

EXECUTIVE SUMMARY



Molasses based 30KLPD Distillery unit of

Udagiri Sugar and Power Limited

Village Bamni (Pare), Taluka Khanapur, District Sangli, Maharashtra

Prepared By



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EXECUTIVE SUMMARY

1.0 INTRODUCTION

M/s. Udagiri Sugar and Power Ltd., (USPL) is one of the progressive public limited sugar mill from western Maharashtra. It is registered as a public limited company with registration number U15424PN2010PLC136000 dated April 06, 2010. The initial installed crushing capacity of the sugar factory was 2500 T.C.D. Its first crushing season was in the year of 2012-13. Dr. Rahul Shivajirao Kadam is the chairman and chief promoter of the project. After two successful seasons of the sugar mill, now the management is planning to setup a molasses based distillery unit of 30KLPD.

The USPL is located at village Bamni (Pare), Taluka Khanapur, district Sangli of Maharashtra. The proposed distillery will be installed within existing sugar factory premises. . The proponent is having 72 acres of land of which 35 acres are occupied by sugar and cogeneration project (including its storage, switch yard, Bagasse yard, ETP, Greenbelt, etc.). The proposed distillery will require 10.7 acres of land (refer table 1 for detailed breakup). Hence, the proponent is having adequate land to install the project. The existing site comply the industrial sitting guidelines of the Ministry.

2.0 PROJECT DESCRIPTION

Table 1: Project at a glance

Type/Nature of the Project and capacity	New molasses based distillery of 30 kilo litres per day (30KLPD)
Geographical Location	17°12'6.53"N and 74°35'40.43"E ; Altitude 676 m above MSL
Nearest City/Town	Vita town 10 km
Road	Karad-Solapur state highway 111 at 12km National highway 4 at 50km
Railway Station	Miraj about 85 km from the site
Air Port	Karad about 50 km from the site, Pune 220km
Land	Distillery unit, Bio-methanation , Evaporation 2.5 Storage lagoon and Bio-compost yard 5.6 Greenbelt 2.65 acres for entire project Total land requirement 10.70 acres

Products and byproducts

Alcohol (Considering i. RS Conforming to ISI Grade I, 323 (1959)
7.5% v/v alcohol in

fermented wash)	Production 28.5KLPD + 1.5KLPD Impure Spirit
	ii. Extra Neutral Alcohol, ISI Grade I, 6613 (1972)
	Production 28.2KLPD + 1.80 KLPD Technical spirit
	iii. Anhydrous alcohol ISI-Grade-I, 321(1964) /IS: 15464 (2004), Production of 30KLPD
	Fusel oil 60.0 lit/day
Main Raw Material	i) Molasses 120.0 MT/day
Water Requirement	Distillery: 345 m ³ /day
(Considering recycle/recirculation)	Source Pare minor reservoir (Permission available for sugar mill)
Fuel	Bagasse 55.00 MT/day - source attached sugar factory Biogas : 11,500.00 m ³ /day
Steam	121.0 MT/day source: sugar mill boiler of 75TPH
Power	435 kwhr – source captive
Manpower	Approx 77
Days of Operation per year	Distillery: 270 days (Maximum)
Spentwash disposal	Biomethanation followed by multi effect evaporation followed by biocompositng
spent lees and other effluent	condensate polishing unit (CPU) comprised of anaerobic followed by aerobic treatment and tertiary treatment- treated water of 255m ³ day will be reused for process or cooling
Air pollution control	Electrostatic precipitator (ESP), stack height 72m
Solid waste	Biodegradable hence mixed with biocompost
Project Cost	Rs. 3842.00 Lakhs
EMP Cost	Rs. 1167.00 Lakhs

2.1 Technology And Process

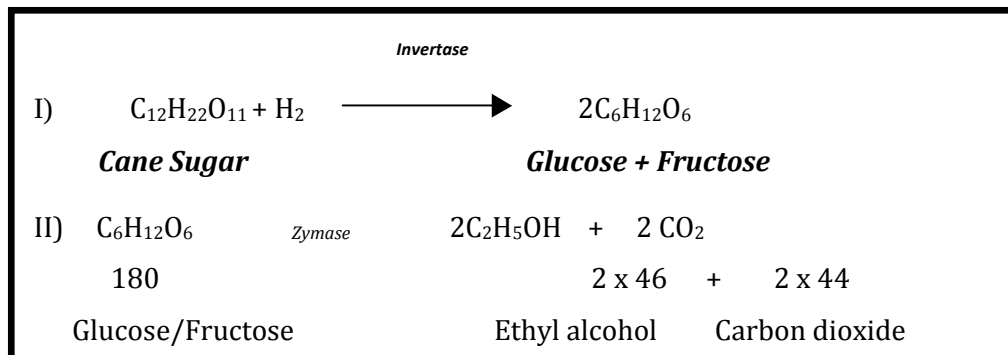
Proposed distillery unit is designed for continuous fermentation process.

2.1.1 Continuous Process

In this process fermentation and distillation is coupled to get a continuous supply of fermented beer for the distillation column. Yeast is recycled. The advantage of the process is highly active

yeast cells initiate the fermentation rapidly and the alcohol yield is also much higher compared to the batch process.

Molasses is the chief raw material used for production of alcohol. Molasses contains about 50% total sugars, of which 30 to 33% are cane sugar and the rest are reducing sugar. During the fermentation, yeast strains of the species *Saccharomyces cerevisiae*, a microorganism belonging to class fungi converts sugar present in the molasses such as sucrose or glucose into alcohol. Chemically this transformation for sucrose to alcohol can be approximated by the equation.



Normally, only 88 to 90% efficiencies are realized in Continuous type plant. Molasses containing 47% fermentable sugars gave an alcoholic yield of 283 liters per MT. Molasses, diluted with water to a desired concentration is supplied continuously to the fermenter. Additives like urea and de-foaming oil are also introduced in the fermenter as required. There is an automatic foam level sensing and dosing system for de-foaming oil. Every kilogram of alcohol generates, about 290 kilocalories of heat. This excess heat is removed by continuous circulation of fermented wash through an external plate heat exchanger called the fermenter cooler. The fermenter temperature is always maintained between 32-34°C, the range optimum for efficient fermentation.

2.1.1.1 Propagation

The propagation section is a feeder unit to the fermenter. Yeast, either *Saccharomyces cerevisiae* or *Schizosaccharomyces pombe* (the choice being determined by other process parameters, mainly the downstream effluent treatment system) is grown in three stages. The first two stages are designed for aseptic growth. Propagation vessel III develops the inoculum using pasteurized molasses solution as the medium. This vessel has a dual function. During propagation, it serves for inoculum build-up. When the fermenter enters the continuous production mode, propagation vessel III is used as an intermediate wash tank. Propagation is carried out only to start up the process initially or after very long shutdowns during which the fermenter is emptied.

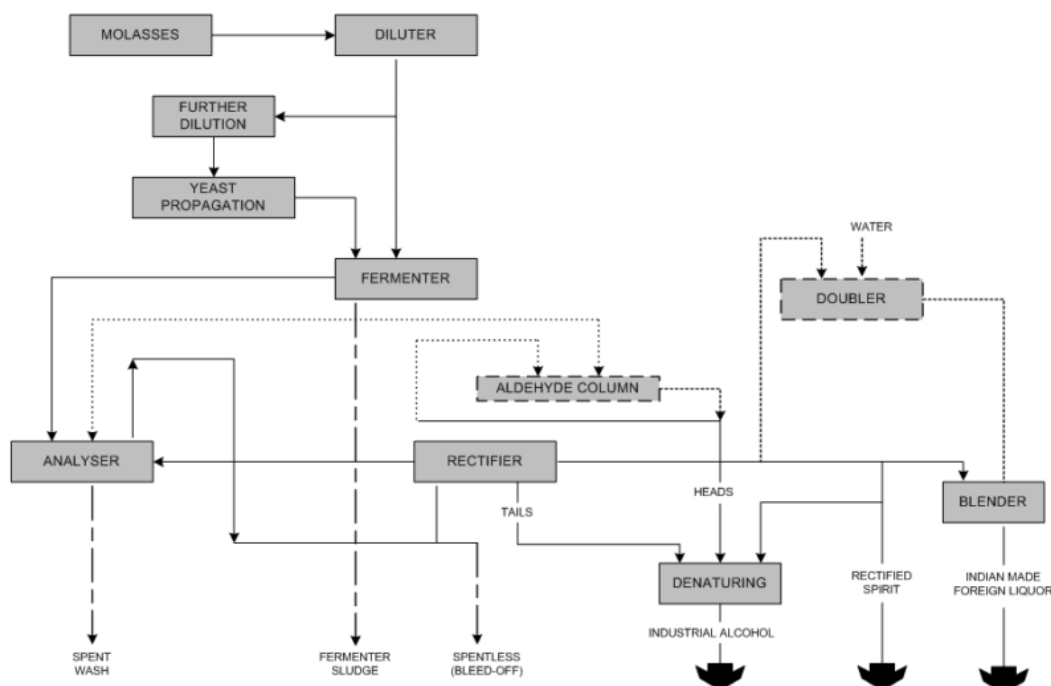


Figure 1: Schematic of distillery process

2.1.1.2 CO₂ Scrubber and Recovery

The carbon dioxide produced during fermentation is scrubbed with water in packed-bed scrubber, to recover alcohol. The water from the scrubber is returned to the fermenter. In some industries, carbon dioxide is captured by, scrubbing the fermenter off gas. A part of the wash is drawn into a separate vessel and is aerated there. This external aeration allows the recovery of carbon dioxide un-contaminated with air.

2.1.1.3 Yeast Recycling

The yeast in the fermenter wash is removed as 45 to 55% v/v slurry, and is returned to the fermenter. This feature ensures that a high yeast cell concentration is achieved and maintained in the fermenter. Mature active yeast will be recycled so as to reduce the excess consumption of sugar by growing yeast. Thus, it make available for ethanol production and ensuring high process efficiency.

2.1.1.4 Fermentation Parameters (Typical)

The pH of the fermenter is maintained within 4.0 to 4.8 usually by addition of any acid. The alcohol concentration is maintained between 7.0 to 8.5 % v/v, unless a highly concentrate effluent is to be produced. Conversion of sugar to ethanol is instantaneous and the residual sugar concentration 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. Weak wash recycling reduces the quantity of effluent spent wash and reduces the process water requirement of the plant.

2.2 Pressure Vacuum Distillation

Vacuum distillation system consists of three to four distillation columns namely –

- ❑ Analyzer column – Operated under vacuum.
- ❑ Pre rectifier column – Operated under vacuum
- ❑ Rectifier cum Exhaust Column – Operated under pressure

Fusel oil concentration column may be added to improve quality of alcohol further.

Fermented wash is preheated in fermented wash pre-heater and fed at the top of the analyzer column, analyzer column is fitted with thermosyphon reboiler. Top vapors of analyzer column are sent to pre-rectifier column. Rest of the fermented wash flows down and is taken as spent wash from analyzer column bottom. Pre-rectifier bottom liquid is preheated with spent- lees and fed to rectifier cum exhaust column.

Low boiling impurities are concentrated in the pre-rectifier column. A top draw is taken out as impure alcohol from the pre-rectifier column. The bottom of pre-rectifier column is sent to rectifier feed tank. Rectifier exhaust is operated under pressure and heats analyzer column through reboiler. Alcohol is enriched towards the top and is drawn out as Rectified spirit (RS). Fuel oil build-up is avoided in the Rectifier column by withdrawing outside streams of fuel oil. These are sent to fuel oil concentration column from where the fuel oil is sent to decanter for further separation. The fuel oil wash water is recycled back to the column. A top draw is taken out as impure alcohol from the top of fuel oil column & pre-rectifier column.

2.2.1 Benefits of Pressure Vacuum Distillation

The technology advantages are as follows.

- Since the analyzer column operates under vacuum, the formation of by-products such as ‘acetyl’ may minimize there by improvement in quality of alcohol.
- Pre-rectification column ensure removal of unwanted substances and also reduces load of lower boiling volatile compounds passing on to Rectifier cum exhaust column.
- The chances of scaling due to invert solubility of certain precipitating inorganic salts are minimized in vacuum distillation.
- Vacuum distillation requires low steam consumption i.e. 2 Kg/lit. for Rectified Spirit and around 3.2 Kg/lit. for export quality ENA.

2.3 Process of Manufacture of Extra Neutral Alcohol (ENA)

Extra neutral alcohol is manufactured from rectified spirit. The impurities in rectified spirit are reduced to considerable extent by properly diluting and redistilling the spirit. The impurities like aldehydes, acids, esters, higher alcohol's are minimized by controlled condition and tapping impurities at appropriate points during distillation.

The main stages in the manufacture of extra neutral alcohol are -dilution of rectified spirit with filtered soft water in the ratio 1:3 to 1:4. The diluted spirit may be treated with potassium permanganate. Separation of low boiling impurities takes place in purifying column, separation of esters and other volatile impurities in Rectifying column and concentration of alcohol. Removal of excess water takes place at exhaust column. Concentration of fusel oil & their removal takes place in the fusel oil concentration column. Concentration of low boiling impurities & their removal takes place in the head concentration column.

2.4 Ethanol (Absolute Alcohol)

Fuel ethanol is an important product required by industry. As per IS specification it is nearly 100% pure or water free alcohol. Therefore, special process for removal of water is required for manufacture of fuel (anhydrous) alcohol. In order to extract water from alcohol it is necessary to use some dehydrant or entrainer, which is capable of separating, water from alcohol. The various processes used for dehydration of alcohol are as follows

- I) Azeotropic Distillation
- II) Molecular Sieve Dehydration (MSDH)
- III) Pervaporation / Vapour permeation system.

From these, the USPL has planned to select molecular sieve dehydration (MSDH) technology.

Table 2: Product and storage details

#	Particulars	Production (KL/Day)	Receiver capacity (m3)	Storage capacity (m3)	Make
1.	Rectified Spirit	28.5 KLPD	60 x 3	600x1	MS
	Impure Sprit OR	1.5 KLPD	10x3	600x1	MS
2.	E.N.A.	28.2 KLPD	60x3	600x3	MS
	Technical alcohol OR	1.8 KLPD	10x2		MS
3	Anhydrous alcohol	30.0 KLPD	60x3	600x2	MS
4.	Fusel oil	60L per day		10x1	MS

3.0 RESOURCE/INFRASTRUCTURE

Table 3: Project requirements

Sr. No.	Particular	Consumption/ Production (per day)	Remark
A.	Raw Materials, Consumption		
1.	Molasses, MT	120 MT	Basis 45 % of F.S. - Source: Attached Sugar Mill upto 27,000 MT/annum; remaining

from the nearby sugar mills. There are 18 sugar mills in the district and only seven are having distillery

B. Chemicals, Consumption

1.	Nutrients (N,P)	15 kg	Stored in Fermentation House Source: Local Market at Vita, Khanapur/Karad/Sangli
2.	Turkey Red Oil (TRO))	150 kg	Source: Local Market Local market at Vita, Khanapur/Karad/Sangli

C. Utilities, Consumption

1.	Fuel: Bagasse	Max. 55MT	Source: Attached Sugar Mill
	Biogas	~11,500m ³ /day	Source: spentwash from distillery
2.	Water	345 m ³	Source: Pare minor reservoir Permission from concerned department is in process
3.	Steam, MT	Max. 121 MT/day	Source: Attached Sugar Mill (during season)
4.	Power	Max. 432 kwhr	Source: Attached Sugar Mill

Table 4: Water Requirement (in m³/day)

Particulars	Intake	Consumption And Losses	Generated Effluent	Recycle and Reuse	Daily Net requirement
Industrial Process	360.0	60.0	300.0	155.00	205.00
Cooling Purpose	225.00	125.00	100.00	100.00	125.00
Domestic	10.0	03.00	7.00	00	10.0
Other & Gardening	05.0	05.0	00.0	00.0	05.00
Total	600.00	193.00	407.00	255.00	345.00

3.1 Steam

The steam requirement of the proposed distillery will vary from 5.5 to 6.5 MT/h depending on the final product (for Multi-pressure option). This requirement will be fulfilled from sugar mill boiler. At present, the mill is having one Bagasse fired boiler of 75 TPH operated at 72.5kg/cm² pressure and 515°C temp. It consumes approx 30TPH of bagasse and supplies steam to cogeneration unit (of 14MW). Exhaust low pressure steam from the turbine is used in sugar unit. Factory is having surplus low pressure steam, that will be used for distillery operations. If the

steam requirement considered in isolation, then the estimated bagasse requirement as a fuel for distillery is 2.29TPH, however, no additional fuel will be required for the distillery during season. The same boiler will be operated at lower capacity to fulfill the requirement of cogeneration and distillery unit during off-season of sugar mill.

Multi-Pressure Vacuum Distillation

- a. F. Wash to rectified spirit (RS)-2.2 Kg/liter; F. Wash to ENA- 3.2 Kg/liter
- b. MEE ~3.0MT/h

The required fuel (Bagasse) will be supplied by sugar mill. It is stored in bagasse yard of sugar mill (approx 3.5 acres), in belled form, and transported to the boiler through closed conveyers.

3.2 Water Requirement

Initial fresh water requirement will be 600m³ per day. This requirement will be minimized by re-circulating 255 cum/day. This includes process condensate 180 m³/day and Spineless 75m³/day (refer water balance figure 2). After recirculation of the treated water from condensate polishing unit net water requirement will be 345 m³ per day. Source of water is Pare minor reservoir. Water drawl permission issued by irrigation department, Government of Maharashtra is available with the Mill (for the sugar unit). Permission for additional water drawl for distillery is under process. Existing water storage tank of **10,000 m³** will be used by proposed distillery.

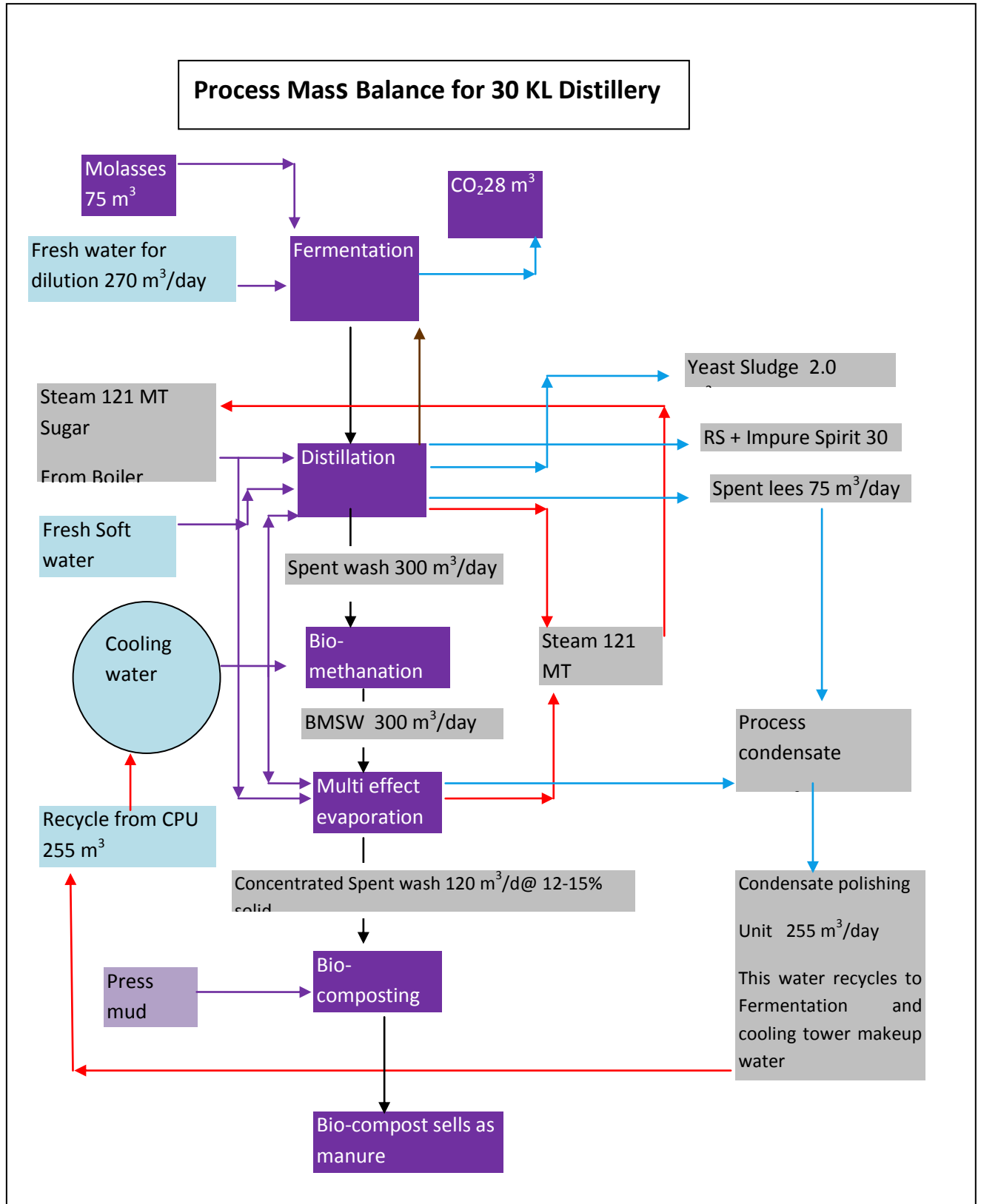


Figure 2: Water and mass balance

4.0 Pollution sources and treatment processes

Waste product and source	Treatment and disposal
Waste water	
Spentwash raw spentwash 300m ³ per day	Bio-methanation followed by stand alone evaporation (spentwash quantity reduced to 120m ³) followed by bio-composting
Other effluent: Spent lees, condensate from MEE, Blow down from cooling tower, etc.	Effluent will be sent to condensate polishing unit (CPU) and reused as a cooling tower make-up
Sewage: Domestic wastewater	As local acceptable practice, by septic tank and soak pit system
Gaseous emission	
Flue gasses from boilers Due to burning of bagasse and biogas	Existing sugar Mill boiler of 75TPH will be used ESP is in place on existing boiler The existing chimney of height 72m Bagasse is carbon neutral fuel, contains sulfur in trace amount No loose bagasse, it will be in belled/bar(block) form, transportation through closed conveyers hence fugitive dust will get controlled Since, the distillery is proposed within sugar Mill premises, hence handling and transportation of various material will be nominal. It will help to control fugitive dust. Greenbelt of 33% of the plot area i.e. 2.6 acres
Bio-composting CH ₄ , H ₂ S	Fully auto spraying and aerobic composting
Diesel generators	It will be operational only when captive as well as grid power supply failure, hence emissions anticipated to be less frequent and minor
Fermentation unit: CO ₂	Fermenteres are covered, CO ₂ scrubbed in water
Solid waste	
Boiler ash	Bagasse ash contains soil nutrients such as potash and phosphates. It will be mixed with bio-compost and sold to farmers for use in agriculture lands.
Fermented sludge: Yeast sludge, Polishing unit sludge	The sludge generated from fermentation unit 1-2 m ³ /day, biodigster sludge 5-7m ³ /day and Polishing unit sludge ~1m ³ /day contains organic nutrient and micro elements. It will be mixed with bio-compost.

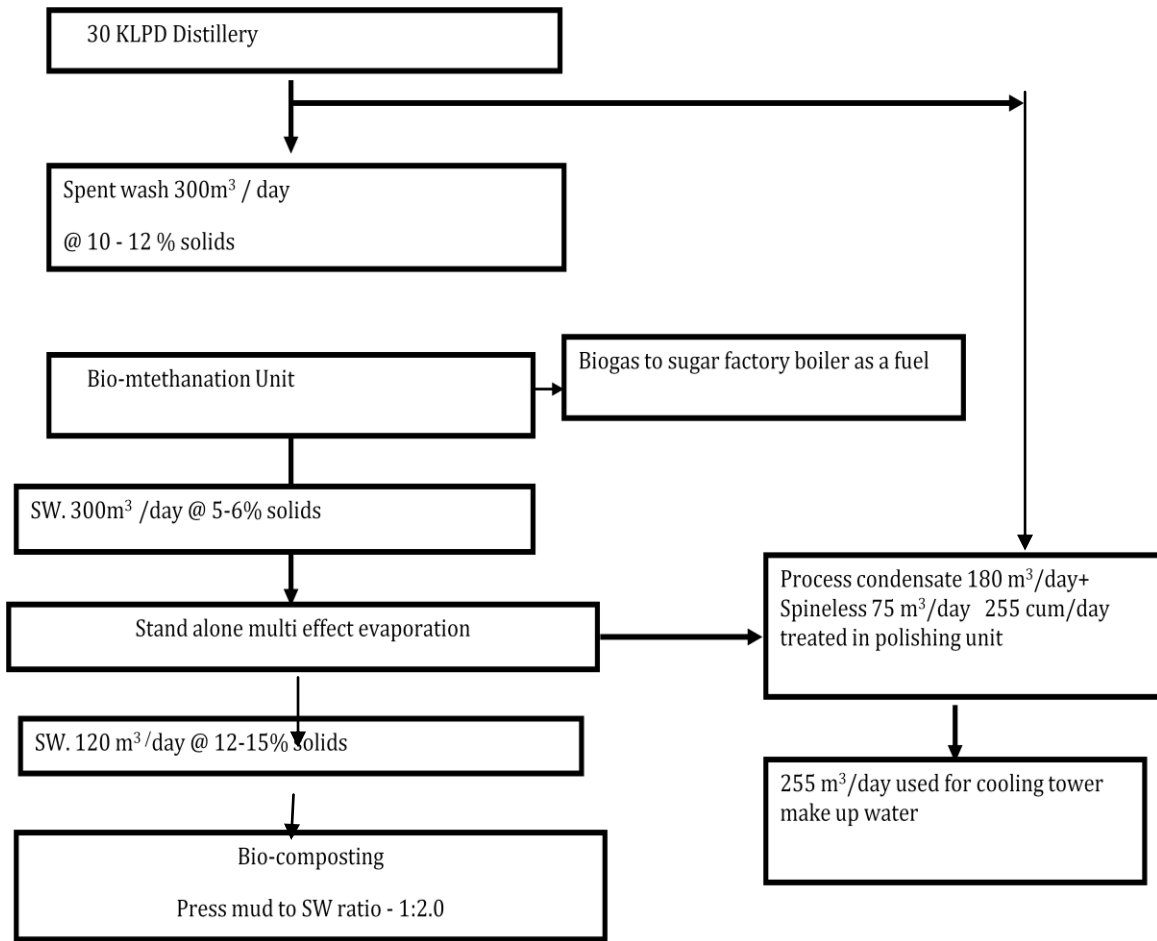


Figure 2: Schematic of effluent Treatment

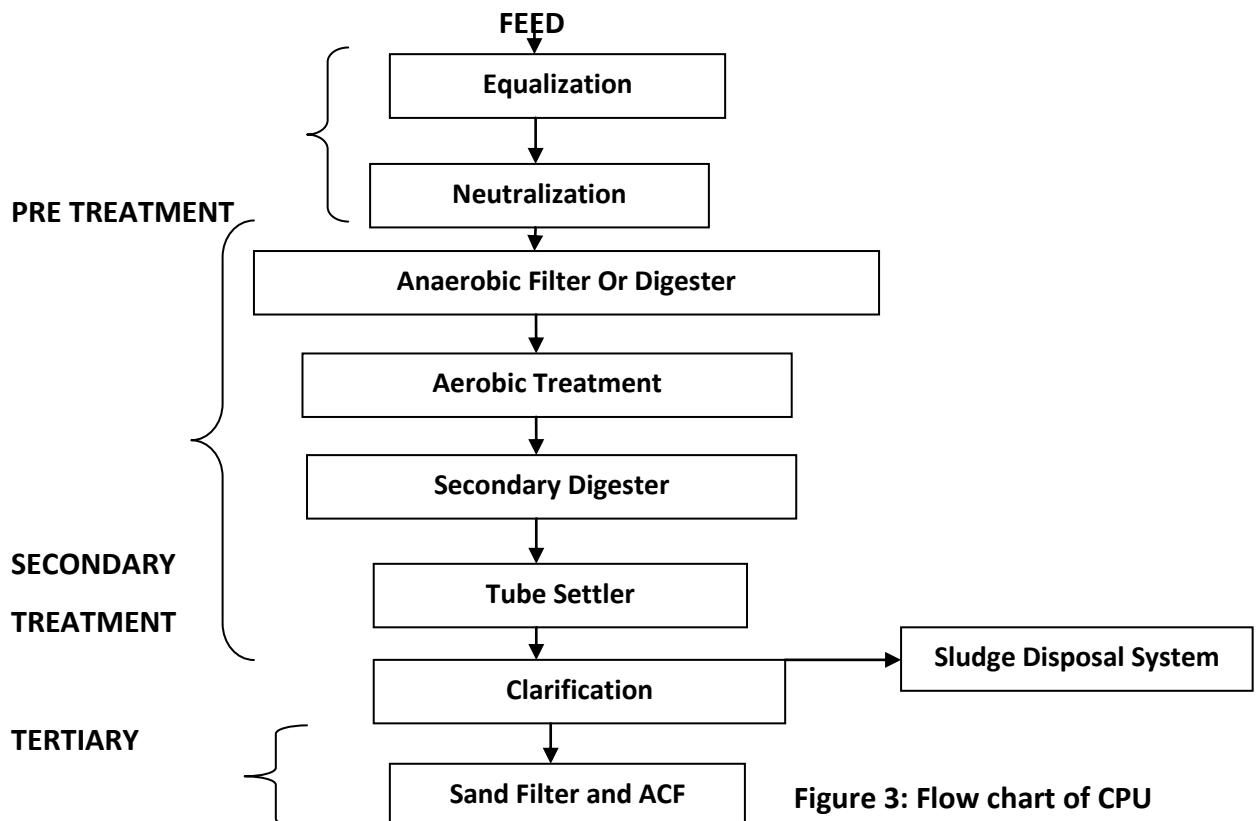


Figure 3: Flow chart of CPU

5.0 Baseline environmental status

Table 5: Environment setting for site and study zone in brief

Sr. No	Particulars	Description
3.	Nearest villages	East - Village Padali at 2km ; South east - village Dhamni 1.5km South – village Bamni 2.4km; South west (SW)- village Mangrul 3.5km West – village Chinchani 2.2km; North village pare 2.3km
4.	Climate and meteorology	
a	Temperature	Annual Max Temp (Avg. summer months): 38 ⁰ C Annual Min Temp (Avg. winter months) : 14 ⁰ C
b.	Precipitation	annual average for Khanapur Taluka 550 mm
c.	Wind	Predominant wind direction Southeast, west, southwest
5	Land	Within in existing sugar factory premises
10.	Water body	River Yerala at 6km towards west
11.	Soil Type	3 Types; Light, medium and deep soil
12.	Ecologically sensitive areas	Sagareshwar wildlife sanctuary at 25.3km
13.	Archaeologically important places	None
14.	Reserved/Protected forests within 10 km radius	No
15.	Nearest place of tourist/ Religious importance	Gorakhnath temple, Shirala 80km Sambhu Appa Urus – Islampur 30km
16.	Topography of proposed site	Flat , barren land
17.	Main Agricultural crop in the District	Jawar, Bajra, Wheat, Groundnuts, , Sugarcane, Turmeric, Grapes, Pomegranate
18.	Major Industries of the district	Sugar mills, cotton mill and engineering unit

Table 6: Impact Assessment and environment management plan proposed for the respective aspect

Environm ental Issue	Potential factors/sourc e	cause	Potential Impact	Preventive control and mitigation measures	Probable Resultant Impact	EMP
Air Quality	particulate matter (PM) SOx and NOx	burning of fuel, handling and/or transportation of material	Impact on human health by PM 2.5 Impact on ecology mainly due to PM, SOx, NOx and emission of heat from flue gases	Electrostatic precipitator to control PM from flue gases; stack height 72 m , Use of bagasse and biogas – a renewable source s of energy Fermentors covered, CO2 scrubber will be in place internal roads to make asphaltting adequate parking for all types of vehicles Enhancement of existing greenbelt by 2600 trees	Levels of PM 2.5, PM10, SOx and NOx anticipated to be within NAAQS Minor negative impact on health of workers and disturbance to avi fauna due to flue gases	Regular health check up of workers (twice a year/season), air quality monitoring within the project premises and upwind and downwind directions at village
	Odour , methane and CO2	spentwash and molasses , composting activity	odour nuisance Green house gas emission	Biogas as a primary treatment for spentwash; it will utilized as a fuel, provision of flare unit when biogas not used as fuel (methane will not get released in an atmosphere) Implementation of CREP norms for storage of spentwash and compost yard preparation	Methane and CO2 likely to get generated in traces from composting and storage of organic waste	Proper maintenance of biogas digester and skilled supervision on composting process; storage and disposal of spentwash as per CREP guidelines only

Environmental Issue	Potential factors/source	Potential cause	Potential Impact	Preventive control and mitigation measures	Probable Resultant Impact	EMP
				Avoid anaerobic condition development for composting Green belt development CO ₂ generated will be from non-fossil source, hence considered as neutral while considering GHG potential		
Noise	Operation of machinery, equipments, transportation	Noise generated during the operation of the machinery	Impact on human health in the form of noise related hazards; disturbance to fauna	High noise potential activities are not involved during operation phase, Noise increase at specific locations only, most of the machinery will be under roof Enhancement of existing greenbelt internal roads to make asphalted adequate parking for all types of vehicles	No negative impact outside the premises; minor negative impact inside the premises on mainly workers as well as partially on faunal elements	Provision of personal protective equipments for workers at high noise areas; monitor noise levels at ambient as well as work place areas; During construction phase restrict noise generating activities for day time only
Water Quality	Spentwash, spent lees, condensate	Contamination of surface &/or ground water	surface and ground water pollution, thermal pollution of	Spentwash disposal thorough biomethanation followed by MEE followed by bio-composting	No negative impact on ground or surface water, minor	Install piezometer/s and bore well towards downstream of compost

Environm ental Issue	Potential factors/sourc e	cause	Potential Impact	Preventive control and mitigation measures	Probable Resultant Impact	EMP
	and other Wastewater, solid waste	Soil Contamination	water bodies,	Spentlees and condensate water recycled after treatment treated water reused mainly for cooling, gardening/irrigation spent wash storage, handling, compost yard as per CREP norms	contamination of soil while handling near compost or storage areas	site check the water quality of bore well; vigilance for accidental spillage of spentwash and for damage to impervious storage lagoon or compost yard
Water Resource	water availability	Water Consumption by the project	Depletion of available water resource	Water conservation thro' recycling and reusing treated/condensate water Rain water harvesting	No negative impact since water is allocated for industrial activity only	Strictly implement proposed conservation practices and encourage the staff to save and conserve water at all possible extents
Soil and land	change in land use solid waste, effluent/wast ewater	project activities	change in land use, soil pollution due to solid waste or effluent probability of alteration in of first	Proposed site is open, barren under the possession of the sugar factory Keep the natural drainages intact Solid waste generated in the project is biodegradable hence utilized in	No change in land use pattern No negative impact on soil quality, minor negative impact	check the characteristics of solid waste and compost at least twice a season/year Monitor the soil quality

Environmental Issue	Potential factors/source	Potential cause	Potential Impact	Preventive control and mitigation measures	Probable Resultant Impact	EMP
			order draining along the boundary	composting process Disposal of effluent as per the regulatory authorities guidelines Excavated soil to be stacked and reused for gardening, greenbelt activity, material other than soil to be used for leveling and similar activities	due to excavation of soil for project activities Solid waste disposal activity (Composting) – support micro flora, insects, worms and indirectly supports the avifauna feeds on it – positive impact on ecology Micro nutrients will get recycled due to compost – positive impact on soil quality and ecology	where treated water is used for irrigation – twice a season/year
Ecology	project activities	Cutting of trees or destruction of habitat	Destruction of terrestrial and aquatic flora or fauna	project within the existing sugar factory premises, and the land is barren and open, flat land no tree felling is required	No negative impact on ecology and biodiversity	Prefer local species for greenbelt development, provide funds and

Environm ental Issue	Potential factors/sourc e	cause	Potential Impact	Preventive control and mitigation measures	Probable Resultant Impact	EMP
		Impact due to contamination of water bodies.		wildlife sanctuary, national park not within 25km radius Effluent/Wastewater recycled/reused after proper treatment Green belt development 'Zero Liquid Discharge' scheme implemented	Greenbelt helpful to improve biodiversity	manpower to maintain it Monitor air, water soil at site and surrounding area at pre-defined interval
Hazard and Risk Assessme nt	Storage of raw material and finished product	fire	damage to living as well as non-living things	Implementation of safety norms as per the regulatory authorities guidelines Appointment of safety officer Lightening arresting system water hydrant, fire extinguishing system and training to staff for its operation also training for first aid and safety	Negative impact only in accidental case	Training and mock drills for safety Policy under PLI act 1991 Risk assessment to be done through professional risk assessors
Socio- Economic Impacts	population flux	Temporary and permanent workforce associated with the project	pressure on social infrastructure	Maximum local labour for construction and local candidates for employment Housing facility is available with sugar mill to accommodate marginal increase	Population flux could be negligible, hence no negative impact anticipated Beneficial impact due	Initiate and implement social developmental activities as a part of CSR

Environmental Issue	Potential cause factors/source	Potential Impact	Preventive control and mitigation measures	Probable Resultant Impact	EMP
				to direct and indirect employment, government and local institutions benefitted through taxes, improvement in infrastructure such as transportation, education, medical facilities, etc. due to the project	

6.0 AIR DISPERSION MODELING

Prediction of impact on air environment has been carried out employing mathematical model based on a steady state Gaussian plume dispersion model designed for multiple point sources for short term. In the present case, Industrial Source Complex-Short Term [ISCST3] developed by United States Environmental Protection Agency [USEPA] has been used for simulations from point sources.

Table 7: Model Input Data

Parameters	Unit	Stack Attached to Boiler
		75 TPH
Stack height	m	72
Stack diameter at exit / top	m	3.0
Stack exit gas velocity	m/s	4.2
Stack gas temperature at exit	Deg. C	160
Bagasse requirement	TPH	2.3-2.5
Emission rate of SPM	g/s	0.12g/s
Emission rate of SO ₂	g/s	3.90g/s

- Ash content 2% and dust removal efficiency of ESP 98%
- Main fuel: Bagasse;
- Auxiliary fuel: biogas, (approx 12,000m³/day)

Prediction

The predicted results with baseline concentrations are tabulated below in **Table 8** while incremental dispersion trend is shown as isopleths in figure 4 & 5

Table 8: Resultant Concentrations Due To Incremental GLC's

Scenario	Incremental Concentration, µg/m ³	Baseline Concentration* µg/m ³	Resultant Concentration, µg/m ³	CPCB Limit for Residential & Rural Areas, µg/m ³
PM ₁₀	0.04	84.21	84.25	100
SO ₂	0.5	8.3	8.8	80

- * The baseline concentration (98th percentile) recorded at village Padali at 2km East of the site

The resultant concentrations of PM and SO₂ will be within the prescribed National Ambient Air Quality Standards (NAAQS) for Residential & Rural Areas

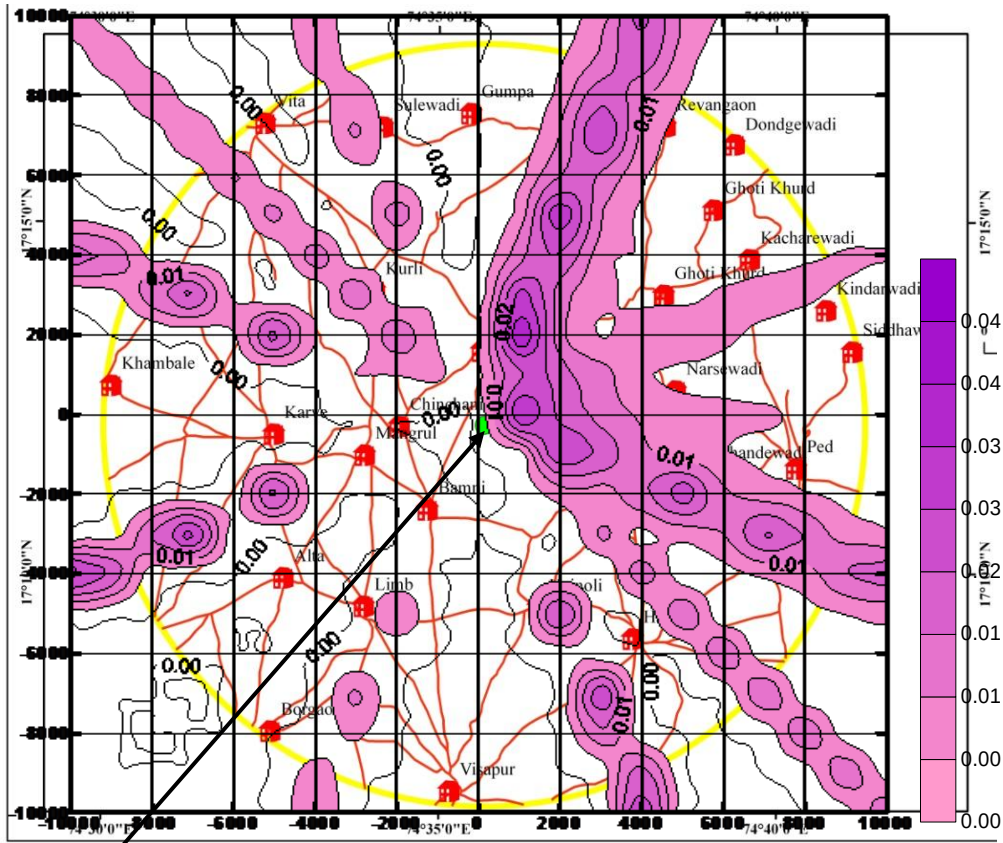
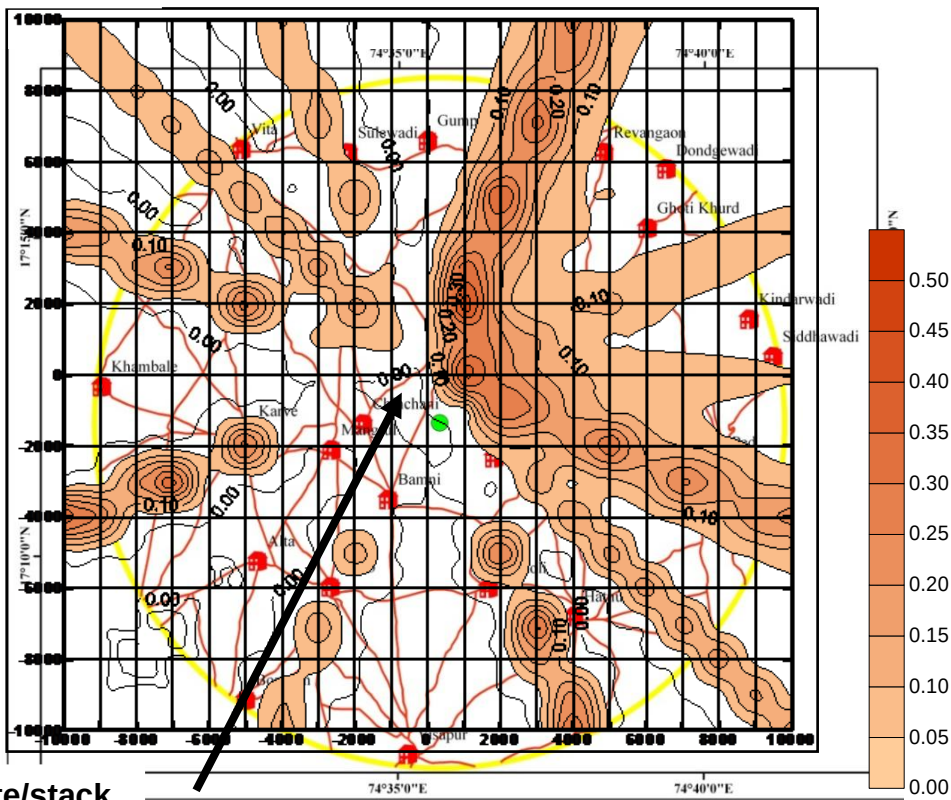


Figure 4: Short Term 24 Hourly GLCs of Particulate matter

Site/Stack



Site/stack

Figure 5: Short Term 24 Hourly GLCs of SO₂

7.0 SOLID WASTE MANAGEMENT

Wastes from a sugar industry include bagasse, molasses, press mud, boiler ash and sludge from effluent treatment plant.

Waste Material	Type	Upshot
Ash	1.10MT/day	Used as a filler material for bio-compost, final disposal system for the spentwash i.e. distillery effluent
Yeast Sludge, sludge from CPU and biodigesters	5-7 MT/day (wet basis)	mixed with biocompost

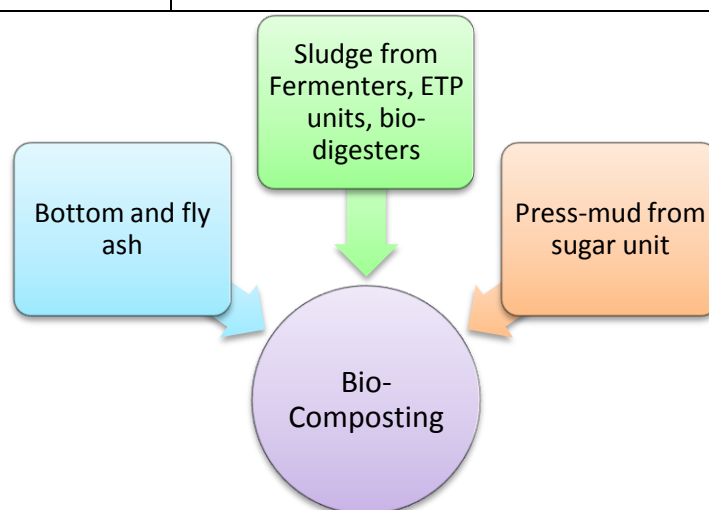


Figure 6: Schematic of waste management

7.1 Hazardous waste management

Spent oil from the gear boxes and automobile batteries will be disposed as per the Hazardous waste (Management and handling) Amended Rules, 2003.

8.0 WATER CONSERVATION

- Polishing unit for treatment of spent lees, CIP and blow down water 255m³ treated water will be reused
- Rain water harvesting
- Steam used twice – once for power generation (high pressure steam) and exhaust low pressure steam for distillery and sugar mill process
- Reduction in Wastewater generation
- Treated water from sugar ETP for greenbelt

9.0 GREENBELT DEVELOPMENT

Greenbelt will be developed on 2.6 acres of land (33% of the proposed activity plot) in and around an industrial complex. Therefore, approx.2,600 plants (including trees and shrubs) are proposed for the greenbelt development. It will require 50m³ of water. Selection of plant species will be based on their following characteristics

- Fast growing
- Thick canopy cover
- Perennial and ever green
- Large leaf area
- Preferably Indigenous
- Resistant to pollutants and should maintain ecological balance for soil and geo-hydrological conditions of the region.

Trees interspacing	tree density per 100m ²	Size/type	Location
3 x 3m	25	Shrubs, small and medium trees	Boundary of sugar and cogeneration, Garden/landscape areas
5 x 5m	09	medium to large size trees	Boundary of plot area –
20-25m	04-05	Large size trees	Road side large size trees

Since, the greenery development will be done as per the requirement i.e. type of activity performed at a particular area/block/plot, thus the tree spacing will vary from plot to plot.

10.0 SAFETY, OCCUPATIONAL HEALTH MANAGEMENT

In this project, aspects of Safety and Occupational Health are given with the due consideration, over and above applicable legislations such as Factories Act 1948. Extra attention is paid to provide measures for ensuring safety and health of workers as well as integrity of the unit.

Following applicable national or international standards shall be followed

- Use of flameproof electrics equipments
- Suitable operating procedures shall be adhered to ensure all Safety, Health and Environment
- Provision of safety gears to workers
- Workers working in high noise/ high risk areas must be rotated to other areas
- Smoking and other igniting activities should be strictly prohibited in the distillery, biogas as well as bio-compost area
- In exceptional case, when biogas couldn't be consumed as a fuel in the boiler then as a safety measure a flare unit shall be installed

- The plant and buildings meet the corresponding provisions of statutes regarding inter-distances, exits, ventilation, illumination, etc. Fire fighting arrangements shall be provided as per the required statutes as well as corresponding standards

Environment Monitoring Programme

11.0 PROJECT BENEFITS

- Fuel ethanol could save the fossil fuel as well as foreign exchange for the import of crude oil
- Other product of the project are also of great demand
- The proposed project on implementation will generate 77 direct employment opportunities
- The project is agro based, hence there will be plenty of indirect employments to locals
- No rehabilitation/resettlement issues are involved
- Factory is already implementing several schemes for the benefit of local farmers and employees and it will be continued
- Compost produced from the spentwash, press mud and other filler material will be sold to farmers; it will help in recycling of soil nutrients and thus soil quality
- Technology for the project and pollution control are available indigenously
- By implementation of management plant the negative impacts of the project anticipated to get reduced considerably and therefore, considering the positive impacts, the project will be beneficial to the society and overall development of the region

Table 9: Estimated Capital & Recurring Expenses for Environmental Management Program

Sr. No.	Particulars	Amount (Rs. in Lakhs)
1.	Spent wash cooling and holding tank	123.00
2.	Compost yard with PCC top finish	195.00
3.	Cil work at ETP (Foundation for evaporation, biogas polishing unit)	100.00
4.	Leachate management system	29.00
5.	Laboratory shed and its glassware, equipments, etc.	10.00
6.	Polishing units for condensate treatment	20.00
7.	Biomethanation Unit	260.00
8.	Stand alone evaporation	300.00

9.	Spraying pumps, Spent wash pumps and piping, HDPE piping, internal site piping, valves and fittings	27.00
10.	Biocomposting machinery, pipeline and other	68.00
11.	DG set for ETP	10.00
12.	Wire fencing around ETP	5.00
13.	Electrification at ETP	10.00
14.	Fire fighting equipments and other	5.00
15.	Tree plantation and bore well for composting	5.00
	TOTAL	1167.00
	Recurring Expenses/annum	
1.	Salaries and wages @ 5% on capital investment	58.35
2.	Operation and maintenance of all pollution control devices, motors, pumps, pipelines, etc. 5% on capital investment	58.35
3.	Fuel (composting activity) and Electricity (in case of diesel generator operation)	1.26
	TOTAL	117.96