Proposal No. : IA/MH/IND2/204354/2021, Category 'A'

EXECUTIVE SUMMARY of Environmental Impact Assessment Report For

Expansion of Molasses Based Distillery Unit from 75 KLPD to 150 KLPD

M/s. RAJARAMBAPU PATIL SAHAKARI SAKHAR KARKHANA LIMITED

Rajaramnagar, Village : Sakharale, Tal. : Walwa,
Dist. : Sangli, Maharashtra - 415 414

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EXECUTIVE SUMMARY

1.0 INTRODUCTION

M/s. Rajarambapu Patil Sahakari Sakhar Karkhana Ltd. (RBPSSKL) located at Rajaramnagar, village: Shakharale, Tal. Walwa, Dist. Sangli -414103 (Maharashtra) is incorporated under the Government of Maharashtra Co-operative Societies Act Registration no. SAN/PRG/A-3 dated 17.08.1968. The proposed plant will be based on advanced technology of cascade continuous fermentation. For distillation, multi-pressure technology will be adopted and Molecular Dehydration (MSDH) for the production of ethanol from rectified spirit. Multi-effect evaporation (MEE) followed by incineration boiler will be used for spent wash and condensate polishing unit (CPU) for spent lees and condensate as a primary effluent treatment system.

The purpose of this environmental impact assessment (EIA) study is to obtain Environmental Clearance for proposed Expansion of molasses -based distillery unit from 75 to150 KLPD, of M/s. Rajarambapu Patil Sahakari Sakhar Karkhana Ltd. The notification no. S.O. 1533 promulgated on September 14, 2006 has covered distillery industry under activity 5(g). This report presents the executive summary of environmental impact analysis of the proposed distillery project. The adverse impacts can be minimized by using appropriate control or mitigation measures.

Because of new ethanol related policies of Government of India, the management of the factory has planned extensive cane development activities in its command area (i.e. area of operations). Hence, sugarcane area is anticipated to increase over a period of time. Considering the increased availability of sugarcane, the production of byproduct like molasses is also increase, so the management of RBPSSKL has decided to expand its molasses-based distillery from 75 to 150 KLPD molasses based distillery unit to improve its financial viability.

1.1 Selection of Site

The present site fulfills the industrial site selection criteria of MoEFCC. Molasses 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.

Table 1: Highlights of the project

1.	Name of the Industry	M/s. Rajarambapu Patil Sahakari Sakhar Karkhana Ltd. (RBPSSKL)
2.	Project	Expansion of molasses -based distillery unit from 75 to150 KLPD
3.	Location of the project	Distillery at Gat No. 1152 1170,1172 Rajaramnagar, village Sakharale, Compost yard at Gat no 191,192, 193, 203, 204, 207, village Urun, Taluka Walva, District Sangli, Maharashtra
4.	Working days	Year around
5.	Product	Rectified Spirit OR ENA OR Ethanol: 150 KLPD Max.
6.	Effluent Treatment System	Standalone multi-effect evaporation (SMEE) followed by incineration of spentwash when molasses is used as a feedstock Concentration followed by biomethanation followed by composting when sugarcane juice/syrup is used as a feedstock. For spent lees, condensate and other effluent: Two stage biological treatment followed by tertiary treatment
7.	Air Pollution Control Systems	Stack of 62 m (with inner diameter of 3 m) with ESP (Electrostatic precipitator)
	INFRASTRUCTURE	
8.	Land	Total area of the plot is 138.96 Ha of which built up area of existing sugar and cogeneration is 24.28 Ha. and 20.05 Ha is greenbelt and internal road. 6.00 Ha land has been allocated for distillery and allied units. Existing compost yard occupies 22.66 ha
9.	Main Raw Material	Molasses (C-Type) 385 TPD OR Molasses (B-Type) 487 TPD OR Sugarcane juice 1875 TPD

10.	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
11.	Steam	32 TPH Source New incineration boiler with 3 MW STG
12.	Fuel	Conc. Spentwash 248 TPD (source -own distillery) + Coal 90 TPD (source -market) or Bagasse 156 TPD (source -own sugar mills
13.	Boiler	New Incineration boiler of 32 TPH with pressure 45 kg/cm^2
14.	Stack height & Inner diameter	Stack of 62 m with inner diameter of 3 m
15.	Power	2.8 to 3 MW (Source: Captive incineration boiler)
16.	Total Water Requirement	725 m^3/day maximum after reuse and recycle
17.	Water Source	Krishna River MIDC lift irrigation scheme from 5 km.
18.	Manpower	Existing: 73, New 50.
19.	Green belt	20.05 Ha
	FINANCIAL ASPECTS	
20.	Total Project Cost	Rs. 10424.09 Lakhs
21.	Capital expenses for EMP	Rs. 4905 Lakhs

TPD = Tons Per Day

2.0 MATERIAL ANDINFRASTRUCTURE

2.1 Molasses/Sugarcane syrup

The estimated molasses requirement for 150 KLPD production capacity for year-round of operation (330 days per annum) will be 127,050 TPA (C heavy) and 160,710 TPA (B heavy).

Raw material and chemical requirements given in the following table.

Table 2: Availability of raw materials, finished good product and mode of transport

Particulars	Estimated quantity	Source market	Final product	Estimated quantity	Transport mode
Raw Material					
Molasses (C-Type)	385 TPD	Own sugar mill	Rectified spirit + Impure spirit (5%) or ENA + IS or Fuel Alcohol + IS	150 KLPD (100 KLPD when C molasses is used)	By pipeline from RBPSSKL & by tanker from other mills.
Molasses (B-Type)	487TPD				
Sugarcane juice	1875 TPD sugar cane or 468.75TPD syrup (60^0Bx)				
Chemicals					
Nutrients N, P	200 Kg/day	Sangli, Kolhapur, Pune etc.	-	-	By Road-Truck
Turkey Red Oil	600 Kg/day				
Utilities					
Fuel					
Spentwash + Coal/ Bagasse	248 TPD + 90 TPD/ 156 TPD	Distillery From market	-	-	By Road/ rail

Water (daily)	725 m^3/d max	Krishna lift irrigation scheme	-	-	Closed pipeline
Steam	372 TPD	Captive incineration boiler	-	-	-
Power	1.6 MW		-	-	-

2.2 Water

Estimated water requirement is given in table 2.5. According to which water requirement for the proposed project will be 725 m^3/day (after recycling). It will bemet from existing Krishna River MIDC lift irrigation scheme. Water will be required for domestic, process and utility purpose. Detailed water budget is as follows.

Table 3: Water Balance: Distillery unit using molasses or sugar syrup

WATER INPUT	**Water requirement in m^3/day**		
	Molasses	BH-Molasses	Sugarcane Syrup
Process Water (Fermentationand CO_2 scrubber)	1020	1250	550
Boiler feed water	768	768	768
Soft Water For Vacuum Pump & Others	100	100	100
Soft Water Makeup For Cooling Towers	600	850	800
Other Domestic Usage	10	10	10
Total Water Input at start-up	**2498**	**2978**	**2228**
WATER OUTPUT			
Spent Lees (PR & Rect.)	150	225	225
CT Evaporation & Drift Losses	600	850	800
Domestic Consumption loss	10	10	10
Soft Water For Vacuum Pump & Others	100	100	100
Boiler waste water as blow down & steam	40	40	40

loss			
Exhaust condensate	728	728	728
Process condensate	800	1000	225
Water loss in RS	5	7.50	7.50
Over all process loss	65	17.5	92.5
Total Water Output	**2498**	**2978**	**2228**
RECYCLE STREAMS			
Lees Recycle For RS Dilution (after CPU)	150	225	225
Raw spentwash for syrup dilution		300	225
Process Condensate (after CPU)	800	1000	225
Steam condensate recycled to boiler	728	728	728
Soft water for Vacuum Pump, others, cooling water	100	100	100
Total Recycling /Re-utilization of water	**1778**	**2353**	**1503**
Total Daily Water requirement/Input	**720**	**625**	**725**
Fresh water requirement per lit of Alcohol incl. domestic water	**7.20 lit**	**4.16 lit**	**4.83 lit**

Fresh water requirement for the proposed distillery unit will be of 725 m^3 per day.

2.3 Fuel

In case C-molasses or BH-molasses is used as feedstock, concentrated spent wash about 200 m^3/day will be burnt in incineration boiler with supplementary fuel coal or bagasse. In case sugar syrup is used Concentrated Bio-methanated spent wash about 225 m^3/day will be used to produce Bio-compost after mixing with press mud cake. Sufficient quantity of press mud cake is available with karkhana to operate the distillery on syrup during sugarcane crushing season.

2.4 Steam

The distillery will require maximum 32 TPH steam which will be fulfilled from new 32 TPH incineration boiler after augmenting its capacity appropriately.

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

It will be utilized for distillation, boiler units, and standalone multi-effect evaporation plant. Exhaust steam from STG will be used for distillery.

2.5 Power

The estimated power requirement for proposed expansion is 2.8-3 MW. It will be fulfilled from the captive incineration boiler. In case of shut down, it will be purchased from state electricity grid.

2.6 Boiler

It is planned to install a new incineration boiler of 32 TPH having 45 kg/cm^2 (g) pressure& 400 ± 5^{0}C temperature.

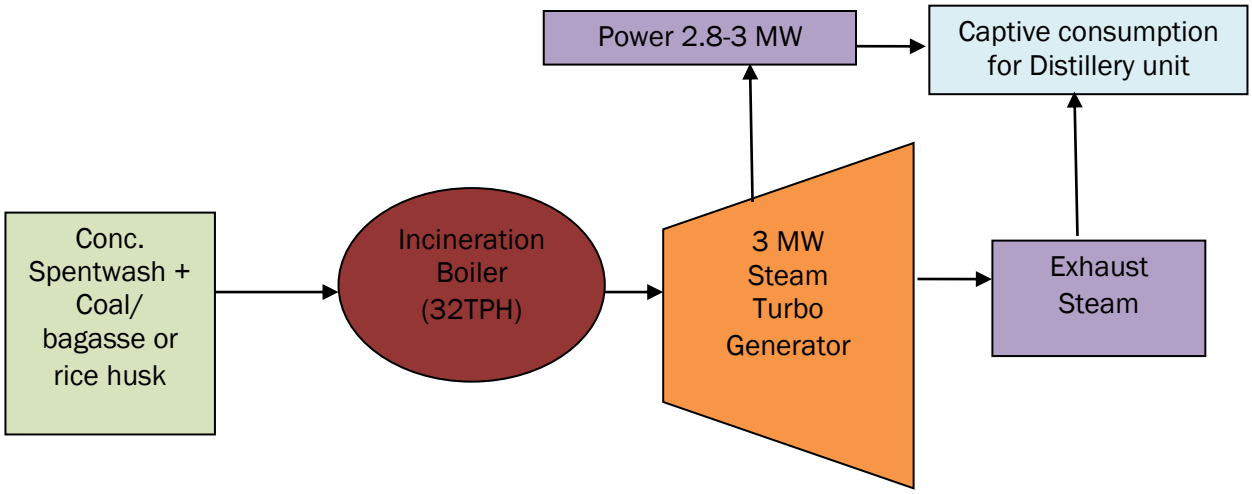

Figure 1: Schematic of steam and power generation

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.

2.8 Ash handling system

The ash handling system envisages wet extraction of bottom ash & dry extraction for fly ash. The fly ash will be extracted in dry form from the electrostatic precipitator hoppers, economizer, air heater hoppers, stack hopper, and transported to storage silo as a measure for promoting ash utilization. For collecting fly ash in dry form, the system will be designed such that, the fly ash and conveying air mixture will be conveyed to storage silo with bag filters. Once in eight hours shift, the fly ash will be sequentially extracted from these hoppers. The fly ash handling system will be designed to collect ash in dry form in fly ash silos through existing screw conveyers and belt conveyers).

2.9 Land

Total area of the plot is 138.96 Ha of which built up area of existing sugar and cogeneration is 24.28 Ha. and 20.05 Ha is greenbelt and internal road. 6.00 Ha land has been allocated for distillery and allied units. Existing compost yard occupies 22.66 ha. The proposed expansion will easily get accommodated in the existing land of distillery unit.

2.10 Manpower

The project will generate additional employment for 50 persons of which 35 will be skilled and remaining semiskilled. Current manpower at distillery is 73.

3.0 PROCESSDESCRIPTION

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).

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 notnecessary.

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 batchFermentation. 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 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. spent wash and spent lees.

3.1.2.1 Multi-pressure 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, few under atmospheric pressure.
c) Low steam consumption with reboiler (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)

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

The various processes used for dehydration of alcohol are as follows-

Azeotropic Distillation

Molecular Sieves

Evaporation / Vapour permeation system

Details of molasses and product storage tanks are given in Table 4.

Table 4: Details of Storage Tanks

Specifications for Receivers & Storage Tanks – Thickness As Per IS-803-1976

#	Particulars	Quantity	Total Capacity (in m^3)
	Existing		
1.	Rectified spirit receivers	9	268.5
2.	Impure spirit receivers	6	49
3.	* Rectified spirit storage tanks	7	3550
4.	Denaturant tank	1	30
5.	Ethanol receivers	3	180
6.	Ethanol storage tanks	4	2800
7.	Molasses storage at distillery (Tons)	4	29822 MT
8.	Rectified spirit receivers	3	180
9.	* Rectified spirit storage tanks	4	1200
10.	Impure spirit storage tank	1	200
11.	Fusel oil storage tank	1	10
12.	RS day tank	1	250
13.	Ethanol receivers	3	180
14.	* Ethanol storage tank	2	1000

* 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).

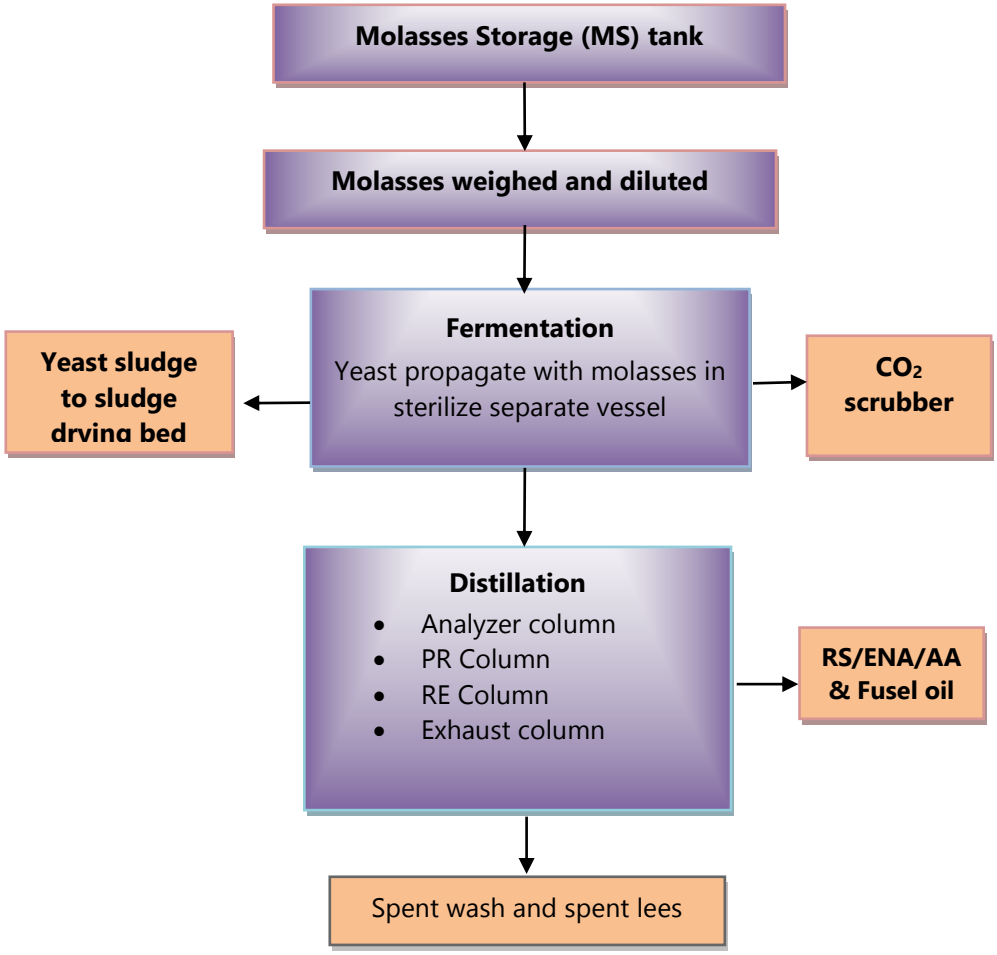

Figure 2: Schematic of RS/ENA/AA manufacturing process

4.0 BASELINE ENVIRONMENTALCONDITIONS

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 December 2020 to Feb 2021.

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 5: Summary of Environmental features of study area

Facet	In brief
General characteristics	Hot and dry
Rainfall	Normal average rainfall 1350 mm.
Temperature	The maximum average temperature in summer is around 39°C and minimum average temperature in winter is around 17°C
Humidity	The maximum humidity in the study area ranges between 60 to 80 percent in the month of August and minimum humidity ranges from 30-40 percent in the month of March and April.
Wind	Predominant wind direction was SE, E followed by N and the wind speed was between 1 to 13 km/h for >71 % during the study period
Land use	Crop land area 88.98%, scrub land 4.02%, forest 0.93%, settlement area 3.69%, river/water bodies 2.44%
Air Quality	Complies NAAQ standards of Nov. 2009 at all monitored locations
Noise	Complies the standard
Groundwater	As per Central Ground Water Board report 2013, the groundwater quality in the district is affected because of high NO_3 concentrations
Soil	Medium and deep black
Nearest sanctuary	Yashwantrao Chavan Sagareshwar Sanctuary ~11.5 km

4.1 Landuse

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 qualitativeand quantitative outcome of land cover/use distribution using remote sensing data and GIS technologies.

The proposed project site is located at village Sakharale, Taluka Walwa of Sangali district, Maharashtra state. Site is more or less flat having average elevation of 582 m above mean sea

level. Latitudes and longitudes of corners of the site are as follows:

1. 17°04'13.96"N & 74°17'24.80"E; 2. 17°04'21.84"N & 74°17'30.41"E;

3. 17°04'16.06"N & 74°17'35.74"E; 4. 17°04'10.05"N & 74°17'27.95"E

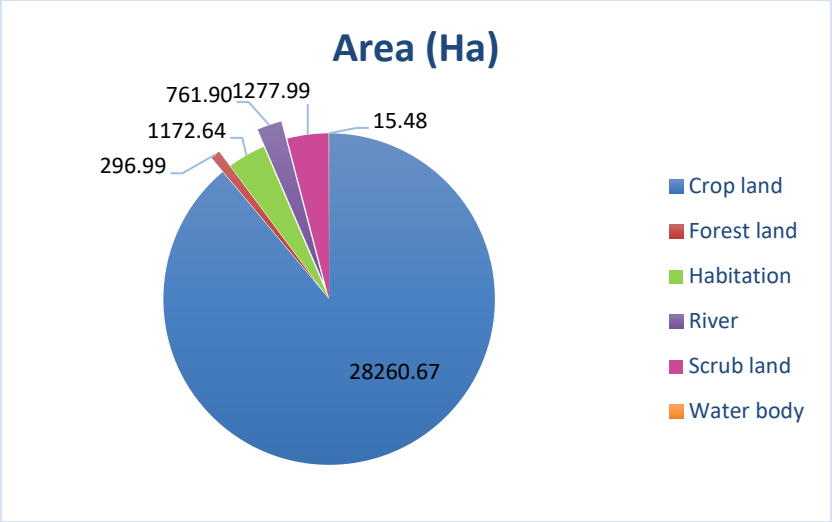

Figure 3: Landuse/ Landcover statistics for the 10 square km area

5.0 IMPACTASSESSMENT

5.1 AirEnvironment

Ambient air quality of the study area was assessed through a network of 8 air monitoring stations, considering the wind pattern for the study area. The observed 24-hour. Methods used for AAQ analysis:$PM_{2.5}$ & PM_{10}: USEPA, NOx: IS- 5182 (Part vi) 2006, SO_2: IS- 5182 (Part ii) 2001. The values for PM10, PM2.5, SO2, NOx and CO for all monitored locations were well within National Ambient Air Quality (NAAQ) Standard limits.

5.1.1 Impact causing factors

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

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. 3,495 dumpers will be required to bring the estimated coal from market to the site. Coal transportation will also have to carried out in bulk. Hence, this could cause minor increase mainly in NOx, particulate matter and HC.

Fugitive Emissions and Other sources of air pollution: Fugitive emissions from handling and storage of coal and ash; transportation activities and odour area so 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

- Provision of asphalted or RCC roads inside the premises
- Approach road is already available up to state highway SH150 and national highway NH48
- Provision of additional parking for goods vehicles to accommodate the increase after expansion
- Engage authorized transport agency for goods transport on the term to use well maintained vehicles for all transportation activities
- While bulk transportation of raw material/finished product, manage the vehicles in such a way that waiting period for vehicles will be minimum. This will help in reducing the risks of traffic congestion, and over all air pollution.
- Provision of separate entrance and exit lanes/gates for vehicles
- Strict prohibition on washing and maintenance of vehicles on site or in parking area
- All roads with street light and proper signage at strategic locations
- Main gate/s with 24x7 security arrangements

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.

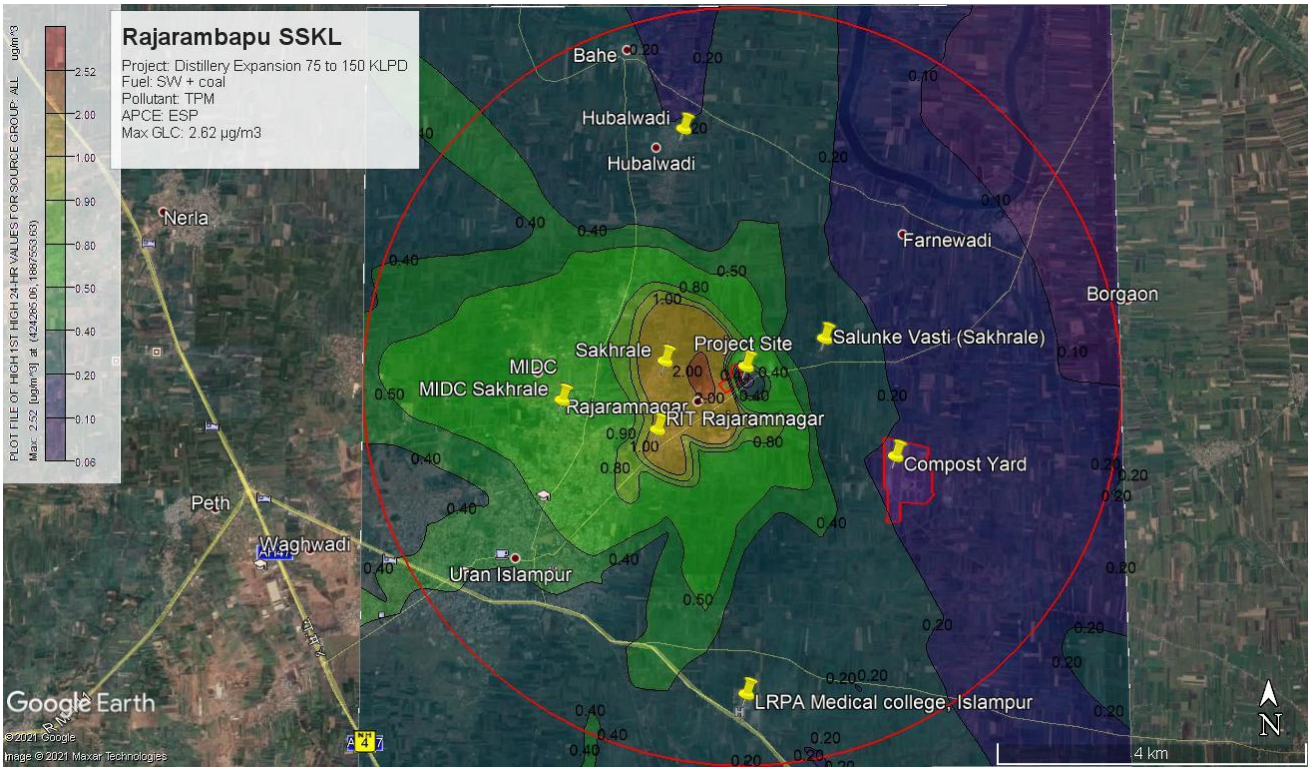

Figure 4: Short term 24 hourly GLCs of PM

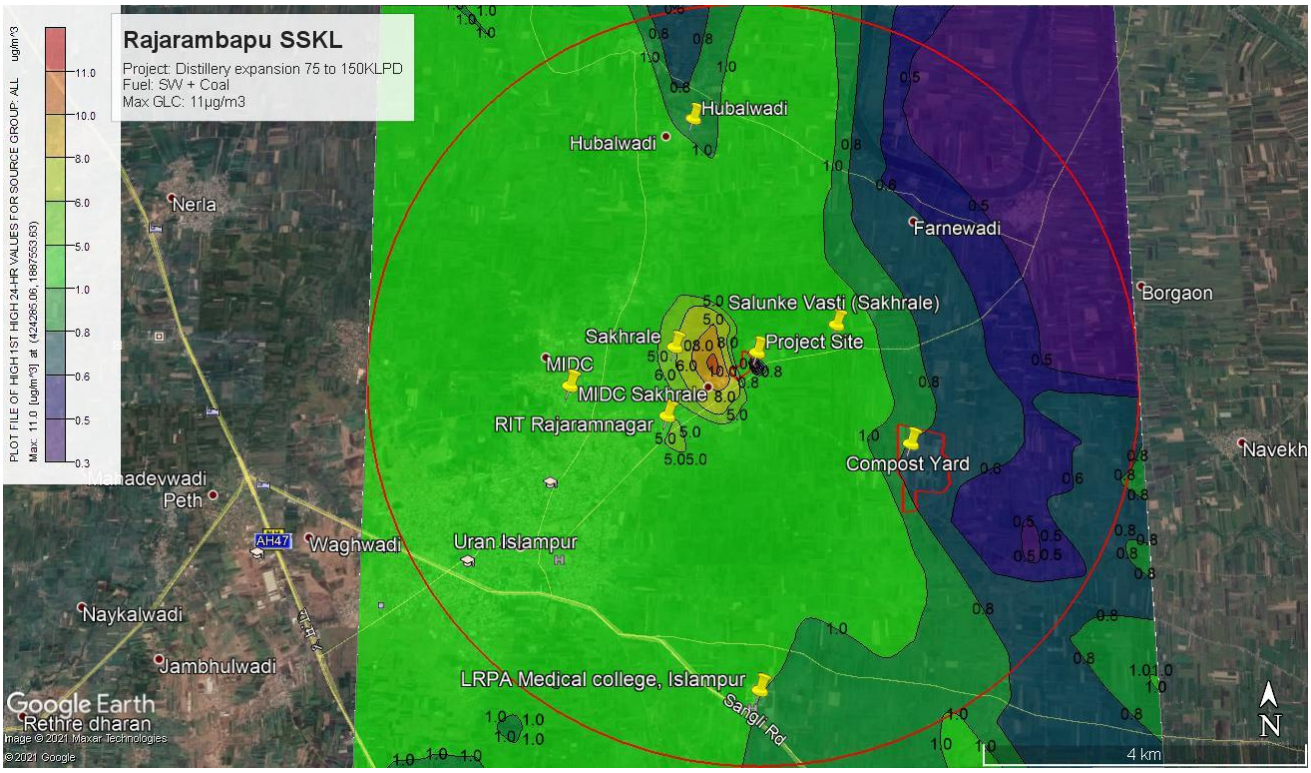

Figure 5: Short term 24 hourly GLCs of SO2

- **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 SOx mainly towards south-west

The maximum incremental load of all these pollutants will be at a distance of ~0.5 km towards west and, where increase of 2.52μg/m3 for PM and 11μg/m3 for SOx could be observed. This area is predominantly occupied by agricultural vegetation

The resultant GLC values indicate that after operation of boilers at above stated capacity and fuel consumption, will be within the prescribed National Ambient Air Quality Standards (NAAQS) for residential & rural areas.

Table 6: Summary of Maximum 24-hour GLC due to proposed project

Description	**Concentration μg/m^3**	
	PM	**SO_2**
Maximum rise in GLC	2.52	11
Direction of Occurrence and distance	W @ 0.5 km	W @ 0.5km
Coordinates of maximum GLC	17^0 04′ 16″ N 74^0 17′ 18″ E	17^0 04′ 16″ N 74^0 17′ 18″ E
Baseline Concentration(average) reported nearby GLC (at Village Sakharale ~1km SW)	73.52	22.24
Total Concentration (Post project scenario) at village Sakharale	74.52	26.24
NAAQS	100	80
*The distance is measured from stack to the maximum GLC		

5.2 Water Environment

5.2.1 Impact causing factors: The impact of a distillery project on water environment is crucial from two aspects viz. the consumption of water in process and the generation of wastewater.

5.2.2 Impact Assessment: Water scarcity or shortage anticipated for other users from the region 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. 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 nay of the nearest natural waterbodies. In such circumstances, the water quality will deplete drastically due to acidic nature of spent wash; its dark brown colour and odour will make the water unfit for all sorts of usage, depletion of DO will make the water unfit for most aquatic life.

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

- **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.

- **Solid waste**

Table 7: Solid Waste and its Management

#	Waste	Quantity TPA	Disposal
1	Yeast sludge (dry)	25-30	Mixed into soil due to organic nature
2	Ash – total (considering coal and spentwash)	22620	Sold to brick manufacturing units
3	Distillery CPU Sludge	150-170	Mixed into soil due to organic nature
4	Spent oil from DG	2-5 KL	Spent oil is burnt in boiler

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 proposedunit.

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. Ash is estimated to be about 22,620 TPA during seasonal operation. 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 bricksmanufacturer.

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 west at approx. 500 m (0.5 km) from the stack. The maximum incremental load at this point will be for particulate matter (PM) 2.52 µg/m^3 and 11 µg/m^3 for SO_2. Agricultural vegetation is observed at this distance. 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 tofollowing.

Due to construction on the present open areas, land- foraging ground may get lost permanentlyfor some of the birds, insects and reptiles; also this activity may cause negative impact on soil micro- fauna

In addition, the transmission lines may cause minor negative impact on soil and avian-fauna. Beneficial Impact is anticipated due to followingfactors.

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 ofit.

Solid waste generated in the project will be 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 theproject.

5.4.3 Environmental management plan: ESP as an air pollution control device; stack of 62 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 andinfrastructure.

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

5.5.3 Environment Management Plan: Project is agro-based – therefore, indirectly beneficial to localfarmers; 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 National Highway No. 48 is approx. 8 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, storageyard.

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 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.

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

The layout will take into account the working space & safety requirement of Factory Inspectorate, Govt. of Maharashtra State.

6.2 Plant Lighting

The normal process area lighting will generally compromise of Fluorescent fittings & Mercury vapor fittings. Flameproof light fittings conforming to IS 2148 shall be provided for hazardous areas, particularly in distillation & storage section, while non-flame proof fittings in otherareas.

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 evaporationsystem)

It is possible to recycle of low strength waste generated i.e. process condensate, spentlees 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 8: 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 CO_2 from fermentation, Odour from spent wash storage Handling of coal and ash	• ESP to control ash emission through stack with height 62m • Mechanized system for coal/fuel and ash handling • Fugitive dust control/suppression for coal yard will be done properly • Provision of CO_2 scrubber and botting unit • Wind breaks for ash storage area • Online emission monitoring system will be installed • Development of a 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 - • 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

Environmental Aspect	Impact causing factor	Control/Mitigation Measures
		• Separate tanks for storage of raw and concentrated spentwash. • Tanks will be made impervious as per CREP guidelines • Fresh water requirement will be reduced by recycling of water (treated water), • Rain water harvesting • 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 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

Environmental Aspect	Impact causing factor	Control/Mitigation Measures
		strategic locations within premises • Provision of adequate personal protective equipment 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	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/ felling 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 a 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	• No rehabilitation and restoration issue involved since site is already under the possession of the project proponent • Local candidates will be preferred for employment. Skilled work force is

Environmental Aspect	Impact causing factor	Control/Mitigation Measures
	to population flux	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 • Firefighting 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 as a rework 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 Standard operating procedures (SOP) will be developed as per the manual of respective equipment and machines. These SOP will be strictly implemented to ensure safety, health and environment throughout the premises. 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. 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 like drinking water, 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.

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

Table 9: Financial provision for CER activities planned for next five years

CER activity head	TOTAL
Provision of sanitation facilities in local schools	40
Provision of clean drinking water to schools	28
Training to local youth/skill development	10
TOTAL BUDGETARY ALLOCATION FOR NEXT FIVE YEARS (0.75% of the capital budget = Rs. 78 lakhs)	**78**

Table 10: Estimated Capital & Recurring Expenses for Environment Management

#	Particulars	Amount (Rs. in Lakhs)
Capital Expenses		
1.	Standalone Multiple Effect Evaporator	845.00
2.	Incineration boiler with electrostatic precipitator and dump condenser	3060.00
3.	Fuel handling system	70.00
4.	Ash handling system	90.00
5.	Stack	90.00
6.	Spentwash storage lagoon	100.00
7.	Condensate polishing unit	395.00
8.	RCC storage tank for process condensate and spentlees	25.00
9.	Coal & bagasse yard	50.00
10.	Environmental monitoring and management	80.00
11.	Greenbelt development	50.00
12.	Rainwater harvesting	50.00
TOTAL		**4905.00**
	Additional provision towards CSR/CER (2 % of capital investment)	**78.00**
Recurring Expenses/Annum		
1.	Salaries and wages	25.00
2.	Maintenance (@ 5% on capital investment of Rs. 3920 lakhs) of pollution control devices e.g. ESP, etc.	245.25
3.	Fuel (incineration activity)	1080.00
4.	Miscellaneous	15.00
	TOTAL	**1365.25**

9.0 CONCLUSION

M/s. Rajarambapu Patil Sahakari Sakhar Karkhana Ltd. (RBPSSKL) located at Rajaramnagar, village: Shakharale, Tal. Walwa, Dist. Sangli -414103 (Maharashtra) has decided the expansion of molasses -based distillery unit from 75 to150 KLPD. The project is placed under item 5 (g) - as 'B' category as per EIA Notification, 2006 (as amended June 2019) and will be appraised at state level. Estimated cost of the project is Rs. 10424.09 Lakhs, out of which Rs. 4905.00 lakhs are allocated for environment management.

Geographical coordinates of the site are 17°04'21.72"N & 74°17'30.41"E; 17°04'11.7"N & 74°17'32.45"E; 17°04'11.43"N & 74°17'26.28"E; 17°04'18.18"N & 74°17'34.75"E. National Highway No. 48 is approx. 8 km from the site. Nearest railway station Karad railway station approx. 35 km from the site & Kolhapur is the nearest airport approx. 50 km away from the project site.

The sugar factory has allocated ~138.96 Ha land, for proposed distillery unit and ancillary activities. This includes main unit, incineration boiler, coal storage, evaporation unit (MEE), storage lagoon and green belt development of 20.05 Ha

Production process: Molasses diluted and feed to fermentation tanks where yeast converts the reducing sugars of molasses into alcohol. This alcohol is separated from rest of waste material by the process of distillation. The process produces wastewater in the form of spentwash, spent lees and solid waste in the form of sludge. The distillery unit will be producing, Rectified Spirit (RS =60 KLPD)/Extra neutral alcohol (ENA =60KLPD) Or Ethanol

i.e. AA (60KLPD) which are very significant for other industries, medical services, etc. Ethanol used to blend with petrol, thus able to save valuable foreign exchange on import of fossil fuel.

The factory will be in operation for year around. The raw materials used are molasses 'C' (385 TPD)/ molasses 'B' (487 TPD)/ Sugarcane juice (1875 m^3/Day) Nutrient N, P (200 Kg/d) and Turkey Red Oil (600 Kg/d). The steam requirement for the project is maximum 768 TPD. Coal/bagasse and concentrated spentwash will be used as a fuel for the steam generation activity. The requirement of coal will be (max) 90 TPD or bagasse 156 TPD. The requirement of power for distillery, boiler and ETP will be 2.8 to 3 MW. Therefore, an independent boiler of 32 TPH (tons per hour) of 45 Kg/cm2 (g) pressure. In case of failure of captive power generation,

electricity will be purchased from state electricity board (MSEDCL). The total water in- put for the proposed project will be 2978 m^3/day and will be sourced from Mula dam. Considering recycled water day-to-day fresh water requirement will be 725 m^3/day.

Waste Management: Effluent generated in the form of spent wash will be 800 m^3/day, 1200 m^3/day & 500 m^3/day for C-molasses, B- Heavy molasses and sugarcane syrup respectively. Spentwash will be concentrated by Multi Effect Evaporation (MEE) followed by incineration to achieve Zero Discharge (ZD). Spent lees and condensate will be treated in Condensate Polishing unit (CPU) and treated water will be recycled. The proposed industrial activity could generate solid waste in the form of yeast sludge (25-30 TPA), Ash – total (considering coal and spentwash) 22620 TPA, distillery CPU sludge 150-170 TPA and spent oil from DG 2-5 KL. The ash will be sold to brick manufacturing unit. Hazardous waste is will be the spent oil from DG set – quantity anticipated to be minor due to captive power source. It will be burnt in boiler. The stack height will be 62 m. Bag filter system will be installed as air pollution control equipment. The plant and equipment's will be specified and designed with a view to minimize noise pollution. RBPSSKL is committed to the Health and Safety of all its employees. It strives to provide hygienic & safe work place and continually improve the effectiveness of Health & Safety system.

The basic infrastructure such as roads, electricity, transportation, drinking water supply, health centers and hospitals, school, colleges, sanitation facilities are available in the vicinity. The proposed project is not going to exert any unbearable load on any of these resources. In fact, it will generate employment for the local people there by raising their standard of living. The proposed project will be generating 50 direct employment opportunities. Apart from this, the project anticipated to give indirect opportunities to transporters, shopkeepers and various facility providers such as schools, medical facilities, etc. Full precautions will be taken for pollution control, resource conservation and environmental protection. The unit is agro-based and hence it will promote sustainable development.