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EXECUTIVE SUMMARY
of
Environmental Impact Assessment Report

Expansion of sugar unit from 2,500 TCD to 6,000 TCD and Molasses based distillery unit from 30 KLPD to 55 KLPD

M/s. Shreenath Mhaskoba Sakhar Karkhana Limited

Shreenathnagar, At. Patethan, Post: Rahu, Tal. : Daund, Dist. : Pune, Maharashtra - 412207

Prepared by

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1.0 Introduction

M/s. Shreenath Mhaskoba Sakhar Karkhana Ltd., (SMSKL) is a progressive sugar mill in Maharashtra, set up in the year 2002-03 and is registered under the Government of Maharashtra, Registration no. 1622100210937 (Re-validation date 22/12/2016). Shri. Pandurang Raut is Chairman and Managing Director of the mill. The present installed capacity of the sugar mill is 2,500 TCD along with molasses based distillery unit of 30 KLPD. The management of the mill has undertaken extensive cane development activities in its area of operations, hence sugarcane area has increased over a period of time. Considering the increased availability of sugarcane, the mill has decided to expand its crushing capacity from 2,500 TCD to 6,000 TCD (operating capacity). This will also increase the production of molasses. Considering this, the management of SMSKL has decided to enhance the capacity of existing distillery unit from 30 KLPD to 55 KLPD, to improve its financial viability.

1.1 Selection of Site:

The present site fulfills the industrial site selection criteria of MoEFCC/CPCB/MPCB. The basic raw material for the proposed project is sugarcane and molasses estimated cane availability in the area. Apart from this water and electricity is also available in the area. Reasonably good infrastructure, support facilities, labour etc. are also available.

Table 1: Highlights of the project

1.	**Project Proponent**	M/s. Shreenath Mhaskoba Sakhar Karkhana Ltd., (SMSKL)	
2.	**Project**	Expansion of Sugar unit from 2,500 to 6,000 TCD and Molasses based distillery unit from 30 to 55 KLPD	
3.	**Location of the project**	Existing mill premises at Shreenathnagar, Patethan, Tal: Daund, Dist.: Pune, Maharashtra-412207	
	PROJECT CONCEPT		
4.	**Working days per annum**	Sugar - Average 180 days and maximum 220 days Distillery – maximum 270 days	
5.	**Product**	**Sugar Unit**	
		White Sugar (11.25% on cane)	675 TPD
		Bagasse Generation (28.50% on cane)	1710 TPD
		Molasses (4% on cane)	240 TPD
		Press mud (4% on cane)	240 TPD
		Distillery Unit	
		Rectified spirit 52.25 KLPD & Impure spirit (5%) 2.75 KLPD OR	

		ENA 51.70 KLPD& Impure spirit (6 %)3.30 KLPD OR Fuel Alcohol 52.25 KLPD & Impure spirit (5%)2.75 KLPD	
	Byproduct/s	Fusel oil	10 L/day
		Biogas	18,190 m^3/day
		Compost	10446.5 tons per annum
6.	**Effluent Treatment System**	For sugar effluent: Activated sludge process based having Primary and Secondary treatment units. For distillery Spentwash: Biomethanation followed by multi-effect evaporation (MEE) followed by bio-composting For Spent lees, condensate and other effluent: Primary treatment followed by anaerobic, aerobic followed by tertiary treatment	
7.	**Air Pollution Control Systems**	Existing venturi wet scrubber will be used as air pollution control device	
	INFRASTRUCTURE		
8.	**Land**	Total land available with the mill = 77acres Land allocated for proposed expansion = ~7.5 acre Greenbelt: Existing 12 acres green belt will be increased by 2.5 acre No need of acquisition of additional land as the proposed project will be set up in existing mill premises only	
9.	**Main Raw Material**	**Sugar Unit**	
		Sugarcane	6,000 TPD
		Lime (0.14 % on cane)	8.40 TPD
		Sulphur (0.04 % on cane)	2.4 TPD
		Distillery Unit	
		Molasses	205 TPD
		Nutrient N,P	185 kg/d
		Turkey Red Oil (TRO)	275 kg/d
10.	**Fuel**	Bagasse as a fuel: 1,091TPD (1,054 TPD with biogas) – during season Biogas: 18,190 m^3/D Source: Own sugar mill, Biogas unit Bagasse as a fuel: 87.37 TPD (50 TPD with biogas) – off during season	
11.	**Boiler**	Existing 2 of bagasse fired boiler having capacities 72 TPH @pressure 42kg/cm^2 and temperature 440±10°C and 32 TPH @pressure 45kg/cm^2 and temperature 440±10°C. The same will be used even after expansion, after modifying it suitable as per requirement. During off-season of sugar mill, an independent bagasse + biogas	

		fired 32 TPH boiler will be used or standalone 8 TPH biogas fired boiler will be used for distillery operations.
12.	**Stack height and Inner diameter**	Existing 65 m height and 2.9 m inner diameter Distillery stack: 32 m (Standby i.e. in case 8 TPH boiler is used)
13.	**Steam**	Maximum 100 TPH for sugar unit after expansion During seasonal operation, the industry will fulfill its steam requirement for proposed sugar and distillery unit from boilers of sugar unit. During off season 32 TPH boiler will be used to produce steam or standalone biogas fired boiler of 8 TPH capacity may be used.
14.	**Power and its Source**	**During Season:** For Sugar + Distillery = 6.5 MW Source: In-house (Captive) **During Off-Season:** For distillery and miscellaneous purpose (Sugar unit) = 1.5 MW Source: 3 MW cogeneration unit or State Electricity Board
15.	**Total Water Requirement and its Source**	**Sugar unit** 18,540 m^3/season (103 m^3/day x 180 days) (Domestic + Industrial) 25 m^3/day during off-season **Distillery unit** 417 m^3/day (x 270 days = 1,12,590 cu.m. Total 1,31,130 cum Permission available for 160,000 cum/ Year. **Source**: Bhima river – with permission from Irrigation Dept.
16.	**Manpower**	Existing: - Permanent – 133+Seasonal 214= 347 Proposed:- Permanent – 125 +Seasonal 239= 364 Total :- 711
17.	**Green belt**	Proposed ~2.5 acre TOTAL 14.5 acres
	FINANCIAL ASPECT	
19.	**Project Cost (Rs. in lakhs)**	Rs. 5,669.1 (Sugar unit Rs. 2295.1 + Distillery Rs. 3374)
20.	**Capital expenses for EMP (Rs. in lakhs)**	Rs. 403.90 lakhs (Sugar unit Rs. 64.9 + Distillery Rs. 339)

2.0 RAW MATERIALS

2.1 Cane and bagasse

Table 2: Expected performance of sugar mill for next five years

Sr. No.	Particulars	Seasons				
		2017-18	2018-19	2019-20	2020-21	2021-22
1.	Sugarcane Area (Ha)	15,517	15,434	15,503	15,588	16,100
2.	Average Yield (MT)	87	92	95	95	95
3.	Sugarcane production (MT)	13,50,000	14,20,000	14,73,000	14,81,000	15,29,500
4.	Cane crushing (MT)	9,30,000	9,60,000	9,90,000	10,20,000	10,80,000
5.	Expected Sugar Recovery (%)	11.25	11.25	11.25	11.25	11.25
6.	Molasses (MT)	37,200	38,400	39,600	40,800	43,200
7.	Press mud (MT)	37,200	38,400	39,600	40,800	43,200

Table 3: Bagasse generation and net consumption estimates for the proposed project

During crushing season (180 days)		
Description	**Tpd**	**T/ season**
Cane crushing rate @ 6000tcd	6000	10,80,000
Average bagasse production @ 28.5% on cane	1,710	3,07,800
Bagasse requirement for existing sugar, cogeneration and distillery unit@45.45tph (f:s = 1:2.2)	1,091	1,96,380
Bagasse saved (generation – consumption)	**619**	**1,11,420**
Bagasse saved during season due to use of biogas	37.3	4,476 (for 120 days)
Biogas generation 18,190m^3 per day		
1000m^3 of biogas = 2.05mt of bagasse		
∴ bagasse saving for 120 days (60 days stabilization period)		
Total bagasse saved during season for use in off season		**1,15,896**
During off season (off season 90 days)		
Description	**Mt per day**	**Total**
Actual Bagasse requirement	87.27	7,854.3
Biogas generation (m^3)	18,190	1,637100
Bagasse saved due to use of biogas as fuel	37.3	3,357
(1000m3 of biogas = 2.05mt of bagasse)		
Bagasse required due to use of biogas as fuel	**50**	**4,500**
In off-season, 32 TPH boiler and 3mw turbine of sugar unit will be used for generation of steam and power for distillery operation.		

2.2 Steam

In the proposed scheme maximum 100 TPH steam will be required. During seasonal operation, the industry will fulfill its steam requirement from its own two (70 TPH + 32 TPH) 102 TPH capacity boilers. During off-season, 32 TPH boiler in operation use & distillery unit.

Existing Steam balance:

Sugar: 43 TPH = 1032 MT/day

Distillery: 4 TPH = 96 MT/day

Total: - 46 TPH = 1104 MT/day

Proposed steam balance:

Sugar: - 92 TPH = 2208 MT/day

Distillery: - 8 TPH = 192 MT/day

Total: - 100 TPH = 2400 MT/day

2.3 Power

The power required for the proposed sugar and distillery unit will be 6.5 MW which will be met through captive generation. SMSKL is having cogeneration unit of 10 MW and they have planned to re-operate an idle STG of 3MW (total operating capacity will be 13 MW. Thus, the required power will be sourced from this captive power station during cane crushing season. The surplus power of 6.5 MW will be exported to state electricity board grid. During off-season, power requirement will be 1.5 MW which will be purchased from state electricity board.

Table 4: Power requirement

Sr. No.	Particulars	Requirement	Source
	During Season		
1.	Power (Sugar + Distillery)	6.5 MW	In-house (Captive)
	During Off-Season		
2.	Power (Distillery + Sugar unit – miscellaneous purpose)	1.5 MW	In-house (Captive)/State Electricity Board

2.4 Water

The water requirement for the project will be met from Bhima River. Water will be required for domestic, process and utility purpose. The mill is having water drawl permission for 160000 cubic meter per annum. Daily fresh water requirement for the proposed sugar and distillery unit will be around 103 m^3/d and 417 m^3/d respectively. Considering overall fresh water availability, the mill will not face any problem of water.

2.5 Manpower

Existing: permanent 133 + Seasonal 214 = 347

For Proposed expansion: permanent 125 + seasonal 239 = 364

Total:-711

3.0 THE PROCESS

SUGAR UNIT

The major units of operations of sugar mill are given below-

- **Extraction of Juice -**The sugarcane is passed through preparatory devices like knives for cutting the stalks into fine chips before being subjected to crushing in a milling tandem comprising 5 Nos mill tandem of 3 and 2 TRPF each. In the best milling practice, more than 95% of the sugar of cane gets extracted into the juice.
- **Clarification-**The treated juice on boiling fed to continuous clarifier from which the clear juice is decanted while the settled impurities known as mud is sent to rotary drum vacuum filter for removal of unwanted stuff called filter cake. It is discarded or returned to the field as fertilizer.
- **Evaporation-**Clear Juice is evaporated from 15^{o} Bx. to 60^{o} Bx. in evaporator
- **Pan boiling -**The syrup is again treated with sulphur dioxide before being sent to the pan station for crystallization of sugar. Crystallization takes place in single-effect vacuum pans, where the syrup is evaporated until saturated with sugar. At this point "seed grain" is added to serve as a nucleus for the sugar crystals, and more syrup is added as water evaporates.
- **Centrifugation-**The massecuite from crystallizer is drawn into revolving machines called centrifuges. The perforated lining retains the sugar crystals, which may be washed with water, if desired. The mother liquor "molasses" passes through the lining because of the centrifugal force exerted and after the sugar is "purged" it is cut down leaving the centrifuge ready for another charge of massecuite.
- **Gradation & Packing-**The final product in the form of sugar crystal is dropped through pan section and this sugar is graded and picked in 50 kg bags. The grade of the sugar depends on the size of the crystal viz. Small (S), Medium (M) and Large (L).

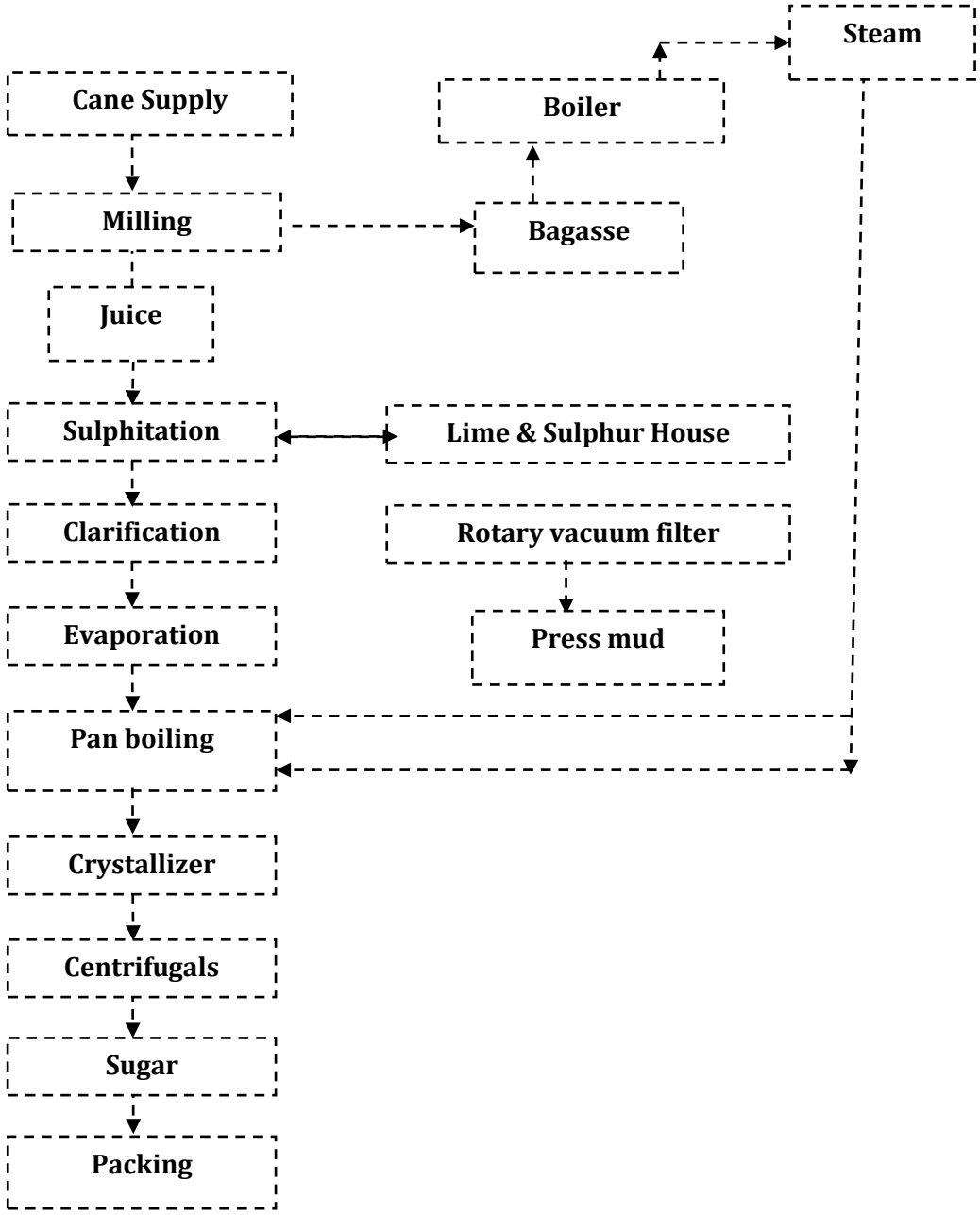

Figure 1: Flowchart of sugar manufacturing process

DISTILLERY UNIT

SMSKL has decided to adopt Zero Liquid Discharge (ZLD) for the proposed 55 KLPD distillery unit. The characteristics of manufacturing process are given below and a schematic is shown in **Fig. 2**.

Manufacturing Process

The production process mainly involves fermentation and distillation process

Fermentation

Molasses is the chief raw material used for production of alcohol. Molasses contains around 50% total sugars, of which 30 to 33% are cane sugar and the rest are reducing sugar. During the fermentation, yeast strains of the species *Saccharomyces cerevisieae*, a living microorganism belonging to class fungi converts sugars such as sucrose or glucose present in the molasses in to alcohol. The continuous fermentation process involves addition of fresh nutrients medium either continuously or intermittent withdrawal of portion of nutrient for recovery of fermentation products. In continuous process, fermenter is in constant usage with little shut down and after initial inoculation of yeast culture, further inoculation is not necessary. Hence, continuous fermenation process will be adopted in the proposed unit.

Distillation

After fermentation, the next stage in the manufacturing process is to separate alcohol from fermented wash and to concentrate it to 95%. This is called Rectified Spirit (RS). For thispurpose, method of distillation is employed. After separation of alcohol, the remaining part is the effluent of the process i.e. spentwash and spent lees.

Re-distillation to manufacture Extra Neutral Alcohol (ENA)

ENA is prepared by re-distillation of the rectified spirit (RS) for the removal of impurities like higher alcohols, aldehydes and methyl alcohol. This is done by, remixing rectified spirit with soft water and distilling it in the ENA column.

Anhydrous Alcohol (AA)

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

The various processes used for dehydration of alcohol are as follows-Azeotropic Distillation, Molecular Sieves and Pervaporation / Vapour permeation system

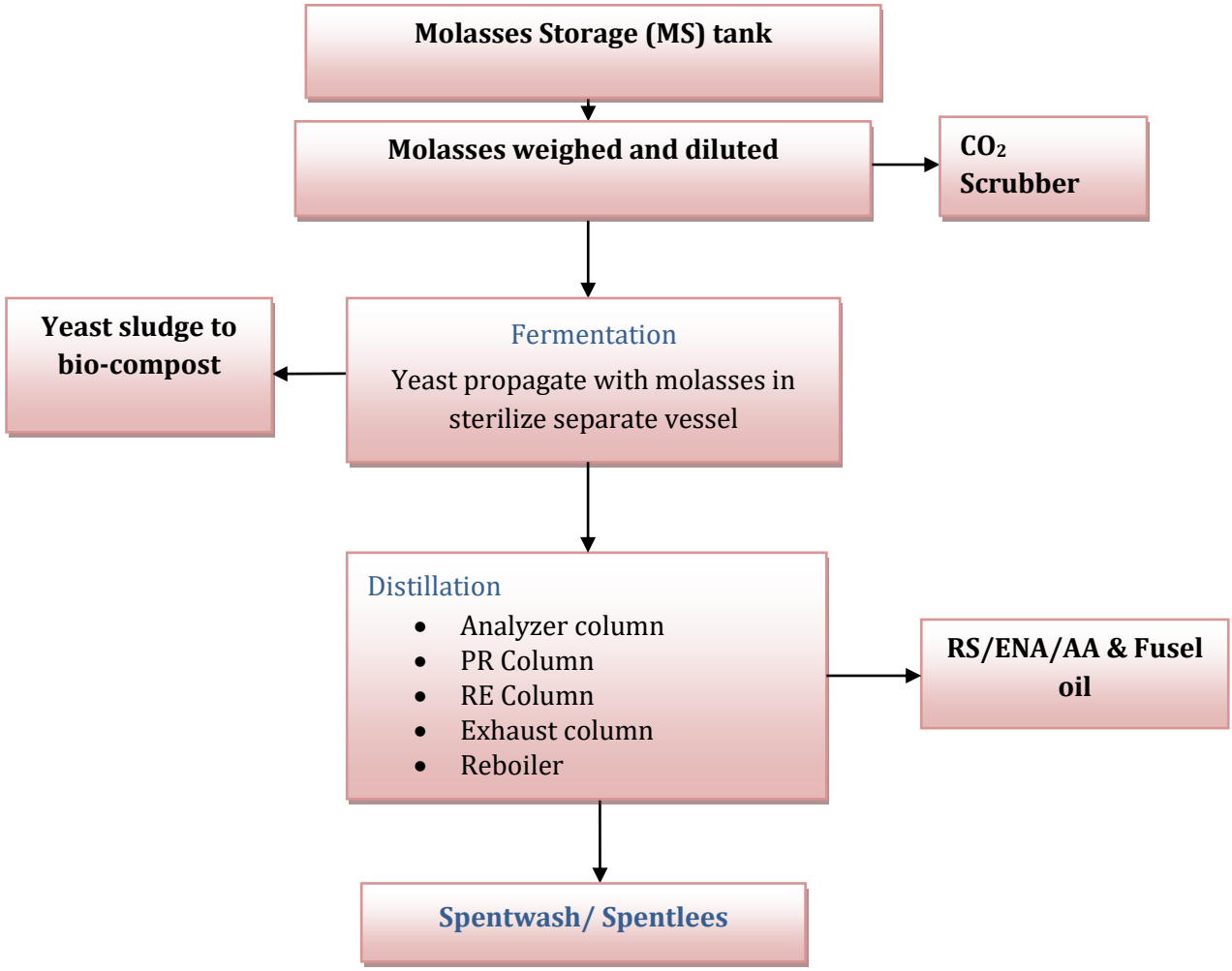

Figure 2: Schematic of RS/ENA/AA manufacturing process

3.1 Technical Features proposed expansion activity

The equipment in milling house, boiling house and centrifugal house and sugar house will be modified to make it suitable to increase crushing rate to around 6000 TCD installed capacity. All modification will be done by considering the maximum efficiency.

4.0 Environmental Aspects: Air Pollution

The sugar industry uses its byproduct bagasse as a fuel. Bagasse is a source of renewable energy and helps to reduce SOx emissions when used for generation of steam and power instead of coal. Bagasse is easily and readily available in adequate quantity.

Estimated quantity of ash likely to be generated from the project (At 6000 TCD) is as follows.

Sugar cane crushing season	6,000 TCD
Bagasse required to generate 2400MT steam per day (generally observed bagasse to steam ratio 1:2.2)	1091 TPD
Total Ash generated @2%	21.82 TPD
In case of fuel bagasse, fly ash generation is usually 70% of total ash generated. Venturi wet scrubber is installed to control fly ash, which will be entrapped and collected as slurry.	
Bottom ash	6.546 TPD
Fly ash generation	15.274 TPD
Fly ash controlled by wet scrubber @95 %	14.51 TPD
Fly Ash emission	0.763 TPD (8.83g/s)
Sulphur Dioxide (SO_2): (Only bagasse used as fuel)	
Bagasse required to generate 2400MT steam per day	1091TPD
Sulphur dioxide emissions (Sulfur content in bagasse 0.02%)	0.4364 TPD (5.05g/s)
Apart from this, trifling fugitive dust emission due to opening and leaks in duct /manholes and also from ash handling operation at unloading and transfer point are minor pollution sources.	

4.1 Water Pollution

Table 5: Estimation of wastewater sources, quantity and characteristics

#	Source of waste water	Quantity of waste water	Characteristics of waste water
1	Effluent from sugar industry	~600 m^3/day	• pH: 4 – 5.5 • BOD- 1500 to 3,000 mg/L, • COD - 2,500 - 6000 mg/L
2	Spray Pond overflow	720 m^3/day	• BOD – 15-30 mg/L • COD – 30 -60 mg/L • TDS – 2200 -2300 mg/L
3	Sanitary wastewater	43 m^3/day	• pH: 7.6 mg/L • BOD: 250 mg/L • COD: 300 mg/L
4	Spent wash	440 m^3/day	• Color – Dark brown • pH – 4.0 – 4.3 • COD – 1,10,000 – 1,30,000 mg/L • BOD – 55,000 – 65,000 mg/L • Total Solids – 1,30,000 – 1,60,000 mg/L
5	Condensate	352 m^3/day	• pH: 6.7 • BOD: 275 mg/L • COD: 800 mg/L

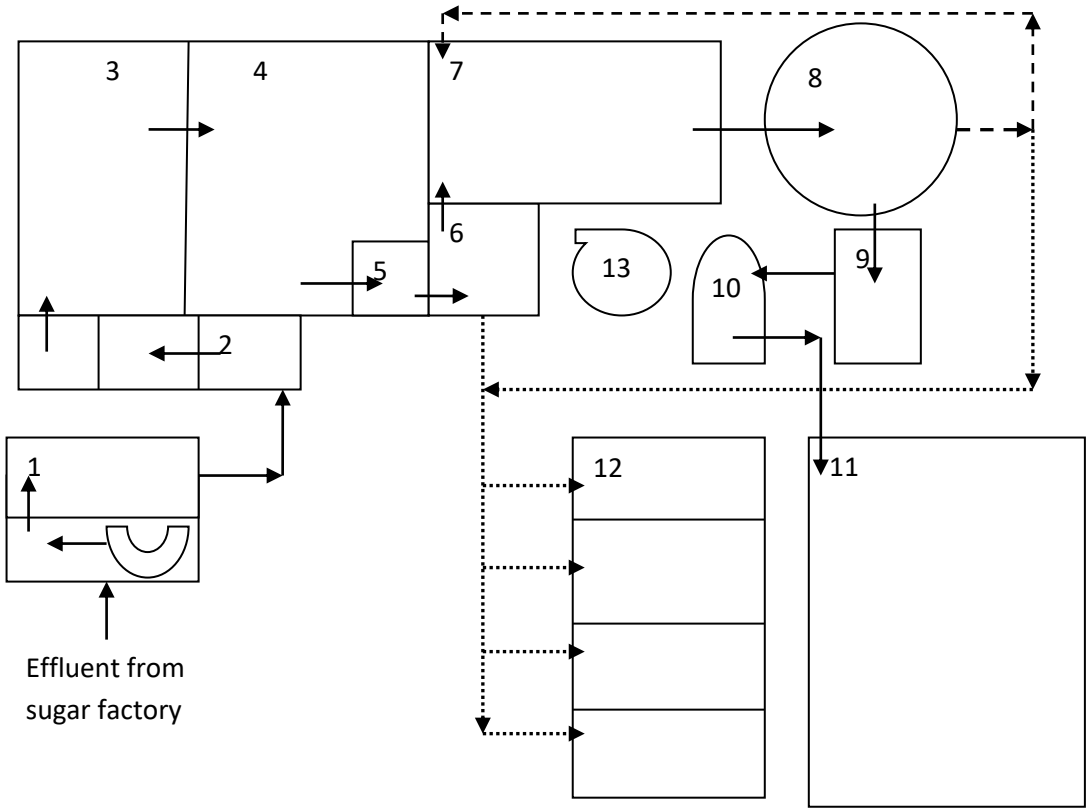

Figure 3: Schematics of Effluent Treatment Plant

Sr. No.	Name of tank	Dimension (L x W x H) in meter
1.	Switch yard E.T.P.	10 x 5.8 x 2
2.	Oil & Grease chamber	13.0 x 2.0 x 1.2
3.	Equalization Tank	8.0 x 15.0 x 1.5
4.	Balancing Tank	11.0 x 15.0 x 1.4
5.	Neutralization tank	2.0 x 2.0 x 1.4
6.	Primary Clarifier	6.0 x 6.0 x 2.5
7.	Aeration Tank	11.0 x 8.0 x 3.5
8.	Secondary Clarifier	8.0 x 2.5
9.	Holding Tank	7.0 x 4.0 x 1.2
10.	Multi Media Filter	---------
11.	Storage Tank	15.0 x 12.0 x 2.5
12.	Sludge Drying Beds	4.0 x 3.0 x 1.2
13.	Air Blower	Capacity 800 cum/Hrs
14.		Oil Skimmer
15.	- - - - - - - →	Sludge recirculation
16.	·····→	Waste/ excess sludge to sludge beds

4.2 Solid waste generation and management

SUGAR UNIT

The proposed industrial activity could generate solid waste in the form of ETP sludge and boiler ash. The quantity and disposal technique is given briefly in the following **Table 6**

Table 6: Solid waste generation and disposal

#	Waste	Quantity (per season)	Treatment	Disposal	Remark
1.	Sugar ETP Sludge	35 MT	Disposal into land/soil	Sold to the member farmers/or used on own plot	Organic
2.	Ash (Considering 180 days of season)	3,927 MT	Disposal into land/soil	Used as manure/soil enriching material	Inorganic
3.	PMC	43,200	Composting	Soil conditioner	Organic
4.	Oil & Grease	4-5 KL	Remove by oil skimmer	Use for boiler	-

DISTILLERY UNIT

The proposed industrial activity will generate solid waste in the form of fermentation sludge which is biodegradable and boiler ash. The quantity and disposal technique is given briefly in the following **Table 7.**

Table 7: Solid waste generation and disposal

#	Waste	Quantity (MT/Annum)	Treatment	Disposal	Remark
1.	Yeast Sludge	50	Composting	Used as manure/soil enriching material	Organic
2.	Boiler Ash (off season of sugar)	157	---	Sold to the brick manufacturing unit	Inorganic
3.	Distillery CPU Sludge	20	Composting	Used as manure/soil enriching material	Organic
4.	Spent oil from DG set	0.1-0.2 KL	-	Spent oil will be burnt in boiler	-

Hazardous Waste

The only hazardous waste likely to be generated will be scrap oil from DG set, automobiles, gears etc. Since the DG set will run only in case of failure of regular power supply. Thus, the quantity of used or scrap oil will be low and has been assumed to be very minor. This will be stored in leak proof drums in storage yard. This will be disposed off periodically by burning in boiler furnace along with fuel.

5.0 BASELINE ENVIRONMENTAL CONDITIONS

The baseline study and primary data collection was carried out during winter i.e. October 2017 to January 2018.

Table 8: Summary of Environmental features of study area

#	Facet	In brief
1.	**General characteristics**	Mostly hot and dry
2.	**Rainfall**	An average annual rainfall of 400-600 mm Most of the rains received from June to September months, July being the month with highest rainfall
3.	**Temperature**	Average maximum temperature in summer is around 31.5°C and average minimum temperature in winter is around 17.7°C.
4.	**Humidity**	Minimum 17% and maximum 74%
5.	**Wind**	The predominance wind is blowing from W and NW in summer months, SW and W in monsoon whereas in winter months from N
6.	**Land use**	Crop land 83.62 %, scrub land 6.76 %, barren rocky land 2.11%, Dense forest 2.0%, open forest 1.18% and others
7.	**Air Quality**	Complies NAAQ standards of Nov., 2009 at all monitored locations
8.	**Noise Quality**	Complies the standards of CPCB
9.	**Ground water Quality**	As per Central Ground Water Board report 2014,
10.	**Soil Quality**	Black cotton soil

5.1 Land use

Table 9: Land use/ Land cover statistics for the study area of ten km radius

Sr No.	Class Name	Area (Ha)	Area (%)
1	Crop land	26270.97	83.62
2	Scrub land	2123.26	6.76
3	Barren rocky land	661.65	2.11
4	Dense forest	628.32	2.00
5	Open forest	369.7	1.18
6	Industrial area	3.83	0.01
7	Lake/ ponds	37.09	0.12
8	River/stream	1031.97	3.28
9	Settlement	288.73	0.92

6.0 IMPACT ASSESSMENT

The proposed expansion is within the existing sugar mill premises. The machinery required for the proposed expansion will be accommodated within existing industrial shed. Therefore, the construction activities will be minor and in the form of godown/s, ETP upgradation etc. Thus, construction activity will cause minor negative impact on the overall environment.

6.1 Air Dispersion Modeling

Table 10: Dispersion Model Input Data

Parameters	Unit	Stack Attached to Boiler
Stack height	m	65
Stack diameter at exit/top	m	3
Stack exit gas velocity	m/s	8
Stack gas temperature at exit	Deg. C	140
Fuel (Bagasse) requirement	TPH	45.45
Ash content of bagasse	%	2
Emission rate of SPM*	g/s	8.83
Emission rate of SO_2#	g/s	5.05
Emission rate of SO_2##	g/s	6.32

* After fly ash removal efficiency of pollution control equipment (wet-scrubber) 95%

Sulphur, considered 0.02% in bagasse

SO_2 emissions from burning of biogas and bagasse during off-season

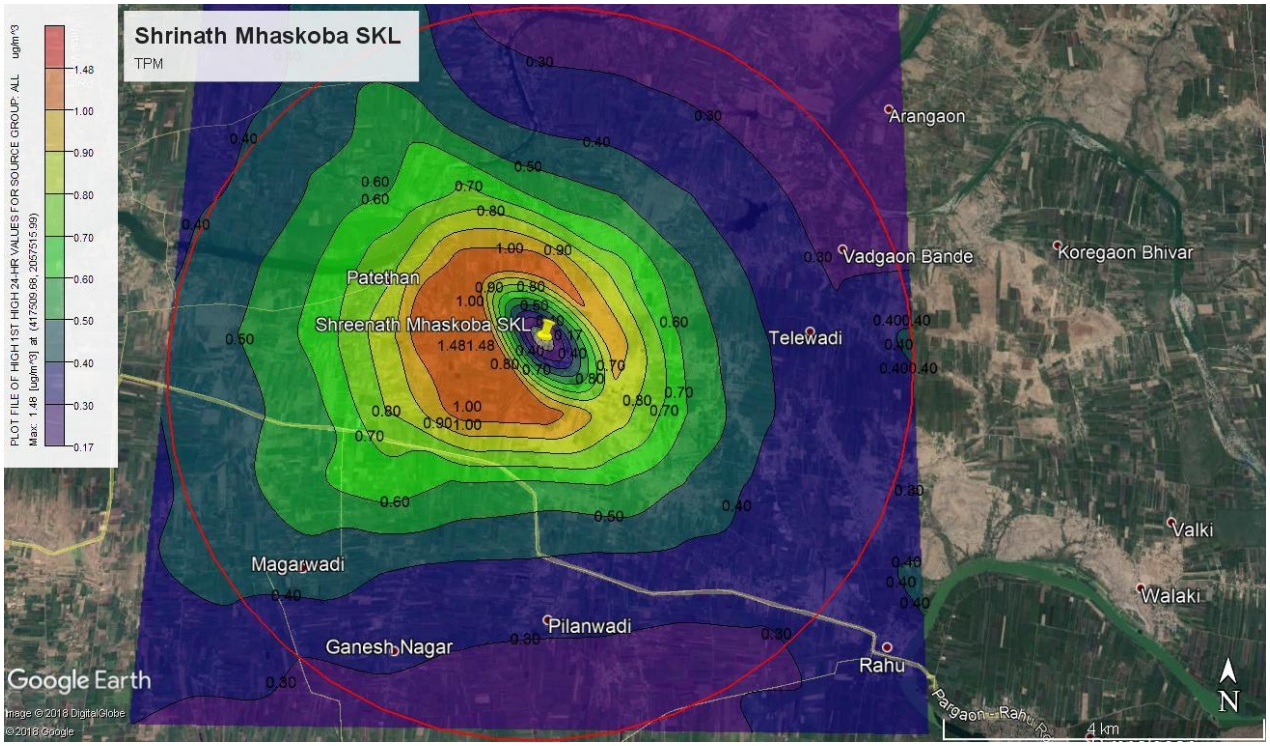

Figure 4: Isopleths showing incremental ground level concentration of particulate matter (Short Term 24 Hourly) during cane crushing season

Terms used in impact assessment table

X= severity (very low (1), low (2), moderate (3), high (4), very high (5);

Y = area – coverage within premises (1), close vicinity outside premises (2), up to 3 from project boundary (3), 3-5km from project boundary (4), and >5km from project boundary (5)

Z = Duration (very short (1), short (2), medium(3), medium to long (4), prolong periods (5);

F = Frequency -remote(1), rare (2), intermittently (3), frequently (4), daily (5)

Highest score = 625; considerable impact score: >310 (considering 50% of highest score)

Table 11: Summary of Impact Assessment and environment management plan proposed for the respective aspect

Activity	Aspect	N/AB/E	Impact	Receptor	Legislative concern (Y/N)	Concern of interested parties (Y/N)	Business opportunity (Y/N)	Significance Assessment				
								X	Y	Z	F	Total #
Burning of fuel – bagasse and biogas – for generate process steam	**Air pollution:** Contamination of ambient air due to emission of Particulate matter (PM), SOx and NOx through stack	Normal (in a situation when APC system works properly)	Levels of PM, SOx and NOx anticipated to increase marginally but will be within NAAQS – minor impact on workers health if continuously get exposed to PM	Workers, villagers, agricultural and wild vegetation, domestic and wild animals	Yes	No	No	2	2	4	5	80
		Abnormal	Level of PM anticipated to be high – moderate impact on human health till the situation returns to normal; significant impact on plants; minor impact on terrestrial fauna	Workers, villagers, agricultural and wild vegetation, domestic and wild animals	Yes	No	No	4	4	2	3	96
		Emergency	Level of PM anticipated to be	Workers, villagers,	Yes	Yes	No	5	5	2	2	100

Activity	Aspect	N/AB/E	Impact	Receptor	Legislative concern (Y/N)	Concern of interested parties (Y/N)	Business opportunity (Y/N)	Significance Assessment				
								X	Y	Z	F	Total #
			very high Significant impact on human health as well as plant (particularly crops)	agricultural and wild vegetation, domestic and wild animals								
Handling of bagasse and ash	**Air pollution:** increase in particulate matter due to fugitive emissions	Normal	Levels of PM anticipated to increase, mainly at workplace	Workers within premises	Yes	No	No	3	2	4	5	120
Vehicular emissions	**Air pollution:** Due to vehicular emissions mainly of Particulate matter (PM), NOx, HC	Normal	Increase in air pollution due to increase in the vehicle number plying on the roads	Residents along the roads, workers within the factory premises, and vegetation along the road	Yes	Yes	Yes	3	5	4	4	240
Pollution due to odour	Odour of spentwash from storage lagoons	Normal	Nuisance -mainly disturbance	workers within the factory premises,	Yes	Yes	No	3	4	4	5	240

Activity	Aspect	N/AB/E	Impact	Receptor	Legislative concern (Y/N)	Concern of interested parties (Y/N)	Business opportunity (Y/N)	Significance Assessment				
								X	Y	Z	F	Total #
				villagers and animals in the close vicinity								
Operation of machineries and equipments for process	**Noise and vibration:** mainly noise generation due operations of machinery	Normal	Impact on health of workers due to continuous exposure to different levels of noise	Mainly workers of the factory	Yes	No	No	4	1	4	5	80
Transportation	**Noise and vibration**– Mainly noise from vehicles	Normal	Impact on health of workers and residents along the road due to exposure to noise	Mainly workers and the residents along the roads	Yes	No	No	3	5	4	4	240
Fresh water utilized for process	**Fresh water availability** for other users from the existing water source	Normal	No impact envisaged as the water drawl will be from Bhima river- with permission	Villagers in the vicinity, domestic animals	Yes	Yes	No	2	5	3	3	90
		Abnormal	Other users may get affected in water scarcity situation (drought condition)	Villagers in the vicinity and domestic animals	Yes	Yes	No	5	5	3	3	225

Activity	Aspect	N/AB/E	Impact	Receptor	Legislative concern (Y/N)	Concern of interested parties (Y/N)	Business opportunity (Y/N)	Significance Assessment				
								X	Y	Z	F	Total #
Wastewater/effluent generation from various project activities, its handling, treatment and disposal	**Water and soil pollution:** Contamination of surface or ground water, Contamination of soil	Normal	No negative impact is envisaged on surrounding aquatic ecosystem and soil health; as measures in practice and proposed are adequate	Water bodies in the nearby areas, residents, domestic and wild animals	Yes	Yes	No	2	3	3	4	72
		Emergency	Probability of contamination will be and impact on aquatic and/or ground water and/or terrestrial ecosystem would depend upon the degree of contamination	Villagers in the vicinity, domestic animals, water bodies in the vicinity	Yes	Yes	No	5	5	3	2	150
Construction of various units	change in land use	Normal	Change in topography of the site,	Vegetation existing on the site, birds and animals, villagers in the vicinity	No	No	No	4	1	5	5	100

Activity	Aspect	N/AB/E	Impact	Receptor	Legislative concern (Y/N)	Concern of interested parties (Y/N)	Business opportunity (Y/N)	Significance Assessment				
								X	Y	Z	F	Total #
Solid waste generation from process	**Water and soil pollution:** Contamination of surface water, Contamination of soil	Normal	In normal situation, no negative impact is envisaged on surrounding ecosystems; as measures practiced and proposed are adequate	Water bodies and soil in the nearby areas, residents, domestic and wild animals	Yes	No	Yes	2	3	3	5	90
Process and allied activities such as transportation, storage, treatment and disposal	Risk and Hazard	Emergency	Negative impact envisaged	Workers, villagers, vegetation at site and surroundings, wild fauna	Yes	Yes	No	5	3	2	3	60
	Socio-economy	Normal	Positive impact is envisaged due to employment generation, recycling of nutrients from waste		No	Yes	Yes	4	5	4	5	400

7.0 FIRE PROTECTION SYSTEM

Fire protection system shall be provided in accordance to OISD-117 and LPA regulations. The firefighting system will consist of a hydrant network, piping etc. Fire protection system will also include one electric driven pump, one diesel engine driven pump, one jockey pump, piping, basin etc. Water hydrants will be provided at all strategic points. A suitable Fire ring system as per the guidelines of TAC will be incorporated. Non-flame proof and flame proof area will be separated by minimum distance of 15 meters. Portable fire extinguishers will also be provided in strategic locations viz., power house, control rooms, switch yard. SMSKL has fire-fighting facility in the existing plant.

8.0 ENVIRONMENT MANAGEMENT PLAN

Table 12: Environment management plan: operation phase

Aspect	Impact causing factor	Control/Mitigation Measures
AIR ENVIRONMENT		
Air Environment	Particulate Matter (PM) Formation of SO_2, NO_x H_2S from Biogas Carbon dioxide due to fermentation, Odour due to composting process	• Existing Stack 65 m height is adequate • Wet scrubber to control ash emission through stack • Existing Greenbelt 12 acre and proposed 2.5 acre Total 14.5acres • Covered fermenters • Bagasse contains traces of S & N, hence generation of SO_2 and NO_X anticipated to be limited • Proper ash and bagasse handling system • Use of biogas as fuel • Provision of flare unit • Aerobic composting by using aero-tiller machines • Storage of spentwash as per CREP guidelines

Aspect	Impact causing factor	Control/Mitigation Measures
	Fugitive dust from Handling and transport of bagasse and ash; dust generated from roads, etc.	Mechanized system for handling of bagasse as well as ash Asphalted internal roads, Adequate parking places for goods and private vehicles
WATER ENVIRONMENT		
Water Environment	Major source – effluent from milling section, boiling house, centrifugal house, boiler blow down, cleaning & condensate. Storage of spentwash, its treatment and disposal	• Existing sugar ETP will be upgraded to treat effluent of 600m^3/day from proposed units (after expansion) • Currently, spray pond over flow is collected separately and sent for irrigation after proper treatment. Same will be followed after expansion (quantity 600 m^3/day) • ETP treated water will be reused for greenbelt/irrigation (within the premises) • Process condensate from sugar unit will be recycled (partially); reducing the fresh water requirement considerably • Rain water harvesting • Bio-methanation as primary treatment for spentwash • Multi Effect Evaporation (MEE)-secondary treatment to reduce spentwash volume • Concentrated spentwash will be mixed with press mud cake to produce bio-compost • Spentlees, condensate of MEE and other effluents will be treated in condensate polishing unit and reused for distillery

Aspect	Impact causing factor	Control/Mitigation Measures
		activities • All effluent will be properly treated and utilized/disposed within the premises • Storage of spentwash in 30 days and five day impervious lagoons as per CREP guidelines • Enhancement of existing impervious compost yard with leachate collection drainage and other facilities - strictly as per CREP guidelines • Fresh water requirement will be reduced by recycling of water , using rain water during start up period • Bore well, in downstream area of bio-compost to monitor ground water quality
SOLID WASTE		
Boiler	Ash	Bagasse ash is rich in potash, thus used to enrich the soil or sold for bricks manufacturing Provision of greenbelt for natural control
ETP (Sugar unit)	Sludge	Organic and degradable hence, mixed with bio compost
Fermentation	Sludge	
Bio digester	Sludge	
NOISE		
Process machineries	Mainly Boiler, STG, pumps and motors	Noise sources/ noise generating activities will be under roof/in covered area Regular maintenance of machinery Provisions of personal protective equipment

Aspect	Impact causing factor	Control/Mitigation Measures
		Job rotation at high noise work places Regular health check up Walls and trees will help to attenuate noise Greenbelt development
	Transportation	Regular maintenance of vehicles Well maintained internal roads and adequate parking will reduce traffic congestion and noise due to it
Ecology and Biodiversity	Air, water, soil and noise pollution Tree cutting failing, disturbance to wildlife due to project	• Adequate preventive, control and mitigation measures for air, water and soil pollutants • No tree cutting failing involved since project is on flat, barren land • No wildlife sanctuary, national park or biosphere reserve within 10km radius, site is not in migratory route of any wildlife, no rare and endangered species of plants/animals reported from the region • Development of greenbelt will help to enhance the biodiversity and may provide habitat to many species
Socio-economic Environment	Rehabilitation and Restoration (RR), pressure on available manmade infrastructure/resource due to population flux	• No rehabilitation and restoration issue involved since site is already under the possession of project proponent • Local candidates will be preferred for employment. Skilled work force is available at nearby towns and cities
Safety and Occupational health	Accidents, improper work practices	• Safety officer and safety committee will be formulated • Provision of adequate safety gears

Aspect	Impact causing factor	Control/Mitigation Measures
		• Other safety measures as per the norms • Insurance policy for workers • Regular health check-up
Risk and disaster management	Fire, accidents, earthquake, etc.	• The entire premises is no smoking zone • Lightening arresting system will be in place • Ethanol vapor condensing system will be installed at storage area • Proper storage of molasses, ethanol, bagasse • Firefighting system as per OISD guidelines • Earthquake resistant construction

9.0 SAFETY, OCCUPATIONAL HEALTH MANAGEMENT

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

- Use of flameproof electrics
- Suitable operating procedures shall be adhered for overall safety and health
- DG sets of appropriate ratings and as per the CPCB guidelines will be provided to ensure the uninterrupted supply of power and thus for safety of plants and workers
- Smoking and igniting activities are strictly prohibited in the entire unit
- Existing Firefighting system should be modified suitably so as to make it suitable for proposed project (as per the statutory guidelines)
- Regular medical checkup of workers, contractual workers and employees
- Group insurance and medical insurance facilities provided in the existing setup should be extended after proposed expansion.

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

Schedule of medical check-up during operational phase

- Comprehensive pre-employment medical checkup for all employees
- General checkup of all employees (including contractual employees and casual labour) once every year (the industry is doing it for existing unit)

Table 13: Financial provision for ESC (CSR) activities planned for next five years

CSR activity head	Year					TOTAL
	1st	2nd	3rd	4th	5th	
	Budgetary provision (Rs. in lakhs)					
A. Drinking Water						
Regular supply of drinking water to nearby villages through tanker	10	10	12	15	15	**62**
Construction of water storage tanks/repair or maintenance	5	5	5	7	7	**29**
Sub-Total for A	**15**	**15**	**17**	**22**	**22**	**91**
B. Health facilities						
Health check-up of workers and their family members	5	7	7	10	10	**39**
Organizing medical camps	1	2	2	3	3	**11**
Medical aid to needy people, etc.	4	5	5	5	5	**24**
Sub-Total for B	10	14	14	18	18	**74**
C. Education						
Training to staff	2	2	4	4	6	**18**
Training to local farmers	2	2	2	4	4	**14**
Educational aid to local schools, colleges, etc	5	5	7	7	9	**33**
Sub-Total for C	**9**	**9**	**13**	**15**	**19**	**65**

CSR activity head	Year					TOTAL
	1st	2nd	3rd	4th	5th	
	Budgetary provision (Rs. in lakhs)					
D. Livestock care						
Providing water, fodder and veterinary facilities for local domestic animals	02	02	02	02	03	**11**
Other activities for maintaining social, cultural and religious harmony	03	03	05	05	07	**23**
TOTAL BUDGETARY ALLOCATION FOR NEXT FIVE YEARS						**264**

Table 14: Budgetary allocations for environment management (Sugar Unit), Rs. in lakhs

#	Particular	Recurring cost	Capital Cost
1	Air pollution control equipment (venturi wet-scrubber)	6.00	--
2.	Noise pollution control	0.10	0.10
3.	Greenbelt	8.00	7.00
4.	Occupational health, training and community development	19.50	32.50
5.	Fire protection	1.50	2.00
6.	Water pollution control and ETP	7.75	11.80
7.	Environmental monitoring system	4.50	4.50
8	Rain water harvesting and storm water management	0.40	7.00
	Total	**47.75**	**64.90**

Table 15: Budgetary allocations for environment management (Distillery Unit), Rs. in lakhs

#	Particular	Recurring cost	Capital Cost
1	Solid waste management/Composting	30.00	60.00
2.	Noise pollution control	0.10	1.00
3.	Greenbelt	8.00	7.00
4.	Occupational health, training and community development	15.50	16.50
5.	Fire protection	1.40	1.50
6.	Water pollution control	100.00	250.00
7.	Environmental monitoring system	01.00	01.00
8	Rain water harvesting and storm water management	0.30	2.00
	Total	**156.30**	**339.00**

10. CONCLUSION

Since its inception in 2002-03 SMSKL has made progressed not only on the industrial front but it has been the node of development for the local villagers. There are >6,000 families which are involved in cane cultivation, harvesting and transportation, will be benefitted due to the project. The expansion of sugar unit will fulfill the demand of local cane growers.

The mill is following all norms and guidelines for prevention and control of pollution (air, water, land and noise). As a result, it will be able to maintain environmental conditions. Considering voluminous development on socio-economy front and sincere commitment of the mill for maintaining environmental attributes, the proposed project will be sustainable.