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EXECUTIVE SUMMARY
of
Environmental Impact Assessment Report
Expansion of Molasses Based Distillery from 45 to 90 KLPD

M/s. Loknete Sunderraoji Solanke Sahakari Sakhar Karkhana Ltd.

Village: Sundernagar, Post: Telgaon, Tal. Dharur, Dist. Beed, Maharashtra-431131

Prepared by

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CONTENTS

List of Tables

List of Figures

EXECUTIVE SUMMARY

1.0 INTRODUCTION

M/s. Loknete Sunderraoji Solanke SSK Ltd., (LSSSSKL) is one of the progressive sugar factories in Maharashtra, founded in the year 1989 with an intention of uplifting the sugarcane growers of Beed district. The registration number of the unit BHR/MGN/PRG/(A)/24(S)/89 dated 09/11/1989 under Maharashtra state societies Act. 1960. The mill started its actual crushing from the year 1992-93 with a crushing capacity of 2,500 TCD which was enhanced to 5000 TCD in due course of time. An allied distillery of 45 KLPD capacity was established in the year 2010 and cogeneration unit of 22 MW in the year 2013. Recently, Government of India announced a policy to promote ethanol production. Therefore, the management has decided to enhance the capacity of existing distillery unit from 45 KLPD to 90 KLPD.

1.1 Selection of Site:

The present site fulfills the industrial site selection criteria of MoEFCC/CPCB/MPCB. Molasses will be mainly supplied by existing sugar mill. The mill already has the main infrastructure such as land, water, power and raw material molasses. Following Table 1 gives highlights of the project.

Table 1: Highlights of the project

1.	Project Proponent	**M/s. Loknete Sundarraoji Solanke Sahakari Sakhar Karkhana Limited, (LSSSSKL)**	
2.	Project	Expansion of molasses based distillery unit from 45 to 90 KLPD	
3.	Location of the project	Survey no. 176 Sundarnagar, Post. Telgaon, Tal. Dharur, Dist. Beed, Maharashtra- 431131	
4.	Working days	All year around	
5.	Product	Rectified spirit followed by Anhydrous Alcohol (Fuel ethanol)	**90 KLPD**
	By-product/s	Fusel oil	360 L/day
6.	Effluent Treatment System	For spent wash: Evaporation followed by standalone multi-effect evaporation (MEE) followed by incineration For spent lees, condensate and other effluent: Two stage biological treatment followed by tertiary treatment	

7.	Air Pollution Control System for flue gases	New stack of 85 m with ESP (Electrostatic precipitator)	
INFRASTRUCTURE			
8.	Land	Expansion of distillery along with Integrated evaporation, Standalone evaporation unit (MEE), storage lagoon, CPU, Incineration boiler, coal/bagasse storage and convey, Cooling towers, internal roads etc.= 28558.05 sq.m (7.05 acres) Proposed green belt development 33% = 9424 sq.m (~2.3 acre) Total land requirement= 37982.1 sq.m (~9 acre)	
9.	Main Raw Material	**Molasses**	**B-Heavy Molasses-** 291 TPD
		Nutrient N,P	50 kg/d
		Turkey Red Oil (TRO)	400 kg/d
11.	Technology for Product Manufacturing	Continuous/Fed-batch fermentation & Multi-pressure-vacuum distillation for the production of Rectified spirit or Extra Neutral Alcohol with Molecular Sieve De-Hydration (MSDH) plant for Anhydrous/Fuel ethanol	
12.	Steam	**Total: Maximum 636 TPD** (Distillation 228 TPD + Evaporation 198 TPD + Boiler units 168 TPD + Pipeline losses- 42 TPD). **Source:** Through proposed incineration boiler	
13.	Fuel	Bagasse from own sugar mill or Indian coal as per availability along with concentrated spent wash from distillery Conc. Spent wash: 223.2 TPD Coal: 95.66 TPD OR Bagasse: 173.92 TPD	
14.	Boiler	New incineration boiler of 28 TPH with pressure of 45 kg/cm^2 with stack of 85 m with inner diameter of 3.5 m will be used	
15.	Power	2050 KWHr, Source: Captive power from proposed 2.5 MW TG	
16.	Total Water Requirement	861 m3/day- for process (considering recycle and reuse) and 10 Cu. m for domestic/drinking	
17.	Water Source	Kundalika River through canal.	
18.	Manpower	50	
FINANCIAL ASPECTS			
19.	**Total Project Cost**	**Rs. 9,335.67 lakhs**	
20.	**Capital expenses for EMP**	**Rs. 4,310.00 lakhs**	

TPD = Tons Per Day

2.0 MATERIAL ANDINFRASTRUCTURE

2.1 Molasses

Molasses is the main raw material for the proposed project. Expected average molasses production (B heavy type) is around 65,000 MT/annum in own sugar mill. The proposed distillery unit will require B heavy molasses of around 96,030 TPA. Therefore, required molasses of approx. 31,030 MT will be procured from nearby sugar mills.

At present, the sugar mill is having five mild steel (MS) molasses storage tanks having capacity of 29,570 MT. LSSSSKL has proposed to install one additional mild steel molasses storage tank of 10,000 MT capacity in the distillery premises. Thus, total molasses storage capacity 39,570 MT is available with sugar mill. Proper care will be taken by the sugar mill to cool down molasses before it goes to molasses storage tank, with suitable pump for recirculation of molasses.

2.2 Water

Kundalika River (Through canal) is the source of fresh water. The mill has taken water drawl permission from irrigation department. (Enclosed as Annexure VIII to main report). Detailed water budget discussed in Table 2.

Table 2: Water Balance: Distillery of 90 KLPD (in m3/day)

Water Input	**Cum/day**
Process Water for Fermentation section and CO_2 scrubber	1085
Boiler feed water	636
Soft Water For Vacuum Pump & Others	100
Soft Water Makeup For Cooling Towers	624
Other Domestic Usage	10
Total Water Input at start-up	**2455**
Water Output	
Spent Lees (PR & Rect.)	180
CT Evaporation & Drift Losses	624
Domestic Consumption loss	10
Soft Water For Vacuum Pump & Others	100
Boiler waste water as blow down & steam loss	42

Exhaust condensate	594
Process condensate	720
Water loss in RS	5
Over all process loss	180
Total Water Output	**2455**
RECYCLE STREAMS	
Lees Recycle For RS Dilution (after CPU)	180
Process Condensate (after CPU)	720
Steam condensate recycled to boiler	594
Soft Water For Vacuum Pump & Others cooling water	100
Total Recycling /Re-utilizations of water per day	**1594**
Total Daily Water requirement/Input = (2455 - 1594 =)	**861**
Fresh water requirements per lit of Alcohol incl. domestic water	**9.56 lit/lit of RS**

Note: Concentrated spent wash about 180 m^3/day will be burnt in to incineration boiler with supplementary fuel coal or bagasse

2.3 Fuel

Concentrated spent wash of >55^o brix up to 60^o brix (Solids) will be incinerated along with coal or bagasse. Spent wash available for incineration will be 180 m^3/day and its specific gravity usually observed 1.24. Thus, estimated spent wash availability per day will be 223.2 TPD. This quantity of spent wash will produce 26.5 TPH steam (GCV 1750Kcal). Along with spentwash, coal or bagasse will be used as supplementary fuel in 70:30 ratio.

2.4 Steam

Maximum steam requirement to produce R.S. or ENA or anhydrous alcohol will be 9.5 TPH. In addition, steam will also be required for standalone spent wash multi-effect evaporation plant which will be about 8.25 TPH and about 8.75 TPH will be required for de-aerator and steam coil air pre-heater (SCAPH) of incineration boiler. Thus, the distillery will require maximum 26.5 TPH steam.

Steam Consumption: Multi-pressure distillation

a. F. Wash to Rectified spirit : 2.2 Kg /litre
b. F. Wash to ENA : 3.2 Kg /litre

c. for Anhydrous ethanol : 2.8 Kg /litre

2.5 Power

The mill has decided to install a separate 2.5 MW capacity steam turbine generator. It will fulfill an estimated power requirement of 2.2 MW of distillery including MEE, CPU and auxiliary units. In case of shut down, power will be purchased from state electricity grid.

2.6 Boiler

One new fluidized bed boiler of 28 TPH capacity, having 45 kg/cm^2 (g) pressure & 400 ± 5^{0}C temperature, proposed for the project. It will comply IBR specifications. The scheme for the incineration boiler and power generation are as per fig. 1.

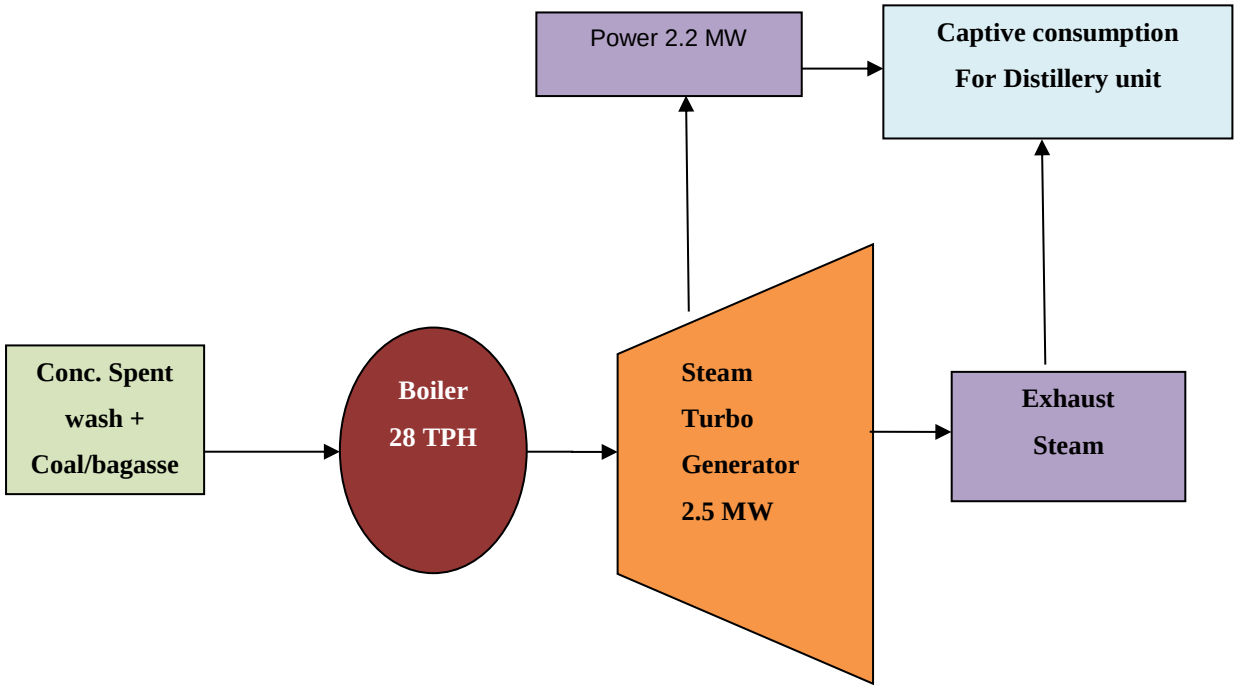

Figure 1: Schematic of steam and power generation

2.7 Fuel Handling System

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

2.8 Ash Handling System

Mechanical ash handling system will be used. Control techniques for fugitive dust emission from ash storage pond, involves watering, chemical stabilization (if required), reduction of surface wind speed with windbreaks or source enclosures.

2.9 Land

The project requires around 9 acres of land The detailed break-up of land for different units of the distillery both old and new are already given in **table 1**.

2.10 Manpower

The project will be generating direct employment to 50 persons out of which 25 will be skilled and others will be semi-skilled and unskilled. Apart from this, anticipated indirect employment opportunities will be from transportation, local service providers, shopkeeper and various facility providers such as schools, medical facilities, etc.

3.0 PROCESS DESCRIPTION

For the proposed project, the management has planned to adopt the latest technology for process as well as for effluent disposal. Overall objective of this is to achieve high efficiency of operations, save energy and water and achieve Zero Liquid Discharge (ZLD). The characteristic of manufacturing process is given below and a schematic is shown in Fig. 2.

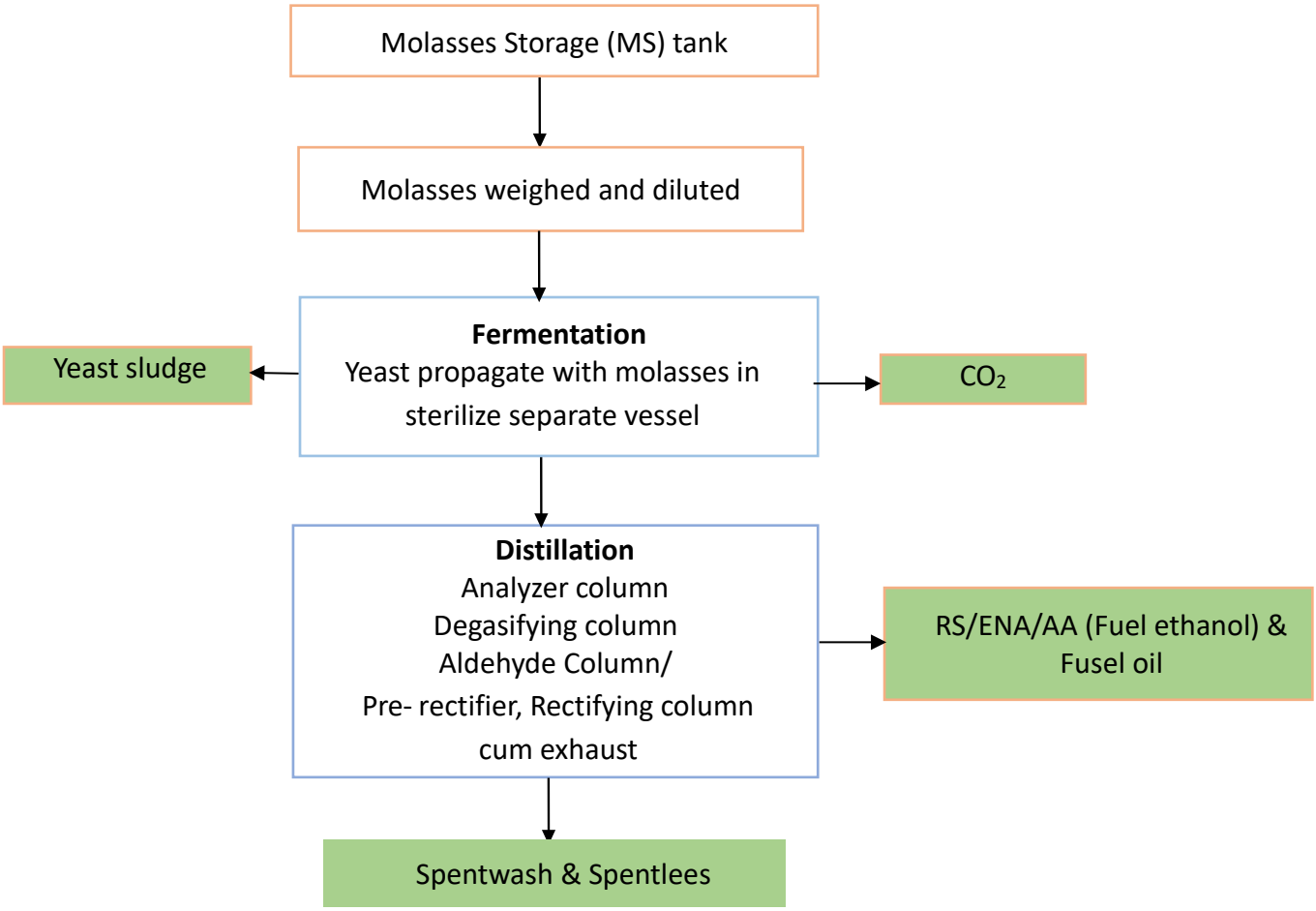

Figure 2: Schematic of RS/ENA/AA manufacturing process

3.1 Manufacturing Process

The production process mainly involves fermentation and distillation process.

3.1.1 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 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.

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 ~270 litres/ ton of C type molasses and 300 to 330 litres for B-heavy type.

3.1.2 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.

Details of molasses and product storage tanks are given in **Table 3.**

Table 3: Details of Storage Tanks

SPECIFICATIONS FOR RECEIVERS & STORAGE TANKS – THICKNESS AS PER IS-803-1976:			
#	**Particulars**	**Quantity**	**Capacity (in m^3)**
1.	Rectified spirit receivers	03	70
2.	Impure spirit receivers	02	10
3.	* Rectified spirit storage tanks	02	800
4.	* Impure spirit storage tank	01	200
5.	Fusel oil storage tank	01	10
6.	Molasses storage at distillery (Tons) – 1. Existing 2. Proposed	 05 01	 Total- 29,570 MT 10,000 MT

***** These will be provided with flame arrester & cooling vent condenser. The level indicators provided on all tanks. Receivers are also provided with flame arrester (SS-304).

Vent Condenser for storage tank and necessary piping will be provide as per requirement. Turbine type Flow meter with totalizer will be provide as per requirement.

4.0 BASELINE ENVIRONMENTAL CONDITIONS

The guiding factors for the present baseline study are the requirements prescribed by the Ministry of Environment, Forestry and Climate Change (MoEFCC) for conducting Environmental Impact Assessment study published in the EIA notification 2006 and its subsequent amendments. Apart from this, the terms of reference for the EIA were also considered while planning and executing the monitoring. For baseline data collection sampling of air, water and soil was carried out from October 2018 to January 2019.

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

Table 4: Summary of Environmental features of study area

#	Facet	In brief
1	General characteristics	Hot and dry
2	Rainfall	An average annual rainfall of 815 mm (Average for 2010-2019 years) Rains are received mainly during June-September months
3	Temperature	The maximum temperature in summer is around 39.3°C and minimum temperature in winter is around 12.6°C.
4	Humidity	maximum between 80 to 88% during monsoon and minimum ranges from 20-30% in the months of February, particularly in afternoons
5	Wind	Predominantly wind direction North-east during study period
6	Land use	Agricultural land 84.45 %, Scrub land 10.18 %, Mining/Industries 0.1 % Settlement 0.79 %, water bodies 1.45 %, River stream 0.84 %, Canal 0.13%, Forest 2.2 %
7	Air Quality	Complies with NAAQ standards of Nov. 2009 at all monitored locations
8	Noise	Complies with the standard
9	Ground water	As per Central Ground Water Board report 2014 - Good and suitable for drinking and irrigation purpose.

10	Soil	Rocky and thin layered soils except on the banks of Godavari and Sina Rivers.
11	Nearest sanctuary	No sanctuary or national park or biosphere reserve exist within 10 km area Naigaon peacock wildlife sanctuary in Beed district is approx. 62 km, SW of the site. Jayakwadi bird sanctuary in Aurangabad district is approx. 100 km from the site towards NW

4.1 Land use

Satellite remote sensing, in conjunction with geographic information systems, has been widely applied and recognized as an effective tool in analyzing land cover/use categories. This study evaluates qualitative and quantitative outcome of land cover/use distribution using remote sensing data and GIS technologies.

The existing site is located at Sundernagar post Telgaon in Dharur taluka of Beed district in Maharashtra is covered in survey of India (SOI) toposheet no. E43E4 and latitudes and longitudes of corners of the site are as follows:

1. 18°58'28.07"N & 76°10'12.23"E
2. 18°58'29.79"N & 76°10'24.08"E
3. 18°58'17.83"N & 76°10'22.94"E
4. 18°58'20.32"N & 76°10'10.73"E

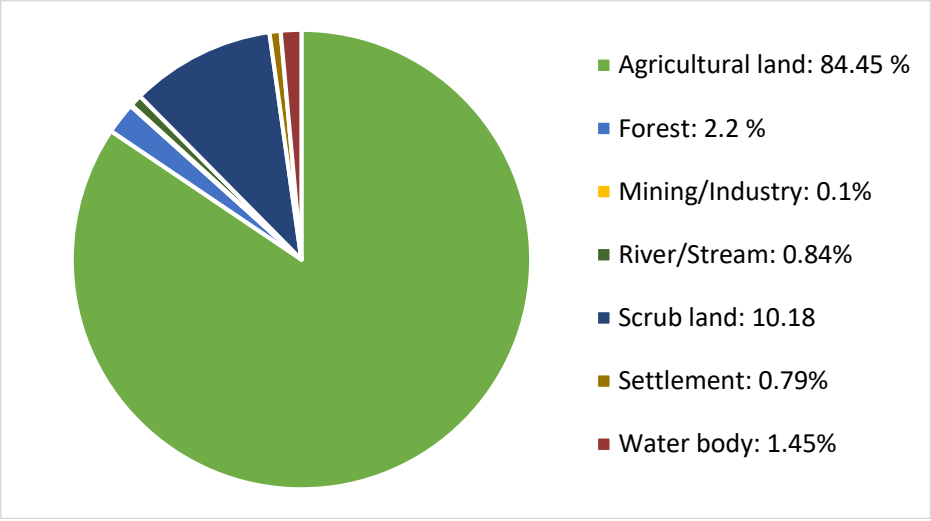

Figure 3: Details of Land use

5.0 IMPACT ASSESSMENT

5.1 Air Environment

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

5.1.1 Impact causing factors

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

2) Transportation: Vehicular pollution due to transportation activity, dust from roads, loading unloading of material and transportation of material will involve mainly transportation of coal, molasses to some extent and ethanol/spirit. For transportation of the coal trucks will get involved on weekly basis and transportation of finished product i.e. RS/ENA or AA. Hence, this could cause minor increase mainly in NOx, particulate matter and HC.

3) Fugitive Emissions and Other sources of air pollution: Fugitive emissions from handling and storage of coal and ash; transportation activities and odour are also anticipated to cause significant negative impact. System for suppression of dust from handling of coal and ash will be installed. It includes mainly,

use of pulse jet bag filters for coal loading-unloading on conveyors, foggers/dust suppressors in coal and ash storage yard, wind breakers for ash storage area.

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

5.1.3 Preventive, control and mitigation measures

- Mechanized handling of coal and ash
- Green belt development on 2.3 acres area for the proposed unit
- Plantation of 2500 trees is proposed for greenbelt
- Wind breaks will be developed to control PM generation from ash storage yard
- PPE will be provided to workers, working in dust prone areas
- Job rotation for workers, working in dust prone areas
- Use of economically affordable techniques for suppression of dust from handling and storage area
- Ash will be transported in closed/covered vehicles to the brick manufacturing unit
- Construction of permanent roads

5.1.3.1 Air Pollutant Dispersion Modeling

Prediction of impacts on air environment has been carried out employing mathematical model -AERMOD view dispersion model 9.5 software developed by Lakes Environment Software, Canada.

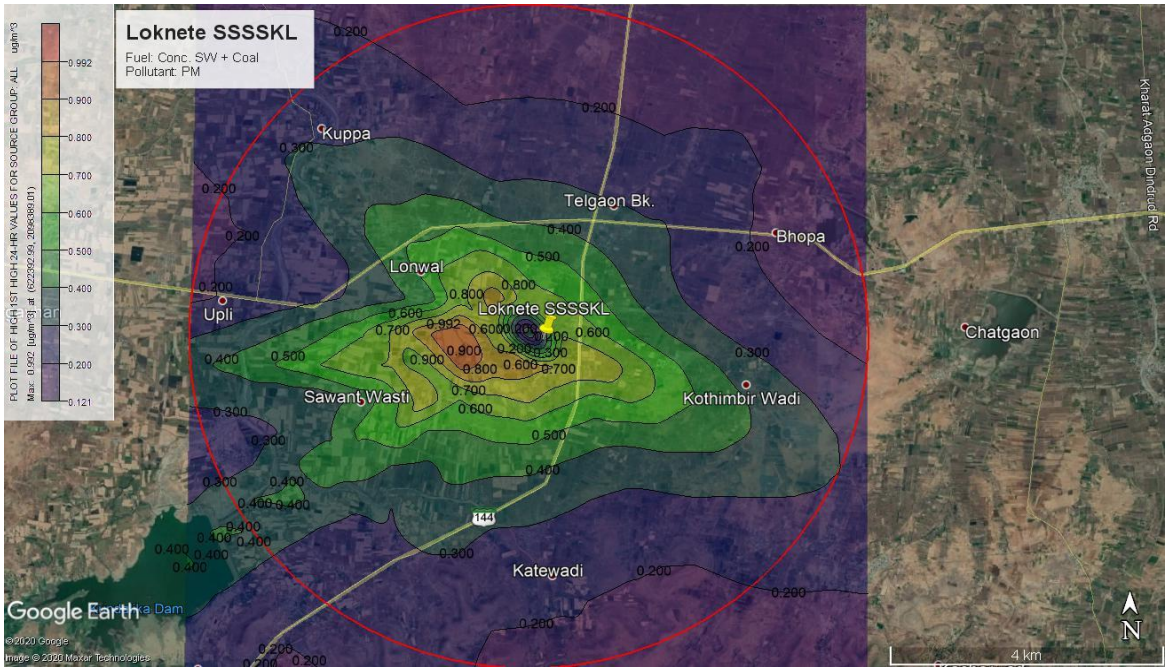

Figure 4: Isopleth showing GLC location and distance for PM (Short term 24 hourly)

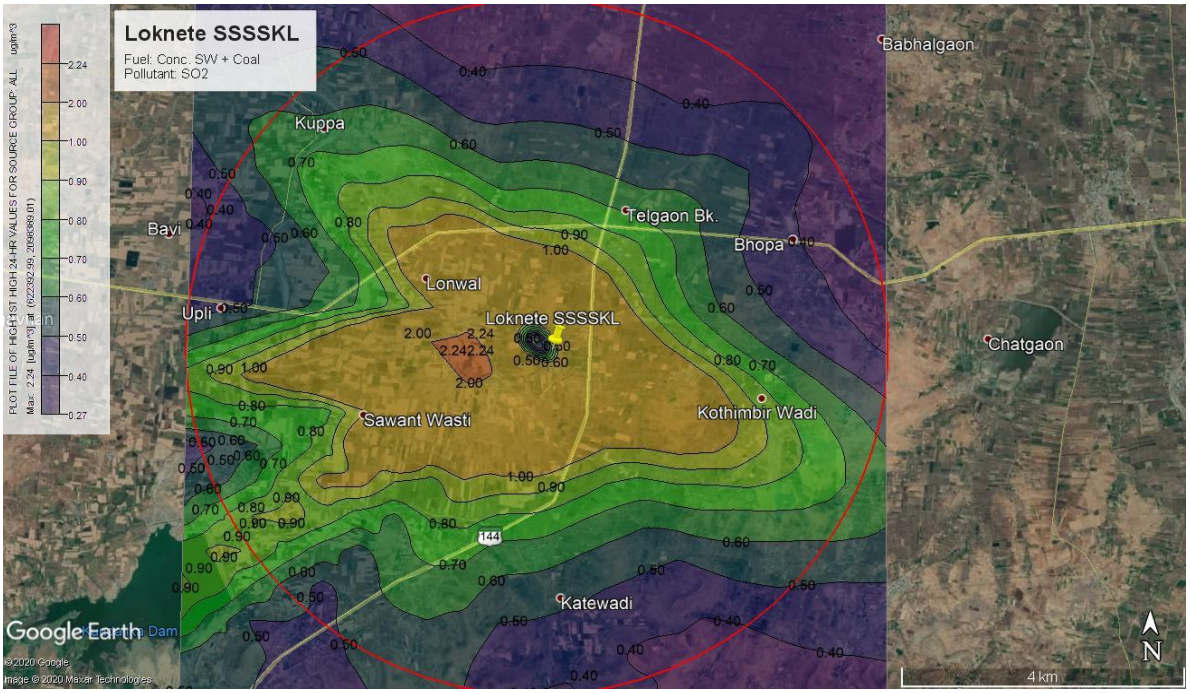

Figure 5: Isopleth showing GLC location and distance for SO_2 (Short term 24 hourly)

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

- There will be an increase in the concentration of PM and SO_2 mainly towards west to west-south-west at approx 1 km from the stack
- The maximum incremental load at this point will be 0.992 µg/m3 for particulate matter (PM) and 2.24 $\mu g/m^3$ for SOx.
- Agricultural vegetation is observed at this distance
- Village Savant vasti is the nearest monitored location in residential areas, in this downwind direction; baseline concentration of PM and SO_2 observed at this location was considered for estimating resulting GLC
- From the mathematical modeling study, it is observed that resultant concentration of these air pollutant in downwind direction will be well within the national ambient air quality standards prescribed by CPCB in Nov. 2009.

Table 5: Summary of Maximum 24-hour GLC due to proposed project

Description	Concentration µg/m^3	
	PM	**SO_2**
Maximum rise in GLC	0.992	2.24
Direction of Occurrence and distance	WSW (1 Km)*	WSW (1 Km)*
Coordinates of maximum GLC	$18^0$58'28" N $76^0$09'45" E	$18^0$58'28" N $76^0$09'45" E
Baseline Concentration reported nearby maximum incremental GLC	60.98 (Savant wasti)	17.09 (Savant wasti)
Total Concentration (Post project scenario at Savant wasti)	61.97	19.33
NAAQS	PM_{10} 100	80
***The distance is measured from stack to the receptor of maximum GLC**		

5.2 Water Environment

Spent wash, spent lees, blow down water and water due to cleaning in place will be the major sources of wastewater (refer table 2.10 of chapter II, page 2-24). From the general characteristics of spent wash described in table 2.11 of chapter II, page 2-26 it is evident that it having high potential of water and soil pollution. If it is released untreated in any water body, its acidic nature, dark brown color, high organic content and COD/BOD severely pollutes the receiving water body. Its control land application helps to improve the soil conditions. However, it is to be done under skilled supervision without which such practices observed to lead towards soil pollution. More upon, the run-off from land where spent wash is disposed indiscriminately causes pollution of neighboring ground and surface water bodies.

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

5.2.2 Impact Assessment: Water availability: Water scarcity or shortage anticipated for other users of Kundalika reservoir during a season when rainfall will be less than average. Though, reuse and recycle of water will save significant amount of freshwater intake but in abnormal conditions, there is a possibility of water shortage for other users.

Water/aquatic environment: Considering the option/s planned for ZLD in the proposed

expansion, No negative impact envisaged on water environment as well as aquatic ecosystems of the surrounding area. However, negative impact in the form of change in the qualitative characteristics of receiving waters, envisaged in case of accidental leakages and spillage of spent wash. In such circumstances, severe impact anticipated if the accidental release of spent wash reaches to the nearest tanks at Lonwal and Kolshacha talav. In such circumstances, the water quality will deplete drastically due to acidic nature of spent wash; its dark brown color and odor will make the water unfit for all sorts of usage, depletion of DO will make the water unfit for most of aquatic life (except anaerobes).

5.2.3 Environment management plan: In order to reduce the fresh water intake, the management has planned to reuse of waste water after proper treatment. Wastewater from various sources will be collected and properly treated so as to reutilize it and thus conserve the fresh water resource. The treated water shall be mainly reused in the sugar unit for auxiliary requirements and/or for gardening activity. The sanitary wastewater will be disposed by using septic tank and soak pit system. Thus, zero liquid discharge will be achieved. Boiler blow down and water from cooling tower will be stored in ponds and recycled thereafter. The management also proposed to install rainwater harvesting system to recharge the aquifer and partly fulfill the requirement during startup.

5.3 Land Environment

Due to impervious lagoon probability of soil pollution/contamination due to percolation of spent wash becomes zero. Lagoons of existing 45 KLPD unit are in operational for last 9-10 years. So far incidence of spent wash percolation have not reported by any of the neighboring villagers. Hence, there is no change in the qualitative characteristics of soil (from the project area and surrounding) anticipated and thus not negative impact. Sludge from spent wash lagoons will be sent to sludge drying beds.

Solid waste:

Table 6: Solid Waste and its Management

Waste Material	Quantity	Disposal
Ash	73.65 TPD when coal is used 43.65 TPD when bagasse is used as supplementary fuel	Sold to brick manufacturers

Yeast Sludge **Sludge from CPU**	27 -30 TPA 40-45 TPA	It will be sent to sludge drying bed. Dried sludge will be used as soil conditioner (mixed into soil)

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

5.3.2 Impact Assessment:

Soil Environment: Sludge generating from the project will be rich in organic matter. Thus, it will enhance the organic content of the soil where it will be applied. Hence, positive impact envisaged on soil due to sludge.

Ash from the project will be utilized for brick manufacturing. It will be temporarily stored at site in ash pits. Indian coal which is planned for the project is usually free of mercury and having low sulfur. Due to which the ash from burning of coal anticipated less hazardous. Ash is likely to cause long term change in the soil characteristics of ash pit area and surrounding soils.

Ash storage and transportation is likely to increase particulate matter in the ambient air. Increase in particulate matter concentration anticipated due to ash storage (at site) and transportation (along the transportation route)

5.3.2.1 Preventive, control and mitigation measures

Boiler Ash

Ash due to burning of spent wash and coal will be sold to bricks manufacturing unit in the nearby areas.

In case if bagasse used as a fuel. The ash is usually non-hazardous, non-toxic in nature, it is rich in potash. Hence, there are two alternatives for the disposal of it.

I. Directly sold to farmer/given to farmers - as it is as a potash enriching material
II. Selling it to brick manufacturing unit

The factory is planning to use it in the composting process.

Sludge from CPU

This sludge is usually bio-degradable, organic and nearly neutral in nature. It doesn't contain

any toxic or hazardous elements. Therefore, it will be dried in sludge drying beds and safely disposed by mixing into soil.

Hazardous Waste

The only hazardous waste likely to be generated in the project will be the scrap oil mainly from DG set and machines. However, the DG set will be used only in case of total power failure i.e. captive as well as failure of power supply from Electricity board. Thus, the quantity of used or scrap oil is assumed very minor. This waste oil can be disposed-off safely by giving it to authorized hazardous waste oil dealer. Alternatively, it can be burnt into boiler along with fuel at periodical interval.

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

5.4 Ecology

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

5.4.2 Impact assessment: In this case, the air dispersion modeling study reveals that the ground level concentration of PM (during operation phase) in ambient air will remain within the NAAQ standard limits. Fly ash released through stack gases is likely to get settled mainly in 2-3 km radius area. Dispersion modeling study concludes that the maximum increase in particulate matter after expansion will be of 0.992 µg/m^3. And for SOx an increase in concentration by 2.24 µg/m^3 anticipated. This increase is very negligible.

1. Due to construction on the present open areas, land- foraging ground may get lost permanently for some of the birds, insects and reptiles; also this activity may cause negative impact on soil micro- fauna
2. In addition, the transmission lines may cause minor negative impact on soil and avian-fauna. Beneficial Impact is anticipated due to following factors.

- The effluent/wastewater generated will be treated and recycled/reused for greenbelt,

which is anticipated as positive impact for the conservation of resource as well as efficient utilization of it.

- Solid waste generated in the project will be added to soils. Thus, nutrient will get recycled and soil enrichment will take place. This is anticipated as another positive impact on the land and the surrounding eco-system.
- Greenbelt development will help in enhancing the biodiversity of the area. It will also help in improving the aesthetics. This is another positive impact anticipated due to the project.

5.4.3 Environmental management plan: ESP as an air pollution control device; stack of 85 m height; mechanized handling of bagasse and ash, etc. for air pollution prevention and control; Greenbelt development - for mitigation of air and noise pollution. Solid waste is organic and safely gets disposed-off by applying into soil.

5.5 Socio- economic environment

The proposed project is going to be beneficial in following ways

- The project is agro-based, that utilizes molasses which is a by-product of sugar mill. Therefore, sugar cane is cultivated and supplied to the mill by approx. 21,114 farmers; these families will be directly benefitted due to the project. These farmers will get at least Rs. 50 to 100 more per ton of cane, which is a direct monitory benefit.
- The project is going to generate about 50 additional direct employments for skilled and semi-skilled workforce available locally.
- This area is industrially backward area, thus the long term employment provided by the project will help to improve livelihood of the local people.
- The proposed project will employ local labour for various works during construction as well as operational phase. It is expected that about 40-50 labour will be get employment during construction phase and nearly same number of labour will get contractual/seasonal employment in the distillery during operational stages.
- These employees as well as cane harvesting labour receive insurance cover for medi-claim and accident;
- Thus, roughly 21,000 families will be directly benefited due to the proposed project
- By utilizing the available resource i.e. land, water and molasses - the sugar factory will generate additional income

- Proposed project will help to improve financial stability for the factory, which will be a 'win-win situation' for both, local cane growers as well as the management
- As a policy the factory will preferentially select local candidates for permanent employment. Therefore, it is anticipated that number of persons likely to migrate to this place will be very limited. Available infrastructure is adequate to accommodate this minor increase in the population due to the project. Thus, it is assumed that local existing infrastructure and natural resources won't be under stress due to such increase in population.
- The factory has made adequate provision of land for the proposed project. The site is within the existing factory premises, no rehabilitation or restoration issues involved.
- Since establishment of the sugar mill, there is a tremendous improvement in the socio-economic conditions of the locals.

All these activities indicate that, the mill's commitment for social and economic sustainable development of the region.

Considering the long term benefits to the locals and no issues of rehabilitation or restoration involved with the project, it is anticipated that project will have immense positive impact on socio-economic environment of the region.

6.0 FIRE AND SAFETY

Fire protection system will be provided in accordance to PESO, 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.

6.1 Types of fire extinguisher for use in the plant

1. Dry Powder Type (stored pressure) fire extinguisher suitable for firewood, cloth, paper oil, petrol, kerosene flammable material, gases, electrically started fires-ISI 3849 (ABC class fire).

2. Carbon dioxide fire extinguisher suitable for – All flammable liquids, gasses, Live and Delicate machinery fix, Electrical and sophisticated electronics equipment fires IS 2878 (BC class fire).
3. Dry chemical Power fire extinguisher suitable for – Fire of oils, solvents, gasses, paints varnish, electrical wiring, Live machinery fires, All flammable liquid and gas fires IS 2171, ISI 0658 (BC class of fire)
4. Mechanical foam fire extinguisher (AFFF) suitable for fire of petrol, oil paints, spirits chemicals flammable liquids. Caution-Do not use on electrical fires IS10204 (AB class of fires)
5. Water CO2 fire extinguisher- Suitable for – fighting of fire of wood, Paper cotton, jute etc. This is not to be used on oil & electrical fires IS-940, (A) class of fire)

LSSSSKL already has firefighting vehicle i.e. fire tender, refer chap. VII (Figure 7.1) as well as portable fire engine (Figure 7.2)

6.1.1 Safety Aspects through Design and Engineering

- All designs will be as per ISI standard specifications and drawings will be approved by factory/electrical inspectorate/safety inspectorate/weights & measurement inspectorate etc.
- The plinth level of distillery building will be at min 0.75 m height from developed ground level and it is to be built by brick masonry. For ground floor flooring of M10 grade (CC1:3:6) as a base concrete is to be made and its IPS shall be 50 mm of M15 grade (CC1:2:4). Plinth foundation should carry the load of 4 m height wall safely.
- Staircase – M.S. (Chequered plate with supports/grating of 5 mm thick) staircase of 1M wide, 150 mm risers and 300 mm treads with a landing at every 3 m maximum and rails provided on both sides, thus two staircases are provided up to top floor of distillery building (fermentation and distillation section). The staircases have to be inside the building.
- All floors (except ground) of the distillation building should be with MS grating of 5 mm thickness and each floor height should be minimum 4 m & Chequered plate at a condenser floor of 6 mm thickness.
- All distillation columns accessed from flooring (grating)

- The roof of the structures (fermentation, distillation, receivers) must be covered totally by pre-coated sheets (Pre-painted galvanic loom sheet i.e. PPGL sheets) of 0.5 mm thickness.
- For anhydrous ethanol receivers & storage tanks PESO guidelines
- Distance between flameproof and non-flame proof area minimum 15m
- The layout will take into account the working space & safety requirement of Factory Inspectorate, Govt. of Maharashtra State.

6.2 Plant Lighting

a. The normal process area lighting will generally compromise of fluorescent fittings & mercury vapor fittings.
b. Flameproof light fittings conforming to IS 2148 shall be provided for hazardous are as particularly in distillation & storage section. while non-flame proof fittings in other areas.
c. The normal lighting design will be based on average illumination levels recommended as per IS & calculated to take into consideration the aged output of lamps. All operating platforms for all floors of plant area shall be properly illuminated.

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

6.3 Energy and Water Saving Measures

- High alcohol % in fermented wash can result in substantial reduction in steam consumption (integrated evaporation system)
- It is possible to recycle of low strength waste generated i.e. process condensate, spent lees and other streams in distillery after treating through condensate polishing unit. It will help to reduce the consumption of fresh water for process and non-process applications.

7.0 ENVIRONMENT MANAGEMENT PLAN

Table 7: Environment management plan: operation phase

Environmental Aspect	Impact causing factor	Control/Mitigation Measures
Air Environment	Generation of Particulate Matter (PM), SO_2, NO_x during incineration Generation of Carbon dioxide from fermentation, Odour from spent wash storage Handling of coal/bagasse and ash	• ESP to control ash emission through stack with height 85 m • CO_2 bottling plant after scrubbing • Mechanized system for coal and ash handling • Fugitive dust control/suppression for coal yard will be done properly • Wind breaks for ash storage area • Development of greenbelt
Water Environment	Effluent generation from processes, cleaning, blow down water & condensate. Storage of spentwash, its treatment and disposal	'Zero liquid discharge' will be achieved by implementing - • Integrated and stand-alone evaporation (using MEE) as a primary treatment to reduce the spentwash volume • Incineration of concentrated spentwash by burning with coal/bagasse in furnace • Spentlees, condensate of MEE and other effluents will be treated in condensate polishing unit (CPU) and treated water will be reused in distillery. • All the effluent will be properly treated/ utilized/disposed within the premises • Separate lagoons for storage of raw and concentrated spentwash. • Lagoons will be made impervious as per CREP guidelines

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

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

Environmental Aspect	Impact causing factor	Control/Mitigation Measures
Risk and disaster management	Fire, accidents, earthquake, etc.	• The entire premises will be declared as 'no smoking zone' • Lightening arresting system will be installed • Ethanol vapor condensing system will be installed at storage area • Proper storage of molasses, ethanol, bagasse and coal • Ethanol storage as per PESO guidelines • Firefighting system as per OISD and local authority guidelines • Earthquake resistant construction

8.1 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).
- Local hospitals and Govt. health monitoring system will be engaged
- Dispensary and ESI facility will be provided to all workers as applicable

Table 8: Financial provision for CER activities planned for next five years

CSR activity head	Year					TOTAL
	1st	2nd	3rd	4th	5th	
	Budgetary provision (Rs. in lakhs)					
Water conservation: Financial aid for construction/maintenance of micro reservoirs, watershed management, provision for drinking water etc. and its maintenance/repair.	12	12	12	15	15	**66**
Health facilities: Health check-up of workers, their family members, organizing medical	5	5	5	5	5	**25**

camps, medical aid to needy villagers, etc.						
Education						
Training to employees	2	2	2	2.5	2.5	**16**
Education/training to local youths, farmers, family members of employee's	2	2	2	3	3	**12**
Environment monitoring and greenbelt development	4	4	4	5	5	**22**
Infrastructure Development/Maintenance (Eg. Road, canal maintenance, etc)	5	5	6	7	7	**30**
Other activities for maintaining social and cultural harmony	2	2	2.5	2.5	3	**12**
TOTAL BUDGETARY ALLOCATION FOR NEXT FIVE YEARS (2% of the capital budget = Rs. 183 lakhs)						**183**

Table 9: **Estimated Capital & Recurring Expenses for Environment Management**

#	Particulars	Amount (Rs. in Lakhs)
Capital Expenses		
1.	MEE and incineration boiler with electrostatic precipitator and dump condenser	2600
2.	Fuel handling system	240
3.	Ash handling system	140
4.	Stack	80
5.	Spentwash storage lagoon	50
6.	Condensate polishing unit	300
7.	CO_2 bottling plant	800
8.	Environmental monitoring and management	50
9.	Greenbelt development	20
10.	Rainwater harvesting	30
TOTAL		**4310**
	Additional provision towards CSR/CER (2 % of capital	**183**

	investment)	
Recurring Expenses/Annum		
1.	Salaries and wages	75
2.	Maintenance (@ 5% on capital investment of Rs. 4310 lakhs) of pollution control devices e.g. ESP, etc.	215.5
3.	Fuel (incineration activity) Electricity (in case of diesel generator operation)	384
4.	Miscellaneous	15
	TOTAL	**689.5**

9.0 CONCLUSION

During environmental impact assessment study, the potential environmental, social and economic impacts of the above project have been assessed and given in EIA report. The proposed distillery expansion will have certain levels of marginal impacts on the local environment. It has been endeavored to minimize the negative impacts by addressing them through environmental management plan. Necessary control measures have been suggested to meet with the norms and safeguard the environment. The implementation of this project will definitely improve the physical and social infrastructure of the surrounding area. Adequate financial provision is made by management of LSSSKL for EMP and CSR activities (i.e. for upliftment of the local people). The proposed expansion project will contribute to economic growth and help in generating Government revenue.