EXECUTIVE SUMMARY FOR THE PROJECT OF CAPACITY UTILIZATION BY 5000 TCD IN EXISTING SUGAR FACTORY AS WELL AS 500 TPD SUGAR REFINERY PROJECT ALONG WITH OTHER ACTIVITIES IN THE CAMPUS OF SHREE TATYASAHEB KORE WARANA S.S.K. LTD., WARANANAGAR, TAL.: PANHALA, DIST.: KOLHAPUR

A. PROJECT DESCRIPTION

a. The Project

The Sugar Industry in India is well maintained and growing at a steady pace, boasting of a consumer base of over billions of people. India is the second largest producer of sugar in the world. With more than 45 millions of sugarcane growers in the country, the bulk of rural population in India depends on this industry. One of the agro-based enterprises in India, sugar manufacturing is the second largest agricultural industry, after the textile sector.

Sugar manufacturing in Maharashtra is one of the most notable sectors in the country. The pace of growth of this industry has been massive over the past few years. Most of the sugar units have by-product utilization plants, based on bagasse and molasses. Ethanol, power and paper projects have tremendous scope for development in India. In near future, about 10-15% ethanol may be allowed to be blended with petrol. Thus, alcohol production from molasses has the most promising prospects. Bagasse based power generation projects, installed in the premises of sugar factory, not only fulfill captive need of the industry but also make available surplus power which could be exported in the grid thereby providing value addition.

"Shree Tatyasaheb Kore Warana Sahakari Sakhar Karkhana Ltd. (STKWSSKL)", (Unit No.: I Sugar Division) Warananagar, Tal.: Panhala, Dist.: Kolhapur was registered under the Maharashtra Co – Operative Societies Act, Vide Registration No.: G-271 in 1955. It is one of the progressive sugar factories in the Western Maharashtra. The first crushing season was conducted in year 1959 with installing crushing capacity 1000 TCD. The registration certificates and IEM are enclosed at **Annexure-II.**

Based on availability of sugarcane in its area of operation, the management of 'STKWSSKL' have planned to go for **Capacity Utilization** of the Existing Sugar unit from 5000 TCD to 10000 TCD. The Capacity Utilization is nothing but using all the remaining unutilized potential of Plant, Machinery and Equipment infrastructure, in existing set up, for increased production.

After successful establishment of the sugar factory and its efficient operations since year 1959, the management of **STKWSSKL** planned and implemented allied projects in the campus which include 30 KLPD Distillery in 1989 followed by expansion by 60 KLPD in 2007 as well as Paper & Pulp manufacturing unit in 1983-84. Moreover, recently it has been decided to undertake certain new and additional activities that include a 44 MW Co–generation Plant, 500 TPD Sugar Refinery Plant as well as expansion of the existing distillery by 30 KLPD.

b. Achievements of STKWSSKL

During the journey of last fifty years, technical performance of the sugar factory has been extremely good in respect of reduction in the loss of sugar and increased recovery.

The industry has been honored with number of prestigious awards and acclaims. To mention a few are as follows -

- First Prize for the 'Best Technical Efficiency' in the year 1988 – 89 from the National Federation of Co- Operative Sugar Factories Ltd., New Delhi.

- An award by 'Vasantdada Sugar Institute (VSI); Pune' for the 'Best Technical Efficiency and Higher Reduce Mill Extraction' in Southern region of Maharashtra in 1991 – 1992,

- The award of 'Most Innovative Sugar Factory' at State Level from Vasantdada Sugar Institute (VSI); Pune in 2004 - 2005,

- An award for maximum Export of Sugar in India for the season 2006 - 07 and 2007 - 08 from National Federation of Co - Operative Sugar Factories Ltd., New Delhi.

Besides the above, the industry has been conferred on a number of other prestigious awards from different institutes. The **Annexure-III** may be referred for more details.

Year 2010 was commemorated as the 'Golden Jubilee Year' of the Warna Sugar Factory. The celebrations were unveiled at the auspicious hands of Hon. A.P.J. Abdul Kalam, our former president & the renowned scientist. During the entire year, a number of events and activities were undertaken by the 'Warna Udyog Samuh' that contributed substantially to socio-economic development of the region and its people.

c. The Place

The 5000 TCD Capacity Utilization Project by **Shree Tatyasaheb Kore Warana Sahakari Sakhar Karkhana Ltd. (Unit No.: I Sugar Division)** would be implemented in the set up of existing sugar factory located at Gat No. 1101/1, 1102, 1103, 1114, 1116 & 1162, Warananagar, Kodoli, Tal.: Panhala, Dist.: Kolhapur (Maharashtra State).

The total land acquired by STKWSSKL is **146.27 Ha.** Out of this total area, **@ 20.67 Ha** comes under Warana industrial campus. Unit wise area breakup in the 'Warana Campus' is as shown in following Table No. 1.0. Therein, area allocation towards various amenities and buildings under different units has been presented.

TABLE NO. – 1.0

Sr. No.	Description	Sugar Factory (Sq. M.)	Distillery (Sq. M.)	Bagasse Pulping Unit (Sq. M.)	Co-gen Plant (Proposed Activity) (Sq. M.)	Sugar Refinery (Sq. M.)	Total (Sq. M.)
1.	Administration Office	3400				150	3550
2.	Product Storage	20600	1616	--	--	1008	23224
3.	Distillation	--	300	--	--	--	300
4.	Fermentation	--	420	--	--	--	420
5.	Milling & Boiler	4800	--	--	--	--	4800
6.	Molasses Handling Storage	--	22	--	--	--	22
7.	Cooling Tower for Fermentation	--	100	--	4200	400	4700
8.	Cooling Tower for Distillation	--	100	--	--	--	100
9.	Water Treatment Plant	--	100	--	1000	220	1320
10.	Security Cabin	25	25	25	25	--	100
11.	Excise Office	25	15	--	--	--	40
12.	Weigh Bridge	125	50	40	--	--	215
13.	Diesel Storage	10	--	--	--	--	10
14.	H.T. Sub Station & Panel Room	1000	400	260	3000	150	4810
15.	D.G. Room	--	25	270	--	--	295
16.	Drinking Water	100	--	--	--	--	100
17.	Water Storage	2100	--	700	6000	--	8800
18.	Evaporation	--	125	100	--	--	225
19.	Secondary Treatment Plant	18000	16300	--	--	--	34300
	Total Built – up Area	**50185**	**19598**	**1395**	**14225**	**1928**	**87331**
	Area under main approach as well as internal roads	**16000**	**14000**	**3000**	**20000**	**4600**	**57600**
	Open Space	20000	10000	3000	20000	8850	61850
	Total Plot Area	**86185**	**43598**	**7395**	**54225**	**15378**	**206781**

All the above units in 'Warana Campus' have been designed in versatile fashion by adopting latest process techniques as well as with state-of-the art machinery.

d. The Promoters

The foundation of Warana S.S.K. Ltd. was laid by the visionary and veteran late Shri Tatyasaheb Kore towards the end of fifties. Since then the industry has achieved steady and consistent growth till date. Now, in light of the cane production and demand for sugar, it has been proposed to get approvals for the **5000 TCD Capacity Utilization** of existing sugar factory unit as well as **500 TPD Sugar Refinery**. The same would be undertaken and implemented by the management of **"Shree Tatyasaheb Kore Warana Sahakari Sakhar Karkhana Ltd., (Unit No.: I Sugar Division)".** The promoters are well experienced in relevant fields and have made a thorough study of the overall project planning and implementation with prime objective towards development of the area and its economy.
The names and designations of key promoters are as under-

TABLE NO. – 1.1

No.	Name	Designation
1.	Smt. Shobhatai Vilasrao Kore	Chairman
2.	Shri Prataprao Balkrishna Patil	Vice Chairman
3.	Shri Vinay Vilasrao Kore	Director
4.	Shri Subhash Anandrao Patil	Director
5.	Shri V. S. Chavan	Managing Director

e. The Products

The different products taken under 5000 TCD capacity utilization as well as 500 TPD Sugar Refinery and their maximum production quantities are as under-

TABLE NO. – 1.2

Sr. No.	Industrial Unit	Product	Quantity
1.	Sugar Unit (5000 TCD)	Sugar	22,000 MT/M
		By Product	
		Molasses	6,000 MT/M
		Bagasse	62,800 MT/M
		Press Mud	5,125 MT/M
2.	Sugar Refinery (500 TPD)	Refined Sugar	15,000 MT/M
		By Product	
		Refined Molasses	150 MT/M

Sugarcane, which is used as a raw material in sugar factory, is grown in the field and harvested according to the maturity survey and date of plantation after ensuring maximum sugar content in the cane. Harvesting may be done either manually or mechanically. Thereafter, the cane is transported to the factory. Sugarcane is unloaded mechanically on cane carrier and subjected to different units like crushing mills, raw juice extraction & its processing, weighment of the juice, juice heater, clarifier, evaporator, pan boiling, crystallizer and ultimately centrifuge to obtain final product.

The details of raw materials required as well as the manufacturing process and flow chart for above products are enclosed separately at **Annexure-IV & V** respectively.

B. DESCRIPTION OF ENVIRONMENT

Environmental degradation is the greatest concern world over and as a citizen of India, it is the responsibility of one and all to strive and bring about a balance between environment, industrial growth and development of economy thereby.
Keeping in view the above fact, an effective 'Environmental Management Plan (EMP)' has already been followed in the existing sugar factory of **"Shree Tatyasaheb Kore Warana Sahakari Sakhar Karkhana Ltd. (Unit No.: I Sugar Division)".** The same practices would be continued under capacity utilization as well as for certain new projects that will follow. The various environmental aspects w.r.t. EMP are as follows.
Presently, in the campus following projects are in operation-

1. **5000 TCD Sugar Factory Unit**
2. **60 KLPD Molasses based Distillery Unit**
3. **Bagasse Pulping Unit**

The capital investments made towards the above projects are **Rs. 162.74/- Cr** for **Sugar Factory**, **Rs.43.14/- Cr** for **Distillery** and **Rs.13.19/- Cr** for the **Bagasse Pulping Unit**.

Moreover, certain new projects under implementation are as under-

1. **5000 TCD Capacity Utilization of the Sugar Factory Unit**
2. **30 KLPD Molasses based Distillery Unit**
3. **500 TPD Sugar Refinery**
4. **44 MW Co-generation Plant**

The capital investments towards above-mentioned proposed activities are **Rs. 162.74/- Cr.** for the Sugar Factory capacity utilization (This is nothing but the investment of existing set-up being used for capacity utilization project), Rs.7.86/- Cr for Distillery expansion, Rs. 43/- Cr for the Sugar Refinery and Rs.207.20/- Cr for the Co-generation Plant.

a. Water Use

The details of water usage in existing units, permitted in MPCB Consent Orders, are as follows-

TABLE NO. – 1.3

Sr. No.	Aspect	5000 TCD Sugar Factory	60 KLPD Distillery	Lignosulphonate & Pulp Unit
	Water Use			
1.	Domestic	280 M^3/Day	9.5 M^3/Day	2.5 M^3/Day
2.	Industrial			
	a. Process	590 M^3/Day	460 M^3/Day	120 M^3/Day
	b. Cooling	50 M^3/Day	----	65 M^3/Day
	c. Other	----	155.2 M^3/Day	----
3.	**Industrial Use (a+b+c)**	**640 M^3/Day**	**615.2 M^3/Day**	**185 M^3/Day**
4.	Total Consumption (1+3)	920 M^3/Day	624.7 M^3/Day	187.5 M^3/Day
5.	Gross Consumption	1732.2 M^3/Day (Sugar Factory + Distillery + Pulping)		

Note:
Out of above total quantity to the tune of **1732.2 M^3/Day**, nearly about 30% water requirement is met from the 'Condensate Water' i.e. the natural water present in sugarcane becoming available after crushing of cane followed by subsequent processing, evaporation & condensation operations. Thus, in present case, about **520 M^3/Day** of condensate water is utilized thereby resulting in to saving of fresh water to be taken from river.

The details of water usage under proposed operations, as per MPCB Consent to Establish Orders, are follows-

TABLE NO. – 1.4

Sr. No.	Aspect	5000 TCD Capacity Utilization of Sugar Factory	30 KLPD Distillery	500 TPD Sugar Refinery	44 MW Co-gen Plant
	Water Use				
1.	Domestic	----	7.5 M^3/Day	-----	10 M^3/Day
2.	Industrial				
	a. Process	1360 M^3/Day *	255 M^3/Day	500 M^3/Day (100 + 400*)	696 M^3/Day
	b. Cooling	410 M^3/Day	153 M^3/Day	10 M^3/Day	4578 M^3/Day
	c. Boiler	100 M^3/Day	--	450 M^3/Day *	
	d. Other	130 M^3/Day (Lab & Washing)	-----	40 M^3/Day (Lab & Washing)	
3.	Industrial Use (a+b+c)	2000 M^3/Day (640 + 1360*)	408 M^3/Day	1000 M^3/Day (150 + 850 *)	5274 M^3/Day
4.	Total Consumption (1+3)	2000 M^3/Day	415.5 M^3/Day	1000 M^3/Day	5284 M^3/Day
5.	Gross Consumption	3415.5 M^3/Day + 5284 M^3/Day = 8699.5 M^3/Day {(Sugar Factory + Distillery + Sugar Refinery) + Co-gen = Total Consumption}			

* - Water Consumption thus represented is actually utilized from the 'Condensation Water Quantity'. i.e. The Natural Water present in Sugar Cane becoming available after crushing of the cane followed by subsequent processing, evaporation and condensation Operations

Note:

1. Out of above total quantity of **3415.5 M^3/Day (Sugar Factory, Distillery and Sugar Refinery)**, about 60% water requirement shall be met from the 'Condensate Water' i.e. the natural water present in sugarcane becoming available after crushing of cane followed by subsequent processing, evaporation & condensation operations. Thus, in present case, about **2210 M^3/Day** of condensate water shall be utilized thereby resulting in to saving of fresh water to be taken from river.
2. Further, in case of the Co-gen project as much as 80% of water is recycled back in the form of turbine condensate becoming available subsequent to steam condensation. Here, about 4000 M^3/Day of water could be utilized from the turbine condensate thereby reducing that much demand from outside source i.e. river.

Thus, the total water being taken from outside source, i.e. river warana, at present is about 1215 M^3/Day. After, commissioning of all the proposed activities, water requirement from the river would become 2500 M^3/Day. Eventually total water lifting from river would become 3715 M^3/Day. This quantity is less than the actually permitted quantity of 6083 M^3/Day by Irrigation Dept.; Govt. of Maharashtra.

The water requirement under capacity utilization only shall be 2000 M^3/ Day. To meet this demand, water quantity of 640 M^3 / Day would be taken from River Warana and remaining demand of 1360 M^3 / Day would be met from the use of 'Condensate Water'.

Refer **Annexure-VI** for water budget and water lifting permission letter.

In the previously granted consent to operate by MPCB, there is a discrepancy w.r.t. water consumption figures. As per the consent, the consumption is 640 M^3/Day for 5000 TCD capacity. This means the water consumption in liters per ton of cane crushed comes to about 128 Lit./MT [640 X 1000 Lit. / 5000 MT]. This figure is almost half the actual consumption rate which is around 245 to 250 Lit. / MT [Refer the Final Manufacturing Report in the Form R.T.8 (C) enclosed at **Annexure-VII** for certificates and documents. To correct this redundancy in consumption figures, somewhat increased water quantities have been put in the applications for Consent to Establish. Thus, when consent to operate for 10,000 TCD shall be granted, the eventual water consumption shall be as per the norms and actual position on site.

b. Effluent Treatment

The wastewaters generated from existing as well as proposed activities could be categorized in to two types namely domestic effluent and industrial or trade effluents.

The details of wastewater generation as granted in MPCB Consents, for existing set up, are as follows-

TABLE NO. – 1.5

Sr. No.	Aspect	5000 TCD Sugar Factory	60 KLPD Distillery	Lignosulphonate & Pulp Unit
1.	Domestic Effluent	200 M^3/Day	5.8 M^3/Day	2 M^3/Day
2.	Industrial Effluents			
	a. Process	475 M^3/Day	510 M^3/Day Spentwash	70 M^3/Day
	b. Cooling	25 M^3/Day	----	5 M^3/Day
	c. Other	----	90 M^3/Day Spentlees	----
	Industrial Total (a+b+c)	**500 M^3/Day**	**600 M^3/Day**	**75 M^3/Day**
4.	Gross Quantity (1+3)	700 M^3/Day	605.8 M^3/Day	77 M^3/Day

The details of wastewater generation under proposed operations, as per the MPCB Consent to Establish Orders, are as follows-

TABLE NO. – 1.6

Sr. No.	Aspect	5000 TCD Capacity Utilization of Sugar Factory	30 KLPD Distillery	500 TPD Sugar Refinery	44 MW Co-gen Plant
1.	Domestic Effluent	----	4 M^3/Day	----	7 M^3/Day
2.	Industrial Effluent				
	a. Process	475 M^3/Day	300 M^3/Day Spentwash	80 M^3/Day	----
	b. Cooling	25 M^3/Day	3 M^3/Day	30 M^3/Day	572 M^3/Day
	c. Other	----	45 M^3/Day Spentlees	40 M^3/Day Washing	68 M^3/Day
3.	Industrial Total (a+b+c)	500 M^3/Day	348 M^3/Day	150 M^3/Day	640 M^3/Day
4.	Gross Quantity (1+3)	500 M^3/Day	352 M^3/Day	150 M^3/Day	647 M^3/Day

As far as effluent treatment is concerned, under present activities, the trade effluents from existing 5000 TCD sugar factory unit, spentlees from the 60 KLPD distillery and effluent from lignosulphonate & pulp operation are treated in an ETP provided at the site. The spentlees and pulping effluents are given a biomethanation treatment first and then the same are admitted in to ETP. The total effluent that is diverted to ETP at present from existing units is to the tune of 1015 M^3/Day (665 M^3/Day + 350 M^3/Day Distillery MEE Condensate) and Spentwash to the tune of 510 M^3/Day is utilized for Aerobic Bio composting after Bio-methanation and Concentration in Multiple Effect Evaporator (MEE). The raw spentwash quantity of 510 M^3/Day is generated from 60 KLPD Distillery operations.

The present ETP comprises of primary, secondary and tertiary treatment units. The same are Oil & Grease Chamber, Equalization Tank, Bio-Digester, Primary Clarifier, Aeration Tank, Secondary Clarifier, Treated Water Sump and Sludge Drying Beds, Pressure Sand and Activated Carbon Filter.

The domestic effluent is treated in septic tanks followed by soak pits in a decentralized manner and the overflow is used for gardening.

Recently, before the crushing season of 2011-12, certain steps were taken towards up-gradation of the Sugar ETP. Also, a few more measures have been planned which shall be implemented within 6 months. There under, an investment of Rs. 1.13 Cr. has been made. A description of upgradation and new implementations is as under-

TABLE NO. – 1.7

Sr. No.	Description	Cost	Remarks
1.	Provision of a **Diffused Aeration System** in the existing Aeration Tank.	Rs. 50,03,208/-	The existing surface aerators have been removed and a totally new state of art retrievable diffused air aeration system has been installed in the aeration tank. This system was commissioned in last season and successfully tested for performance.
2.	Provision of a tertiary treatment comprising of sand filter, carbon filter and chlorination treatment.	Rs.12,65,625/-	A totally new introduction of the tertiary treatment units in existing setup has been done. This system was commissioned in last season and successfully tested for performance.
3.	Incorporation of additional infrastructure for the primary treatment of effluent comprising of - a. Additional Oil Skimmer b. Additional equalization come holding tank of 300 M^3/day capacity c. Pumping & electrification infrastructure	Rs. 15,00,000/-	A new setup towards primary treatment has been planed in series and the same would be provided in addition to the one existing presently at our Sugar Factory. Implementation of same shall be done within 6 months.
4.	Bio-digester Plant based on ULRD principle for treatment of effluents from sugar factory and bagasse pulping units.	Rs. 80,65,688/-	A totally new Bio-digester has been erected in the Warna Sugar Factory premises. This plant shall be taken in to operation from the ensuing crushing season of 2011.12. Till the foregone crushing season of 2010.11, for treatment of the effluents from sugar and pulping units, the UASBR type bio-digester (1700 M^3) from distillery spentwash treatment set up was being used. In the distillery, Four Bio-digesters have been provided at present. Now, after commissioning of distillery under 30 KLPD expansion, all the four digesters will come in to operation.
5.	Provision of a Diffused Aeration Tank	Rs. 50,83,000/-	27 M x 28 M x 3 M = 2268 M^3
6.	RCC Gutter around Refinery	Rs. 13,63,999/-	--
7.	Provision of Lime Storage on ETP site	Rs. 2,50,784/-	--
8.	Provision of Secondary Clarifier	Rs. 25,00,000/-	--
	TOTAL	**Rs.2,50,32,304/-**	

The flowchart, process description and photographs of existing ETP as well as the analysis report for effluent sample collected by MPCB as well as by the industry have been enclosed at **Annexure-VIII.**

The entire treated effluent quantity from existing activities is used for irrigation on 47.3 acres of own factory land as well as farm lands of share holders of STKWSSKL.

As far as the distillery spentwash treatment is concerned, surface aerobic biocomposting process is being followed. Here, the spentwash is first subjected to biomethanation as primary treatment. Thereafter, the digested spentwash is concentrated in MEE and subsequently the digested and concentrated spentwash is utilized in aerobic composting. All the relevant details of the process, mass balance and photographs have been presented at **Annexure-IX.**

So far as the treatment of effluent from proposed activities is concerned, about 1338 M^3/Day of same shall be generated {(500 M^3/Day from Sugar Factory + 48 M^3/Day from Distillery Spentlees + 175 M^3/Day from MEE Condensate + 150 M^3/Day from Sugar Refinery = 873 M^3/Day) + 640 M^3/Day from Co-Gen Plant} This quantity again will be sent to ETP for treatment along with the existing flow. The effluent that shall be generated would come from sugar factory's capacity utilization by 5000 TCD, spentlees from 30 KLPD distillery, 500 TPD refinery and 44 MW co-gen plant.

The details of design sufficiency of existing ETP for the increased effluent flow rate have been presented at **Annexure-X.**

The effluent generated under capacity utilization activities would come from process and washing, cooling and boiler blow down aggregating to **500 M^3 / Day.** As already stated, this entire quantity of trade effluent shall be treated along with the effluent generated from existing sugar factory activities in the existing 'Effluent Treatment Plant (ETP)'. The ETP has been recently upgraded, the details of which have been furnished in above paras.

c. Emissions

The steam required for existing units namely sugar factory, distillery and bagasse pulping is taken from various boilers erected in the premises. Further, the steam requirement under proposed activities namely sugar factory (capacity utilization), distillery, sugar refinery shall also be met from the boilers in existing set up. However for the co-generation plant, a totally new high pressure boiler shall be provided.

Annexure-XI may be referred for more details about air pollution control aspect in the warana campus. Therein, relevant details have been furnished about the fuel burning operations, boilers, control equipments, stacks etc. along with photographs.

All the existing boilers have been provided with **'Electrostatic Precipitator (ESP)'** as Air Pollution Control (APC) equipment in addition to stacks of adequate heights. Also, the new co-gen boiler will come with **ESP and stack of 100 M height**. D.G. Set of 2200 KVA capacity is installed on site. HSD @ 50 Lit./Hr is used as fuel. The same is provided with a stack of 45 M height and acoustic enclosure. The D.G. Set is used only during power failure.

d. Noise Pollution Aspect

The major noise generating sources in sugar factory are cane carrier, mills, turbine, pumps, compressors, boiler house and stand by D.G. set. In a distillery, the fermentation house, distillation section and boiler house are major noise generation areas. All preventive measures such as regular operation & maintenance of pumps, motors, and compressors are carried out. In addition, the high noise generation equipments are located in specific areas so as to control the noise through isolation and separation principles.

Further, people working in close vicinity of the high noise generating equipments and sources in the sugar factory, distillery, co-gen, pulping unit, refinery etc. shall be provided with Personal Protective Equipments (PPE) such as ear plugs, ear muffs etc. so as to attenuate the noise levels and minimize bad effects of exposure to high sound.

e. Hazardous Wastes

Solid wastes from the Industries are categorized as hazardous and non-hazardous. Wastes that pose a substantial danger immediately or over a period of time to human, plant or animal life are classified as hazardous wastes.

Non- hazardous waste is defined as the waste that contributes no damage to human or animal life. However, it only adds to the quantity of waste.

The different types of hazardous wastes being generated from existing operations in various units as well as those to be generated from proposed activities have been listed in following tables.

i. Existing Unit

TABLE NO. – 1.8

SR. NO.	INDUSTRIAL UNIT	HAZARDOUS WASTE	DISPOSAL METHOD
1.	Sugar Unit (5000 TCD)	Cat. No.: 5.1 & 5.2 Used / Waste Oil @ 18 MT / Year	Waste Oil is burnt in boiler alongwith bagasse / Sale to Authorized Re-processor.
2.	Distillery Unit (60 KLPD)	Cat. No.: 20.3 Distillation Residue @ 600 Kg/ M	Mixed with Compost.
3.	Paper & Pulp Unit	No any Hazardous Wastes are generated by the Unit	--

ii. Proposed Unit

TABLE NO. – 1.9

SR. NO.	INDUSTRIAL UNIT	HAZARDOUS WASTE CATEGORY	DISPOSAL METHOD
1.	Sugar Unit (5000 TCD) Capacity Utilization	Cat. No.: 5.1 & 5.2 Used / Waste Oil @ 18 MT / Year	Waste Oil would be burnt in boiler alongwith bagasse / Sale to Authorized Re-processor.
2.	Distillery Unit (30 KLPD)	Cat. No.: 20.1 and 20.3 Distillation Residue @ 300 Kg/ M	Mixed with Compost.
3.	Co – gen Unit (44 MW)	Cat. No.: 5.1 & 5.2 Used / Spent Oil @ 300 Kg / Day	Waste Oil would be burnt in boiler alongwith bagasse / Sale to Authorized Re-processor.
4.	Sugar Refinery (500 TPD)	No any Hazardous Wastes to be generated by the Distillery	--

f. Solid Wastes:

From different operations in the sugar factory, distillery and bagasse pulping units, various solid wastes are generated. A description of same is presented in Table No.-1.10

i. Existing Unit

TABLE NO. – 1.10

SR. NO.	INDUSTRIAL UNIT	SOLID WASTE	DISPOSAL METHOD
1.	Sugar Unit (5000 TCD)	Boiler Ash @ 4 MT / Day is generated from the fuel (Bagasse) burning operations. ETP sludge, i.e. secondary biological sludge, @ 500 MT / Month is generated from operations of the ETP	The ash is utilized along with pressmud in spent wash composting at the distillery effluent treatment facility. Excess if any, is given to the farmer members for use as manure in their farms. The ETP sludge also is used as manure in own factory premises
2.	Distillery Unit (60 KLPD)	Yeast Sludge @ 600 Kg / Day is generated.	The yeast sludge is utilized along with press mud in spent wash composting at the distillery effluent treatment facility.
3.	Paper & Pulp Unit	No any Solid Wastes is generated by the Unit	--

ii. Proposed Unit

TABLE NO. – 1.11

SR. NO.	INDUSTRIAL UNIT	SOLID WASTE CATEGORY	DISPOSAL METHOD
1.	Sugar Unit (5000 TCD) Capacity Utilization	Boiler Ash @ 90 MT / Day shall be generated from the fuel (Bagasse) burning operations. ETP sludge, i.e. secondary biological sludge, @ 20 MT / Month shall be generated from operations of the ETP	Boiler Ash would be used in spentwash composting / supplied to farmers for use as manure. ETP Sludge would be used as manure.
2.	Distillery Unit (30KLPD)	Yeast Sludge @ 300 Kg / Day shall be generated.	The yeast sludge shall be utilized along with press mud in spent wash composting at the distillery effluent treatment facility.
3.	Co – gen Unit (44 MW)	Boiler Ash @ 17,216 MT/Year shall be generated from the fuel (Bagasse) burning operations.	Boiler Ash would be disposed off for composting / Brick Manufacturers / Manure.
4.	Sugar Refinery (500 TPD)	Boiler Ash @ 28.8 MT/Month shall be generated from the fuel (Bagasse) burning operations.	Boiler Ash would be used in spentwash composting / supplied to farmers for use as manure.

g. Rain Water Harvesting Aspect

Harvesting of rainwater and its recharge into the ground is a very important aspect which creates positive impact on the ground water table.

The rain harvesting could be of two types namely harvesting from ground and harvesting from rooftops. The quantity of harvested rainwater that becomes available during and after precipitation depends upon a number of factors such as area of land, nature of soil, impervious or paved areas, plantation on the land, average annual rainfall in the region, ambient temperatures of the region, wind direction and speed etc.

1. The Rooftop Harvesting:

Here collection of the rainwater getting accumulated from direct precipitation on the total roof area is taken in to account. The rainwater thus becoming available from terraces as well as roofs of various structures and units in the industrial premises is presently led in to adjacent open areas and nearby surface / runoff drains. A part of the accumulated rainwater gets absorbed in to the ground whereas remaining quantum is carried to low lying areas where subsequent accumulation, ponding and overflow occur.

Under a recent planning, it has been decided to adopt more systemic approach towards this rooftop harvesting. Therein, the rainwater from rooftops of certain prominent structures and buildings in the 'Warna Campus' would be collected through arrangements of channels and pipes to be provided as per appropriate slopes at the roof level. The collected rain water then would be taken to ground and either stored in open excavated tanks / ditches in the ground or charged directly to bore wells provided / to be provided in the premises. Such locations have already been marked depending up on roof top / terrace areas and location of the structures in the industrial premises as well as their nearness to the open spaces where proposed tanks would be provided.

For the calculation of rain water quantity, that is going to become available subsequent to rooftop harvesting, a computation method from the **'Hydrology and Water Resources Engineering'** has been adopted. Thereunder, A.N. Khosala's formula has been followed. The allied calculations are as under-

The average annual rainfall in the area = 900 mm.

Now, as per "A. N. Khosla's Formula", the average annual accumulation can be calculated by using the following equation:

$$R = (P - t / 2.12)$$

Where,

R = Average annual accumulation in cm, for the catchment area.
P = The corresponding average annual rainfall or precipitation, in cm, over the entire catchment. (In current case it is 900 mm i.e. 90 cm)
t = Mean annual temperature in deg. Centigrade. (In current case it is 30^0C.)

$\therefore$ The accumulation on the entire catchment area will be,

R = (90 – 30/2.12)
= 75.85 say 76 Cm.

∴ Volume acquired by this accumulation water will be,

= 76 Cm × Roof Top Area
= 0.76 M × 23,418 M^2
= 17,797.68 M^3
Say **17,800 M^3**

Thus, about **17,800 M^3** of rainwater shall become available after its systemic harvesting during every season from the 'Roof Top Harvesting' operations. This water which presently is being collected in a haphazard manner and put to application randomly when systematically charged to open / bore wells shall definitely have an immediate positive impact on the ground water table in the region.

2. Surface Harvesting:

Under this type of harvesting, the rainwater getting accumulated through surface runoff, from land area in the industrial premises, would be collected and stored in open excavated tanks / pits to be provided in the industrial plot. This harvested rainwater would recharge the ground water through actions namely seepage and infiltration to the aquifers. On the open land in the premises counter bunding, terracing and dressing would be done so as to divert the rainwater as per natural slopes to various tranches excavated on the plot in a decentralized manner. The entire industrial premises would be divided in zones and the harvested water from such zone would be directed to the nearest available ditch / tank constructed as mentioned above. Further, the recharge points would be located as per geometry of zones.

The areas available for land harvesting could be worked out from calculations are as follows-

(Total Plot Area) – (Built- up Area + Area under Roads) = Open Land Area
2,06,781 M^2 – 1,44,931 M^2 = 61,850 M^2

Now,

a. Average annual rainfall in the Warananagar area is 900 mm
b. Open land area in the industrial premises is 61,850 M^2
c. Type and nature of the Area with about 30% area being impervious (paved). Here areas under yards as well as roads come in the category of paved surfaces.
d. Type of Land- On an average, the land in Warananagar belongs to flat land with 0 to 5% slope.
e. Value of Runoff Co-efficient based on type and nature of area as well as the land – 0.40
f. Runoff getting accumulated from the land area under Point No. b above-

61,850 M^2 X 0.90 M x 0.4 = **22,266 M^3**

Hence, the total water becoming available after rooftop and land harvesting would be -

17,800 M^3+ 22,266 M^3= 40,066 M^3

h. The Green Belt

In our Sugar Factory, a comprehensive Green Belt Plan has been undertaken and successfully implemented. The present area under green belt is to the tune of **18.94 Ha**. i.e. about **48 Acres**. Thereunder, **12,091 trees** have been planted. The green belt comprises of various fruit bearing trees and plants, flowering and non flowering trees, flower beds, lawns and nursery's.

Moreover, under the proposed **'Green Belt Development Plan'** in the Factory premises, about **2,000 trees** would be planted in phase wise manner in coming five years plan covering an area of about **10 Acres.**

The salient features of the green belt development program implemented in our industry are as under -

1. Tree plantation at different tiers to suit the existing topography.
2. Avenue plantation along the roads and shelterbelt plantation along the peripheral fence of the plot.
3. Mass Plantation in certain pockets and at the plot corners of the sugar factory unit.
4. Plantation of peculiar tree species serving typical purposes such as noise attenuation and dust suppression at selected premises.
5. Lawns and landscaped gardens in the plot.

At **Annexure-XII** host of the photographs have been enclosed for ready reference.

i. Socio-Economic Development

The Sugar Factory has promoted infrastructural developments in its command area in education, communication and irrigation sectors over last 50 Years. The same includes construction of roads, lift irrigation schemes, schools and colleges, wired village project etc. The unit also undertakes activities related with social welfare such as arranging aids awareness campaigns, health checkup camps, and distribution of education materials among economically deprived students in its command area. Moreover, blood donation camps are arranged every year on 27th September.

Medical checkup of workers from sugar factory, distillery and pulping unit is periodically done in the unit. Further the medical facilities available on site are extended to the residents of nearby villages. All the activities, in Warna Campus, are providing direct or indirect employment opportunities to the local people. Also, the project proponents have always taken lead in donating funds for noble causes such as earthquake and flood relief operations.

The factory has provided quarters for the workers with all essential facilities like sanitation, filtered water supply, cheaper electricity etc. The workers avail the credit facilities from the departmental store i.e. warana bazaar.

The Sugar Factory develops good varieties of sugarcane in its own nursery. The same are distributed to shareholders for cultivation in their farms.

C. ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

a. Impact on Topography

No major topographical changes are envisaged in the acquired area except some leveling and landscaping. In acquired area, the changes will be due to manmade structures like administrative buildings and industrial complex.

It may be noted that the industrial activity will invite positive benefits in the form of land leveling and tree plantations in the plant vicinity. “Shree Tatyasaheb Kore Warana Sahakari Sakhar Karkhana Ltd.”, has developed a green belt of adequate width and density as per MPCB & CPCB guidelines in the existing premises. The present area under green belt is to the tune of 18.94 Ha. i.e. about 48 Acres. Thereunder, 12,091 trees have been planted. The green belt comprises of various fruit bearing trees and plants, flowering and non flowering trees, flower beds, lawns and nursery’s.

b. Impact on Climate

Impact on the climatic condition due to the Existing & Proposed activities is not envisaged. Emissions to the atmosphere viz. flue gases with very high temperatures are not expected. Also, proposed unit will have to implement a plantation program in its premises, along periphery and internal roads as well as on open spaces. Under the proposed ‘Green Belt Development Plan’ in the Factory premises, about 2,000 more trees would be planted in phase wise manner in coming five years plan covering an area of about 10 Acres.

c. Impact on Air Quality

The steam required for capacity utilization activities would be taken from the existing 6 nos. of boilers having different capacities. Boiler No. 1, 2 & 4 are provided with common stack of 32 M height. Boiler 3 is provided with 32 M height stack. Further, boiler no. 5 & 6 are provided with a common stack of 40 M height. These boilers are provided with three no. of Electrostatic Precipitators (ESPs) as Air Pollution Control equipment.

Proper operation & maintenance would be carried out for the Electrostatic Precipitator for its maximum efficiency in controlling the emissions.

To determine the Impacts, we have considered an area of 10 Km radius with the Warana campus as a center.

i. Baseline Ambient Air Concentrations

The 24 hourly 98 percentile concentrations and averages of PM_{10}, $PM_{2.5}$, SO_2 and NO_x in Ambient Air, recorded during the field study conducted for the season March, April & May 2012 are considered as baseline values.

The existing baseline concentrations are summarized in the following table:

TABLE NO.: 1.12
BASELINE CONCENTRATIONS

Parameter	Concentrations
PM_{10}	57.2
$PM_{2.5}$	13.9
SO_2	26.1
NO_X	36.9

Concentrations are in $\mu g/m^3$

ii. Probable Air Polluting Sources

Fuel Burning Sources

The major source of pollution would be the boiler house. Steam required for Capacity Utilization activities would be taken from the existing boilers of capacities.

The steam required for existing units namely sugar factory, distillery and bagasse pulping is taken from various boilers erected in the premises. Further, the steam requirement under activities namely sugar factory capacity utilization, distillery expansion, sugar refinery shall also be met from the boilers in existing set up. However for the co-generation plant, a totally new high pressure boiler shall be provided.

D.G. Set of 2200 KVA capacity is installed on site. Furnace Oil @ 50 Lit./Hr is used as fuel. The D.G. Set stack is provided with adequate height of 45 M from ground level. The D.G. Set is operated only during power failure.

d. Impact on Water Resources

i. Impact on Surface Water Resources

The total water requirement for capacity utilization project would be @ 2000 M^3 / day. The same would be utilized for Process @ 1360 M^3/day, for Cooling @ 410 M^3/day, for Boiler Feed @ 100 M^3 / day and for Washing & Lab @ 130 M^3/day.

Out of total water requirement, @ 640 M^3/day would be taken from River Warana & remaining quantity @ 1360 M^3 / day would be utilized from 'Condensate Water Quantity'.

ii. Impact on Ground Water Quality

Ground water quality in the region is found to be well within the prescribed limits of IS: 10500, Revised 2003.

Entire quantity of wastewater generated due to capacity utilization activities in Existing Sugar Factory set - up would be treated in the existing Effluent Treatment Plant (ETP) and would suffice the norms of CPCB / MPCB. Thus, even if the water percolates and joins the ground water body, chances of pollution / contamination would be very remote. Hence, the impact on ground water is nil.

e. Impact on Soil and Agriculture

Impact on the soil characteristics is usually attributed to air emissions, wastewater discharges and solid waste disposal.

Molasses would be used in own Distillery for production of Rectified Spirit, Press Mud would be mixed with spent wash from distillery unit and would be used for composting through Surface Aerobic Bio-Composting (SABC) Process along with other filler material while Bagasse would be used as fuel in Sugar Factory boilers. Also, solid waste in the form of boiler ash @ 90 MT / Day would be generated from the capacity utilization project. The same would be used in Spentwash composting / supplied to farmers for use as manure.

Further, Biological ETP Sludge @ 20 MT/Month would be generated & the same would be used as manure in own factory premises. Hence, no impact on soil characteristics is envisaged here.

Treated effluent would be used for irrigation, green belt development etc. Here, no impact is envisaged as the quality of the effluent would be as per the norms stated by CPCB / MPCB. Hence, effect of wastewater discharges on soil and agricultural would not be significant.

f. Impact on Noise Levels

The noise levels in the Work Environment are compared with the standards prescribed by Occupational Safety and Health Administration (OSHA-USA) which in turn were enforced by Government of India through model rules framed under Factories' Act. These standards were established with the emphasis on reducing hearing loss. It should be noted that each shift being of 8 hours duration, maximum permissible limits should not be exceeded. The maximum permissible limit of 115 dB (A) should not be exceeded even for a short duration. Adequate care should be taken by providing ear muffs and separate rooms, at sitting place, for the operators/workers working on high noise generating machines. This will significantly reduce the exposure levels.

The resultant noise levels at the receptor in different areas/zones are envisaged to be within permissible limits, as identified by MoEF.

Thus, it can be stated that the noise impact due to the capacity utilization activity could be significant on Working Environment without control measures, while the noise impact on Community would be negligible

g. Impact on Land Use

The development, in the study area, will definitely change in land use pattern. Due to industrialization, the lands in the immediate vicinity of the capacity utilization of existing sugar factory are generally converted into non-agricultural uses and other ancillary activities. Existing Sugar Factory is situated in Warananagar, village Kodoli. However, the industry will take adequate measures to contain all its industrial activities within a pre-defined area.

h. Impact on Flora and Fauna

In the case of capacity utilization project in existing sugar factory unit, emission of particulate matter will be of concern. Due care will be taken by the industrial unit to reduce emissions to the minimum as per the emission standards. No significant loss to the productivity of surrounding agricultural crops is envisaged. However, undertaking and implementation of green belt development programme will control whatever little soot that would be generated. The emissions are only in the form of SPM. Three stacks & three Electrostatic Precipitators (ESPs) have been provided as Air Pollution Control (APC) equipments to the Boilers. Air and noise pollution would be caused due to increased transportation and other industrial operations & the same will remain much below the specified standards. The intensive forestation activity that will be undertaken on industrial premises will help to reduce these parameters further and would make working atmosphere better.

i. Impact on Historical Places

Panhala fort, located at 20 Km northwest of Kolhapur district & 9.2 Km towards southwest from village Kodoli. Panhala is a sort of hill station and provides all the necessary facilities for tourists. There would be no any significant impact on historical place by capacity utilization project.

D. ENVIRONMENTAL MONITORING PROGRAMME

Reconnaissance survey of the study area was undertaken in the month of March 2012. Field monitoring for measuring meteorological conditions, ambient air quality, water quality, soil quality and noise levels, was initiated in March 2012. This report incorporates the data monitored during the period 1st March 2012 to 31st May 2012 and secondary data collected from various sources, which include Government Departments related to ground water, soil, agriculture, forest etc.

a. Land Use

Land use study requires data regarding topography, zoning, settlement, industry, forest, roads and traffic etc. The collection of this data was done from various secondary sources viz. Census Books, Revenue Records, State and Central Government Offices, Survey of India Toposheets etc. and through primary field surveys.

The purposes of land use studies are:

- To determine the present land use pattern;
- To determine the temporal changes in land use pattern over a period of ten years or so;
- To analyze the impact on land use due to industrial growth in the study area;
- To give recommendations for optimizing the future land use pattern vis-à-vis growth of industries in the study area and its associated impacts.

b. Land Use / Land Cover Categories of Study Area

TABLE NO.: 1.13

Name of the Taluka	Geographical area (Ha)	Forest (Ha)	Land under Cultivation (Ha)			Culturable waste land (Ha)	Area not available for cultivation (Ha)
			Irrigated	Non-irrigated	Sub-total		
Panhala	14356	415.2	2236.3	6507.1	11743.4	564.6	1424.5
Hatkanangale	6073	226.9	2668	2810.91	5478.9	275	440
Shirala	5742	58.7	1370.2	3734.2	5104.4	256.3	267.9
Walwa	3905	108.2	2815.4	690.7	3506.1	84.43	220.2
Total	**30076**	**809**	**9089.90**	**13742.90**	**25832.8**	**1180.3**	**2352.6**
Percentage of total area (%)	**100**	**2.68**	**30.22**	**45.69**	**85.89**	**3.92**	**7.82**

Source: Census Report, 2001

c. Meteorology

The methodology adopted for monitoring surface observations is as per the standard norms laid down by Bureau of Indian Standards (BIS) and the India Meteorology Department (IMD). On-site monitoring was undertaken for various meteorological variables in order to generate the data. Further, meteorological data has been taken from IMD, Mumbai.

The meteorological parameters were monitored for one season up to 31st March 2012. The details of parameters monitored, equipments used and the frequency of monitoring is given below-

TABLE NO. 1.14
METEOROLOGICAL PARAMETERS

Sr. No.	Parameters	Instrument	Frequency
1.	Wind Speed	Counter Cup Anemometer	Hourly
2.	Wind Direction	Wind Vane	Hourly
3.	Temperature	Min. / Max.: Thermometer	Once
4.	Relative Humidity	Dry/ Wet bulb Thermometer	Twice a day

d. Sources of Information

Secondary information on meteorological conditions has been collected from the IMD station, Mumbai. Temperatures, relative humidity, rainfall intensity have been compiled from the same. Similarly data on solar radiation, inversion, cloud cover and evaporation rates are compiled from climatological tables from the nearest IMD station, Kolhapur.

e. Air Quality

This section describes the selection of sampling locations, includes the methodology of sampling and analytical techniques with frequency of sampling. Presentation of results for the March 2012 to May 2012 survey is followed by observations. All the requisite monitoring assignments, sampling and analysis was conducted through the laboratory of M/s. Horizon Services, Pune. The lab has approved by MoEF; New Delhi and has received ISO 9001 – 2008 and ISO 14001 – 2004 accreditation by DNV.

Ambient air monitoring was conducted in the study area to assess the quality of air for PM_{10}, $PM_{2.5}$, SO_2, NO_x & CO.
The Four Stations selected are:

TABLE NO. 1.15
AMBIENT AIR QUALITY MONITORING LOCATIONS
WITH DISTANCE AND DIRECTION FROM THE SITE

AAQM Station Code	Name of the Station	Distance from the Center of Site (km)	Direction w.r.t. the Site
A1	Site	--	--
A2	Kakhe	2.7	W, Upwind
A3	Nilewadi	3.9	NE, Downwind
A4	Bahirewadi	4.0	SE, Downwind

TABLE NO. 1.16
SUMMARY OF THE AAQ LEVELS FOR MONITORING SEASON [MARCH 2012 TO MAY 2012]

Sr. No.	Location	PM_{10} µg/M^3				$PM_{2.5}$ µg/M^3				SO_2 µg/M^3				NOx µg/M^3			
		Max.	Min.	Avg.	98%	Max.	Min.	Avg.	98%	Max.	Min.	Avg.	98%	Max.	Min.	Avg.	98%
1.	**Site**	59.7	54.7	57.2	59.6	14.9	12.9	13.9	14.9	28.0	24.2	26.1	27.9	39.2	34.5	36.9	39.1
2.	**Kakhe**	38.7	37.0	37.9	38.6	9.9	9.0	9.5	9.9	16.7	13.3	15.0	16.5	32.9	30.6	31.8	32.8
3.	**Nilewadi**	43.6	39.8	41.7	43.3	13.3	12.4	12.8	13.3	20.3	14.6	17.4	19.9	35.0	32.3	33.7	34.1
4.	**Bahirewadi**	43.6	41.7	42.7	43.5	11.9	11.0	11.5	11.9	19.3	14.3	16.8	19.1	33.9	31.2	32.5	33.8

Note:

- PM_{10}, $PM_{2.5}$, SO_2 and NO_x are computed based on 24 hourly values.
- CO is computed based on 8 hourly values.
- The CO concentrations were observed to be well below detectable limits and hence the same are not mentioned in the above table.

TABLE NO. 1.17
NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) SPECIFIED BY CENTRAL POLLUTION CONTROL BOARD NOTIFICATION (NEW DELHI, THE 18TH NOVEMBER, 2009)

Sr. No.	Zone Station	PM_{10} µg/M^3		$PM_{2.5}$ µg/M^3		SO_2 µg/M^3		NOx µg/M^3		CO mg/M^3	
		24 hr	A.A.	24 hr	A.A.	24 hr	A.A.	24 hr	A.A.	1 hr	8 hr
1.	Industrial and mixed use zone	100	60	60	40	80	50	80	40	4	2
2.	Residential and rural zone	100	60	60	40	80	20	80	30	4	2

Note: A.A. represents “Annual Average”

f. Water Quality

Sampling and analysis of water samples for physical, chemical and heavy metals were undertaken through MoEF; New Delhi approved laboratory- M/s. Horizon Services, Pune - that has also received ISO 9001 – 2008 and ISO 14001 – 2004 accreditation. Four locations for surface water and five locations for ground water were selected. Those are listed below-

TABLE NO. 1.18
MONITORING LOCATIONS FOR SURFACE WATER

Station Code	Name of the Station	Distance from the Center of Site (km)	Direction w.r.t. the Site
SW1	Arale	5.9	SW
SW2	Chavare	7.3	E
SW3	Pargaon	3.7	E
SW4	Nilewadi	3.9	NE

TABLE NO. 1.19
MONITORING LOCATIONS FOR GROUND WATER

Station Code	Name of the Station	Distance from the Center of Site (km)	Direction w.r.t. the Site
GW1	Site	--	--
GW2	Bahirewadi	4.0	SE
GW3	Kakhe	2.7	W
GW4	Padali	7.7	SE
GW5	Nilewadi	3.9	NE
GW6	Dongarwadi	4.75	N

g. Noise Level Survey

The study area of 10 km radius with reference to the plant site has been covered for noise environment. The four zones viz. Residential, Commercial, Industrial and Silence Zones have been considered for noise monitoring. Some of the major arterial roads were covered to assess the noise due to traffic. Noise monitoring was undertaken for 24 hours at each location.

The main objective of noise pollution impact assessment in the study area is to assess the impact of total noise generated by industries and vehicular traffic on the human settlements within 10 km radius.

The surroundings of the noise monitoring stations are given in **Table 1.20**

TABLE NO. 1.20
NOISE SAMPLING LOCATIONS

Station Code	Name of the Sampling Point	Distance, Direction w.r.t. the Plant Site
N1	Site	--
N2	Bahirewadi	4.0 Km; SE
N3	Dongarwadi	4.75 Km; N
N4	Kakhe	2.7 Km; W
N5	Kekhale	6.7 Km; S
N6	Mohare	4.0 Km; SW
N7	Nebapur	9.5 Km; SW
N8	Padali	7.7 Km; SE
N9	Pakirwadi	8.25 Km; NW
N10	Pargaon	3.7 Km; E

TABLE NO. 1.21
AMBIENT NOISE LEVELS

PRE-MONSOON, MARCH 2012 TO MAY 2012							
Sr. No.	Location	Average Noise Level in dB (A)					
		L_{10}	L_{50}	L_{90}	$L_{eq(day)}$	$L_{eq(night)}$	L_{dn}
1.	N1	44.25	48.3	50.85	54.6	44.0	54.9
2.	N2	39.8	42.35	45.7	45.1	40.7	49.6
3.	N3	39.9	42.9	46.0	47.4	39.8	49.6
4.	N4	40.15	44.05	46.75	46.3	43.3	50.8
5.	N5	39.5	42.25	46.15	45.6	40.5	49.4
6.	N6	39.9	42.25	46.05	45.6	40.3	49.7
7.	N7	39.6	42.4	45.3	45.1	40.8	49.6
8.	N8	41.05	43.15	45.55	44.8	42.2	50.5
9.	N9	39.9	42.85	46.3	45.8	41.5	50.3
10.	N10	40.0	42.65	45.25	45.0	41.2	49.9

h. Socio-Economic Profile

Socio-economic status of the population is an indicator for the development of the region. Any developmental project of any magnitude will have a bearing on the living conditions and on the economic base of population in particular and the region as a whole. Similarly, the industry will have its share of socio-economic influence in the study area. The section delineates the overall appraisal of socially relevant attributes.

As per the scope of this study, the information on socio-economic aspects has been gathered and compiled from several secondary sources. These include Taluka Office, Collectorate, Agriculture Department, Irrigation Department, Central Ground Water Board, Department of Mines and Geology etc. The demographic data has mainly been compiled from the District Census Report, 2001 for District Kolhapur as the information is comprehensive and authentic.

i. Ecology

The ecological impact assessment presented in this report is based on-

- Data generated during one time field visit in March 2012. It involved a detailed study of 10 km radius area with the capacity utilization of sugar unit as center.
- Data collected from secondary sources.

Based on the criteria, following terrestrial and aquatic sites were selected for detailed study.

TABLE NO. 1.22
LIST OF TERRESTRIAL LOCATIONS

Location Code	Name	Location & Direction w.r.t. Site
T1	Panhala	10 Km; SW
T2	Wadi Ratnagiri	7.9 Km; S
T3	Talsande	6.11 Km; E
T4	Kodoli	1.9 Km; NW

Terrestrial sites were studied by employing random sampling and/or using least count quadrate method. List of flora was done by visual observation and classification of species into life forms was done according to Braun-Blanquet's modification of Raunkiaer's classification. The importance of species for various uses was noted from secondary sources and on consulting the local people. The terrestrial fauna was studied by sighting, calls, sounds, and interrogating local people as to presence and abundance of animals.

Information gathered during field studies was supplemented from secondary sources.

E. ADDITIONAL STUDIES

- **Risk Assessment**

Area in the factory where potential and major fire hazard can take place as follows –

a) Storage of Bagasse
b) Storage of Molasses
c) Boiler Operation
d) Storage of Sugar Bags
e) Others

(a) Storage of Bagasse: - Bagasse in sugar factory should be stored properly or otherwise it may catch fire.

(b) Storage of molasses: - Molasses is stored in steel tanks. Molasses can char and lead to ignition by spontaneous combustion.

  (i) Leakage of molasses from pipes
  (ii) Leakage from storage tanks

(c) Boiler operation: - It may cause fire due to-

  (i) Improper maintenance
  (ii) Heat released by radiation
  (iii) Bad house keeping
  (iv) Fire injury to workers in boiler operation

(d) Storage of Sugar Bags: - Sugar bags are generally stored in warehouses. Major accidents can take place due to –

  (i) Electrical short circuit
  (ii) Fire due to terrorist activities

Generally it is observed that factory management does not follow the necessary precautions for preventing disasters.

Following inadequacies are generally observed –

(i) No special care is taken for storage of molasses.
(ii) Special action plan in emergencies are not provided.
(iii) Fire-fighting system is not adequate.
(iv) Fire fighting training is not given to all employees.
(v) No special care is taken for storage of bagasse.
(vi) Bad house keeping.
(vii) No special care is taken of pipes, which carry steam.

To overcome all these possible hazards, the following measures may be adopted

(i) Spacing between the units in the plant should be kept as per the specifications of safety distances.
(ii) Precautionary measures.
(iii) Provision of fire fighting system.

Precautionary measures:

(a) Bagasse storage: - Bagasse is a combustible material and as such the following measures may be taken –

  (i) Bagasse storage should be done away from heat processes.
  (ii) Welding and steel cutting should not be allowed in the vicinity of storage of bagasse.
  (iii) It should not be stored where high voltage electric supply lines are overheads.
  (iv) It should be stored away from explosive materials.
  (v) Bagasse storage should be kept in least to reduce the intensity of fire. Bagasse should be used for pulp-paper mill or as a fuel for boilers.
  (vi) Proper ventilation should be provided while stacking bagasse so that auto combustion can be avoided.

Compliance Done On Site By STSKWSSKL:

Bagasse in Sugar factory is stored properly so that, it may not catch fire. Further, Fire Hydrant System and Lightening Arrestor are provided surrounding the Bagasse yard.

(b) Storage of Molasses: -

1. Molasses should be stored in good quality and leak proof steel tanks. Bound walls should be constructed around the tank.
   Volume of bound = 1.2 x volume of storage.
2. Continuous mixing of molasses should be done.
3. If there is increase in temperature beyond 30^0C external cooling of tanks should be provided. A temperature recorder should be provided to the tanks.
4. If there is leakage –
   a. Leakage should be washed out and diluted.
   b. Replacing of leaky gaskets, joints, should be done strictly by following work permit system.
   c. Leakage of pipelines, welding repairs should be attached outside the plant.
   d. Leakage through gland should be regularly attached. It should be perfectly stopped by adopting improved techniques such as mechanical seals.
   e. To attend all major leakage in tanks the following procedure should be followed –
      1. Transfer the material to other tank.
      2. Prepare the tank for welding repairs and this should be done by skilled workers.

Compliance Done On Site By STSKWSSKL:

5 Nos. of Molasses storage tanks have been provided on site having capacity 6500 MT each. The material of construction of the same is Steel. The tanks are provided with water spraying system to avoid increase in temperature of molasses stored, during summer.

Refer **Annexure – XIII** for the above mentioned compliance done on site by STKWSSKL.

(c) Boiler operations: -

(i) Personal protective equipments should be given to workers.
(ii) Pilot lights should be provided on electrical panel boards.
(iii) Hand operable fire fighting cylinders should be provided.

(d) Storage of Sugar bags: -

(i) Electrical wiring should be flame-proof.
(ii) Ventilation should be provided.
(iii) Warehouse should be kept in good condition.
(iv) Adequate fire fighting equipment should be kept.

(e) Others: -

(i) Frequent checking of pipelines and storage units should be done.
(ii) Welding should not be done near combustible material storage.
(iii) Ash generated from fire should always be placed in metal receptacles and removed as soon as possible.
(iv) Fuel pipes provided should be as short as possible and should be separated from any unprotected combustible material by a distance of 3 times the diameter of fuel pipe.

a) Fire fighting:-

(i) Fire -extinguishers should be hand operable.
(ii) Fire hydrants.
(iii) DCO type or CO_2 type hand operable fire extinguishers should be kept at exit of the plant and entrance of the plant. Center to center distance of each extinguisher should not be greater than 25 M. 9 Kg of DCP or 2 Kg CO_2 should be kept in every 100 M^2 area.

Fire hydrant system should be provided around the periphery of the plant with adequate water capacity.

Bagasse storage should be surrounded by fire hydrants. Center to center distance of hydrant should be kept 10 to 15 M.

Plant should have well trained fire-fighting squad. Regular parades and drills must be conducted.

At emergency or at high strength fire hazard, employees go through "Emergency Action Plan" of the industrial complex.

F. PROJECT BENEFITS

Main Products of economically importance & Secondary Products for value addition are manufactured that include; Sugar, Molasses, Bagasse, Alcohol, Pulp & Paper, Power, Refined Sugar, etc. The economy & developments as a result of projects such as sugar factory, distillery, power, etc. Help in improving standard of living of the local people & assist towards social development of the region. The improved employment potential & development of infracture are direct benefits resulting out of the projects.

G. ENVIRONMENT MANAGEMENT PLAN (EMP)

Environment Management Plan is required for ensuring sustainable development of the project. It should not affect the surrounding environment adversely. The management plan presented in this chapter needs to be implemented by Capacity Utilization of existing Sugar Factory Unit by 5000 TCD.

The Environment Management Plan aims at controlling pollution at source with available and affordable technology followed by treatment measures. Waste minimization and waste recycling measures are emphasized. In addition to the industry specific control measures, the Capacity Utilization of Existing Sugar Factory Unit should adopt following guidelines.

They are:

- Application of Low and Non Waste Technology in the production process; and
- Adoption of Reuse and recycling technologies to reduce generation of wastes and to optimize the production cost of the industry.

The recycling and reuse of industrial waste not only reduces the waste generation but also can be an economic gain to the industry.

It is concluded that the Capacity Utilization of Existing Sugar Factory unit would have minor impact on the environment in terms of depletion of surface water body & soil.

The details of proposed mitigation measures that are suggested in order to achieve economic development due to the Capacity Utilization of Existing Sugar Factory without harming the nature are as follows.

a. At A Glance Review of Existing Activities in the Warna S.S.K. Campus

For description of overall activities in the Warna S.S.K. campus, both existing as well as proposed, **as per MPCB consents issued** (both establish as well as operate), description presented in above para's may be referred.

Now, hereunder at **Table No. 1.23**, description about the ongoing project activities have been presented which comprise of actual onsite details of raw material consumption, production, water use and effluent generation, solid as well as hazardous waste details etc.

TABLE NO. – 1.23

SR. NO.	DESCRIPTION	EXISTING SUGAR FACTORY	EXISTING 60 KLPD DISTILLERY	LIGNOSULPHONATE & PULP	REMARKS
01	Raw Materials (Major)	Cane – 7295 TCD	Molasses– 5993 MT / M	Bailed Bagasse – 5550 MT / Year Sodium Sulphite- 363.3 MT / Year Caustic Soda– 60.75 MT / Year	For sugar factory average of 4 seasons have been taken. Details furnished are based on averages taken from Form RT 8 (C). For Distillery, average of 4 seasons has been taken.
02	Production	Sugar – 27,945 MT/M Molasses – 7,279 MT/M Bagasse – 62,596 MT/M Pressmud – 7,159 MT/M	Rectified Spirit– 1128 KL/M	Lignosulphate Powder – 338.75 MT / Year Bagasse Pulp – 975 MT / Year	
03	Operational Days	167 Days / Season	218 Days / Season	For Lignosulphate- 164 Days / Season For Pulp – 206 Days / Year	
04	Water Consumption				
	Domestic	280 CMD	8.5 CMD	2.1 CMD	
	Industrial	1725 CMD (Ave. as per RT 8 C)	665.75 CMD	149.5 CMD	
	Total	2005 CMD	674.25 CMD	151.6 CMD	
05	Effluent Generation				
	Domestic	200 CMD	6 CMD	1.5 CMD	
	Industrial	730 CMD	362 CMD 51.5 CMD (Spentlees)	71 CMD	Avg. spentwash generation was 9.63 lit / lit of alcohol. Av. spentlees generation was 1.37 lit / lit of alcohol.
06	Effluent Treatment	Existing ETP; Primary, Secondary & Tertiary Treatments	Spentwash- Biomethanation followed by Surface Aerobic Bio-composting. Spent lees- ETP of Sugar Factory	Anaerobic Digester followed by Existing ETP of Sugar Factory; Primary, Secondary & Tertiary Treatments	

SR. NO.	DESCRIPTION	EXISTING SUGAR FACTORY	EXISTING 60 KLPD DISTILLERY	LIGNOSULPHONATE & PULP	REMARKS
07	Air Pollution Control Aspect A. Boilers	Boiler No. 1- 48TPH, No.2- 20TPH, No.3- 22TPH No.4- 38TPH, No.5-40TPH, No.6-47.5TPH (All Boilers use Bagasse as fuel)	Steam is taken from Boilers of Bagasse Pulping Unit.	Boiler No.1- 12 TPH (Biogas / FO based) Boiler No.2- 30 TPH (Bagasse based)	
	B. Stack	Stack No. 1 : 30 M (Boiler 1,2 & 4) Stack No. 2 : 30 M (Boiler 3) Stack No. 3 : 40 M (Boiler 5 & 6)	----	Stack No. 1 : 40 M (Boiler 1) Stack No. 2 : 33 M (Boiler 2)	
	C. APC Equipment	Three Separate ESPs are provided to three different stacks mentioned above.	----	Wet Scrubber	
08	Hazardous Wastes Aspect	Cat. No.: 5.1 & 5.2 Used / Waste Oil @ 7.5 MT / Year	Nil	Nil	
09	Solid Waste Aspect	Boiler Ash @ 42 MT / Day ETP sludge, i.e. secondary biological sludge, @ 50 MT / Month is generated from operations of the ETP	Yeast Sludge- 193.75 MT / Year	Nil	1. Sugar Factory-Boiler Ash is used in spentwash composting / supplied to farmers for use as manure. ETP Sludge is used as manure. 2. For Distillery, average of 4 seasons have been taken

Note:

1. The data in above table has been presented after considering four working seasons of industrial operations. They are from 2007-2008 to 2010-2011 for the Sugar Factory, Distillery as well as Lignosulphonate and Bagasse Pulping Unit.
2. The details furnished for Sugar Factory are based on averages taken from Form RT 8 (C).

b. Compliance with the Norms

The requisite compliance required under EPA Act (1986) and Rules thereunder is observed through different units in the Warna Campus. There under, following protocol is followed-

1. Renewal of the Consent to Operate for regular products.
2. Obtaining Consent to Establish for any new products, by products etc.
3. Regular filing of Water Cess Returns and making payments as per the assessment orders issued by MPCB.
4. Yearly submission of Environmental Statements
5. Yearly submission of Hazardous Wastes Returns
6. Self monitoring of AAQ, Stack emissions, Noise levels, quality of treated and untreated effluents from ETP through a MoEF; New Delhi approved laboratory.
7. Regular analysis of quality of compost, spentwash etc.

c. Environmental Management Cell

The Warna S.S.K. Ltd. has developed an Environmental Management Cell for its Sugar Factory, Distillery and Bagasse Pulping Units. The same comprises of 22 people who are well qualified and experienced. The members of cell are as follows –

TABLE NO. – 1.24

Sr. No.	Description	Number of Working Person
1.	Works Manager	1
2.	Environmental Advisor	1
3.	Environmental Engineer	1
4.	Environmental Chemist	2
5.	Safety Officer	1
6.	Supporting Staff	10
7.	Laboratory Attendants	6
Total		**22**

The industry has also developed its own onsite laboratory to analyze samples collected from ETP abs composting facility. Here, primarily analysis w.r.t. basic parameters for daily monitoring are done. However, for analysis of certain important parameters and sophisticated monitoring as well as precise testing w.r.t. water, wastewater, soil, air etc., services of reputed laboratories as well as that of the Consultants are hired.

d. Investments in Pollution Control Infrastructure

The Capital as well as O & M Costs towards Environmental Aspects in the existing Industrial setup is as follows –

TABLE NO. – 1.25

SR. NO.	DESCRIPTION	COST COMPONENT IN RS. LAKHS	
		CAPITAL	O & M PER YEAR
I	**The Sugar Factory Unit**		
1.	Air Pollution Control Equipment (APC) & Stacks	Rs. 735	Rs. 60
2.	Effluent Treatment Plant (ETP)	Rs. 150	Rs. 15
3.	Noise Pollution Control	Rs. 10	Rs. 2
4.	Environmental Monitoring	Rs. 10	Rs. 5
5.	Green Belt Development	Rs. 60	Rs. 10
6.	Occupational Health and Safety	Rs. 20	Rs. 3
	Total	**Rs. 985**	**Rs. 95**
II	**The Distillery Unit**		
1.	Bio-methanation Plant for Spent wash Digestion	Rs. 700	Rs. 34
2.	Multiple Effect Evaporation (MEE) Plant for Concentration of Digested Spent wash	Rs. 800	Rs. 20
3.	Spent wash Bio-composting Infrastructure including Land, Machinery, Plant & Equipment	Rs. 220	Rs. 30
	Total	**Rs. 1720**	**Rs. 84**
III	**The Bagasse Pulping Unit**		
1.	Lignosulphonate Plant Infrastructure which converts the liquid wastes from pulping (i.e. black liquor) in to powder. Thus, it forms a facility for treatment of effluents	Rs. 30	Rs. 3
	Total	**Rs. 30**	**Rs. 3**
	Grand Total	**Rs. 2735**	**Rs. 182**

e. Salient Features of EMP

i. Management during Construction Phase

During construction phase, following recommendations are suggested-

- During construction phase, there is a scope for local dust emissions. Suitable measures would be taken to protect workers against dust arising from leveling, drilling, crushing, excavation and transportation. Water would be sprinkled frequently in the vicinity of the construction activity and on kuccha internal roads. Provision should be made for water sprinklers as an initial project construction investment.

- Industry would go for extensive tree plantation program at the outset of the project itself along the boundaries of the plant site and along internal roads to mitigate dust from construction activities.

- The construction site would be provided with sufficient and suitable sanitation facilities for workers to maintain proper standards of hygiene. It is advisable that on site workers using high noise construction equipment like bulldozers, concrete mixers should adopt noise protection devices. Noise prone activities would be restricted during night particularly between the periods 21 hrs. To 06 hrs. In order to have minimum adverse impact.

- It would be ensured that both petrol and diesel powered construction vehicles are properly maintained to minimize pollutants in the exhaust emissions. The vehicle maintenance area would be located in such a manner to prevent contamination of surface and ground water resources by accidental spillage of oil. Unauthorized dumping of waste oil would be prohibited.

- As soon as construction is over overburden would be utilized to fill up low-lying areas. The rubbish would be cleared and all open surfaces would be leveled and cleaned. Appropriate vegetation would be planted and all such areas would be landscaped. Hazardous materials (e.g. acids, paints and explosives) would be stored and disposed off in designated areas.

- Normally a construction activity would benefit the local populace in a number of ways, such as supply of construction laborers (semi and unskilled), tertiary sector employment and provision of goods and services for daily needs, including transport. This could bring in its wake proliferation of slums, unauthorized occupation of roadside lands and result in sanitary conditions. Planning and allocating lands and resources with the help of local administration should restrict these. The public conveniences should be connected to soak pits. The construction site should be secured with fencing and should have security men at entry points.

ii. Management during the Post Construction Phase

Additional measures to be taken during the post construction phase are given below.

1. Air Pollution Management

The steam required for proposed industrial activity would be taken from existing sugar unit. The same has been provided with Electrostatic Precipitator as a Air Pollution Control equipment adequate stack height. Please refer **Annexure - XI** for more details of air pollution aspect and its control measures i.e. Electrostatic Precipitator (ESP) and photograph of the same.

Recommendations:

The following measures would be adopted by the industry:

- Stack ports at a distance, as specified by MPCB from top of chimneys would be provided to enable for taking stack emission samples.
- The Capacity Utilization in existing Sugar Factory unit should plan for proper Fly Ash Arresting System in the plant.
- Provision of dense green belt along all internal roads, outer periphery of industrial unit & office would be made.
- Provision of tarred roads to minimize dust generation due to vehicular movement would be made.
- Industry would provide ESP for control of SPM from boiler.
- Ash storage would be separate and well covered, to avoid dispersion due to wind blowing. The ash would be taken to the disposal site after proper cooling.
- The responsibility of dumping the same lies with the project proponent.
- The industrial units would install all required air pollution control equipment prior to commissioning of the plant.
- Emissions from stack and air pollution control equipment would be monitored regularly to ascertain the efficiency of pollution control.

2. Water Management

The water required for the Capacity Utilization activities would be taken from the water scheme on River Warna. Refer the water lifting permission letter from irrigation department enclosed separately at **Annexure – VI.** The total water requirement for Capacity Utilization of Existing Sugar Factory project would be @ 2000 M^3 / day. The same would be utilized for Process @ 1360 M^3/day, for Cooling @ 410 M^3/day, for Boiler Feed @ 100 M^3 / day and for Washing & Lab @ 130 M^3/day. The total water requirement for capacity utilization project would be **@ 2000 M^3 / Day** out of which the water quantity **@ 640 M^3 / Day** would be taken from River Warana & remaining quantity **@ 1360 M^3 / Day** would be utilized from **'Condensate Water Quantity'** i.e. The Natural Water present in sugar cane becoming available after crushing of cane followed by subsequent processing evaporation & condensation operation. Please refer the Water budget enclosed at **Annexure - VI** for more details.

The liquid effluent generated from the Capacity Utilization activities would be in the form of process effluent **@ 475 M^3 / day** as well as cooling & boiler blow down **@ 25 M^3 / day**. The total effluent generated would be diverted to a separate Effluent Treatment Plant (ETP) of the parent sugar factory. The entire effluent from the proposed activity would be treated along the existing sugar factory effluent in the existing ETP.

The existing ETP set up the raw effluent is passed through Screen Chamber and Oil & Grease Trap and is collected in an Equalization Tank. Thereafter it is taken into a second equalization tank where pH adjustment is done. The effluent is then taken into the Bio-Digester. The effluent from Bio-Digester in taken into Primary Clarifier to settle out suspended matter. The supernatant is passed into the Aeration Tank, where organic contents of the effluent are converted in to simple end products by means of aerobic bacterial activity. The required air is supplied through Diffused Aeration System. The overflow from aeration tank is taken to secondary clarifier. Here, the active microbial flock is settled and supernatant is diverted to treated effluent sump. The sludge from primary as well as secondary clarifiers is taken to the sludge drying beds for de-watering purpose. The dried sludge is used as manure for green belt development in own factory premises. The treated effluent, which confirms to MPCB standards, is used for gardening in own factory premises on a land of 47.30 Acres (18.94 Ha) as well as on the land @ 120 Ha of shareholders farming.

Segregation of waste streams & storm water drains originating from various sources shall be considered while planning of layout and construction of each unit

Recommendations:

The following measures would be adopted by the industry:

1. The industry would observe that the effluent collection, disposal and treatment facilities always remain in a good shape to achieve desired efficiencies.

2. No any untreated domestic or industrial effluent would be allowed to dispose off on land or in any surface water body.

3. The treated water would be supplied for irrigation / gardening, on own land, in a rotational style so to achieve uniform distribution of the wastewater.

3. Noise Level Management

Mitigation measures for noise levels are of following types:

- Prevention at source
- Control of transmission path
- Protective measures in the work environment
- Administrative control

Prevention at source not only reduces the cost of measures but also alleviates the danger of possible exposure to high noise levels.

The baseline levels monitored at the nearest village are well within the limits. The likely increase in noise levels at this location is expected to be negligible. Hence noise impact from the plant at this village will be very minimal.

In case of the exposure within the industry the noise levels at some sources may exceed 90 dB (A), in such cases, the exposure time of workers to noise should be regulated so as to be within specified period. No exposure beyond 115 dB (A) for any amount of time is envisaged.

Recommendations:

The following measures would be adopted by the industry:

1. The industry would take care while procuring major noise generating machines / equipment to ensure that the manufacturers have taken adequate measures to minimize generation of noise.
2. Surrounding / concealment of noise generating machinery with artificial, non-permanent arrangement like noise insulation structures shock absorbing techniques would be adopted to reduce impact.
3. Provision of insulating caps and lids at the exit on noise source on the machinery and providing polystyrene, etc. as noise insulation material would be adopted. All the openings like covers, partitions would be acoustically sealed; Reflected noise would be reduced by the use of absorbing material on roofs walls and floors.
4. The distance between source and receiver would be increased and the relative orientation of the source and receiver would be altered.
5. Thick bushy trees would be planted in and around the industrial area to intercept noise transmission to the nearby villages.
6. Workers would be provided and made to wear protective earmuff & earplugs, noise helmets etc.
7. Allocation of work would be managed so that no worker is expose to more than 90 dB (A) for more than 8 hours.
8. Restructuring of work patterns such as job switching etc. would be adopted so as to reduce pressure on few workers.
9. Creating noise awareness among the workers would be undertaken.
10. The overall noise levels in and around the plant area would be kept well within the standards by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation.

4. Land Management

Impact on the soil characteristics is usually attributed to air emissions, wastewater discharges and solid waste disposal. Increase in chemical constituents of soil is unlikely through deposition of air pollutants.

Adequate measures are proposed for taking care of other solid wastes. Dustbins would be provided throughout the industrial area. Collection and transportation of waste should be done in vehicles with closed container. The wastes would be disposed in sanitary landfill, an abandoned quarry, if one exists nearby, shall be utilized. So no solid waste shall be allowed to litter around and degrade the land.

Solid waste, include Boiler Ash generated from the Capacity Utilization project would be 90 MT / Day which would be sold to farmers & brick manufacturers for secondary reuse.

Proposed plantation around the industrial unit and around the solid waste sanitary landfill will arrest the aerial spread of particulate contaminants, if any.

Recommendations:

1. Provision of shrubs and thick trees at storage and disposal places of the solid waste would be made.
2. Trees would be planted along the roads, solid waste landfill area and along the periphery as recommended in the plantation program. The water requirement for this purpose would be met from reuse of treated domestic effluent/industrial effluent.
3. Water sprinklers would be provided to suppress the wind blown dust on the solid waste dumps, if necessary.
4. Extensive green belt development would be taken up all around the plant. This will not only preserve the ecological conditions but also ameliorate the present condition.

5. Operation Control and Equipment Maintenance

It is also necessary to highlight the importance of proper Plant Operation & Maintenance.

The quality of stack emission depends very much on the operating parameters of plant. Improper combustion of bagasse in the boilers increases unburnt carbon particles in the exhaust flue gases. Maintenance is an important factor.

The lubricants used for various equipment and fuel-handling areas would contribute to the pollution aspect. It would be taken care of, at the source, by looking after possible spillage, drippings, leakage etc. in the plant.

6. Measures for Socio-Economic Development

1. Better Employment Opportunities

The shift in the occupational structure from less productive agricultural to non-agricultural base will improve the economic condition of the people. The Capacity Utilization might generate permanent or indirect employment to the local populace. The following measures may be employed to improve the occupational structure:

- Industry should try to employ local persons as far as possible and try to create indirect employment also.

2. Industrial Development

As the area is totally agricultural area, there is no industrial development worth mentioning in the study area. The Capacity Utilization project would bring a positive development in the area.

3. Provision of Health Care Facilities

The Capacity Utilization of project should take up the following measures.

- The expansion project would consider provision of health care facilities for the workers of industry.
- Regular health checkups and doctor visits would be arranged.
- Necessary first aid as well as emergency situation handling facilities would be provided.