PRE FEASIBILITY REPORT

New Proposed 45 KLPD Molasses based Distillery

with

Expansion of Sugar unit from 4000 TCD to 7500

and

Bagasse Based Co generation from 15 MW to 28 MW

For

Mohanrao Shinde Sahakari Sakhar Karkhana Ltd.

At

Mohannagar, At/ Post- Arag, Tal- Miraj, Dist- Sangli.

Maharashtra.

1.0 Introduction

1.1 Project Proponent

This project is proposed by M/s. Mohanrao Shinde Sahakari Sakhar Karkhana Ltd., (MSSSKL). The sugar factory is located at village Mohannagar, At/ Post- Arag, Tal- Miraj, Dist- Sangli., Maharashtra. The present installed capacity of the sugar factory is 4000 TCD and 15 MW bagasse based Cogen.

The management of the factory has undertaken extensive cane development activities and due to increasing sugarcane plantation in area of operation, the factory has decided to expand its crushing capacity from 4000 TCD to 7500 TCD. 15 MW to 28 MW bagasse based Cogen Due to increase in the crushing capacity generation of byproducts namely molasses and bagasse will also increase. Hence the management wish to install new 45 KLPD molasses based distillery on the existing factory land.

The overall control and management of the Company is vested with the Board of Directors. The Company is managed by experienced promoters-directors with a long track record who will be instrumental in the growth of the Company.

List of Board of Directors

MOHANRAO SHINDE SAHAKARI SAKHAR KARAKHANA LTD.,
At-Mohannagar, Post-Arag, Tal-Miraj, Dist-Sangli
State :- Maharashtra, Pin . 416 401,India .
Ephax. 0233-2264853, 8600025901/ 902 /903
Email ID- md@mohansugar.com
contact@mohansugar.com
Factory Code-53008, Short Name – Mohannagar
PAN No. AACAM0354L
GSTIN NO. 27AACAM0354L1ZK
Registration No. SAN/MRJ/PRG (A) S-49 Date 06.04.1994

List of Board of Directors

Sr. No.	Name of Directors	DESTIGNATION	Residential Address
1	Shri. Manoj Mohanrao Alis Ramsing Shinde	Chairman	A/p :- Mahisal , Tal :- Miraj , Dist :- Sangli
2	Shri. Parasappa Gurupad Patil	Vice- Chairman	A/p - Khatav, Tal - Miraj, Dist - Sangli.
3	Shri. Ashok Shripal Vadagarve	Director	A/p - Arag, Tal - Miraj, Dist - Sangli.
4	Shri. Annaso Ramchandra Pidde	Director	A/p - Dhavali, Tal - Miraj, Dist - Sangli.
5	Shri. Salim Noormahmad Soudagar	Director	A/p - Nilaji, Tal - Miraj, Dist - Sangli.
6	Shri. Bahubali Adgonda Patil	Director	A/p - Malgoan, Tal - Miraj, Dist - Sangli.
7	Shri. Arun Shivajirao Latwade (Suryavanshi)	Director	A/p - Shipur, Tal - Miraj, Dist - Sangli.
8	Shri. Shantinath Nana Shete	Director	A/p - Erandoli, Tal - Miraj, Dist - Sangli.
9	Shri. Appasaheb Chimraya Patil	Director	A/p - Miraj, Tal - Miraj, Dist - Sangli.
10	Shri. Annasaheb Tamanna Kurane	Director	A/p - Miraj, Tal - Miraj, Dist - Sangli.
11	Shri. Vijaysing Jayasingrao Bhosale	Director	A/p - Dudhgoan, Tal - Miraj, Dist - Sangli.
12	Shri. Mohan Rajaram Shinde	Director	A/p - Sambarwadi, Tal - Miraj, Dist - Sangli.
13	Shri. Shivajirao Bodhale Patil	Director	A/p - Kavalapur, Tal - Miraj, Dist - Sangli.
14	Shri. Shivajirao Pandit Alis Ganpati Chavan	Director	A/p - Manmodi, Tal - Miraj, Dist - Sangli.
15	Shri. Mahadev Shankar More	Director	A/p - Tanang, Tal - Miraj, Dist - Sangli.
16	Shri. Vasant Tatoba Magdum	Director	A/p - Lingnur, Tal - Miraj, Dist - Sangli.
17	Shrimati. Padminidevi Mohanrao Shinde	Director	A/p :- Mahisal , Tal :- Miraj , Dist :- Sangli
18	Sou. Vaishalidevi Khanderao Jagtap	Director	A/p - Santoshwadi, Tal - Miraj, Dist - Sangli.
19	Shri. Parashram Gunda Suryavanshi (Koli)	Director	A/p - Juni Dhamani, Tal - Miraj, Dist - Sangli.
20	Shri. Nanaso Shamrao Lavate	Director	A/p - Kupwad, Tal - Miraj, Dist - Sangli.
21	Shri. Pandurang Ramkirshana Vhaval	Director	A/p -Bedag, Tal - Miraj, Dist - Sangli.
22	Shri. Suryakant Bhimrao Patil	Managing Director	At :- Mohannagar , Post :- Arag , Tal :- Miraj, Dist :- Sangli

1.2 The Consultant

The project proponent is having interlinked unit at Mohannagar, Arag with an existing 4000 TCD sugar unit, 15 MW Cogen unit. Now, the management of MSSSKL (Mohanrao Shinde Sahakari Sakhar Karkhana Ltd.) is planning to expand the sugar plant capacity from 4000 TCD to 7500 TCD and expansion in Cogen Power plant from 15 MW to 28 MW and Instal new 45 KLPD molasses based distillery unit. According to EIA Notification 2006 and their amendments time to time, proposed expansion project comes under category A project. Hence, Environmental Clearance is to be required from EAC/EIAA MoEF, New Delhi.

1.3 Project Details

The company envisaged setting up of the following facilities in phase:

Byproducts of Existing and Proposed Expansion of Sugar and Cogeneration Plants

Phase I		**Phase II**		**Total**
Existing Facilities		**Proposed Facilities**		**After Expansion**
4000 TCD Sugar Mills	Commissioned	3500 TCD Sugar Mill	Expansion	7500 TCD Sugar Mills
15MW Co-gen PP	Commissioned	13 MW Cogen PP	Expansion	28 MW Co-gen PP
---	--	45 KLPD distillery	New	45 KLPD distillery
By Products				
1200 MTD Bagasse	Useful as fuel	1050 MTD Bagasse	Useful as fuel	2250 MTD Bagasse
180TPD Molasses	Will be used in distillery	160TPD Molasses	Will be used in distillery	340TPD Molasses
175TPD Press Mud	Bio compost	150TPD Press Mud	Bio compost	325TPD Press Mud

List of products& byproducts of proposed 45 KLPD molasses based distillery

Sr. no.	Names of the products/ byproducts	Proposed quantity production
1	Fuel Ethanol/Extra Neutral Alcohol(ENA)/ or Absolute alcohol/Rectified spirit	**45 KLPD**
Byproducts		
1	**Biogas generation**	**22000 Nm3/day**
2	**Bio compost**	**28 MT/day**
3.	**Co2 generation**	**35 TPD**

1.4 Purpose of the Project

Sugar industry is one of the major agro based manufacturer industries. India being the largest Sugarcane producer country after Brazil, it is inevitable and unavoidable for India to grow as largest sugar and allied products manufacturing country. The major stake holder of this sector is the farmer, producer of raw material sugarcane and it is estimated that around 45 millions of people in India are sugarcane growers. Sugarcane Potential, agro climatic conditions and the cost of conversion and overheads etc. are the major deciding factors for fixing the crushing capacity of a sugar plant. It has been established that wages and other overhead costs per ton of sugar get reduced substantially with higher plant sizes. As there is excess cane available in the command area, industry shall have to make arrangement for timely crushing of sugarcane of not only its shareholders but also entire farmer‟s community in the command area. Incidentally, the economic viability would also improve not only by producing sugar more but also to generate power which can be exported to state grid and additional money can be distributed to farmers as cane price.

The Ministry of Environment and Forests and Climate Change (MoEF &CC) Government of India has issued an EIA Notification, S.O. 1533 dated 14th September 2006 amended in 1st December 2009 vide No. 3067, under Environmental (Protection) Act (EPA) 1986. Prior Environmental Clearance (EC) from the EIA Authorities is mandatory for the establishment of projects/activities listed in the schedule of above Notification Sugar Industry > 5000 TCD cane crushing capacity are categorized under 5 (j) of schedule of

activities Category "B'. Cogeneration power projects of 15 MW based on biomass as bagasse and using auxiliary fuel such as coal/lignite/petroleum products 15% are categorized under 1(d) of schedule of activities, category 'B'. Similarly all molasses based distillery units are categorized under 5 (g) of schedule of activities, category 'A'.

1.5 Justification for the project

India is predominately an agro based economy. Sugarcane plays a very vital role in the agro based economy by providing sugar, the main sweetner used in India. With the growing demand for sugar, the emphasis has been on increasing sugar production. India is the second largest producer of sugar over the globe. With more than 45 millions of sugar cane growers in the country, the bulk of the rural population in India depends on this industry. One of the major agro-based industries in India, sugar industry is the second largest agricultural industry followed after the textile industry. There are few major reasons for the installation of ethanol plant. Since the absolute alcohol demand on All India basis is going to increase in proportion to petrol consumption with 5% blend. The demand for absolute alcohol outstrips the supply quite considerably. This Distillery plant will help to cope up some need of alochol (ethanol) for the above said purpose.

Sugar industry is one of the Agricultural based industry in Maharashtra, one of the largest sugar producing state in India contributing to about 34% of the total sugar produced in the country. Looking in to the present demand of E.N.A. and for extending support to Government's Fuel Ethanol Blending policy, the Management, have decided to diversify their activities by expanding Distillery. After expansion of sugar unit the molasses and press mud production will also be increased and same can be used in the interlinked distillery unit.

Cogeneration is the concept of producing two forms of energy from fuel sources, one of the forms of energy must always be heat and the other may be electrical or mechanical energy. Since, the sugar mills in India consume their own bagasse (which is the byproduct of cane crushing) to run their mills during season and generate steam to run

the boilers and turbines. The surplus power during season/off season can be sold to the grid which is turn results in the profit of sugar plant.

1.6 Project Location and Environmental Settings

M/s Mohanrao Shinde Sahakari Sakhar Karkhana Ltd. is proposing expansion with the following facilities at Mohannagar, Arag, Taluka- Miraj, District-Sangli (Maharashtra).

- About 111.61 Ha area is already available with Proponent. This much land is sufficient for the proposed expansion of the entire unit.
- Nearest village is Arag at 0.5 km away from the site.
- The site is well connected with National and State Highways, Railway Station and Airport.
- Arag railway station is 0.18 km and Kolhapur Airport is 68 km away from the site.
- Krishna river is at 12 km from the project site.
- The average rainfall of the District is 637 mm/year.
- Maximum temperature in summer is 32.5^0 C and minimum temperature in winter is 18.3^0 C
- Environmental conditions dusty and non-corrosive
- Seismic zone III
- The project location map and Study area Map are given in **Figure 1** and **Figure 2.**

Figure 1: Project Location

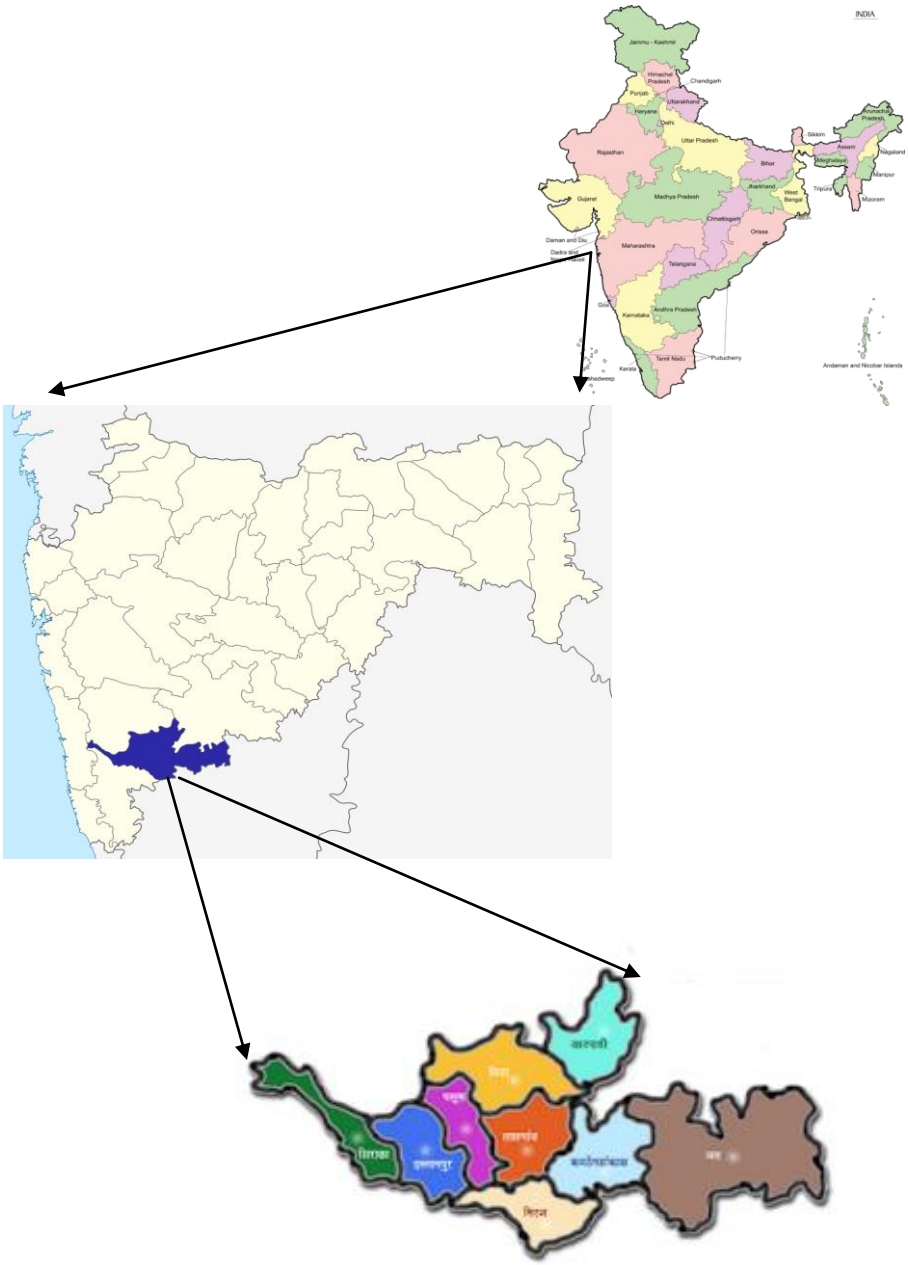

Figure 2 Google Image of the Project site

1.7 Land Details

Total land details are given below:

Total plot area available for factory is about 111.61 Ha.

Land Utilization	Land Area, acre
Built up area	20.0
Green belt area	20.0
ETP/ESP/CPU	6.0
MSEB/ yard	6
Compost Yard	10
Total	**62**

1.8 Raw Material

Total raw material requirement for sugar, cogen& distillery unit is given as below:

Sr. No.	Particular	Quantity		Total	Source
		Existing	Expansion		
Sugar unit					
1	Sugarcane (TCD)	4000	3500	7500	Nearby farms
2	Lime Tonnes/ month	310	340	650	From outside venders
3	Sulphertonnes/month	130	260	390	From outside venders
Cogneration unit					
1	Bagasse (TPD)	875	800	1675	From sugar unit
Distillery					
1	Molasses (MT/M)	---	5000	5000	From sugar unit
2	Nutrients (kg/D)	---	1.5	1.5	From outside venders
4	Press mud (TPD)	--	30	30	From sugar unit
5	Boiler ash (12 TPh)	--	4.32 TPD	4.32 TPD	From sugar unit

2.0 Manufacture of Sugar Process

Sugarcane is weighed, washed, cut, shredded and fed to series of mills. Sugarcane juice is extracted and bagasses are separated. Juice is heated and clarified. Mud is separated out and clarified juice is subjected to multiple effects evaporators. Concentrated syrup is fed to vacuum pan where syrup gets super saturated and fine crystals and mother liquor are separated in centrifuges. Raw sugar is dumped on moving belt where it gets dried

before moving to storage. In normal courses main sugar plant boiler will function and fulfill steam requirement of distillery also.

Manufacturing Process is given below:

- Extraction of juice by pressing sugarcane and bagasse is separated
- Boiling the juice to obtained crystals and clarification with mud separation
- Creating raw sugar by spinning crystals in extractor
- Raw sugar to a refinery for the process of filtering and washing to discard remaining non-sugar elements and hue
- Crystallizations and drying sugar
- Packaging the ready sugar

The process flow diagram is given in **Figure -3.**

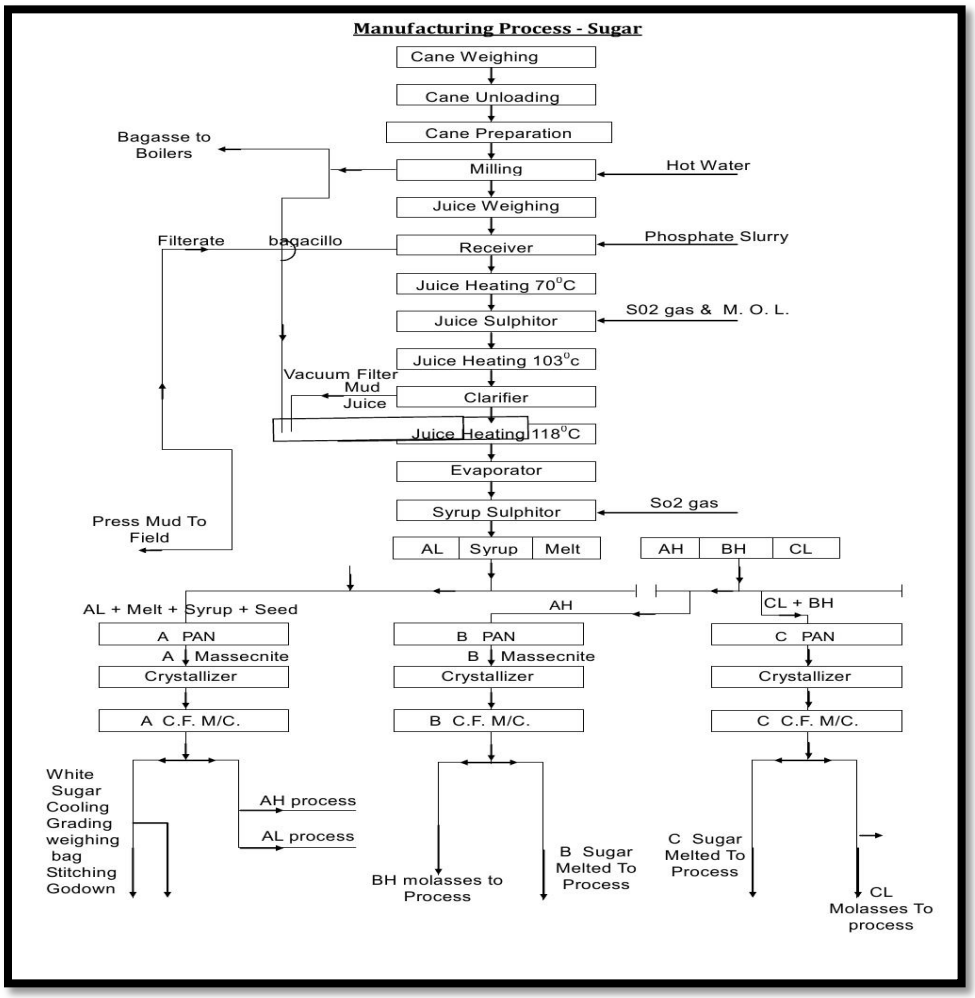

Figure 3: Sugar Manufacturing Process

2.1 Cogeneration of Electrical Power: Process

- When a properly coiled wheel is rotated within magnetic field electricity is generated
- To rotate the wheel mechanical, water or steam may be used
- Steam generated in a boiler is fed to a turbine coupled to an alternator
- Steam is produced in a boiler by burning of bagasse and coal as fuel
- Steam at high pressure moves the turbine which rotates alternator and electricity is produced
- Part of steam is ejected at low pressure is used for heating requirement of sugar mill, de-aeration of incoming water and balance is condensed and recycled
- The management is planning to expand sugar mill up to 7500 TCD and cogeneration up to 28 MW & new 45 KLPD disitllery.
- The proposed expansion of project will be equipped with existing 2 boilers of 55 TPH each and addition of one new 55 TPH boiler. The process Flow Sheet is given in **Figure 4.**

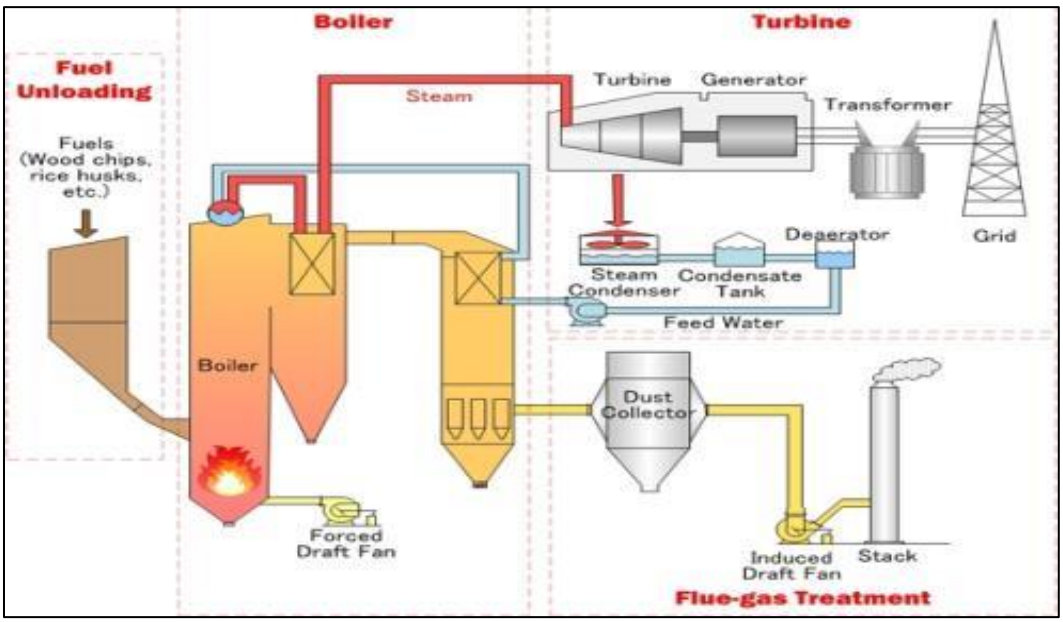

Figure 4: Co-gen Power Plant Process Flow

Bagasse generated from cane crushing of the expanded capacity & bagasse saved from the existing sugar plant, excluding handling losses and bagacillo requirements, will be available for operation of the high-pressure boilers during 160 days season and 160 days during off-season on saved bagasse.

The auxiliary steam consumption for the power plant will be for soot blowing and other auxiliary consumptions like Steam Jet Air Ejector (SJAE) & Gland Steam Condenser (GSC) at high pressure, for HP heater at medium pressure and for de-aerator at low pressure. The auxiliary power consumption for the power plant will be about 9.0% & 9.5% of generation during seasons and off-season periods, respectively. The colony power requirement will be met by the cogen power plant, both during season and off season periods.

2.2 Manufacturing process for distillery

The process envisages use of own molasses generated by the sugar factory for manufacture of ethanol during sugar mill season and during off-season days.

Following is brief description of the process:

Distillery shall be set-up based on latest Design, Engineering and Supply technology for Molasses handling, Fermentation, Distillation, Molecular Sieve Dehydration, Bio-Methanation, Evaporation & Bio-composting, Effluent Treatment in condensate polishing unit so as to have the Plant compliance to Zero Discharge. Latest Technology ensures incorporation of High efficiency Design, Higher fermentation efficiency and Effective heat integration in distillation and evaporation. The Process Technology adds value to overall plant engineering by incorporating global standards for Design, on safety norms and adherence to local design codes. The distillery process will be Continuous Fermentation.

Continuous Fermentation

Series of fermenters of identical size capacity will be provided equipped with agitators for mixing of fermenter mass & facilitate release of CO2 produced. Molasses, diluted with water to the desired concentration is metered and fed continuously into Fermenter I. Additives like urea and de-foaming oil are also introduced in the Fermenter I. There is an automatic foam level sensing and dosing system for de-foaming oil, in both the Fermenters.

Fermentation

Every Kilogram of alcohol produced, generates about 290 Kcal of heat. This excess heat is removed by continuous circulation of the fermenting wash through an external plate heat exchanger called the **Fermenter Cooler I.** The Fermenter temperature is always maintained between 32 and 34°C, the range optimum for efficient fermentation. The conversion of 80%

sugar approximately in to ethanol is completed in Fermenter I. The fermenters are provided with a provision for stillage recycle for maintaining high dissolved solids concentration in the Fermenters. The temperature in the Fermenters is maintained between 32 to 34°C for optimum fermentation. Conversion of sugar to ethanol is instantaneous, and the residual sugar concentration in Fermenters is maintained below 0.2 % w/w as glucose. This usually corresponds to a residual reducing substances concentration of 2.0 to 2.5% w/w in wash.

The yeast for the fermentation is initially (i.e. during start-up of the plant) developed in the Propagation Section. Once propagated, a viable cell population of about 300-500 million cells/ml is maintained by **yeast recycling and continuous aeration of the fermenter.** Fluctuations in the yeast count of ±20% have little effect on the overall fermenter productivity. Yeast cell vitality which is usually above 70 % may, in times of stress (such as prolonged shut-downs) drop to 50% without affecting the fermentation. The aeration rate in both the Fermenters is adjusted for desired yeast cell vitality.

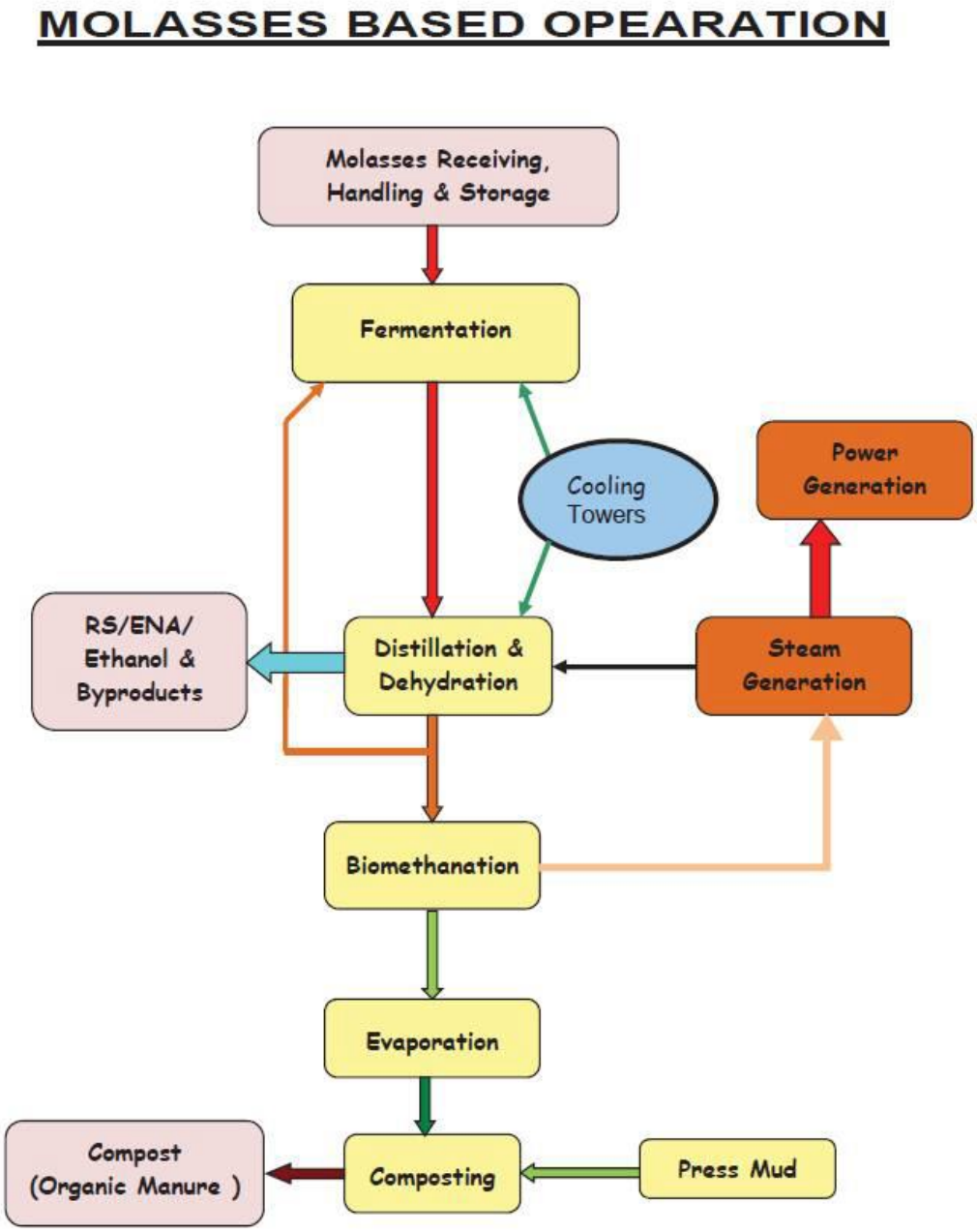

Figure 5: Distillery Manufacturing Process

All the nutrient elements necessary for yeast growth exist in adequate quantities as impurities in molasses. Occasionally, Nitrogen may have to be supplemented. De-foaming oil (DFO), say Turkey Red Oil is added to the fermenter by an automated DFO dosing system, to control foaming. Usually no other additives are required.

Fermented wash from Fermenter II passes through a series of hydro-cyclones , which remove grit, iron filings and heavy particulate matter. The overflow from the first set of hydro-cyclone is

taken to Yeast Separator, which clarifies the wash. The hydro-cyclonesprotect the separator from erosion damage by removing grit and hard particles. The reject from 1st stage hydro-cyclone is fed to 2nd stage hydro-cyclone for further separation. The reject from 2nd stage hydro-cyclone containing sludge along with some wash, is fed to **Decanter Centrifuge for separation of sludge** which is sent to composting. The clear wash recovered from the Decanter Centrifuge is fed to wash column for **alcohol recovery** The overflow from 2nd stage is recycled back to Fermenter I.

Yeast recycling

The yeast in the fermented wash is removed as 40% to 45 % v/v slurry, and is returned to the Fermenter I. This feature ensures a high yeast cell concentration is achieved and maintained in the fermenters. By re-circulating grown, active yeast, sugar that would have otherwise been consumed in yeast growth is made available for ethanol production, **ensuring high process efficiency and extra alcohol yield.** The clarified wash from separators is collected and sent to distillation section.

Propagation

The propagation section is a feeder unit to the fermenters. Yeast is grown in 3 stages. The first two stages are designed for aseptic growth. Propagation vessel III develops the inoculums using pasteurized molasses solution as the medium. Propagation is carried out only to start up the process initially or after very long shutdowns during which the fermenter is emptied.

CO2 Scrubbing and recovery

The carbon-di-oxide produced during fermentation from Fermenter I is scrubbed with water in sieve tray scrubber to recover alcohol from vent gases. The vent gases from Fermenter II mainly air and carbon dioxide are also scrubbed in sieve tray scrubber for alcohol recovery. The water from both the scrubber is returned to respective Fermenters. About 1% of the total alcohol production is saved by scrubbing the Fermenter off gases.

The CO2 produced from fermenters after scrubbing will be bottled to avoid air pollution.

Molasses Handling and Distribution

Screened molasses transferred to molasses receiving tank and molasses is weighed. Weighed molasses is distributed to cell mass propagation, fermentation and yeast activation section.

Yeast Propagation

Yeast is grown in laboratory during plant start up. Yeast propagation section comprises of molasses diluter and hygienically engineered yeast vessels equipped with heating, cooling and air sparging facility.

Dilute molasses media are prepared in yeast vessel by re-circulating media through molasses diluter. Laboratory propagated cell mass is scaled up in series of yeast vessels. Filtered air is

sparged in pasteurized and cooled dilute molasses medium for optimum growth of yeast. Temperature is maintained at 30-32°C by recirculation cooling water through jacket of yeast vessels. Cell mass from Yeast vessel is transferred to yeast activation vessel to build up cell mass required for fermentation by cell mass transfer pump.

MULTI-PRESSURE DISTILLATION

Multi-Pressure distillation scheme has distillation columns operating under different pressures. Heat energy from columns operating under high pressure is recycled back to columns operating under low pressure to conserve energy. The plant can be operated under 2 different modes to produce RS or ENA as desired.

2.3 Magnitude of Operations

Following table clearly indicates all facets of proposed project to elaborate magnitude of project:

Magnitude of Operations

Sr. No.	Feature	Details
1.	Working days for sugar &cogen	
	Season	Sugar &Cogen: 160
	Off-season	Cogen: 160
	Working days for distillery	330
2.	Expansion of Sugar Mill	4000 TCD to 7500 TCD
	Expansion Cogeneration Plant	15 MW to 28 MW
	Proposed distillery unit	45 KLPD
3.	**Raw Material**	
	List of raw material required for sugar, cogeneration and distillery unit is given in point no. 1.8	
4.	**Water Resources**	
	Surface Water	Irrigation Department
	Fresh Water Demand for Sugar & Cogeneration project	1800 KLD
	Fresh Water Demand for distillery	490 KLD
5.	Power Requirement for Sugar Plant Distillery Cogeneration unit	Power required for construction work would be taken from existing 15 MW cogen plant as well as existing DG sets power required for operations of sugar factory and distillery will be taken from

Sr. No.	Feature	Details
		in house cogen plant
6.	Backup power	
	D G set rating	Existing : 625 + 320 KVA Praposaed : 1010 KVA
	Fuel used	HSD
		Existing 65 liters/hour (at full load) Prposaed : total 145 liters/hour (at full load)
7.	Man Power	Existing : Permanent : 209 Seasonal : 102 On contractual : 138 Proposed employment generation : 110
8.	Total Investment for Phase	Existing – Rs. 5563.27 Lakhs Expansion of Sugar &Cogen - Rs. 11731.08 Lakhs New Distellery unit : 6115.0 lakh
9.	Utilities	Two boilers of 55 TPH capacity each are existing and new 12 TPH boiler will be provided for expansion
	Steam generation capacity	72 ata @ 67 kg/cm2
	Fuel – Bagasse Requirement	1320 MT/day
10.	Total Ash Generation	39.6 MT/day
	Fly Ash expected	13.2 MT/day
	Bottom Ash expected	26.4 MT/day
	Fly Ash Dust collector	DC and ESP
	Bottom ash & fly disposal	Used as Manure & Brick manufacturers
11.	Height of chimney	60 m
	Diameter chimney	3 m

Sr. No.	Feature	Details
	Bottom Ash disposal	Silo
	ETP capacity (ETP of sugar unit)	Existing 540 m^3/day Expansion Sugar Cogen1060 m^3/day For Distellery : 433 m^3/day
12.	Solid waste	Fly ash : 39.6 MTD Bottom ash: 26.4MTD ETP Sludge from ETP/DM Plant:2.0 MT/day Bio-compost: 75 MT/day

2.3 Utilities and Consumables

2.3.1 Water

Water will be met from Irrigation department. Water permission is taken from the authority. Therefore no difficulty envisaged in terms of availability of water required for the proposed sugar complex, except the draught years.

The average water requirement per day for sugar & cogen unit is 1768 m^3/day and for distillery will be & 463 m^3/day, respectively.

Water will be recovered from cane so surplus water will be available to reuse within factory for different purposes.

2.3.2 Steam

- The steam turbine to be used in the project is extraction and condensation type. The steam extracted from the turbine will be used in process.

2.3.3 Power

- Power generated from the Co-gen will be used internally and the excess power will be sold to grid.
- Any deficit of power will be met through grid purchase.

- Although the Company will be utilizing in-house power, still will have suitable DG set with all the plants to safeguard any power failure situation.

2.3.4 Manpower

Manpower for phase II facilities is indicated as below:

- Permanent : 209
- Seasonal : 102
- On contractual : 138
- Proposed employment generation : 110

MSSSKL is in a process of appointing required manpower and has already appointed key top management positions for the purpose. It is most essential that the experienced and well- qualified manpower is employed right from the project development / implementation period, through advertisement or through head hunting exercise, particularly for the top and key positions. Manpower training and skill up-gradation must become an integral part of the HRD policy.

3.0 Environmental Management Plan (EMP)

MSSSKL is an existing industry planning expansion of entire unit and have well established environmental management plan (EMP). The sugar plant, distillery and power plant utilize resource such as water, cane sugar, bagasse etc. and discharge liquid, gaseous and solid waste products. Mitigation measures are incorporated in the project to protect environment against any harm. A comprehensive environmental management plan is adopted consisting of proposed pollution control measures and additional mitigation measures for abatement undesirable impacts. Summary of these measures includes:

1. Green belt and greenery development in the factory premises (about 33% of the plot area).
2. Waste water management, Recycle and Reuse of condensate
3. Paving and lining of roads, solid storage yards of ash etc.

4. Self monitoring system is established in the industry with man power and facilities to ascertain the compliances of environmental norms and standards.
5. Personal health care program, emergency management plan and safety management systems will be implemented in the proposed project activities.
6. Operation and Maintenance of pollution control measures
7. Establishment of waste reduction measure.
8. The project is technically and financially viable, subject to the assumptions made in this report found good.

3.1 Wastewater Management

Waste water management will include:

- Operation of ETP should be started at least one month before starting of plant to achieve desired MLSS so as to meet the prescribed standard from day one of the operation of the plant.
- Reduce waste generation
- Plant should achieve zero discharge to inland water surface
- Plant should provide 15 days storage capacity for treated effluent to care for no demand for irrigation.
- Rain water harvesting scheme will be adopted.

Effluent Treatment Plant (ETP) for Sugar & Cogen unit:

Effluent treatment is the process of removing contaminants from wastewater, including household sewage and runoff (effluents). It includes physical, chemical and biological processes to remove physical, chemical and biological contaminants. Its objective is to produce an environmentally safe fluid waste stream (or treated effluent) and a solid waste (or treated sludge) suitable for disposal or reuse (usually as farm fertilizer).

Figure 6 gives an overview of a typical effluent treatment plant.

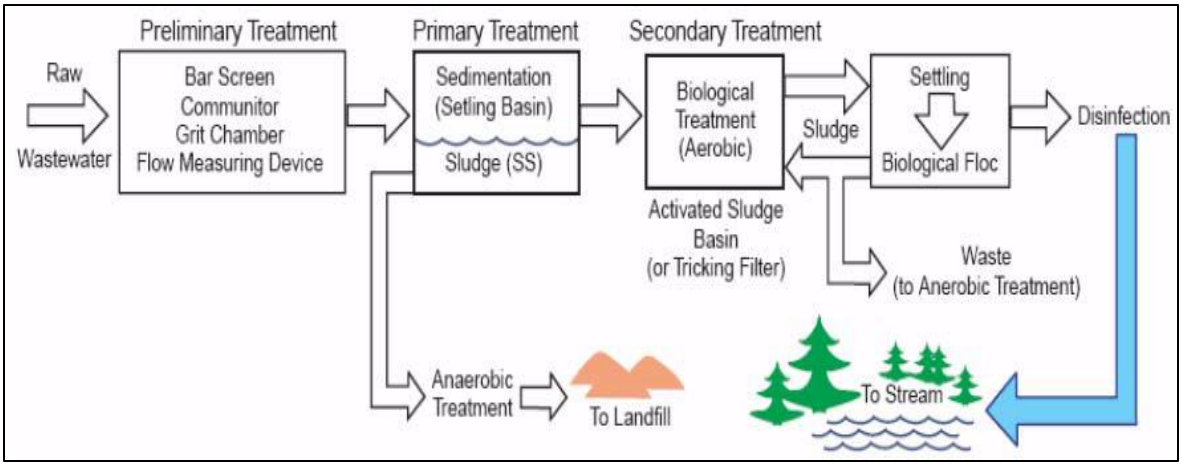

Figure 6: Effluent Treatment Plant (ETP) for Sugar & Cogen unit

The treatment processes are divided into three stages:

- Preliminary (physical)
- Primary (physical) treatment
- Secondary (biological) treatment

The plant provides primary (physical removal/settling) and secondary (biological) treatment, which can be followed by disinfection before discharge.

Effluent Treatment for Distillery unit:

- Distillery effluent i.e Spent wash generated shall be 362 KLD which is 8KL/KL of alcohol production. 71 KLD (non spent wash) effluent will be treated proposed condensate polishing unit.
- The spent wash generated will be treated by Bio digester as Primary Treatment followed by Multiple Effect Evaporation as secondary treatment. Concentrated spent wash will go to the Bio-composting which will be mixed with pressmud that is available with the attached existing sugar mill.
- Condensate water from distillery unit will be treated separately in the Condensate Polishing Unit.

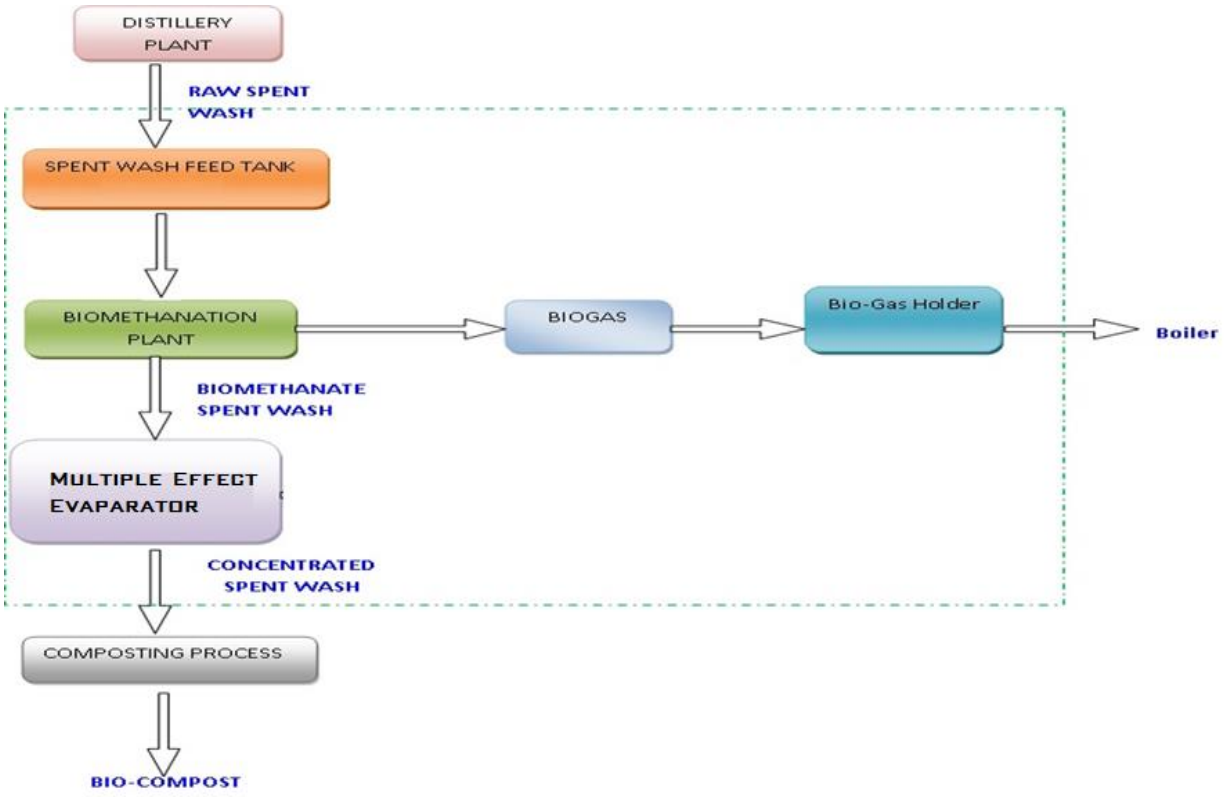

Figure 7: Effluent Treatment Plant (ETP) for Distillery unit

3.2 Emission Control

In order to control emission, the plant should provide ESP/Bag Filters/ high efficiency scrubbers to comply with the standards for particulate matter emission to less than 150 mg/Nm^3.

3.3 Environmental Impact and Mitigation measures

The plant can cause environmental pollution in the following forms:

- Air Pollution
- Water Pollution
- Noise Pollution
- Solid Waste Generation

3.3.1 Air pollution

The proposed expansion of sugar & cogeneration plant may cause environmental pollution in the following forms:

The plant can cause air pollution due to the following activities:

- Particulate matter emission from steam boiler
- Dust emission from un-paved access roads
- Emission from D G sets
- The elements polluting the ambient air that are discharged from the proposed cogeneration plant that are dust, fly ash, NOx, SO_2 in flue gases.
- There will be provision of ESP which will reduce dust emission from plant to the level < 100 mg/Nm^3
- There will be provision of one number MS Chimney/stack of 60 M height will be considered for Travelling Grate Steam Generator
- The air quality monitoring will also be undertaken to ensure that the dust pollution levels is within limits.
- Adequate sampling opening will be provided in the stack. The sampling at the Stack will be done once in six months to check on performance of ESP.

Mitigation Measures

The project proponent provided the following mitigation measures for air pollution in existing industry:

- Electrostatic Precipitator to capture ash due to burning of bagasse for boiler fuel
- Providing well designed chimney with adequate height for proper dispersion of pollutants
- Providing road surface with black toping to avoid dust emission due to transportation
- Use wet scrubbers for removal of dust from drying and cooling of sugar
- Dust catchers to collect sugar from sugar graders
- Periodic monitoring of stack and ambient air quality to keep a check on pollution parameters as per the directives of MPCB.

3.3.2 Water Pollution

The plant can cause water pollution due to the following activities:

- Main plant house wastewater due to continuous cooling and intermittent floor washing
- Wastewater due to washing of utilities
- Spirit/ molasses mixed water
- Boiler/ cooling tower blow down
- Sewage generation due to domestic activities

The plant should ensure that the treated effluent quality shall comply with the norms set by the pollution control board.

Mitigation Measures

The Project proponent provided following measures to mitigate water pollution in an existing unit and required changes will be done after expansion of projects:

Process wastewater from the plant should be treated in an effluent treatment plant.

The most commonly used treatment option consists the following:

- Preliminary treatment consisting of screens and oil and grease trap
- Equalization tank for maintaining the flow and load
- Sedimentation tank for removal of suspended solids
- Biological treatment consisting of extended aeration tank followed by settling tank or anaerobic lagoons, aerobic lagoon based on the imperviousness of soil in the area
- Disinfection by chlorination or ultra-filtration as per the recommendation of Pollution Control Board
- Sludge generated can be provided with sludge thickener followed by sludge drying beds
- Spent wash treatment with bio-mechanization followed by multi effect evaporations followed by bio-composting.
- Condensate water form distillery will be treated separately in CPU.

- Sewage generated can be treated along with process water or can be segregated and provided with septic tank followed by soak pits as recommended in the consent from MPCB.
- Treated effluent from the ETP can be used for irrigation or discharged to sewer or to the common effluent treatment plant if available in the area as per the recommendation of the Pollution Control Board.
- Monitoring of inlet and outlet effluent quality from ETP to keep a check on pollution parameters.
- Compressive Water Management plan has been planned with the site-wide strategies for minimizing water use efficiency, minimizing wastewater discharge and encouraging a policy of reuse and recycle to control a plant's water footprint
- The effluent will then be pumped into the effluent Treatment Ponds which form a part of the power plant's effluent disposal system
- The rejects form WTP which will be used for clean purposes in the project activities and also for plantation
- The chlorine dose of 0.2 ppm done mainly to prevent biological growth in the cooling tower system
- Process water from sugar plant is required to be treated in ETP and inlet and outlet to be check regularly on pollution parameters.

3.3.3 Noise pollution

- The proposed cogeneration plant cause noise pollution due to presence of centrifugal pumps, motors, DG sets, EOT Crane etc.
- The Consultants believe that noise pollution can be controlled to a considerable extent by providing proper maintenance to equipment and providing suitable acoustic enclosure to DG sets.
- Providing thick green belt (33%) area in and around the plant premises can also attenuate noise pollution.

- This noise pollution can be controlled up to a certain limits as per pollution control boards norms
- There should be provision of acoustic enclosure to DG sets
- The plant should ensure that the ambient noise quality standards set by the Pollution Control Board as indicated below:

Ambient Noise Quality Standards w.r.t Noise

Area Code	Category of Area/Zone	Limits in dB(A) Leq	
		Day Time	Night Time
(A)	Industrial Area	75	70
(B)	Commercial Area	65	55
(C)	Residential Area	55	45
(D)	Silence Area	50	40

Source:CPCB Norms

3.3.4 Solid Waste Pollution

The plant can generate solid waste in the following form:

- Press Mud
- Sludge from DM Plant
- Sludge from ETP
- Fly ash and bottom ash
- Press mud can be used as manure after composting.
- Bio-compost generated from spent wash treatment will be used as manure.
- Sludge from ETP can also be send to landfill or used as manure as per the direction of MPCB
- Establishment of waste reduction measure will be adopted.

3.3.5 Flora and Fauna

Flora: Most dominant plant species found in this area are Banyan**,** Ashoka, Peepal, Babul, Mango, Gulmohar, Poinciana regia, Bel, Neem, Eucalyptus globulus, Coconut,

Bor, Chinch, Sitafal, Tantani, Tarwad etc. The common grasses found in this area are Marvel, Kusli, Kunda and goshya.

Fauna: The common species of animals and birds found in the region includes the following:

- Among the carnivorous animals found in the region are the Kolha Jackal, Fox.
- The herbivorous animals commonly found are Indian Gazelle, monkey; spotted deer
- Animals such as the Hare, Khargosh, Parempine are also found in almost all the forest areas.
- Among the birds the peafowl, Grey and painted partridges, Tetar, Pater, pigeons are found in some varieties of ducks, kingfisher etc. are found near water bodies.
- There is no endangered flora or fauna or rare species plant or animal existent at this location.
- Adequate environment protection systems will be put in place for the treatment of all liquid, solid and gaseous discharges from the power plant to achieve the required emission levels well within the permissible limits of state pollution boards.
- As a result there shall be no adverse impact on either the air or water quality in and around the integrated project.

3.3.6 Environmental Monitoring Program

- MSSSKL will ensure effectiveness of pollution control measures will be ascertained by systematic monitoring of discharges at factory and receiving levels.
- Environmental Management Cell (EMC) consisting of Departmental Heads will be created to effectively manage the environmental activities in the integrated plant.
- Environmental department will be formed with environmental scientist, laboratory chemists and operators to implement and operate pollution control and environmental protection measures.
- Third party monitoring will be carried out to double check effectiveness of mitigation measures.

- Proponent analysis report, third party report will be corroborated with statuary body, so that results are in line with standards all time.

3.3.7 Monitoring Facilities and Schedule

- A laboratory will be established with manpower and facilities to analyze water, wastewater, etc. Stack emission, ambient air monitoring will be outsourced.
- The parameters monitored will be temperature, SPM, SO_2 and NO_X for gaseous emissions and RSPM, SO_2 and NO_X ambient air. Analysis is also carried out by competent third party for cross checking.
- The quality of discharges including wastewater, flue gas, and the receiving bodies such as ambient air, water, surface water and soil will be monitored for the desired parameters.
- Sampling locations and post project monitoring schedule have been worked out.

3.3.8 Environmental Records

- Environmental department will maintain log sheets and manuals for operation and maintenance of pollution control and related facilities
- Progress reports and statuary records as per environmental acts will also be maintained
- MSSSKL is an existing industry planning new unit and we have well established environmental management plan (EMP)
- A comprehensive environmental management plan is adopted consisting of proposed pollution control measures and additional mitigation measures for abatement undesirable impacts.

3.3.9 Budget Allocation for EMP

#	Environmental Aspect	Capital Expenditure Rs in Crores	Recurring Expenditure Rs in Crores
1	Emission control Engineering	1.5	0.25
2	Water & Wastewater management	2.5	0.3
3	Solid Waste	1.5	0.15
4	Greening Drive	0.5	0.10
5	Monitoring	0.01	0.01
6	Environmental Cell & PR	0.02	0.09
7	Other aspects like Rain Water Harvesting, Safety, Security etc	0.2	0.03
	Total	4.73	0.93

4.0 Project Benefits

- The industry on expansion will provide direct and indirect employment to many local rural people.
- The project will be a boon as power will be fed to grid for other users in a power deficit state as is ours.

5.0 CSR Activity

About 2.5 % of the capital cost will be earmarked for CSR activity.

6.0 Conclusions

- The major raw material required for cogeneration unit and distillery is produced in own sugar plant.
- This industry is eco friendly with zero discharge schemes and does not have adverse effect on the quality of land, water and air.
- The industry will be taken all the necessary preventive measures to mitigate even the small effects which may be caused by industrial activities.
- The concept of Reduce, Recycle and Reuse is proposed in the industry. This will result in reducing the water and air pollutants discharge to the environment.

- The industry has adopted an effective environment management system and environment management plan to protect the environment.
- The industry has given due priority for 33% green belt development within and around the factory premises.
- In the vicinity of the factory there are no protected forests, sanctuary, or any exotic flora and endangered fauna. Therefore, the proposed expansion will not have adverse effect on the environment or the eco system.
