EXECUTIVE SUMMARY

PROPOSED DISTILLERY OF CAPACITY 150 KLPD TO PRODUCE RECTIFIED SPIRIT/ EXTRA NEUTRAL ALCOHOL/ ETHANOL BASED ON SUGARCANE JUICE/SYRUP/ "C"/ "B" HEAVY MOLASSES/ GRAINS

AT

GAT NO. 174 & 175, VILLAGE- CHANDAPURI, TAL. MALSHIRAS, DIST. SOLAPUR, MAHARASHTRA,

BY

M/S. MALHAR SAKHAR KARKHANA LIMITED

PROPOSAL FOR

ENVIRONMENT CLEARANCE

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EXECUTIVE SUMMARY

1 INTRODUCTION

M/s Malhar Sakhar Karkhana Ltd. (MSKL), will be a standalone multi feed Distillery ("C"/ "B" Heavy molasses/sugarcane juice/syrup/grains) unit registered under the Company Act 1956. Factory is located at Gat No. 174 & 175, Village Chandapuri, Tal. Malshiras, Dist. Solapur, State- Maharashtra.

The registered office of M/s Malhar Sakhar Karkhana Ltd is located at office no. 1, Ground Floor, Himalaya Bunglow, Near Malshiras Nagar Panchayat, Malshiras, Dist. Solapur, Maharashtra, and Pin-413107 and the project site is located at Gat No. 174 & 175, Village Chandapuri, Tal Malshiras, Dist. Solapur, Maharashtra, Pin-413310.

The proposed project will produce 150 KLPD RS/ ENA/ Ethanol from "C"/ "B" Heavy molasses/sugarcane juice/syrup/grains as a raw material. The industry proposes to establish 3000 TCD sugarcane crushing and utilizing its own sugarcane juice/syrup as a raw material during season. The raw materials required during off season such as "C"/ "B" Heavy molasses/ grains shall be directly taken from molasses traders and grain from the nearby farmers. This will help to maintain socio economy in the region.

The effluent generated from distillery unit shall be treated in CPU and recycled in to process. Distillery effluent (i.e. Spentwash) shall be treated based on Biomethanation followed by Concentration in MEE and burnet into incineration boiler.to achieve Zero Liquid Discharge (ZLD).

The aggregated capital investment for the proposed project is estimated at Rs. **192.35 Crores.**

The promoters have extensively and carefully analyzed the present and future scenario of central Govt. policies for promotion of ethanol addition in the petroleum fuels. They have also studied carefully the present irrigation facilities and surplus cane availability, as well as future potential of irrigation and additional cane availability.

1.1 PROJECT LOCATION

The salient features of the project site are

Table 1.1 Salient features of the project site

Sr. No.	Features	Description
1.	latitude	17º 44' 27.03'' N
2.	Longitude	74º 56'18.71'' E
3.	Elevation above MSL	560 m
4.	Nearest highway	SH-74 (9 Km)
5.	Nearest railway station	Pandharpur (41.2 km)
6.	Nearest air port	Pune (142.9 Km)
7.	Nearest town	Malshiras (13.8 km)
8.	Nearest human settlement	Chandapuri. (2.8 km)
9.	Protected Area	None within 10 km
10	Reserved Forests	None within 10 km

Sr. No.	Features	Description
11	Wildlife Sanctuary	None within 10 km
12	Archeological site	None within 10 km
13	State boundary	None within 10 km
14	Defense installations	None within 10 km
15	Average Rainfall	450 mm

2 PROJECT DESCRIPTION

The details about the maufacturing capacity of the proposed establishment are given in table below

Table 2.1 Proposed Products manufacturing quantities

Sr. no.	Description	Unit	Proposed Capacity
1	**Sugarcane Crushing**	TCD	**3000**
2	**Distillery Unit**	KLPD	**150**
	Rectified Spirit or	KLPD	150
	Extra Neutral Alcohol or		150
	Ethanol		150

2.1 RESOURCE REQUIREMENT AND INFRASTURE FACILITIES

A) Land use Details

The total area available with the factory is **22.57 Hectares** Out of which, **7.45 Hectares will be** utilized for green belt development. A detailed area breakup is given below

Table 2.2 Landuse breakup

Sr. No.	Description	Area in Hectares	% of Area
1	Built Up	1.24	5.49
2	Area Under Road	0.59	2.62
3	Green Belt Area	7.45	33.00
4	Parking Area	2.26	10.00
5	Vacant Area	11.03	48.89
	Total Plot Area	**22.57**	100.00

B) Power requirement

The power requirement for proposed distillery unit will be 4.2 MW and it shall be taken from 5 MW Turbine generator.

C) Water Consumption details

The water required for proposed project shall be taken from Irrigation department.

Sugar Division - The sugar unit works on zero water requirement. Due to excess condensate available from Sugar unit, there shall not be water requirement for sugar unit. . In fact, an excess amount 165 m^3/day is saved and this shall be used for greenbelt development/ Gardening within the factory. Detailed water budget of the Sugar division is shown in **Table 2.3**

Distillery Division – The net fresh water requirement for distillery division shall be 684 KLD (Max of I to IV). Detailed water budget of the industry is shown in **Table 2.4 to Table 2.7**

Domestic Purpose:

Water requirement for domestic purpose is 50 KLD.

Thus, the net fresh water requirement of the industry is **734 KLD** (Industrial 684 KLD, Domestic 50 KLD). The required water is sourced from irrigation department. The necessary permission from the state irrigation department is already obtained.

Water balance calculations:

Sugar division

Table 2.3 Water Budget -Sugar Division

Sr. No.	Details	Water Requirement (m3/day)	Consumption/Losses (m3/day)	Reuse / Recovery (m3/day)	Waste Water Generation
Domestic Purpose					
1	Domestic	50	10	-	40
Industrial Purpose					
1	Process Water	100	15	--	85
2	Washing of equipment	30	--	--	30
3	Air compressors & pumps	40	5	35	
4	Condenser Water			500	All the condenser water shall be treated in proposed CPU and recycled as process water.
5	Spray pond blow-down	500	250	--	250
6	Cooling tower blow-down				
7	Colony fire fighting& Gardening	200	200		
8	Recycling of Excess Condensate			500	
Total		**870**	**470**	**1035**	**365**

Note: Fresh water requirement shall be 50 m3/day, which is for Domestic purpose.

- The consumption/losses and final wastewater generated is amounting (470 + 365) = 835 m3/day
- The excess condensate and condensers water available is 1000m3/day. Thus the excess water available for reuse would be around 1000– 835 = 165 m3/day.

Net Water Requirement:

i) Industrial Purpose: 870 – 1035 = -165 m3/day

Due to excess condensate available from Sugar unit, there shall not be water requirement for sugar unit. . In fact, an excess amount 165 m^3/day is saved and this shall be used for greenbelt development/ Gardening within the factory.

ii) Domestic Purpose: At present water requirement is 50m3/day

Distillery division

I. Based on "C" Molasses

Table 2.4 Water Budget for Distillery Division (based on "C"Molasses)

Sr. No.	Details	Water Requirement (m3/day)	Consumption/ Losses (m3/day)	Reuse / Recovery (m3/day)	Waste Water Generation and treatment		
					Waste water Generation	Wastewater treated in CPU	Wastewater
Domestic Purpose							
1	Domestic	50	10	--	40	--	40
Industrial Purpose							
1.	Boiler 50 TPH	1145	20	1115	10	--	10
2.	DM Plant	**55****	45	--	10	10	
3	Process Water	1500	--	**Evaporator Condensate**	Spentwash - 280 Spentlees – 300	-- 300	280 00
4	Cooling Tower Make-up Water	210	155	--	55	55	00
5	Fermenter Washing	20	--	--	20	20	00
6.	Miscellaneous such as pump and gland cooling etc.	40	--	40	--	-	--
7.	**Evaporator Condensate**	--	--	**920**	--	--	--
8	Condensate Polishing Unit	--	--	385			
Total		**2970**	**220**	**2460**	**675**	**385**	**290**

Note:

1*50 TPH incineration boiler shall be installed for the proposed 150 KLPD distillery.

Remark: 280 m3/day of concentrated spentwash shall be generated after anaerobic digester followed by MEE. (Raw spentwash quantity - 1200)

Solids content in raw spentwash shall be around 12 – 14 % by its weight, and finally it is converted to 60% by its weight after MEE.

Note:

The consumption/losses and final wastewater generated is amounting (220 + 290) = 510 m3/day.

Net Water Requirement: 2970 –2460 = 510m3/day.

Effluent Generation: 675 m3/day out of which spentwash – 280 m3/day, spentlees – 300 m3/day, DM plant wastewater generation-10m3/day, fermenter washing waste-20 m3/day, boiler blow-down wastewater-10m3/day and cooling tower wastewater generation – 55m3/day.

All the effluent except concentrated spentwash and boiler blow-down shall be treated in proposed CPU and treated effluent shall be recycled in process.

Concentrated spentwash shall be burnt into 50 TPH incineration boiler.

II. Based on "B" Heavy Molasses

Table 2.5Water Budget for Distillery Division (based on "B" Heavy Molasses)

Sr. No.	Details	Water Requirement (m3/day)	Consumption/ Losses (m3/day)	Reuse / Recovery (m3/day)	Waste Water Generation and treatment		
					Waste water Generation	Wastewater treated in CPU	Wastewater
Domestic Purpose							
1	Domestic	50	10	--	40	--	40
Industrial Purpose							
1.	Boiler 50 TPH	1145	20	1115	10	--	10
2.	DM Plant	**55****	45	--	10	10	
3	Process Water	1200	--	**Evaporator Condensate**	Spentwash - 150	--	150
					Spentlees – 300	300	00
4	Cooling Tower Make-up Water	210	155	--	55	55	00
5	Fermenter Washing	20	--	--	20	20	00
6.	Miscellaneous such as pump and gland cooling etc.	40	--	40	--	-	--
7.	**Evaporator Condensate**	--	--	**750**	--	--	--
8	Condensate Polishing Unit	--	--	385			
Total		**2670**	**220**	**2290**	**545**	**385**	**160**

Note:

1*50 TPH incineration boiler shall be installed for the proposed 150 KLPD distillery.

Remark: 150 m3/day of concentrated spentwash shall be generated after anaerobic digester followed by MEE. (Raw spentwash quantity - 900)

Solids content in raw spentwash shall be around 8 – 10 % by its weight, and finally it's converted to 60% by its weight after MEE.

Note:

The consumption/losses and final wastewater generated is amounting (220 + 160) = 380 m3/day.

Net Water Requirement: 2670 –2290 = 380 m3/day.

Effluent Generation: 545 m3/day out of which spentwash - 150 m3/day, spentlees – 300 m3/day, DM plant wastewater generation-10m3/day, fermenter washing waste-20 m3/day, boiler blow-down wastewater-10m3/day and cooling tower wastewater generation – 55m3/day.

All the effluent except concentrated spentwash and boiler blow-down shall be treated in proposed CPU and treated effluent shall be recycled in process.

Concentrated spentwash shall be burnt into 50 TPH incineration boiler

III. Based on Sugarcane juice / concentrated sugarcane juice

Table 2.6Water Budget for Distillery Unit (based on Sugarcane juice / concentrated sugarcane juice)

Sr. No.	Details	Water Requirement (m3/day)	Consumption /Losses (m3/day)	Reuse / Recovery (m3/day)	Waste Water Generation and treatment		
					Waste water Generation	Wastewater treated in CPU	Wastewater
Domestic Purpose							
1	Domestic	50	10	--	40	--	40
Industrial Purpose							
1.	Boiler 50 TPH	1145	20	1115	10	--	10
2.	DM Plant	**55****	45	--	10	10	
3	Process Water	1050	--	**Evaporator Condensate**	Spentwash - 100	--	100
					Spentlees – 300	300	00
4	Cooling Tower Make-up Water	210	155	--	55	55	00
5	Fermenter Washing	20	--	--	20	20	00
6.	Miscellaneous such as pump and gland cooling etc.	40	--	40	--	-	--
7.	**Evaporator Condensate**	--	--	**650**	--	--	--
8	Condensate Polishing Unit	--	--	385			
Total		**2520**	**220**	**2190**	**495**	**385**	**110**

Remark: 100 m3/day of concentrated spentwash shall be generated after MEE. (Raw spentwash quantity - 650)

Solids content in raw spentwash shall be around 8 – 10 % by its weight, and finally it's converted to 60% by its weight after MEE

Note:

The consumption/losses and final wastewater generated is amounting (220 + 110) = 330 m3/day.

Net Water Requirement: 2520 –190 =330 m3/day.

Effluent Generation: 495 m3/day out of which spentwash - 100 m3/day, spent lees – 300 m3/day, DM plant wastewater generation-10 m3/day, fermenter washing waste-40 m3/day, boiler blow-down wastewater-10 m3/day and cooling tower wastewater generation – 40 m3/day.

All the effluent except concentrated spentwash shall be treated in proposed CPU and treated effluent shall be recycled in process.

Concentrated spentwash shall be burnt into 50 TPH incineration boiler

IV. Based on Grains

Table 2.7 Water Budget for Distillery Unit (based on Grains)

अ. क्र.	वर्णन	पाण्याची आवशकता (मी^{3} / दिवस)	वापर/नुकसान (मी^{3} / दिवस)	पुन्हा वापर/पुनर्प्राप्ती (मी^{3} / दिवस)	सांडपाण्याचा उगम आणि उपचार		
					सांडपाण्याचा उगम	सीपीयूमध्ये सांडपाण्यावर प्रक्रिया केलेले	सांडपाणी
1	50 टीपीएच बॉयलर	1145	20	1115	10	--	10
2	डी.एम. प्लांट	**55****	45	--	10	10	
3	प्रक्रिया आणि पाणी सौम्य करणे	1240	150	एमईई मध्ये	**865**	**डिकॅन्टर जेथे 160 मे.टन / दिवस ओला केक आणि 705** मी^{3} / दिवस **पातळ उतार एम ई ई वर**	160
					225	**225ते एम ई ई**	--
4	थंड पाणी	150	110	--	40	40	--
5	धुण्याची आवश्यकता	45	--	--	45	45	--
6	**एव्हपोरेटर कंडेन्सट**	--	114	741	75	--	75
7	कंडेनसेट पॉलिशिंग युनिट	--		95	--	--	--
	Total	**2635**	**439**	**1951**	**1270**	**95**	**245**

Remark: Final Waste generation shall be 245m3/day out of which 160 m3/day of wet cake, 10m3/day of boiler blow-down and 75 m3/day of MEE wastewater shall be generated after MEE. (Raw process wastewater quantity – 1090 m3/day).

Note:

The consumption/losses and final wastewater generated is amounting (439 + 245) = 684 m3/day.

Net Water Requirement: 2635 –1951 = 684 m3/day.

Effluent Generation: 1270 m3/day out of which process and dilute wastewater – 1090 m3/day, DM plant wastewater generation-10m3/day, fermenter washing waste-45 m3/day, boiler blow-down wastewater-10 m3/day, MEE wastewater generation-75 and cooling tower wastewater generation – 40m3/day.

All the effluent except concentrated spentwash shall be treated in proposed CPU and treated effluent shall be recycled in process.
Concentrated spentwash shall be treated in 50 TPH incineration boiler.

Table 2.8 Water Requirement and wastewater generation of the factory

<table>
<tr><th>Sr. No.</th><th>Water Requirement m3/day</th><th colspan="2">Wastewater generation m3/day</th></tr>
<tr><td>1.</td><td colspan="3">Sugar Division</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">Zero water requirement for sugar division.
Domestic water requirement is 50</td><td>Sugar effluent</td><td>115</td></tr>
<tr><td>Spray-pond effluent</td><td>250</td></tr>
<tr><td>2.</td><td colspan="3">Distillery Division</td></tr>
<tr><td rowspan="5">A.</td><td colspan="3">Based on “C” Molasses</td></tr>
<tr><td>510</td><td colspan="2">675</td></tr>
<tr><td rowspan="3"></td><td colspan="2">Concentrated spentwash-280</td></tr>
<tr><td>Spentlees</td><td>300</td></tr>
<tr><td>Other dilute effluent</td><td>95</td></tr>
<tr><td></td><td colspan="3">OR</td></tr>
<tr><td rowspan="5">B.</td><td colspan="3">Based on “B” Heavy Molasses</td></tr>
<tr><td>380</td><td colspan="2">545</td></tr>
<tr><td rowspan="3"></td><td colspan="2">Concentrated spentwash-150</td></tr>
<tr><td>Spentlees</td><td>300</td></tr>
<tr><td>Other dilute effluent</td><td>95</td></tr>
<tr><td></td><td colspan="3">OR</td></tr>
<tr><td rowspan="5">C.</td><td colspan="3">Based on “Sugarcane Juice/Syrup”</td></tr>
<tr><td>330</td><td colspan="2">495</td></tr>
<tr><td rowspan="3"></td><td colspan="2">Concentrated spentwash-100</td></tr>
<tr><td>Spentlees</td><td>300</td></tr>
<tr><td>Other dilute effluent</td><td>95</td></tr>
<tr><td></td><td colspan="3">OR</td></tr>
<tr><td rowspan="4">D.</td><td colspan="3">Based on “Grains”</td></tr>
<tr><td>684</td><td colspan="2">1270</td></tr>
<tr><td rowspan="2"></td><td>Process and diluted wastewater</td><td>1090</td></tr>
<tr><td>Other diluted effluent</td><td>180</td></tr>
<tr><td colspan="4">Note:
A. Other diluted effluent consist of DM plant wastewater, fermenter washing waste, boiler blow-down wastewater and cooling tower wastewater generation.
B. Spentwash StoragePonds:
1. - Concentrated Spentwash (280 m3/day) - 30 days storage capacity i. e. 280*30 = 8400 m3.
2. – Raw Spentwash (1200m3/day) – 7 days storage capacity i.e. 1200*7 = 8400 m3.</td></tr>
</table>

D) Air Emission Management

Bagasse will be used as fuel for 1*50 TPH Incineration boiler. The bagasse requirement of the proposed unit will be 480 MT/D. Coal will be used at a rate of 224 MT/D in case of shortage of bagasse.

A stack of 60 meters height and electrostatic precipitator (ESP) as APC equipment shall be provided to control air emissions.

Table 2.9 Details of boilers and its APC equipment for existing as well as proposed

Sr. No.	Stack attached to		Types of Fuel	Height in meter	APC System
Proposed Installation					
1	50 TPH incineration boiler	Distillery Division	Bagasse/Coal	60	ESP

E) Solid waste Management

a) Non Hazardous solid wastes details

Table 2.10 Details of non-hazardous waste generated and its disposal

Sr. No.	Description of waste	Quantity	Mode of Collection and Disposal
	Bagasse as fuel for boiler		
1.	Fly/ Boiler Ash	172.8 MT/M	Ash generated shall be sold to to brick manufacturer/ Mixed with pressmud and sold as manure
2	Bottom Ash	43.2 MT/M	
Coal as fuel for boiler			
	Fly/ Boiler Ash	806.4 MT/M	Ash generated shall be sold to to brick manufacturer/ Mixed with pressmud and sold as manure
	Bottom Ash	201.6 MT/M	
3.	ETP Sludge	300 MT/A	ETP Sludge and Pressmud shall be sold as manure.
4.	Pressmud	120 MT/D	
Other Solid Wastes			
1.	Paper waste	0.01 MT/M	Manually collected and stored in a designated area and sold to scrap vendors
2.	Plastic waste	0.01 MT/M	
3.	Municipal Solid waste		
	Non-Biodegradable	7 MT/M	Manually collected and sold to scrap vendors
	Bio-degradable	10 MT/M	Used as manure.

b. Hazardous Waste

Table 2.11 hazardous waste generated and its disposal

Sr. No.	Category	Description of waste	Quantity	Mode of Collection and Disposal
1.	5.1	Used Oil	1.01 KL/A	Shall be collected in Leak Proof Containers and utilized as lubricant for bullock carts

3 BASELINE ENVIRONMENTAL STATUS

3.1 AIR ENVIRONMENT

Ambient air monitoring was carried out at 8 locations, 24 hours a day, twice a week at each location over/for a period of three months (March 2021 to May 2021) to determine background concentrations. The Maximum concentrations of each pollutant observed are considered as a background concentration of the respective location, the summary of the results is given below.

1. Particulate Matter (PM_{10})

The maximum, minimum, average and 98th percentile concentrations for PM_{10} were recorded in the study area in the range of 40.5 to 55.9 µg/ m^3. The maximum 98th Percentile concentration is 55.39/ m^3 were recorded at Khudus (location -1). The concentrations of PM_{10} are well below the CPCB standard of 100µg/ m^3.

2.Particulate Matter (PM2.5)

The maximum, minimum, average and 98th percentile concentrations for Particulate Matter ($PM_{2.5}$) monitored in the study area were 18.9– 28.9µg/m^3. Highest 98th percentile value is 27.61 µg/m^3 which was observed at Village Nimgaon (Location-2). The concentration of $PM_{2.5}$ is well below the prescribed limit of 60µg/m^3.

3. Sulfur Dioxide (SO_2)

The Minimum, maximum, average and 98th percentile value of Sulphur dioxide in the study area from the monitored data was in the range of 10.3 – 16.9 µg/ m^3. Maximum 98th Percentile value of Sulfur dioxide is 16.72 µg/ m^3obtained at Khudus (Location-1). The concentration of SO_2 is well below the prescribed limit of 80µg/m3.

4.Oxides of Nitrogen (NOx)

The Minimum, maximum, average and 98th percentile value of Oxides of Nitrogen (NOx) in the study area from the monitored data was in the range of 14.6– 20.6 µg/ m^3. Maximum 98th Percentile value of Oxides of Nitrogen (NOx) is 20.51 µg/ m^3obtained at Nimgaon (Location-2). The concentration of NOx is well below the prescribed limit of 80µg/m^3.

5. Carbon Monoxide (CO)

The Minimum, maximum, average and 98th percentile value of Carbon Monoxide (CO) in the study area from the monitored data was in the range of 0.01 – 0.09 mg/ m^3. Maximum 98th Percentile value of Carbon Monoxide (CO) is 0.09 µg/ m^3 .The concentration of CO is well below the prescribed limit of 4.0 mg/m^3.

The ambient air quality monitoring results indicates that the overall air quality in the study area is within permissible standards prescribed by NAAQ Standards.

3.1.1 IMPACT ON AIR QUALITY DUE TO PROPOSED ACTIVITY

1*50 TPH incineration boiler for distillery division shall be installed. Considered the boiler working at full load conditions to estimate the GLC of PM_{10}, $PM_{2.5}$, SO_2 and NO_x due to the establishment of the industry under the prevailing conditions of meteorology and emission data set, air quality modeling is performed for Malhar Sakhar Karkhana Ltd., Chandapuri, Tal Malshiras, Dist Solapur. Incremental concentrations are worked out for 8 receptor locations, at which ambient air quality monitoring was carried out. Total concentrations are computed considering background (Ambient Air Monitoring) concentrations and incremental concentrations (AERMOD) due to the proposed establishment. Results are compared with the Ambient Air Quality Standards (AAQS).

Table 3.1 Stack Inventory

Sr. No.	Particulars	Description	
A. Point Source (Stack attached to boiler)			
1	Stack attached to	Distillery boiler	
2	Capacity	50 TPH	
3	Fuel type	Bagasse	
4	Total fuel quantity requirement	Bagasse -480 MT/day	Coal-224 MT/day
5	Stack height	60 m.	
6	Stack diameter	4.0 m.	
7	Flue gas temp.	120^0 - 135^0C	
8	Flue gas velocity	7.5 – 11.0 m/s	
9	Controlling equipment	ESP – 99% removal efficiency	
10	Emission rate	(g/sec)	
	i. TPM	0.67	
Based on Observed Conc. & Fuel			
	ii. NOx	based on observed concentrations - 6.91	
	iii. SO_2	based on observed concentrations - 6.48	
		based on fuel characteristics - Bagasse – 2.3148	
		based on fuel characteristics-Coal-31.11	
11	Ash content	7.2 MT/day	
12	Ash below grate	1.44 MT/day (20 % of the total ash)	
13	Remaining Ash	5.76 MT/day (80 % of the total ash)	
14	Ash going to stack, QPM (with ESP removal efficiency of 99%)	0.0576 MT/day (Consider 99% ESP Efficiency)	
15	Ambient temperature	30^0C	
B. Line Source (Vehicular emission)			
	Average time of movement of vehicle inside the premises	5 min	
	Distance travelled by the vehicles inside premises	0.2 km	
	Q_{PM} (g/sec)	0.1047	
	Q_{NOx} (g/sec)	1.1367	
	Q_{CO} (g/sec)	0.5967	

3.1.1.1 Results of the AERMOD software for air quality predictions for proposed establishment of the factory

The AERMOD software was developed by US-EPA and American Meteorological Society (AMS) to compute dispersion of air pollutants in the ambient air due to the various sources. In this study, emissions from proposed stack are coupled with the subsequent meteorological data by using AERMOD 8.0.5 air quality model. Also, dispersion patterns are studied by the output of concentration isopleths plotted by the software. Incremental concentration values for selected receptors are added in the background concentration values.

From the results, it can say that,

- At the selected 8 receptor locations, surrounded in 10 km radius around Malhar Sakhar Karkhana Ltd., Chandapuri, Tal Malshiras, Dist Solapur, GLCs are well within the limits of AAQS.
- Under the working conditions of 1*50 TPH boilers, PM_{10} GLCs at all the 8 receptor locations are in the range of **48.17 µg/m^3** to **55.96 µg/m^3** which are within the limits of AAQS.
- For $PM_{2.5}$, GLCs are in the range of **24.94 µg/m^3** to **29 µg/m^3** which is within the limits of AAQS.
- For SO_2, GLCs are in the range of **14.53 µg/m^3** to **17.8 µg/m^3** which is within the limits of AAQS.
- NO_x GLCs are in the range of **19.29 µg/ m^3** to **21.5 µg/ m^3** which is within the limits of AAQS.

It can be inferred that there shall not be any adverse effect on Ambient Air Quality due to the proposed establishment project.

3.2 WATER ENVIRONMENT

Water sampling and subsequent analysis was carried out to determine both the groundwater and surface water quality of the study area. Ground water & Surface water samples were collected at 8 locations & 3 locations respectively within study area. These samples were analyzed for physical and chemical parameters to ascertain the Baseline status in the existing surface water and ground water bodies.

Table 3.2 Water Analysis Results

Sr. No	Parameters	Ground water		Surface water	
		Min	Max	Min	Max
1.	pH	6.57	7.7	6.84	7.60
2.	Dissolved Solids (mg/l)	462	676	520	569
3.	Total Hardness (mg/l)	294	585	242	582
4.	Chlorides (mg/l)	50	194	74.94	152.40
5.	Fluoride (mg/l)	0.25	0.63	0.42	0.53
6.	Sulphates (mg/l)	27	43	23	39

Ground water and surface water samples were collected and analyzed as per the Standard methods and the water quality of the study area is found within the permissible limits of IS: 10500- 2012. Except Fluoride concentrations observed are lower than the required concentration.

Groundwater quality is found to be good, which can be directly used for irrigation purpose. However, ground water used for drinking purpose after the appropriate treatment.

Surface water quality is found to be good, which can be directly used for irrigation purpose. However, for drinking purpose, conventional treatment suggested.

3.3 SOIL ENVIRONMENT

The soil monitoring was carried out at 8 locations in the study area, and analyzed for chemical and physical characteristics; the summary of the results is as under

- The finding of the study reveals that pH of soil in the area ranged between **7.10** to **7.50** which is an indicative of the **neutral** to **slightly alkaline** soil.
- The values for Nitrogen at all locations varied between **214.6** to **371.54 mg/kg.** Maximum concentration of nitrogen was observed at location S-4, while the lowest concentration can be observed at location S-3.
- It is important to note that the concentration of potassium was found to be high at all locations ranging between **92.65** to **204.31 mg/kg.**

Based on the above findings it can be concluded that the soil samples can be classified as per soil classification given by Tondon H.L.S. (2005). The samples fall under **medium to high** fertile soils.

3.4 NOISE ENVIRONMENT

In order to assess the noise levels in the study area, monitoring was carried out at eight different locations within 10 km radius of the study area.

Daytime Noise Levels $(Leq)_{day}$

Residential Zone: The daytime noise levels in all the locations were observed to be in the range of 45.9 dB (A) to 52.3 dB (A), which is well below the permissible limit of 55 dB (A).

Night time Noise Levels $(Leq)_{night}$

Residential Zone: The night time noise levels in all the residential locations were observed to be in the range of 39.8 dB (A) –44.9 dB (A), which is well below the permissible limit of 45 dB (A).

The industry is making all efforts to control the noise levels within the limits by providing acoustic measures and silencer pads etc. all the employees in these work places shall be provided with ear plugs / muffs for the proposed establishment

3.5 LAND USE/LAND COVER OF THE STUDY AREA

Table 3.3 Change in General Land use/ Land cover of Study Area (2008 to 2019)

Landuse	Area in km2		% of Study Area	
	2008	2019	2008	2019
Agriculture land	87.58	110.17	21.90	27.55
Barren Land	242.98	211.29	60.75	52.83
Open Scrub	32.11	16.95	8.03	4.24
Settlement	21.86	35.81	5.47	8.95
Water Bodies	15.4	25.72	3.85	6.43
Total	**399.93**	**399.94**	**100.00**	**100.00**

- In the year 2008 Water body area is about 15.4 km^2, whereas in the year 2019 is increased and it is 25.72 km^2.
- It can be inferred that there is an increase in 46.85 % of land under settlement, water bodies and agricultural land whereas a decrease in area under Scrub and Barren Land is 46.85%.
- Increase in settlement due to an increase in industrial growth and migration of the people.
- Increase in agricultural land due to improved irrigation facilities like drip/trickle irrigation instead of surface

3.6 ECOLOGY AND BIODIVERSITY

- The existing biodiversity in the study area was observed to be very low mainly due to the semi-rural and agrarian setting of the location. The project doesn't involve any clearance of trees as the project is establishment facility and well connected to major and minor roads.
- Shannon Weiner Diversity Index of the buffer zone was 0.656 for herbs while in core zone was 0.662.
- All waste management practices should be identified and implemented right from the construction phase of the project and should be up-graded during the operational phase. The up gradation should be periodic and in match with improving technologies.
- A robust forestation and biodiversity plan should be formulated and practiced with a continuous check on its efficacy.
- The project activities should be carried out only after considering all possible secondary and tertiary impacts on the environment and mitigation measures should be incorporated such as to reduce any possibility of impact on the existing environment.

3.7 DEMOGRAPHIC OR SOCIO-ECONOMIC PROFILE

The project has a positive response from the public. The willingness to pay and the willingness to accept the project has positive an outcome. The ratio between this is around 1:10. It means the benefits are ten times greater than the loss. The losses due to the polluting agents are proposed to be diluted through various methods. The wastes and the pollutions can be reducing with some measures as suggested in the report. The social and cultural vulnerability index responds a very less and level of resilience is at the higher side. The sustained high growth rates and poverty reduction, however, can be realized only when the sources of

growth are expanding, and an increasing share of the labour force is included in the growth process in an efficient way. From a static point of view, growth associated with progressive distributional changes will have a greater impact in reducing poverty than growth which leaves distribution unchanged. This is in fact expresses the inclusive growth of the region.

4 IDENTIFICATION, PREDICTION AND MITIGATION MEASURES

Approx. 60 nos. of labours shall be employed during installation phase for the project which includes installing new machinery and units of the plant.

Table 4.1 Anticipated environment impacts its effect and mitigation measures during construction phase

Sr. No.	Impacts	Effects	Mitigation Measures
1	Dust	Respiratory diseases	All the internal Roads are tar felted Dust separation sprinkling water, use machinery meeting
2	Noise	Impairing, Hearing, Fatigue related Health issues	Provide acoustic measures and silencer pads to reduce noise level. Provide personal protective equipment to the workers.
3	Land	Reduction of vacant land	Utilize the existing infrastructures and adopt vertical expansion and maximize the operation schedules.
4	Top soil	Loss of fertility	Utilize for Green belt development.
5	Water	Additional water is required for construction activities and Drinking	Minimize the water requirements by adopting mechanical mixing and Drinking water in Bottles instead of Taps.
6	Wastewater	Improper disposal of waste water leads to contamination of water sources and soil	Domestic wastewater shall be treated based on Root zone technology and treated wastewater shall be used for gardening.

Anticipated environment impacts its effect and mitigation measures during operational phase is given in chapter 4.

5 ANALYSIS OF ALTERNATIVE (TECHNOLOGY AND SITE)

M/s Malhar Sakhar Karkhana Ltd. (MSKL), will be a standalone multi feed Distillery ("C" / "B" Heavy molasses/sugarcane juice/syrup/grains) unit registered under the Company Act 1956. Factory is located at Gat No. 174 & 175, Village Chandapuri, Tal. Malshiras, Dist. Solapur, State- Maharashtra.

The registered office of M/s Malhar Sakhar Karkhana Ltd is located at office no. 1, Ground Floor, Himalay Bunglow, Near Malshiras Nagar Panchayat, Mashiras, Dist. Solapur, Maharashtra, and Pin-413107 and the project site is located at Gat No. 174 & 175, Village Chandapuri, Tal Malshiras, Dist. Solapur, Maharashtra, Pin -413310.

The proposed project will produce 150 KLPD RS/ ENA/ Ethanol from "C"/"B" Heavy molasses/sugarcane juice/syrup/grains as a raw material. The raw materials are directly taken from sugar factories or molasses traders and grain from the nearby farmers. This will help to maintain socio economy in the region.

The Project Site is conveniently located for development of the Project.

- Chandapuri village at a distance of 2.8 km
- Malshiras, at a distance of 13.81 km
- Akluj at a distance of 17.96 km
- Pandharpur is nearest Railway station 41.72 km away from factory site.
- Pune International airport is nearest Airport 142.90 Km away from factory site.

➢ Environmental Setting-

- Location –17^{o} 44' 27.03'' N and 74^{o} 56'18.71''E
- Nearest State Highway – SH-74 – 9 Km
- There is no any river flowing near to the factory site
- Seismicity – Seismic Zone as per IS:1893 (Part-I):2002

The industry has sufficient land for proposed establishment. The minimum quantity of water is required, which can be obtained from the irrigation department.There are no negative impacts due the proposed establishment. Thus, the existing site is suitable for the porposed establishment.

6 ENVIRONMENT MONITORING PROGRAMME

Table 6.1 Environment management programme

SR.NO	ITEM	PARAMETERS	FREQUENCY OF MONITORING	LOCATION
1.	Ambient Air quality at appropriate location for PM_{10}, $PM_{2.5}$, SO_2,andNO_x,	PM_{10}, $PM_{2.5}$, SO_2,andNO_x	24 hourly, Quarterly	5 Locations 1 @ Upwind and 2@ downwind directions from stack @ 120^0 to each other Near entry and exit gates
2.	Stationary Emission from Stack PM, SO_2, NOx	PM, SO_2, NOx	Monthly	1 DG set Stack, 2 Boiler Stack
3.	Water	Water quality parameters as per 10500:2012	Monthly	Drinking water locations
	Waste water quality (treated and Untreated)	pH, BOD, COD, TSS, Flow, TDS etc.	Monthly	ETP inlet and Outlet
4.	Noise	Day and Night levels Equivalent noise level- dB (A)	Quarterly or as often as required	6 Locations Upwind and downwind directions Near boilers and near main gate and ETP.
5.	Soil (Qualitative and quantitative testing/analysis to check the soil fertility,)	pH, Cation Exchange Capacity, Total Nitrogen, Phosphorous, Potassium, moisture, Permeability, Conductivity, Texture & structure, Organic carbon	Quarterly or as often as required	1 near Greenbelt 1 near ETP Composite sample shall be taken at each location
6.	Solid waste generation monitoring / Record Keeping	Manual record keeping	To be updated daily	
7	Greenbelt and plantation monitoring	Type of species shall be decided based on soil & climatic conditions. The number of trees would be 1500 per hectare, however; the number of trees would	Six Monthly	

SR.NO	ITEM	PARAMETERS	FREQUENCY OF MONITORING	LOCATION
		vary depending on the typeof soil		
8	Carbon and Water foot Print Monitoring	Maintain the data of raw materials consumption, steam consumption, vehicle frequency for transport of raw materials, effluent generation, air emissions, hazardous waste generation, and raw material recovery	Daily and Monthly	

7 ADDITIONAL STUDIES

7.1 RISK ASSESSMENT

HAZOP and Quantitative Risk Assessment studies are carried out for each product, disasters management plan, onsite and offsite emergency plan are prepared and given in Chapter 7 of the EIA Report

Consequence analysis of ethanol due to storage facility

Scenario of Ethanol in different forms

SITE DATA:

Location: M/S MALHAR SAKHAR KARKHANA, INDIA

Building Air Exchanges Per Hour: 0.40 (unsheltered single storied)

Time: August 1, 2021 1200 hours ST (using computer's clock)

CHEMICAL DATA:

Chemical Name: ETHANOL

CAS Number: 64-17-5 Molecular Weight: 46.07 g/mol

ERPG-1: 1800 ppm ERPG-2: 3300 ppm ERPG-3: N/A

IDLH: 3300 ppm LEL: 33000 ppm UEL: 190000 ppm

Ambient Boiling Point: 76.6° C

Vapor Pressure at Ambient Temperature: 0.088 atm

Ambient Saturation Concentration: 93,798 ppm or 9.38%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 2.78 knots from 178° true at 3 meters

Ground Roughness: open country Cloud Cover: 5 tenths

Air Temperature: 27° C Stability Class: B

No Inversion Height Relative Humidity: 50%

Type of Tank Failure: BLEVE tank explodes and chemical burns in a fireball

Potential hazards from BLEVE:

- Thermal radiation from fireball and pool fire
- Hazards fragments and blast force from explosion
- Downwind toxic effects of fire byproducts

BLEVE/Fire ball Scenario: The higher the internal tank pressure/temperature at the time of tank failure, the larger the fire ball. Any liquid not consumed by the fire ball will form a pool fire.

SOURCE STRENGTH:

BLEVE of flammable liquid in vertical cylindrical tank

Tank Diameter: 20 meters Tank Length: 21.5 meters

Tank Volume: 6750 cubic meters

Tank contains liquid

Internal Storage Temperature: 27° C

Chemical Mass in Tank: 4,376 tons Tank is 75% full

Percentage of Tank Mass in Fireball: 100%

Fireball Diameter: 918 meters Burn Duration: 40 seconds

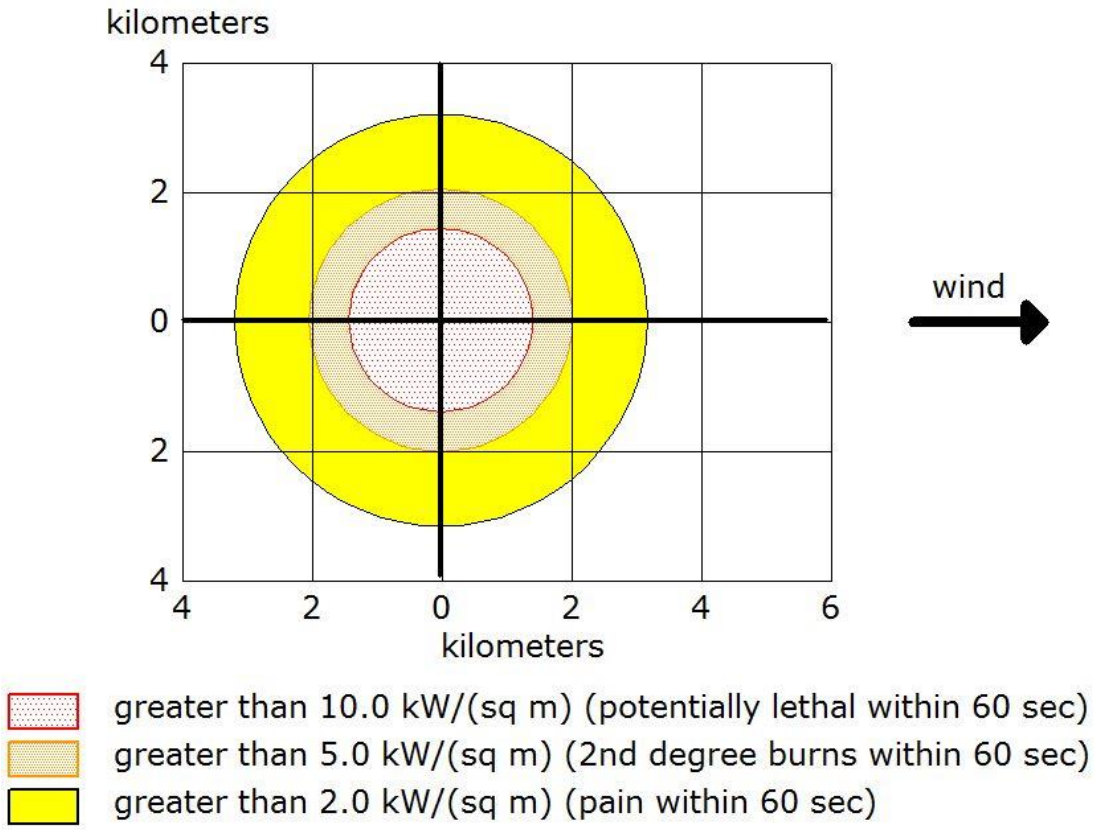
THREAT ZONE:

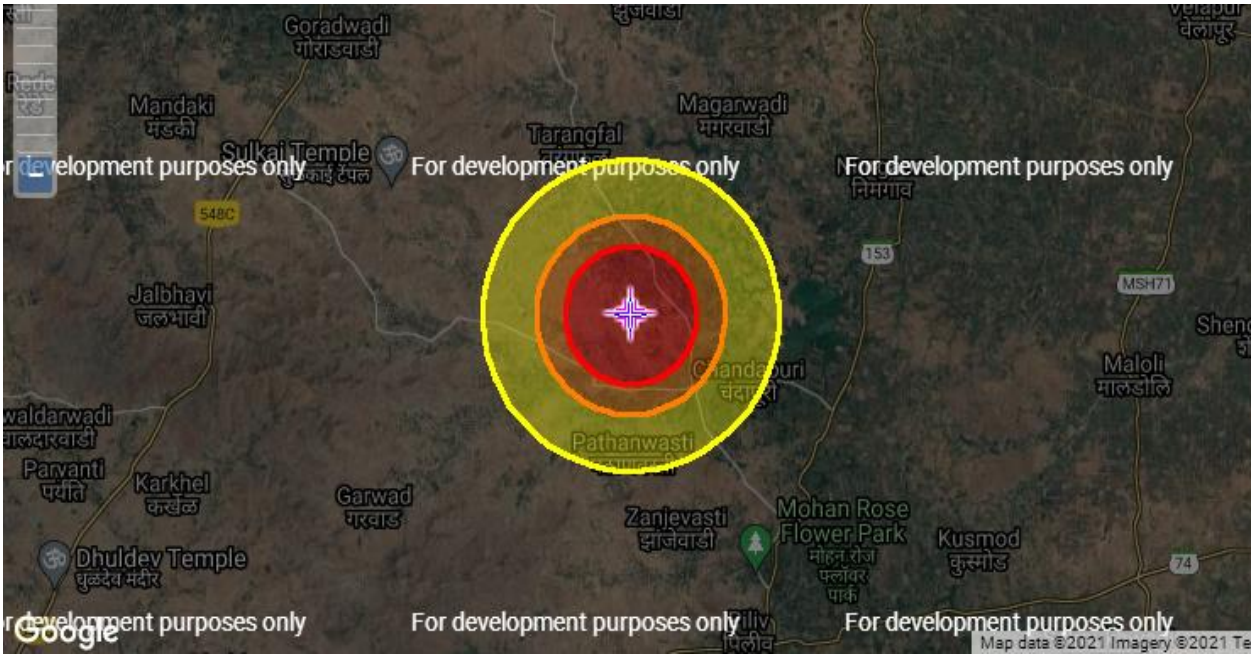
Threat Modeled: Thermal radiation from fireball

Red : 1.4 km --- (10.0 kW/(sq m) = potentially lethal within 60 sec)

Orange: 2.0 km --- (5.0 kW/(sq m) = 2nd degree burns within 60 sec)

Yellow: 3.2 km --- (2.0 kW/(sq m) = pain within 60 sec)





Conclusions

When tank explodes and ethanol in a fireball due to BLEVE;

The thermal radiation for the Ethanol tank confined to the maximum at 1.4 km that means the thermal radiation intensity of 10kW/m^2 is potentially lethal within 60 seconds. Similarly, the other threat zone of 5.0 kW/m^2 causes 2nd degree burns within 60 seconds at 2 km and the rest is 2.0 kW/m^2 subjected to within the unit at 3.2 km, which causes pain within 60 seconds.

Project proponent will implement all preventive measures to tackle all type of emergencies arising out of operation or malfunction of individual unit's. The required resources for Onsite and Offsite emergency management plan will be properly planned and provided to implement the plan effectively. The factory shall give highest priority towards Health and safety of the employees and people residing nearby areas. Management shall conduct the training to the nearby villagers to appraise them about their role during emergency. All nearby people shall be given training on do's and don'ts during emergency situation.
Distillery Industry (Ethanol Plant) is associated with potential hazards to the employee and environment**.** As the hazards involved during operation and production activities will be known to the Management, all required mitigation measures shall be implemented in time to avoid the emergency situation from the arising. Unfortunately, if there is any emergency onsite of offsite, it will be tackled effectively due to availability of required resources at the site. Similarly, all the concern staff and members of the Teams shall be trained appropriately to tackle the emergencies in the plant. By knowing the type of emergency situation that may arise during operation of the plant, appropriate control measures will be implemented to reduce the gravity of the emergencies. Similarly, to avoid the emergency situation, all required mitigation measures will be implemented as recommended.

8 BUDGETARY PROVISIONS TOWARDS ENVIRONMENTAL MANAGEMENT PLAN:

The costs involved in environmental monitoring and management to mitigate the adverse effects will be put on account for the proposed project. The capital cost for the EMP will be Rs. 4080 Lakhs. And recurring cost will be Rs. 305 Lakhs. The detailed EMP budget is given in table below

Table 8.1EMP Budget

SR. NO.	COMPONENT	PARTICULARS		CAPITAL INVESTMENT (IN LAKHS)	RECURRING INVESTMENT (IN LAKHS)
1.	Air	Construction of new stack, incineration boiler and ESP		3000	150
2.	Water	• Establishment of Sugar ETP • Distillery CPU • Anaerobic Digester, MEE for Distillery Spentwash treatment		1000	100
3.	Noise	Acoustic enclosures, Silencer pads, ear plugs etc.		20	5
4.	Environment monitoring and Management	Quarterly Environment Monitoring (Per Year)		--	20
		Ambient air monitoring	PM_{10}, $PM_{2.5}$, SO_2, NOx		
		Boiler & DG Set Monitoring	TPM, SO_2, NOx		
		Effluent (Treated &Untreated)	pH, COD, BOD, TSS, TDS, Oil & Grease		
5.	Occupational Health	Gloves, Breathing Masks, Gloves, Boots, Helmets, Ear Plugs etc. & annual health-medical checkup of workers, Occupational Health (training, OH center)		15	5
6.	Greenbelt	Green belt development activity		10	
		Maintenance of green belt		--	5
7.	Solid Waste Management	Solid Waste Management		20	10
8.	Rain water harvesting	Rain water harvesting		15	5
9.	Carbon and Water Foot Print	Maintain the data of raw materials consumption, steam consumption, vehicle frequency for transport of raw materials, effluent generation, air		--	5

SR. NO.	COMPONENT	PARTICULARS	CAPITAL INVESTMENT (IN LAKHS)	RECURRING INVESTMENT (IN LAKHS)
		emissions, hazardous waste generation, and raw material recovery		
		TOTAL COST (INR, LAKHS)	**4080**	**305**

9 CORPORATE ENVIRONMENT RESPONSIBILITY PLAN

The capital cost of the proposed establishment project is Rs. 192.35 Crores. The industry has reserved **Rs. 2.885 Crores** (1.5% of the cost of the project as per Office Memorandum Vide F. No. 22-65/2017-IA.III Dated 01.05.2018) which will be spent on the activities like sanitation and health, education, and educational facilities as a cost towards corporate environment responsibility (CER).

10 RAINWATER AND STORMWATER HARVESTING PLAN

The industry is making efforts to conserve natural resources by adopting green technologies and as such industry proposes to adopt rain water harvesting system. With the annual rainfall of 450 mm there is good potential to harvest rainwater. The rainwater harvesting system is installed at various buildings and about 1635.09 m^3 per year water is harvested. This harvested water shall be send to own reservoir within the factory premises

Stormwater management system is also adopted by the industry. Separate drains of minimum 0.45 m * 0.60 m are provided for the collection and disposal of stormwater from the industry premises. The rainwater harvesting design details are given in Annexure-III of the EIA Report.

11 CONCLUSIONS

As the industry has provided all the necessary pollution control measures for water, Air and Solid and hazardous waste disposal, the negative impacts on the environment would be minimal/ negligible. The establishment programme would help the farmers to crush their produce in time which would help to minimize the loss of sugarcane tonnage and yield maximum financial benefits.