CHAPTER 4 - ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

4.1 Introduction

Identification of impacts and mitigation measures of the same in Environmental Impact Assessment study helps in quantification and evaluation of impacts. During baseline study several impacts can be identified but it is necessary to identify the critical impacts both positive and negative on various components of the environment that are likely due to installation of proposed Units.

The environmental impacts can be categorized as either primary or secondary. Primary impacts are the ones that are caused directly due to the project activity on environmental attributes, whereas secondary impacts are indirectly induced.

The construction and operational phase of the project activity comprises various activities, each of which may have either positive or negativ**e** impact on some or other environmental attributes. The proposed project activities would impart impact on the environment in two distinct phases:

The proposed project may influence the environment of the area in two phases:

Phase I: During the Construction period, the impact may be temporary or short term
Phase II: During the Operation Phase which may have long term effects.

4.2 Construction Phase

This phase involves the activities like

- Site preparation and development
- Civil construction work
- Vehicular movement
- Loading and unloading civil items and plant machineries
- On site storage of civil items & plant machineries.
- Erection of plant and civil structures
- Maintenance of construction machinery
- Disposal of solid wastes
- Accommodation for construction workers
- Green Belt Development

Land, Air and Noise are likely to be effected by these activities, although Aesthetics and Socio-economic factors are also identified. But the impacts will be marginal and for short term only.

The green belt development will have positive impacts.

The detailed impacts & mitigation measures have been discussed in the following sections.

4.2.1. Land Environment

This is an existing operating sugar plant and adequate land is available within the premises for distillery unit. The area identified for the unit is almost flat and not much of leveling work is expected.

Mitigation Measures

- All earth work will be completed in such a way so that the soil erosion and carryover of the materials in other areas are protected.
- The packaging materials which may consist of wooden boxes and jute wrappers will be stored at suitable place and disposed off suitably.
- Excavated soil will be used for green-belt development.

4.2.2. Water Environment

Due to construction activities, the surface run-off during rainy season may contain more of eroded soil and other loose matter. With segregation of construction area and proper drainages, the water contamination is prevented. As far as possible, construction activities will be avoided during rainy days. Increased water demand during construction phase for site preparation, dust spraying, construction activities, curing, domestic and other water requirements for labour and staff onsite.

Mitigation Measures

- The earth work (cutting and filling) will be avoided during rainy season and will be completed during the winter and summer seasons only
- Stone pitching on the slopes and construction of concrete drains for storm water to minimize soil erosion in the area will be undertaken
- To strengthen green belt in and around plant will be undertaken during monsoon
- Soil binding and fast growing vegetation will be grown within the plant premises to arrest the soil erosion
- The overall impact on water environment during construction phase of the modernization unit will be temporary and insignificant

- Construction worker will not allow for staying at project site
- Use of tanker water for construction activity
- Provision of temporary toilets for labour
- Wastewater generated will be recycled/reused

4.2.3. Air Environment

The main sources for impact of air quality during construction period is due to movement of vehicles and construction equipment at site, dust emitted during leveling, foundation works, transportation of construction material etc. Dust would be generated during activities such as loading and unloading of construction materials, top soil removal, movement of vehicles over dusty roads and air born dust from exposed project site. Hence, during the construction phase, suspended particulate matter PM_{10} & $PM_{2.5}$ will be the main pollutant. The emissions from vehicles and construction equipment may also contribute to NOx and SOx.

The dust generated will be fugitive in nature, which can be controlled by sprinkling of water. The impacts will be localized in nature and the areas outside the project boundary are not likely to have any major adverse impact with respect to ambient air quality.

Mitigation Measures:

Following measures would greatly reduce the impacts during the construction phase

- The approach roads will be paved or tarred and vehicles will be kept in good order to minimize the pollution due to vehicular traffic.
- It is necessary to control the dust emissions particularly during dry weather. This will be achieved by regular water sprinkling all over the exposed area, at least twice a day using truck-mounted sprinklers.
- The nose-mask will be provided to workers in dust prone area.
- Existing green belt will help in attenuation of fugitive emission.
- Checking of vehicles and construction machinery to ensure compliance to Indian Emission Standards
- Transportation vehicles and machineries to be properly and timely maintained and serviced regularly to control the emission of air pollutants in order to maintain the emissions of NOx and SOx within the limits established by CPCB

4.2.4. Noise Environment

The major sources of noise during the construction phase are vehicles and construction equipment like dozers, scrapers, concrete mixers, cranes, pumps, compressors, pneumatic tools,

saws, vibrators etc. The operation of these equipments can generate noise levels in the range 85-90 dB (A) near the source. These noises levels will be temporary during the day time only hence will not have any significant impact on surrounding during construction phase.

Mitigation Measures:

- The noise control measures during the construction phase include provision of caps on the construction equipment and regular maintenance of the equipment.
- Equipments will be maintained appropriately to keep the noise level within 85 dB (A).
- Wherever possible, equipment will be provided with silencers and mufflers.
- High noise producing construction activities will be restricted to day time only. Greenbelt development will be undertaken from the construction stage itself. Further, workers deployed
- High noise areas will be provided with protective devices such as ear plug, ear-muffs etc.
- Overall, the impact of increase in noise on the environment would be insignificant, as it will be localized and mainly confined to the day hours.

4.2.5. Biological Environment

The site acquired for the proposed distillery unit of the project is devoid of any vegetation. Hence there will not be any adverse impact on flora during construction phase of the proposed project. Also, the increased vehicular traffic coupled with higher noise level due to various constructional activities will drive away the local fauna from the project site to the neighboring area temporarily.

Mitigation Measures

- Construction activities needs to be restricted to day hours only and the movements of workers and vehicles should be completely banned during early morning and late evening when wildlife activities are at peak.
- Workers should be briefed about do's and don'ts like No hunting, vegetation burning, off-road driving, speeding, improper behaviour towards local residents
- The project area is close to open scrub reserve forest and there are occurrences of schedule wild life. Hence, sign boards/ Notice Boards at the site like, NO HORN PLEASE, SILENCE ZONE etc. will be fixed
- Animals, which are found within the project area and categorized under schedule I to Schedule IV of Wild Life Protection Act 1972, are strictly protected and there is a complete ban on their exploitation for any purpose. Care should be taken not to disturb their habitats.

- In addition, do the awareness program among the, drivers school children & local community about the ecology & biodiversity.
- Proper management of waste material.

4.2.6. Storage of Hazardous Material

The hazardous materials used during construction may include petrol, diesel, welding gas and paints. These materials will be stored and handled carefully under applicable safety guidelines. Some of the precautions of storage include the following:

- Temporary storage will be made for diesel and other fuels. These fuels required for running construction equipment's, DG sets etc.
- Storage shall be separated by fire insulating walls from other storage tanks;
- The distance between the storage tanks shall be at least half of their height.

4.2.7. Socio-Economic Environment

- The proposed project does not involve any displacement of inhabitants for the construction of terminal.
- Construction phase could lead to creation of employment and procurement opportunities.
- A multiplier effect will be felt on the creation of indirect employment through the local community establishing small shops like tea stalls, supply of intermediate raw materials, repair outlets, hardware stores etc.
- Self- employment options for individuals possessing vocational or technical training skills like electricians, welders, fitters etc, which are likely to be sourced locally;
- There would be influx of workers during construction phase which could lead to pressure on key local infrastructure such as water, healthcare, electricity.
- The construction activity could lead to increased nuisance level from air emissions and noise due to transportation of material and equipment as well as labourers.
- The construction activity could also lead to water logging in mud pockets leading to breeding of mosquito and related health impacts.

Mitigation Measures

- Employing local people for construction work to the maximum extent possible.
- Providing proper facilities for domestic supply, sanitation, domestic fuel, education, transportation etc. for the construction workers.
- Barricades, fences and necessary personnel protective equipment such as safety helmet, hoes, goggles, harness etc. will be provided to the workers and employees.

- Constructional and occupational safety measures to be adopted during construction phase of the industry.
- The health of workers will be checked for general illness; first time upon employment and thereafter at periodic intervals, as per the local laws and regulations.
- The workers will be diagnosed for respiratory functions at periodic intervals and during specific complaints etc. Health centre and ambulance facility will be provided to the worker.
- Job rotation schemes will be practiced for over-exposed persons. Insignificant impact is expected on the workers' health and safety during the operation phase stage.

4.3 During Operation Phase

Operational phase activities may have impacts minor or major, positive or negative on environmental discipline such as soils, surface and ground water hydrology, micro meteorology, water use, water and air quality, ecology, socio economics & noise environment.

This phase includes following activities:

- Raw material storage
- Product manufacturing
- Product storage
- Transportation
- Gaseous emission
- Effluent discharge
- Solid waste generation
- Occasional equipment failure/ process upset and related problems
- Industrial development
- Chemical hazards

4.3.1. Air Environment

The operational phase of the project comprises of various activities each of which will have an impact on air quality. The impact on air quality can be due to:

- The source of dust emissions is loading/unloading, transportation and storage of raw material& finished product.
- Adequate pollution control measures will be taken to keep the emissions from all sources within the statutory norms. Spraying of water on roads will be done to control such emissions.

- In a plant, the major emission from stack is Particulate Matter (PM) emissions. In addition,
- Gaseous pollutants (SO_2, NOx and CO) are also anticipated from stack emissions and vehicular emissions.

The boiler will be equipped with high efficiency three fields Electro Static Precipitator, which will remove the suspended particles and ash particles from the flue gas. The efficiency of the Co-gen boiler ESP is 98.08% and that of Coal and CSW fired boiler will be 99.88% the dust concentration at the outlet of ESP of Co-gen boiler will be 50.0 mg/Nm^3 and that of Coal and CSW fired cogeneration boiler will be 100 mg/Nm^3.

Hence, the overall quality of the ambient air will be maintained within the limit prescribed by CPCB/SPCB after the commencement of the operation of proposed project. ESP is proposed as air pollution control measure to proposed boiler. Also, stack of adequate height, 60m is proposed to disperse the flue gas.

Table 28: Emission Control Measures

#	Source	Pollutant	In-plant Measures	Control Equipment
1	Molasses Yard	SPM road dust, HC	Leveled Roads and land, rubber tire, slow speed. Less waiting	--
2	Boiler	RSPM, CO	Feed Bagasse/husk drier, also will be used methane. Improved quality of water	Dampers, ID Fan, CO_2 meter, Fly-ash arrestor ESP, Light ash through very tall stack.
3	Fermentation	CO_2	Tank covered	Collected and scrubbed
4	Distillation	HC	Closed circuit	
5	Spent-wash	HC, Heat	Heat Exchanger	(Not open to sky cooling)
6	Bio-Digester	HC, CO_2,	Covered transfer	Fully closed
7	Other effluents	H_2O, CO_2	Closed transfer	Fully Aerobic regime.

As co-gen is of small size and Boiler uses bagasse, long distance haulage is not required.

i) Boiler: There will be two boilers. The first boiler of 190 TPH is based on Bio-mass and 35 TPH boilers are based on Coal and CSW. The construction of the boiler is such that the fouling potential is minimized through suitable design, and is easily maintainable. The convective section of the main boiler is of vertical tubes. The total assembly is of gas tight construction. Air Pre-heater is provided to preheat combustion air. The furnace with economizer and super heater ensures complete combustion.

The total steam 225 TPH, Total high pressure steam will be fed to turbine (1) 35 MW, (2) 3MW.

The low pressure tail steam will be used for sugar and distillery processes on normal working day. High pressure steam from the boiler is fed to back pressure turbine to generate electric power for captive use in the industry and also for export. The exhaust steam from the boiler will be utilized in distillation and evaporation plants respectively.

4.3.1.1. Mathematical Modeling

Ground level concentrations (GLCs) have been predicted using AERMOD Cloud software. The application incorporates popular U.S. EPA air dispersion models AERMOD and ISCST3 into one integrated graphical interface. The model uses rural dispersion and regulatory defaults options as per guidelines on air quality models (PROBES/70/1997-1998).

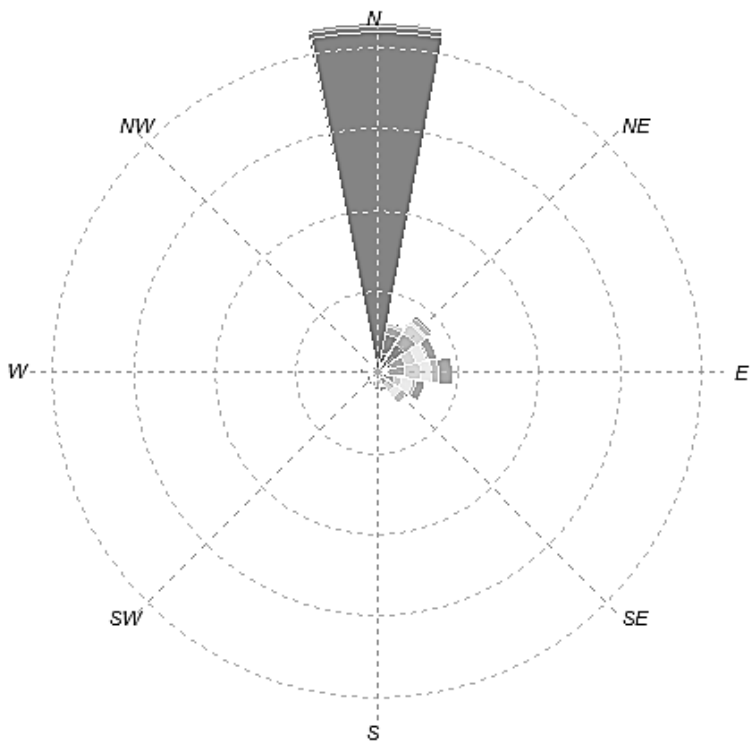

Figure 10: Site Specific Wind Rose

In the short-term simulations, the incremental ground level concentrations were estimated to obtain an optimum description of variations in concentrations within 10 km radius w.r.t. stack attached proposed boiler as center.

New boiler will be connected to stack through ESP. The stack details and flue gas characteristics are provided below:

Table 29: Stack Emission Details

Boiler Configuration	190 TPH	35 TPH
Type of Fuel	Bagasse	CSW and coal
Calorific value	2,250 Kcal/kg	CSW - 1750 Kcal/kg Coal - 3,800 Kcal/Kg
Ash content	2%	CSW - 17% Coal - 39%
Sulphur content	0.05%	CSW: XXX % Coal : 0.38 %
Fuel Feeding Rate	72 TPH	CSW: 12 TPH Coal : 4 TPH
Material of construction	RCC	RCC
Shape (round rectangular)	Round	Round
Stack Height from ground level (m)	80	80
APCE (Air pollution control equipment) Proposed	ESP with outlet concentration PM <50 mg/Nm^3	ESP with outlet concentration PM <50 mg/Nm^3

4.3.1.2. Stack calculations

- **Height of Chimney for Sugar Co-gen Boiler (190TPH) fired with Bagasse**

Relation for estimation of stack height for boilers based on ash emissions from agro waste bio-mass as fuel;

$$H = 74(Q)^{0.27}$$

Where Q is emission rate of Ash in TPH, and H is stack height in meters

Ash generation = 1,300kg/day

$$H = 74(1.3)^{0.27}$$

$$H = 74 \times 1.073$$

$$H = 79.43m$$

$$Height\ Provided = 80m$$

- **Height of Chimney for Distillery Co-gen Boiler (35TPH) fired with Coal and CSW**

Relation for estimation of stack height for boilers based on SO_2 emissions from conventional fuel;

$$H = 14(Q)^{0.3}$$

Where Q is emission rate of Ash in TPH, and H is stack height in meters

SO_2 emissions = 2,400kg/day

$$H = 14(2.4)^{0.3}$$

$$H = 14 \times 1.3$$

$$H = 18.21m$$

$$Height\ Provided = 24m$$

- **Diesel Generator (1 x 300 kVA, 2 x 1010 kVA)**

Diesel generators are used only during the emergency of power failure from the regular source to run essential services for a limited period. A maximum of utilization of gen set is about 30 hours per month. The performance of diesel generator will meet CPCB/MOEF specification with regards to noise and emission.

In addition, other attendant efforts like water spraying, tree plantations and covered storage etc. shall be adopted, wherever feasible and needed. Totally for pollution control, Rs. 35 Cr. with corresponding figures for O&M is earmarked.

Fugitive: A number of mitigation measures are taken to control fugitive emissions, the presence of which will be noticeable by plain vision if not controlled. The measures are thus taken seriously and continuously such as:

- Rubber wheel carts / tractors/ trucks to bring in cane, not filled high, sides cladded, slow speed travel, avoiding vibrations en-route.
- Engineering the plant layout in such a way so as to virtually eliminate need of using heavy equipment for material handling in the main plant
- Internal roads paved, leveled, no undulations, no sharp curves, slow speed
- No open storage of bagasse, husk, and molasses involved. Provided closed godown, warehouses, transmission lines and steel tank for finished.
- Tree plantation on surrounding available area as barrier.
- Bagasse where excess is baled and used off-season.

The Industry proposes to continue the efforts of air pollution control and remain inside the limits. Mathematical modeling is done. Prediction is reported and is satisfactory even with incremental values.

4.3.1.3. Ground Level Concentration (GLC) of Air Pollutants

The quality of ambient air after the proposed capacity enhancement is estimated by mathematical modeling. The dispersion and ground level concentration of suspended solids,

sulphur dioxide and nitrogen oxides in ambient air due to the emissions from boiler stack is estimated. The estimation of impact due to project activities on air environment was based on

- Pre project ambient air quality
- Source, quantity and quality of emissions
- Air quality modeling

The concentration of suspended solids, sulphur dioxide and nitrogen oxides in ambient air in the region will be enhanced due to the presence of the proposed industry. The maximum ground level concentration of pollutants under worst operation and environmental scenario in down wind direction is estimated by Gaussian point dispersion equation.

- The maximum concentration of these parameters in ambient air under slightly unstable conditions is estimated by Gaussian model relations as per CPCB guide lines and the results are furnished below.
- Mathematical modeling has been done for predicting short term ground level incremental concentrations of pollutants based on post monsoon site data to predict the maximum incremental contributions over the existing pollutant levels due to the proposed expansions in the plant.
- Maximum values of incremental ground concentrations of pollutants are estimated. The quality of air is calculated for the locations of highest concentrations, which shall be present in downwind direction from the chimney. The calculations are done for 200 m to 5,000 m from the source. Model Options used for Computations

The options used for short-term computations are:

- The plume rise is estimated by Briggs formulae, but the final rise is always limited to that of the mixing layer.
- Stack tip down wash is not considered.
- Buoyancy Induced Dispersion is used to describe the increase in plume dispersion during the ascension phase.
- Calm /near neutral condition is assumed.
- Wind profile exponents are used by 'Irwin'.
- Flat terrain is used for computations.
- It is assumed that the pollutants do not undergo any physico-chemical transformation and that there is no pollutant removal by dry deposition.
- Washout by rain is not considered.
- Cartesian co-ordinate system has been used for computations.

- The model computations have been done for up to 5 km.

Ground level concentration (GLC) has been predicted using AERMOD-Cloud software. The application incorporates popular U.S. EPA air dispersion models AERMOD and ISCST3 into one integrated graphical interface. The model uses rural dispersion and regulatory defaults options as per guidelines on air quality models (PROBES/70/1997-1998).

Table 30: Data on Ambient Air quality

Parameter	Value
Ambient air temperature, Ta	303 K
Atmospheric pressure, P	940 mb
Dry ambient lapse, T	-1.6 K/100m
Wind direction,	From WWN & E
Wind velocity at 10 m/height, ua	1 m/sec
Pasquill stability category of the Atmosphere,	C (slightly unstable)
Exponential factor for wind velocity Profile for rural conditions, p	0.15 for atmospheric stability of C category

Table 31: Mixing Heights Considered For Computations

Stability Class	Mixing Height (m)
A	1300
B and C	900
D	750
E and F	400

From IMD data it is noted that the weather in the region is slightly unstable and for wind velocity 1 cm/s the Pasquill atmospheric stability criteria is class C.

- **Estimation of downwind ground level SPM concentration**

Ground level concentrations directly downwind at a distance of x meter from source are given by the Gaussian Plume source dispersion equation as;

$$C_{(x,y,z)} = \frac{Q}{2\pi \bar{u}_x \sigma_y \sigma_z} exp\left\{\frac{y^2}{2\sigma_y^2}\right\} exp\left\{\frac{z^2}{2\sigma_z^2}\right\}$$

Where,

$C_{(x,y,z)}$ = Concentration at ground level at a distance x meter from the bottom of chimney the downwind direction, µg/s

X = Downwind distance along plume mean center from source (200m to10000m)

Q = Emission rate, µg/s

H = (h + Δh), effective height, m

Δh = Plumb rise, m

H = Height of the chimney, m

σy = standard deviations plume concentration (dispersion co- efficient) in horizontal direction, m.

σz = standard deviations plume concentration (dispersion co- efficient) in Vertical direction, m

The value of dispersion co-efficient depends on distance x, wind speed and stability conditions of atmosphere. The isolation is selected as moderate based on Cloud cover and solar angle data. The stability classification is identified as C class based on meteorological data of atmosphere and wind speed obtained from nearest meteorological station at Belgaum. The identified Dispersion coefficients for the same are given below.

Dispersion co-efficient σy and σz for stability class 'C'

Dispersion co-eff.	Distance from source						
	400 m	700 m	1000 m	2000 m	4000 m	7000 m	10000 m
σy	44 m	74 m	105 m	200 m	370 m	610m	840 m
σz	26 m	43 m	61 m	115 m	220 m	360 m	510 m

(Source: D.B. Turner, 1969)

The analytical procedure for estimation for of GLC is presented bellow;

Q = Pollution load, µg/s = (g/s of SPM) $(10)^6$, µg/s

F = Buoyancy flux parameter, m^4/s = gd2vs (Ts-Ta)/4Ts, m^4/s

u = Wind speed at emission discharge, m/s

u is calculated by Irvins wind scaling law.

u = ua x (H/10)p , m/s

Where, p = 0.15 for 'C' class stability and rural conditions

Δh = Plume rise, m

Plume rise is estimated from Briggs formulae and the relation is indicated bellow

$\Delta h = Exb/ua$, m

Where, $E = 1.6xF^{1/3}$, a=1 and b=2/3 for the conditions F > 55 and $x < 119xF^{0.4}$

$E = 38.7xF^{0.6}$, a=1 and b=0 for the conditions F > 55 and $x < 119xF^{0.4}$

$H = (h + \Delta h)$,

GLCs at different distances from the source are predicted.

- **Estimated Ground Level Concentrations**

The monitored air quality data at different locations is given in Chapter 3. The short-term ground level concentrations have been computed for pre-monsoon season. The estimated values of ground level concentrations at different locations are calculated with modeling.

- **Prediction**

The maximum incremental GLC of PM and SO_2 is superimposed on the baseline concentrations recorded during the study period to arrive at the likely resultant concentrations after implementation of the proposed boiler. The cumulative concentration (baseline + incremental) is calculated.

- **Impact Assessment**

Ambient air quality in study area with respect to PM and SO_2 is within NAAQS 2009. Hence, any significant impact is not envisaged.

- **Mitigation Measures**

Ambient air quality will be within NAAQS 2009 as mentioned above. ESP is proposed as air pollution control measures to proposed boiler. Also, stack of adequate height, 80 m and 80 m are proposed to disperse the flue gas. Thus SO_2, SPM and NOx precautions are taken as above.

B) Carbon Di-oxide Emission:

There are three sources of CO_2 namely, (1) burning of fuel in proposed boiler, and (2) Generation in fermentation step and (3) ETP on biological principle. The emissions are controlled as follows;

i. In the boiler indicators are provided to have proper air-fuel ratio for maximum combustion efficiency. Thus CO_2 will be found but not CO. the emissions are liberated at

a stack height designed as per MoEF. In the surrounding, greenery is provided to absorb the residual CO_2.

ii. The CO_2 is generated in the biological fermentation step by the help of yeast. This fermentation tank is not kept open to sky but is kept closed, so that CO_2 is collected and then scrubbed in water.

iii. From the effluent treatment whether by aerobic/ anaerobic, CO_2 is generated as an end result. As the BOD leading to is reduced by prevention and abatement method; CO_2 is controlled. The greenery maintained around is capable to reduce above. At this location there is no other CO_2 liberating activity.

The predicted results are tabulated below and dispersion trend is shown as iso-pleths for Particulate Matter, SO_2 & NOx.

4.3.2. Impact on Land Environment

Along with implementation of project, more than 33 % of the land area will be covered with greenery. The study area comprises of agricultural and non-agricultural lands.

During summer, the latter are dry and devoid of vegetation. However, during rainy season they cover green with grass and shrubs. Part of the agricultural land is irrigated under bore well and lifts irrigation. The main sources which will affect the land environment are by products from proposed activity i.e. ash, Spent wash, ETP effluent & sludge etc.

Pollutants from the proposed activity damage the porosity, oxygen transfer is hampered and the degradation of the effluent organics in soil depletes of nitrogen. These factors cause germination disorders in seeds that are planted. Prolonged land irrigation using effluent, may cause soil sickness.

Other damages caused by effluent discharge on land are:

- Charring of vegetables and crops.
- Accumulation of salts.
- Increase in cropping period.
- Increase in the electrical conductivity

Soil quality may be affected by accidental leakage and spillage of hazardous chemicals/oils during handling. Improper segregation and disposal of solid waste generated during operation of the proposed project.

Mitigation measures: The generated ash along with press mud directly sold farmers as a manure. Balanced ash will be sold to brick manufacturers unit. The spent wash will be concentrated in MEE followed by Incineration and condensate will be treated in CPU and used for industrial use Measures will be taken to minimize waste soil generation. Construction waste material will be recycled.

- Designation and demarcation of construction site with due provision for infrastructure.
- Appropriate measures are adopted for slope stabilization to reduce land erosions.
- Used oil from D.G. Set shall be sold to recyclers. There are no other hazardous wastes
- All hazardous wastes shall be securely stored, under a shed for eventual transportation and disposal to the authorized dealer by MPCB.

4.3.3. Impacts Due To Particulate Emissions

Particulate emission due to burning of fuel from proposed Incineration boiler; similarly transportation facilities will affect the surrounding will be controlled through adequate dust suppression and/or extraction system so that the impact will be negligible.

Stack Emissions: The following measures will be adopted for the control of emissions for the proposed plant

- Suitably designed ESP and 80 m stack height will be placed to 190TPH boilers which will separate out the incoming dust in flue gas and limit the dust concentration at its designed outlet concentration of 50 mg/Nm^3.
- For the effective dilution and dispersion of the pollutants stack height has been proposed as per CPCB guidelines. The height of the stack will be 80m single chimney.

Fugitive Emissions: The following measures will be adopted to control fugitive emissions:

- Dust suppression system by water sprinkler during operational activities
- Regular dust suppression with water sprinkler at transfer points;
- Control of fugitive emissions from ash handling area will be mitigate through frequently water sprinkling
- Green belt development and afforestation in plant and surroundings of ash handling area
- Dust suppression/extraction system at fuel handling plant to control fugitive emissions

4.3.4. Impact on Ambient Noise

During the operation phase noise will be generated from noise generating sources. The principle source of noise from industry are from fans, centrifuge, turbine, steam traps, steam vents etc.

Exposure to excessive noise produces varying degree of damage to human hearing system which is initially reversible. Speech interference, sleep interference annoyance, mental fatigue and headache are few of the other effects which are caused by the high level exposure of long duration noise. In certain circumstances noise can cause decreased electrical resistance in the skin and a reduction in gastric activity

With increasing distance from the source the noise level decreases due to wave divergence. Additional decrease also occurs due to atmospheric effects and interaction with objects in the transmission paths.

Mitigation Measures

The ambient noise levels in the study area within permissible limits and will remain stipulated/prescribed limit even after commissioning of the proposed project.

The general mitigation for the attenuation of the noise are given below:

- Noise level can be reduced by stopping leakages from various steam lines, compressed air lines and other high pressure equipment
- By providing padding at various locations to avoid rattling due to vibration
- By adopting new technologies for control of noise in various units
- Encasement of noise generating equipment where otherwise noise cannot be controlled
- Providing noise proof cabins to operators where remote control for operating noise generating equipment is feasible.
- The air compressor, process air blower, pneumatic valves will be provided with acoustic enclosure;
- In all the design/installation precautions are taken as specified by the manufacturers with respect to noise control will be strictly adhered to;
- High noise generating sources will be insulated adequately by providing suitable enclosures;
- Design and layout of building to minimize transmission of noise, segregation of particular items of plant and to avoid reverberant areas;

- Use of lagging with attenuation properties on plant components / installation of sound attenuation panels around the equipment
- Other than the regular maintenance of the various equipment, ear plugs/muffs are recommended for the personnel working close to the noise generating units;
- All the openings like covers, partitions will be designed properly
- Inlet and outlet mufflers will be provided which are easy to design and construct.
- All rotating items will be well lubricated and provided with enclosures as far as possible to reduce noise transmission. Extensive vibration monitoring system will be provided to check and reduce vibrations. Vibration isolators will be provided to reduce vibration and noise wherever possible;
- The insulation provided for prevention of loss of heat and personnel safety will also act as noise reducers

Noise source and control measures

Sources of noise: The source and quality of noise in the distillery are given bellow;

- Steam turbines	:	85-90 dB (A)
- Diesel Generators	:	75-80 dB (A)
- Fans, blowers and compressors	:	80-85 dB (A)

The sound intensity appears to be at moderate level in distillery plants. In general at the locations of turbines, compressors, fans etc. The sound intensity generally exceeds the limit. Necessary measures as indicated below are taken to reduce the sound intensity below the allowable limits at the source itself. The workers engaged in such locations are provided with earmuffs to have additional safety against noise nuisance. These units will be manufactured to meet the noise levels as per MOEF&CC/ CPCB guide lines.

Noise control measures: Workers near equipment will be provided ear muff and ear plug as personnel protective appliances against noise. They are installed on vibration proof foundation and base. Steam turbine and diesel generators are located in isolated and acoustic building.

Diesel Generator – 1 x 300 kVA, 2 x 1010 kVA Diesel generators will meet the Specification of MoEF&CC. They are with low noise engine supplied with vibration free base frame and acoustic enclosure. Efforts shall be done to bring down the noise level of the D. G. set with in the allowable limits of about 70 dB(A) by sitting and control measures.

Steam Turbine –35 MW

In addition to green belt will be developed,

- At 100 meters from project boundary, 0. 6 dB of time averaged increase over baseline noise levels is predicted, and at 200 meters, 0.2 dB of increase is predicted, both of which are negligible.
- Surrounding Villages are located beyond a distance of 250 meters from the Plant boundary and will not see any increase in Noise Levels because of the Sources of noise inside the Project site.
- Mitigations Measures as listed below should be implemented for avoiding any potential impact on the Noise Environment.

Table 32: Equipment Noise and Mitigation Measures

Sr. No.	Machinery / Equipment Description	Predicted SPL at 1m distance	Mitigations Required
1.	Air Handling Units	95~100 dB	1. Air handling units usually comprise of Motors and Blowers (either axial fans or centrifugal blowers). Centrifugal blowers usually have larger Noise levels because of turbulence generated inside the blower. 2. The Motor and the Blower usually have combined Noise Level of 100 dB, hence Acoustical Enclosure with 20 dB Transmission Loss should be installed for All AHUs. 3. The ducting from each of the AHUs must have Acoustical Lining from inside or In-line Silencer installed after the blower in order to avoid the transmission of Noise through the ducts.
2	Pumps (Multiple Numbers)	85~95 dB	1. Pumps can have Sound Pressure Levels ranging from 85 dB to 95 dB Depending upon size. 2. Acoustical Enclosures should be installed in order to bring the SPL below 80 dB at 1 meter distance. 3. Acoustical Panels with Transmission Loss Rating of 15 dB or more should be used for pumps.
3.	Boiler	100~105 dB	There are multiple sources of sound in a Boiler. 1. All Boiler feed pumps to be provided with Acoustical Enclosures with 30 dB Transmission Loss 2. All Safety valves to be installed with 15 dB Insertion Loss Rating Silencers. 3. Detailed study should be conducted of the boiler for noise levels upon completion of installation.
4.	Air Compressors (Or Compressor House)	> 100 dB	1. All compressors should be installed at a common location i.e. compressor house. 2. The Compressors should be provided with Acoustical Enclosure of at least 30 dB Transmission Loss Rating.

5.	Steam Turbine	90~100 dB	1. Usually Steam turbine will not create noise levels above 90 dB, however 100 dB has been considered for a worst-case scenario. 2. Steam turbine to be provided with Acoustical Enclosure of 20 dB Transmission Loss Rating. 3. Appropriate Thermal insulation blanket with noise reduction rating of 6-7 dB should be installed onto the steam turbine.
6.	Cooling Tower	85 dB	Noise Levels of up to 85 dB will be generated due to the cooling tower, which is safe for a noise dosage of up to 8 hours even if there are people working around the cooling tower, hence no mitigations are necessary for this source of noise.
7	Additional Mitigations / Cares to take	N/A	1. All people working in the vicinity of the Equipment/Machinery with Sound Pressure Levels higher than 95 dB should wear protective ear plugs to avoid permanent hearing damage.

4.3.5. Impacts on Water Environment

Water requirement for the proposed plant will be 935m³/day. The water requirement will be fulfilled from River. Permission from Irrigation department, GoM is obtained. This is treated to a reasonable extent by us, and it has good characteristics. As it is earmarked for this industry, we are not encroaching on anybody else's water source. Water is used at various stations like heating, cooling, process, floor washing, vessel washing, laboratory, scrubbing etc.

I. <u>Water Balance for Distillery 90 KLPD</u>

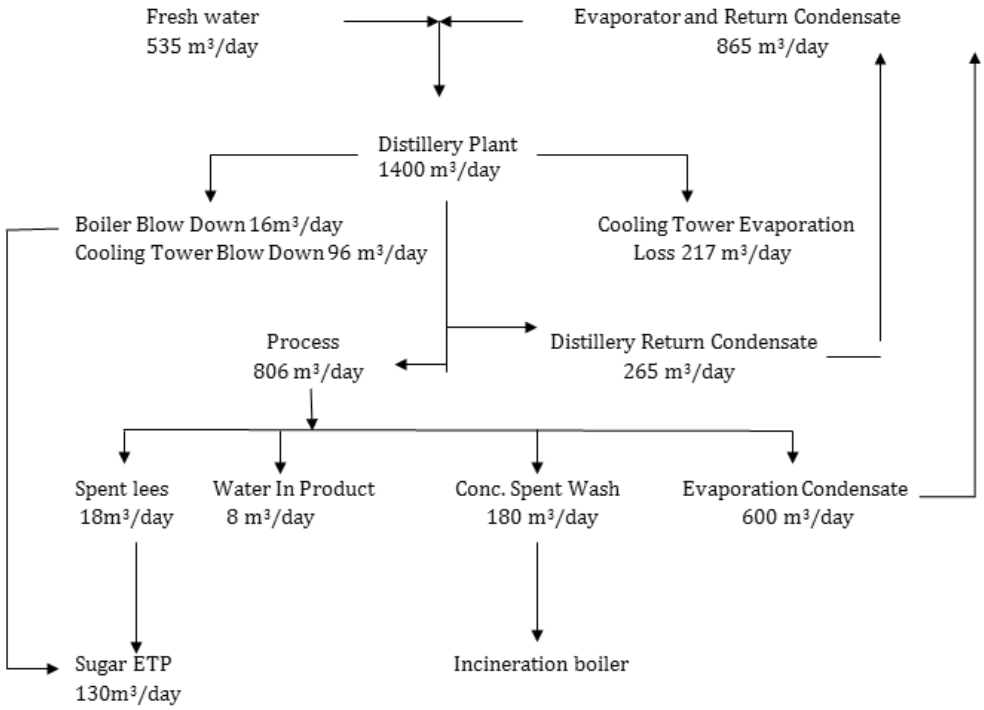

Figure 11: Water Balance for Proposed Distillery

II. Water Balance for 8000 TCD sugar & 35 MW Co-gen unit (160 days season)

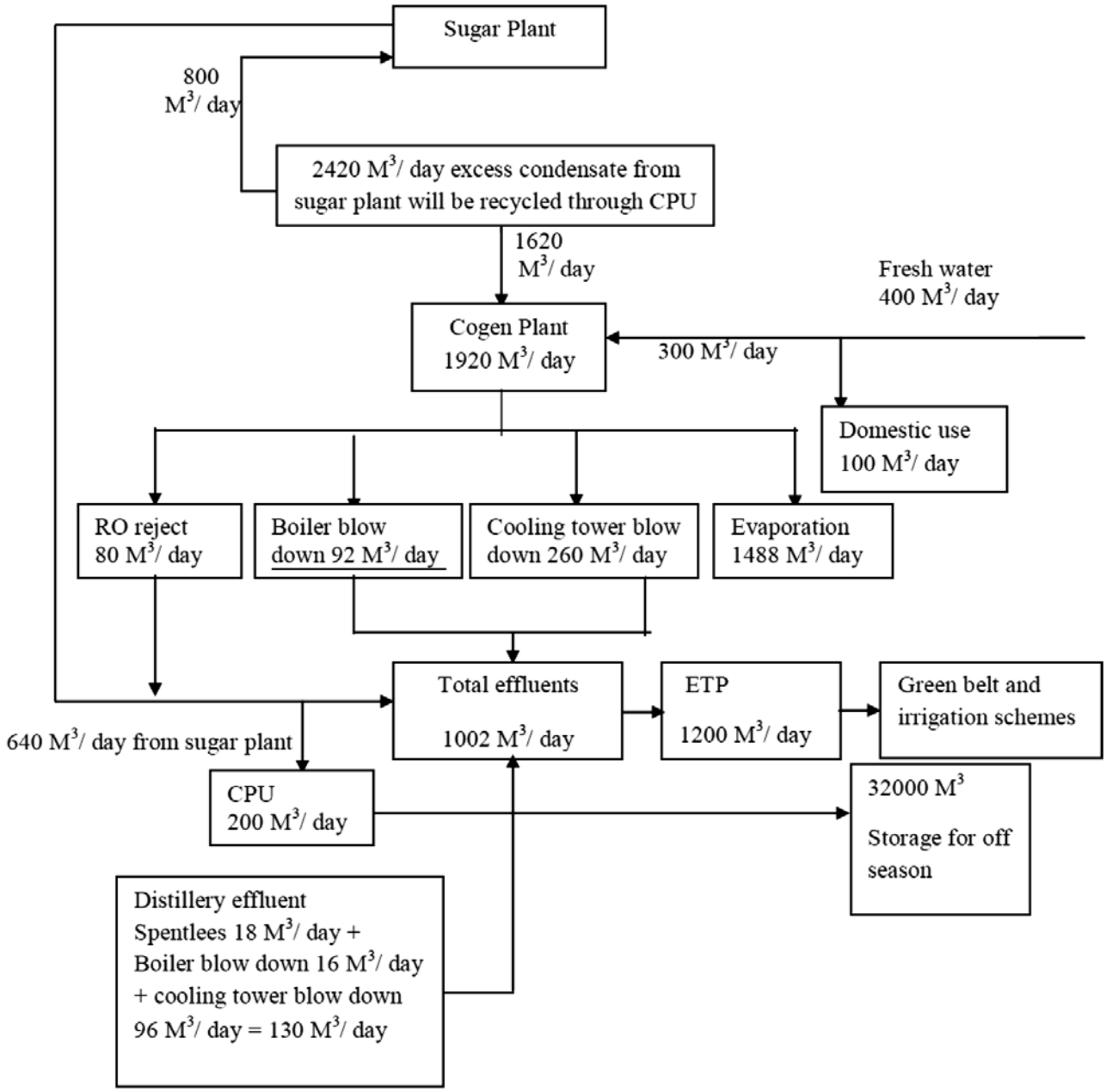

Figure 12: Water Balance for Proposed Sugar and Co-gen in Season

Fresh water requirement for 8,000 TCD sugar plant & 35 MW co-generation plant would be 400m^3/day.

III. Water Balance for 35 MW Co-gen Plant (50 days off season)

3,2000 m^3 of excess condensate saved during the season shall be stored in a Reservoir which shall be used during the off season for operation of co-generation plant.

Co-generation plant can operate 50 days during the off season with saved excess condensate water and additional of 1,090 m^3/day of fresh water only is required.

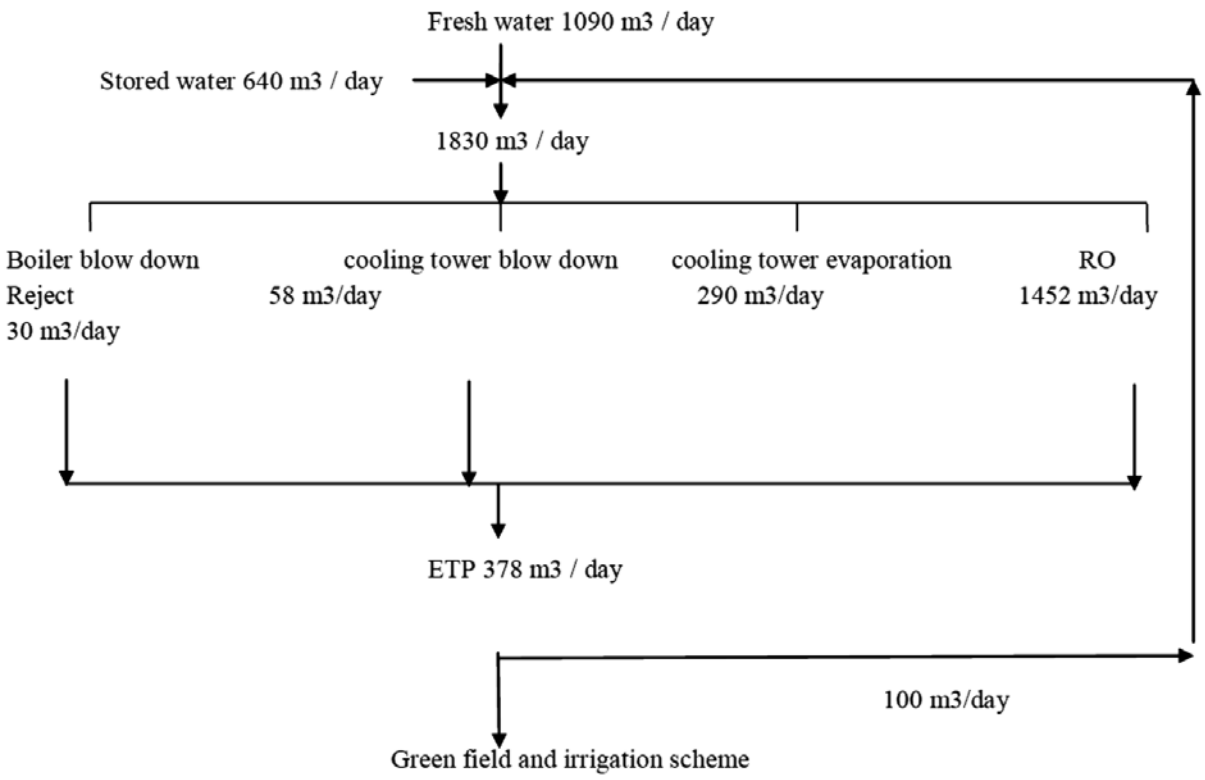

Figure 13: Water Balance for Proposed Sugar and Co-gen in Off-Season

4.3.6. Effluent Treatment Plant

For Sugar and Co-gen, Effluent Treatment Plant is proposed to treat the effluent up to tertiary level. The schematic Diagram is given below;

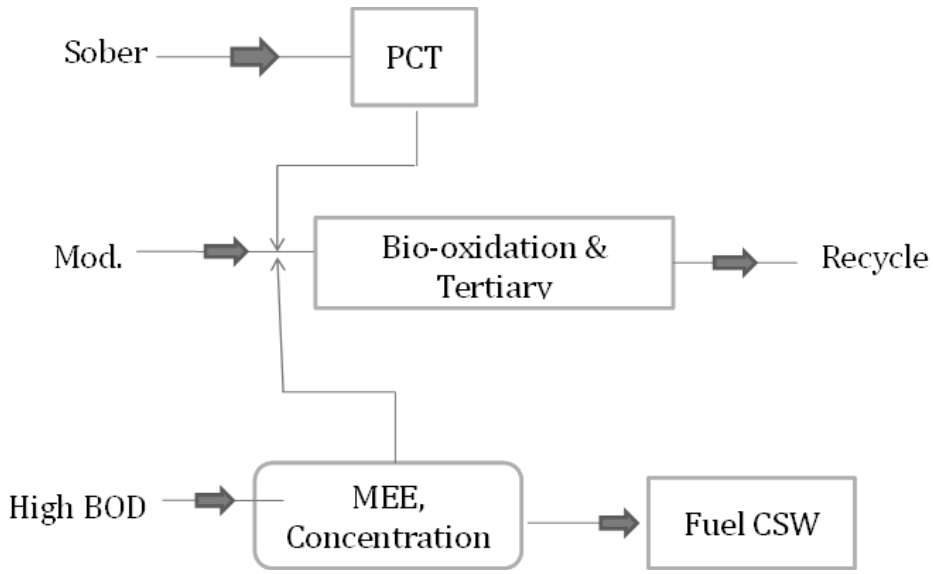

Figure 14: ETP Scheme

4.3.7. Condensate Polishing Unit (CPU)

Following condensate polishing treatment schemes are adopted by the industry.

- Conventional anaerobic treatment followed by aerobic (extended or diffused aeration) treatment followed by polishing
- RO – MBR Technology
- Photo-oxidation

Considering the initial capital investment and recurring cost for operation of the scheme, Conventional anaerobic treatment followed by aerobic (extended or diffused aeration) treatment followed by polishing appears to be most economical for treatment of process condensate of evaporation, spent lees of distillation etc. Therefore, we propose Conventional anaerobic treatment followed by aerobic (extended or diffused aeration) treatment followed by polishing for treatment of process condensate of distillation, evaporation, RO permeate etc.

Conventional anaerobic treatment followed by aerobic (extended or diffused aeration) treatment followed by polishing

To have eco-friendly & natural treatment, this plant will be designed based on the biological treatment concept. This means microbes removes or degrade the organic matter present in the effluent & at the end clean water is available for the non-potable usage for reuse in process and non-process applications. In brief, the CPU will consist of:

d. PRE-TREATMENT

- Collection: Collection tank of one day capacity.
- Neutralization: Neutralization system is provided to neutralize the effluent using lime slurry (10%) or soda ash.

e. SECONDARY TREATMENT

UP-FLOW ANAEROBIC SLUDGE BLANKET REACTOR (UASBR): Wastewater from intermediate tank would be pumped into UASB reactor through especially designed distribution pipes. The multiple distributions ensures uniform distribution of flow throughout the sludge blanket making maximum rises to the top of Anaerobic reactor along with bio-gas generated and also some sludge particles. A unique three-phase gas – solid- liquid separator would be provided at the top to separate out the gas, liquid and the sludge particles. The wastewater flows upward through a sludge blanket composed of biologically formed granules or particles. Treatment occurs as the wastewater comes in contact with the granules. The gases produced

under anaerobic conditions (principally methane and carbon dioxide) cause internal circulation, which helps in the formation and maintenance of the biological granules. Some of the gas produced within the sludge blanket becomes attached to the biological granules. The free gas and the particles with the attached gas rise to the top of the reactor. The particles that rise to the surface, strike the bottom of the degassing baffles, which causes the attached gas bubbles to release. The degassed granules typically drop back to the surface of the sludge blanket. The free gas and the gas released from the granules are captured in the gas collection domes located in the top of the reactor. Liquid containing some residual solids and biological granules passes into settling chamber, where the residual solids are separated from the liquid. The separated solids fall back through the baffle system to the top of the sludge blanket. Gas will be collected in the domes provided at the top. The liquid overflows through the gutters and suspended solids then separated are allowed to settle down in the sludge blanket thereby retaining valuable bacterial population. The gas will be carried through a gas line equipped with safety devices to the flare stack and would be burnt subsequently.

ANAEROBIC TREATMENT: The anaerobic waste treatment process is an effective method for the treatment of many organic wastes. The treatment has a number of advantages over aerobic treatment process, namely,

- The energy input of the system is low as no energy is required for oxygenation
- Lower production of excess sludge (biological synthesis) per unit mass of substrate utilized
- Lower nutrient requirement due to lower biological synthesis, and
- Degradation leads to production of biogas which is a valuable source of energy

FUNDAMENTAL MICROBIOLOGY: The anaerobic treatment of organic wastes resulting in the production of carbon dioxide and methane, involves two distinct stages. In the first stage, complex waste components, including fats, proteins, and polysaccharides are first hydrolyzed by a heterogeneous group of facultative and anaerobic bacteria. These bacteria then subject the products of hydrolysis to fermentations, oxidations, and other metabolic processes leading to the formation of simple organic compounds, mainly short-chain (volatile) acids and alcohols. The first stage is commonly referred to as "acid fermentation". However in the second stage the end products of the first stage are converted to gases (mainly methane and carbon dioxide) by several different species of strictly anaerobic bacteria. This stage is generally referred to as "methane fermentation".

The primary acids produced during acid fermentation are propionic and acetic acid. It is reported that only one group of methane bacteria is necessary for methane fermentation of

acetic acid, whereas propionic acid, which is fermented through acetic acid requires two different groups of methane bacteria. The bacteria responsible for acid fermentation are relatively tolerant to changes in pH and temperature and have a much higher rate of growth than the bacteria responsible for methane fermentation. As a result, methane fermentation is generally assumed to be the rate limiting step in anaerobic wastewater treatment.

ASP – ACTIVATED SLUDGE PROCESS (AERATION): This is the main section of the plant where degradation of organic pollutants with the help of aerobic micro-organism takes place. In aeration tank activated biomass is developed in such a way that certain MLSS is maintained for continuous effluent flow which comes to aeration basin. Effluent is degraded in given retention time and activated sludge is further passed to clarifier and recycled as per requirement. The sludge, which is not required after recirculation, is passed to sludge drying bed. To maintain the aerobic condition in the bioreactor, air supply arrangement is provided by means of aeration equipment which has high oxygen transfer efficiency. Primary Clarifier: In Primary clarifier, effluent passed from first aeration tank along with biomass (MLSS) gets settled here. The settled biomass recycled back to aeration tank as per requirement and excess biomass transfer to sludge drying bed.

Secondary Clarifier: In secondary clarifier, effluent passed from second aeration tank along with biomass (MLSS) gets settled here. The settled biomass recycled back to aeration tank as per requirement and excess biomass transfer to sludge drying bed.

f. TERTIARY TREATMENT

COARSE FILTRATION: The raw water is first passed through a multigrade sand filter to reduce the suspended solids present in the raw water. The filter will have to be washed with the help of raw water for 10 to 15 mins daily. This filter is provided to keep a check on the suspended solids.

ACTIVATED CARBON FILTER: Activated Carbon Filter shall be used for De-chlorination of filtered water, where the excess chlorine will be removed along with undesired color & odor.

Advantages of treatment scheme;

- This plant will produce the treated water which can be recycled back.
- This plant is based on biological principle hence no need use of any excessive hazardous chemicals for the main degradation process.
- Due to efficient aeration system, electrical power requirement is very low.

- Due to user friendly equipment, plant maintenance is very less.
- Due to inbuilt automation, plant machinery life is high & ensures trouble free operation
- All process rotating electromechanical equipment is provided with standby equipment to ensure the uninterrupted operation.
- Due to effective after sales service from our qualified staff, maintenance issues to the owner are less.

Storage for Spent Wash

One Tank of 30m x 25m x 3m is provided. The tank is constructed at ground level by excavation of earth, construction of bunds and compaction of surface as per standard practices. The tank interior is suitably prepared as per CPCB guide lines by RCC lining and 250 micron HDPE plastic sheet to prevent seepage of effluent.

MoEF has prescribed that the lagoons should not be more than 5 days detention. Ours are kept same. Further they will serve only as storage in case of emergency and during stream line flow, these will be dry.

The lagoon will be lined in order to avoid any leachate. This lining will have three components. The first will comprise of watering and compacting of Soil (Black Cotton), the second component will be of HDPE 250 micron and the third component, as normally practiced consist of either concrete, brick on edge or shahbad tiles. As concrete or shahbad tiles are sensitive to acidic pH, people normally preferred brick on edge, which is also supported by CPCB. We shall do good job engineering like manner and joints will be filled with acid proof cement.

Mitigation: As additional mitigation measures, ASL proposes to take-up following:

- To spread awareness to the workers about the importance of water quantity measurements and resource conservation.
- Shop-floor supervisors are encouraged for mopping up, dry collection and good house-keeping by arranging lectures, and by conscious supervision.
- The treated domestic and industrial sober waste water will be applied judiciously on land for gardening so that there will not be any flooding of excess water either to migrate to ground water table or get away as runoff to join surface water drains.
- Documentation shall be maintained and submitted in annual Environmental Statement.

Summary: From the foregoing it may be seen that the industry is without any such effluent which is hazardous, poisonous or non-biodegradable. It is not likely to create pollution from the point-of-view of water phase of environment, once used on land.

Action Plan: The action plan is prepared to ensure that there is no discharge of effluent anywhere during anytime.

- There will be no storage of effluent in the lagoon in the rainy season.
- Pre-monsoon inspection shall be carried out to ensure that garland drains are dry and pumps are working in the eventuality of rain run on or rain runoff.
- Two down gradient and one up gradient well will be monitored regularly during rainy season.
- The ETP and Digester sludge also will be taken care off during pre-monsoon inspection.

Water regime is discussed from source, quantity and permission of withdrawal, up to water balance chart. This further includes effluents generation (section-wise), characterization, treatment train, recycle and ZLD. Spent wash generation will be 8 KL/KL of alcohol production. Capacity for spent wash holding tank is kept within the normally permitted & will be constructed water-tight as per CPCB norms.

4.3.8. Rain Water Harvesting

This is designed as per CPCB Publication. The site has 1200 mm rainfall per year. Rainwater harvesting is done for following area: 1) Main Factory Building, 2) Lime Godown, 3) Sugar Godown and 4) Admin office, with total roof area of approximately 5000 m2. Total rainfall harvest is 54,00,000 Ltrs.

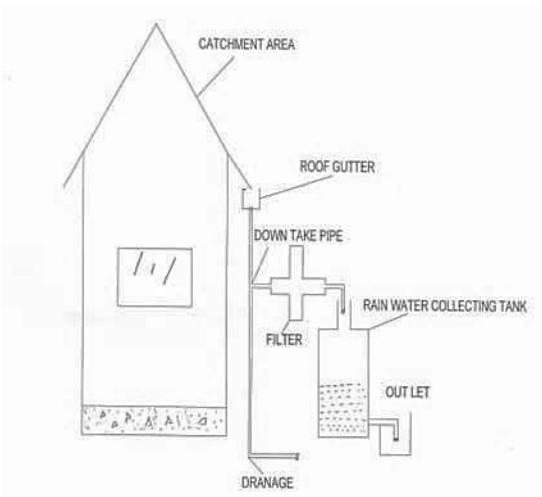

Figure 15: Rainwater Harvesting System

The water collected is used in factory premises, guest house, canteen etc. The water from other areas is used for groundwater recharge. In due course, under CSR, we propose to have consultation with local Gram Panchayat and village Heads to augment the ground water level by introducing RWH in their village.

4.3.9. Impacts on Soil & Biological Environment

Every industrial activity brings in some change to soil environment. The land-use pattern changes, eyesore buildings may come up, excavation and filling with borrow-pits gets involved, the soil gets paved by roads, buildings (terraces/roofs) and platforms. All this, reduces areas for percolation into soil and increases storm run-off that leads to erosion of soil in channels downstream. Sometimes the rapid congregation of water becomes too high for the carrying capacity of channels/ nallas giving rise to build-up of back waters.

Borrow Pits:

The present plot for development of ASL has sober undulations. By good architectural practices, the flow of activities will be planned so as to make maximum use of gravity for the traffic of material. The buildings and the plinths will be as adjusted as the cutting should balance the embankments or filling. Indeed very little murum or any other material will be required to be borrowed from outside.

The fear of erosion, nalla back-water, need of soil stabilization etc. are thus of no cause for anxiety by this proposal and hence no effect is expected on biological environment in developing this unit.

4.3.10. Impacts Solid Waste

Following mitigation practice is the policy for future:

- Minimization at all levels need be attempted for discarded products, empty containers, packing surpluses, incoming raw material unloading spillages and fugitives. The factory has very little scrap materials. All these, however, be carefully stored on raised platform with dwarf toe walls all around, and a roof over-head. The contents should not be held in the premises for more than a fortnight.
- The solid in process generate only as ETP/CPU sludge, spent catalyst and boiler ash. Ash is non-hazardous and in fact a good building material. Even can be used in Cement mills and for soil enrichment.

- Other will be empty drums which can be used for refill or may be disposed to original vendors. The colony is very small and its organic portion will be composted and inert sent for low land filling.
- These measures can easily be taken by ASL because (1) they have no discards or off-specification products, (2) the waste is fully recycled and (3) they have experience in the line for the same type of product.

a. Non Hazardous Solid Waste:

Based on above working, the summary is per day.

Table 33: Solid Waste per Day

#	Waste	Quantity	Disposal	Remark
1	Canteen	50 kg	Own garden	Organic
2	Colony	100 kg	Own garden	Mixed
3	ETP sludge	2 MT	On Land after composting	Organic, Non-Hazardous
4	Office & Packing	50 kg	Sales	Non- Hazardous
5	Yeast Sludge	167 kg	On greening belt	Organic, and Non-Hazardous
6	Ash	76 TPD	Sale to farmers after composting, brick manufacturers	Takers available
7	Lube oil	6 Kg/day	Own boiler (with Bagasse)	--

Fly Ash management plan for coal based & bagasse & action plan-

Bagasse contains very little ash, which is approximately 2% of its weight. Nevertheless, a good system for handling of the ash from the boiler ash outlets to the disposal point is required in order to eliminate the pollution hazard to the plant with the ash. Another important point with regard to the bagasse ash is that the ash contains sodium and potassium and other nutrients for plant growth and hence could be used for the cane fields.

The Scheme of the Ash Handling system envisaged is given in the furnace bottom ash from the hoppers shall be handled by the water impounded submerged Belt conveyor.

As the grate ash from the steam generator is taken care off, the remaining is only the fly ash from the collection point's at the air heater hopper(s) and the electrostatic precipitator hopper(s). The ash collected at these two places will be dry and powdery and hence is more suitable for dense phase pneumatic handling. It is proposed to use this system for the handling of the fly ash from the boiler.

The fly ash shall be collected at ESP & APH etc. through hoppers, provided below this equipment. Below the hoppers chain/hand wheel operated knife / plate valves and metallic bellow type expansion joints shall be provided. The hoppers shall be provided with level probes. ESP hoppers shall be provided with fluidizing pads for ash fluidization. The Dense phase system blow down ash vessels with all accessories like pneumatic operated dome valve, vent valve and conveying air blow valve etc. shall be provided below the knife gate valves. All valves mounted on the blow down vessel shall be remote operated.

The fly ash collected in the blow tanks shall be conveyed to the 100m^3 capacity fly ash silo through MS pipes. Proper vent filters shall be provided at the top of Silo for controlling the dust generated in the silo. Target box/Terminal box shall be provided to terminate the ash pipe at silo top. Suitable level switches (high, high-high) shall be provided in silo for ash level control. Silo shall be provided with suitable manhole, pressure relief valve and ash fluidizing pads. Silo outlet shall be provided with power cylinder operated knife/plate valve, rotary feeder, ash conditioner with flexible chute, motor operated retractable chute/unloading spout for disposal of the ash through trucks or by other means of transport. For the purpose of air fluidization in the silo blowers will be provided and blowers shall be rotary twin lobe type, one working and one standby, along with electric air heater with suitable interlocks. The conical portion of the silo shall be lined with 3mm thick Stainless steel sheets.

The compressors supplying the conveying air shall be non-lubricated type, with one working and one standby. The required conveying air for Dense phase system shall be supplied by these compressors through air receiver of adequate capacity.

The ash handling system shall be designed and constructed aiming for totally dust free operation. Fugitive dust emission in any area shall not exceed 50mg/m^3 for all solid particles.

The design of equipment shall ensure maintenance of noise and Vibration levels within the limits specified below. Measured noise level produced by any rotating equipment shall not exceed85 dB at a distance of 1m from it in any direction. This wet ash is sold out to farmers & brick manufacturers.

Fly Ash management plan for Distillery Incineration Boiler & action plan-

Coal used for incineration boiler contains very high ash, which is approximately 25% of its weight. Nevertheless, a good system for handling of the ash from the boiler ash outlets to the disposal point is required in order to eliminate the pollution hazard to the plant with the ash.

Another important point with regard to this ash is that the ash contains high potassium and other nutrients for plant growth and hence could be used for the cane fields.

The Scheme of the Ash Handling system envisaged is given in the furnace bottom ash from the hoppers shall be handled by the chain conveyor.

As the grate ash from the steam generator is taken care off, the remaining is only the fly ash from the collection points at the air heater hopper(s) and the electrostatic precipitator hopper(s). The ash collected at these two places will be dry and powdery and hence is more suitable for dense phase pneumatic handling. It is proposed to use this system for the handling of the fly ash from the boiler.

The fly ash shall be collected at ESP & APH etc. through hoppers, provided below this equipment. Below the hoppers chain/hand wheel operated knife / plate valves and metallic bellow type expansion joints shall be provided. The hoppers shall be provided with level probes. ESP hoppers shall be provided with fluidizing pads for ash fluidization. The Dense phase system blow down ash vessels with all accessories like pneumatic operated dome valve, vent valve and conveying air blow valve etc shall be provided below the knife gate valves. All valves mounted on the blow down vessel shall be remote operated.

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The compressors supplying the conveying air shall be non-lubricated type, with one working and one standby. The required conveying air for dense phase system shall be supplied by these compressors through air receiver of adequate capacity.

The ash handling system shall be designed and constructed aiming for totally dust free operation. Fugitive dust emission in any area shall not exceed 50 mg/m3 for all solid particles.

The design of equipment shall ensure maintenance of noise and Vibration levels within the limits specified below. Measured noise level produced by any rotating equipment shall not exceed85 dB at a distance of 1 m from it in any direction

The concentrated spent wash at 60 % solids will be fired and completely burned in a Special incineration boiler of 34 MT/hr capacity (45 kg/cm2 (g) pressure) to achieve 'Zero Discharge'. This boiler will require coal as a subsidiary fuel (about 25 % of the total fuel requirement). Thus, "Zero Pollution" and "Fuel is saving" will be achieved by employing spent wash incineration boiler. The boiler ash generated will contain minimum 15-20 % of potash and can be sold in the market as a source of potash.

b. Hazardous Waste:

The relevant summary of above reads as:

Table 34: Summary of Hazardous Waste

Sr. No.	List of Processes Generating Hazardous Waste		Waste stream	Remark Please vide Note
38	Cleaning of barrels which have held chemical substances	38.1	Chemicals containing residues from barrel cleaning	No. 1 below
		38.2	Sludge from waste-water purification	
41	Waste treatment processes e.g. distillation, separation and concentration technique.	41.4	Distillation residue from the work-up of contaminated halogen-free organic solvents	No. 2 below
44	Every action relating to and every use of lubricating and system oil	44.1	Spent oil	No. 3 below
		44.2	Other spent lubricating and system oil	

- **Note 1:** The number of barrels containing Turkey Red Oil is small, as the substance is not a raw material. It is merely an anti-foam agent. These are on returnable basis to suppliers. So it can be said for the yeast supplement substances, like nutrients, which comes in bags only.
- **Note 2:** The activity is bound to remain inside, as no organic solvents are involved anywhere in the line of process reaction or work-up.
- **Note 3:** Not being an Engineering Industry, use of oil-grease, lubricants, or hydraulic/ system oil is extremely limited. The steps like fermentation, distillation do not involve any rotating machines, hence it is not applicable. Recovered and used for lubricating cane carrying carts.

Handling of solid waste is considered, which is limited in volume. Some of it is already proposed to be used for good cause to serve as raw material or fuel or as manure. Hazardous waste is only in the form of limited waste oil and can be used after separation a either for lubricating the carts or burnt in boiler along with bagasse. Ash is useful both for brick-making as well as foe farming, and hence, much in demand. Thus, this leads to conservation of natural resources.

Handling of Molasses:

Some part of the molasses required will be fulfilled through the 8,000 TCD sugar mill. This molasses will be transported through the pipes (closed Remaining molasses will be outsourced from the surrounding sugar mills. While transporting, following precautions shall be taken:

- Transport shall be only during day-time.
- Tankers will be inspected and leak proof
- Excise permission will be obtained in advance for both the factories namely sender and receiver of molasses
- Weighment will be made at both the units namely sending and receiving with manifest.
- These two figures will be checked.
- Loading will be from steel tanks and unloading will also be in steel tanks
- Steel tanks at receiver's end will have dyke walls
- Arrangements with receiver factory will be to cool the tanks with watering to avoid auto-combustion.
- Monthly statement of transport will be sent to government.
- Our doctor looking after occupational health is advised to look after any fungal presence due to molasses especially examining the people handling molasses at both the ends, namely sending and receiving units.

4.3.11. Traffic Management

For raw materials (molasses), fuels (Bagasse) and press mud, we are almost fully self-sufficient and hence, no new to be procured from others. Sugar and alcohol produced in the factory is transported to various consumers through lorry tankers. The vehicles will move mainly through district roads from Shewalewadi to Karad, Satara and beyond. District roads are tarred. Presently, the traffic on these roads is meager. The additional traffic due to the proposed activity is not likely to affect the environment.

i) Personnel: During operation a maximum of about 700-750 persons (inclusive of employees and others) are attending the industry but majority of them will be sons of soil from vicinity villages. Visitors are very less because it is done mostly from the city office and not from site.

Only nominal few four wheeler vehicles (say 10 per day) are expected. In addition 2 night duty vehicles provided for emergency movement.

ii) Material: Movement of heavy vehicles due to transportation of material and personnel during operation is given below.

- Alcohol 90KL/d, 9 heavy duty tanker lorries per day and empty return, long distance
- Boiler ash to vicinity brick makers/farmers 76 T/d, 4 heavyduty lorries per day and empty return. Short distance
- Miscellaneous storages 1 truck per day and empty return. Long distance
- Trucks for transport of sugar bags: 32 per day during season. Long distance.
- For bringing cane, 200 tractors/trailers/trucks. Short distance

Totally, 42 long distance and about 204 short distance haulage. If spread over 15 hrs., the frequency may be 20 minutes, one way for long distance and 15 minutes for short distance in three directions.

iii) Traffic Survey:

Traffic survey is the study of flow of traffic/vehicles, designing and operating traffic system to achieve safe and efficient movement of vehicles, persons and goods. Survey was conducted to assess the present volume of the vehicles passing on the road adjacent to the village. The volume was found very low on this two lane road. The surface is good to serve our new traffic, as estimated above.

The transportation density on the road presently is much less and hence we accommodate easily our traffic of about 60 vehicles (one way) on this road which is tarred and wide with two lanes.

The road passes through villages and adjacent to agriculture lands. Lorries carrying solid material such as sugar bags will be covered with tarpaulin. The industry will take measures to additional plantation on road sides. Bell mouth shape geometry will be provided at entry and gates to the industry. Considering the facilities as above the impact of additional transportation on road will be insignificant.

This unit is located in mofusil and there is no other activity in the vicinity. The present traffic is mainly from local bullock carts/ lorries/ tractor and material transport of our existing units. The construction phase is of a short duration, more of a fabrication type, side cladding rather than walls and workers coming from nearby villages normally on foot or bicycles. In operation

phase, we foresee additional traffic only by about 60-70 trucks. Night transport will be generally avoided and this will be placed in 15 hours. The road has a capacity to support traffic for about 3000 vehicles per day (24 hours) and thus is safe with good level of comfort. There is a big yard for cane carrying carts, tractors and trucks which is a seasonal activity. Adequate space is provided for truck parking. For drivers and loading-unloading workforce, facility is provided in vicinity to take rest and sanitation.

4.3.12. Greening Drive

Objective: To provide a measure of air pollution mitigation, fugitive dust control, shed for men and bullocks, cooler atmosphere, camouflage the land-use, aesthetics of the region, absorption of green-house gas, utilization of NPK of the wastewater after treatment, as also Noise Barrier and Erosion prevention.

i. **Methodology:** Design of Plantation will be such as;
   - Not to get disturbed in future expansions
   - Be nearer to source of water and supervision.
   - Be where the need is
   - Capability of securing maximum survival rate with an aim of 100%

Selection of species will be done by detailed considerations:

- A large variety of species selected to have bio-diversity
- Indigenous local species have a more chance of survival. So will be surveyed.
- Species of origin outside of India, but subsequently found established too shall be encouraged.
- Species that will grow rapidly under local dominant stress of soil salinity, high wind, water needs, sustainability in dry months
- Species that have more foliage area, absorbing gasses.
- Rapid growth and evergreen type of species.
- Tolerance to water stress and extreme climatic conditions.
- Difference in height and growth habits
- Aesthetic and pleasing appearance
- Large bio-mass to provide fodder and fuel
- Ability to efficiently fixing carbon and nitrogen.
- Improving waste land
- To suit specific climate and soil characteristics.
- Sustainability with minimum maintenance.

ii. **Sections:** Will be at least four for greening drive;

- Three row curtain on periphery
- Block of trees near temple
- Avenue trees near approach road and internal roads
- Ornamental trees in the garden
- Bushes on slopes of roads
- Fruit trees in the colony.

iii. **Logistics:** Provision is made in advance for;

- Securing plants from nearby Nursery
- Water distribution arrangement
- Staff earmarked for the purpose having trained in the respect
- Agricultural implements, pesticides and manures necessary
- Fire protection.

Selection: Central Pollution Control Board (CPCB) has divided India in 15 different regions. The present location comes under Krishna. CPCB has further divided this region in sub-zones. The peculiarities of this subzone are identified as follows;

- Rainfall 1,200 mm
- Climate Semi-Arid
- Soils BC to coarse

CPCB has recommended more than 150 species which can be attempted in this subzone of the region. Selection is therefore based further on availability of species in the nearby nurseries. Biodiversity is also kept in view. Trees, shrubs, dwarf trees and vegetative cover/ lawn is proposed. For biodiversity we propose ten verities of species as out of Mango, Ashok, Wad, Nilgiri, Sitafal, Badam/Almond, Gulmohar, Pimpal, Chinch, Umbar, Babhul, Santra/Orange, Papaya, Lemon, Jamb/Guava, Sag, Aavla.

We currently have around 5030 nos. of large trees of about 5 nos. of species and shrubs and herbs of around 20 species for biodiversity. We propose to plant more trees in the near future during this expansion.

4.3.13. Occupational Health Care

Safety officer is already appointed in the industry. He will co-ordinate and manage occupational health management. A medical facility with qualified doctor and clinical facilities will be created in the industry to meet the factory and residential colony requirement of the health services.

Higher medical services shall be availed from the hospitals present in Karad and Satara. Health care aspects to be practiced in the industry are indicated below;

- Health and safety related displays will be exhibited at strategic locations in the industry.
- Workers will be educated and trained in occupational health safety.
- Regular health check-up of the workers will be carried out and health records of individual workers will be maintained.
- Spirometry, Pulseoxyeometry, X-rays and other routine and specific tests will be conducted and submitted to authorities
- Utility rooms provided will be provided with facilities and properly maintained.
- First aid facilities will be provided at different locations. Further first aiders will be trained.
- Housekeeping in the industry, sanitation in utility rooms, canteen, Rest rooms and other places will be given top priority.

4.3.14. Impacts on Socio-Economic Environment

The proposed project is expected to have several positive impacts on demography and socio-economic condition which are listed below:

- Increase in employment opportunities so as people will not migrate outside for employment
- Increase in literacy rate
- Growth in service sectors
- Improvement in prices of indigenous produce and services benefiting local people such as increase in land value, house rent rates and labour wages
- Improvement in socio-cultural environment of the area
- Improvement in transport, communication, health and educational services
- Increase in employment due to increased business, trade & commerce and service sector
- Thus the overall impact on the socio economic environment of the region is expected to be beneficial for the local population

Summary of Impact

- Based on the assessment made in the preceding sections the overall impacts due to the proposed power project are summarized in **Table 35**.

Table 35: Assessment of Environment Impacts due to proposed activity

Sr. No	Environmental Component	Project Activity	Impacts Identified	Impact Assessment after Mitigation
1	Topography	Site Clearance	Minor changes in landscape.	Insignificant
		Construction Activities	Changes in landscape.	Insignificant
		Operation activities	Changes in land use. The available free land is utilized.	Insignificant
2	Air Quality	Site clearance	Excavation and levelling activities are limited hence, fugitive emissions would be restricted.	Insignificant
		Construction activities	Local increase in SPM	Insignificant
		Transportation	Vehicular and fugitive emissions	Insignificant
3	Noise	Construction activities	Temporary local increase in noise	Insignificant
		Operation activities	Continuous noise but confined to within the Plant Area	Insignificant
		Transportation	Increase in noise levels due to vehicular traffic	Insignificant
4	Water Resources	Construction activities	The water will be used during the construction activities.	Insignificant
		Operation activities	Surface water	Insignificant,
5	Water Pollution	Construction activities	Small volume of wastewater from the construction and sanitation	Insignificant
		Operation activities	Effluent generated in the plant	Insignificant as there will be zero discharge of effluent.
6	Ecology	Site Clearance	There will not be major disturbance to flora fauna	Insignificant
		Construction activities	There will not be major disturbance	Insignificant
		Operation activities	There will not be major disturbance to flora fauna	Insignificant
7	Soil Characteristics	Construction activities	Since there is minimal levelling and excavation, the proposed project area is within the existing facilities.	Insignificant
		Operation activities	No changes are envisaged in this phase	Insignificant
8	Land Use	Construction activities	There will be change in landuse for industrial purpose.	Significant
		Operation	The existing landuse is change to	Insignificant

		activities	industrial use	
9	Socio-economics	Construction activities	Creation of additional jobs/ businesses	Significant
		Operation activities	Rise in per capita income due to increased opportunities	Significant
10	Civic Amenities	Construction activities	Built up of temporary structures for workers and non-workers	Moderately insignificant
		Operation activities	Availability of permanent structures for workers, non-workers	Moderately insignificant
11	Occupational Health	Construction activities	Dusty conditions during summer with vehicular movement	Insignificant
		Operation activities	Process specific activities, heat and emission protective control measures followed	Insignificant
12	Vibrations	Construction activities	Heavy equipment usage will be temporary	Insignificant
		Operation activities	Continuous usage of machinery	Insignificant
13	Solid/ Hazardous waste	Construction activities	General construction waste will be disposed off in designated sites	Insignificant
		Operation activities	Ash from burning of bagasse in boilers	Insignificant

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