EXECUTIVE SUMMARY

1.0 INTRODUCTION

This project is proposed by M/s. Kumbhi–Kasari Sahakari Sakhar Karkhana Ltd., (KKSSKL). It is located in village Kuditre, Karveer taluka of Kolhapur district, Maharashtra. It is one of the progressive co-operative sugar factories from western Maharashtra. The factory is registered under the Government of Maharashtra Co-operative Societies Act as no. G 282, dated 20-6-1960. The KKSSKL was established in 1960. The first crushing was completed successfully in year 1964. The present installed capacity of the sugar factory is 5000 TCD along with bagasse based cogeneration unit 19.5 MW and distillery 30 KLPD. The factory Management has decided to expand its crushing capacity from 5000 TCD to 10,000 TCD, cogeneration 19.5 MW to 30 MW and distillery 30 KLPD to 100 KLPD. This is brown field project.

1.1 Features of the site

The proposed expansion is planned within the existing premises of respective units. The main production unit (factory site) is located at Gat no. 189/1, 191,192, 195/1, 247/2, 249, 250, 272, 273, 274/1, 275, 276, 278,279,281,282,283,284, 303/A, 304,305, 306, 307, 308, 309, 311, 312, 313/P, 316/1, 232 and 277 Village Kuditre, Tal – Karveer, Dist- Kolhapur. The distillery unit is having compost site located at survey no. 171, gat no. 708 village Satarde Taluka Panhala, Kolhapur.

The project site is well connected by road, railway as well as air network. Site is located on the Kolhapur - Gaganbavda road, state highway no. 115. Kolhapur railway station is approx. 20 km from the project site. The Kolhapur (approx. 18 km) is the nearest airport to the site. Radhanagari wildlife sanctuary is 33 km far from the site towards SW direction.

The industrial activities are carried out in the southern part of the plot. There is a housing colony and other non-industrial activities carried out in the northern part. In the area used for industrial activities, distillery is located in the eastern part, sugar mill is located at the Centre, boiler and bagasse yard is located in the western part. The factory has kept the plots open towards south. Shrubby vegetation cover with few scattered trees observed in south-west, and northern sides of the entire plot. Satellite image shows that there are limited households just outside the factory boundary towards west and south-east. Village Kuditre is located towards south of the factory premises. Kumbhi river located towards west of the factory at approx. 600 m.

Table 1: Project highlights

1	Name of the Proponent	M/s. Kumbhi - Kasari Sahakari Sakhar Karkhana Ltd.,
2.	Project	Capacity Enhancement of • Sugar unit from 5,000 TCD to 10,000 TCD • Cogeneration Unit from 19.5 MW to 30 MW • Distillery unit from 30 KLPD to 100 KLPD
3.	Location of the project (Factory site)	Gat number for industrial premises are 189/1, 191,192, 195/1, 247/2, 249, 250, 272, 273, 274/1, 275, 276, 278,279,281,282,283,284, 303/A, 304,305, 306, 307, 308, 309, 311, 312, 313/P, 316/1, 232 and 277 Village Kuditre, Tal – Karveer, Dist- Kolhapur, Maharashtra
	Compost site	Gat number 708 in village Satarde, Taluka Panhala, Kolhapur.
4.	Land	Total land area of factory site =59.58 Ha. Total land area of compost site = 08.00 ha Existing sugar, cogeneration and distillery unit 13.98 Ha. • Existing greenbelt area 12.0 Ha + Proposed greenbelt area 7.70 ha = Total 19.70 ha + 2.64 ha (33% of area of factory and compost site) • Total land allocated for proposed expansion: 3.33 Ha • No need of acquisition of land as the proposed project will be set up in the existing factory premises only
5.	Product	A. Sugar Unit (Production figures are based on operational capacity of 10,000 TCD)
		i) White Sugar (average 12.70% on cane for calculation): ~1270 TPD ii) Bagasse (generation 28.0 % on cane): ~2800 TPD iii) Molasses C heavy (4.0 % on cane): Max. 400 TPD OR B heavy (6.10% on cane) = Max. 610 TPD iv) Press mud (4.0 % on cane): 400 TPD
		B. Cogeneration Unit Power generation (30 MW unit) = 30 MW (during crushing season) and 12.5 MW (during off-season for 40 days).

		C. Distillery Unit Industrial Alcohol (RS): 100 KLPD OR Extra Neutral Alcohol (ENA): 100 KLPD OR Ethanol (AA): 100 KLPD By-product Bio Compost: 8,000 TPA Fusel oil 400 LPD
6	**Operation days per annum**	• Sugar: Average 120 days and Maximum 150 days • Cogeneration: season + max. 40 days • Distillery: year around (330 days for calculations)
7.	**Main Raw Material**	**Sugar Unit** (based on operational capacity) • Sugar Cane: 10,000TPD • Lime: 15.0 TPD • Sulfur: 5.0 TPD **For sugar and Cogeneration Unit: During season** • Bagasse as a fuel: 90.91 TPH (Considering steam generation of 200 TPH) **For cogeneration unit During Off-season** • Bagasse= 32.38 TPH **Air pollution control equipment: separate ESP for existing and new 100 TPH boiler of sugar, cogen unit** **For 100 KLPD distillery unit** Molasses: Option 1) Only C heavy molasses (CHM) = Max. 365 TPD Option 2) Only B-heavy molasses (BHM) = Max. 312.5 TPD Option 3) sugar cane for juice or syrup route = 1429 TPD (only during cane crushing season) and BHM during off-season **FUEL** Incineration boiler (30 TPH): spent wash to bagasse ratio of 60:40 Spent wash (Concentrated) = 139 TPD Bagasse as fuel: 92.67 TPD Air pollution control device: separate ESP for incineration boiler
8.	**Process Technology**	Sugar: Double sulphitation process to produce plantation white sugar Cogeneration: DECC (Double extraction cum condensing) turbine (for expansion unit)

		Distillery: Continuous/Fed-batch fermentation & Multi-pressure-vacuum distillation for the production of Rectified spirit or Extra Neutral Alcohol and Molecular Sieve De-Hydration (MSDH) plant for Anhydrous alcohol/Fuel ethanol
9.	**Water Requirement**	Sugar & Cogeneration = 768 m^3/day during season Cogeneration (for offseason) = 298 m3/day Distillery (For season) = 130 m3/day For off-season = 284 m3/day source: Kumbhi River with permission from irrigation Department - Kolhapur. Permitted quantity is 2,60,000 m^3/annum for industrial purpose)
10.	**Manpower**	In existing Sugar + cogeneration = 805 + proposed 70 = 875 In existing distillery unit = 45 + proposed 30 = 75
10	**Project Cost**	Total: Rs. 323.70 Cr. (including CER) A. Sugar & cogeneration Unit: Rs. 200.25 Cr. B. Distillery Unit: Rs. 120.25 Cr

2.0 Material and Infrastructure

Table 2: Raw material, finished goods/product and mode of transport

Particulars	Estimated quantity	Source/ market	Final product	Estimated quantity	Transport mode
Raw Material					
A. Sugar unit					
Sugar cane	10,000 TPD	Local farms	White Sugar	1270 TPD	By road
Lime	12TPD	Maharashtra, Karnataka, Rajasthan	Molasses	400 TPD	
			'C' or B Heavy		
Sulphur	04 TPD	Mumbai, Pune	Press Mud	300 TPD	
			Bagasse	2860 TPD	
B. Co-generation Unit					
Bagasse	2,182 TPD	Own factory	Power	30 MW	Closed conveyer belt
C. Distillery Unit					

Particulars	Estimated quantity	Source/ market	Final product	Estimated quantity	Transport mode
Molasses (C) or Molasses (B) or Sugarcane (for syrup/juice)	365 TPD 312.5 TPD 1429 TPD	Own sugar mill	Rectified spirit or ENA or Fuel Alcohol (ethanol)	100 KLPD	By Road
Chemicals					
Nutrients N, P	150 Kg/day	Kolhapur, Pune etc.	-	-	By Road
Turkey Red Oil (TRO)	150 Kg/day				
Fuel /Utilities					
A. Co-generation unit					
Bagasse	2,182 TPD	Own sugar unit	-	-	Closed conveyer belt
B. Distillery unit					
Spentwash Bagasse	139 TPD 92.66 TPD	Distillery From market Own Mill	-	-	By Closed pipeline, road/ Closed conveyer belt and rail
Water (daily) A. Sugar & cogeneration B. Distillery unit	950 m^3/d 398 m^3/d	Kumbhi river, with permission from Irrigation Dept.,	-	-	Existing closed pipeline

Table 3: Water Balance: Distillery unit (Quantities in cum/day)

A. For B-heavy molasses route

A. WATER	Input m^3/day	Recycle/reuse m^3/day	Net fresh water m^3/day
Process	600	412	188
Cooling tower make up (CT for fermentation, Distillation, F. A. & Evaporation etc.)	766	302+466	-
Boiler	600	544	56
Pump seal and air blower	15	15	-
WTP reject	15	-	15
Alcohol scrubber	15	-	15
For fusel oil decanter	10	-	10
A) Total Water Input at start-up	**2021**	**1737**	**284**

B. For Juice or syrup route

A. WATER	Input m^3/day	Recycle/reuse m^3/day	Net fresh water m^3/day
Process	660	619	188
Cooling tower make up (CT for fermentation, Distillation, F. A. & Evaporation etc.)	766	379+387	-
Boiler	528	479	49
Pump seal and air blower	15	15	-
WTP reject	15	-	15
Alcohol scrubber	15	-	15
For fusel oil decanter	10	-	10
A) Total Water Input at start-up	**2009**	**1879**	**130**

C. For sugar and cogeneration unit

A. WATER	Input m³/day	Recycle/reuse m³/day	Net fresh water m³/day
Process	15,900	15,900	00
Cooling tower make up (CT for fermentation, Distillation, F. A. & Evaporation etc.)	400	112	288
Boiler	4800	4416	384
Washing and Other	30	30	0
A) Total Water Input at start-up	**21,130**	**20,458**	**672**

D. Total annual water requirement after expansion

#	Unit	Operation days	Water requirement
1.	Sugar & Cogeneration Unit + Drinking	150 (Max)	1,15,200 m³
2.	Distillery Unit	330	75,240 m³
	Total water requirement		**1,90,440 m³**

Industry has water drawl permission from Kumbhi River about 2,60,000 m³/Annum for industrial + 90,000 m³/Annum for domestic i.e. total 3,50,000 m³/Annum which fulfil the requirement of industry.

2.1 Power & Fuel requirement and Its source

The sugar factory is having environmental clearance for 19.5 MW power plant. But, the factory has installed steam turbine of 17.5 MW (back pressure). Therefore, to achieve 30 MW capacity, it will actually install 12.5 MW turbine (double extraction cum condensing). This will be operated during season and off-season.

There are two numbers of D.G. set of 700 KVA each. These are used as standby arrangement for power supply.

Fuel: Bagasse will be used as a fuel for steam generation at sugar and cogeneration (power) plant. It will be used as a auxiliary fuel for incineration of distillery spent wash. Presently, the sugar mill is having 100 TPH boiler (87 ata pressure). In the proposed expansion it has planned to install a new boiler of the same capacity. Bagasse requirement for generating 200 TPH steam will be 90.91 TPD. It will be sourced from own sugar factory. The flue gasses will be passed through existing ESP and released through a round stack of 72 m height. Separate ESP is proposed for the new 100 TPH boiler.

For distillery unit, incineration boiler will be used to produce approx. 25 TPH steam. This boiler will use 139 TPD of concentrated spentwash. Bagasse of 92.67 TPD will be used as a supplementary fuel to dispose the spent wash in incineration boiler.

Table 4: Steam balance

Sugar unit	
For 10,000 TCD sugar mill and 17.5 MW Back pressure turbine	3,600 TPD
For 12.5 MW DECC turbine	1,050 TPD
Steam generation at sugar and cogeneration unit	4,800 TPD
Distillery unit	
Steam generation at distillery unit	600 TPD
Max steam required for distillery process	330 TPD
Max steam required for MEE unit	270 TPD

2.2 Man power

Table 5: Existing and proposed manpower

	Existing unit	Proposed	**After expansion**
	Permanent + Contract/seasonal	Permanent + Contract/seasonal	**TOTAL**
Sugar	740	50	790
Cogeneration unit	65	20	85
Distillery	45	30	75
	850	**100**	**950**

3.0 THE PROCESS

3.1 Sugar Manufacturing Process: In India, double sulphitation process is used to manufacture plantation white sugar.

3.1.1 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 4 to 6 roller mills. In the best milling practice, more than 95% of the sugar of cane gets extracted into the juice.

3.1.2 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 returned to the field as fertilizer.

3.1.3 Evaporation: 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.

3.1.4 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.

3.1.5 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) and Medium (M)

3.2 Cogeneration

In case of cogeneration or power generation, the steam produced from boilers is of high pressure. It is fed to steam turbine generator. Generator produces power which is used for captive purpose and remaining power is exported to the grid. Exhaust steam with low pressure is used in the sugar manufacturing and distillery processes. Steam is also used for the evaporation of spent wash, etc.

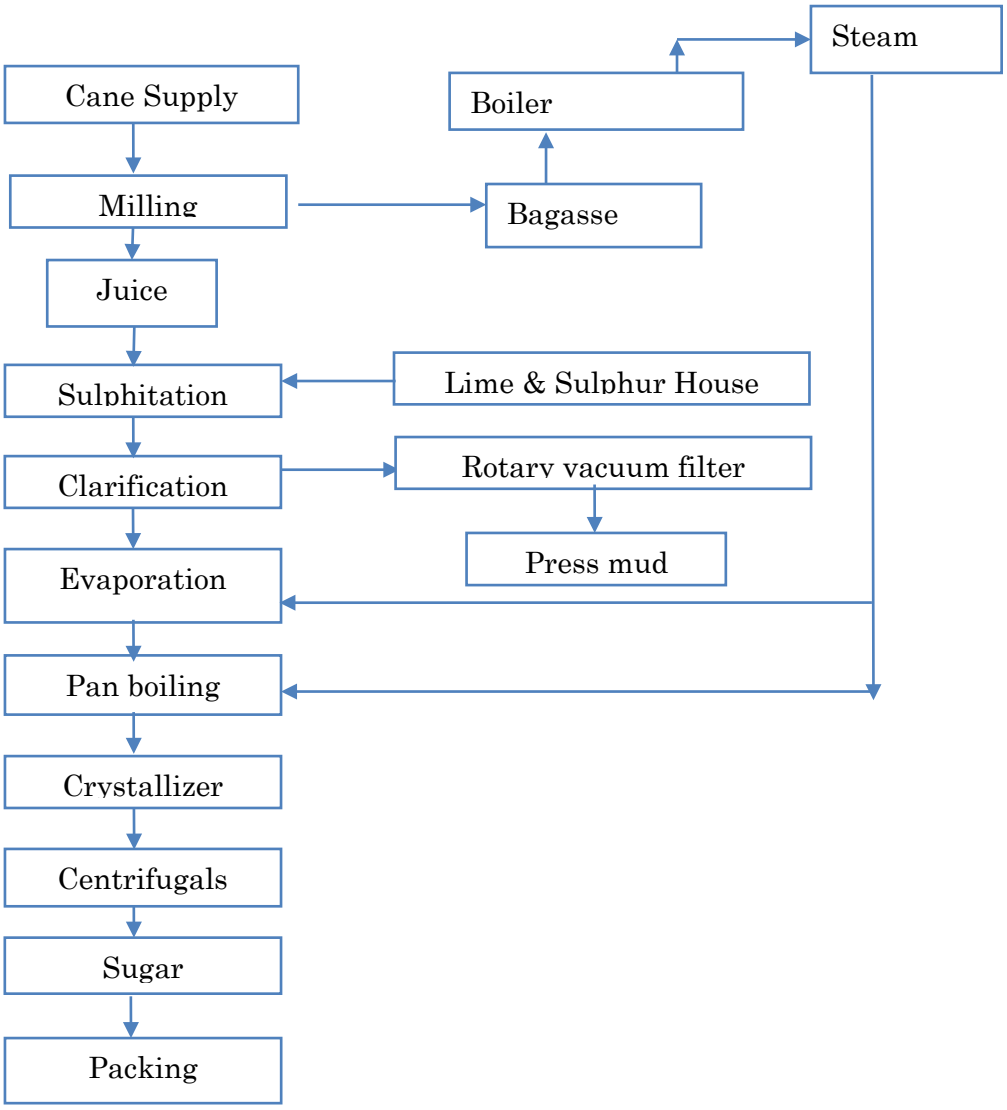

Figure 1: Flowchart of sugar manufacturing process

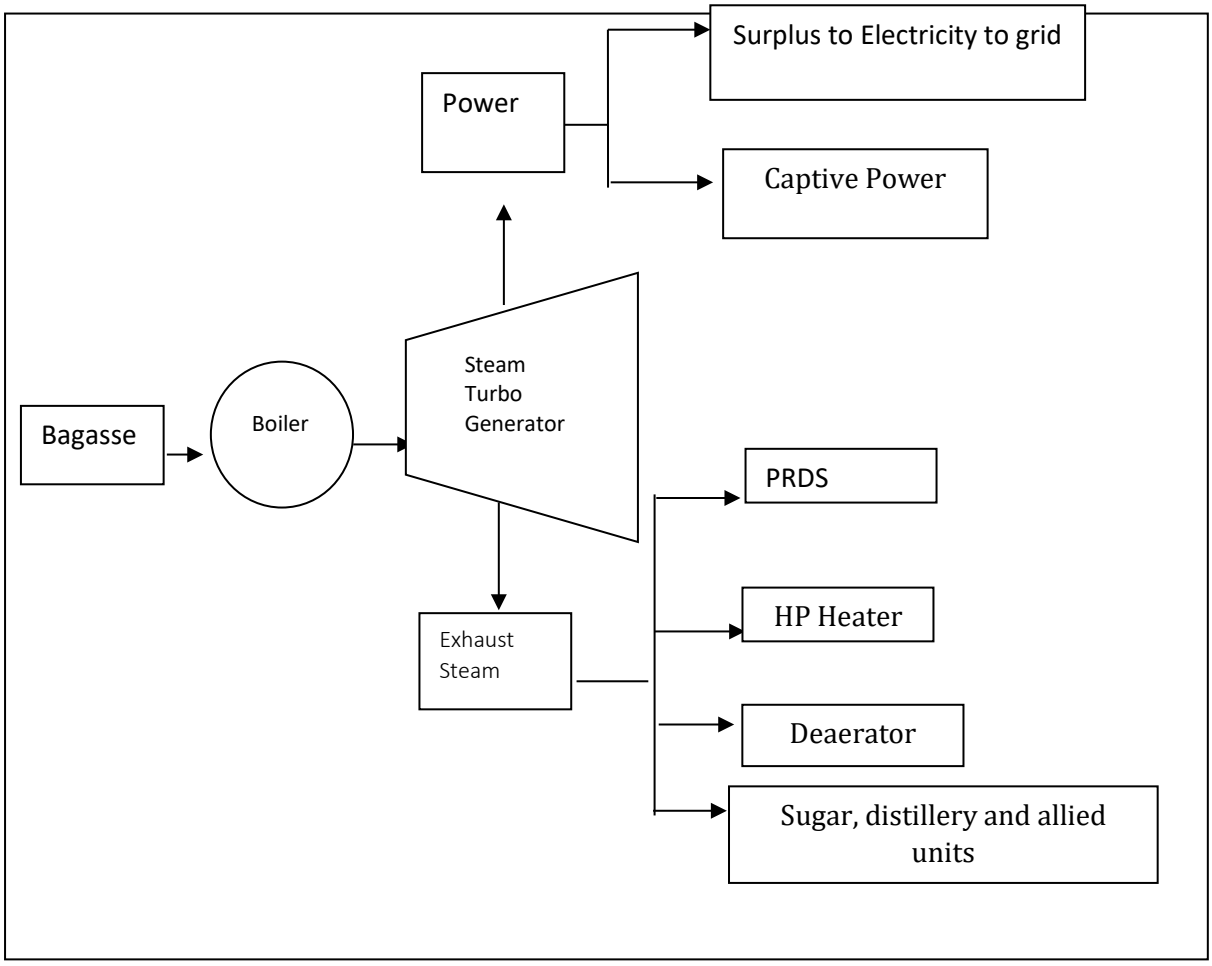

Figure 2: Schematic of power generation from the cogeneration

3.3 Manufacturing Process: Distillery

3.3.1 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 cerevisiae*, 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.

It has many advantages like continuity of operation, higher efficiency and ease of operation. Continuous fermentation also results into consistent performance over a long

period as compared with batch fermentation. Most modern ethanol production plants adopt this continuous fermentation technology. Hence, continuous fermentation process will be adopted in the proposed unit. The yield of alcohol is minimum ~270 litres/ ton of C type molasses and 300 to 330 litres for B-heavy type. Juice from one ton of sugar cane produces approx. 70 L of alcohol.

3.3.2 Distillation

After fermentation, the next stage in the manufacturing process is to separate alcohol from fermented wash and to concentrate it to 95%. This called Rectified Spirit (RS). For this purpose, method of multi-pressure distillation will be adopted. After separation of alcohol, the remaining part is the effluent of the process i.e. spent wash and spent lees.

3.3.2.1 Multi-pressure Distillation

Multi-pressure distillation system for produces Rectified spirit. Additional ENA column required to produce ENA.

Advantages of MPR Distillation:

a. Maximum heat integration is possible.
b. Few columns operate under vacuum, few under pressure and few under atmospheric pressure.
c. Low steam consumption with reboiler (2.2 Kg/lit. of Rectified Spirit)
d. Spent wash generation is less.

3.3.2.2 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.

3.3.2.3 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-

i. Azeotropic Distillation
ii. Molecular Sieves
iii. Evaporation / Vapour permeation system

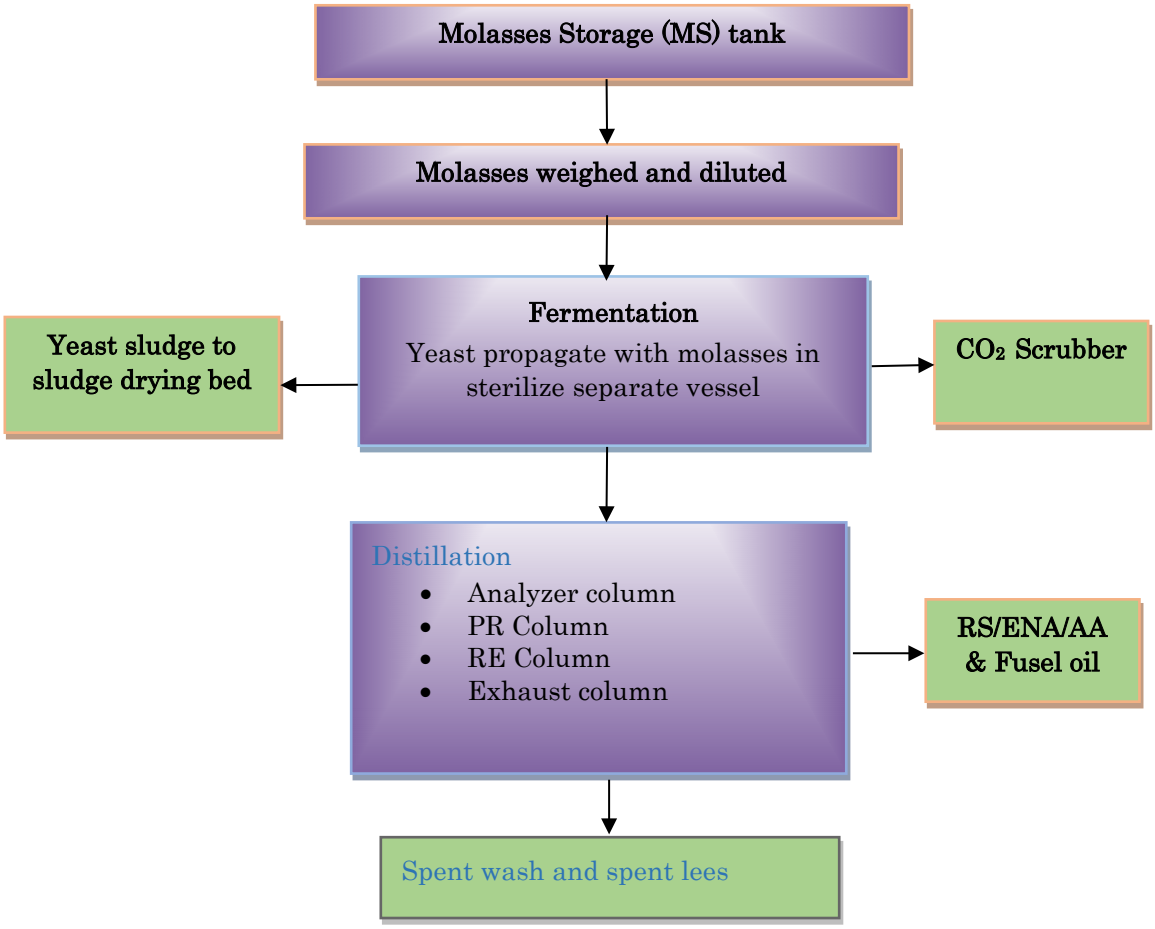

Figure 3: Schematic of Alcohol Manufacturing Process

3.4 Finished Products

The sugar unit is having 14 go-downs with a collective capacity of 6.25 Lakh quintals. It has planned to construct two more go downs of one lakh quintals each. The sugar mill is having 4 tanks to store molasses. Each tank is having capacity of 6000 tons. Thus, 24,000 tons of molasses storage is presently available with sugar unit. The management has planned to double the number of tanks and thereby molasses storage capacity in the proposed expansion project.

Cogeneration unit: In the existing unit, the grid line connected to MSEB at substation located at village Koparde. It is 1.2 km from the factory site in N direction. Same line will be used after expansion.

4.0 Pollution sources

Table 6: Overview of pollution sources, its treatment and/or disposal

#	Waste product and source	Treatment and disposal
1.	**Effluent/Wastewater**	
	Hot water	Hot water will be cooled. Recycled for the same activity
	Effluent from sugar mill/spray pond overflow	Will be treated in sugar ETP. Sugar ETP will be upgraded to treatment effluent as well as spray pond overflow. Treated water reused for cooling activities, greenbelt and irrigation
	Sugar process condensates	Will be reused in plant and distillery unit after treatment in CPU
	Spent wash (distillery unit)	ZLD will be achieved. For existing 30 KLPD unit, the same route i.e. biomethanation, followed by MEE followed by composting will be used for ZLD. In case of a new unit of 70 KLPD, raw spent wash will be concentrated in standalone Multi effect evaporation (MEE); Conc. spent wash of >55-60% solids will be burnt in incineration boiler using bagasse as an auxiliary fuel
	Spent lees, condensate from MEE and Other effluent	Treated in CPU; comprises of anaerobic digestion as a primary treatment of effluent followed by aeration as secondary treatment and in tertiary treatment filtration units are working
	Sewage: Domestic wastewater	It will be treated in proposed sewage treatment plant (STP).
2.	**Gaseous and dust emission**	
	Flue gases from incineration boiler (due to burning of spent wash with bagasse) and sugar unit boiler (burning of bagasse)	Existing two stacks 72m height Separate ESP for both the unit (i.e. stack of sugar and distillery), and greenbelt of 19.70 Ha (existing + proposed)
	Bagasse handling- fugitive particulates	Bagasse handling through closed conveyor

#	Waste product and source	Treatment and disposal
	ash handling	Mechanized handling and transportation of ash (through closed conveyors), Dust quenching and/or dust suppression system will be provided to control fugitive dust from ash handling
	Diesel generators	It will be operational only when captive power supply failure, hence emissions anticipated to be less frequent and minor
	Fermentation unit: (CO_2)	Fermenters will be covered;CO_2 bottling or dry ice plant will be installed
3	**Solid waste**	
	Ash (from incineration boiler)	It will be mixed into soil
	Ash from sugar unit boiler	It will be mixed into soil
	Fermented yeast sludge,	The sludge from fermenter will be degradable, containing organic nutrient and micro elements. It will be mixed in soil land after analysis
	CPU / ETP sludge	Will be used for land application

Table 7: Characteristics of Water (inlet and Outlet) from Sugar ETP

Sr. No	Characteristic	Inlet	Outlet
1	pH	4.0 to 5.5	6.5 to 8.0
2.	Biochemical Oxygen Demand	600-1300 mg/L	< 100 mg/L
3.	Chemical Oxygen Demand	1500-4000 mg/L	< 250 mg/L
4.	Oil and Grease	20-40 mg/L	< 10 mg/L
5.	Total Suspended Solids	300-500 mg/L	< 200 mg/L
6.	Total Dissolved Solids	2000 – 4500 mg/L	< 2,100 mg/L

Table 8: General characteristics of raw spent wash from B-molasses

#	Parameter	Value
1.	Volume, Lit./Lit. of Alcohol	6-8
2.	Colour	Dark brown
3.	pH	4.5-4.8
4.	COD	90,000-1,00,000
5.	BOD	40,000-45,000
6.	Solids -	
	Total	1,30,000-1,60,000
	volatile	60,000-75,000
	Inorganic dissolved	35,000-45,000
7.	Chlorides	4,000-5,500
8.	Sulphates	2,500-3,500
9.	Total nitrogen	500-1,000
10	Potassium	8,000-10,000
11	Phosphorus	100-200
12	Sodium	500-1,000
13	Calcium	2,500-3,000

All parameters except pH, volume and colour in mg/L

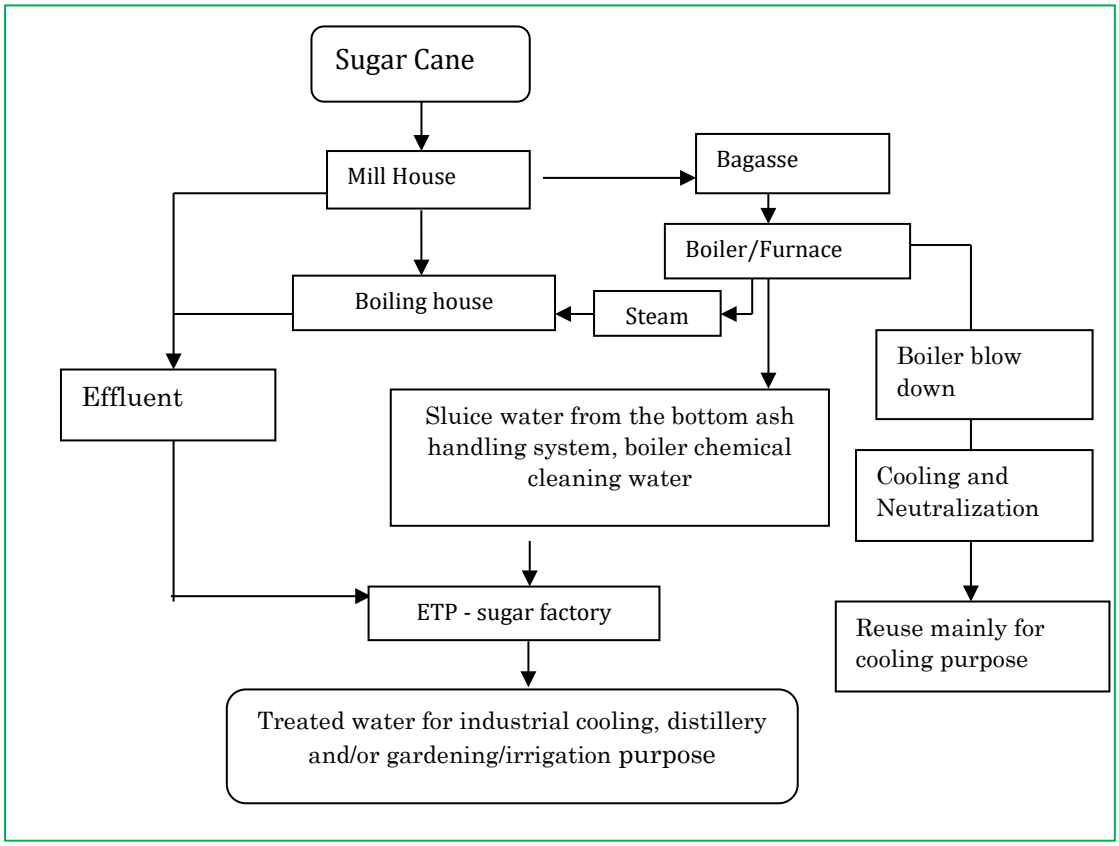

Figure 4: Flowchart for effluent generation from Sugar along with cogeneration unit

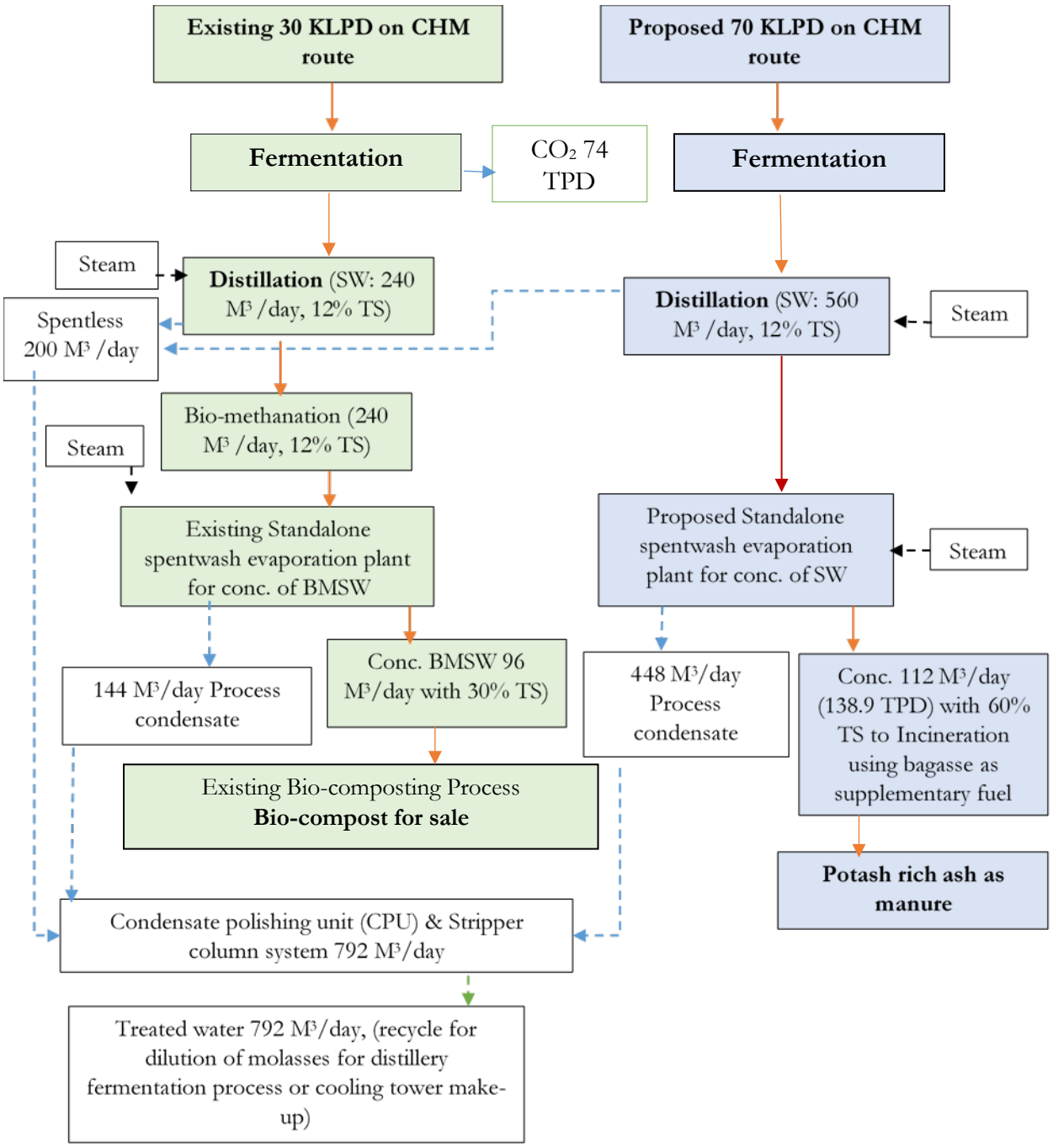

Figure 5: ZLD scheme for proposed 100 KLPD distillery unit

4.1 Solid waste

The proposed industrial activity at KKSSKL gives solid waste in the form of sludge and boiler ash. The details of solid waste management is summarized in the following table.

Table 9: Solid waste generation and disposal

#	Waste	Quantity TPD	Treatment	Disposal	Remark
			Sugar Unit		
1	Sugar ETP sludge (TPD)	2.5	Drying	Land Application	Organic + Inorganic
	Ash (bagasse)	1.78	Collected in dry form and mixed with press mud	Composting process of distillery spent wash	
			Distillery		
1	Yeast sludge (wet weight)	1.5	Drying in SDB	Used as a soil enriching material	Organic
2	Incineration Boiler Ash(TPD)				
	From spent wash (@16%) Bagasse ash (@2%)	17.92 TPD 1.5 TPD	Mix with press mud	Used as a soil enriching material	
3	CPU sludge (wet weight) TPD	0.8	Drying in SDB	Used as a soil enriching material	Organic
	Hazardous waste				
4.	Scarp oil	5 to 7 KLPA	Separate storage	Authorized center	Oily and Hazardous

5.0 Baseline environmental conditions and summary of impact analysis

Table 10: Summary of Environmental features of study area

#	Facet	In brief
1	General climate	Hot and dry
2	Rainfall	Average approx. 1300 mm.
3	Temperature	The maximum average temperature in summer observed around 38°C and minimum average temperature in winter is around 14°C
4	Humidity	The maximum humidity > 85 percent during monsoon and minimum humidity <20 percent during March and April.
5	Wind	Predominant wind direction during the study period was NW, W and the wind speed was between 0.50 to 2.10 m/s (58.2%)
6	Land use	Crop land area 73.51%, scrub land 18.15%, forest 3.76%, Habitation area 2.75%, Water body 1.35% and road 0.48%
7	Air Quality	Complies NAAQ standards of Nov. 2009 at all monitored locations.
8	Noise	Complies the standard for most of the locations
9	Groundwater	As per Central Ground Water Board report 2013, the groundwater quality in the district is affected because of high NO_3 concentrations
10	Soil	Red as well as brown-black alluvial soils, shallow to deep,
11	Ecology, Biodiversity	No sanctuary, national park or biosphere reserve in the study area (10 km radius); Radhanagari Wildlife sanctuary 35 km SW from the site; bird species (4 in number) from schedule I of W(P)A 1972
12.	Socio-economy	Direct employment for 100 locals, indirect employment for transporters, labor, harvesters, etc. Economic activities will get boosted due to the expansion project
13.	Geology, hydro-geology	Natural drainages in the surrounding areas will not be disturbed

Table 11: Summary of anticipated impact and its Management Plan

Environmental Aspect	Impact/impact causing factor	Control/Mitigation Measures
Air Environment	Negative impact anticipated due to a) generation of Particulate Matter (PM), SO_2, NO_x during burning of bagasse and incineration process; b) generation of Carbon dioxide from fermentation; c) Odour from spent wash storage; d) bagasse and ash handling/transport	• Separate ESP to control PM/ash emission from sugar unit boiler and incineration boiler of distillery • stack with height 72 m for sugar, cogeneration boiler and 60 m for incineration boiler • Mechanized system for bagasse and ash handling • Loose bagasse will be minimum; Excess bagasse will be baled • Fugitive dust control/suppression for will be done properly during storage and transportation of ash • CO_2 bottling or chemical plant after separation/scrubbing of the gas • Spent wash storage tank capacities not more than 30 days as per norms • Flare unit in case biogas not used for boiler • Adequate parking for cane carrier vehicles, distillery goods carrier and private vehicles • Fragrant tree plantation around spent wash storage tanks • Greenbelt enhancement • Continuous online emission monitoring system as per the norms
Water Environment	Negative impact anticipated a) if effluent from sugar and distillery units not treated properly, b)	Upgradation and modification of ETP to treat 2100 m3 of effluent per day. Sugar unit process condensates will be treated in CPU and then recycled in sugar as well as distillery units.

Environmental Aspect	Impact/impact causing factor	Control/Mitigation Measures
	Storage of spentwash, its treatment and disposal c) fresh water reuirement	'Zero liquid discharge' will be achieved in distillery by implementing following options. For existing 30 KLPD ZLD for spent wash will remain same i.e. biomethanation followed by stand-alone multi-effect evaporation (MEE) followed by bio-composting • For new 70 KLPD unit, ZLD for spent wash will be concentration of spent wash using stand-alone evaporation (MEE) as a primary treatment to reduce the spentwash volume • Incineration of concentrated spentwash by burning with bagasse in proposed incineration boiler • Spentlees, condensate of MEE and other effluents will be treated in condensate polishing unit (CPU) and treated water will be reused in distillery. • All the effluent will be properly treated/ utilized/disposed within the premises • Separate tanks of 7 days capacity for storage of raw and concentrated spentwash for new 70 KLPD unit. • New tanks for concentrated spent wash storage will be made impervious as per CREP guidelines • Fresh water requirement will be reduced considerably by recycling of water, reusing treated water and using

Environmental Aspect	Impact/impact causing factor	Control/Mitigation Measures
		harvested rain water during startup period • Piezometric well, in downstream area of spentwash storage tanks to monitor ground water quality • Continuous online effluent monitoring system – as per the norms (separate for sugar as well as distillery unit) • Greenbelt development around the compost yard
Soil Environment	Positive impact anticipated from bagasse and spent wash ash	Potash rich bagasse ash will be given to local farmers to mix into the soil
	sludge from Fermentation unit, spent wash tanks and CPU	It is organic in nature, degradable hence, mixed into soil (after drying in the beds)
	Excavated fertile soil	• Stacked separately and reused for greenbelt development Stones and excess soil will be used for foundation or internal roads or leveling purpose within premises
	Negative impact likely from other solid waste (packaging material)	• Segregated as per the characteristics of the material and sold to local recyclers
Noise	Negative impact anticipated due to increase in noise level - operation of machines, motors, vehicular movement, DG set etc.	• Regular oiling and greacing of machines and factory vehicles • provisions of separate parking for goods and other vehicles • Internal roads will be either asphalted or RCC, leveled, illuminated and will be maintained

Environmental Aspect	Impact/impact causing factor	Control/Mitigation Measures
		• Safety sign boards will be placed at strategic locations within premises • Provision of adequate personal protective equipment (PPE) for workers • Job rotation for high noise level work places, if required • Regular health checkup for workers • Acoustic enclosure will be provided to DG set
Ecology and Biodiversity	Negative impact on ecosystem anticipated if - air, water, soil and noise pollution not done efficiently and adequately b) in case of Tree cutting failing c) transportation activity likely to cause disturbance to wildlife	• Preventive, control and mitigation measures for air, water and soil pollutants for the proposed project are adequate to control pollution. Therefore, its implementation by the project proponent will help in maintaining the natural environment in the surrounding area. • Existing transmission line will be used for cogeneration unit • No tree cutting/ failing involved since project is on open land • No wildlife sanctuary, national park or biosphere reserve within 10km radius, site is not in migratory route of any wildlife, • Enhancement of greenbelt will help to maintain the biodiversity and will provide habitat to many species • Nigh time light arrangements in the unit, to be made non-intense, non-glary; it should not disturb the wild animals

Environmental Aspect	Impact/impact causing factor	Control/Mitigation Measures
		• Transportation will be carried out during day time
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 • Proper safety measures while transportation of goods
Safety and Occupational health	Accidents, improper work practices	• Safety officer and safety committee will be formulated • Provision of adequate safety gears for factory workers • Insurance policy for workers, cane harvesters and transporters • Regular health check-up of factory workers
Risk and disaster management	Fire, accidents, earthquake, etc.	• The entire premises are declared as 'no smoking zone' • Lightening arresting system will be upgraded time to time • Ethanol vapor condensing system will be installed at storage area • Proper storage of molasses, ethanol and bagasse • Ethanol storage as per PESO guidelines • Firefighting system as per OISD and local authority guidelines • Earthquake resistant infrastructure

Table 12: Financial provision for CER activities planned for next three years

CSR activity head	Year			TOTAL
	1st	2nd	3rd	
	Budgetary provision (Rs. in lakhs)			
Improvement in social infrastructure				
Provision of rooftop solar system in local schools	30	30	40	**100**
Provision for plantation in nearby villages	05	06	07	**18**
Provision of clean drinking water facility in local schools	10	10	10	**30**
Provisions for sanitation at schools or education aid to school	15	15	20	**50**
Provision for healthcare and Medical Emergency	10	12	15	**37**
Infrastructure Development/Maintenance (Eg. Road, canal maintenance, etc)	10	11	12	**33**
Other activities for the development of youths (e.g. supporting wrestling and other sports)	5	5	8	**18**
Provision for training to farmers and local youth	10	12	12	**34**
TOTAL BUDGETARY ALLOCATION FOR NEXT THREE YEARS (1% of the capital budget)				**320**

Table 13: Estimated Capital & Recurring Expenses for Environment Management

#	Particulars	Capital cost in Lakh
A. Sugar and Cogeneration unit		
1	Electrostatic precipitator for new 100 TPH boiler	140.00
2	Fuel handling system (upgradation)	60.00
3	Ash handling system (upgradation)	40.00
4.	Stack for new 100 TPH boiler (upgradation)	130.00
5	Sugar ETP Up-gradation	200.00
6	Condensate polishing unit (Sugar process)	210.00
7.	STP (combined)	75.00
B. Distillery unit		
1	Multi Effect Evaporator (MEE)	900.00
2	Incineration boiler with electrostatic precipitator and dump condenser	3700.00
3	Fuel handling system	200.00
4	Ash handling system	100.00
5	Stack (distillery unit)	120.00
6	Spent-wash storage tanks	70.00
7	Condensate polishing unit (upgradation)	170.00
8	CO_2 Bottling	195.00
9	Environmental monitoring and management for Sugar, Cogeneration and distillery unit	25.00
10	Greenbelt development for Sugar, Cogen and distillery unit	40.00
11	Rainwater harvesting for Sugar, Cogeneration and distillery unit	30.00
	Total	**6325.00**
C. Recurring Expenses/ Annum for Environment Management		
1	Salaries and wages	75.00
2	Maintenance @2.5% on capital investment for EMP i.e. 6325.00	158.50
3	Fuel (Incineration activity) and Electricity (in case of diesel generator operation)	150.00
4	Miscellaneous/contingency	10.00
	Total	**393.50**
D. Additional Provision towards CER (0.75 % of capital investment)		**200.18**