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EXECUTIVE SUMMARY
of
Environmental Impact Assessment Report
New 60 KLPD Molasses based Distillery

M/s. KUKADI SAHAKARI SAKHAR KARKHANA LIMITED

Village: Pimpalgaon Pisa, Tal. Shrigonda, Dist. Ahmednagar, Maharashtra

EIA Consultant

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EXECUTIVE SUMMARY

1.0 INTRODUCTION

M/s. Kukadi Sahakari Sakhar Karkhana Ltd, (KSSKL) is a cooperative sugar mill established in the year 2002-03, located at Pimpalgaon Pisa, Taluka Shrigonda in Ahmednagar district of Maharashtra. The registration number of the unit is ANR/SG/PRG/A/S-84, dated 01/08/1997. Its existing capacity is 5,500 TCD. This mill is in good working conditions and its overall performance is also good. The crushing capacity of the sugar mill was recently enhanced from 3,500 TCD to 5,500 TCD. This will also lead to an increase in the production of molasses. To utilize this valuable byproduct and to improve its financial viability, the management of KSSKL has decided to establish a new molasses based distillery unit of 60 KLPD. This project has also been selected for financial assistance from the Government of India under the scheme of 'Augmentation and Enhancement of Ethanol Production Capacity'.

1.1 Selection of Site:

The present site fulfills the industrial site selection criteria of MoEFCC. Molasess will be available from own sugar mill and supplementary from nearby sugar mills. Also, water, electricity, good infrastructure, support facilities and labouretc is also available in the area. Following Table 1 gives highlights of the project.

Table 1: Highlights of the project

1.	**Project Proponent**	**M/s. Kukadi Sahakari Sakhar Karkhana Ltd. (KSSKL)**	
2.	**Project**	New 60 KLPD molasses based distillery	
3.	**Location of the project**	Adjacent to the existing sugar mill premises, at village Pimpalgaon Pisa and Kolgaon, Tal. Shrigonda, Dist. Ahmednagar, Maharashtra - 413 307	
4.	**Working days**	300 Days per annum	
5.	**Product**	Rectified spirit + Impure spirit (5%) **OR** ENA +Impure spirit (6 %) **OR** Anhydrous Alcohol/ ethanol +Impure spirit (5%)	**60 KLPD**
	Byproduct/s	Fusel oil	240 L/day
6.	**Effluent Treatment System**	For Spentwash: Integrated evaporation followed by standalone multi-effect evaporation (MEE) followed by incineration	

		For Spent lees, condensate and other effluent (Condensate): Primary treatment followed by anaerobic, aerobic at secondary stage followed by tertiary treatment	
7.	**Air Pollution Control Systems**	New stack of 75 m with ESP (Electrostatic precipitator)	
	INFRASTRUCTURE		
8.	**Land**	Distillery along with intigrated evaporation, stand alone evaporation unit (MEE), storage lagoon, ETP/CPU, Incineration boiler, coal/bagasse storage and convey, ash pond, internal roads etc.= ~ 15,550 sq.m Proposed green belt development 33% =5,132 sq.m **Total land requirment = 20,682 sq.m (5.1 acre)** **Land Allocated = 28,328 sq.m (7 acres)**	
9.	**Main Raw Material**	**Molasses**	222 TPD
		Nutrient N,P	100 kg/d
		Turkey Red Oil (TRO)	300 kg/d
	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	
	Steam	**Total: Maximum 412 TPD (from new 22 TPH boiler)** **Source:** Through proposed incineration boiler **Steam utilization:** Distillery, stand-alone MEE and incineration boiler	
10.	**Fuel**	Conc. Spentwash: 161.2 TPD and Coal: max. 26.4 TPD or bagasse: 48.1TPD **Source:** Own sugar mill for bagasse proposed distillery effluent for conc. Spentwash and Indian coal from Wardha-Chandrapur coal blocks or as per availability/ for bagasse own sugar unit	
11.	**Boiler**	New incineration boiler of 22 TPH with pressure of 45 kg/cm^2	
12.	**Stack height and**	Stack of 75 m with inner diameter of 3.5 m will be used	

	Inner diameter	
14.	**Power**	1.32 MW, Source: Captive power from proposed 2 MW TG
15.	**Total Water Requirement**	590 m^3/day - for process (considering recycle and reuse) and 9.86 m^3/day for domestic/drinking
16.	**Water Source**	Moharwadi reservoir
17.	**Manpower**	68 permanent + 40 seasonal = 108
18.	**Green belt**	Proposed 2 acre
	FINANCIAL ASPECTS	
19.	**Total Project Cost**	Rs. 8279.43 lakhs
20.	**Capital expenses for EMP**	Rs. 3,475.00 lakhs

TPD = Tons Per Day

2.0 MATERIAL AND INFRASTRUCTURE

2.1. Molasses

Molasses will be available from own sugar mill and supplimentary from nereby sugar mill. The requirement of molasses will be 222 MT/day or around 66,600 MT/annum. The mill will have its own molasses to the extent of 34,000 – 38,000 MT C heavy molasse or 50,000 – 60,000 MT B heavy molasse. Thus, mill will require about 6,000 -16,000 MT of molasses from market to utilize the optimum capacity. At present, the sugar mill is having three mild steel molasses storage tanks each having of 8,500MT capacity, thus, total molasses storage capacity 25,500 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

Moharwadi resrviour is the source of freash water. The mill has taken a permission from irrigation department. (Enclosed as annexure VII to main report). Detailed water budget discussed in Table 2.

Table 2: Water Balance: Distillery of 60 KLPD

WATER INPU	Cum/day
Process Water for Fermentation section and CO_2 scrubber	720
Boiler feed water	422
DM Water For RS Dilution	240
Soft Water For Vacuum Pump & Others	100
Soft Water Makeup For Cooling Towers	360
Other Domestic Usage	20
Total Water Input at start-up	**1,862**
WATER OUTPUT	
Spent Lees (PR & Rect.)	240
CT Evaporation & Drift Losses	360
Domestic Consumption loss m (Loss 4 + WW 16 = 20)	20
Water In Spent Wash (5% solids)	650
Soft Water For Vacuum Pump & Others	100
Boiler water as blow down	10
Exhaust condensate	412
Over all process loss	70
Total Water Output	**1,862**
RECYCLE STREAMS	
Lees Recycle For RS Dilution (after CPU)	240
Process Condensate (after CPU)	520
Steam condensate recycled to boiler	412
Soft Water For Vacuum Pump & Others cooling water	100
Total Recycling /Re-utilizations of water per day	**1,272**
Total Daily Water requirement/Input = (1862 - 1272 = 590)	**590**
The fresh water requirements per lit of Alcohol including domestic water	**9.83 lit/lit of RS**

2.3. Fuel

In the proposed project, concentrated spent wash of >55 up to 60° brix (Solids) will be incinerated along with coal or bagasse. Spent wash available for incineration will be 130 m^3/day and its specific gravity is 1.24. Thus, estimated spent wash availability per day will be 161.2

TPD. This quantity of spent wash will produce 306.28 TPD. In order to produce remaining 105.72 TPD steam will produce by using coal (26.4 TPD) or bagasse (48 TPD) as fuel.

2.4. Steam

Maximum steam requirement will be 17.2 TPH including, steam required for re-boiler, integrated evaporation and standalone spent wash multi-effect evaporation plant. It will be produced from proposed an independent incineration boiler of 22 TPH having 45 kg/cm^2 (g) pressure. It will be supplied to 2 MW STG. Low pressure exhaust steam from STG will be used for distillery and evaporation activities.

2.5. Power

The mill has decided to install a separate 2 MW capacity turbine generator. It will fulfill the power requirement of 1.32 MW of distillery, MEE, CPU and auxiliary units.

2.6. Boiler

One new fluidized bed combustion multi-feed fuel boiler is proposed for the project. It will be of 22 TPH capacity having operating parameters of 45 kg/cm^2 (g) pressure & 400 ± 5^{0}C temperature.

The scheme for the incineration boiler and power generation are as per figure 1.

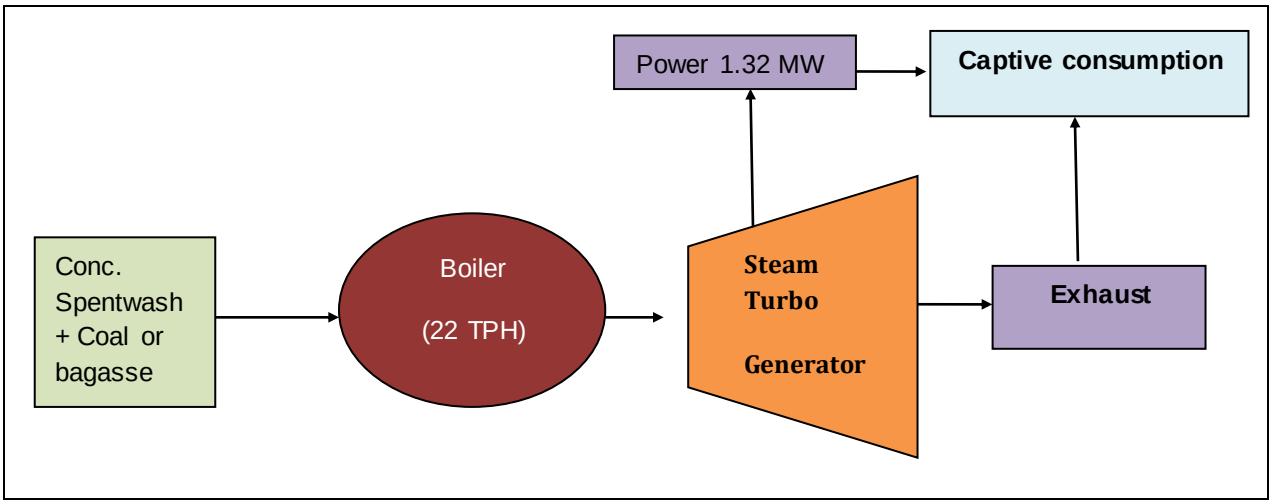

Figure 1: Schematic of steam and power generation

2.7 Fuel Handling System

Entire coal storage area 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. Coal handling will have a capacity of 4 TPH. The conveyors of bagasse/coal will suitably have covered with hood or enclosures.

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 Sugar mill is holding 117 acres of land. Out of which sugar mill has occupied approx. 35 acres, part of it and remaining land which is flat, open will be allocated for proposed unit. Therefore, out of available land, a provision of approx. 28,328 sq. m is for the proposed distillery and ancillary units thereof such as ash storage, ETP, spentwash lagoon, etc.

2.10 Manpower

The project will be generating 108 direct employment opportunities, of which 68 will be permanent and 40 for seasonal operation. Apart from this, the project is anticipated to give plenty of indirect opportunities to transporters, shopkeepers 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 characteristics of manufacturing process are given below and a schematic is shown in figure2.

3.1 Manufacturing Process

The production process mainly involves fermentation and distillation process.

3.1.1 Fermentation

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 270-280 liters/ ton of molasses.

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 is 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. spentwash and spent lees.

3.1.2.1 Multipressure Distillation

Multi-pressure distillation system for production of Rectified spirit consists of distillation columns namely –

For –Rectified Spirit mode

1. Degasifying cum analyzer column, 2. Rectification column, 3. Fusel Oil Concentration column, 4. Extractive Distillation columns

For –ENA mode

1. Degasifying cum analyzer column, 2. Pre-rectifier column, 3. Extractive Distillation column, 4. Rectification Column, 5. Refining /Simmering column, 6. Fusel Oil Concentration column, 7. Head Concentration column

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 re-boiler (2.2 Kg/lit. of Rectified Spirit)
d. Spent wash generation is less.

3.1.2.2 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.

3.1.2.3 Anhydrous Alcohol (AA)

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) Pervaporation / Vapour permeation system

Details of molasses and product storage tanks are given in Table 5.

Table 3: Details of Storage Tanks

SPECIFICATIONS FOR RECEIVERS & STORAGE TANKS – THICKNESS AS PER IS-803-1976:			
		Quantity	Capacity (in m3)
1	Rectified spirit receiver	3	70
2	Impure spirit receivers	3	10
3	* Rectified spirit storage tanks	1	900
4	* ENA storage tanks	2	600
5	* Impure spirit storage tank	1	200
6	Fusel oil storage tank	1	10
7	Molasses storage at distillery (Tons)	1	10000
8	Vent Condenser for storage tank and necessary piping	As per requirement	-

9	Turbine type Flow meter with totalizer for issue to be approved by Weight & Measure Dept.	As per requirement	-

***** 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).

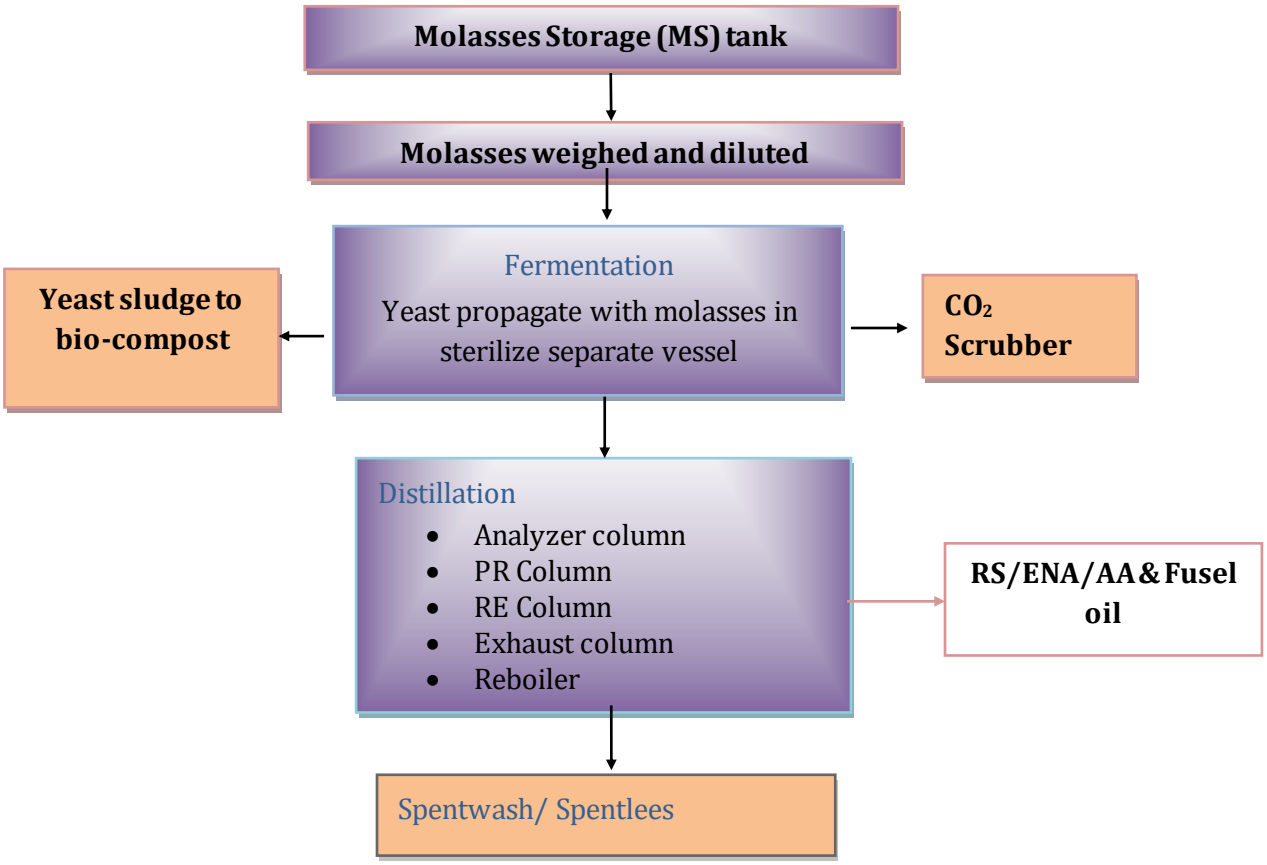

Figure 2: Schematic of RS/ENA/AA manufacturing process

4.0 BASELINE ENVIRONMENTAL CONDITIONS

In baseline data collection, air monitoring was carried out from third week of October 2015 to second week of January 2016. Soil sampling and analysis was also carried out during the air monitoring work. Water samples were re-collected in November 2018. Re-survey for socio-economic data as well as for ecology and biodiversity was carried out in Oct-Nov 2018 to update the information collected previously and for ecological experiments.

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 449 mm Rains are received mainly during August-September months
3	Temperature	The maximum temperature in summer is around 40°C and minimum temperature in winter is around 11°C
4	Humidity	The relative maximum humidity ranges between 60 to 95% in the month of August and minimum humidity ranges from 30-40% in the months of March and April
5	Wind	Predominantly wind direction North west during study period
6	Land use	Agricultural Land area 24.16 %, vegetation land 1.19 %, fallow land 26.45 % area not available for cultivation 18.34 %, build up area 0.48%, open Scrub area is 28.43 % and water bodies is 0.96
7	Air Quality	complies NAAQ standards of Nov. 2009 at all monitored locations
8	Noise	Complies the standard
9	Ground water	As per Central Ground Water Board report 2014 - Slightly alkaline, good for irrigation purposes throughout the district.
10	Soil	Regur or kali observed on near rivers and the gray of inferior quality locally known as barad in most of the study area
11	Nearest sanctuary	Rehkuri Sanctuary at 60 km from the site

4.1 Land use

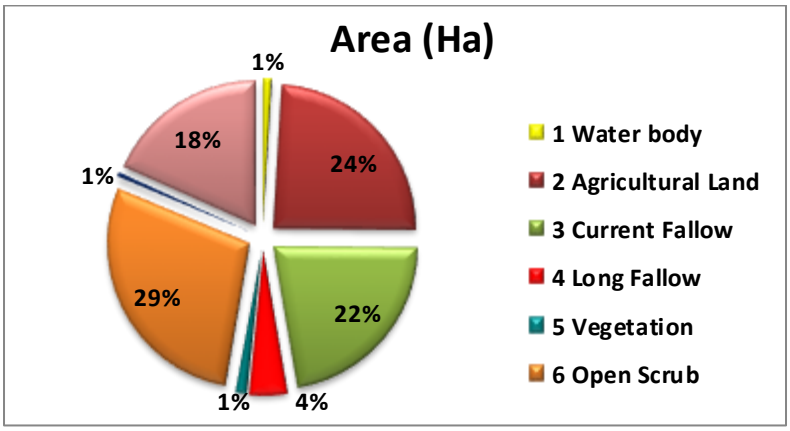

Figure 3: Details of Land use

5.0 IMPACT ASSESSMENT

5.1 Air Environment

5.1.1 Impact causing factors

1) Emissions from process: It will be due to incineration of spentwash along with coal or bagasse.

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 approx. 50 trucks will get involved on weekly basis and transportation of finished product i.e. RS/ENA or AA will require about 120 tankers (considering each tanker of 15 m^3 capacities). Hence, this could cause minor increase mainly in NOx, particulate matter and HC.

3) Fugitive Emissions and Other sources of air pollution: Fugitive Emissions: 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 5,132 sq.m area for the proposed unit
- Plantation of 1,500 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 9.2 software developed by Lakes Environment Software, Canada.

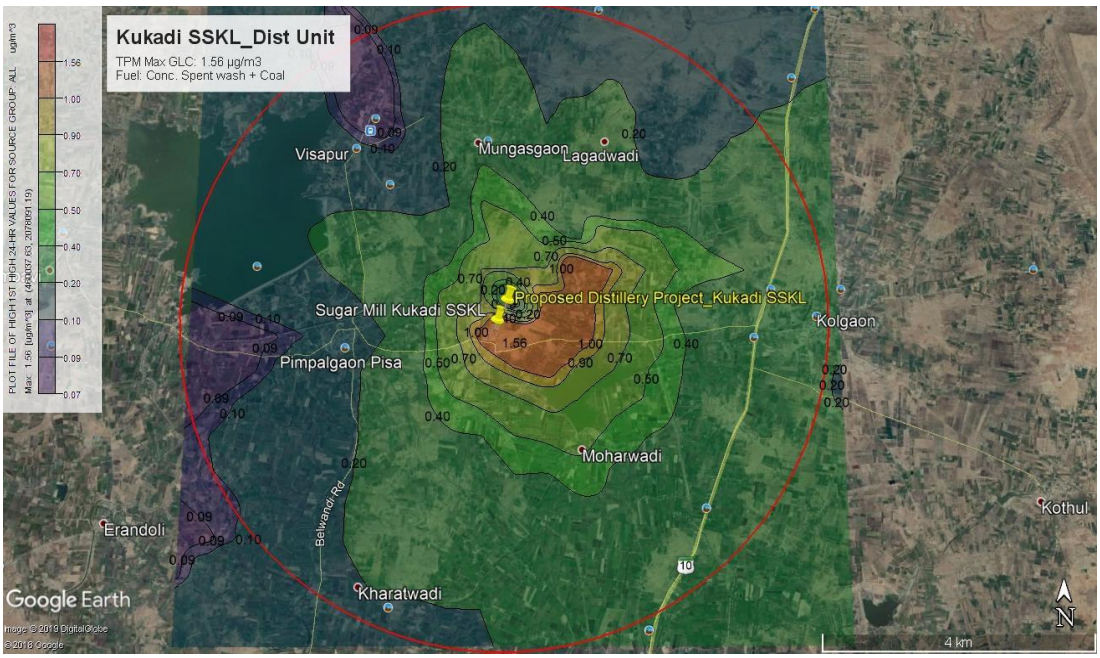

Figure 4: Short term 24 hourly GLCs of PM

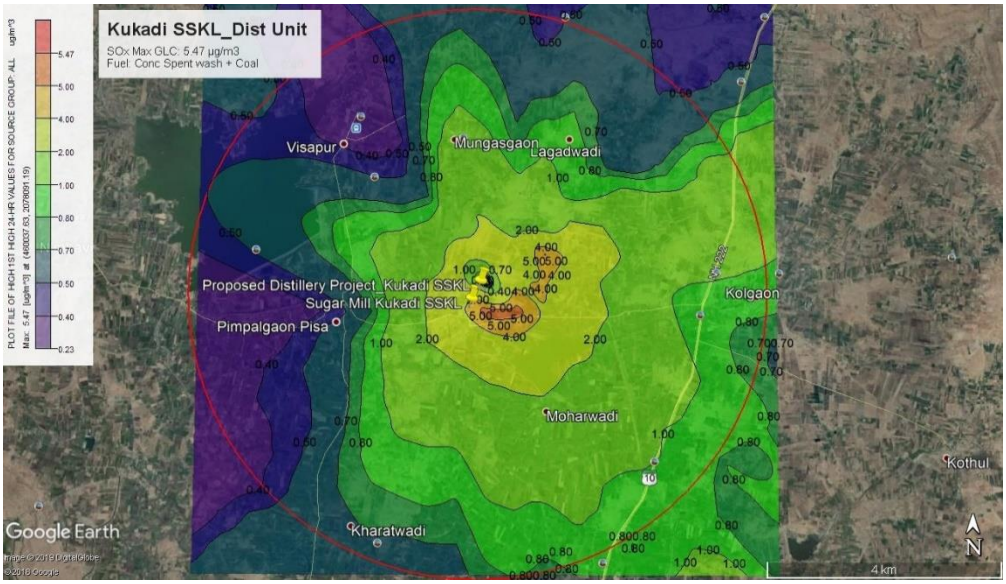

Figure 5: Short term 24 hourly GLCs of SO_2

a. Observation

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_x mainly towards south-east at approx. 420 m (0.42 km) from the stack towards Moharwadi village ~ 2.4 km from proposed site
- The maximum incremental load at this point will be for particulate matter (PM_{10}) 1.56 µg/m^3 and 5.47µg/m^3 for SO_x.
- Agricultural vegetation is observed at this distance (400 m towards SE)
- Village Moharwadi is the nearest monitored location in residential areas, in this downwind direction; baseline concentration of PM_{10} and SO_x observed at this location was considered for estimating resulting GLC
- From the mathematical modeling study, it is observed that resultant concentration of this 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/m³	
	PM	SO_2
Maximum rise in GLC	1.56	5.47
Direction of Occurrence and distance	SE (0.42 Km)*	SE (0.42 Km)*
Coordinates of maximum GLC	18.794196 N 74.620691 E	18.794196 N 74.620691 E
Baseline Concentration reported nearby GLC (at 1.75 km SE)	47.22 (Moharwadi)	15.43 (Moharwadi)
Total Concentration (Post project scenario)	48.22	16.43
NAAQS	PM_{10} 100	80
*The distance is measured from stack to the receptor of maximum GLC		

5.2 Water Environment

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: No negative impact on water environment and aquatic ecosystem is envisaged due to the proposed project. Minor negative impact is envisaged on soil within the premises. The project proponent has water drawl permission from Irrigation Department to lift the water from Moharwadi reservoir. Thus, water used in the project will be exclusively allocated for industrial activities.

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

a) Impact of effluent discharge

As discussed earlier, highly polluted wastewater i.e. spent wash will be disposed by incineration process. It will be stored in impervious lagoons as per CPCB guidelines. Other polluted water will be treated in CPU and reused.

b) Solid waste

Table 6: Solid Waste and its Management

Waste Material	Quantity	Upshot
Ash	38.25 TPD	Sold to brick manufacturing unit
Yeast Sludge	4 - 5.5 TPD	Mixed into soil
sludge from CPU (wet basis)	0.2 TPD	

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

5.3.2 Impact Assessment: The project is not going to generate any hazardous waste. Since, the solid waste is non-toxic and non-hazardous, it is anticipated that the solid waste will have no negative impact on land but very negligible negative impact on air environment due to emissions from stack. Minor negative impact is also envisaging on the land environment of the site due to construction of the proposed unit.

5.3.3 Environmental management plan: The solid waste expected would be ash from boiler. It is estimated to be about 38.25 TPD during seasonal operation. Sludge from ETP is another solid waste which will be organic in nature. The boiler ash from bagasse is generally rich in potash; hence, ash as well as sludge will be given to the farmer as soil enriching material. 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 case of proposed project, the air dispersion modeling study reveals that the ground level concentration of PM (during operation phase) in ambient air will be

an increase in the concentration of PM and SO_x mainly towards South – east at approx. 420 m from the stack towards Moharwadi village ~ 2.4 Km from proposed site. The maximum incremental load at this point will be for particulate matter (PM) 1.56 µg/m^3 and 5.47 µg/m^3 for SO_x. Agricultural vegetation is observed at this distance. Village Moharwadi is the nearest monitored location in residential areas, in this downwind direction; baseline concentration of PM_{10} and SO_x observed at this location was considered for estimating resulting GLC. From the mathematical modeling study, it is observed that resultant concentration of this air pollutant in downwind direction will be well within the national ambient air quality standards prescribed by CPCB in Nov. 2009. The negative impact is anticipated due to following.

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 (bagasse ash) will be organic in nature and rich in potash. It 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: Use of bagasse – a renewable energy source; ESP as an air pollution control device; stack of 75 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

5.5.1 Impact Causing Factors: issues of rehabilitation; restoration; population flux; pressure on available resources and infrastructure.

5.5.2 Impact Assessment: Considering the long term benefits to the locals, the project will have positive impact on socio-economic environment.

5.5.3 Environment Management Plan: Project is agro-based – therefore, indirectly beneficial to local farmers; no issues of rehabilitation or restoration; local candidates will be employed – thus, migration of population to the site surrounding area and pressure on infrastructure and resources is anticipated to be negligible**.**

5.6 Other impact: Traffic

In the project, the transportation activity will take place mainly during the construction phase. Considering the availability of Baramati-Daund-Ahmednagar State Highway 10 (now it is also NH 160) passes from Kolgaon which is 4.0 km away from the project site. Pune–Ahmednagar state highway and Pune-Solapur national highway (NH 65) is approx. 30 and 57 km from the site. The nominal increase in vehicles during construction phase may not cause any traffic congestion.

During operation phase, the transportation activity will be very negligible; hence, the probability of traffic congestion is insignificant.

6.0 FIRE PROTECTION SYSTEM

Fire protection system shall be provided in accordance to PESO, OISD-117 and LPA regulations. The fire-fighting 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, storage yard.

Fire Protective System – Fixed supply of Carbon dioxide from the Tank, normally connected to fixed piping system with nozzles arranged to discharge CO_2 directly on the burning material, equipped with Fire Alarm, Fire hydrant fm 200/70 and extinguishing system H.V.W / M.V.W Spray system (LOCAL APPLICATION ONLY). System consists of Alarm Bell, Control panel,

remote station, electric control needed for operating system, Pressure switch Heat detector, Heat collector, and conveyor rail, Drain Board with dip tank and discharge nozzles.

Automatic fire Sprinkler System (Water Hydrant) – Electro-magnetic dehydration system uses an electric fire detection system installed in the area as open sprinklers /spray nozzles. Upon sensing a hazard, the Electromagnetic valve opens.

6.1 Safety Aspects through Design and Engineering

- All design will be as per ISI standard specification and drawings are to 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.
- 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 galvano loom sheet i.e. PPGL sheets) of 0.5 mm thickness.
- For anhydrous ethanol receivers & storage tanks PESO (Petroleum and Explosive Safety Organizations) guidelines
- Distance between flameproof and non-flame proof area min. 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 areas, particularly in distillation & storage section, while non-flame proof fittings in other areas.

Plant building lighting will be 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
Soil Environment	Boiler Ash	• Sold to nearby brick manufacturing unit
	Sludge from Fermentation unit, CPU and Bio-digesters	• 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 well 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 check up for workers • 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 provide habitat to many species
Socio-economic Environment	Rehabilitation and Restoration (RR), pressure on available man made 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
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 and coal • Ethanol storage as per PESO guidelines • Fire fighting system as per OISD and local authority guidelines • Earthquake resistant construction

8.0 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 will 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 will be strictly prohibited in the entire unit
- Existing Firefighting system (of sugar unit) will 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 will be extended after proposed project.

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

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).

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.	10	11	12	13	14	**60**
Health facilities Health check-up of workers, their family members, organizing medical camps, medical aid to needy villagers, etc.	2	3	3	4	4	**16**
Education						
Training to employees	2	1	1	1	1	**6**
Education/training to local youths, farmers, family members of employee's	2	2.5	2.5	3	3	**13**
Educational aid to local schools, colleges, etc	1.5	1.5	1.5	2	2	**8.5**
Environment monitoring and Greenbelt development	6	4	5	6	6	**27**
Infrastructure Development/Maintenance (Eg. Road, canal maintenance, etc)	4	5	5	6	7	**27**
Other activities for maintaining social and cultural harmony	1	1.5	1.5	2	2.5	**8.5**
TOTAL BUDGETARY ALLOCATION FOR NEXT FIVE YEARS (2% of the capital budget = Rs. 165.6)						**166**

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

#	Particulars	Amount (Rs. in Lakhs)
1.	Spent wash lagoons	80.00
2.	Incineration boiler (Civil+ Machinery) including ESP	2,050.00
3.	CPU - Treatment units for condensate and other effluent	75.00
4.	Standalone Multi Effect Evaporator (Civil+ Machinery)	860.00
5.	Coal handling (Civil+ Machinery)	140.00
6.	Ash handling system	75.00
7.	Fugitive dust control (Foggers/sprinklers, bag filters, etc.)	40.00
8.	Chimney	80.00
9.	Firefighting equipment's and other	40.00
10.	Rain Water harvesting	05.00
11.	Greenbelt development/Tree plantation	10.00
12.	Laboratory shed and its glassware, equipment's, etc.	15.00
13.	Miscellaneous (Piezo metric well, etc.)	05.00
TOTAL		**3,475.00**
B.	Additional provision towards CSR/CER (2 % of capital investment)	**166**
Recurring Expenses/Annum		
1.	Salaries and wages	132.36
2.	Maintenance (@ 5% on capital investment of Rs. 8279.43 lakhs) of pollution control devices e.g. ESP, etc.	413.97
3.	Fuel (incineration activity) Electricity (in case of diesel generator operation)	316.00 10.00
4.	Miscellaneous	05.00
	TOTAL	**877.33**

9.0 CONCLUSION

The project proposed by a progressive cooperative sugar mill from Ahmednagar district of Maharashtra. The mill is having adequate capacity to produce >75% of required molasses in the form of B heavy type and remaining will get easily available from nearby sugar mills. The mill is having its own open land where the project will be developed. Hence, issues of rehabilitation and restoration of people is not involved in this case. The project is going to use captive power and dependence on external power is only incidental. The project is going to install a 22 TPH incineration boiler to produce approx. 17 TPH steam for process as well as allied activities. This incineration boiler will use spentwash and coal/bagasse as a fuel. ESP will be installed to control particulate matter from flue gasses. Appropriate systems will be developed to arrest fugitive dust from handling and transportation of coal and ash. In case of wastewater, the project will provide impervious lagoons for storage of spent wash. Low strength effluent will be treated in CPU and treated water will be reused. Solid waste is in the form of sludge which is biodegradable; hence disposed off safely by mixing into soil. In short, proposed distillery will follow 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. Greenbelt development will help in maintaining the biodiversity. The product ethanol is very important to the country. Considering voluminous development on socio-economy front and sincere commitment of the mill for maintaining environmental attributes, the proposed project will be sustainable.