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Sugar Industry- 5(j)

Environmental Impact Assessment Report

Expansion of Sugar unit from 4,750 TCD to 7,500 TCD

M/s. VIKASRATNA VILASRAO DESHMUKH MANJARA SHETKARI SAHAKARI SAKHAR KARKHANA LIMITED,

Vilasnagar, Chincholirao Wadi, Tal. & Dist. Latur, Maharashtra

Prepared by

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Environment Monitoring period: 03/10/2023 to 29/12/2023

Laboratory Involved: Department of Environmental Sciences, Vasantdada Sugar Institute (NABL certificate No. TC-9821)

CONTENT

1.0 INTRODUCTION

Vikasratna Vilasrao Deshmukh Manjara Shetkari Sahakari Sakhar Karkhana Ltd., a cooperative sugar mill situated in Chincholiraowadi village, Tal & Dist- Latur, Maharashtra, was established in 1984. The mill successfully completed its inaugural crushing season in 1984. VVDMSSSKL has increased its distillery unit capacity to 150 KLPD and expanded its sugar unit to 4,750 TCD. The management plans to increase the crushing capacity of the sugar unit to 7,500 TCD. This additional capacity will serve both the juice/syrup to ethanol process and sugar production. The expansion will primarily involve modifying the existing setup and adding necessary machinery and equipment.

1.1 Features of the site

In this project expansion of sugar unit is planned by one of the leading cooperative sugar mill of Latur district. The expansion activity will be carried out within the existing premises. The project proponent is having adequate land, water and infrastructure resources for the proposed expansion. Raw material i.e. sugar cane is an agro-based renewable resource. It is available in adequate quantity for the project. The existing infrastructure of the factory is suitable to accommodate proposed capacity enhancement.

Table 1: Project highlights

1.	**Project Proponent**	M/s. Vikasratna Vilasrao Deshmukh Manjara Shetkari SSK Ltd.			
2.	**Project**	Expansion of existing sugar unit from 4,750 TCD to 7,500 TCD			
3.	**Location of the project**	Gat no: 99, 109, 110, 111, 115,116,117 of Chincholirao wadi and gat number 289 & 291 of Harangul (Bk), Tal & Dist. Latur, Maharashtra.			
4.	**Working days**	Average 160 days Max 200 days			
5.	**Project capacity**	**Activity**	**Existing**	**Proposed**	**Total**
		Sugar cane Crushing	4750	2750	7500
6.	**Air pollution Control**	**Boiler type**	**Boiler**	**APCD**	**Stack**
		High pressure boiler	40 TPH	ESP (Separate)	76 m Combined stack
		High pressure boiler	80 TPH	ESP (Separate)	
7.	**Effluent Treatment System**	For effluent: Sugar factory will upgrade the existing ETP of sugar unit from 850 cum/day to 1,500 cum/day to treat the additional effluent generated after expansion. Factory will install CPU for the condensate treatment and STP for the treatment of sewage and domestic wastewater.			
INFRASTRUCTURE					
8.	**Land and Area details**	Total plot area: 3,42,700 sq. m. (34.27 ha) Green belt area: 1,13,091 sq. m. (33% of the total plot) Built-up area of existing sugar and distillery unit: 47,726.27 square meters The sugar unit will not require any additional land. The expansion involves addition of one extra mill within its existing milling section.			

9	**Main Raw Material required**	**Raw Material**	**Existing**	**Proposed**	**Total**
		Sugar cane (TPD)	4,750	2,750	7,500
		Lime (TPD)	8	4	12
		Sulphur (TPD)	2.5	1.5	4
10.	**Manufacturing Technology**	Double Sulphitation process for sugar manufacturing			
11.	**Steam and Power required**	**Steam requirement:** Steam required for Sugar (7500 TCD) and 20 MW cogen unit will be max. 2837 TPD which includes the steam requirement for cogeneration unit and its exhaust steam for sugar process **Source:** Existing boilers of total 120 TPH of sugar unit **Power requirement:** Total power requirement after proposed expansion will be 360 KW **Source:** Captive power turbine of sugar unit.			
12.	**Fuel utilization**	Bagasse 53.75 TPH (1290 TPH) for 7,500 TCD sugar cane crushing			
13.	**Boiler**	**Existing Scenario:** In the current situation, the sugar unit has one 80 TPH boilers, one 40 TPH boiler available. **Proposed Scenario:** During the expansion, the plan is to operate both the boilers. Consequently, the total steam generation capacity will get increased to 120 TPH.			
14.	**Total Water requirement**	260 m^3/day			
15.	**Water Source**	Tarwaja Dam			
16.	**Manpower**	Direct employment to the additional 25-30 persons will be provided			
17	**Sanctuary/national park**	There is no sanctuary or national park or biosphere reserve in 10 km radius of the project.			
FINANCIAL ASPECTS					
	Total Project Cost	• Project cost for expansion: Rs. 9257.00 Lakh (Including CER) • EMP cost included in project cost: Rs. 978 Lakh • CER cost @ 1.00 % on total project cost i.e. Rs. 92.00 Lakh			

2.0 Material and Infrastructure

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

Raw materials	Estimated quantity	Source market	Final product By product	Estimated quantity	Transport mode
Sugar Cane	7,500 TPD	Local farms	White sugar @ 11.25% Molasses 'C '@ 5.0 % OR Molasses 'B'@ 6.0% Pressmud @ 4.0 % Bagasse @ 28.0%	843.75 TPD 375 TPD 450 TPD 300 TPD 2100 TPD	Truck Tractor Bullock cart
Lime	12.00 TPD	Nanded, Latur			Truck Tractor
Sulphur	4.0 TPD				

Table 3: Water Balance

		Input or Requirement	Output	Output	Reuse/ recycle	Daily fresh water intake
			Effluent	**Loss**		
1.	Boiler	2840	57	142	2641	199
2.	Water input through sugar cane (70% on cane)	5250	-	-	5250	-
	For cooling tower (capacity 450 cu.m/h)					10,800
	Water recycles back					10,044
	Water loss					540
	CT blow down					216
	Water requirement for CT makeup					**756**
	Sugar Process					
	A. Imbibition	2250	750	1500 (in products and by products	750 after treatment	-
	B. Spray pond	750	750		750 after treatment	-
	C. MoL preparation	188	-	188	-	-
	D. Vacuum filter	450	-	450	-	-
	E. Pan section	375	-	375	-	-

	F. Sugar melting & magma mixers	300	-	300	-	-
	G. Washing	37.5	-	37	-	-
		4350.5	**1500**	**2850**		
	Water required for sugar process = 4,351 m3 per day will be fulfilled from water available from sugar cane condensate = 5,250 **∴ 5,250- 4,351 = 899 m3 /day excess condensate available with sugar unit** • **Treated water will be reused for cooling tower make up = 756 cu.m/day** • **Remaining treated water will be sent to distillery unit = 143 cu.m./day** **And 1500 m3 treated sugar effluent available for reuse – it will be used for irrigation purpose**					
	1500 m3 of ETP treated water will be stored in a storage tank of 15 day's capacity = 22,500 cu.m. In addition, • Harvested rain water of approx. 28,646 cu.m will be available for distillery operations during the off-season of the sugar mill.					
	Excess condensate will be treated through Condensing Policing Unit. CPU will have equalizing tank, anoxic tank, aeration tank, clarifier, duel media filter and activated carbon filter. CPU will deliver industrial utilizable water such as sugar factory cleaning washing, cooling water for makeup and distillery process etc. 100% excess condensate can be utilized by the industry.					
	H. Fresh water requirement or seasonal operation is for boiler only 199 m3/day					
	Domestic water requirement = 61 cu.m.					
	J. Net fresh water requirement during seasonal operation = 199+61=260 m3/day **K. Total water requirement in operational season @ 160 days = 41,600 m3** **Permission available for 1,50,000 cu.m. per annum**					

2.1 Steam and Power

Steam Balance				
For existing 4750 TCD steam requirement @ 67.30 TPH				1615 TPD
For Proposed 2750 TCD steam requirement @ 39 TPH				936 TPD
Total steam requirement @ 118.2 TPH - For cogeneration +sugar - rounded				2837 TPD
Installed capacity of boilers 80 TPH + 40 TPH = 120 TPH				2880 TPD
Power balance: Season				
Power from		**Consumption**	**Existing**	**Proposed**
a. Back pressure turbine	**12000 Kw/h**	Sugar unit	5200 Kw/h	6000 Kw/h
b. DECC Turbine for season + Off-season	**8000 Kw/h**	Cogen unit	2000 Kw/h	3000 Kw/h
Total Power generation	**20000 Kw/h**	**TOTAL Captive**	**7200 Kw/h**	**9000 Kw/h**

		Consumption		
		Export to Grid	**12800Kw/h**	**11000 Kw/h**
			12.80 MW	**11.00 MW**
Power balance: Off-season				
a. DECC turbine	**8000 Kw/h**	Sugar unit	220 Kw/h	360 Kw/h
		Cogeneration unit	2000 Kw/h	2000 Kw/h
		TOTAL Captive Consumption	**2220 Kw/h**	**2360 Kw/h**
		Export to Grid	**5780 Kw/h**	**5640 Kw/h**
			5.780 MW	**5.640 MW**

2.2 Man power

Proposed Sugar expansion project will provide employment to 25-30 persons. However, it has a great potential to generate large indirect employment mainly through Sugar cultivation.

3.0 Process description

A. Sugar

The double Sulphitation process manufacturing plantation white sugar will be used in this expansion. The process consists of the following steps. A flowchart of the process is given in figure .1

- Extraction of Juice

The sugarcane is passed through preparatory devices like knives for cutting the stalks into fine chips before being subjected to crushing in a milling tandem comprising 4 to 6 roller mills. In the best milling practice, more than 95% of the sugar of cane is extracted into the juice.

- Clarification

Raw juice treated with lime and SO2 gas, heated and sends to continuous clarifier from which the clear juice is decanted while the settled impurities known as mud is sent to rotary drum vacuum filter for removal of unwanted stuff called filter cake. It is discarded or returned to the field as fertilizer.

- Evaporation

Clear juice is taken to quadruple and conc. juice syrup is treated with Sulphur dioxide before being send to the pan station for crystallization of sugar.

- Pan boiling

The syrup is send to pan station for crystallization of sugar. Crystallization takes place in single-effect vacuum pans, where the syrup is evaporated until saturated with sugar. At this point “seed grain” is added to serve as a nucleus for the sugar crystals, and more syrup is added as water evaporates.

- Centrifugation

The massecuite from crystallizer is drawn into revolving machines called centrifuges. The perforated lining retains the sugar crystals, which may be washed with water, if

desired. The mother liquor "molasses" passes through the lining because of the centrifugal force exerted and after the sugar is "purged" it is cut down leaving the centrifuge ready for another charge of massecuite.

- Gradation & Packing

The final product in the form of sugar crystal is dropped through pan section, graded and packed in bags. The grade of the sugar depends on the size of the crystal i.e. Small (S) and Medium (M).

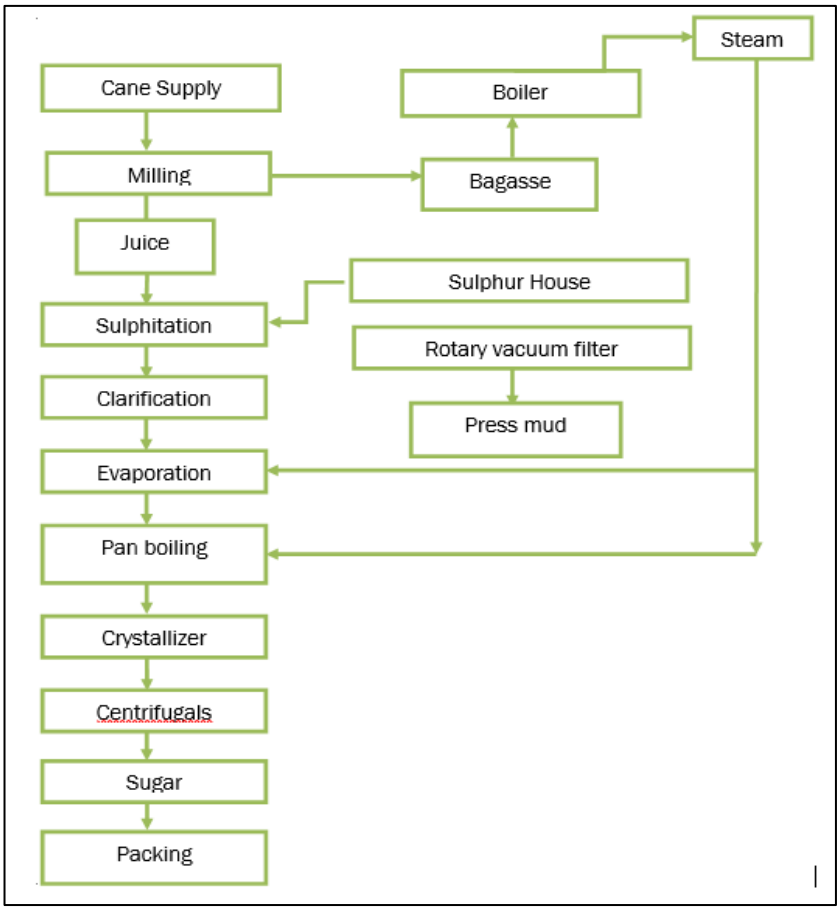

Figure 1: Flowchart of sugar manufacturing process

4.0 Pollution sources

Table 4: Overview of pollution sources, its treatment and/or disposal

#	Waste product and source	Treatment and disposal
1.	**Effluent/Wastewater**	
	Hot water	Hot water recycled after cooling.
	Effluent from sugar mill/spray pond overflow, blow down and RO/DM reject	It will be treated in sugar ETP. Sugar ETP will be upgraded wrt proposed capacity

#	Waste product and source	Treatment and disposal
	Sugar process condensates	It will be treated in CPU (proposed) and treated water will be reused in sugar and distillery unit
	Sewage: Domestic wastewater	It will be treated in STP (proposed)
2.	**Gaseous and dust emission**	
	Flue gases from boiler due to burning of bagasse	Sugar unit existing stack of 76 m (combine for both the boiler) with separate ESP will be used Online continuous emission monitoring system is installed for all stack Greenbelt area 1,13,091 sq. m;
	Bagasse handling- fugitive particulates	Bagasse handling through closed conveyor
	Ash handling	Mechanized handling and transportation of ash (through closed conveyors), it will be in the dry form. It will be transported through covered vehicle.
	Diesel generators	It will be operational only when captive power supply failure, hence emissions anticipated to be less frequent and minor
3	**Solid waste**	
	Ash from boiler	It is rich in potash; hence given to farmers for use as a soil nutrient
	CPU, ETP and STP sludge	Will be used for land application

Table 5: Characteristics of Water (inlet and Outlet) from Sugar ETP

#	Parameter	ETP		CPU	
		Inlet	**outlet**	**Inlet**	**Outlet**
1.	pH	4.0-5.0	5.5 – 9.0	7.0-7.5	8.0-8.5
2.	BOD_5 mg/L	600-1200	<100	250-280	<30
3.	COD mg/L	2000-4500	<250	600-800	<100
4.	Suspended Solids, mg/L.	250-450	<200	150-200	<50
5.	Dissolved Solids, mg/L	2500-4500	<2100	150-400	<250
6.	Oil & Grease, mg/L	15-30	<10	BDL	BDL

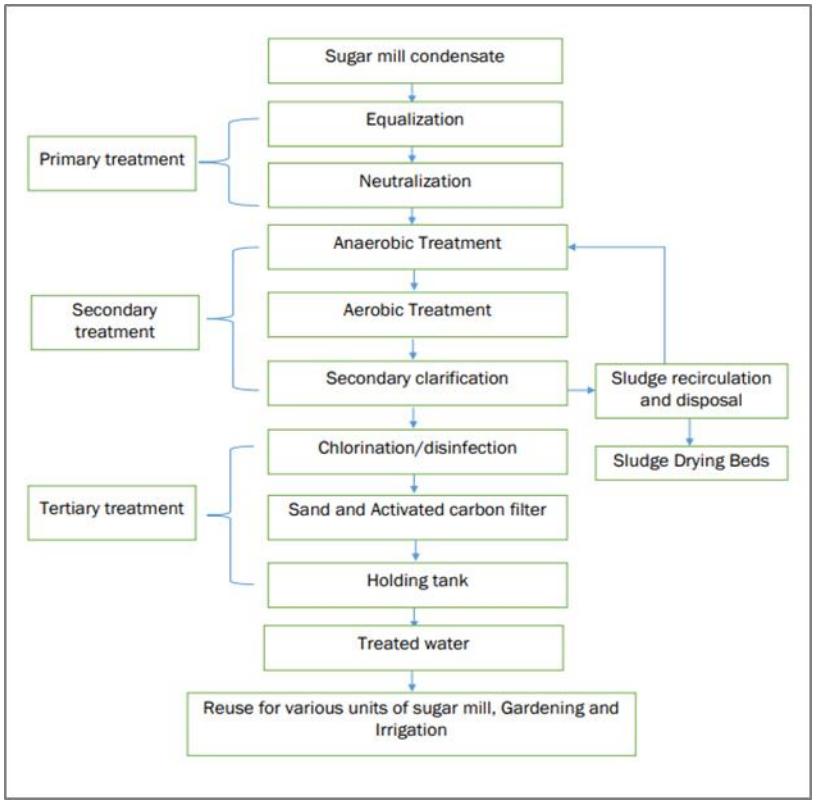

Figure 4: Flowchart for Effluent Treatment Plant Unit

4.1 Solid waste

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

Table 6: Solid waste generation and disposal

#	Waste	Quantity, TPD	Treatment	Disposal	Remark
1	Sugar ETP + STP + CPU sludge (wet basis)	7-8	Utilized as manure	Sold to member farmer/own plot	Organic
2	Bagasse ash	Max. 26.00	Mixed into Soils	Used as a soil enriching material.	Rich in potash
3	Spent oil from DG and process	2 to 3 KL/A	Spent oil is burnt in boiler	burnt in incineration boiler	Oily

5.0 Baseline environmental conditions and summary of impact analysis

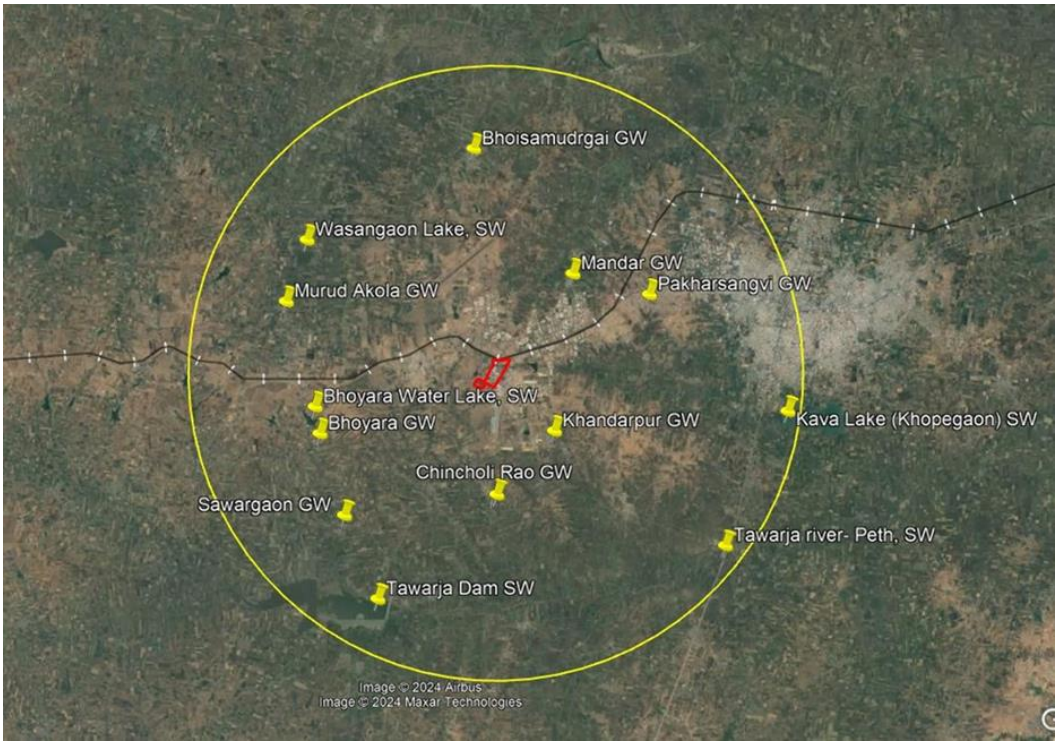

Figure 5: Monitoring Location Map

Table 7: Summary of Environmental features of study area

Facet	In brief
General Climate	Hot and dry
Annual rainfall	average 853 mm
Temperature	The maximum temperature in summer is around 40°C and minimum temperature in winter is around 15°C
Humidity	The maximum humidity for the study area > 80 percent during monsoon and minimum humidity < 30 percent in the month of Feb to April.
Wind	Predominant wind direction was East, NE and SE. wind speed was between 0.50 to 2.10 km/ hr. (>60 %) during the study period
Land use	Crop land area 62.15 %, scrub land 19.43 %, settlement area 4.07%, waterbody 2.03% and road 12.32%
Air Quality	Complies NAAQ standards of Nov. 2009 at all monitored locations
Noise	Complies the standard
Groundwater	No issues reported during the study
Soil	Clayey. Very deep soil
Nearest sanctuary, National Parks & Biosphere reservoir.	None within 10 km radius.

Table 8: Summary of anticipated impact and its Management Plan

Environmental Aspect	Impact causing factor	Control/Mitigation Measures
Air Environment	Generation of Particulate Matter (PM), SO_2, NO_x due to burning of fuel (Bagasse) Handling of ash	Separate ESP of existing unit will be used to control ash emission; combine stack (for two boilers) with height 76 m Mechanized system for ash and bagasse handling Loose bagasse will be minimum; Bagasse baling will be done to excess Fugitive dust control/suppression for bagasse yard will be done properly – provision of wind breaks Wind breaks for ash storage area and ash transportation through covered vehicles only Provision of separate and adequate parking for cane carriers and other vehicles Permanent internal roads Development of greenbelt – enhancing tree density in south, SSE and SW Continuous online emission monitoring system as per the norms
Water Environment	Effluent generation from processes, cleaning, blow down water & condensate.	Effluent and spray pond overflow will be treated through ETP - Upgradation of existing ETP Excess condensate will be treated through CPU; Sewage will be treated in STP; new CPU and STP is proposed. Condensate will be reused in the sugar unit and Treated water of CPU will be partially reused in the distillery unit. Treated water of ETP will be reused for greenbelt watering and irrigation purpose Fresh water requirement will be reduced considerably by recycling of water, reusing treated water and using harvested rain water during startup period

Environmental Aspect	Impact causing factor	Control/Mitigation Measures
		Continuous online effluent monitoring system – as per the norms (sugar)
Soil Environment	Boiler Ash (from bagasse)	Rich in potash; Sold to nearby farmers
	Sludge from ETP, CPU, STP	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
	Other solid waste (packaging material)	Segregated as per the characteristics of the material and sold to local recyclers
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 New internal roads will be either asphalted or RCC, leveled, illuminated and will be maintained Safety sign boards will be placed at strategic locations within premises Provision of adequate personal protective equipment (PPE) for workers Job rotation for high noise level work places, if required Regular health checkup for workers Acoustic enclosure for DG set Greenbelt development/enhancement
Ecology and Biodiversity	Air, water, soil and noise pollution	Enhancing the tree density of greenbelt. No tree cutting/ failing involved in the project

Environmental Aspect	Impact causing factor	Control/Mitigation Measures
	Tree cutting failing, disturbance to wildlife due to project	No national park or sanctuary near to project site. Development/enhancement of greenbelt will help to enhance the biodiversity and will provide habitat to many species Nigh time light arrangements in the unit, will be made non-intense, non-glary; it will not disturb the wild animals
Socio-economic Environment	Rehabilitation and Restoration (RR), pressure on available manmade infrastructure/resource due to population flux	No rehabilitation and restoration issue involved since site is already under the possession of project proponent Local candidates will be preferred for employment. Skilled work force is available at nearby towns and cities Project benefits will be shared with member farmers and employees Skill development of youth is planned in CER activities Training to local farmers
Safety and Occupational health	Accidents, improper work practices	Safety officer and safety committee will work towards control of accidents 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 Firefighting system as per the local authority guidelines

5.1 Air Dispersion Modeling

Crushing of 2,750 TCD planned during the expansion. It will require roughly 39 TPH steam. The factory is having two boilers – 80 TPH and 40 TPH i.e. collectively 120 TPH – steam will be procured from these two boilers. Therefore, impact on air quality is determined by considering the operation of these two boilers.

Bagasse will serve as a fuel source. Consequently, particulate matter (PM) resulting from the combustion of bagasse is anticipated to be a primary pollutant. Although sulfur is present in bagasse only in trace amounts, for the purpose of this analysis, we are assuming a worst-case scenario with a concentration of 0.02%. The assessment of air quality impacts has been conducted using the 'AERMOD view dispersion model 11.2' software This software has been utilized for simulations originating from point sources. The incremental dispersion trend is shown as isopleths in Figure 6, 7 & 8

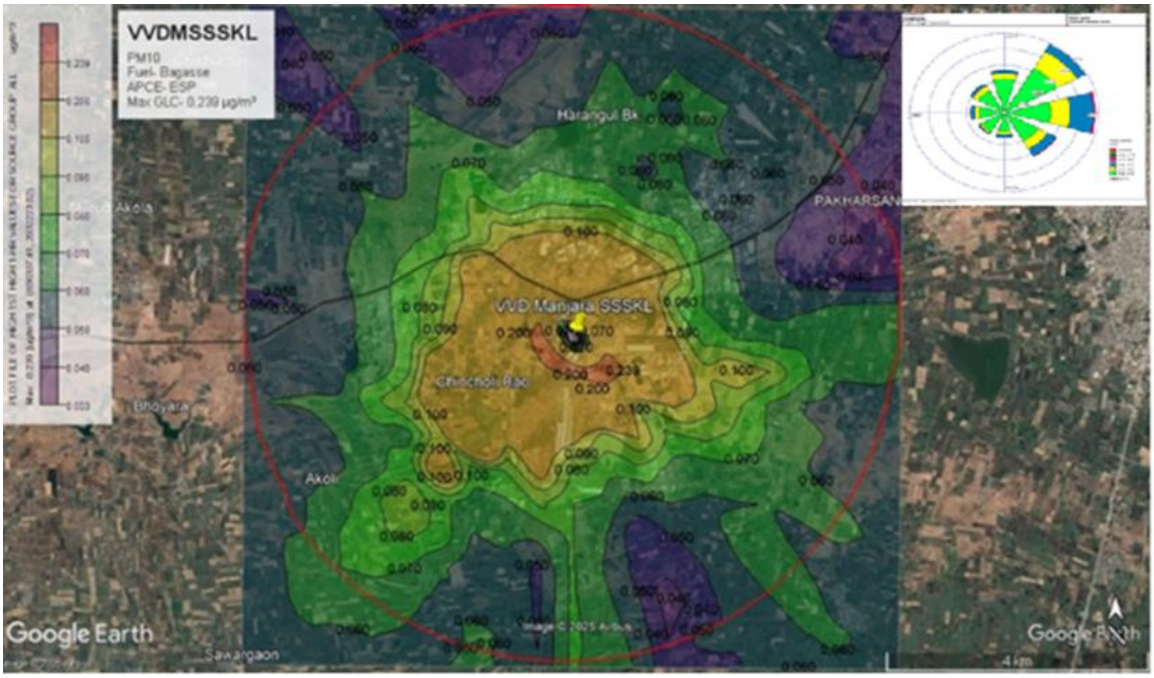

Figure 6: Short term 24 hourly GLCs of PM_{10}

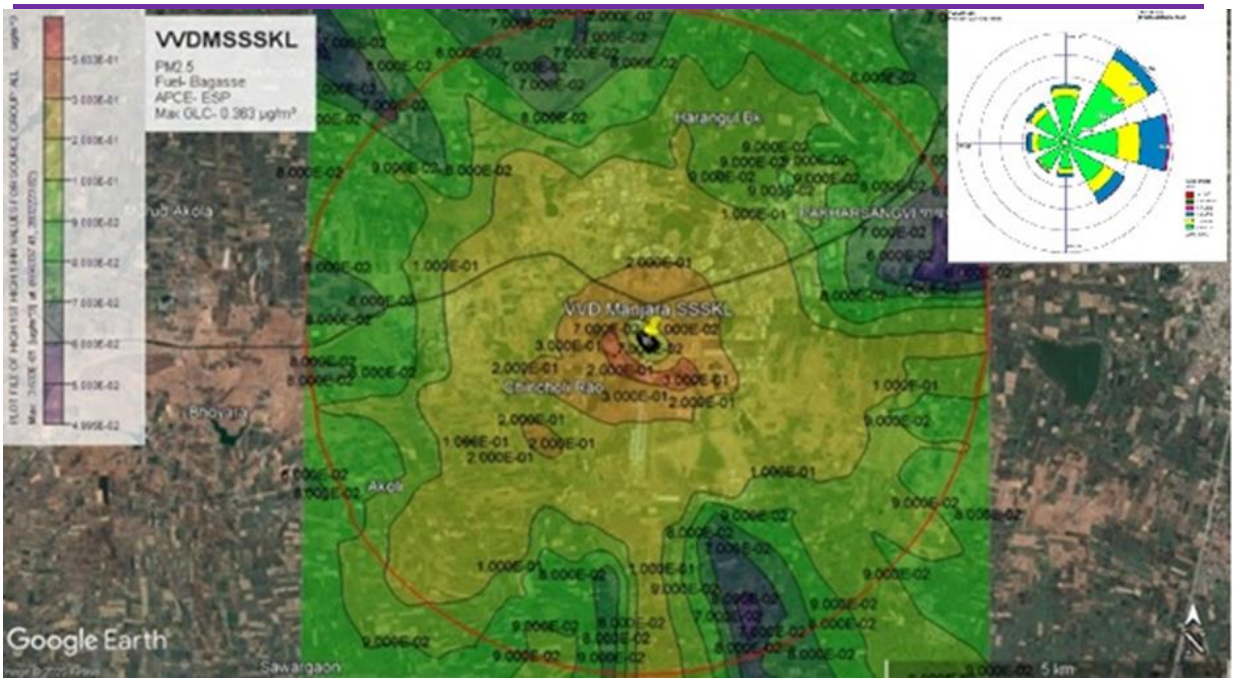

Figure 7: Short term 24 hourly GLCs of PM 2.5

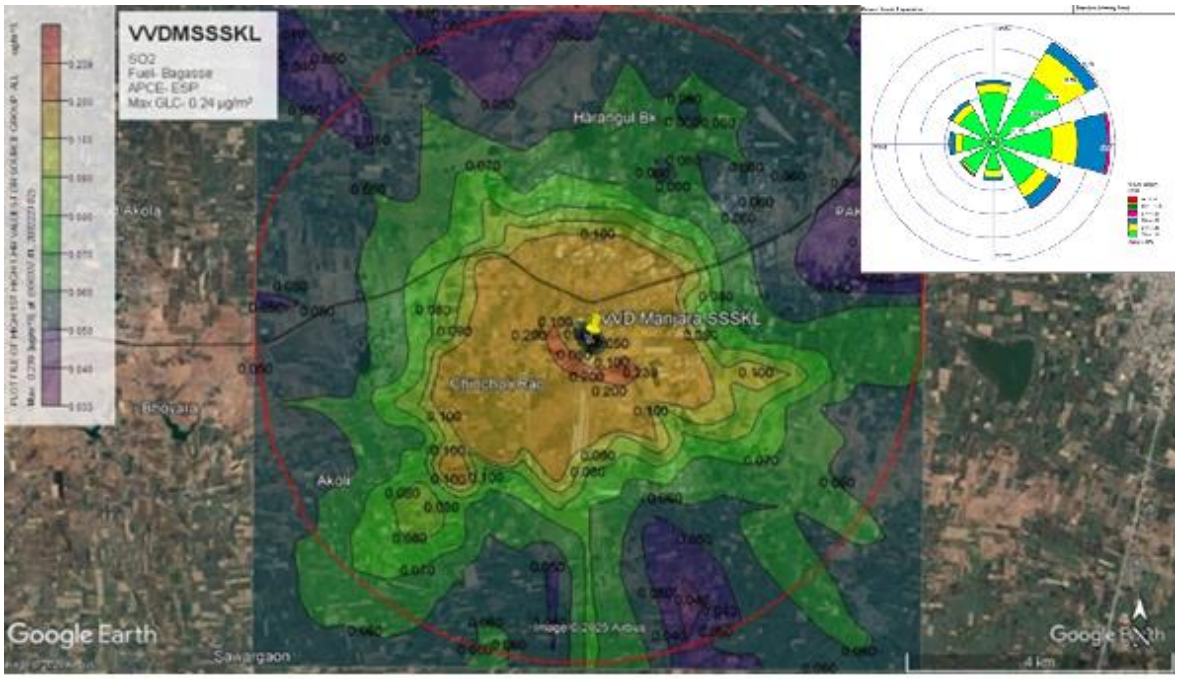

Figure 8: Short term 24 hourly GLCs

Table 9: Financial provision for CER activities

CER activity head	TOTAL
Education and training: **a.** Financial aid to local schools for providing drinking water	7.00
b. Sanitation facilities	10.00
c. Roof top solar system for schools	27.00
Tree plantation in neighboring villages	10.00
Support to local NGO working for conservation of wildlife	05.00
Improving public infrastructure (e.g. improving infra of health care center, road maintenance, canal maintenance, etc.)	18.00
Training to local farmers	05.00
Providing training to local youths for improving employability	10.00
TOTAL (1% of capital budget)	**92.00**

Table 10: Estimated Capital & Recurring Expenses for Environment Management

#	Particulars	Amount (Rs. in Lakhs)
Capital Expenses		
1.	Upgradation/modification of ETP	140.00
2.	Installation of new CPU and STP	361.00
3.	Upgradation of ash and bagasse handling	132.00
4.	ESP upgradation	126.00
5.	Provision of safety gears	42.00
6.	Provision for other safety measures	18.00
7.	Additional measures for fire fighting	17.00
8.	Noise and solid waste management	15.00
9.	Greenbelt development	82.00
10.	Rainwater harvesting	45.00
TOTAL		**978.00**
Recurring Expenses/Annum		
1.	Salaries and wages	50.00
2.	Maintenance of pollution control devices e.g. ETP, CPU, ESP	20.00
3.	Fuel	50.00
4.	Miscellaneous	15.00
5.	Health check-up	05.00
	TOTAL	**140.00**