EXECUTIVE SUMMARY

PROPOSED EXPANSION OF SUGARCANE CRUSHING CAPACITY FROM 6000 TCD TO 10000 TCD, DISTILLERY CAPACITY FROM 45 KLPD TO 90 KLPD (RS/ENA/ETHANOL) AND CO-GENERATION POWER PLANTCAPACITY FROM 22 MW TO 34 MW.

AT

SHREEPUR, TALUKA-MALSHIRAS, DISTRICT-SOLAPUR

BY

SHREE PANDURANG SAHAKARI SAKHAR KARKHANA LIMITED

Report Prepared By:

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EXECUTIVE SUMMARY

1. INTRODUCTION OF THE PROJECT

Shree Pandurang SSK Ltd. has an existing Sugar factory with sugarcane crushing capacity of 6000 TCD distillery of 45 KLPD capacity and co-generation power plant of 22 MW. It is proposed to expand sugarcane crushing capacity from 6000 TCD to 10000 TCD, distillery capacity from 45 KLPD to 90 KLPD and co-generation power plant capacity from 22 MW to 34 MW.

1.1. Purpose of the Report

As per the EIA Notification dated 14th September 2006; it is mandatory to have the Environmental Clearance for any proposed industry or for the expansion of the industry from Ministry of Environment, Forests and Climate Change (MoEF and CC), Government of India, New Delhi for which EIA is a prerequisite as per the guidelines of MoEF and CC, New Delhi. The proposed project falls under Category "B" as per the Gazette notification of S.O. 1960 (E) dated 13th June 2019. The purpose of the EIA report is to provide a coherent statement of the potential impacts of the proposed project and the measures that should be taken to establish the impacts and suggest mitigation measures.

1.2. Identification of Project & Project Proponent

1.2.1.Identification of project:

Name and Address: Shree Pandurang S.S.K. Ltd.
Factory Site:Shreepur, Taluka- Malshiras,
District-Solapur, Maharashtra- 413112
Ph:(0) (02185) 255233, 255344, 255355
Fax:(0) (02185) 255435
E-mail:spssk_sugar@yahoo.com,spssk_purchase@yahoo.com, mfg_spssk@yahoo.com
Constitution & Type: Private Limited.

1.2.2.Project Proponents:

The list of the Board of Directors is as below:

Table 1 List of Board of Directors

Sr. No.	Name	Role
1	Shri. SudhakarRamchandraParicharak	Chairman
2	Shri. VasantraoDaulatraoDeshmukh	Voice Chairman
3	Shri. PrashantPrabhakarParicharak	Director
4	Shri. DinkarraoAmbadas More	Director
5	Shri. DilipraoTrimbakChavan	Director
6	Shri. Harish BhaskarraoGaikwad	Director
7	Shri. ShivajiMachchhindraSalunkhe	Director
8	Shri. DnyandeoShrirangDhobale	Director
9	Shri. Suresh Rajaram Agavane	Director
10	Shri. Balasaheb Dada Yalmar	Director
11	Shri. ShivajiraoDagaduGavali	Director
12	Shri. TanajiMarutiWaghamode	Director
13	Shri. MahibubKamruddin Shaikh	Director

14	Shri. NamdeoChintuZambare	Director
15	Shri. DinkarDnyandeoKavade	Director
16	Shri. AnandraoRamdasAarkile	Director
17	Shri. ParmeshwarBajrangGanage	Director
18	Shri. NagannathSavataShinde	Director
19	Sau. SangitaGulab Pore	Director
20	Sau. ParvatiKantilalNarsale	Director
21	Sau. ShindhuBrahamdeoPawar	Director
22	Shri. YashwantShankarrao Kulkarni	Managing Director

1.3. Products and By-products

List of the products and by-products along with their existing and proposed quantities, proposed by the industry are given in the table below

Table.2 Quantity of products and By-products (At existing as well as after proposed expansion)

Sr. No	Description	Existing Quantity	Proposed Deletion	Proposed Addition	Total
1	Sugarcane Crushing capacity	6000 TCD	--	4000 TCD	10000 TCD
2	**Sugar**	**21000 MT/M**	**--**	**14000 MT/M**	**35000 MT/M**
3	**Rectified Spirit OR**	**1282.5 KL/M**	**--**	**1282.5 KL/M**	**2565 KL/M**
	Extra Neutral Alcohol OR	**1282.5 KL/M**	**--**	**1282.5 KL/M**	**2565 KL/M**
	Ethanol	**1282.5 KL/M**	**--**	**1282.5 KL/M**	**2565 KL/M**
4	Bagasse	52325 MT/M	--	34884 MT/M	87209 MT/M
5	Molasses	7280 MT/M	--	4853 MT/M	12133 MT/M
6	Pressmud	5460 MT/M		3640 MT/M	9100 MT/M
7	Fusel Oil	2.67 KL/M	--	2.67 KL/M	5.34 KL/M
8	Impure Spirit	67.5 KL/M	--	45 KL/M	112.5 KL/M
9	**Electric Power**	**22 MW**	**3 MW**	**15 MW**	**34 MW**

1.4. Capacity Utilization:

Existing and proposed capacities of various units are given in the **Table 3**.

Table.3 Capacities utilization of various units

Sr. No.	Description	Existing quantity	Proposed Deletion	Proposed expansion quantity	Total
1	Sugarcane crushing capacity (TCD)	6000	--	4000	10000
2	Distillery (KLPD)	45	--	45	90
3	Co-generation Power (MW)	22	3	15	34

1.5. Project Cost:

The total cost of the project is around Rs.150.0 Crores.

1.6. Background:

M/s Shree Pandurang Sahakari Sakhar Karkhana Ltd., (SPSSKL), Shreepur, Taluka Malashiras, Dist Solapur, has an existing sugar factory of 6000 TCD and Distillery of 45 KLPD and co-generation power plant of 22 MW. The

industry was established in the year 1934 with an initial crushing capacity of 250 TCD, which was owned by the private limited company named "Brihan Maharashtra Sugar Syndicate Limited." The Brihan Maharashtra Sugar Syndicate Limited sold its unit to a Shree Pandurang Sahakari Sakhar Karkhana Limited, which is a co-operative company established in the year 1993. The first crushing operations i.e. 1250 TCD under the new management started in the year 1993-94. The industry expanded its capacity of sugar complex from time to time which is given in **Table 4**.

Table..4 Year of establishment/expansion of sugar complex along with their capacities.

Sr. No.	Initial Capacity	Expansion Capacity	Year of Establishment	Year of Expansion
1	**Sugar**			
a.	250 TCD		1934	
b.		250 TCD to 1250 TCD		1993-94
c.		1250 TCD to 2500 TCD		1997-98
d.		2500 TCD to 3500 TCD		2006
e.		3500 TCD to 4800 TCD		2011
f.		4800 TCD to 6000 TCD		2016
2	**Co-generation**			
	09 MW		2006	
		09 MW to 19 MW		2011
		19 MW to 22 MW		2016
3	**Distillery**			
a.	45 KLPD	--	2010	

1.7. Importance to the Country and Region

In agro-based industries in India, the sugar industry is the second largest agricultural industry after the textile industry. As there is excess cane available in the command area, industry shall have to make an arrangement for the timely crushing of sugarcane available in the command area. Incidentally, the economic viability would also improve not only by producing more quantity of sugar but also generate power which can be exported to state grid and additional money can be distributed to farmers as cane price.

Most of the sugar units have by-product utilization plants, based on bagasse and molasses. Ethanol and power projects have tremendous scope for development in India. India is the fourth largest producer of ethanol in the world and the second largest in Asia. Most of the Indian distilleries use sugarcane molasses as raw material. The demand for potable alcohol has been ever ethanol blending with petrol/motor fuel, the requirement of ethanol/industrial alcohol has increased manifold increasing with the more liberal attitude, rising middle class and less taboo/stigma in Indian society. With the advent of in the country to the extent that in case 5 % blending, if made mandatory all over the country, the sugar factory molasses available in the country shall not prove to be adequate for meeting the total requirement of ethanol including its use for potable liquors and other industrial uses. However, the notification no.G.S.R.705(E) dated 27th October, 2004, Ministry of Petroleum and Natural Gas, Government of India, mandates that 5% ethanol-blended petrol (E5), conforming to Bureau of Indian Standards specifications which may grow to 20%. The sugarcane farmers in the region and state will be directly benefitted by assuring stability of the sugar industries, reasonable return for the molasses and then passing a significant part of the same to the farmers. Fuel ethanol is able to save valuable foreign exchange on import of fossil fuel. Apart from its use for beverage, medicinal, pharmaceutical and flavoring, alcohol constitutes the

feedstock for large number of organic chemicals, which are used in manufacturing a wide variety of intermediates, drugs, rubber, pesticides, solvents etc.

The proposed project shall be generating direct as well as indirect employments and other developmental opportunities in the entire region. To implement the above program, the management of SPSSKL has appointed consultants with the objective of expansion & capacity optimization of sugar plant, with emphasis on reduction in the cost of production through improvement in milling efficiency and reduction in process steam/power consumption.

1.8. LOCATION

There are no sensitive, historical, forest reserves and wildlife sanctuaries etc within 10 Km radius of the factory site. The Pune – Solapur National Highway (N.H. 9) is 25 Km away from the factory site. The latitude and longitude are $17^0$51‟ 12” N & $75^0$5’ 56” E respectively. The Elevation above the Mean Sea Level is 495 m.

- The Project Site is conveniently located for development of the Project.
  - 110 Km away from Solapur, which is a district place.
- Other important towns nearby are
  - Akluj, at a distance of 9 km
  - Pandharpur, at a distance of 30 km
  - Kurduwadi is nearest Railway station 38 km away from factory site.
  - Solapur is nearest Airport 110 Km away from factory site.
- **Environmental Setting-**
  - Location –$17^0$51‟ 12” N and $75^0$5’ 56” E
  - Nearest Village – Shreepur
  - Nearest town – Akluj – 9 Km
  - Nearest City – Pandharpur – 30 Km
  - Nearest Head Quarters – Solapur – 110 Km
  - Nearest National Highway – NH-9 – 25 Km
  - Nearest Railway Station – Kurduwadi – 38 Km
  - Nearest Airport – Solapur – 110 Km
  - Nearest River – Bhima River – 5 Km
  - Seismicity – Seismic Zone III 6 to 8 Richter Scale

Table 5 Co-ordinates of the project boundary

Location	Latitude	Longitude
A	17°51'22.84"N	75° 6'21.19"E
B	17°51'16.76"N	75° 6'24.39"E
C	17°51'15.24"N	75° 6'13.42"E
D	17°51'7.73"N	75° 6'14.34"E
E	17°51'7.37"N	75° 6'18.91"E
F	17°51'1.32"N	75° 6'19.82"E
G	17°50'56.31"N	75° 6'7.18"E
H	17°51'3.55"N	75° 6'8.24"E

I	17°51'16.57"N	75° 6'4.81"E
J	17°51'19.76"N	75° 6'6.23"E

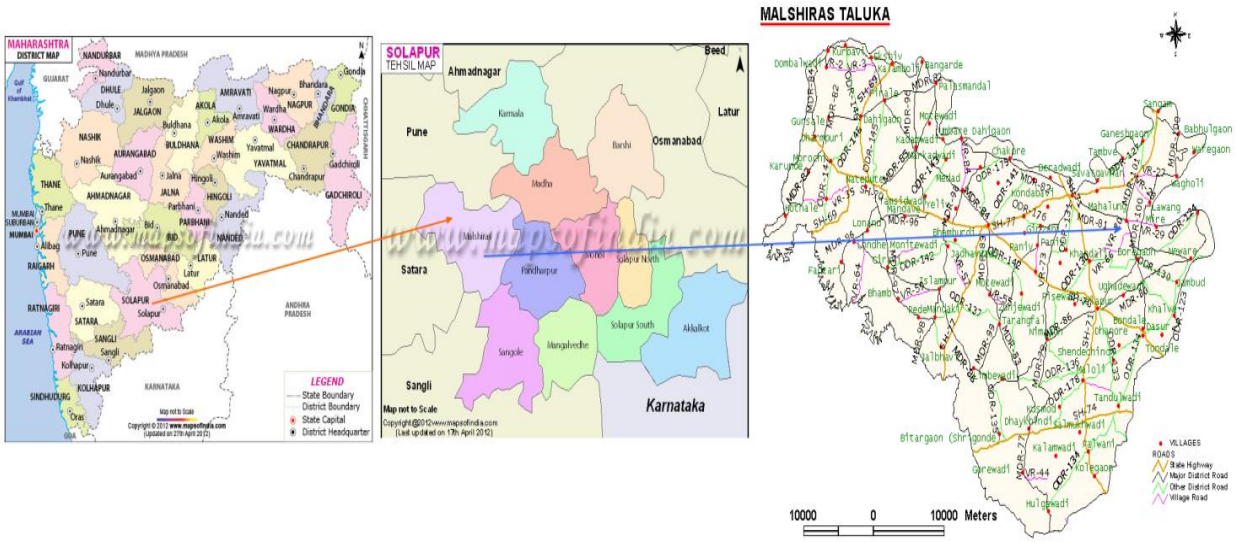


Figure 1 Map showing General Location

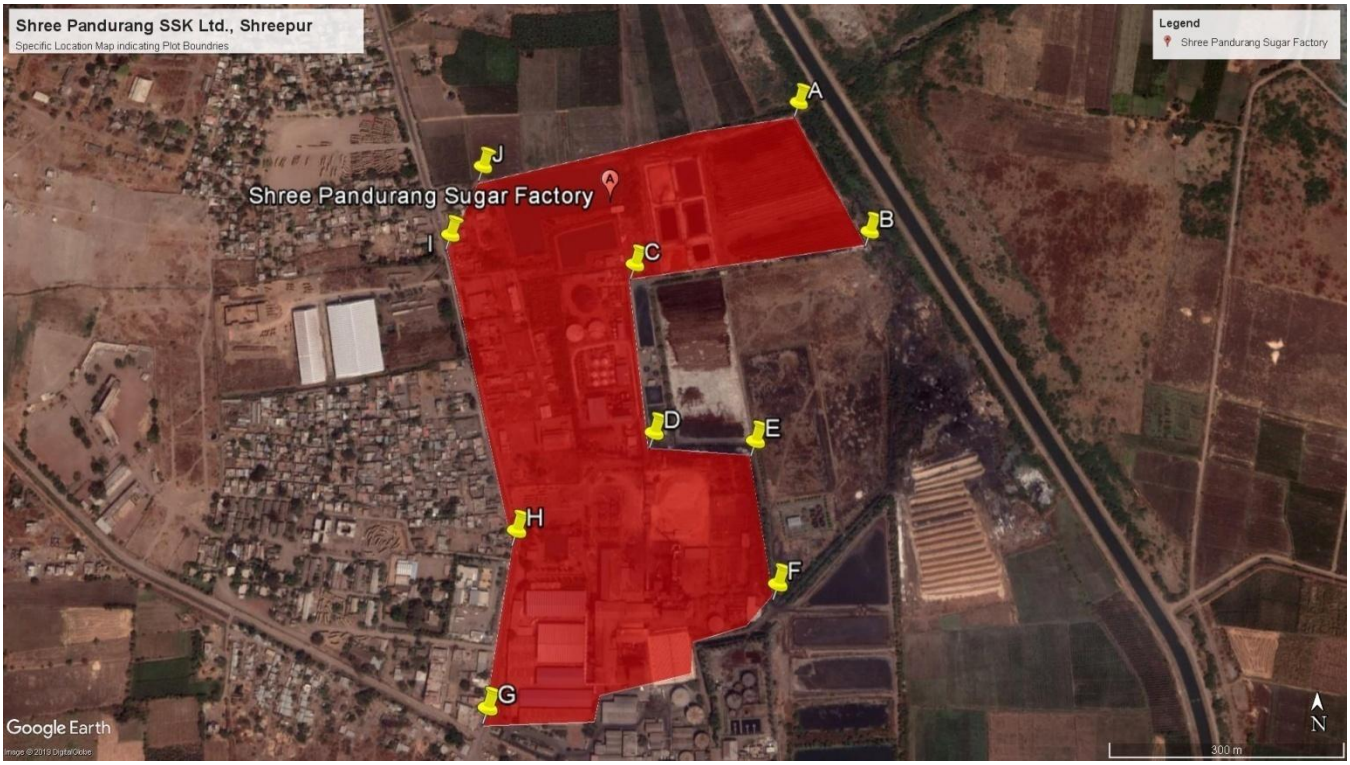


Figure 2 Specific Location and Project Boundaries (Refer to Table 5)

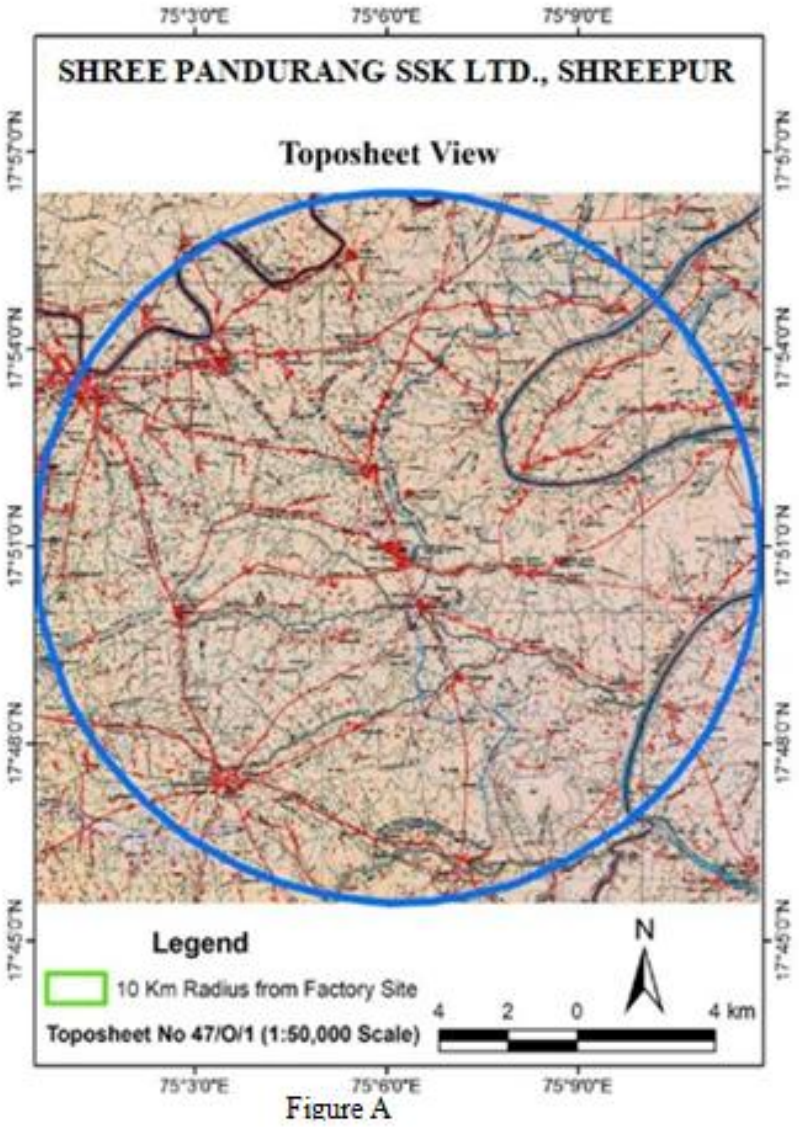


Figure A

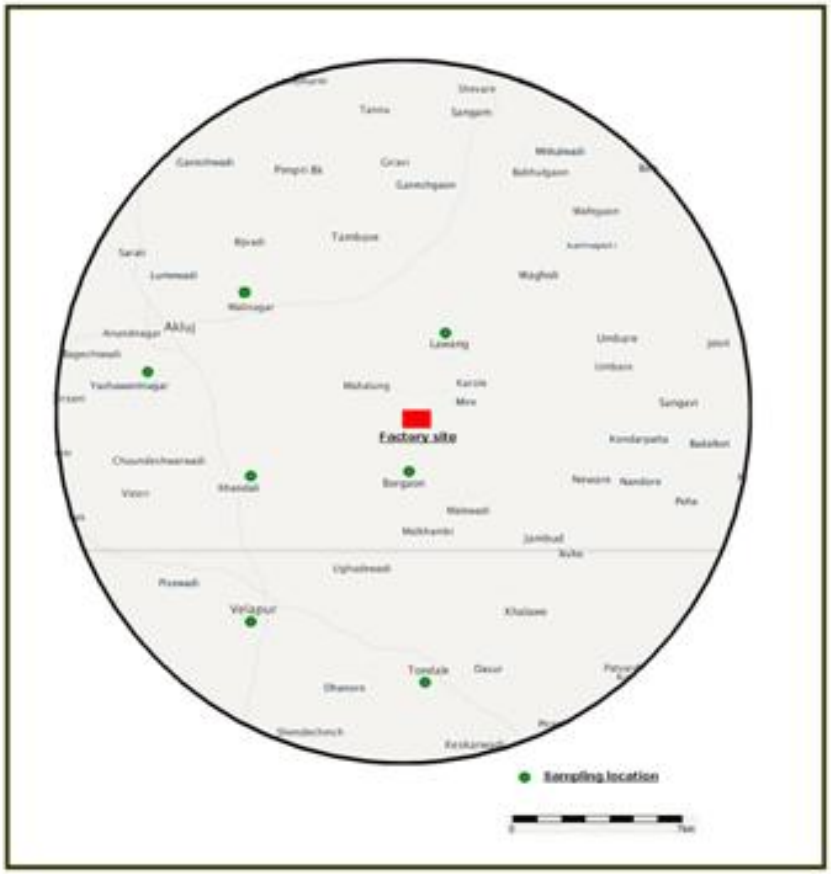


Figure B

Figure 3 Toposheet Map, Survey of India (Figure A) and 10 km Radius Map (Figure B)

Figure 4 Layout map of factory site

2. AVAILABILITY OF WATER, ITS SOURCE, ENERGY/ POWER REQUIREMENT AND SOURCE

2.1. Water:

Industrial Purpose:

The Bhima River is the nearest River and Nira right bank canal is 0.3 km away from factory site, which is the main source of water.

Sugar Division - The sugar unit works on zero water requirements and co-generation power plant water requirement met from excess condensate available from sugar unit.

Distillery Division – Zero water requirement due to recycle of evaporator condensate, recycle of boiler blow down after treatment, use of available excess condensate from sugar unit and also use stored harvested rainwater. Detailed water budget of the industry is shown in **Table 6& Table 7.**

Domestic Purpose:

A) Sugar and Co-generation division: The existing water requirement is30m3/day. No additional water is required even after the proposed expansion.

B) Distillery division: The existing water requirement is 11m3/day. No additional water is required even after the proposed expansion.

The required water is drowning from Nira right bank canal for drinking purpose; the clarified water is treated in sand filters and chlorinated.

Water Budget for Sugar, Co-generation power plant and Distillery unit:

I. Water budget for Sugar & Co-generation Division.

Table 6 Water budget for Sugar & Co-generation Division

Sr. No.	Details	Water Requirement (m3/day)			Consumption/Losses (m3/day)			Reuse / Recovery (m3/day)			Waste Generation (m3/day)		
		Present 6000 TCD & 22 MW	4000 TCD & Expansion 12 MW	Total 10000 TCD & 34 MW	Present 6000 TCD & 22 MW	4000 TCD & Expansion 12 MW	Total 10000 TCD & 34 MW	Present 6000 TCD & 22 MW	4000 TCD & Expansion 12 MW	Total 10000 TCD & 34 MW	Present 6000 TCD & 22 MW	4000 TCD & Expansion 12 MW	Total 10000 TCD & 34 MW
Domestic													
1	Domestic	30	--	30	10	--	10	--	--	--	20	--	20
Industrial													
1(a)	Boiler 55 TPH	1320	--	1320	60	--	60	1260	--	1260	Boiler blow down water shall be recycling as process water after treated in CPU.		
1(b)	Boiler 55 TPH	1320	--	1320	60	--	60	1260	--	1260			
1(c)	20 TPH Boiler at 46 Kg/ cm^2	480	--	480	20	--	20	460	--	460			
1(d)	Boiler 80 TPH	--	1920	1920	--	80	80	--	1840	1840			
2	Process Water	200	140	340	20	15	35	--	--	--	180	125	305
3	Cooling	120	80	200	80	55	135	--	--	--	40	25	65
4	DM plant	160	92	252	140	80	220	--	--	--	20	12	32
5	Washing of equipment	50	20	70	--	--	--	--	--	--	50	20	70
6	Air compressors & pumps	75	25	100	05	05	10	70	20	90	--	--	--
7	Spray pond blowdown	1200	800	2000	600	400	1000	--	--	--	600	400	1000
8	Condensers water	--	--	--	--	--	--	1200	800	2000			
9	Colony fire fighting& Gardening	295	--	295	295	--	295	--	--	--	--	--	--

10	Recycling of Excess Condensate	--	--	--	--	--	--	1200	800	2000	--	--	--
Total		**5220**	**3077**	**8297**	**1280**	**635**	**1915**	**5450**	**3460**	**8910**	**890**	**582**	**1472**

Note:

- The consumption/losses and final wastewater generated is amounting (1915 + 1472) = 3387m3/day
- The excess condensate and condensers water available is 4000m3/day. Thus the excess water available for reuse would be around 4000 – 3387 = 613 m3/day.

Net Water Requirement:

i) Industrial Purpose: 8297- 8910 = - 613 m3/day.

Due to excess condensate available from Sugar unit, there is no water requirement for sugar and co-generation unit. In fact an excess amount 613 m3/day is saved, out of which 397 m3/day used for distillery and remaining quantity of 216 m3/day shall be stored in proposed tank of capacity 40000 m3 for distillery operation during off season.

ii) Domestic Purpose: At present water requirement is 30m3/day, no additional water requirement after the proposed expansion.

Effluent Generation:

i. Industrial - 1472 m3/day out of which sugar effluent - 375 m3/day, spraypond effluent – 1000 m3/day and co-generation power plant effluent- 97 m3/day.

ii. Domestic effluent - 20m3/day.

Remarks: Sugar effluent shall be treated along co-generation effluent in the existing ETP after the up-gradation.
Spraypond effluent shall be treated in proposed 1200 m3/day capacity CPU.

II. Water budget for distillery division

Table 7 Water budget for Distillery Division

Sr. No.	Details	Water Requirement (m3/day)			Consumption/Losses (m3/day)			Reuse / Recovery (m3/day)			Waste Generation (m3/day)			Recycle / Reuse (after CPU)	Final Waste water
		Present 45 KLPD	Proposed 45 KLPD	Total 90 KLPD	Present 45 KLPD	Proposed 45 KLPD	Total 90 KLPD	Present 45 KLPD	Proposed 45 KLPD	Total 90 KLPD	Present 45 KLPD	Proposed 45 KLPD	Total 90 KLPD		
Domestic															
1	Domestic	11	--	11	03	--	03	--	--	--	08	--	08	--	08
Industrial															
1	Boiler 20 TPH	--	480	480	--	20	20	--	440	440	--	20	20	20 To CPU	00
1.	Process Water	450	450	900	--	--	--	**Evaporator Condensate**			167	80	247	--	247
											90	90	180	180 To CPU	00
2	DM water plant		25	25	--	20	20	--	--	--	--	05	05	05 To CPU	
3	Cooling Tower Make-up Water	80	80	160	55	55	110	--	--	--	25	25	50	50 To CPU	00
4	Fermenter Washing	10	10	20	--	--	--	--	--	--	10	10	20	20 To CPU	00
5	Miscellaneous such as pump and gland cooling etc.	10	10	20	--	--	--	10	10	20	--	--	--	--	--
6	Evaporator Condensate	--	--	--	--	--	--	**193**	**280**	**473**	--	--	--	--	--
7	Excess condensate from sugar unit	--	--	--	--	--	--	--	**397**	**397**					
Total		**550**	**1055**	**1605**	**55**	**95**	**150**	**203**	**1127**	**1330**	**292**	**230**	**522**	**275**	**247**

Note:

- All the effluent generated except spentwash shall be treated in CPU, after treatment used as process water.

Net water requirement:

i) Industrial: 1605 – 1330 – 275 = 00 m3/day

a. During season- Zero water requirement for distillery unit due to recycle of evaporator condensate, recycle of boiler blow down after treatment and use of available excess condensate from sugar unit.

b. During off season- distillery water requirement met from recycle of evaporator condensate, recycle of boiler blow down after treatment along with **stored excess condensate** and **stored harvested rainwater**. Therefore distillery unit works on zero water requirements.

Table 8 Water requirement calculations (existing as well as proposed)

Sr. No.	Description	Quantity in m3/day			
		Consumption/Loss	Final wastewater generation	Water requirements	Total water requirement
1	Present 45 KLPD distillery	55	167	222	**397**
2	Proposed 45 KLPD distillery	95	80	175	

Table 9 Water requirement calculation for distillery unit

Description	Daily water requirements/save	No. of working days	Total (m3/annum)		Final (m3/annum)
Existing 45 KLPD Distillery water requirements	222	270	59940	117690	**117690** (Water Requirement)
Proposed 45 KLPD Distillery water requirements	175	330	57750		
Excess Condensate and & Condensers Water	613(Save)	180	110340		**123340** (Water Save)
Stored harvested rainwater (See **Table 10.2**)	--	--	Around 13000		
Net Water Requirements					**-5650**

Note: After meeting the distillery water requirement, remaining water if any **(5650m3/annum**) shall be used for greenbelt purpose.

ii) Domestic: 11m3/day.

Effluent Generation:

i) Industrial: 522 m3/day(Spentwash = 247 m3/day, spentlees = 180 m3/day, Cooling make-up effluent = 50 m3/day, Washings = 20 m3/day, boiler blow down effluent – 20m3/day, and Dm plant wastewater – 05m3/day.

ii) Domestic: 8m3/day.

Remarks: 748m3/day is recycled into the process out of which 473 from evaporator condensate after concentration of digester effluent and 275m3/day from CPU.

2.2. Energy/Power

2.2.1.Manpower Requirement

After the proposed expansion project, direct employment of about 50 people will be generated and indirect employment of around 100 people is possible. Also, around 20 % increase in indirect employment is expected due to the additional transportation required after the proposed expansion.

2.2.2.Power Requirement

At present, power requirement by the industry is 12 MW, which is taken from its own 22 MW co-generation power plant and 2*500 KVA DG sets are installed for power back up. After the proposed expansion additional 6 MW of power will be required. Therefore total power requirement after the proposed expansion will be 18 MW, which shall be fulfilled from the proposed 34 MW co-generation power plant. Excess electricity produced will be supplied to the state electricity grid.

2.2.3.Land

The total area available with the factory is 30.66 Hectares. Out of which 11 Hectares is used for green belt development. A detailed area breakup is given in **Table 10.**

Table 10 Detailed land use planning along with green belt is given as below

Sr. No	Description	Existing(sq. m.)	Proposed(sq. m.)	Total Area(sq. m.)
1	Built up Area(Sugar Cogen and Distillery)	31000	18000	49000
2	Storage of Bagasse	8000	2000	10000
3	Sugar Godown	16500	--	16500
4	Parking Area	37215	--	37215
5	Colony Residential	35368		35368
6	ETP	8093		8093
7	Green Belt	82500	27500	110000
8	Vacant Land	87924	-47500	40424
Total		**306600**	**0**	**306600**

3. DESCRIPTION OF ENVIRONMENT

The main objectives of describing the environment, which may be potentially affected, are to assess present environmental quality and the environmental impacts and to identify environmentally significant factors. This chapter incorporates the description of existing environmental status within an area of 10 km radius circle with the plant at its centre (i.e. within 31400 ha. of area). The chapter contains information on existing environmental scenario of the proposed project study area.

3.1. LAND USE PATTERN OF THE STUDY AREA

The knowledge of land use and land cover is important for any planning and management activities as it is considered as an essential element for modeling and understanding the earth feature system. The land resources used for human purpose termed as **"land use"** which varies with the purposes it serves. According to Meyer (1995) Land use and land cover are distinct though they are closely linked characteristics of the earth's surface and there is no standard universally accepted set of categories for classifying land either by use or cover. In Environment Impact Assessment (EIA) projects Landuse condition is one of the vital aspects.

3.1.1.Data

In this landuse study both primary and secondary source of data is utilized. The Survey of India toposheet and satellite images are used for mapping. Especially the Land use within 10 km radius of the study area is studied with the help of satellite imagery. **Table 11** represents the details of used satellite data.

Table 11 Details of the used Satellite datasets

	Satellite	Sensor	Date	Path / Row	Source	Spectral Range	Spatial Resolution	Band
Dataset -I	Landsat	MSS	19-Jan-1976	157/0448	GLCF	0.5 – 1.1 µm	68m x 83m	4
Dataset–II	Landsat	ETM +	22-Oct-2000	146/048	GLCF	0.45 – 12.5 µm	30 m (60 m – thermal, 15- m pan)	5
Dataset–V	IRS	LISS – IV	22-Oct-2012	146/048	IIRS	0.45 – 12.5 µm	30 m (60 m – thermal, 15-m pan)	6

Source: GLCF web and Manuals

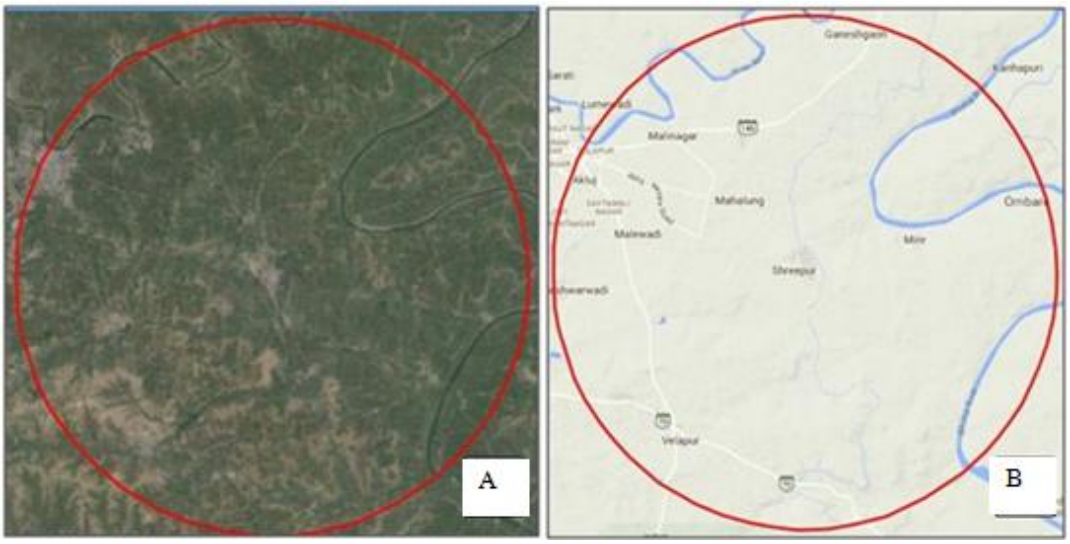


Figure 5 A) Bird Eye View of Study Area & B) Physiographic View

3.1.2.Landuse / Land cover Mapping

The land use classification within a distance of 10 kilometers from the project location and the areas coming under the respective classifications are as given in the **Table 12.** This data is derived from satellite imagery classification and final landuse land cover map.

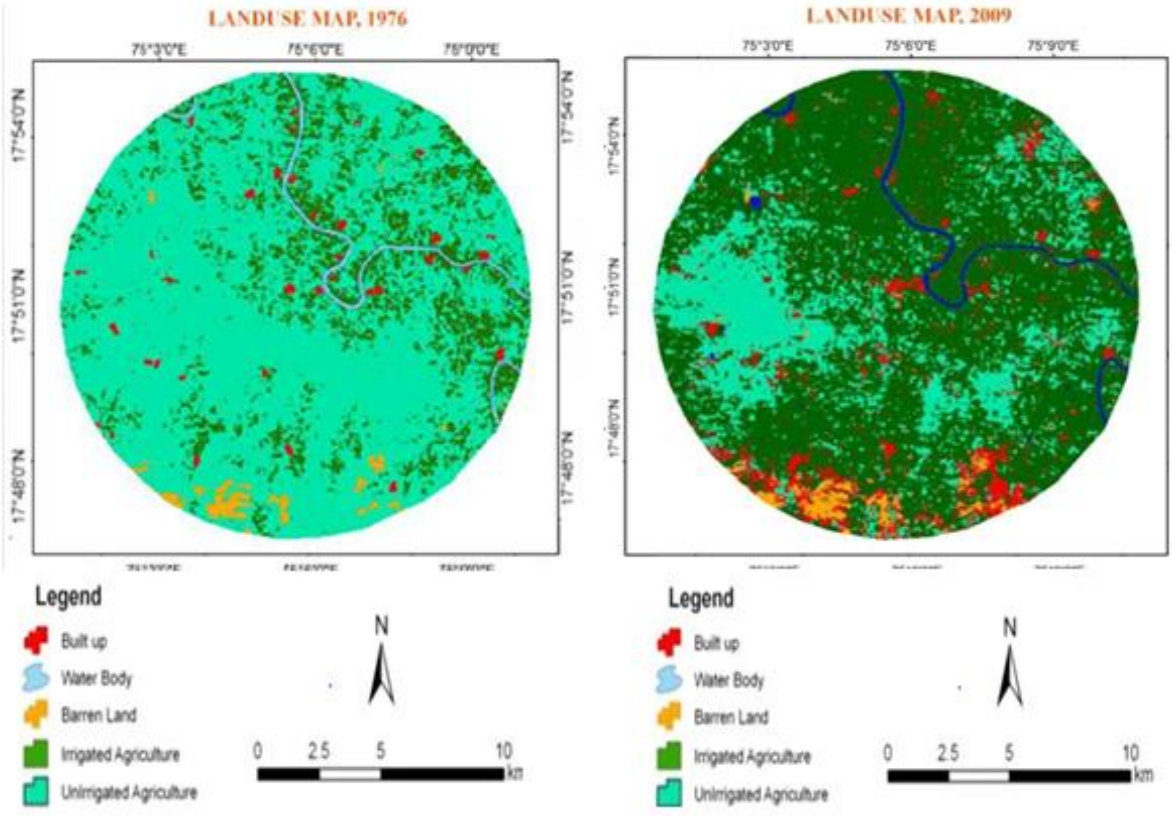


Figure 6 Landuse/Land cover map 1) 1976 & 2) 2009

3.1.3.Change in Land use (1976 to 2009)

Table 12 and **Figure 6** shows the landuse land cover condition of two different periods. During first time period (1976) the landuse condition was un-irrigated and dry. This is the time period when sugar factory was not established. At that time most of the agricultural land was un-irrigated and depend on rainfall.

Table 12 Change in General Landuse/ Land cover of Study Area (1976 to 2009)

Landuse Category	1976 (Area in Ha.)	% to Total	2009 (Area in Ha.)	% to Total	Change + /-	% Reduced + Increased
Barren Land	1522.32	4.85	570.83	1.82	-951.49	- 3.03
Water	302.10	0.96	341.19	1.09	39.09	+ 0.13
Settlement	1269.17	4.04	2229.57	7.10	960.40	+ 3.06
Irrigated Agriculture	7628.27	24.29	20637.27	65.72	13009	+ 41.43
Un Irrigated Agriculture	20678.14	65.85	7621.14	24.27	-13057	- 41.58
Total	**31400**	**100.00**	**31400**	**100.00**		

Source: Calculations based on Satellite data sets

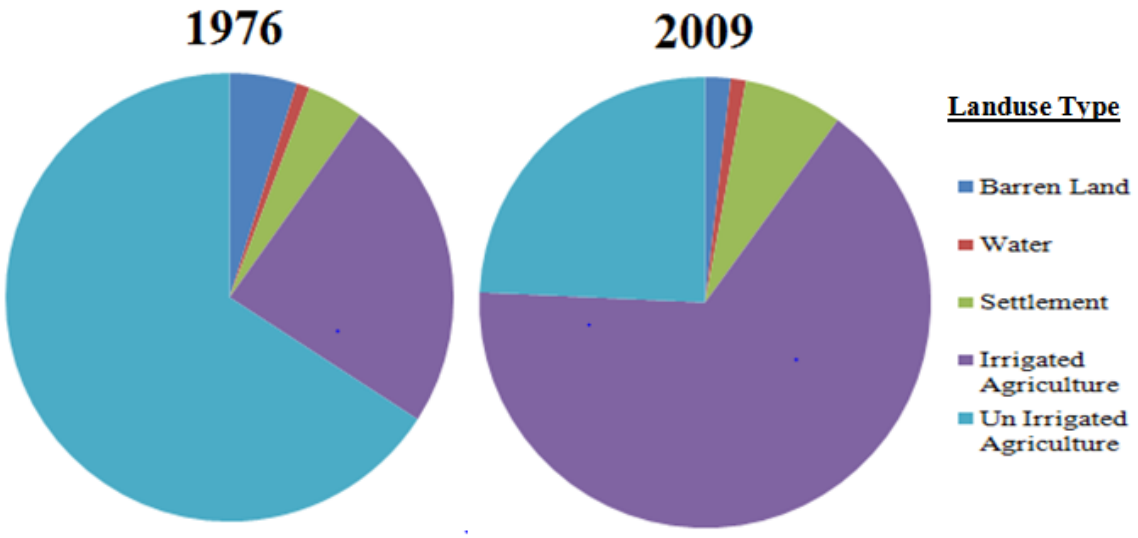


Figure 7 Pie chart showing change in Landuse pattern between year 1976 & 2009

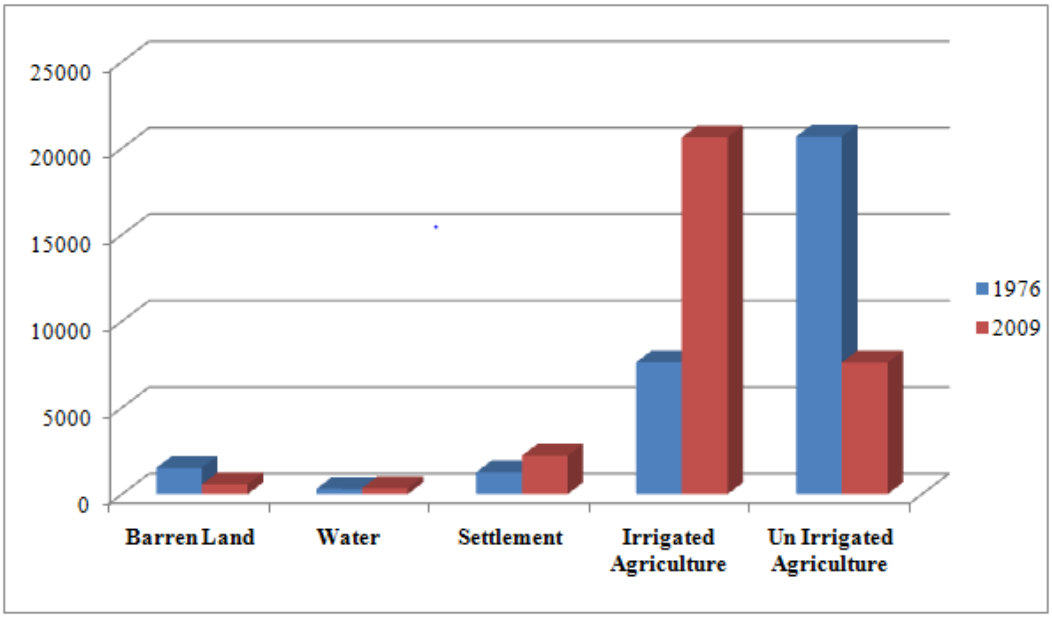


Figure 8 Bar chart showing change in Landuse pattern between year 1976 & 2009

In due course of time many irrigation schemes were launched in this region as a result un-irrigated and some barren land was brought under irrigation. In 1976 only 24.29% (7628.27 ha.) land was irrigated on the contrary 65.85% land (20678.14 ha.) was un-irrigated. In the year 2009 the scenario was drastically changed. The irrigated land becomes 65.72% to total land (20637.27 ha.) which is increased by 13009 ha. At the same time the proportion of un-irrigated area is decreased very fast by 24.27%. The area under settlement is also increased.

Land use, reflects the human activities, which indicates the agricultural landuse and manmade structures covering the land surfaces i.e. the modification of landscape. There are several transformations can be seen in the landuse category within 10 km radius from the sugar factory. The major transformations are occurred in the agricultural class where proportion of agriculture land is increased and most of the land is brought under utilization. In this transformation Pandurang sugar complex have played a great role. Overall in the landuse is greatly associated with the irrigation facilities and other transformation.

3.2. Geomorphological, Geological and Hydro-geological Status

Introduction-

Malshiras is the most representative Taluka of Solapur district and the Bhima valley where the major crops are sugarcane, jawar, groundnut etc. It lies towards west of the district place. It consists of more than 117 villages with a total area of about 1522 sq. km. Out of that factory location is having the coordinates of the region as 17º 51’ N and 75º 60’ E.

3.2.1.Geomorphology-

The area mainly consists of flat topography. There is no important hill system in the region. However there are a few scattered hills in the area under study with no significant relief. The area is thus characterized by flat and at places slightly undulating topography.

3.2.2.Drainage-

The term drainage describes the river system of the area. The streams within a drainage basin form certain patterns depending upon the slope of land underlying rock structure as well as the climatic conditions of the area. The Bhima River has carved a neatly developed drainage in the region. The dendritic drainage pattern develops where the river channel follows the general slope of terrain. Most streams are first to third order streams and prominently show dendritic drainage pattern which is typical of the Deccan Trap terrain.

Figure 9 Dendritic pattern of i) Bhima River & ii) Bhima River basin

3.2.3.Soil-

The Malshiras taluka consists of different types of soil such as light black, reddish and the black cotton soil (BCS) which contains high alumina and carbonates of Ca and Mg. A typical characteristic of the soil is that it swells when wet and dries up with cracks on loosing moisture. The thickness of the soil cover shows a large variation and ranges from few centimeters to 5 meters. The soil is mostly non retentive in nature.

Figure 10 Typical Black cotton Soil

3.2.4.Geology-

The only geological formation in the region is the Deccan Trap Basalts (Cretaceous-Eocene). Basalts normally occur with a horizontal disposition, however at places gentle dips can be observed. Deccan Trap Basalts of the region are dark grey to greenish grey in colour and contains augite and plagioclase as the essential minerals.

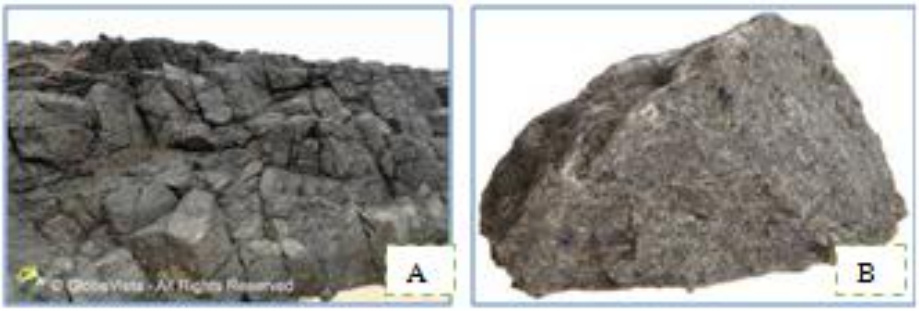


Figure 11 A) Exposure of Deccan Trap & B) Specimen of Basalt

3.2.5.Hydrogeology-

The main aquifers in the region are the inter-trappean beds or decomposed zones of the deccan traps. At places the presence of joints and vesicles yield sufficient quantity of ground water. The area is well irrigated due to the canals from Ujani and Nira dam and the main source of wells is the percolation from irrigated land. However most of the deep bore wells yield sufficient quantity of ground water. Malshirastaluka receives an average **rainfall 545 mm. with 40 rainy days on an average**

Figure 12 Ujani Dam

3.3. Air Environment

Ambient air monitoring was carried out at 8 locations (two inside the factory premise and 6 within study area) twice a week at each location over/for a period of three months to determine background concentrations. The Maximum concentrations of each pollutant observed is considered as a background concentration of the respective location, the results of which are given in Table below. AERMOD 8.0.5 is used to compute incremental concentrations due to the proposed establishment. Total concentrations are compared with the National Ambient Air Quality Standards.

Table 13 Receptors Summary

Sr. No	Location	Latitude	Longitude	Distance from Stack	Angle w. r. t. Stack
S-1	Stack-1	17°51'2.35"N	75°6'14.49"E		
S-2	Stack-2	17°51'8.42"N	75°6'11.11"E		
A-1	Near Main Gate	17°51'8.24"N	75° 6'7.99"E	270	313
A-2	Near ETP	17°50'49.00"N	75°6'24.02"E	500	146
A-3	Section 11- Wadibangala	17°50'44.87"N	75° 7'7.28"E	1650	108
A-4	Nevare	17°50'8.00"N	75°10'45.02"E	8140	102
A-5	Borgaon	17°50'11.32"N	75°6'36.25"E	1670	158
A-6	Mire	17°51'41.33"N	75°8'39.52"E	4440	74
A-7	D-19	17°50'31.16"N	75° 5'1.16"E	2370	246
A-8	Mahalung	17°52'16.37"N	75°5'35.08"E	2570	333

Table 14 Existing ScenarioOR Maximum Background concentrations of Ambient Air

Sr. No.	Receptor/Village	PM_{10}(µg/m3)	$PM_{2.5}$(µg/m3)	SO_2(µg/m3)	NOx(µg/m3)	CO(mg/m3)
1	Near Main Gate	64.4	41.2	45.5	36.2	1.2
2	Near ETP	64.5	41.5	45.6	36.3	1.2
3	Section 11-Wadibangala	49.3	33.3	36.5	29.6	1.0
4	Nevare	46	31.8	35.4	27.5	1.1
5	Borgaon	53.4	36.1	39.4	32.5	1.3
6	Mire	45.3	25.4	34.5	30.7	0.7
7	D-19	37.3	23.5	25.9	25.4	0.9
8	Mahalung	36.1	20.2	24	22.1	0.9

Table 15 PM_{10}& PM $_{2.5}$- 24 hr. Concentrations, computed by AERMOD 8.0.5

		PM_{10}- 24 hour concentration (µg/m3)			$PM_{2.5}$- 24 hour concentration (µg/m3)		
Sr. No.	Receptor/Village	Background	Incremental	Total	Background	Incremental	Total
1	Near Main Gate	64.4	0.36	64.76	41.2	0.03	41.23
2	Near ETP	64.5	0.98	65.48	41.5	0.15	41.65
3	Section 11-Wadibangala	49.3	0.57	49.87	33.3	0.08	33.38
4	Nevare	46	0.36	46.36	31.8	0.03	31.83
5	Borgaon	53.4	0.42	53.82	36.1	0.04	36.14
6	Mire	45.3	0.31	45.61	25.4	0.04	25.44
7	D-19	37.3	0.42	37.72	23.5	0.03	23.53
8	Mahalung	36.1	0.40	36.5	20.2	0.03	20.23

Table 16 SO_2& NO_X-24 hr. Concentrations, computed by AERMOD 8.0.5

		SO_2 - 24 hour concentration (µg/m3)			NOx - 24 hour concentration (µg/m3)		
Sr. No.	**Receptor/Village**	**Background**	**Incremental**	**Total**	**Background**	**Incremental**	**Total**
1	Near Main Gate	45.5	0.65	46.15	36.2	0.55	36.75
2	Near ETP	45.6	3.01	48.61	36.3	3.18	39.48
3	Section 11-Wadibangala	36.5	1.54	38.04	29.6	1.63	31.23
4	Nevare	35.4	0.51	35.91	27.5	0.54	28.04
5	Borgaon	39.4	0.86	40.26	32.5	0.90	33.4
6	Mire	34.5	0.74	35.24	30.7	0.78	31.48
7	D-19	25.9	0.66	26.56	25.4	0.69	26.09
8	Mahalung	24	0.61	24.61	22.1	0.65	22.75

3.4. Isopleths:

Isopleths or contours are plotted by software model (AERMOD). The same colour represents the same concentration value range. Under the conditions of this meteorological scenario, dispersion pattern is obtained; following dispersion contours (or Isopleths) are based on the incremental concentrations due to the proposed expansion capacity of sugarcane complex.

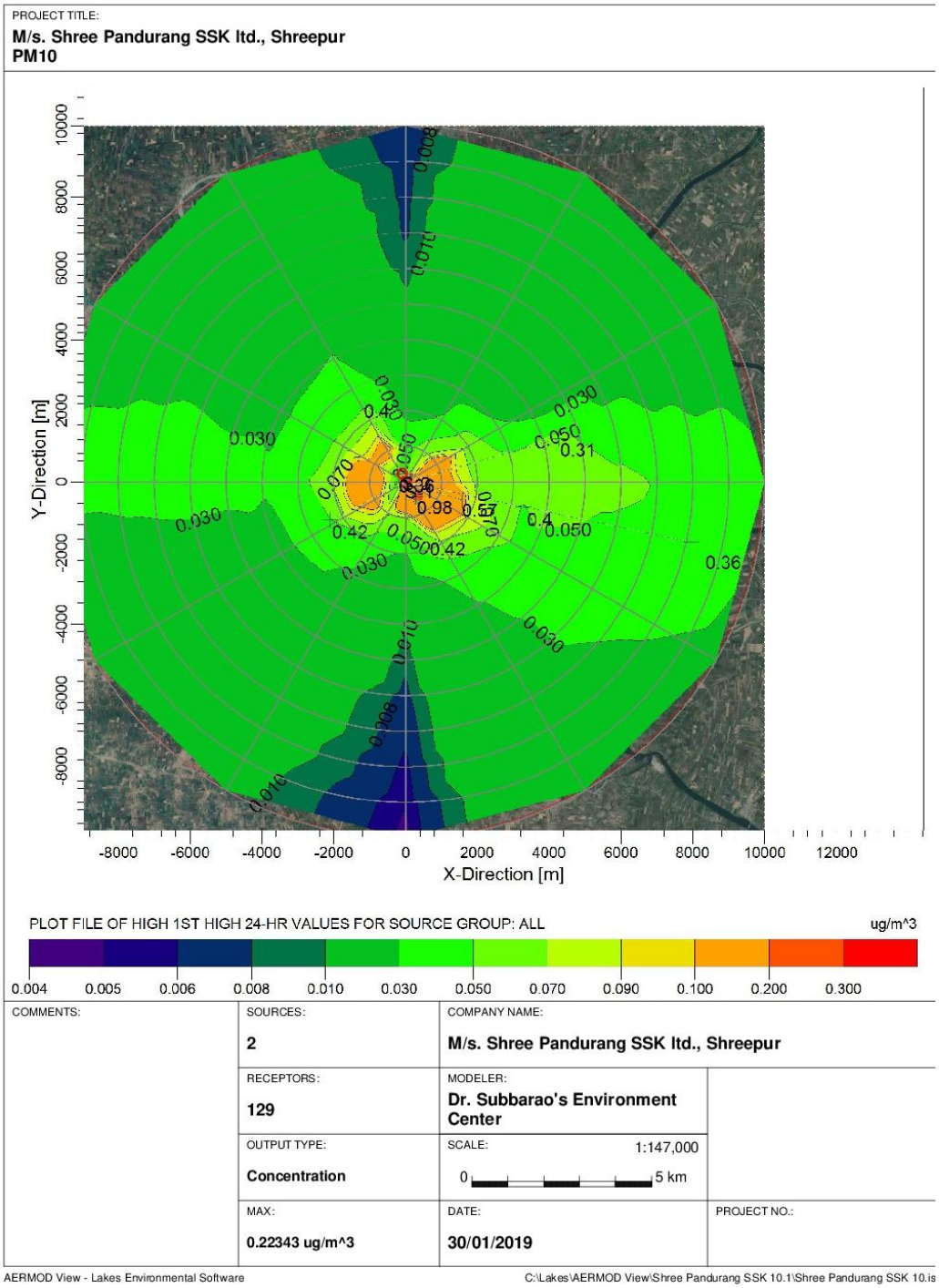


Figure 13 Concentration Isopleths for PM10 incremental concentrations

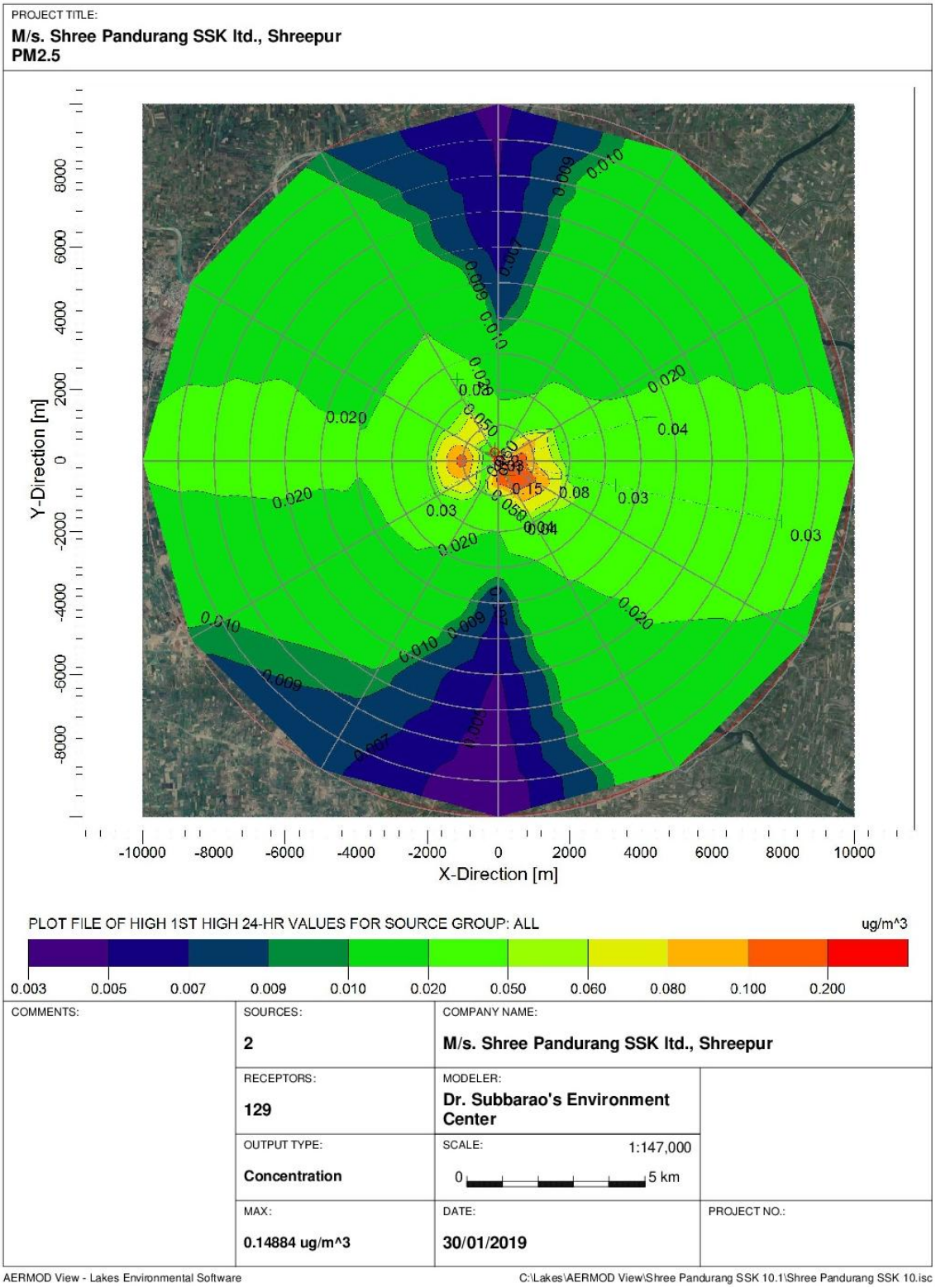


Figure 14 Concentration Isopleths for PM2.5 incremental concentrations

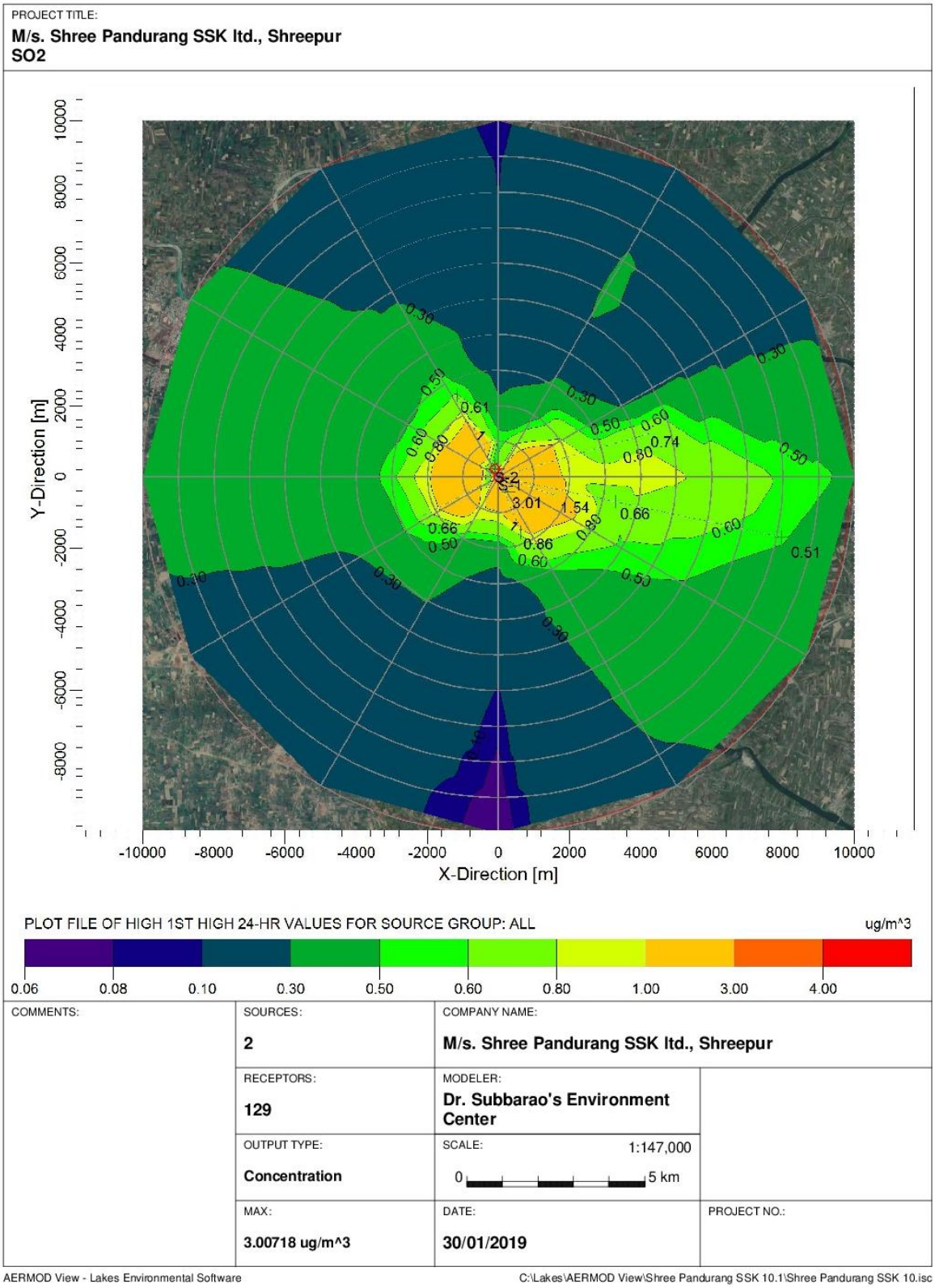


Figure 15 Concentration Isopleths for SO2 incremental concentrations

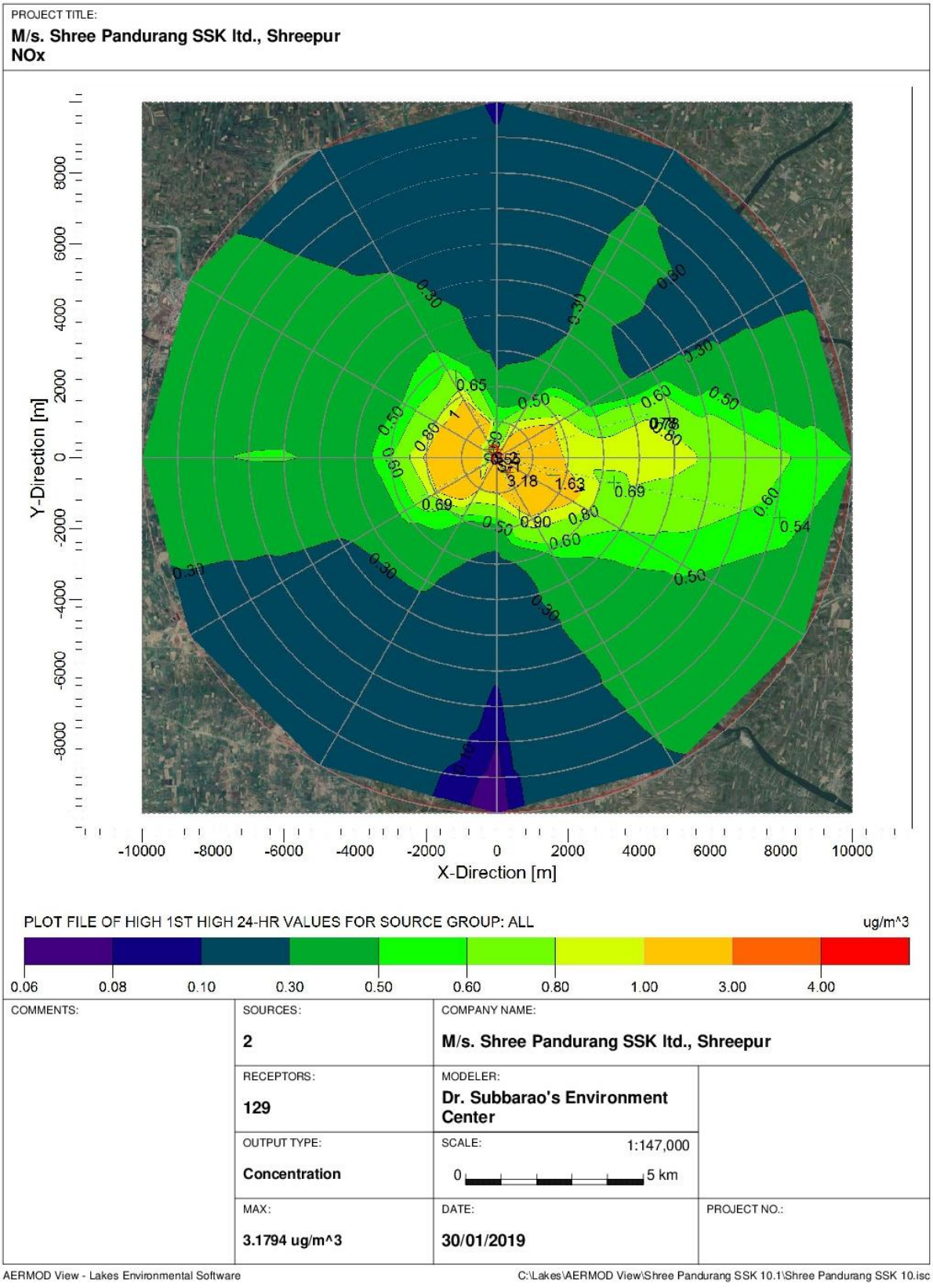


Figure 16 Concentration Isopleths for NOx incremental concentrations

CONCLUSIONS:

Two numbers of 55 TPH boilers and one 20 TPH (i.e. existing) and one 80 TPH Boiler for co-generation and one 20 TPH incinerator boiler (i.e. after expansion) are considered to estimate the GLC of PM_{10}, $PM_{2.5}$, SO_2 and NO_X due to the proposed modeling., under the prevailing conditions of meteorology and emissions. Incremental concentrations are worked out for 8 receptor locations, at which ambient air quality monitoring was carried out. Total concentrations are computed considering background concentrations and incremental concentrations (AERMOD) due to the proposed expansion. Results are compared with the Ambient Air Quality Standards (AAQS).

At the selected 8 receptor locations, surrounded in 10 km radius around SPSSK Ltd., Shreepur, Taluka-Malshiras, Dist.-Solapur GLCs are well within the limits of AAQS. Results of the Ambient Air monitoring are enclosed in the **Annexure III.**

From the results it can said that,

- PM10GLCs at all the 8 receptor locations are in the range of **36.50 µg/m3to 64.76**µg/m3 which are within the limits of AAQS.
- Similarly, $PM_{2.5}$ GLCs for those receptors are in the range of **20.23 µg/m3to 41.65µg/m3**which are within the limits of AAQS.
- For SO2, GLCs are in the range of **24.61 µg/m3to 48.61 µg/m3**which are within the limits of AAQS
- NO_X GLCs are in the range of **22.75µg/m3to 39.48µg/m3**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 expansion of Sugarcane crushing capacity from 6000 TCD to 10000 TCD, Distillery from 45 KLPD to 90 KLPD and expansion in co-generation power plant from 22 MW to 34 MW.

3.5. Water Environment:

3.5.1.Ground Water

According to the Standard ToRs, Groundwater quality monitoring was carried out 8 Locations, within the study area. The sampling was done as per the CPCB Guidelines. The details of the Groundwater sampling locations are given in **Table 17**, and the analysis results are reported in **Table 18.**

Table 17 Groundwatersampling locations

Legend	Description	Latitude	Longitude
A	Project Site – Colony Well Water	17°51'8.30"N	75° 6'5.80"E
B	Shri BhagwanHaridasZagade Sr. No 15 (Lawang) – Borewell Water	17°53'4.84"N	75° 7'30.43"E
C	Shri ChandrakantNivrutiIngale - Sr. No 176 (Mire) – Borewell Water	17°51'43.45"N	75° 8'27.23"E
D	Smt. GodabaiDattuSalunkhe - Sr. No 42 (Malinagar) – Borewell Water	17°54'10.49"N	75° 3'19.30"E
E	Shri SadashivRamuJadhav - Sr. No 239 (Khandali) – Borewell Water	17°50'1.23"N	75° 2'35.16"E
F	Shri ShivajiDaduPawar – Sr. No 1339 (Velapur) – Borewell Water	17°47'25.54"N	75° 3'12.83"E
G	Shri Jaganath Krishna Kurale - Sr. No 135 (Bondale) Borewell Water	17°46'53.49"N	75° 7'0.97"E
H	Shri ArunKishanGaikwad - Sr. No 531 (Borgaon) – Borewell Water	17°50'7.40"N	75° 6'29.06"E

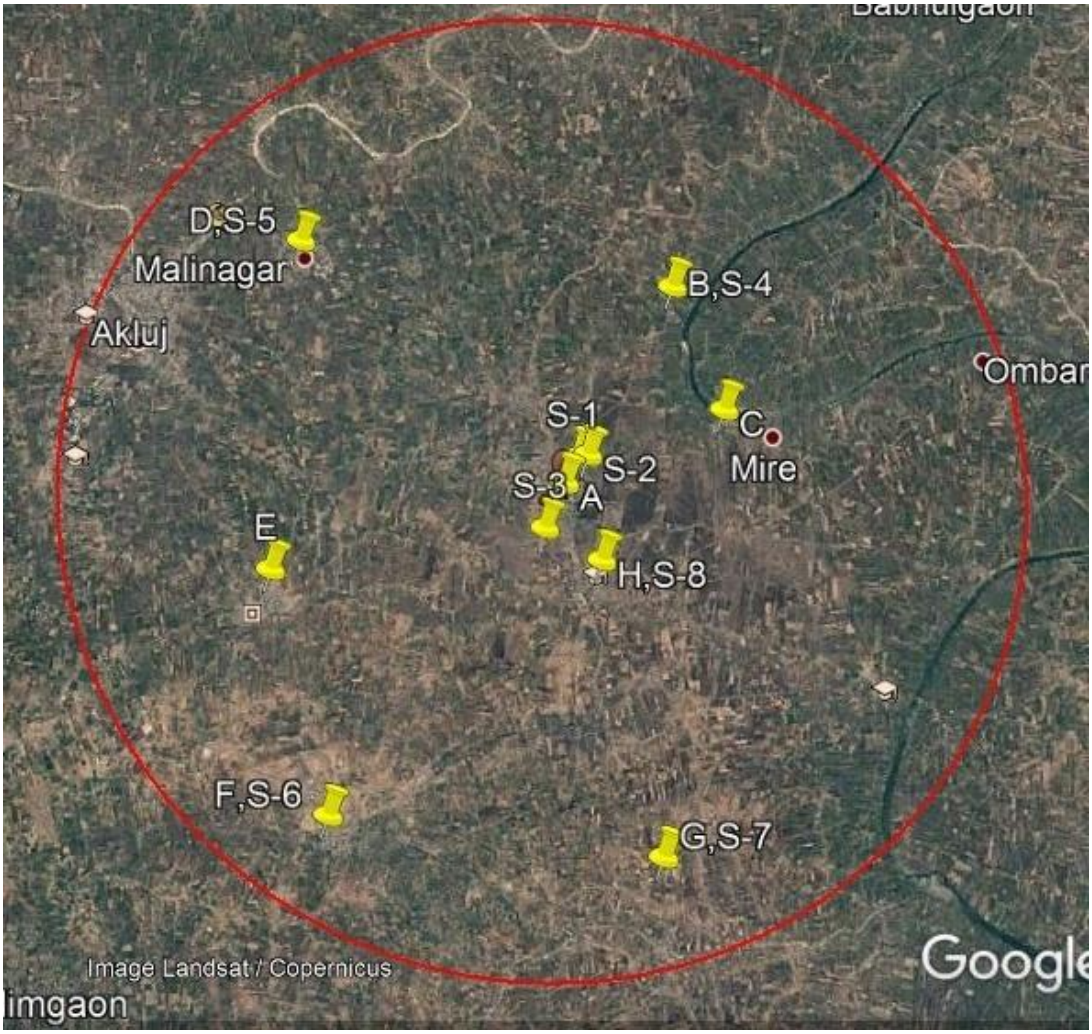


Figure 17 Map showing locations of ground water and soil samples.

ANALYSIS REPORT

Date of sampling: 14th Dec 2019

Sample Description: GroundWater Samples

Table 18 Groundwater quality analysis results

Sr. No.	Test Parameter	Unit	Results								Desirable	Permissible
			A	B	C	D	E	F	G	H	IS 10500:2012 Standards	
1	Color	Hazen	< 5								<5	15
2	Odor	--	Agreeable								Agreeable	Agreeable
3	pH	-	7.6	7.5	7.65	7.55	7.8	7.35	7.81	7.76	6.5-8.5	No relaxation
4	Turbidity	NTU	0.5	0.8	1.7	1.1	0.8	0.3	0.9	1	1	5
5	Total Dissolved Solids	mg/l	321	342	403	487	543	543	492	611	500	2000
6	Electrical Conductivity	µmhos/cm	518	543	655	744	848	890	799	953	--	--
7	Total Hardness (as $CaCO_3$)	mg/l	241	312	271	426	484	431	358	515	200	600
8	Calcium Hardness(as $CaCO_3$)	mg/l	183	233	200	330	363	323	270	390	--	--
9	Magnesium Hardness(as $CaCO_3$)	mg/l	58	79	71	96	121	108	88	125	--	--
10	Calcium (as Ca)	mg/l	73	93	80	132	145	129	108	156	75	200
11	Magnesium (as Mg)	mg/l	14	19	17	23	29	26	21	30	30	100
12	Total Alkalinity (as $CaCO_3$)	mg/l	167	161	202	191	280	294	227	310	200	600
13	Chlorides (as Cl)	mg/l	74	89	112	158	118	132	163	144	250	1000
14	Sulphate (as SO_4)	mg/l	19	15	23	17	34	39	26	40	200	400
15	Total Nitrate (as	mg/l	3.7	4.8	6.1	4.9	5.6	5.8	5.9	6.1	45	No

	NO_3)											Relaxation
16	Total Nitrogen (as N)	mg/l	< 0.25	< 0.5	< 0.25	< 0.25	< 0.25	< 0.5	< 0.25	< 0.25	--	--
17	Total Phosphate (as PO_4)	mg/l	< 0.03	< 0.02	< 0.02	< 0.01	< 0.01	< 0.03	< 0.02	< 0.01	--	--
18	Ammonia (as total ammonia-N)	mg/l	< 0.25	< 0.25	< 0.3	< 0.25	< 0.25	< 0.25	< 0.25	< 0.5	0.5	No Relaxation
19	Copper (as Cu)	mg/l	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.05	1.5
20	Manganese (as Mn)	mg/l	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.07	< 0.05	< 0.09	0.1	0.3
21	Iron (as Fe)	mg/l	0.1	0.1	0.2	0.1	0.1	0.3	0.2	0.3	1.0	No Relaxation
22	Fluoride (as F)	mg/l	0.47	0.43	0.6	0.52	0.8	1.0	0.6	1.0	1	1.5
23	Cyanide (as CN)	mg/l	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.05	No Relaxation
24	Phenolic Compounds(as C6H5OH)	mg/l	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.002
25	Boron (as B)	mg/l	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.6	< 0.5	< 0.7	0.5	1
26	Zinc (as Zn)	mg/l	< 0.1	< 0.1	< 0.2	< 0.1	< 0.2	< 0.3	< 0.2	< 0.4	5	15
27	Aluminium (as Al)	mg/l	< 0.02	< 0.02	< 0.03	< 0.02	< 0.02	< 0.03	< 0.02	< 0.02	0.03	0.2
28	Cadmium (as Cd)	mg/l	< 0.002	<0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.003	0.003	No Relaxation
29	Lead (as Pb)	mg/l	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	
30	Nickel (as Ni)	mg/l	< 0.01	< 0.02	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.02	0.02	
31	Mercury (as Hg)	mg/l	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001	
32	Arsenic (as As)	mg/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	
33	Selenium (as Se)	mg/l	< 0.005	<0.005	<0.01	<0.005	<0.01	< 0.005	<0.005	<0.005	0.01	
34	Sodium (as Na)	mg/l	29	15	34	26	31	23	21	35	--	--
35	Potassium (as K)	mg/l	1.8	1.6	1.9	2.8	3.7	4.3	2.9	4.1	--	--
36	Chemical Oxygen Demand	mg/l	34	16	29	28	31	37	30	40		
37	BOD 3 days at 27^oC	mg/l	7	< 4	< 4	< 4	< 4	8	< 4	8		

38	MPN (Coliform bacteria)	MPN/100ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	No Relaxation

3.5.2. Surface water

Surface water quality was assessed at upstream and downstream of Bhima River and one location on Nira canal. The details of the surface water analysis results are given the **Table 19.**

ANALYSIS REPORT

Date of sampling: 14th Dec 2019

Sample Description: SurfaceWater Samples

Table 19 Surface water quality analysis results

S. No.	Test Parameter	Unit	Bhima River (Results)		Nira Right Bank Canal (Results)	Permissible	
			Up-stream	Down-stream		IS 10500:2012 Standards	
1	Color	Hazen	< 5			5	15
2	Odor	--	Agreeable			Agreeable	Agreeable
3	pH	-	7.55	7.58	7.4	6.5-8.5	No relaxation
4	Turbidity	NTU	2.8	3.1	2.2	1	5
5	Total Dissolved Solids	mg/l	257	326	161	500	2000
6	Electrical Conductivity	µmhos/cm	400	501	258	--	--
7	Total Hardness (as $CaCO_3$)	mg/l	198	251	109	200	600
8	Calcium Hardness(as $CaCO_3$)	mg/l	148	193	85	--	--
9	Magnesium Hardness(as $CaCO_3$)	mg/l	50	58	24	--	--
10	Calcium (as Ca)	mg/l	59	77	34	75	200
11	Magnesium (as Mg)	mg/l	12	14	5.8	30	100
12	Total Alkalinity (as $CaCO_3$)	mg/l	135	165	90	200	600
13	Chlorides (as Cl)	mg/l	48	55	34	250	1000
14	Sulphate (as SO_4)	mg/l	12	19	8	200	400
15	Total Nitrate (as NO_3)	mg/l	4.8	6.0	3.9	45	No Relaxation
16	Total Nitrogen (as N)	mg/l	< 0.25	< 0.25	< 0.25	--	--
17	Total Phosphate (as PO_4)	mg/l	< 0.1	< 0.1	< 0.1	--	--
18	Ammonia (as total ammonia-N)	mg/l	< 0.25	< 0.25	< 0.25	0.5	No Relaxation
19	Copper (as Cu)	mg/l	< 0.02	< 0.02	< 0.02	0.05	1.5
20	Manganese (as Mn)	mg/l	< 0.05	< 0.05	< 0.05	0.1	0.3
21	Iron (as Fe)	mg/l	0.2	0.1	0.2	1.0	No Relaxation

22	Fluoride (as F)	mg/l	0.6	0.6	0.5	1	1.5
23	Cyanide (as CN)	mg/l	< 0.04	< 0.04	< 0.04	0.05	No Relaxation
24	PhenolicCompounds(as C6H5OH)	mg/l	< 0.001	< 0.001	< 0.001	0.001	0.002
25	Boron (as B)	mg/l	< 0.1	< 0.1	< 0.1	0.5	1
26	Zinc (as Zn)	mg/l	< 0.2	< 0.2	< 0.3	5	15
27	Aluminium (as Al)	mg/l	< 0.02	< 0.02	< 0.02	0.03	0.2
28	Cadmium (as Cd)	mg/l	< 0.002	< 0.002	< 0.002	0.003	No Relaxation
29	Lead (as Pb)	mg/l	< 0.005	< 0.005	< 0.005	0.01	
30	Nickel (as Ni)	mg/l	< 0.01	< 0.01	< 0.01	0.02	
31	Mercury (as Hg)	mg/l	< 0.001	< 0.001	< 0.001	0.001	
32	Arsenic (as As)	mg/l	< 0.01	< 0.01	< 0.01	0.01	
33	Selenium (as Se)	mg/l	< 0.005	< 0.005	< 0.005	0.01	
34	Sodium (as Na)	mg/l	31	42	23	--	--
35	Potassium (as K)	mg/l	2.7	4.1	2.1	--	--
36	Chemical Oxygen Demand	mg/l	60	71	38		
37	BOD 3 days at 27^oC	mg/l	19	23	12		
38	MPN (Coliform bacteria)	MPN/100ml	250	1100	120	No Relaxation	

3.5.3. Conclusions

- Ground Water quality appears to be satisfactory except in few wells hardness is high, however; water can be used for irrigation purpose. It can be used for drinking purpose after appropriate treatment.
- Surface Water quality appears to be satisfactory, however; water can be directly used for irrigation purpose. It can be used for drinking purpose after Conventional Treatment.

3.6. Soil Environment

Soil quality is assessed at 8 locations; the samples were collected as per the CPCB guidelines. The details of soil quality monitoring location are given in **Table 20** and the analysis results are reported in **Table 21**.

Table 20 Description of soil sampling locations (See Figure 17)

Legend	Description of soil sample locations	Latitude	Longitude
S-1	Project site near spentwash storage	17°51'16.90"N	75° 6'16.09"E
S-2	Project site near compost yard	17°51'18.03"N	75° 6'22.89"E
S-3	Compost applied field at shreepur near factory site	17°50'29.80"N	75° 5'50.36"E
S-4	Shri Bhagwan Haridas Zagade Sr. No 15 (Lawang)	17°53'4.84"N	75° 7'30.43"E
S-5	Smt. Godabai Dattu Salunkhe - Sr. No 42 (Malinagar)	17°54'10.49"N	75° 3'19.30"E
S-6	Shri Shivaji Dadu Pawar – Sr. No 1339 (Velapur)	17°47'25.54"N	75° 3'12.83"E
S-7	Shri Jaganath Krishna Kurale - Sr. No 135 (Bondale)	17°46'53.49"N	75° 7'0.97"E
S-8	Shri ArunKeshan Gaikwad - Sr. No 531 (Borgaon)	17°50'7.40"N	75° 6'29.06"E

Analysis Report Soil Quality

Date of sampling: 14th Dec 2019

Sample Description: Soil samples

Table 21 Analysis report of soil samples at eight location

Sr. No.	Parameter	Unit	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8
1	Colour	--	Dark Grayish	Dark Brownish Black	Dark Brown	Vary Dark Gray	Dark Grayish Brown	Grayish Brown	Dark Grayish brown	Dark brown
2	pH	--	7.5	7.8	7.7	8.1	8.2	7.4	7.9	7.8
3	Conductivity	mS/m	0.81	0.73	0.83	0.58	0.39	0.91	0.88	0.72
4	Texture	--	Loam	Clay Loam			Sandy Loam	Clay Loam		
5	Calcareous matter	%	4.3	10.4	8.4	5.9	7.1	7.9	7.8	4.7
6	Available P_2O_5	Kg/Ha	29	31.24	33.56	16.57	15.45	21.86	22.56	25.07
7	Available K_2O	Kg/Ha	165.26	135.45	161.11	182.30	173.22	172.43	181.06	178.74
8	Available Nitrogen	Kg/Ha	236	202	207	235	255	227	248	249
9	Organic Carbon	%	0.71	0.76	0.69	0.69	1.01	0.97	0.94	0.82
10	Sodium	ppm	31	38	51	45	28	47	40	57
11	Calcium	ppm	1720	2350	2768	2208	1560	2604	2380	3295
12	Potassium	ppm	367	298	420	512	301	416	289	397
13	Magnesium	ppm	148	387	456	385	179	403	366	464
14	Water Holding capacity	%	67.17	49.23	45.37	51.58	43.56	42.15	54.32	46.46
15	Cation Exchange capacity	meq/100 gm.	10.91	15.90	18.94	15.761	10.19	17.65	15.86	21.61

3.7. NOISE LEVELS FOR SURROUNDING VILLAGES

Noise Monitoring was performed at the factory site and at surrounding villages. The ambient/source noise values during day time as well as during night time are computed, and the results are given in the **Table 22**.

Analysis Report on Noise level

Date of sampling: 14th Dec 2019

Table 22 Noise level Analysis report

Sr. No.	Station	Standard Limit dB(A) Leq	Time	dB (A) Leq
Inside factory premises				
1.	Factory Main Gate	75	Day	61.5
		70	Night	49.9
2.	Near ETP Plant	75	Day	62.2
		70	Night	48.8
3.	Near Boiler	75	Day	83.6
		70	Night	78.1
4.	Near Compressor	75	Day	84.2
		70	Night	77.9
5.	Near Turbine	75	Day	88.5
		70	Night	84.1
6.	Near Mill house	75	Day	87.6
		70	Night	83.4
Outsite factory (withing study area)				
1.	Lawang(Nr. Gram Panchyat Office)	55	Day	47.3
		45	Night	42.1
2.	Malinagar(Nr. Gram Panchyat Office)	55	Day	46.6
		45	Night	40.0
3.	Khandali(Nr. Gram Panchyat Office)	55	Day	47.1
		45	Night	42.9
4.	Welapur(Nr. Gram Panchyat Office)	55	Day	48.3
		45	Night	43.1
5.	Bondale(Nr. Gram Panchyat Office)	55	Day	43.7
		45	Night	36.8
6.	Borgaon(Nr. Gram Panchyat Office)	55	Day	45.2
		45	Night	39.1

Conclusion: Noise Monitoring was carried out at factory site and in surrounding villages as well. As the Noise levels are not exceeding in the surrounding villages, both at day and night times. Whereas, in some of the stations in the factory premises, Noise Levels are found to be slightly exceeding the desired limits (i.e. near Compressor, near Turbine and near mill house). The industry is making all efforts to control the noise levels within the limits by providing acoustic measures and silencer pads etc. The employees in these work places are provided with ear plugs / muffs.

3.8. Ecology and Biodiversity:

- The ecology and biodiversity studies indicate that Shannon Weiner index for plant varies between **3.23** to **4.18** and species richness of plant population from **50** to **125**.
- The Shannon Weiner index of bird's population varies between **1.80** to **2.90** and species richness from **7** to **22.**

Thus Shannon Weiner index indicates the maximum species diversity within the study area of factory.

3.9. Socioeconomic Environment: s

The socioeconomic studies indicate that the social, cultural and economic development have substantially improved by the establishment of the industries in and around the project area. There are no complaints with regard to the existing as well as proposed expansion of the sugar, distillery and co-generation power plants. The industry provides employment to the nearby villagers and helps the socioeconomic conditions of the surrounding villages as there will be a certain amount of money is allotted for corporate social responsibility as per the guidelines of the MoEF&CC. The expansion has positive outcomes which is 1:11 which means the benefits are 11 times more than the loss. Rainwater harvesting has been implemented and collected in to spray pond tank and also used for process/green belt development after treatment.

4. Pollution Control and Management:

4.1. Waste Water Treatment Facilities:

A. Wastewater generated from Sugar & Co-generation Division after expansion shall be 1472 m3/day (Sugar effluent - 375m3/day, co-generation power plant effluent - 97m3/day, spray pond Overflow-1000m3/day).

B. Domestic effluent generated is 28m3/day.

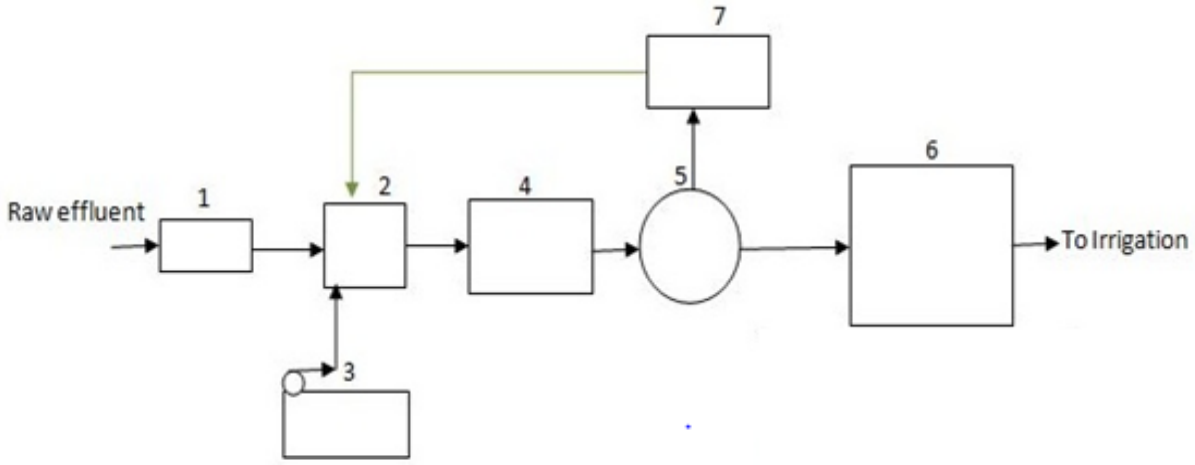
C. Distillery unit effluent generated shall be 522 m3/day (Spentwash = 247 m3/day, spentlees = 180 m3/day, Cooling make-up effluent = 50 m3/day, Washings = 20 m3/day, DM plant effluent = 05 m3/day and boiler blow down effluent = 20 m3/day.

The existing sugar ETP is designed for 450m3/day, consisting of Preliminary treatment (Oil & Grease trap, screen, "V" notch), Anaerobic lagoon, Aeration Tank, Secondary Clarifier, Monthly washing holding Tank, Sludge Drying Bed and 15 days treated storage tank. The quantity of wastewater generated from sugar and co-generation unit shall be 472m3/day, therefore sugar ETP shall be up-graded by providing primary treatment as an anaerobic filter and for secondary treatment MBBR media shall be installed in the existing aeration tank, Sludge drying bed followed by clarifier followed by sand and Activated charcoal filter in order to treat sugar and co-generation effluent together and disposed on land for irrigation. Spray pond overflow shall be treated separately having a capacity of 1200 m3/day, based on Primary and Secondary treatment. The treated effluent shall be disposed on land for irrigation. The excess condensates shall be recycled back into the process by treating it into the proposed CPU of 3000 m3/day capacity. (CPU treatment shall have anaerobic filter , Aeration Tank, clarifier, Sand and Activated Charcoal filter). The treated excess condensates shall be used for irrigation purpose after meeting the industrial water requirement.

The Domestic wastewater of 28m3/day shall be treated on the principles of Root Zone Technology and treated effluent shall be used for gardening/irrigation.

Spentwash generated from existing 45 KLPD distillery unit are 167 m3/day and spentwash generated after proposed expansion of 45 KLPD distillery unit shall be 80m3/day. The spentwash generated from existing 45KLPD distillery unit are treated using present treatment based on "Composting principles" and the spentwash generated from the proposed 45 KLPD distillery shall be treated on the principle of concentration and incineration technology i.e. concentration in MEE and incinerated in boiler. Other effluent like spentless, cooling make up effluent, fermented washing, DM plant effluent and boiler blow down effluent shall be treated in condensate polishing unit and recycled as process water / make up water for cooling tower.

Note: 9.0 acre of composting yard is used for composting of spentwash generated from present 45 KLPD distillery. For the proposed expansion of 45 KLPD distillery capacity, Incinerator Boiler shall be installed.



Sr.No.	Treatment units	Capacity
1	Oil and grease trap	--
2	Anaerobic lagoon	15 x 46 m at Bottom, 23.6 x 54.6m at Top & liquid depth - 3.0 m.
3	Monthly washing tank	17 x 20 m at Bottom, 20.4 x 23.4m at Top & liquid depth - 1.2 m.
4	Aeration tank	15m*17m at Bottom, and 23.6m*25.6m at Top & liquid depth – 3.0 m.
5	Secondary Clarifier	Dia- 8.0 m & liquid depth – 3.5 m.
6	Treated effluent sump 15 day storage capacity	17 x 112.5 m at Bottom, 24 m x 119.5m at Top & liquid depth–3.0 m.
7	Sludge drying bed	5m x 8m x 2 Nos.

Figure 18 Existing Sugar ETP Flow Sheet

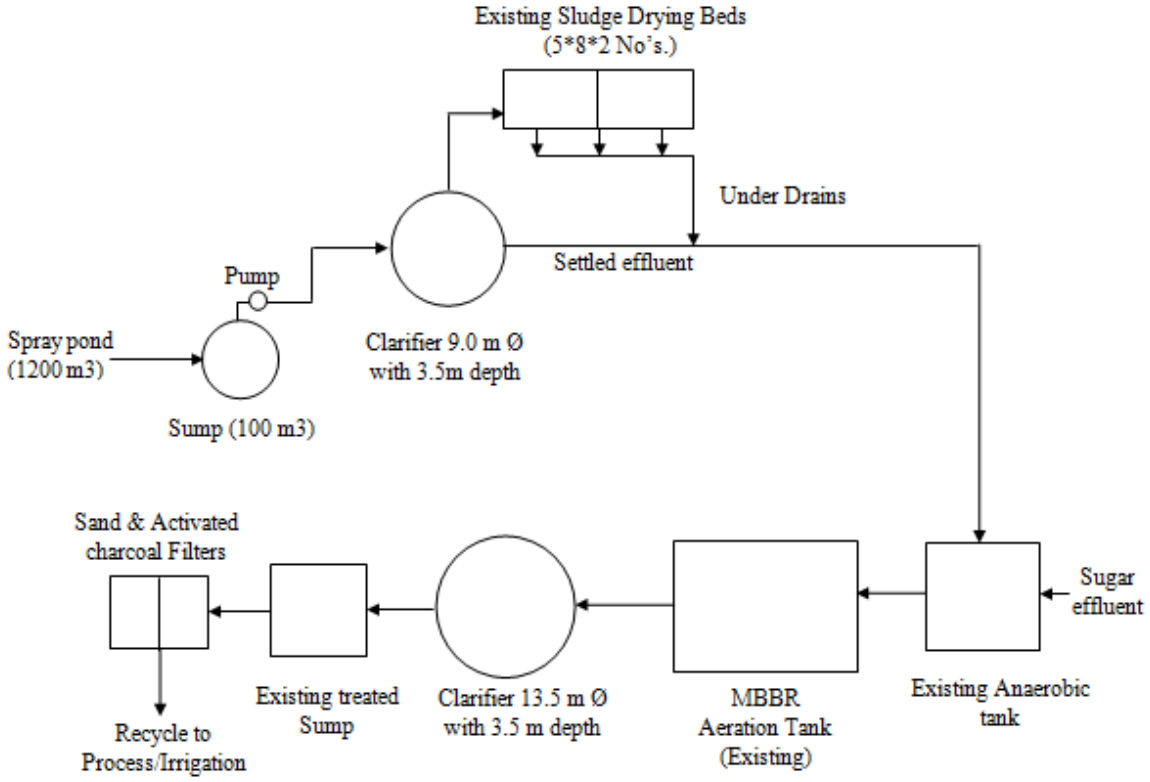


Figure 19 Up-gradation of Sugar ETP

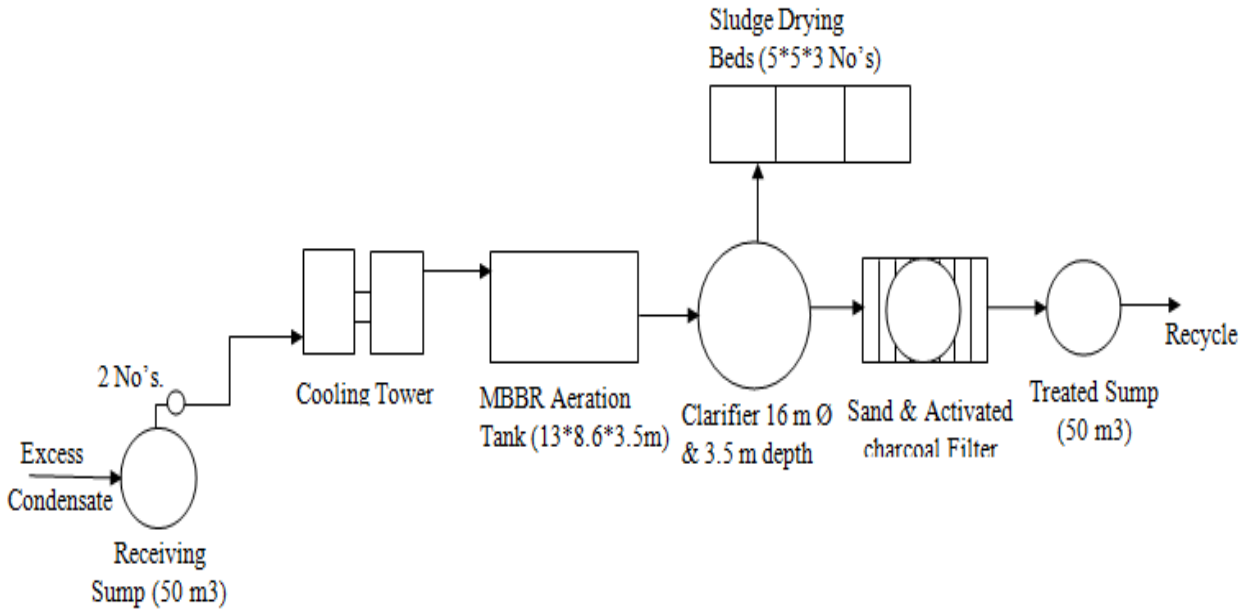


Figure 20 Proposed Condensate Polishing Unit

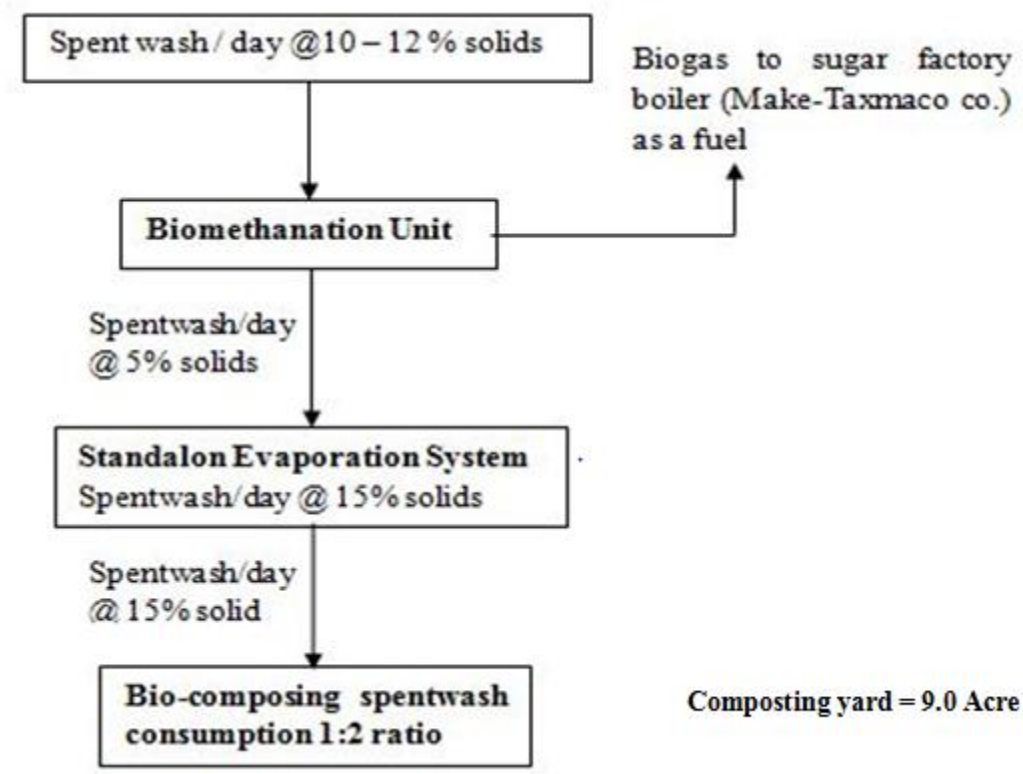


Figure 21 Existing Bio-composting process flow chart for spentwash generated from existing 45 KLPD distillery.

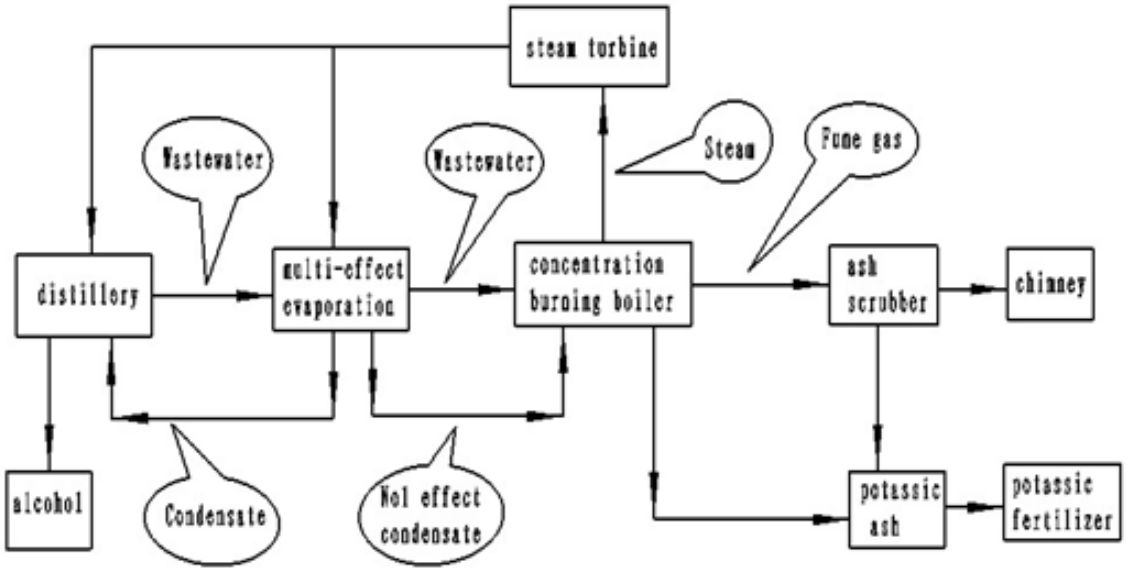


Figure 22 Process flow diagram of concentration & incineration technology for spentwash from proposed 45 KLPD distillery unit.

4.2. Air pollution Control System:

The details of existing and the proposed boilers and its Air Pollution Control equipments are given in below table.

Table 23 Details of boilers and its APC equipments (existing as well as proposed)

Sr. No.	Stack attached to	Types of Fuel	Height in meter	APC System
Present Installation				
1	Boiler 55 TPH	Bagasse	60	ESP
2	Boiler 55 TPH	Bagasse	55	Wet Scrubber
3	Boiler 20TPH	Bagasse	60	Wet Scrubber
4	DG sets of 2*500 KVA	--	--	Acoustic enclosure
Proposed Installation				
1	Boiler 80 TPH	Bagasse	65	ESP
2	Boiler 20 TPH	Concentrated spentwash + Coal	70	ESP

4.3. Solid Waste Management

The total quantity of pressmud generated shall be 9000 to 10000 MT per month. The perssmud generated will be used in composting.

The Ash generated from sugar and co-generation division shall be 910 MT per month which will be used in composting/manure, the remaining will be sold to Brick manufacturer.

Ash from incineration boiler shall be 635 MT/month, which shall be used in composting/manure and remaining will be sold to Brick manufacturer.

The total quantity of ETP sludge generated shall be 100 MT/annum, which will be used in composting.

4.4. Hazardous Waste Management

The only hazardous waste generated is spent oil of quantity is 1.01 MT/annum and disposed as per CPCB guidelines to authorized recyclers.

5. ASSESSMENT OF SIGNIFICANCE OF IMPACTS (CRITERIA FOR DETERMINING SIGNIFICANCE, ASSIGNING SIGNIFICANCE)

5.1. Identification of impact during construction and operation phase

Table 24 Impact identification matrix (Construction Phase)

Activities	Environmental Attributes										
	Air	**Noise**	**Water**	**Hydrogeology**	**Geology**	**Climate**	**Land**	**Ecology**	**Socio Economic**	**Solid/ Hazardous**	**Risk**
Operation of DG Set	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Operation of Construction Equipment	✓	✓	✓	-	Nil	-	✓	✓	-	✓	✓
Traffic	✓	✓	-	-	-	-	-	-	-	-	✓
Land Development and Building Construction	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

Table 25 Identification of Impacts during Operation Phase its source and mitigation measures

Sr. No.	Environmental Component	Source	Impact	Mitigation measures
1.	Air Quality	- Excavation, Transportation during the Construction, - Emission through stack (After the Plant is commissioned)	- Increased Dust levels. - Increase in the Ground level concentration of SPM - Causing respiratory diseases on human and animal life and effect on health of vegetation	-Provide masks to the workers and spray water to suppress the dust. -Green belt will be developed in the plant premises to act as carbon sink. -Regular air quality monitoring will be carried out as per CPCB/SPCB norms and in case of any variations in the quality of ambient air/stack emissions necessary modifications/replacement of the APC equipment shall be carried out. -Electrostatic Precipitator and Wet scrubber to control stack emissions.
2.	Water Quality	-Process	-Oil & grease, COD, BOD, low pH, and suspended solids can cause water pollution in surface and ground water and can effect on human and aquatic life.	- Domestic effluent shall be treated on the principle of Root Zone Technology. The treated effluent shall be used for gardening/irrigation. -Wastewater generated from Sugar & co-gen division shall be **1472m3/day** out off which sugar effluent - 375 m3/day, co-gen effluent-97 m3/day and spray pond effluent- 1000 m3/day. This effluent shall

Sr. No.	Environmental Component	Source	Impact	Mitigation measures
		- Hot water (Condensates) -Spillages, leakages & washings	-ETP performance gets affected, Can deplete dissolved oxygen and affect biological activity resulting in fish kills Would affect the ETP performance if it is combined with process effluent. -Shock loads on ETP. Efficiency of ETP would get affected resulting in poor quality of effluent.	be treated in existing sugar ETP after up-gradation, which is adequate after proposed expansion. Treated effluent will be used for irrigation/gardening. -Spentwash generated from proposed 45 KLPD distillery shall be 80m3/day, which shall be treated using concentration incineration technology and spentwash generated from existing 45 KLPD distillery are 167m3/day, which are treated using existing composting technology. Dilute effluents- spentlees, cooling make up wastewater, boiler blow down, fermenter washing and DM plant wastewater etc. shall be treated in CPU and recycle back for cooling towers and process water. –Adopt Clean technologies as per Comprehensive Industry Document on Sugar Industry (COINDS), Control pH by biological means. - Cool the water and reuse. - Adopt dry-cleaning methods and collect the leakages, spillages and reprocess, the effluent. - Provide a separate storage pond and add in a controlled manner to ETP, to avoid shock loading
3.	Noise	Turbines, Steam exhausts, Vibrator, Cane cutters, Boiler etc.	Affects the hearing and cause fatigue and sometimes nervous breakdown.	-Proper maintenance, oiling and greasing of machines at regular intervals will be done to reduce generation of noise. -Personal protective equipment like earplugs and earmuffs will be provided to the workers exposed to high noise level. -Regular monitoring of noise level will be carried out and any higher noise levels shall be controlled by proper alignment/ maintenance of the machinery. - Acoustic enclosure for turbine and D.G. sets would be provided. -Change the work schedules of the workers

Sr. No.	Environmental Component	Source	Impact	Mitigation measures
				from high exposure places to low levels of exposure.
4.	Soil Quality	Application of treated effluent	Increase in soil salinity.	-Effluent quality as well as quantity shall be strictly controlled by regular monitoring.
5	Solid/Hazardous waste Environment	Boiler/Stack- Ash, ETP- Sludge and Spent oil, Process- Pressmud and Yeast sludge.	Impact on worker health	-Ash used for composting or sold to brick manufacturer -Spent oil mixed with bagasse and burned as fuel for boiler. -ETP sludge, yeast sludge and pressmud used for Composting.
6.	Green-belt	All around the factory and within the premises	Helps to reduce green house gases. -Increase O2 level	-Provide at least 1500 plants per hectare covering more than 33% area of the total area.

5.2. Environmental Monitoring Program:

Table 26 Parameters and Frequency for Post Project Environmental Monitoring

Sr.No	Item	Parameters	Frequency
1.	Ambient Air quality	PM_{10}, $PM_{2.5}$, SO_2,and NO_x.	24 hourly, Once in a Month
2.	Stationary Emission from Stack	PM	Continuous Online Monitoring
3.	Water and Wastewater	All the parameters required for reuse & recycle.	As often as possible
4.	Treated Effluent	pH, BOD, COD, TSS, Flow, TDS	Continuous Online Monitoring
5.	Noise	Equivalent noise level- dB (A)	Monthly or as often as required
6.	Soil	pH, Cation Exchange Capacity, Total Nitrogen, Phosphorous, Potassium, moisture, Permeability, Conductivity, Texture & structure, Organic carbon	As required
7.	Solid wastes and Manure/Compost	Moisture, pH, Organic Carbon, N, P, K	As required
8.	Greenbelt	Type of species shall be decided based on	The survival rate should

		soil & climatic conditions. A number of trees would be 1500 per hectare, however; the number of trees would vary depending on the type of tree.	be 90% and the plant shall be planted to cover 100% greenbelt.

5.3. Budgetary provisions towards Environmental Management Plan:

The capital cost of the project of M/s Shree Pandurang SSK Limited, Shreepur. Tal: Malshiras, Dist: Solapur is around Rs. 150 Crores. It is proposed to reserve around 38.33% of total cost for environment and pollution control measures and 1.57 % for operation and maintenance. 0.75 % of the project cost shall be reserved for corporate social responsibility.

Table 27Budget for pollution control measures

Sr. No	Environmental Controlling Measure	Capital investment (Rs. In Lakhs)	O&M Cost/Annum (Rs. In Lakhs)
1.	Air Pollution Control (Existing)	300	50
2.	Condensate Polishing Unit (Proposed)	200	10
3.	Water Pollution Control (Existing & proposed)	200	50
4.	Hazardous waste and Solid waste management	0	2
5.	Greenbelt Development	10	5
6.	Incineration Boiler, MEE & CPU	5000	100
7.	Occupational Health and Safety	10	05
8	Other Green initiatives		
	-Rainwater Harvesting	15	5
	-Solar Power	50	5
	-Energy Conservation	10	3
Total		**5795**	**235**

6. Project Benefits and CSR

Shree Pandurang SSK Ltd., Shreepur, Taluka Malshiras was established in 1934, the factory started with an initial capacity of 250 TCD, 9 MW co-generation unit in the year 2006 and 45 KLPD distillery in the year 2010. The industry started number of lift irrigation schemes on Bhima River , Manganga River, Nira bank canal etc. and thus the irrigation facilities in the area increased substantially and the industry has now grown to 6000 TCD capacity almost covering more area under irrigation facilities. Besides sugar industry, numbers of ancillary industries such as foundry, dairy etc. were established and the education facilities in the study area were developed due to the industrial growth. The factory has also established number of colleges in and around factory.

The industry developed seed farm and supplies seeds, bio fertilizers, pesticides, insecticides to the farmers on deferred payment basis. It can be also visualized from land use pattern and socio economic studies that the surrounding village economy has improved to a great extent which is comparable to urban areas. The industry also gives drinking water to the needy villages and spends around **1.125 to 1.25**crores on social activities as a part of Corporate Social Responsibility. Numbers of recreational facilities in this factory area were developed, construction of roads, sanitation facilities, Street lighting, plantation etc.

The industrial growth has taken place without any adverse impacts on the environment with green flush of trees to absorb green house gases and make the environment clean and tidy. At present the industry has 45 KLPD distillery from its own molasses which has improved the economy of the industry to pay remunerative price for sugarcane.

Due to the diversification of industrial activities of the SPSSK Ltd., ShreepurTalukaMalshiras, the farmers are highly benefited by getting remunerative prices to their produce sugarcane and this expansion of the crushing capacity would help for timely crushing of their produce with high recovery which would improve the economy of industry further.

Industry had also established a distillery unit whereby the byproduct molasses is utilized in its own premises and hence reducing cost of transportation and pollution due to transportation of raw materials. The distillery unit has further improved economy, and improved cane price which had benefitted the farmers. The ecological balance of the region is well maintained and in fact, further improved due to the availability of nutrients such as bio-compost which enhanced plant growth and biodiversity. Treated wastewater is used for maintaining the flora and fauna in the region.

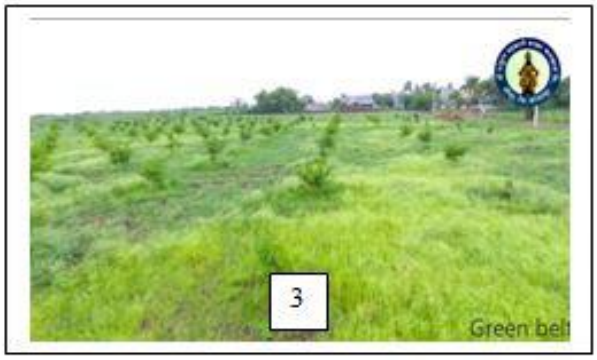
The establishment of industry in Shreepur, Taluka Malshiras area has given indirect employment to a number of ancillary industries and establishment of tourist resorts and hotels. The industry has total 150 office staff and 750 workers in sugar, co-generation as well as dstillery unit. As it is a Co-operative factory, all the benefits accrued are distributed to the share holders which are the farmers, the backbone of the Nation. The establishment of the industry helped to enhance the socio-cultural and political activities in the region due to which the developmental activities gave a positive impact.

Any developmental activity could have some adverse impacts; however, the resilience of the community and acceptance to pay in terms of losses as compared to benefits has a positive response by the people and has been observed to vary at a ratio of 1:11. In other words, the benefits of the projects are 11 times more as compared to the damages/losses in community.

Thus, it can be concluded that the project has a positive impact and would immensely benefit the growth and development of not only the project area but also the entire region around the SPSSKL.

7. Existing infrastructures and other projects:

1- Factory Building View & 2- Distillery View



3- Green Belt View & 4- Compost Yard

5- Rain Water Harvesting System & 6- Condensate Polishing Unit

7-Borewell near residential colony & 8- Dugwell Residential Area

9- Nalah bund near boy's hostel in Shelave village & 10- Check Dam in Shelave village