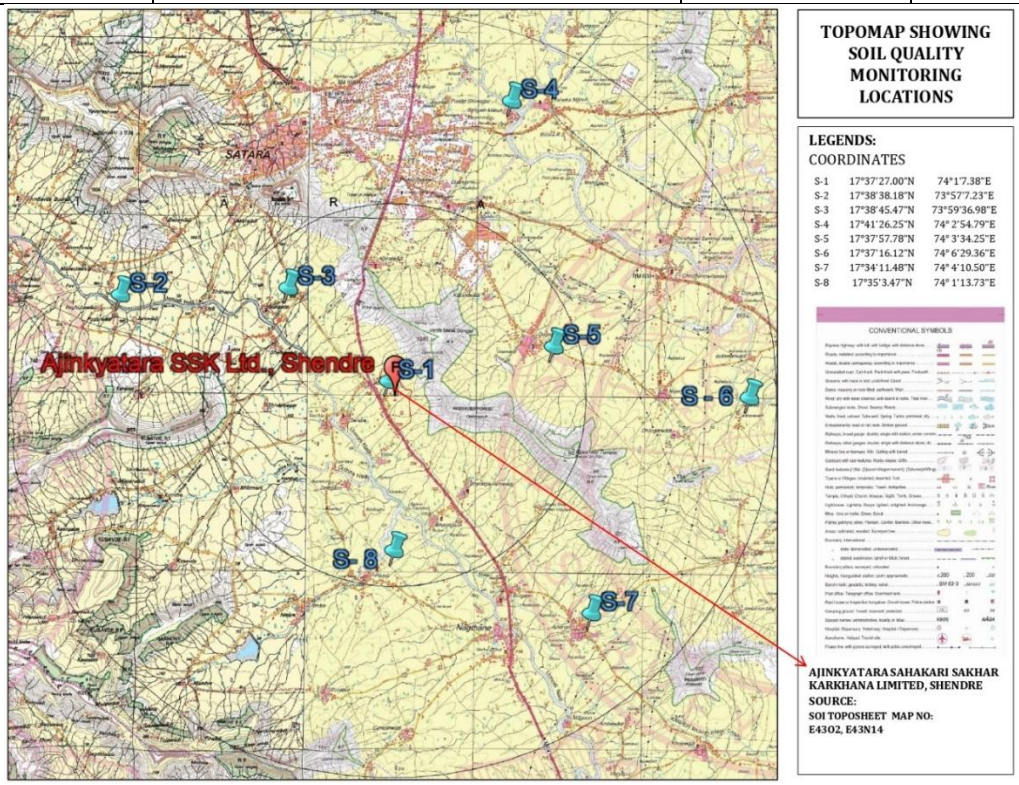


Figure 3.410 km. radius study area map indicating soil sampling location

Table 3.9Soil Analysis report within 10 km radius of the study area

Sr. No.	Test Parameter	Unit	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	Standards
1	pH	--	7.81	7.74	7.9	7.85	7.06	7.51	7.82	8.15	6.5 – 8.5
2	Conductivity	mmhos/cm	0.31	0.24	0.3	0.29	0.32	0.34	0.4	0.39	0.2 – 0.5
3	Available Nitrogen	Kg/ha	223	271	246	319	285	298	257	243	>200
4	Available Phosphorus	Kg/ha	45	43	42	56	47	46	49	42	40 – 60
5	Available Potassium	Kg/ha	286	324	426	319	378	534	324	409	>280
6	Organic Carbon	%	0.82	0.84	0.8	0.97	0.99	0.81	1.06	1.01	>0.75
7	Sodium (as Na)	%	1.89	1.75	1.40	1.43	1.59	1.89	2.00	2.16	< 5
8	Calcium (as Ca)	%	21.60	23.84	23.57	25.35	23.54	19.77	24.62	21.13	---
9	Magnesium (as Mg)	%	11.10	8.77	7.26	7.00	7.63	8.54	8.95	8.17	---
10	Cation Exchange Capacity	meq/100gm	40.78	41.38	41.47	40.68	40.95	41.77	42.59	40.32	>30
11	Water Holding Capacity	%	43	42	49	56	54	47	49	42	---
12	Particle Size Distribution										
12a	Sand	%	25	23	22	23	24	22	25	21	---
12b	Silt	%	21	24	23	26	21	20	23	22	---
12c	Clay	%	54	53	55	51	55	58	56	57	---

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

- Soil in the area is mainly clayey in nature hence good water holding capacity.
- The finding of the study reveals that pH of soil in the range of 7.06 to 8.15, which is an indicative of the **neutral** to **slightly alkaline** soil.
- The values for Nitrogen at all locations varied between 223 to 319 kg/ha. Maximum concentration of nitrogen was observed at location S-4.
- The concentration of phosphorus was estimated to be between 42 to 56 kg/ha. The highest concentration can be observed at location S-4, while the lowest concentration can be observed at location S-3.
- It is important to note that the concentration of potassium was found to be high at all locations ranging between 286 to 534 kg/ha.

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

In order to assess the noise levels in the study area, monitoring was carried out at eleven different locations within 10 km radius of the study area.

Table 3.10 Details of noise quality monitoring locations

Sr. no.	Description	Locations	Latitude	Longitude
1	N-1	Factory (Near Quarters)	17°37'40.86"N	74° 1'20.19"E
2	N-2	Factory (Near ETP)	17°37'18.84"N	74° 1'20.77"E
3	N-3	Factory (Main Gate)	17°37'25.49"N	74° 1'7.17"E
4	N-4	Factory (Near Manufacturing Area)	17°37'27.76"N	74° 1'16.23"E
5	N-5	Factory (Near Administrative Office)	17°37'27.92"N	74° 1'10.14"E
6	N-6	Pogarwadi	17°38'38.61"N	73°57'6.76"E
7	N-7	Songaon	17°38'46.50"N	73°59'34.62"E
8	N-8	Shahunagar	17°40'47.97"N	74° 0'12.24"E
9	N-9	Degaon	17°38'11.60"N	74° 3'21.75"E
10	N-10	Jadhavwadi	17°37'16.90"N	74° 6'28.22"E
11	N-11	Apshinge	17°34'17.99"N	74° 4'0.96"E
12	N-12	Padali	17°35'1.51"N	74° 1'4.07"E

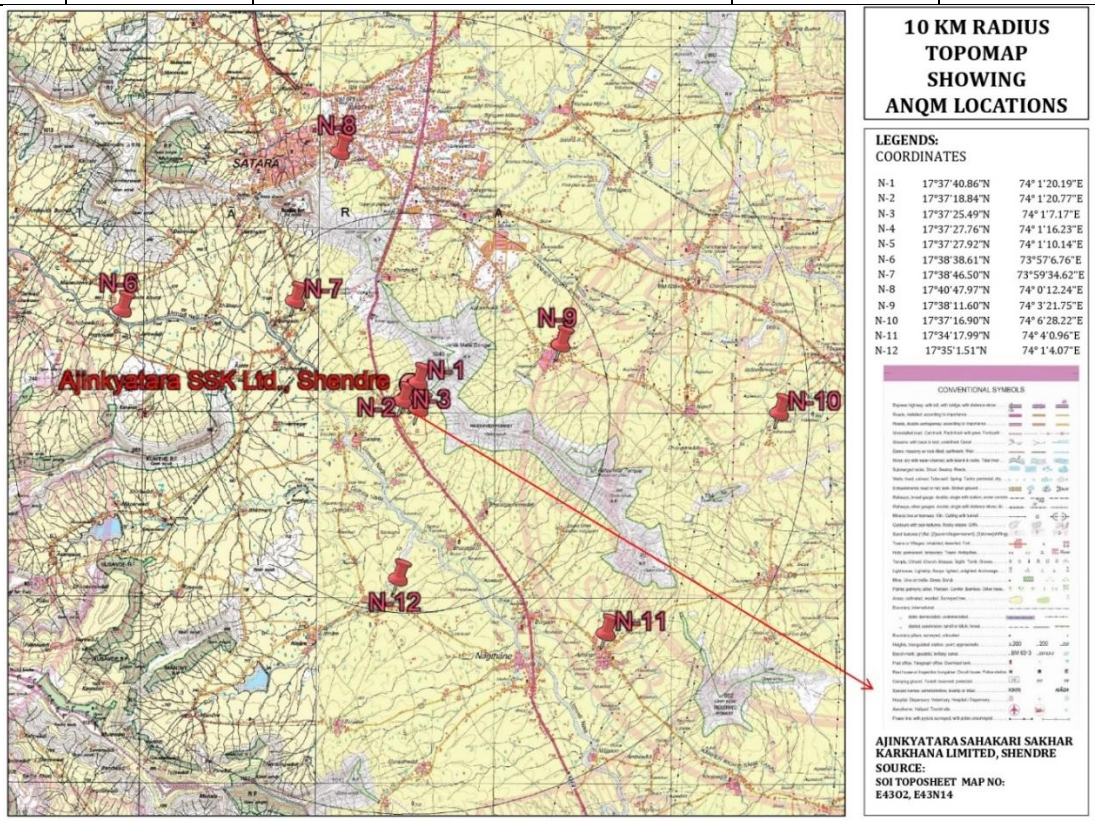


Figure 3.5km. radius study area map indicating noise location

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

Industrial Zone: The day time noise level at the Project site was found in the range of 46.7 – 64.3 dB (A), which is well below the permissible limit of 75 dB (A).

Residential Zone: The daytime noise levels in all the residential locations were observed to be in the range of 46.3 dB (A) to 49.7 dB (A), which is well below the permissible limit of 55 dB (A).

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

Industrial Zone: The night time noise level in the Project site was observed in the range of 41.2– 62.2 dB (A), which is well below the permissible limit of 70 dB (A).

Residential Zone: The night time noise levels in all the residential locations were observed to be in the range of 41.3 dB (A) to 44.3 dB (A), which is well below the permissible limit of 45 dB (A).

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.

Table 3.11 Noise levels of the study area

Sr. No.	Station	Standard Limit dB(A) Leq	Time	dB (A) Leq
Inside factory premises				
1.	Factory (Near Quarters)	75	Day	56.7
		70	Night	53.1
2.	Factory (Near ETP)	75	Day	46.7
		70	Night	41.2
3.	Factory (Main Gate)	75	Day	58.6
		70	Night	55.8
4.	Factory (Near Manufacturing Area)	75	Day	64.3
		70	Night	62.2
5.	Factory (Near Administrative Office)	75	Day	63.6
		70	Night	60.1
Outside factory (within study area)				
1.	Pogarwadi	55	Day	46.3
		45	Night	42.7
2.	Songaon	55	Day	48.1
		45	Night	43.2
3.	Shahunagar	55	Day	46.8
		45	Night	43.9
4.	Degaon	55	Day	49.7
		45	Night	44.1
5.	Jadhavwadi	55	Day	49.3

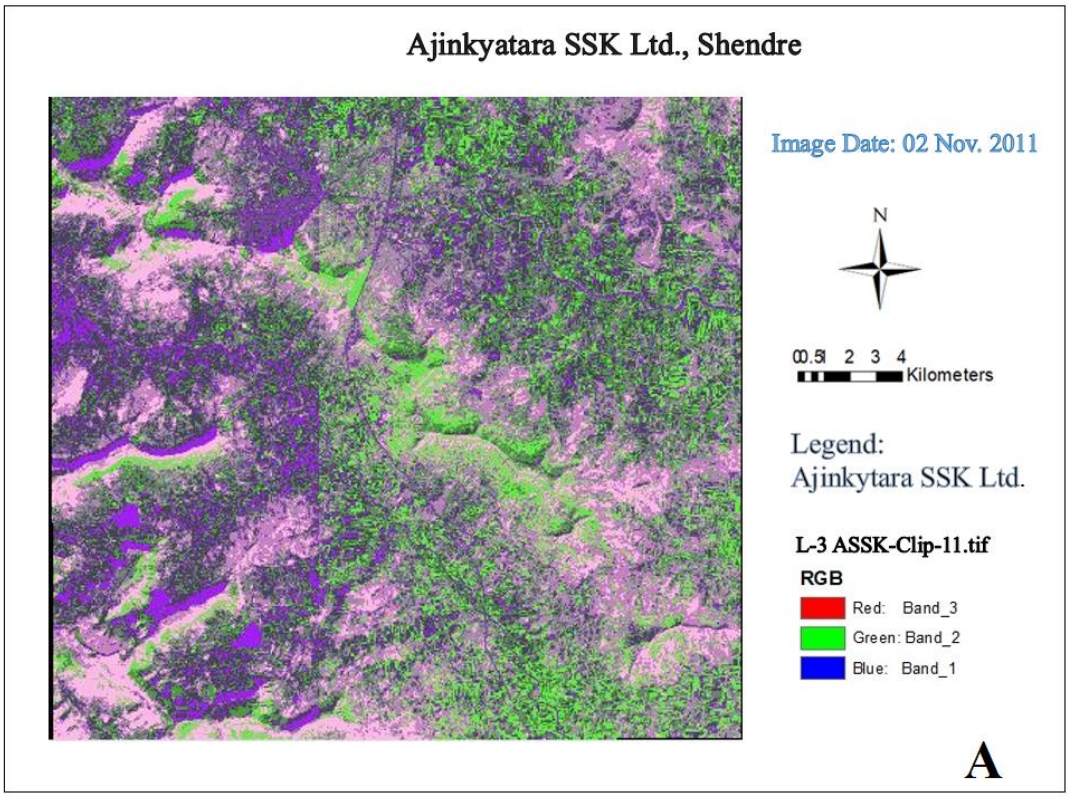
Sr. No.	Station	Standard Limit dB(A) Leq	Time	dB (A) Leq
		45	Night	43.8
6.	Apshinge	55	Day	48.5
		45	Night	42.4
7.	Padali	55	Day	47.6
		45	Night	41.3

3.5 LAND USE/LAND COVER OF THE STUDY AREA

Table 3.12 Change in General Land use/ Land cover of Study Area (2011 to 2019)

Landuse	Area in km2		% of Study Area	
	2011	2019	2011	2019
Water Bodies	0.42	0.64	0.11	0.16
Settlement	23.58	27.31	5.90	6.83
Open Scrub	61.35	52.65	15.35	13.17
Agriculture	137.42	152.23	34.38	38.08
Barren Land	67.21	59.86	16.81	14.97
Grazing	59.17	58.20	14.80	14.56
Reserved Forest	50.60	48.88	12.66	12.23
Total	399.75	399.76	100.00	100.00

- In the year 2011 water body area is about 0.42 km^2, whereas in the year 2019 is increased and it is 0.64 km^2.
- It can be inferred that there is an increase in area of 4.45 % under water body, settlement, and agricultural land whereas a decrease in area under open scrub, barren land, grazing and reserved forest is 4.45%.
- Increase in water body due to Jalswarajya scheme and Jalyuktya Shivar scheme.
- Increase in settlement due to an increase in industrial growth and migration of the people.
- Increase in agricultural land due to improved irrigation facilities like drip/trickle irrigation instead of surface and subsurface irrigation techniques. Therefore barren land is converted into agricultural land.



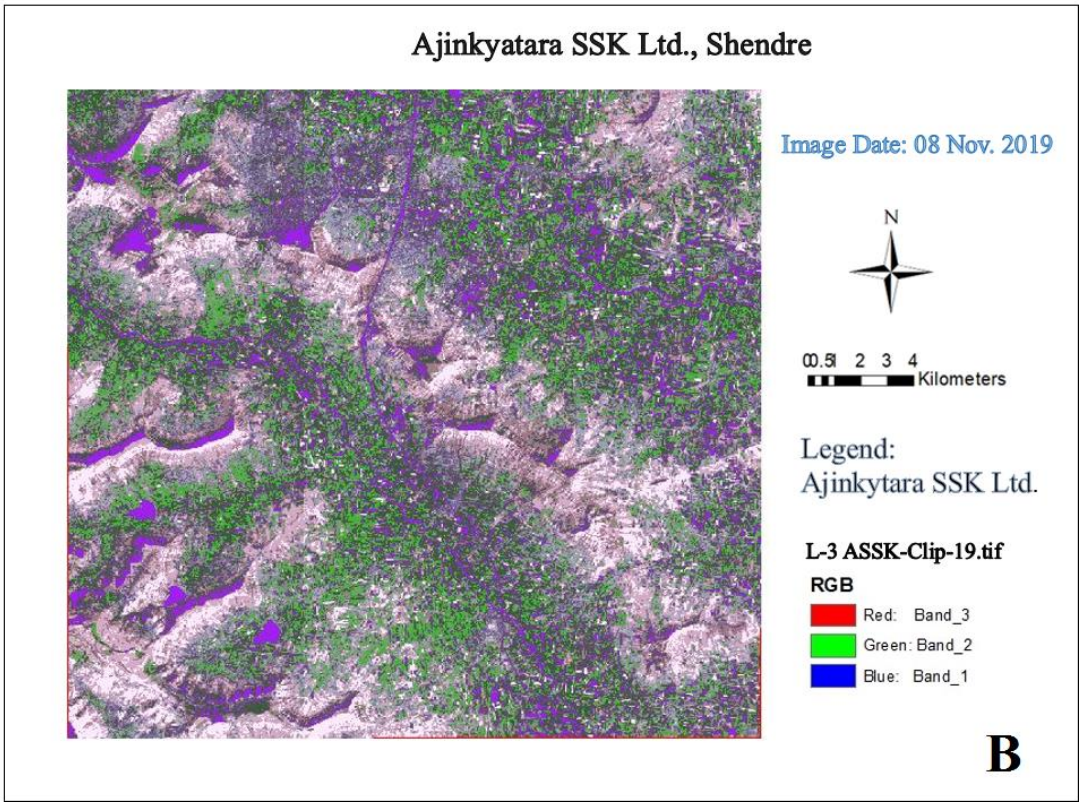


Figure 3.6 Landuse/Land cover map 1) 2011 & 2) 2019

3.6 ECOLOGY AND BIODIVERSITY

- The existing biodiversity in the study area was observed to be very low mainly due to the semi urban setting of the location. The project doesn't involve any clearance of trees as the project is on barren land and well connected to major and minor roads.
- The project involves the plantation of avenue trees in Shendre village and their maintenance to improve the landscape which would have a positive impact on the general setting of the area. Approximately 4000 trees have already been planted on site apart from the above mentioned proposed plantation
- 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.
- The proponent has already proposed a well-developed waste treatment plant for proper utilization of waste water and bagasse.
- A sensitization program should be carried out to spread awareness about the vivid bird species seen in the area for locals and staff for better ecological management.

3.7 DEMOGRAPHIC OR SOCIO-ECONOMIC PROFILE

The project has a positive response from the public. The willingness to pay and the willingness to accept the project has positive an outcome. The ratio between this is around 1:10. It means the benefits are ten times greater than the loss. The losses due to the polluting agents are proposed to be diluted through various methods. The wastes and the pollutions can be reducing with some measures as suggested in the report. The social and cultural vulnerability index responds a very less and level of resilience is at the higher side. The sustained high growth rates and poverty reduction, however, can be realized only when the sources of growth are expanding, and an increasing share of the labour force is included in the growth process in an efficient way. From a static point of view, growth associated with progressive distributional changes will have a greater impact in reducing poverty than growth which leaves distribution unchanged. This is in fact expresses the inclusive growth of the region.

3.8 SITE PHOTOGRAPHS

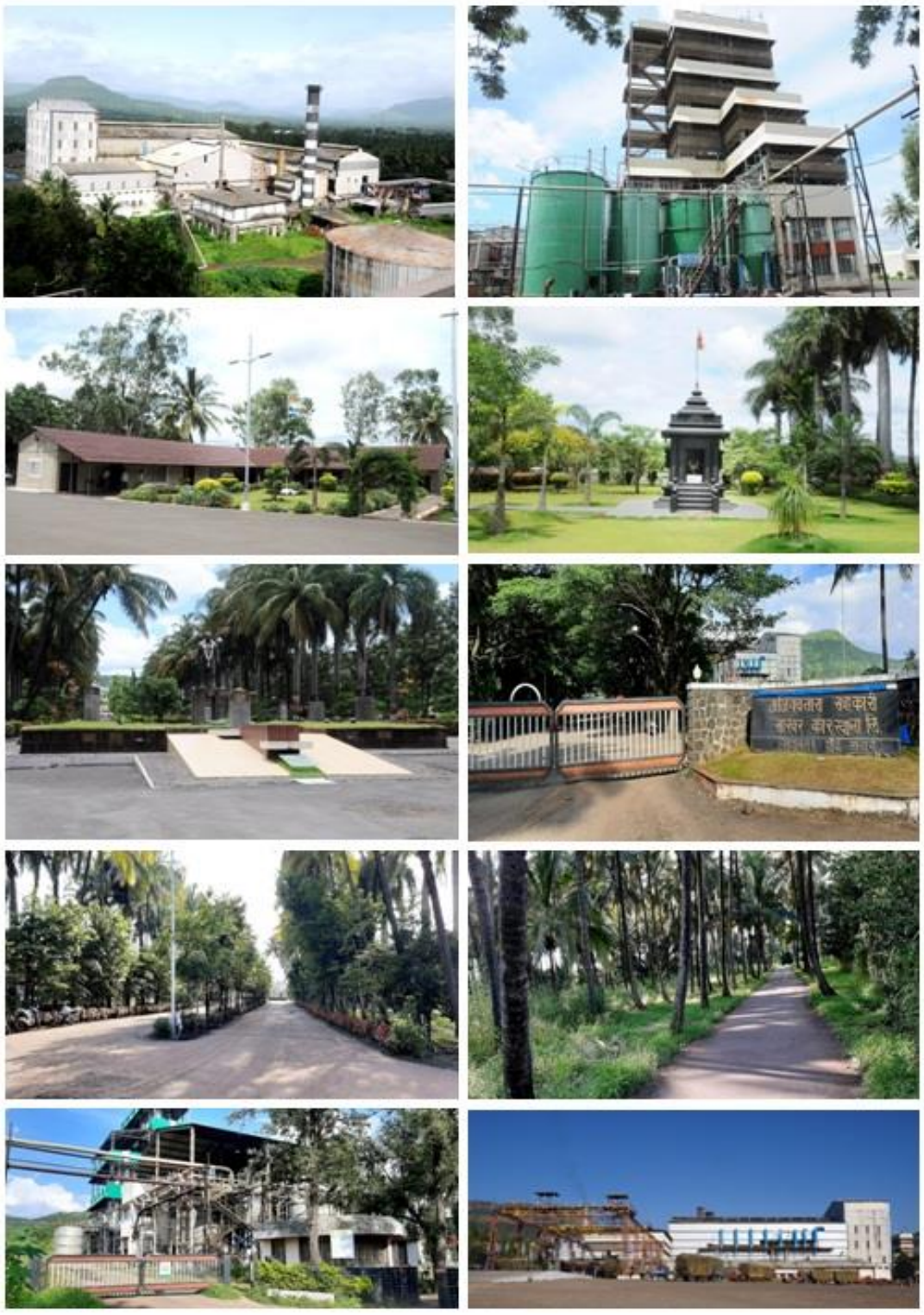


Figure 3.7 Site photographs

4 IDENTIFICATION, PREDICTION AND MITIGATION MEASURES

Approx. 50 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 are given in chapter 4.

5 ANALYSIS OF ALTERNATIVE (TECHNOLOGY AND SITE)

ASSKL has existing sugar factory of 2500 TCD. The command area is rich in sugarcane cultivation and has excellent irrigation facilities. Also the other location features are

- Required land is available at the project site and is owned by ASSKL
- The site is easily accessible by Road.
- The cane potential and irrigation facilities in the command area are adequate and will ensure sustained cane availability for the proposed project with the extensive experience of farmers in sugar cane cultivation.

- The present power requirement for Sugar and Distillery unit is 5.2 MW. Additional 3.3 MW of power will be required after the proposed expansion. Thus, the total power requirement after the proposed expansion will be 8.5 MW. At present, the steam and power required by the Sugar and Distillery unit is taken from Co-generation power plant which is operated on BOOT principle.

Infrastructure:

- The site has easy access to latest communication and other social infrastructure facilities, including telecommunication, schools and colleges, medical & health facilities, commercial infrastructure, etc. at Satara, which is a Taluka and district Headquarter.
- Environment-friendly zone as the habitation is remote and surrounded by Agricultural activities

In view of the above positive features of the existing site no alternative site is considered.

5.1 Analysis of alternative technology

ASSKL intends to expand its sugarcane crushing capacity from 2500 TCD to 4800 TCD by adopting the state of art technology to reduce the steam consumption from conventional 40% of steam per tonne of cane to 33% of steam per tonne of cane crushed and distillery capacity from 30 KLPD to 45 KLPD to produce 45 KLPD RS/ ENA/ Ethanol by adopting the integrated continuous fermentation technology to reduce the steam consumption from 3.5 to 2.8 kg/lit of Ethanol & the water requirement as2 to 3 liters per liter of alcohol production as against 10 liters per liter of alcohol production by conventional method & the effluent quantity is around 1.5 to 2 liters as against 6 liters in conventional system. The reduction of water requirement is mainly achieved by recycling the condensate as process water and the reduction in effluent quantity is achieve by recycling spentwash and spentlees.

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6 ENVIRONMENT MONITORING PROGRAMME

Table 6.1Environment 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 vary depending on the	Six Monthly	

Sr.No	Item	Parameters	Frequency Of Monitoring	Location
		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, distaster management plan, onsite and offsite emergency plan are prepared and given in Chapter 7 of the EIA Report

Consequence Analysis of Ethanol due to Storage Facility.

Scenario of Ethanol in different forms

SITE DATA:

Location: AJINKYTARA SAHAKARAI SAKHAR KARKHANA LTD, INDIA

Building Air Exchanges Per Hour: 0.59 (unsheltered single storied)

Time: May 11, 2021 1154 hours ST (using computer's clock)

CHEMICAL DATA:

Chemical Name: ETHANOL

CAS Number: 64-17-5 Molecular Weight: 46.07 g/mol

ERPG-1: 1800 ppm ERPG-2: 3300 ppm ERPG-3: N/A

IDLH: 3300 ppm LEL: 33000 ppm UEL: 190000 ppm

Ambient Boiling Point: 169.3° F

Vapor Pressure at Ambient Temperature: 0.088 atm

Ambient Saturation Concentration: 95,035 ppm or 9.50%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 4.83 knots from 339° true at 3 meters

Ground Roughness: open country Cloud Cover: 5 tenths

Air Temperature: 27° C Stability Class: B

No Inversion Height Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical escaping from tank (not burning)

Tank Diameter: 20 meters Tank Length: 15 meters

Tank Volume: 4,712 cubic meters

Tank contains liquid Internal Temperature: 27° C

Chemical Mass in Tank: 2,771,423 kilograms

Tank is 75% full

Circular Opening Diameter: 2 inches

Opening is 10 centimeters from tank bottom

Ground Type: Default soil

Ground Temperature: equal to ambient

Max Puddle Diameter: Unknown

Release Duration: ALOHA limited the duration to 1 hour

Max Average Sustained Release Rate: 448 pounds/min

(averaged over a minute or more)

Total Amount Released: 16,377 pounds

Note: The chemical escaped as a liquid and formed an evaporating puddle.

The puddle spread to a diameter of 86 yards.

Type of Tank Failure: BLEVE tank explodes and chemical burns in afire ball

Potential hazards from BLEVE:

- Thermal radiation from fireball and poo lfire
- Hazards fragments and blast force from explosion
- Downwind toxic effects of fire by-products

BLEVE/Fire ball Scenario: The higher the internal tank pressure/temperature at the time of tank failure, the larger the fire ball. Any liquid not consumed by the fire ball will form a pool fire.

SOURCE STRENGTH:

BLEVE of flammable liquid in vertical cylindrical tank

Tank Diameter: 20 meters Tank Length: 15 meters

Tank Volume: 4712cubic meters

Tank contains liquid

Internal Storage Temperature: 27° C

Chemical Mass in Tank: 2,771,423 kilograms

Tank is 75% full

Percentage of Tank Mass in Fireball: 100%

Fireball Diameter: 891 yards Burn Duration: 37 seconds

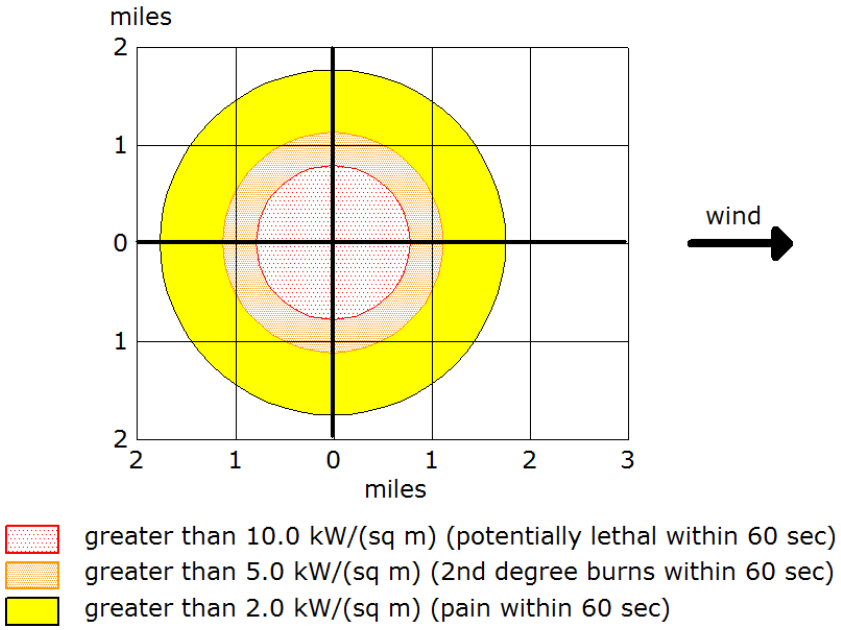
THREAT ZONE:

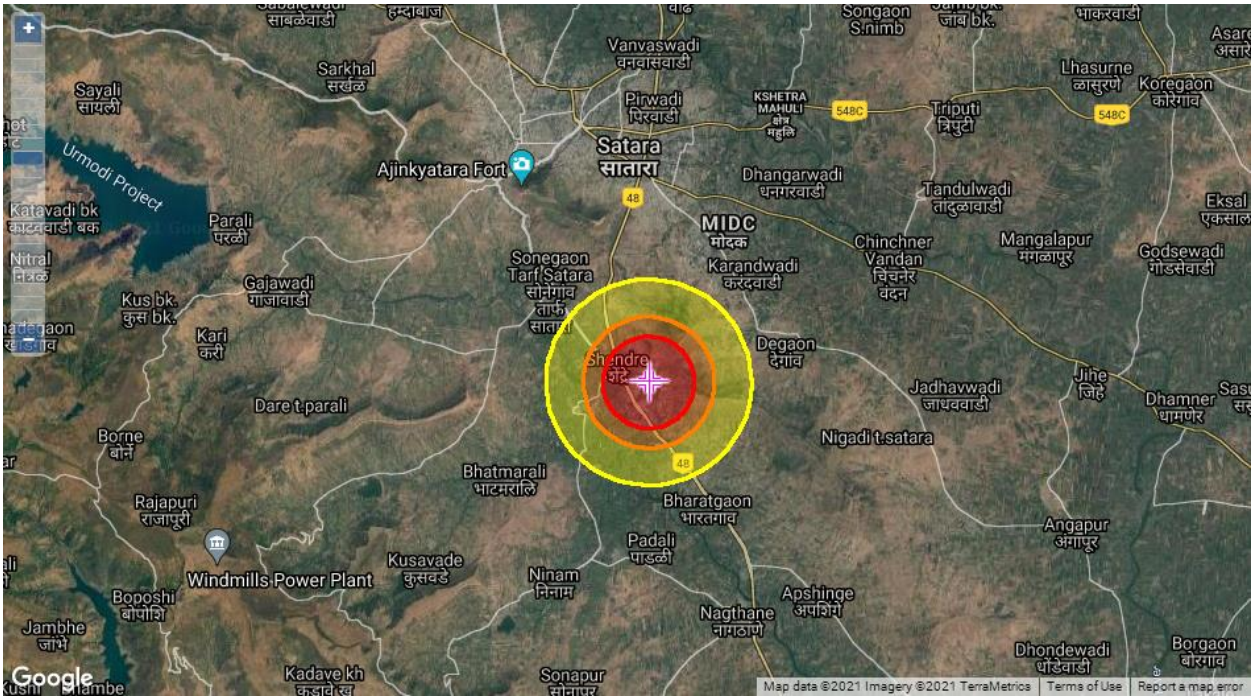
Threat Modeled: Thermal radiation from fireball

Red : 1381 yards --- (10.0 kW/(sq m) = potentially lethal within 60 sec)

Orange: 1.1 miles --- (5.0 kW/(sq m) = 2nd degree burns within 60 sec)

Yellow: 1.8 miles --- (2.0 kW/(sq m) = pain within 60 sec)





The Thermal radiation from fireball of Ethanol having value of 5 kw/sqm is Vulnerable for second degree burns to all the plant personnel in the radius of 1685 yards

Conclusions

When tank explodes and ethanol in a fireball due to BLEVE;

The thermal radiation for the Ethanol tank confined to the maximum at 1381 yards that means the thermal radiation intensity of 10kW/m^2 is potentially lethal within 60 seconds. Similarly, the other threat zone of 5.0 kW/m^2 causes 2nd degree burns within 60 seconds at 1.1 mile and the rest is 2.0 kW/m^2 subjected to within the unit at 1.8 miles, which causes pain within 60 seconds

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.
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. 1130 Lakhs. And recurring cost will be Rs. 184 Lakhs. The detailed EMP budget is given in below table.

Table 8.1EMP Budget

Sr. No.	Component	Particulars		Budgetary Allocation Capital Investment (INR In Lakhs)	Budgetary Allocation Recurring Investment (INR In Lakhs)
1.	Water pollution	• Construction of Distillery Condensate Polishing Unit (CPU) • Up gradation of ETP		400	50
2.	Noise	Enclosure to noise generating places		10	-
3.	Environment monitoring and Management	Quarterly Environment Monitoring (Per Year)		--	4
		Ambient air monitoring	PM_{10}, $PM_{2.5}$, SO_2, NOx, CO		
		Work Place Air Monitoring	VOCs & Fugitive Emissions		
		DG Set Monitoring	TPM, SO_2, NOx		
		Effluent (Treated &Untreated)	pH, COD, BOD, TSS, TDS, Oil & Grease		
4.	Occupational Health	Glares, Breathing Masks, Gloves, Boots, Helmets, Ear Plugs etc. & annual health-medical checkup of workers, Occupational Health (training, OH center)			50
5.	Greenbelt	Green belt development activity		10	2
6.	Solid Waste Management	Solid Waste Management		600	60
7.	Rain Water Harvesting Tank	Construction of RWH tank. Annual Cleaning up and maintenance of RWH tank		30	2
8.	Storm Water			30	2
9.	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		--	4
10.	Laboratory			50	10
		TOTAL COST (INR, LAKHS)		**1130**	**184**

9 CORPORATE ENVIRONMENT RESPONSIBILITY PLAN

The capital cost of the proposed expansion project is Rs. 67.30 Crores. The industry has reserved Rs.1.346 Crores (2% 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 1023 mm there is good potential to harvest rainwater. The rainwater harvesting system is installed at various buildings and about 1752.92 m^3 per year water is harvested. This shall be recharged into open well

Storm water management system is also adopted by the industry. Separate drains of minimum 0.45 m * 0.6 m are provided for the collection and disposal of storm water from the industry premises.

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.