ENVIRONMENTAL IMPACT ASSESSMENT REPORT

DAUND SUGAR LTD.

At Post Alegaon, Tal. Daund,
Dist. Pune, Maharashtra -413801

Expansion of Sugar up to 6000 TCD and Distillery Up to 90 KLPD

PREPARED BY

ULTRA-TECH

(Environmental Consultancy & Laboratory Gazzeted By MoEF,

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CHAPTER 1 – INTRODUCTION

Contents of this Chapter shall be:

Purpose of the Report, Identification of Project & of Project proponent,Brief description of nature, size, location of the Project and its importanceto the region and to the country, Scope of the study or TOR.

1.1 Introduction

M/s Daund Sugar Ltd. is an agro based Company focused on the manufacture of sugar, power and allied products. The company has established and running a 3500 TCD sugar, 18 MW cogeneration power plant and 45 KLPD molasses based distillery at Post Alegaon, Tal. Daund, Dist. Pune, Maharashtra, referred as **This Industry TI** for brevity. **TI**wishes to do another expansion of sugar capacity up to 6000 TCD (2500 TCD expansion), cogeneration kept at par (18 MW) and molasses based alcohol distillery up to 90 KLPD (45 KLPD expansion). The sugar unit generates large quantities byproducts viz. bagasse, molasses and press mud. To be economically and environmentally sustainable it is necessary for the sugar industries to convert these byproducts into high value products, and hence this is done.

The plant will be established in the same premises of the existing sugar industry. The raw material, molasses and bagasse generated from the sugar plant will be utilized in the proposed distillery and power plant, respectively. For the existing 45 KLPD Molasses based Distillery and 18 MW Co-gen Power Plant, MoEF has already kindly granted an Environmental Clearance dated 20th November 2009. Now,

Table No. 1.1: Existing and Proposed Production Details

#	Product	Production			Unit	Schedule	Category
		Existing	New	Total			
1	Cane crushing Capacity	3500	2500	6000	TCD	5 (j)	B
2	Co-gen power	18	-	18	MW	1 (d)	-
3	Alcohol Distillery	45	45	90	KLPD	5(g)	A

Further, the Notification no. S. O. 1533 promulgated on 14th September 2006 has categorized, ≥ 5000 TCD sugar under category-B of schedule 5(j) and 90 KLPD distillery based on molasses is categorized under Category–A Schedule 5 (g). MoEF, New Delhi has considered the proposal in the 21st EAC meeting dated 30th July, 2014. A letter prescribing 51-point TOR Scoping dated 10th October 2014 (including both A & B categories of Industry as above) was received and accordingly draft EIA was prepared. The Public Hearing Consultation was conducted by MPCB at site. The Public Hearing considered both the aspects namely expansion of sugar plant as well as alcohol distillery. (Detailed report is enclosed in Annexure for ready reference). This final report takes cognizance both of ToR and Public Hearing points.

1.1.1 Historical Background:

Earlier, the Sugar and Co-gen unit as well as molasses based distillery was commissioned during the season 2009-10 and now going for the first expansion in its two units.

1.2 Purpose of the report

Purpose of this Report is to examine whether our efforts address all the published requirements of Ministry of Environment and Forests, New Delhi; such as

- All options to be explored, not merely the site.
- Land to be Minimum, Load-bearing, Level, and without Rain-wash pollution possibilities.
- Water consumption to be Minimum, no encroachment on others existing source, and recovery-recycling to be practiced.
- Wastewater to be segregated and accordingly treated.
- Land should not come in the migration route of wildlife and transitory birds.
- Consideration of aesthetics (odour and noise nuisance) is necessary.
- Proper Green Belt to be designed (CPCB Guidelines are available).
- Transportation risk to be minimized.
- Rehabilitation or resettlement if involved must be resolved smoothly.
- In all above efforts, transparent approach must be maintained.

This is attempted here by keeping the following objectives:

1. To know the existing environmental status.
2. To estimate the future pollution load.
3. To design preventive and curative steps so that any probable significant impact can be turned insignificant first by control measures and inconsequential next by further mitigation measures.
4. To superimpose the future resultant pollution load on existing environmental conditions due to the proposed activity.
5. To understand the views of other departments and incorporate measures to fulfill the statutory requirements.
6. To prepare an environmental management plan (EMP) including monitoring schedule to serve as "Watch-dog"
7. To make this Report available to all stake-holders so as to be useful.

There are no litigation pending against the project and/ or any direction / order passed by any court of law against the project. **(ToR 51)**

1.3 Intended Use of this EIA:

This EIA is not undertaken as an idle exercise. It is not intended to be just a plan on paper to satisfy the statutory requirement. **TI** desires to use this work as a tool that can become handy for many decisions making processes.

Legend:

SPCB = State Pollution Control Board
CIF = Chief Inspector of Factories
CCI = Chamber of Commerce, Industries and agriculture
NGO = Non-Government Organization
MoEF = Ministry of Environmentand Forest, Central Government
ED = Environment Department, State Government
TI = This Industry.

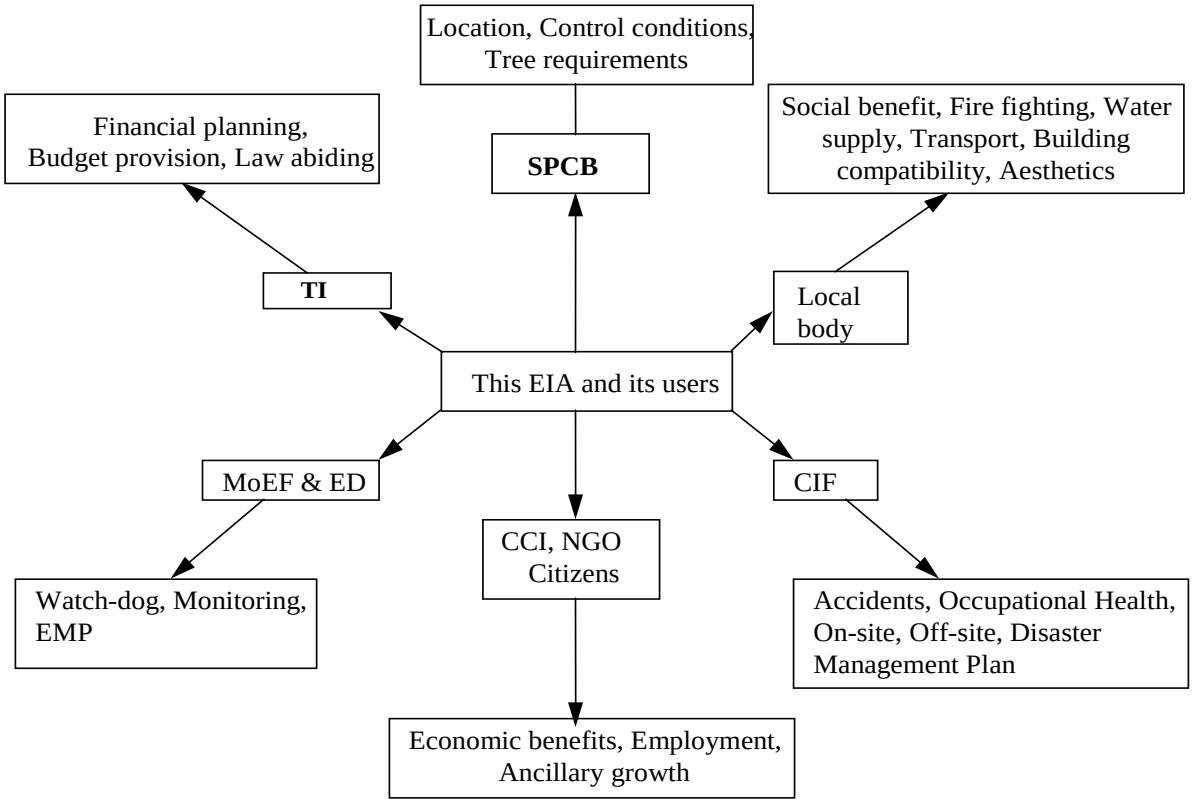

Figure No. 1.1: EIA – Users

This EIA is aimed at fulfilling the requirements of all these possible users.

1.4 Identification of the project

M/s Daund Sugar Ltd. is an agro based Company focused on the manufacture of sugar, power and allied products. The company has established and running a 3500 TCD sugar, 18 MW cogeneration power plant and 45 KLPD molasses based distillery at Post Alegaon, Tal. Daund, Dist. Pune, Maharashtra, referred as **This Industry TI** for brevity. **TI**wishes to do another expansion of sugar capacity up to 6000 TCD (2500 TCD expansion), cogeneration kept at par (18 MW) and molasses based alcohol distillery up to 90 KLPD (45 KLPD expansion). The sugar unit generates large quantities byproducts viz. bagasse, molasses and press mud. To be economically and environmentally sustainable it is necessary for the sugar industries to convert these byproducts into high value products, and hence this is done.

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The target production quantity will not be manufactured from day one, but will be smoothly taken up, keeping environmental aspects in mind simultaneously. Justification of the project is submitted before Authorities.

Number of working days for thenew distillery unit of 45 KLPD will be 300, for existing 45 KLPD continues to be 270 daysand for sugar, 180 days since it is now decided to deal with the spent wash thermally (for new 45 KLPD)rather than by taking compost route. **(ToR12)**

Alcohol has assumed a very important place in the economy of the country. Alcohol is used as a raw material for number of organic chemicals, as a potential fuel in the form of power alcohol when blended with petrol and as an ingredient in beverages. Use of Alcohol as a main ingredient in beverages is well known. The importance and utility of Alcohol as an industrial raw material for manufacture of variety of organic chemicals is now being increasingly appreciated all over the world. This is partly due to the escalating costs of these chemicals produced through petrochemical route consequent and abnormal increase in crude oil prices. Crude oil which was sold at 2 dollars per barrel in 1969 is now around 65 dollars. The price is predicted to increase rise further depending upon international situation and with depletion/exhaustion of petroleum resources of the world.

The proposed location is rural, agro-based and economically back word. The proposed project will generate direct and employment potential to the local population in terms of employment in the industry, transportation and vehicle maintenance activity and housing activity. This will also cause better price to the molasses and in turn to sugar cane grown in the region.

Project Proponent has (A) already obtained various permits/NOCs and (B) Project Proponent has made SWOT Analysis and finds the overall summation, encouraging. The SWOT (Strength, Weakness, Opportunity and Threat) analysis is made and all this goes to suggest that the Project Proponents have made a serious homework and have seen that the environmental impact will be minimal. We submit:

(A) Various permissions obtained and obtainable from:

1. IEM, Govt. of India
2. Water permission, Govt. of Maharashtra
3. Power connection, Electricity Board under Govt. of Maharashtra
4. Central sales tax
5. VAT Registration
6. Town Planning Department, Layout approval
7. Grampanchayat NOC Permission
8. Incorporation of Company

(B) SWOT Analysis

1. Strengths :

- Raw material is available within this district itself which hitherto was a waste product (and gap if any can be filled by neighbouring District).
- The procurement centers are well connected by rail and road.
- Good market potential in India (pharmaceutical, food and other activities and as petrol-substitute).
- Treated as priority sector project.
- More recovery due to prompt instrumentation
- Government appreciates this venture which is in rural area.
- Even in non- sugar season, power can be generated.
- Availability of correct Technology and Equipments with after sales service, is immediately available.

2. Weakness :

- Moderate recovery due to feed quality, occasionally
- May not be able to get quality material in lean months, occasionally.
- Sugar unit cannot run for full year, as season is to be kept closed for four to six months.
- Changes in Govt. Policy for Taxes with respect to Alcohol.

3. Opportunities :

- Bringing an expansion of project for benefit of local people.
- Use of waste residuals for reuse benefits.

4. Threats :

- Competition from existing units as regards to pricing
- Changes in Government policy.
- Non-availability of raw material, a possibility due to drastic water shortage occasionally.
- Volatile international and domestic prices.
- Compliance with stringent environment norms.
- High attrition rate, at all levels
- Reluctance of suppliers and end users to compensate for increasing costs.

1.5 Identification of the Proponent

This enterprise is a legal entity, registered under Companies Act 1956 with due registration in 2008.

Mr. Jagdish Laxmanrao Kadam is chairman of TI and the Board of Directors list is given below.

Table 1.2 Board of Directors

#	**Name Sarvashri**	**Designation**
1.	Jagdish Laxmanrao Kadam	Chairman
2.	Rajendra Shankarrao Ghadge	Director
3.	Vivek Shankarrao Jadhav	Director
4.	Virdhaval Krishnarao Jagdale	Director
5	Charudatta Narhar Deshpande	Director

By the honest working, this group has developed the existing unit well.

The present Directors of this firm are working hard to fulfill a dream of industrially strong Nation and running it well. The land is already in possession and is not a prime agricultural land. The acumen of the team can be judged by only one single success indicator that the same customers are continuing over the years.

The Project Proponents are known for their **track record** of honest and transparent businesses. The team is law abiding, and goes much beyond mere obedience to the letters. They go to the spirit of law. The track record of merit and honesty is evident from the working of existing unit.

The company will continue their efforts in making the proposed plant ideal with state of art hardware and same responsible working as other enterprises of the proponents group. The company is well aware about energy crisis and takes various steps for **Conservation of energy, such as-**

- Electrical load management to restrict maximum demand
- Optimum utilization of fuel
- Power factor improvement
- Energy management and monitoring
- Improving thermal efficiency of boiler.
- Change to more energy efficient motors
- Variable frequency drive application for motors
- Energy conservation awareness training

This Industry is committed to

- Prevent pollution in its activities associated with manufacturing and supply of sugar, rectified spirit & power.
- Continually improve environmental performance
- Comply with environmental legislations and regulations
- **(ToR 51)** The PP is very keen to obey the provisions of Environmental Statutes. PP also takes care for the health of their farmer members. As such there is no litigation against this industry.

These shall be implemented by

- Reducing the spillages and fugitive pollutants emissions through extensive monitoring
- Conserving energy and other resources through optimum utilization and waste minimization
- Training and involving the employees for development of Clean and Green Environment

This is a Limited sugar factory and local farmers are the contributing members who grow sugarcane and their number is more than 15,000.

1.6 Location and its Importance

The government has a desire to improve status of this District and has encouraged Tax incentives, subsidies, interalia. In order to have a sustainable development, the pollution generation from this industry is finally made insignificant having taken all the precautions right from raw material selection up to low or no waste generation and more over conversion.

1.6.1Location and Boundaries:

This plant is of about 19.42 hectares, has a connecting road and has approachability. This site is connected with Maharashtra State Electricity Board power. When various sites were seen, this site appeared to be environmentally best as also from the business angle and therefore this option was finally adopted, including infrastructure optimization.

The site is located at rural surroundings and is about 10 km from Railway Station (Daund) and 87 km from District place Pune, 2.5 km from river Bhima, as crow flies in the midst of cane growing area but not itself a prime agricultural land. It is geographically located at74°37'59.44"Elongitude and 18°25'39.74" Nlatitudes. The premises is about 19.42 hectare and as much as about 28% of which is already planned to be brought under the honest green-belt and landscaping. The site is near SH 60 (Nagar-Aurangabad) and on the Daund-Baramati Road axis. It is bounded by rural area.

There is no sensitive establishment in the vicinity such as health resort, hospital, archaeological monuments, sanctuaries, etc. River Bhima and Siddhatek Temple are respectively 3.5 and 3 km away. The normal wind direction is found to be favorable at this site. All villages are away but connected. All are provided with drinking water from wells or Government Water Supply Schemes RWS. Hence **TI** is not encroaching upon their supply.

Thus as Site Details, we have covered the ToR requirements including the physical location, location of the project site covering village, Taluka/Tehsil, District and State and corresponding map, as well

as a Toposheet of the study area of 10 km, as given. We have also submitted Google map-Earth downloaded of the project site. Regarding environmental sensitivity, we find that there is no critically/severely polluted area(s) and Eco-sensitive Areas within 10 km radius of the project site.There is no moratorium imposed. We have also prepared layout maps indicating existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities. Photographs of site are submitted. We have further provided photographs of plantation/greenbelt in the existing project. **(ToR3)**

The land is already in our possession over the years (an earlier 7/12 extract is available and enclosed.). This Proposal is submitted to the Ministry for environment clearance as the land is fully acquired and in possession. This land is already appraised by MoEF last time and EC is granted for Distillery of 45 KLPD and Co-gen of 18 MW in 2009.

As this particular site is free from any forest land, permission and approval for the use of forest land (forestry clearance) is not applicable.Land use map based on high resolution satellite imagery (GPS) of the proposed site delineating the forestland is enclosed. The projectis not located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals. There is no existence of Schedule I fauna, that needs conservation.

With all this consideration, this site was ranked first and adopted. The features

Table1.3: Salient feature of the project

1	Name and address of project proponent	M/s Daund Sugar Ltd. At Post Alegaon, Tal. Daund, Dist. Pune, Maharashtra,
2	Project	Existing 45 KLPD + expansion 45 KLPD = 90 KLPD distillery and Existing 3500 TCD + expansion 2500 TCD = 6000 TCD Sugarunit at the existing sugar industry premise.
3	New/expansion/ modernization	Expansion
4	Location of the site	Gat no. 99 At Post Alegaon, Tal. Daund, Dist. Pune, Maharashtra,
5	Constitution of the organization	Limited Company
6	No. of working days in a year	Distillery: (New 45 KLPD)300 days, SWC Distillery : (Existing 45 KLPD) 30 days, SWC and 270 days, Bio-composting Sugar: 180 days Co-gen: 210 days
7	Products & Capacity of industry	Distillery : 90 KLPD Alcohol of RS/ENA/AA grades Sugar: 6000 TCD
8	Basic raw material	Molasses : 350 T/d Sugarcane: 6000 T/d
9	Requirement of additional land area	In our existing 57.38 hectares, these units will be accommodated.
10	Man power for proposed project	During construction : 100 During operation : 535(Sugar + Co-gen) + 73 (Distillery) = 608
11	Boiler capacity:	• Existing 100 TPH with pressure/ temperature @ 87Kg/cm^2 and 510^{O}C • Existing 15 TPH with pressure/ temperature @ 47 Kg/cm^2 and 490 ^{O}C • Proposed 40 TPH (dedicated for distillery) with pressure/ temperature 43 Kg/cm^2 and 390^{O}C
12	Boiler fuel	• Bagasse for 100 and 15 TPH boiler • Concentrated Spent Wash CSW and Coal for 40 TPH boiler

13	Power generation from co-gen power unit	18 MW, Existing
	Exportable power from co-gen power unit	11 MW
14	Water requirement, m^3/d	1953
15	Effluent Treatment facility	• Distillery unit:Spent wash will be concentrated in MEE and CSW (60 brix) fired with coal in the incineration boiler, for new 45 KLPD, for 300 days • Distillery unit: Spent wash will be concentrated in MEE and CSW (60 brix) fired with coal in the incineration boiler, from existing 45 KLPD, for 30 days • Distillery unit: Spent wash will be passed through bio-digester& bio-composter for existing 45 KLPD distillery, for 270 days • Sugar unit:ETP (Bio-oxidation and tertiary). • CPU for excess condensate
16	APC measures for boiler	1. 100 T/h boiler: Common70 m stack with ESP(Existing) 2. 15 TPH boiler : Common70 m stack with ESP (Existing) 3. 40 T/h boiler: 81 m stack with ESP (Proposed)
17	Project cost	Rs. 118 crores (additional)
18	Investment towards pollution control & Environmental protection measures	Rs.52.41 Crores. (additional and existing)
19	Category of project according to EIA notification dated 14thSeptember 2006 and as amended?	90 KLD molasses based distillery: 5(g)–A 6000 TCD sugar: 5 (j) - B
20	Seismic characteristics	Safe as per Indian Seismological Institute.
21	Whether there is any litigation pending against the project and/or land in which the project is proposed to be set up? (a) Name of the Court (b) Case No. (c) Order/ directions of the Court, if any and its relevance with the proposed project.	No

1.6.2 Importance to Country, Region

The Indian sugar industry is passing through a difficult period. The sugar price in the Indian market is low, and even the world market price is low. The release of sugar for sales from the mills is controlled and hence, the Indian manufacturers are saddled with higher Inventories. On the other hand, the cost of the raw material, the sugar cane, keeps increasing every year and so is the production cost. With high inventories and the prices low and with the raw material and production costs increasing every year, survival has become a major problem for the Indian sugar industry. The sugar industry can hope to come out of this situation only by cutting down the cost of production, and by adopting energy efficient processing and this justifies going in for higher and more efficient systems.

Molasses is risk as it has a property of auto – combustion and its BOD is as high as 9, 00,000 mg/lit. Thus, even a small escape can result in large scale fish kill. Bagasse if not baled can become air-borne

fugitive with high SPM nuisance. We shall attempt to minimize this by using some fraction of molasses and bagasse.

This is precisely the main objective of this project, which will be supported by low or no discards and conservation of resources. This type of plant is likely to be more viable in view of present situation, when the Organic Chemicals have demand in the particular market and global inflow of money is permissible. This has a foreign-exchange saving/ earning potential.

Ethanol has assumed a very important place in the economy of the country. It is used as a raw material for number of organic chemicals, as a potential fuel in the form of power alcohol when blended with petrol and as an ingredient in beverages. Use of ethanol as a main ingredient in beverages is well known. Further, it is a major source of revenue by way of excise duty to the State Governments. The economic and social significance of alcohol production has of late assumed considerable importance all over the world. The importance and utility of ethanol as an industrial raw material for manufacture of variety of organic chemicals is now being increasingly appreciated all over the world. This is partly due to the escalating costs of these chemicals produced through petrochemical route consequent and abnormal increase in crude oil prices. Crude oil which was sold at 2 dollars per barrel in 1969 is now around 135 dollars. The price is predicted to increase rise further depending upon international situation and with depletion/exhaustion of petroleum resources of the world.

Ethanol has a potentiality as fuel in the form of "power alcohol" for blending with petrol. This trend is continuing and will continue in view of the fact that potable liquor has larger revenue generating potential for the Governments. The demand for alcohol will always be there for industrial purposes. Further the use of alcohol in automobile fuel will enhance the demand for alcohol. Other than the above mentioned major requirement, alcohol is also being used in the production of many downstream chemicals including drugs, polymers, plastic, etc.

The Government of Maharashtra envisaged the policy to encourage sugar industries along with co-generation of power and alcohol in the state with various incentives. Sugar cultivation gives higher economical returns to the farmers. The Government of Maharashtra envisaged the policy to encourage co-gen sugar industries in the state with various incentives including power purchase agreement.

The establishment of alcohol power units in sugar industry will thus meet the national interest of economic power, substitute to petroleum as a source of raw material for various chemicals, foreign exchange saving through sustainable development. Further it helps to uplift the rural mass. The project has the direct employment potential of totally 535 (Sugar + Co-gen) + 73 (Distillery) = 608 people and indirect employment opportunities to more than 200persons in terms of transportation, vehicle maintenance, petty shops etc. and 100 during construction phase.

Thus, this shows that there is justification of the project at this site.**(ToR2)**

1.7 Scope of Study (TOR)

Keeping in mind, the Scope of this Document is given herein below:

1. The present lands are already non-agricultural and have a NOC from the District Collector for industrial purpose.
2. Raw material requirement, water requirement, water balance, process details, technology, product storage, etc. is complied
3. Ambient Air Quality Monitoring for three months except monsoon covering 10 km radius around Industry and its impact.
4. Mathematical Modeling for calculating the dispersion of air pollutants and ground level concentration.

5. Ground water quality around.
6. Treatment scheme to achieve Zero/ minimal discharge.
7. Soil quality monitoring, permeability and other details.
8. Scheme of Treatment, mode of disposal
9. Inventory of medium or large scale similar industries present.
10. Information of solid waste, no. of working days, etc.
11. Employment generation, Benefits of project.
12. The raw material used is Molasses and the same is not covered under MSI rules. Chemicals and oil used in process/ utilities is in very small quantity. However, Risk Assessment will be done and submitted.
13. Water harvesting details will be submitted.

1.7.1 Scope of Planning Programme

This is an attempt where environment information is used for planning, development and decision making. Every step is required to be systematically documented. In short, the scope of document will entirely synchronize the planning program. The logic is given in Figure No. 1.3 below as voluntary scoping.

Planning Process for this Project	**Environmental Inventory** ⇨	**Future** ⇨	**Alternatives for TI** ⇨	**Impact Around in the region** ⇨	**Management Action**
Scope of Corresponding Documents	• Environment natural • Environment manmade • Environmental goals • Indian Laws • Local compulsions	• Future load on existing environment • Control • Mitigation • Future needs	• Technical • Collaborators • Environmental engineering • Economics • Constructions • Siting • No-project	• Selection • Project description • Significant load, but insignificant impact.	• Obey Consent conditions. • EMP, Self-discipline • Monitoring • Watch-dog efforts

Figure No. 1.2: Planning Programme

1.7.2 ToR framed by MoEF

ToR given by MoEFare 51 nos. as per MoEF letter No. J-11011/212/2014-IA II-(I) dated Oct. 10, 2014. These are attended and referred below in brief.

Table 1.4:ToR Compliance

#	ToR Content	Reference	Remarks
1	Executive summary	Chapter 11	Covered properly
2	Justification of the project.	Chapter 1	Products have many uses and factory has positive impact on local economy. Details are given.
3	Breakup of the land area, photograph	Chapter 2	Optimum foot-print, about 28% for green belt. Photographs are provided.

4	Land use based on satellite imagery	Chapter 3	Satellite imagery provided and land use breakup given. No sensitivity issue.
5	Environmental setting within 10 km radius	Chapter 2	No major industry or ecologically sensitive area within 10 km.
6	Eco-sensitive area within 10 km radius	Chapter 2	No ecologically sensitive area within 10 km.
7	Cost of the project	Chapter 2	Total proposed investment Rs. 118 Crores. Funds allotted for Environment care & social purpose.
8	Lease deed or allotment letter, for land	**Annexure 3**	7/12 documents attached.
9	Existing distillery units in the study area	Chapter 2	List of sugar mills & distilleries enclosed, but all beyond 10 Km
10	Layout maps	Chapter 2	Layout map is given indicating green belt, storage etc.
11	Proposed products	Chapter 2	Expansion of distillery to 90 KLPD and Sugar to 6000 TCD
12	Number of working days	Chapter 1	Distillery : 300 days Sugar: 180 days
13	Raw material and its source with availability	Chapter 2	In midst of cane cultivation area, molasses produced here used for distillery. MoU for deficit if any.
14	Manufacturing process	Chapter 2	Standard manufacturing processes, details given
15	Fuel, care of SO_2 emission	Chapter 2	Own CSW and procured coal for distillery.Bagasse for sugar & co-gen. Details given.
16	Storage facility	Chapter 2	Proper storage of sufficient quantity is given for day to day and bulk storage.
17	Air quality Monitoring	Chapter 3	Air pollution control equipment installed to control ambient air quality. Monitoring is done regularly.
18	micro- meteorological data,data for water and noise monitoring	Chapter 3	Samples are studied and characteristics are found to be within limit.
19	Mathematical modeling	Chapter 4	Modeling is done for the project. Details are given.
20	Fugitive emissions	Chapter 4	fugitive emissions are controlled by adopting cleaner technology, Development of green belt& spraying of water

21	An action plan prepared by SPCB to control & monitor secondary fugitive emissions from all the sources.	Chapter 4	Any action plan prepared by SPCB/CPCB will be followed.
22	Details of boiler	Chapter 2	Existing 100 TPH boiler-common for sugar & co-gen Existing15 TPH boiler-common for sugar & co-gen Proposed 40 TPH boiler-Distillery
23	Ground water quality around lagoon	Chapter 3	Ground water quality will be monitored regularly.
24	Water balance recycling & reuse	Chapter 2	Water balance chart for distillery is prepared. Reuse/recycle policy adopted wherever possible.
25	Source of water supply Water drawls permission	**Annexure2**	Drawl permission is obtained.
26	Effluent treatment system	Chapter 2	Extensive treatment is given to waste water and characteristics are maintained within permissible limit
27	Spent wash generation	Chapter 2	Spent-wash at generation stage kept at permitted 8L/L
28	Spent wash holding tank	Chapter 2	Spent wash storage tanks 5 days (2 nos.) and 15 days (2 nos.)
29	Storage of bagasse	Chapter 2	Area provided for storage in sugar unit
30	Spent wash holding tank, control of ground water pollution.	Chapter 2	Spent wash storage tanks (2 Nos. 5 days, 2 nos. 15 days). Normally kept dry.
31	Dryer to dry DWGS.	Chapter 2	Not Applicable. This is not a grain based distillery.
32	Storage of biomass	Chapter 2	No biomass is used. We are self-sufficient in own bagasse for 100 and 15 TPH boilers.
33	Solid waste management	Chapter 2	Reuse and recycle policy is adopted. Hazardous waste is disposed of properly
34	Risk assessment for storage and handling of alcohol	Chapter 7	Study is done. Details are given.
35	Alcohol storage and fire fighting facility	Chapter 7	Study is done. Details are given.
36	Green belt	Chapter 2	About one third area is earmarked for green belt.
37	Flora & Fauna in study area	Chapter 3	List of flora & fauna is given. No endangered species found.
38	Noise level monitoring	Chapter 3	Noise levels monitored and

			found within limit
39	Environmental Management plan (EMP)	Chapter 6 and 10	Details are given. Funds are earmarked.
40	Waste minimization, recycle/reuse/recover techniques, energy conservation, & natural resources conservation.	Chapter 6 and 10	Details are given. Funds are earmarked.
41	Rainwater Harvesting system	Chapter 2,4	Rain water from roof will be harvested. No incremental run-off.
42	Occupational health surveillance	Chapter 7	Health status of employees is regularly monitored. Personal protection equipment are given to workers. Risk exposure is minimized by various measures.
43	Socioeconomic welfare activity	Chapter 10	CSR activities will be undertaken after consulting with local residents and Revenue Department.
44	Transportation	Chapter 2	Traffic study was conducted at project site. Details are given.
45	Post-project environmental monitoring	Chapter 6 ,10	Details are given. Funds are earmarked.
46	Corporate environmental responsibility	Chapter 10	Policy for improvement of environmental management system & minimize the impact of manufacturing activity is in place.
47	(A) well laid down environment policy approved (B) Standard operating process (C) Hierarchical system (C) System of reporting of non-compliance	Chapter 10	Corporate Environment Policy is in place and has the approval of Board of Directors. The details of Hierarchical system are given. Policy for standard operating process is in place. Details are given.
48	At least 5% of the total cost of the project towards the enterprise social commitment	Chapter 10	Funds will be earmarked towards enterprise social commitment based on public hearing.

49	Capital cost for environmental pollution control measures.	Chapter 10	The details of Hierarchical system are given.
50	Expansion /modernization proposals: i) Copy of Clearance(s), Monitoring Report, compliance of Consent ii) Reasons for not taking EC	Chapter 2 **Annexure 1**	• System is in place to report the non-compliance of any condition to the concerned authority as well as Board of Directors. • For 45 KLPD, EC is obtained. The sugar production was below threshold of Notification. Compliance is reported to regional office of SPCB. Consent conditions are complied and hence obtained renewals.
51	Any litigation pending against the project	Chapter 1	None

This EIA Report also considered the sugar effluent and sugar CREP norms in full.

1.7.3 Public Consultation

As per requirement of the Notification, MPCB was requested to conduct public consultation and the report accordingly was submitted by MPCB toMoEF.

- Venue: - At Factory site.
- Date & Time: - 13/03/2015, 11:00 AM.
- Chairmanship: - ADM, Pune.
- Panel:- of 2 Members.
- Members of Public: - 125 present including ladies.

Table 1.5: Public Hearing Proceedings

SN	Name	Regarding	Remark/ Reply
1	Shri Suhas Jagdale Local Resident	Whether plant species will be made available to local farmers also?	Plant species will be made available to local farmers.
2	Shri. Vasant Dhumal Local Resident	How the increased effluent will be treated?	Employing modern ETP, 80% of the effluent will be recycled and 20% used for gardening. No discharge outside.
3	Shri. Bhagwan Jagtap Local Resident	What will be the benefits to local people due to expansion?	More sugarcane will be used for production. It will be beneficial to local farmers and young people.
4	Shri. Milind Salunkhe Local Resident	Whether we will get electricity produced in the project?	The produced electricity will have to be connected to he MSEB grid only.
5	Chairman of the Committee	• How you have made provision for extra water? • What steps are taken to control air pollution?	• We have obtained permission from the Government. In addition, we shall be doing rain water harvesting from roof. • Modern new ESP (Electrostatic Precipitator) will be installed with 81 m stack.

MPCB had received 11 letters and SRO reported that they have supported the project.

The Chairman of the committee directed the Project Proponent to implement the Environment management Plan as promised and carry out the activities under CSR fund.

Meeting terminated with thanks to the Chair.

1.8 Chapter Conclusion

This is an introductory Chapter, submitting a brief summary of our thought process, need of the project, relevancy at this site, capability of Proponents, environmental record of good behavior and delineating Scope of this study and documentation.

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CHAPTER 2 - PROJECT DESCRIPTION

Contents of this Chapter shall be:

Vision of the Proponents, Peculiarities of the Project, Responsible Care, Type and Need of Project, Location, Project boundaries, Project layout, Magnitude of Operation, Permissions obtained, Implementation schedule, Sensitive Issues and Condensed Corresponding Mitigation measures.

2.1 Introduction (Justification and Sensitivity)

2.1.1 Justification for the project

Justification of this Project can be submitted in many ways, namely –

- How this Project is economically strong by converting waste molasses and bagasse of surrounding Sugar Mills to serve as raw material for this unit,
- How this Project is economically strong by converting its own waste in useful product and power generation.
- How the pollution generated from this unit can be successfully managed through EMP implementation
- How the pollution generated from this unit can be converted to useful irrigation water with nutrients, and

Table 2.1: Justification of Project

India Needs Alcohol
Saves Petrol (additives)
Foreign Exchange Saver-Earner
Condensate water for Boiler/ process
Irrigation water with nutrients for crop
Consumes bagasse, which otherwise is an environmental risk
Consumes spent wash concentrate, which otherwise is an environmental risk

How the waste generated from this unit can be visualized as:

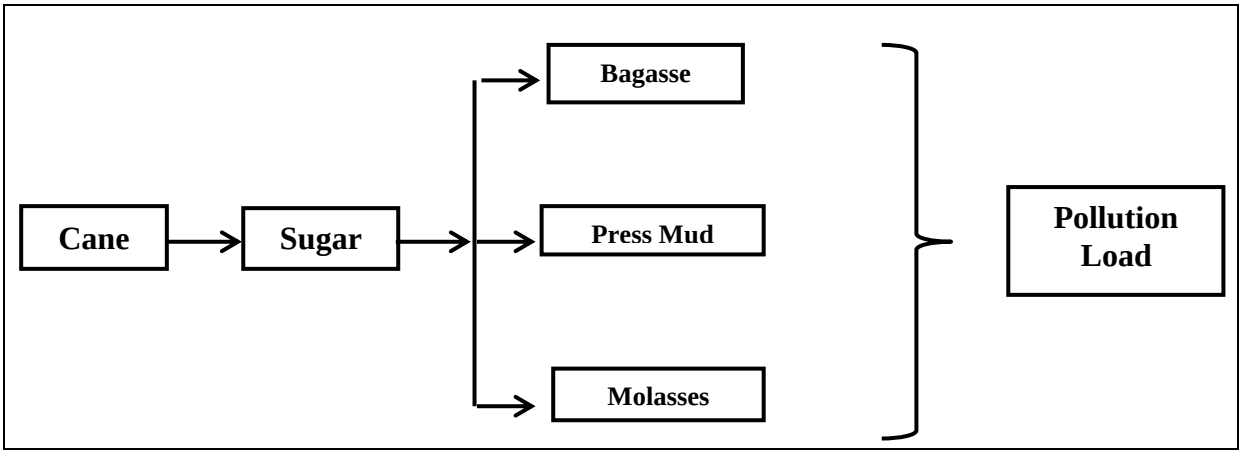

Fig.2.1: Old method

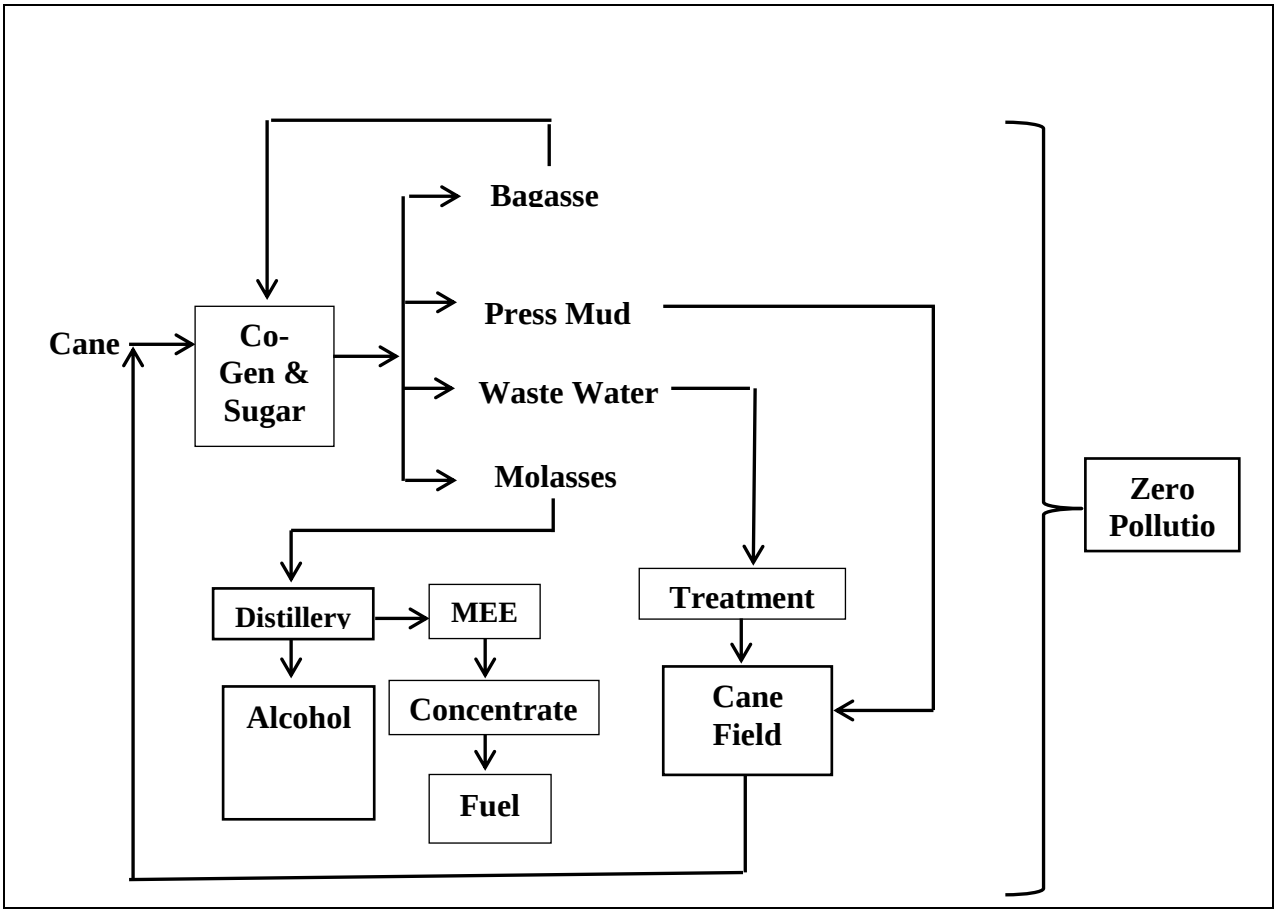

Fig. 2.2: New Method for Distillery Expansion

WEOU (Waste Exchange Oriented Unit)

2.1.2 Sensitivity

Any proposed human activity is never a simple straightforward matter. When production is done, the side effect of pollution takes place though the degree may vary as per alertness of the Project Proponent. There are many facets of environment, and which is more sensitive depends both on the industrial process involved as well as on the location characteristics. This must be considered in that hierarchy, and is so considered during the scoping exercise.

In this particular case the mill has thoroughly examined the Charter 2003 and CREP. Accordingly, following steps are taken:

(A) Sugar:

- Developing MLSS before crushing season
- Limiting waste water to 100 litres/tonnes cane crushed
- ZLD
- 15 days tank for no demand period
- Controll SPM to 150 mg/NM3

(B) Distillery:

- Compost making with press mud/ agri. Residue
- Concentration & Incineration

The wastewater is of prime importance, being low in pH (acid), high in BOD, solids and deep in colour. If this finds way into surface water (1) the DO will soon get depleted resulting in large scale fish mortality (2) the solids will deposit and create sludge banks, (3) the colour even after dilution, will give uncomfortable appearance, (4) the lower acidic pH and high TDS may hamper the crops.

Second sensitive issue regarding alcohol distillery is the resultant mal-odour. (Especially true in molasses-based. In the sugar factory, juice is decoloured for getting white crystalline sugar. This discoloration is done by using sulfur. Spent or residual sulfur is present in molasses. In fermentation-distillation process, it comes in spent wash. Due to anaerobiosis the sulfate turns into sulfide and foul odour like rotten egg is generated). However, in the new unit, we are not proposing bio-digester.

These aspects are required to be attended on priority in industrial sector and done so in this study. Various Govt. departments are also keeping a control on this activity and permissions are sought from all the departments. Unless these are in hand, the proponents will not commence the production.

- Industrial Entrepreneurial Memorandum from Govt. of India, Ministry of Industry, New Delhi.
- Central sales tax.
- Water Drawl permission.
- VAT Documents
- NOC from Grampanchayat.
- Power sanction from MSEB
- Incorporation of company

Status of compliance of Consent for the ongoing/existing operations of the project from SPCB is fulfilled and therefore we are getting repeated renewals of the consent and conductance of public hearing. **(ToR50)**

2.2 Location

2.2.1 General Location

The proposed industry will be established in the premise of the existing sugar industry located at A/P-Alegaon, Tal. Daund, Dist. Pune in Maharashtra state.The total land area of the site is 61.92 acres. The land area is sufficient for present and proposed activities.

Pune Solapur high way, SH 67 –6.5 Km. Daund-Ahmednagar State highway in vicinity. The nearest town;Daundis 10 kmNW from the site and Alegaonis 2 kmN. The location features of site are given in Table-2.2. Google map of the site is given in Figure- 2.4.

The area is in dry tropical climate with hot summer and cold winter with scanty rain fall. The surrounding area of the project site is rural agrarian. Annual rainfall is low with an average of about 600 mm. River Bhima, the perennial river, is located at about 2.5 km to the site. Rain water streams are present in the region and they carry water during rainy days.

Thus as Site Details, we have covered the ToR requirements including the physical location, location of the project site covering village, Taluka/Tehsil, District and State and corresponding map, as well as a Toposheet of the study area of 10 km, Co-ordinates (lat-long) of all four corners of the site are as given. We have also submitted Google map-Earth downloaded of the project site. Regarding environmental sensitivity, we find that there is no critically/severely polluted area(s) and Eco-sensitive Areas within 10 km radius of the project site. There is no moratorium imposed. We have also prepared layout maps indicating existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities. Photographs of proposed and existingplant site are submitted. We have further provided photographs of plantation/greenbelt in the existing project.

Direction	Latitude	Longitude
East	18°25'43.99" N	74°38'21.59" E
South	18°25'27.88" N	74°38'03.48" E
West	18°25'34.59" N	74°37'40.54" E
North	18°25'45.77" N	74°37'52.77" E

Details of site are thus as given above. Information related to environmental setting within 10 km radius of the project site is detailed in chapter 3 for various phases of environment like Air, surface water, ground water, noise & soil. This appears to be congenial. There is no eco-sensitive area such as national park/wildlife sanctuary/ biosphere reserves within 10 km radius of project area. **(ToR 5, 6)**

Table 2.2: Location features of the project site

#	**Feature**	**Particulars**
1	Location	A/P- Alegaon, Tal. Daund, Dist. Pune 413801, Maharashtra state
2	Latitude/Longitude	Latitude: 18°25'39.74" N Longitude: 74°37'59.44" E
3	Average altitude above mean MSL	523 m above MSL
4	Temperature in °C	The highest temperature is usually observed during the months of April–May and lowest temperature during December/ January. Maximum – 41^0 C, Minimum – 16^0 C
5	Rain fall in mm	Total annual average rainfall : 600 mm
6	Wind velocity	This region is characterized by low to moderate wind velocities. The mean day velocities are in the range of 2 to 4.5 Km/hand especially high during pre-monsoon period of April to May.

7	Nearest highway	Pune Solapur high wayMH SH 67 – 6.5Km, Daund – Baramati State highway in the vicinity.
8	Railway line	Daund Railway station 10 km from site. PuneRailwayStation:87 km from site
9	Nearest airport	Pune airport – 93.8 km
10	Nearest Villages	Alegaon2 km N &Khorawadi5km W
11	Nearest town	Daund :10 km NW from the site
12	Nearest major city	Pune : 87 km
13	Nearest water body	Bhima River 2.5 Km
14	Sensitive locations such as protected forests, monuments, national park, zoos etc.	No such locations in study zone.

2.2.2 Land requirement

The land requirement for different applications for the existing and proposed plant is given in Table-2.3.

Table-2.3Land Utilization (Sq. metres)

#	**Land Utilizationwith Appurtenant Area For**	**Land Area, Sq. metres**
1	Industrial Area main Factory and Co-gen	2,14,544
2	Distillery	1,04,944
3	Open Space Plantation & Cane yard	2,19,098
4	Roads	25,502
5	Reservoir	9,715
	Total	**5,73,804**

Key Maps:

1. The location is shown in Figure 2.3 **index map (political)** of District Pune, in Daund Tehsil.
2. The location is shown in Figure 2.4, a map with **TI** as center, (Google image)
3. The location is shown in Figure 2.5, a map with **TI** as center, (Toposheet)
4. The **TI** premises are shown in figure 2.6 with boundaries layout **map**, with all the shops/sheds, roads, and open spaces shown on it, not to scale.

Fig.2.3: Pune Map (Political) with Rail and Road Network

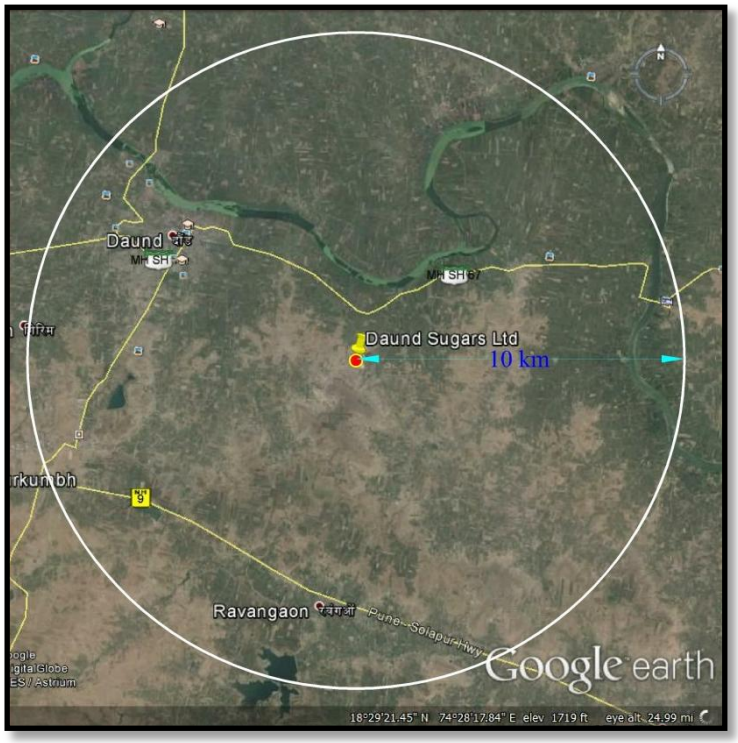

Fig. 2.4: Google Map of the Project Site

Note:

Altitude: 523 m above MSLLatitude: 18°25'39.74" NLongitude: 74°37'59.44" E

Photo of Factory

Photo of Greening drive (Part)

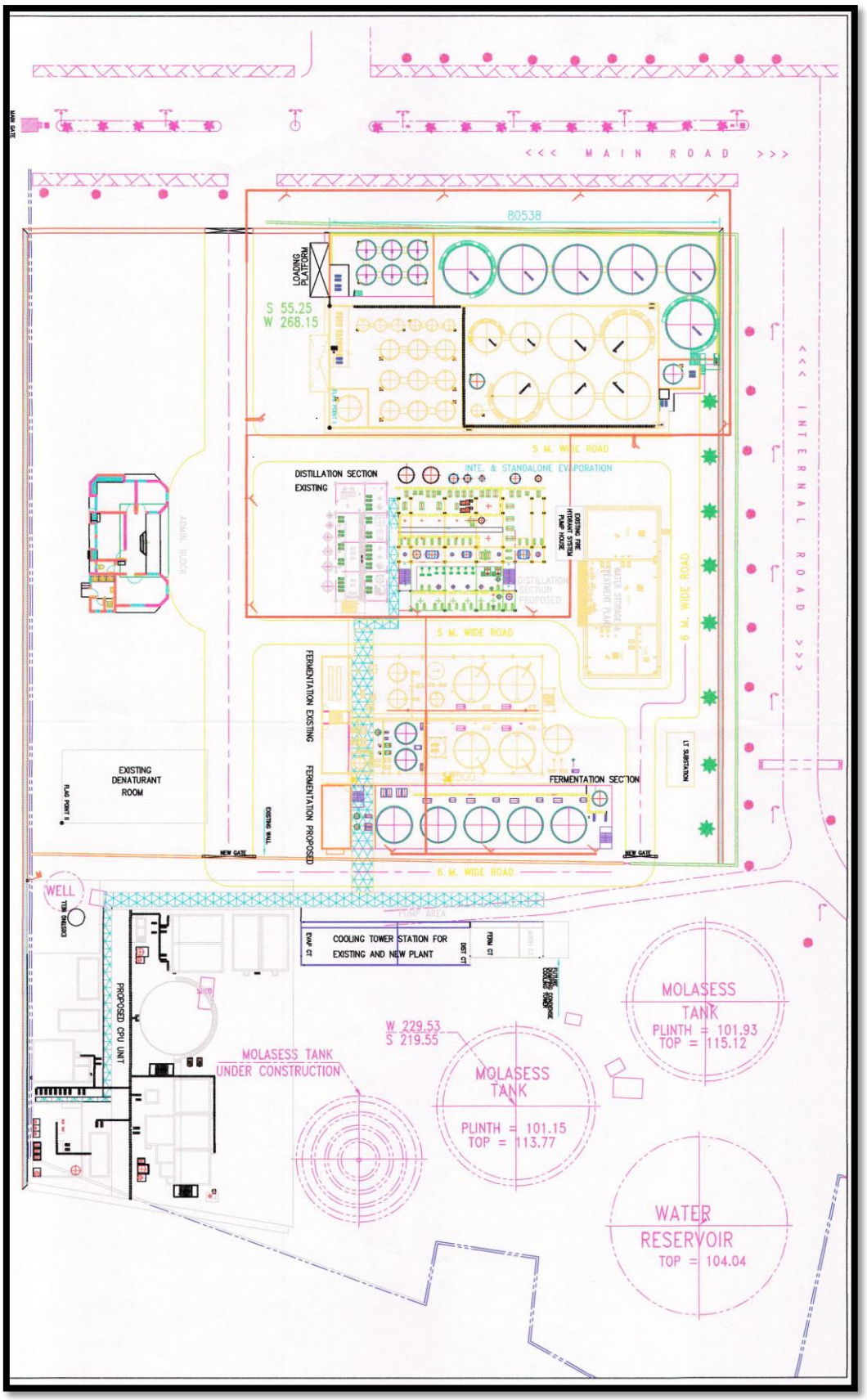

Fig. 2.5 A: Distillery Plant Layout

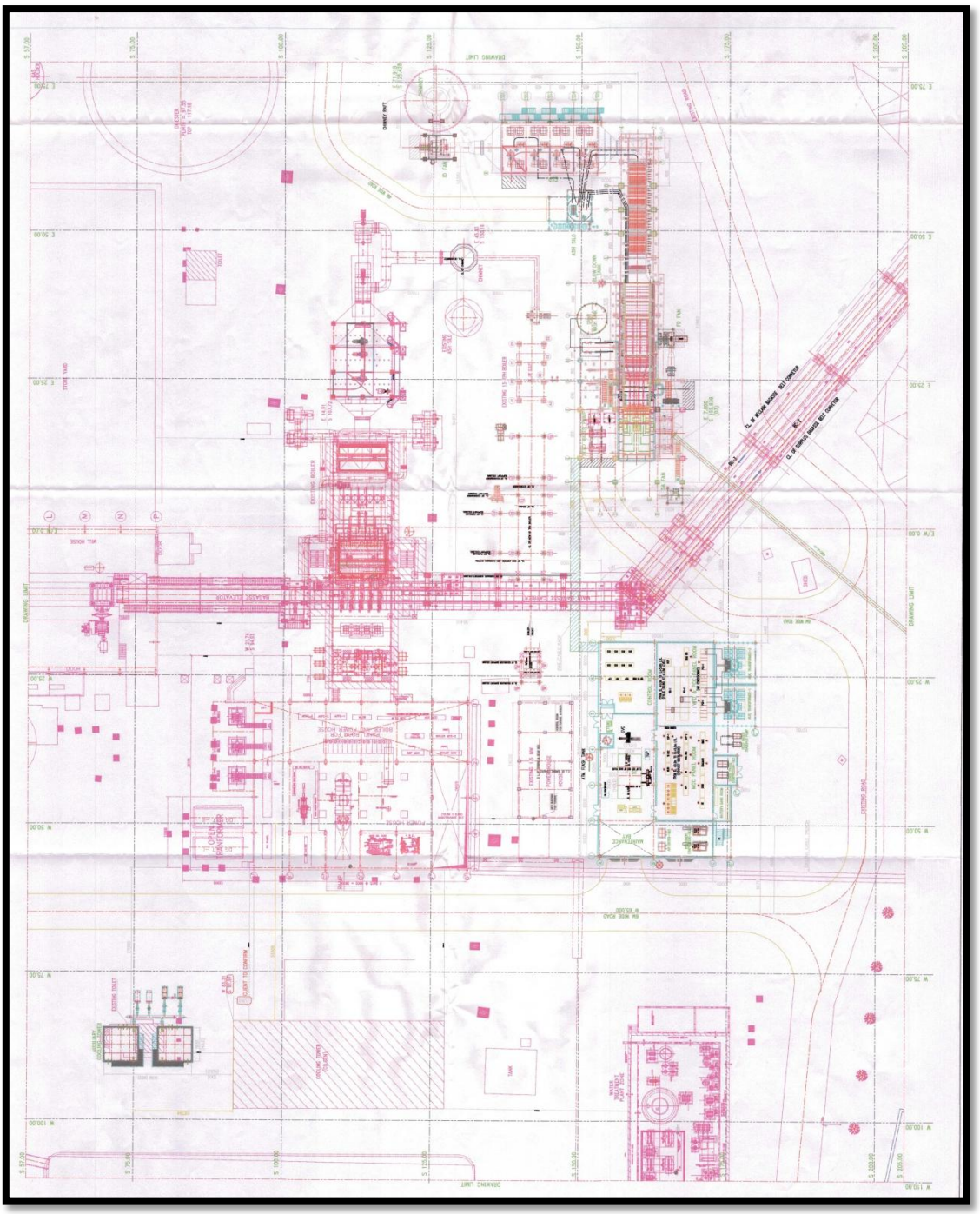

Fig. 2.5 B: Sugar and Co-gen Plant Layout

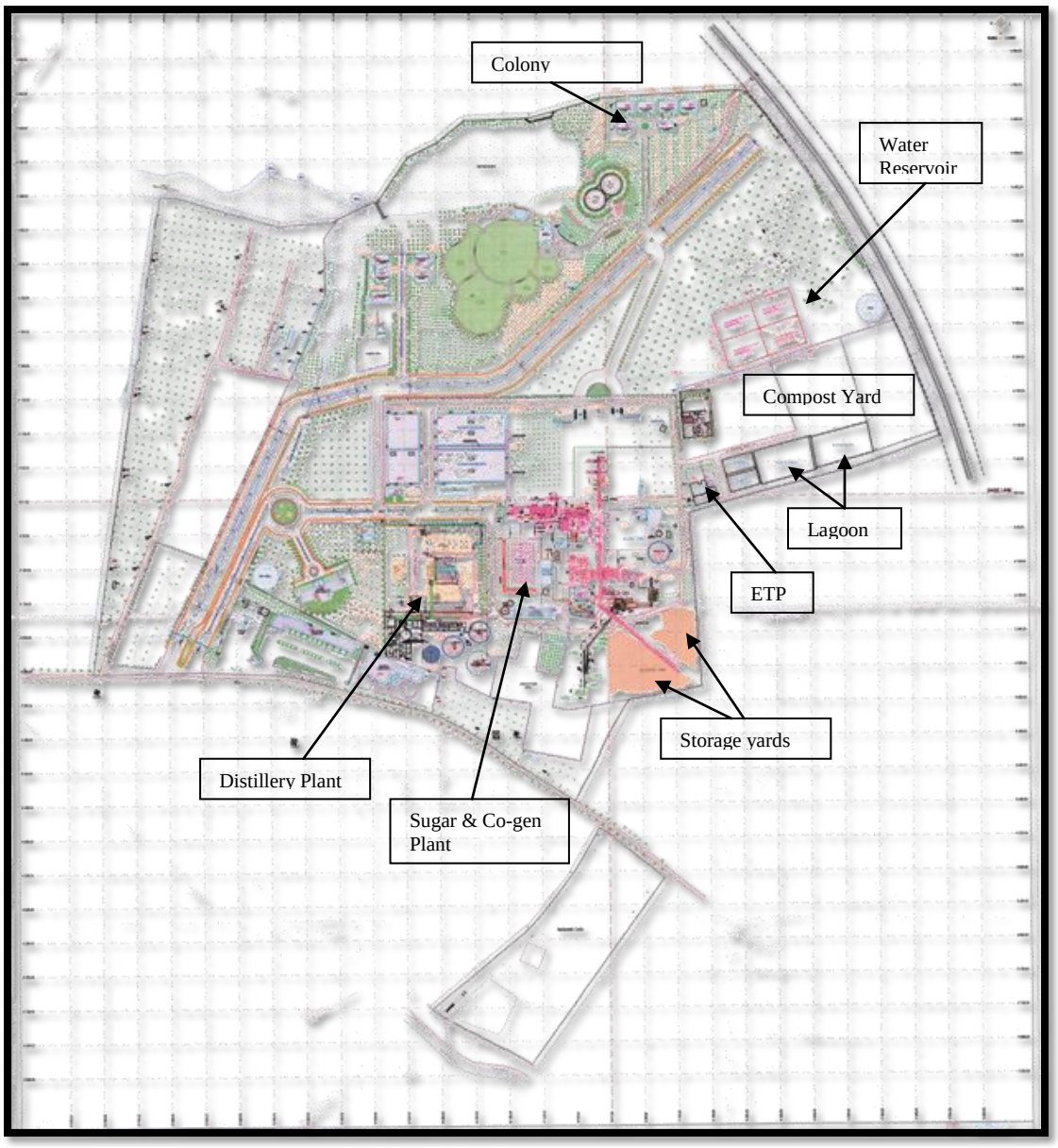

Fig. 2.5 C: Landscape Layout

The project site is fully in possession over the years. This is a working factory since long. The present proposal is only expansion and diversification. Thus, no new rehabilitation & resettlement (R & R) issue is any more involved. Details of drainage of the project for 10 km radius of study area is presented. The site is not within 1 km radius of any major river.

Detailed breakup of the land area is submitted along with latest photograph of the area.Land use break up of total land of the project site does not have any forest, waste land, water bodies or settlements. We have provided adequate greenery and agricultural seed plot.**(ToR 3)**

As this particular site is free from any forest land, permission and approval for the use of forest land (forestry clearance) is not applicable. Land use map based on high resolution satellite imagery (GPS) of the proposed site delineating the forestland is enclosed. The projectis not located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, and Migratory Corridors of Wild Animals. There is no existence of Schedule I fauna, that needs conservation.

There is no other major industry within study area (10 km radius), as this is in rural background. The list of sugar mills and distilleries is separately given, but none of them within 10 km area

Project site layout plan to scale using Auto CAD showing raw materials, fly ash and other storage plans, bore well or water storage, aquifers (within 1 km) dumping, waste disposal, green areas, water bodies, rivers/drainage passing through the project site shall be included.

2.2.3Size and Magnitude of operation

M/s Daund Sugar Pvt. Ltd. located at, A/P- Alegaon, Tal. Daund, Dist. Pune -413801 is a large scale industry. Capital investment for the proposed project (Sugar &Distillery component) will be Rs. 118 Crores.

2.3 Components of Project

2.3.1 Product:

M/s Daund Sugar Ltd. is an agro based Company focused on the manufacture of sugar, power and allied products. The company has established and running a 3500 TCD sugar, 45 KLPD distillery and 18 MW cogeneration power plant A/P- Alegaon, Tal. Daund, Dist. Pune -413801. **TI** wishes to do another expansion of sugar capacity up to 6000 TCD (2500 TCD expansion)and cogeneration up to 18 MW (with no expansion). The sugar unit generates large quantities of byproducts viz. bagasse, molasses and press mud. To be economically and environmentally sustainable, it is necessary for the sugar industries to convert these byproducts into high value products, and hence Alcohol Distillery 45 KLPD presently will be expanded to 90 KLPD is proposed, for which, this EIA is prepared.

The plant will be established in the same premises of the existing sugar industry. The raw material, molasses and bagasse generated from the sugar plant will be utilized in the proposed distillery.

Table 2.4: Existing and Proposed Production Details

#	Product	Production			Unit
		Existing	New	Total	
1	Cane Crushing Capacity	3500	2500	6000	TCD
2	Co-gen Power	18	--	18	MW
3	Alcohol Distillery	45	45	90	KLPD

Details of distillery unit will be now given. **(ToR 11)**

2.3.2 Raw Materials:

Distillery and Sugar Unit:

The capacity of the proposed Molasses based distillery shall be 90 KLPD, sugar 6000 TCD and Co-gen (existing) 18 MW. For this the main and sole raw material is molasses. The yeast brings about the change. Some chemicals in small quantity are used for supporting propagation of the yeast and help to fermentation. The following raw materials will be used.

Table No. 2.5: Raw Materials

Item	Quantity			Unit	Particulars
	Existing	Additional	Total		
Sugarcane	3500	2500	6000	MT/D	Self & Available in District. Local transport will be by tractors, carts and tankers.
Molasses	175	175	350	MT/D	
Lime	7	5	12	MT/D	Available from nearby Pune and Mumbai market. Brought by road or railway.
Phosphoric acid	0.5	0.3	0.8	MT/D	
Sulphur	2.5	1.0	3.5	MT/D	
Nutrients N, P	50	50	100	Kg/day	
Turky Red Oil (TRO)	36	36	72	Kg/day	

Note: Now the baggasse availability will be about 1176 MT/day and for coal it will be about 96 MT/day.

2.3.3 Raw Material Availability

The requirement of molasses is 350 T/d i.e. for 300 days 105,000 T/annum. Molasses will be obtained from captive source (from the associated sugar unit)43,200 T/Annum. The balance (105,000 minus 43,200 =61,800T/Annum) molasses will be met from nearby sugar industries (without the associated distilleries).

There is the sister concern Jarandeshwar Sugar Mills Ltd. 2500 TCD sugar factory (without a distillery) and producing 18,000 T/Annum molasses, from whom we have obtained the commitment for supply of molasses and bagasse by bilateral agreement.We have other similar units in this area as follows.

Table 2.6: List of Existing Sugar and Distillery Units in Vicinity

#	Existing Factories	Sugar TCD	Co-gen MW	Dist. KLPD
1	The Shrigonda Sahakari Sakhar Karkhana Ltd.	3500	-	30
2	Ambalika Sugar Pvt. Ltd.	7500	12	60
3	The Sanjivani (Takli) Sahakari Sakhar Karkhana Ltd.	2500	12	60
4	Shrimakai S.S.K	2500	18	30
5	Jay Shri Ram &Agro products ltd.	2000	-	--
6	Nira –BhimaS.S.K.Ltd. Indapur	2500	9	30
7	Raosahebdada Pawar GSSK.Ltd.	2500	20.5	30
8	Yashwant S.S.K Ltd.	2500	-	30
9	Anuraj Sugar Pvt. Ltd.	2500	-	-
10	The Kopargaon Sahkari Sakhar Karkhana Ltd.	2500	-	45
11	Shri Dnyaneshwar Sahakari Sakhar Karkhana Ltd.	2500	12	30
12	Sangamner Bhag Sahakari Sakhar Karkhana Ltd.	2500	15	30
13	Saikrupa Sakhar Karkhana Ltd	6500	12	90
14	Padamshree Dr. VitthalraoVikhe-Patil S.S.K Ltd.	5000	18	100
15	Nagar Taluka Sahakari Sakhar Karkhana Ltd.	2500	-	-
16	Mula Sahakari Sakhar Karkhana Ltd.	2500	15	30
17	Kukadi Sahakari Sakhar Karkhana Ltd.	2500	-	-
18	Dr. Baburao Bapuji Tanpure Sahakari Sakhar Karkhana Ltd.	3500	-	30
19	Agasti Sahakari Sakhar Karkhana Ltd.	2500	-	-
20	Ashok S.S.K. Ltd.	2500		30
21	Kedareshwar Sahakari Sakhar Karkhana	2500	-	-
22	Shri Ganesh S.S.K. Ltd.	2500	-	30
23	Parner Taluka Sah. Sakhar Karakhana Ltd.	1250	-	-
24	Jarandeshwar Sugar Ltd*	2500	-	-
25	Chhatrapti Sahkari Sakhar Karkhana*	3500	-	-
26	Astoria Agro and Allied Industries*	2500	-	-
	Total	**101500**	**143.5**	**685**

*: Daund Sugar has entered in MoU with these factories for supply of molasses.

Details of proposed raw materials and products along with production capacity, both for existing unit and for new (proposed) unit are given, along with its source & mode of transportation. Instructions are given that all the trucks for raw material and finished product transportation must be "Environmentally Compliant". In order to have continuity of operation, raw material (molasses) supply is ensured. There are many existing distillery units in the study area. We have also entered in

MoU. The availability of sugarcane in the area is also sufficient for continuous production. **(ToR9, 13).**

The molasses will be transferred very carefully at both the ends. Molasses will be outsourced partly 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.

2.3.4 Utilities

In addition to the raw material, utilities are also required. These are:

- Power and Steam: Need connected 2000 KW. Available through Govt. Electricity Board and own generation.
- Fuel: Available Bagasse and concentrate from spent wash.
- Man Power:The project has the direct employment potential of totally 555 (Sugar, Co-gen) + 47 (Distillery) = 602 people and indirect employment opportunities to more than 200 persons in terms of transportation, vehicle maintenance, petty shops etc. and 100 during construction phase.
- Water: Water need is 1953m^3/day totally and met from surface flow with Irrigation Department Permission available and by recycling the waste water.
- Steam requirement:15 TPH for distillation and 15 TPH for evaporation i.e. 30 TPH this size of unit can be met by using boiler of 40 TPH for distillery. For Sugar, Steam requirement is 93 TPH.
- Compressed air is required for instrumentation and servicing. Thus, a compressed air is provided.
- Building materials: It will not be a heavy construction, and majority is in fabrication from Mild steel structural. The orientation is so kept as to balance nearly the cutting and filling. The small requirement is available systematically. The construction –erection time will be small and will be done in day time. Labour camp is not necessary.
- Total Cost for distillery and sugar project will be 158.49 (existing) + 118(proposed) = 276.49 Crores**.**

Table 2.7: Project Cost Break-up for Proposed Unit(Rs. in lac)

#	Particulars	Cost		
		Distillery	**Sugar**	**Total**
1	Land and Site Development	10	-	10
2	Civil Works	435	75	510
3	Plant & Machinery	7491	2772	10263
4	Preliminary & Pre-operative exp.	357	145	502
6	Contingencies	197	70	267
7	Margin Money	20	25	45
8	Misc. and Fixed Asset	185	-	185
	Total (Rs. in lac)	**8695**	**3087**	**11782**

For existing unit (Sugar, Distillery and Co-gen), total cost is Rs.158.49Crores.

- Plant facilities will be provided like:90 KLPD alcohol plant with fermentation and distillation units, Water treatment plant, boiler, T.G set, Evaporator for spent wash, Bulk storage facilities for molasses and alcohol, ETP, cooling tower, fuel storage yard etc. And also mill tandem, sugar house, crystallizers.
- **Storage:** Alcohol and molasses storage facilities shall be provided as per the rules of (1) Excise Department, (2) Factory Inspectorate and (3) MoEF/ SPCB. Warehouse will be provided for other requirements and sugar godowns for finished products.

Table 2.8: Storage Capacity for Molasses and Alcohol

Product	**Particulars**	**Existing (**BL)	**Nos.**	**Proposed (**BL)	**Nos.**
Alcohol	R.S.&E.N.A. Bulk Storage tank	740000	4	360000	4
	A.A. Bulk Storage tank (Proposed)	-	-	90000	1
	I.S. Bulk Storage tank	204863	2	90000	1
Molasses tank	Storage Tank	9500	2	9500	1

Note: There will be supporting attendant small capacity tanks to hold R.S., E.N.A., A.A., I.S. Receiver as also fusel oil and de-natured spirit.

For Environmental care, funds are already provided for existing unit. Now considering expansion of sugar and distillery, totally Rs.52.41 crores is earmarked.

Table 2.9: Funds for Environmental Care

#	**Environmental Aspect**	**Capital Expenditure Rs in Crores**	**Recurring Expenditure Rs in Crores**
1	Emission control Engineering	12.00	3
2	Water & Wastewater management	25.00	4.5
3	Solid Waste	9.00	1.50
4	Greening Drive	3.0	0.90
5	Monitoring	1.01	0.54
6	Environmental Cell & PR	0.50	0.50
7	Other aspects like Rain Water Harvesting, Safety, Security etc.	1.9	0.30
	Total	**52.41**	**11.24**

In addition to this, for occupational health and incidental additional funds are reserved at Rs. 5.00 crores. Thus, total funds provided and earmarked as environment funds will be 57.41Crores.

2.3.5 Steam and Power Requirements

For Distillery Unit

Steam economy is achieved by employing multi-pressure distillation and multi effect evaporation units and adopting heat recovery systems in the plant. The distillery will be supported by 40 T/h high pressure boiler and its'steam turbine. The details of steam and power in the Industry are given in Table below.

Table 2.10: Utilization of Steam and Power

#	Item	Particulars
1	Boiler capacity,	40 TPHat 43 kg/cm^{2}and 390 ^{0}C temperature
2	B.P. steam utilization	Distillation : 15 T/h, Evaporation: 15 T/h
3	Power Generation	Captive
4	Diesel generators	2 x 1010kVA (Utilized only during power failure to run essential services).

For Sugar Co-gen Unit

The Unit will be supported by 100 & 15 TPH high pressure boilers and its' steam turbine. The details of steam and power in the Industry are given in Table below.

Table 2.11: Utilization of Steam and Power

#	Item	Particulars
1	Boiler capacity,	100 & 15 TPH at 87 & 47 kg/cm^{2}pressureand 510 & 490 ^{0}C temperature respectively
2	B.P. steam utilization	93 TPH
3	Power Generation	Captive
4	Diesel generators	2 x 1010 kVA (Utilized only during power failure to run essential services).

Table 2.12: Characteristics & Requirement of Fuels

SN	Parameter	fuel		
		Coal	SWC	Bagasse
1	Heat value, GCV,	3800 kcal/kg	1750 kcal/kg	2200 kcal/kg
2	S content, % wt	0.38	0.62	0.04
3	Ash content % wt	38.66	18.66	20 kg/T
4	Steam/fuel ratio	4.08 kg/kg	2.35 kg/kg	2.2 kg/kg
5	Requirement	150 T/d	300 T/d	1176 T/d

2.3.6 Project Layout:

The site is well connected by Road and by Transmission lines so that both the raw materials and finished goods can be conveniently handled. The Road is neither too busy, so as to have a fear of accidents, nor is too away from network. Area requirement and built-up area requirement in this distillery industry is moderate. We have made a survey of a few existing Distillery units to find the "Use Factor" of their built-up area. Accordingly the Architects have designed a least- plinth outlay.

Table 2.13: List of plant-machinery

#	Section	Main Instruments and Machineries
1	Fermentation section	Molasses weighing system, yeast vessels, air blower, nutrient tanks, decanter centrifuge, clarifier, CO2 scrubber, heat exchangers, fermenters.
2	Distillation	Distillation columns (7 Nos.), re-boilers, condensers, heat exchangers.
3	Power plant	Boiler, Steam turbine, Chimney, ESP, fuel yard
4	Spent Wash Treatment	Evaporation & Incineration Boiler.
5	Auxiliaries units	WTP, ETP, Cooling tower etc.,
6	Bulk storage	Storage of alcohol, diesel and molasses,

We are also employing instrumentation for suga and co-gen as detailed in para 2.5

Less buildings and less roads means saving of rubble, sand, bricks, etc, which otherwise has to be procured by robbing nature. The land utilization of the plant area is:

#	Land Utilization with Appurtenant Area For	Land Area, Sq. metres
1	Industrial Area main Factory and Co-gen	2,14,544
2	Distillery	1,04,944
3	Open Space Plantation & Cane yard	2,19,098
4	Roads	25,502
5	Reservoir	9,715
	Total	**5,73,804**

The new Company rules of CSR will be homogenized with this ToR that at least 5 % of the total cost of the project shall be earmarked towards the Enterprise Social Commitment based on Public Hearing issues and item- wise details along with time bound action plan will be accordingly planned. Total cost of the proposed project is worked out and is Rs. 118 Crores. Total capital cost and recurring cost /annum for environmental pollution control measures comes to respectively Rs. 57.41crores and Rs. 11.24 Crores. The fuel is majority coal having low Sulphur contents and own CSW. For sugar, bagasse is used. Understanding (MoU) is signed with the coal suppliers. Responsible care is taken for separate storage facility for raw material, prepared alcohol, fuels and fly ash. There will be one dedicated boilerfor distillery. Details as asked by ToR are given. Storage of bagasse will be in baled form. The unit is self-sufficient for fuel by own baggasse and hence other biomass is not required to be collected. Coal depot is limited but will be kept quenched suitably. This is not a grain-based distillery and hence there is no spent mash that can be converted to DWGS form as a cattle feed. Details of socioeconomic welfare activity are covered suitably **(ToR 7, 15, 16, 22, 29, 31, 32, 43 & 49)**

2.3.7 Manufacturing Process

A)Distillery Unit

The manufacturing process of Distillery plant and flow diagram is given below.

I. Substrate (Feed) Preparation for Fermentation

Molasses is procured carefully with good contents. Molasses stored in a storage tank is first weighed in a tank with load cells so that accurate quantity can be fed to the fermentation section. The weighed

molasses then transferred from tank to the diluter in fermentation section where it is diluted with water and fed to the fermenters or culture preparation vessels.

II. Yeast Propagation and Continuous Fermentation

In this process the culture containing highly efficient yeast strain is propagated in yeast culture vessel under aseptic conditions.

The ready yeast seed is then transferred from culture vessel to fermenter. The sugar/glucose in media gets converted to Alcohol in the fermenters operating on continuous cascade mode. CO_2 gas liberated during reaction is contaminated with traces of alcohol vapours. It is sent to CO_2 scrubber for recovery of Alcohol.After fermentation, the sludge containing spent yeast is separated from the wash in a thickener consisting of settler cum decanter tank and then concentrated in a decanter centrifuge. The yeast sludge in the form of cake with 2.5 % solids is disposed for use as manure.

III. Multi-Pressure Distillation

The distillation plant consists of multi pressure vacuum distillation and columns operate at different pressures to save steam. The plant operated with exhaust steam obtained from co-gen steam turbine. The distillation consists of following stages:

- Distillation of clarified fermenter product (wart) in distillation columns to separate aqueous alcohol (40 %) and spent wash.
- Rectification of aqueous alcohol to separate rectified spirit (RS) containing 95 % alcohol and spent lees.
- Dilution and rectification of rectified spirit to produce extra neutral alcohol (ENA).

The fermentation wash containing Alcohol, non-fermentable solids and water is supplied to distillation to separate the alcohol and other impurities, as a continuous flow. The distillation system is designed for quality. The system details are as below:

The system consists of 7 columns, namely Analyzer column, De-gassifier, Pre-rectifier column, Rectification Column, Extraction column, Recovery Column, Simmering column. Wash is fed to de-gassifier cum analyzer column. CO_2 and other non-condensable gases are removed at the de-gassifier unit. Distillate containing 40 % alcohol from top of analyzer column is sent to RS column for further purification and concentration. Alcohol free aqueous solution containing non fermentable matter is discharged as spent wash from the bottom of analyzer column. Dilute alcohol is concentrated in RS column from where distillate containing 95 % of alcohol is removed as Rectified Spirit (RS) from top and aqueous waster containing trace impurities is discharged from bottom as effluent. In case of ENA (Extra Neutral Alcohol) production, the RS along with dilution water is sent to extraction column. Most of the high boiling impurities are removed from top of this column and from bottom aqueous alcohol is obtained. The latter is taken to ENA column, and from where 95 % alcohol is obtained as distillate. 95 % alcohol is further distilled in recovery column to remove low boiling impurities (mainly methanol) along with bottoms. ENA from top of purification is sent to storage tanks.

The Alcohol with high boiling impurities (mainly aldehydes) removed from top of RS, extraction, rectifier and refining columns are taken to aldehyde column. Impure spirit is recovered from top of aldehyde column and the balance alcohol with moderate purity is recycled to RS column for further distillation. Low boiling alcohols such as propyl and amyl alcohol are removed from appropriate locations of the RS and ENA columns. These are concentrated in fuel oil columns and recovered as fuel oil.

IV. Dehydration of RS to Anhydrous/Fuel grade ethanol:

There are various dehydration routs such as Azeotropic Distillation, Evaporation, Membrane Technology and Molecular sieve Technology. Environmentally best is selected.Rectified spirit is pumped by a feed pump to the dehydration plant. The rectified spirit containing 95 % alcohol and 5 % water will first pass through feed economizer, then through a vaporizer cum super heater which will convert the rectified spirit feed to superheated vapors. The superheated vapour will pass through a sieve column, which is already regenerated and pressurized to working pressure. All the water vapors present in vapor mixture are adsorbed in the column. Along with alcohol traces of alcohol are also adsorbed in the column. The Anhydrous alcohol vapors free from water vapors exhausted from the column are duly condensed in the re-boiler at the recovery column and is further passed through feed economizer to preheat the incoming feed and then to a final product cooler. After saturation of sieve column with water, the flow will be shifted to the next sieve column, which is already regenerated and pressurized. After completion of dehydration cycle, the sieve column saturated with water is regenerated by evacuation of adsorbed water and alcohol. The evacuated vapors are condensed. The condensed mixture of alcohol and water is then fed to a recovery column. This sequence of adsorption and regeneration of sieve column continues.

It is note- worthy that:

- Rectified spirit feed is pretreated by product vapour
- Evaporator column gets energy from re-boiler
- Steam condensate is fed back to boiler
- Twin adsorbents beds. One in dehydration mode, other is regeneration mode.
- Switching of beds by Automation.

Flow Diagram:

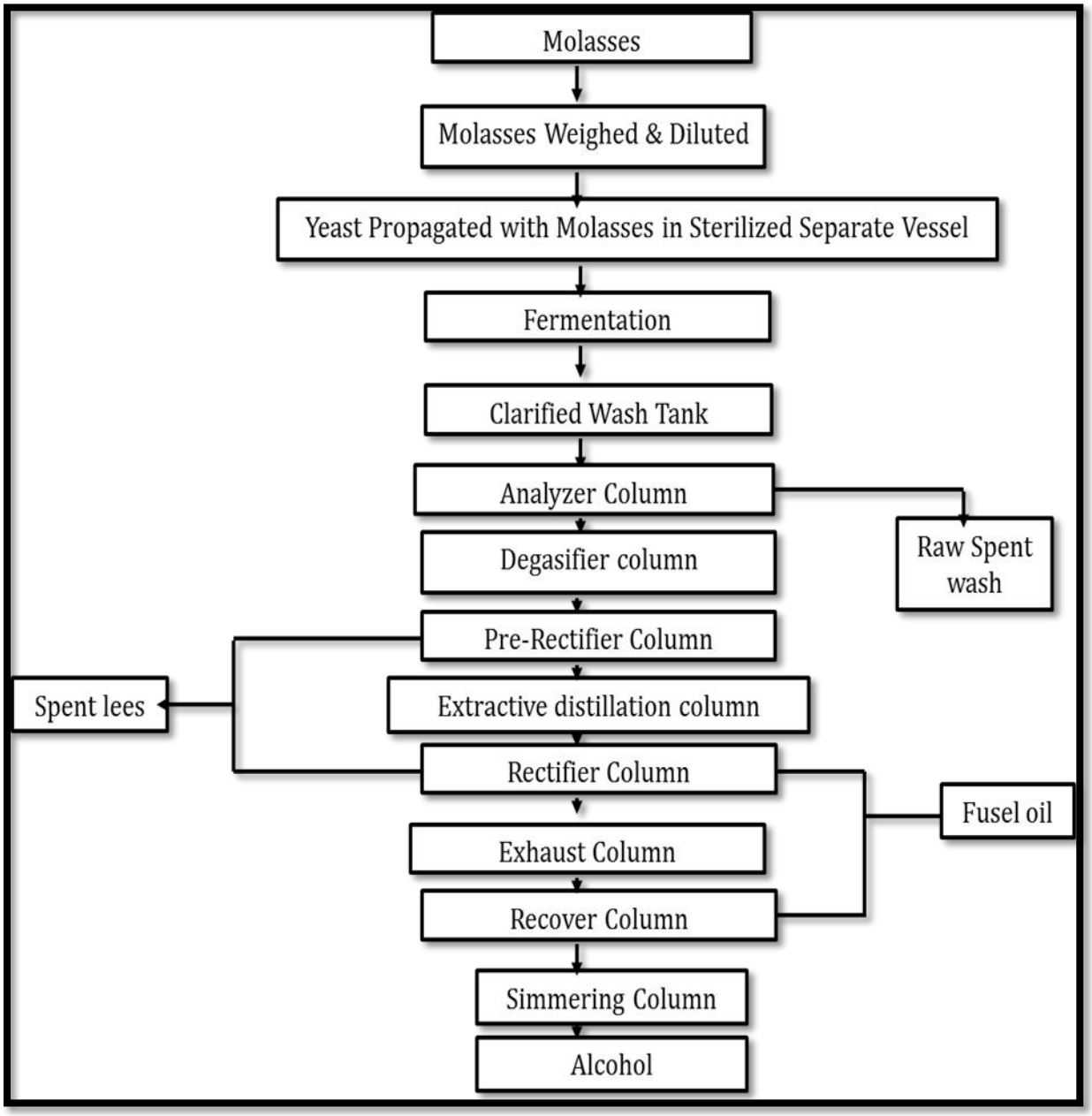

Fig.2.6 Flow Diagram of Distillery Process

2.3.7.3 Energy Balance

Energy is provided by steam with appropriate pressure at3.5 kg/cm2 (g) and its temperature ranging from 127 to 148^{o} C. The details are:

Table 2.14 Energy Balance

Section	Unit	Normal operation	Peak	Pressure (kg/cm2 (g))	Temperature (^{o} C)
Wash to RS Mode	Kg/hr	6875	8250	3.5	147.9
Wash to ENA Made	Kg/hr	10625	12750	3.5	147.9
MSDH Plant	Kg/hr	1375	1650	3.5	147.9
Fermentation Section	Kg/hr	500	700	1.5	127.5
Evaporation Section	Kg/hr	8600	9000	1.5	127.5

2.3.7.4 Mass Balance

The chemistry behind this with controlling equations can be presented as

Controlling Equations:

1. $C_{12}H_{22}O_{11}$ + H_2O ⟶ $2C_6H_{12}O_6$
   Sucrose + Water ⟶ Reducing Sugar
   342 + 18 ⟶ 360
   1 + 0.05263 ⟶ 1.05263

2. $C_6H_{22}O_6$ ⟶ $2C_2H_5OH$ + $2CO_2$
   Reducing Sugar ⟶ Ethyl Alcohol + Carbon Dioxide
   180 ⟶ 92 + 88
   1 ⟶ 0.5111 + 0.4889
   1.05263 ⟶ 0.53978 + 0.51462

Thus,

#	In	Output Alcohol
1.	1 kg Reducing Sugar	0.511 kg by Equation
2.	463.68 kg Reducing Sugar (Say 1 Tonn Molasses)	236.98 kg by Equation
3.	463.68 kg Reducing Sugar	298.23 Lit. by Equation
4.	463.68 kg Reducing Sugar	259.46 Lit. Actually (87% η)

For the sake of eco-friendly considerations continuous fermentation and multi-pressure distillation will be practiced. The CO_2 will be scrubbed in water and the water that entraps escaping alcohol fumes will be recycled for molasses preparation.

The input is 350 tonnes of molasses and water. The output is72tonnes of alcohol (90 KLPD) and waste water (in three forms: sober, moderate and high BOD).

B) Sugar Unit

Themanufacturing process of sugar unit and flow diagram is given below.
Most of the sugar factories in India follow double sulphitation process and produce plantation white sugar.

The major unit operations are shown in figure these are

1. Extraction of juice
2. Clarification
3. Evaporation
4. Crystallization
5. Centrifugation

1. Extraction of Juice

The sugarcane is passed through devices like knives for cutting the stalks in to chips before being subjected to crushing in a milling tandem comprising 4 to 6 three roller mills. Fine preparation with its impact on final extraction, is receiving special attention & shredders & particularly the fibrizsers gaining popularity. The mills are of modern design, being equipped with turbine drive, special feeding devices, efficient compound imbibition system etc. In the best milling practice, more than 95% of the sugar in the cane goes into the juice, this percentage being called the sucrose extraction or more simply the extraction.

A fibrous residue called bagasse; with a low sucrose content is produced about 25 to 30 % of cane, which contains 45 to 55% moisture.

2. Clarification

The dark-green juice from the mills is acidic (pH 4.5) & turbid, called raw juice or mixed juice. The mixed juice after being heated to 65 to 75 ^{0} C is treated with phosphoric acid, sulphur dioxide & milk of lime for removal of impurities in suspension in a continuously working apparatus. The treated juice on boiling fed to continuous clarifier from which the clear juice is decanted while the settled impurities known as mud is sent to the field as fertilizer. The clear juice goes to the evaporators without further treatment.

3. Evaporation

The clarified juice contains about 85 % water. About 75% of this water is evaporated in vaccum multiple effects consisting of a succeeding (generally four) of vacuum boiling cells arranged in series so that each succeeding body has higher vacuum. The vapours from the final body go to condenser. The syrup leaves the last body continuously with about 60% solids & 40% water

4. Crystallization

The syrup is again treated with sulphur dioxide before being sent to the pan station for crystallization of sugar. Crystallization takes place in single-effect vacuum pans, where the syrup is evaporated until saturated with sugar. AT this point 'seed grain' is added to serve as a nucleus for the sugar crystals & more syrup is added as water evaporates. The growth of the crystals continue until the pan is full. Given a skilled sugar boiler(or adequate instrumentation) the original crystals can be grown without the formation of additional crystals, so that when the pan is just full, the crystals are all of desired size & the crystal & syrup form a dense mass known as 'massecuite'. The 'strike' is then discharged through a foot valve into a crystallizer.

5. Centrifugation

The massecuite from crystallizer is drawn in to revolving machines called centrifuges. The perforated lining retains the sugar crystals, which may be washed with water if desired. The mother liquor 'molasses' passes through the lining because of the centrifugal force exerted & after the sugar is 'Purged' it is cut down leaving the centrifuge ready for another charge of massecuite . Continuous centrifuges may purge low grades. The mother liquor separated from commercial sugar is again sent to pan for boiling and re-crystallization. Three stages of re-crystallization are adopted to ensure maximum recovery of sugar in crystal form. The final molasses is sent out the factory as waste being unsuitable for recovery of sugar under commercial condition from economical point of view.

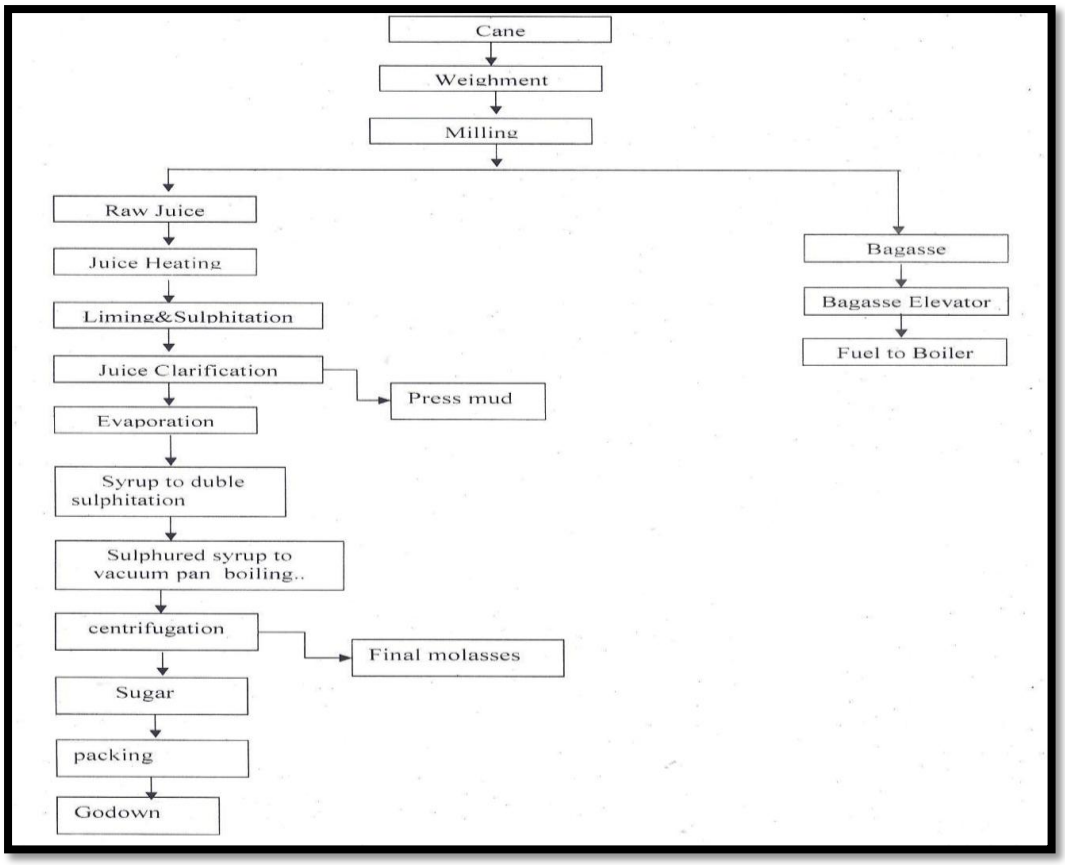

Fig.2.7 Flow Diagram of Sugar Unit

In this way, manufacturing process, hardware, Co-gen power details, process flow chart are included. Mass balance & controlling chemistry is indicated along with Energy balance data. The project layout is submitted as figure 2.5. From that layout, sugar godowns are also shown with a general warehouse and molasses tanks. **(ToR 10, 14, 15, 16)**

2.3.8 Environmental Significance for Distillery

Table No. 2.15: Environmental Significance of Process Steps

#	Unit Operation /Process	Peculiarities	Environmental Significance
1	Incoming Molasses	Selected from nearest area. Quick transport, by closed tankers.Quick use.	Prompt use prevents spillages, discards, Less loss of sugar. More yield. Less HC hydrocarbons in the air. Ease of keeping Environmental Statistics.
2	Weighing	Load Cell Based weighing system provided	Processing basis kept by strict weighment. Better check on mass balance
3	Yeast Propagation	Vessel sterilized. Nutrients added. Aeration provided.	Self yeast propagation helps in less mass.
4	Fermentation	Exact culture. Optimum reuse/ recycle. Temperature controlled to 33-35^{o}C – congenial to yeast activity, though reaction is exothermic.	Specific biomass creates more conversion. Exothermic reaction cooled by Heat Exchanger. Saves large quantity of once through cooling water.

5	Wash clarification	Arrests Suspended Solids and floatables.	Ease of distillation, better quality product. Avoids discards. Avoids downtime.
6	Yeast Recycle	Yeast Activation Vessel and aeration provided	Maintains high viable biomass, yeast recycled, saves in bringing new yeast and avoids wasted yeast mass.
7	Distillation	Multi column operating at different pressure conditions.	If all of same pressure, energy exhausted by one cannot be used in next lower pressure vessel. Present configuration conserves energy, and avoids pollution.
8	Analyzer Column	Heated by flash steam	Latent heat of condensation of Rectifier column, reused.
9	Rectifier Column	Fusel oil is taken out separately instead of build-up	Fusel oil decanted by first diluting with water and recovering layered fusel oil.
10	Absolute Alcohol Unit	Configured as "Stand-alone" or as "Post- Rectified Spirit" column, either way	Brings flexibility in operation by maneuvering utilities. Improves efficiency in one step rather than two.
11	Instrumentation	Computer-controlled system to actuate valves	facilitates monitoring the quality of product and safety of operation. Predicts in time, resetting the process.
12	Controls	Training imparted, Documentation designed, Indicator chart, hourly reading charts provided	Best operational control and retrieval of information results in better checks.

After pollution prevention step as above, control and mitigation step will follow.

2.4 Mitigation Measures

A) Mitigation Measuresin Brief:

Every human activity creates some side-effects. This can make significant adverse impact if left unattended. It is proposed to reduce the impact by prevention, abatement, and control and mitigation mechanism. These are described in details later in **Chapter Four**. Brief resume can be indicated as follows.

Table 2.16: Mitigation in Brief

#	Facets of Environment	Mitigation & Impact Thereafter
1.	Air	The emissions are from Boilers of capacity 40, 100 and 15TPH.Stacksof height 81m and 70 m respectivelyare provided with ESP. The CO_2 and escaping alcohol in fermentation section will be scrubbed with the help of scrubber. DG Set as stand by.
2.	Fugitive	Internal roads paved, leveled, no undulations, no sharp curves, slow speed. Press-mud, compost yard and compost not involved. Tree plantation on surrounding available area.
3.	Water and Waste Water	The waste water generated will be treated through evaporators. Spent wash will be converted to Fuel and fertilizer (new and old) and moderate both from Sugar & distillery units will be treated aerobically with disposal on seed/ demonstration plot or recycled. CPU is also used for effluent generated.
4.	Solid Waste	Collection 100% every day. Segregated and treated/ disposed as per SPCB norms.
5.	Odour	Limited source of odour. Controlled by keeping closed regime

		during initial treatment. Use of heat exchanger for cooling. Small capacity ETP for moderate and sober BOD effluent will be aerobic and away with a barrier. No cess pools in disposal area.
6.	Noise	Smooth roads. Sturdy foundation. No Vibrations. Acoustic enclosures to all DG Set as per manufacturers' design. Use as standby only. Trees are planted around. Side cladding. Large No. of tree barriers. Factory placed away from boundary.

B) Measures Built in the Process

Built- in measures for resource conservation and pollution control in the industry are discussed along with project details in Chapter-2. The main objective is to follow environment- friendly process, with efficient utilisation of resources, minimum waste generation and built in waste treatment and operation safety. The measures adopted are,

i. Continuous fermentation to improve alcohol yield and recovery and thereby molasses consumption reduced.
ii. Separation, recovery and recycle of yeast present in fermenter wash for reuse in fermenter. This reduces the use of fresh culture and nutrients in the fermenter and also improves ethanol yield.
iii. Use of live steam is avoided by employing re-boiler in distillation columns. This reduces the generation of wastewater.
iv. Multi pressure distillation system is used to reduce the consumption of steam and quantity of effluent.
v. Use of pumps with mechanical seals to avoid liquid leakages.
vi. Scrubbing of fermenter vent gases containing CO_2 to recover traces of alcohol present in it.
vii. Water utilization reduced by: 1. Evaporation of spent wash with recovery condensate water for use in cooling tower. 2. Re-boiler reduces water utilization 3. Recycle of lees water for dilution of molasses.
viii. Concentrated spent wash is used as fuel in boiler
ix. Provision in boiler to use concentrated spent wash and coal as fuel.

This forms the basis for Environment Management Plan (EMP) to mitigate the adverse impacts due to the project and item wise cost of its implementation. Total capital cost and recurring cost/annum for environmental pollution control measures are also earmarked.

2.5 Assessment of new and untested technology for the risk of technological failure

The modern distillery is now well established with above standard Environmental friendly technology and hence there is no risk of any technology failure.

The technology of manufacturing of this consortium has been developed over the years, and refined indigenously in well-equipped Research and Development Laboratory of VSI, Vasantdada Sugar Institute, Pune, NSI, National Sugar Institute, Kanpur, and Private Vendors etc., in which devoted scientists, engineers, skilled and experienced staff is working, to find the best alternatives, addressing the above enquiries.

A) Engineering & Hardware Options:

- The first peculiarity is this, that the Project Proponent has made a provision of about 20-25% of their capital outlay for pollution control and greening drive in the outset itself.
- The Molasses is transferred without any chance of losing sucrose contents. This has become possible due to nearness of site to the Sugar Mills and tar roads in the vicinity. The size is controllable.
- It is possible to select good molasses answering following specifications, as free from any foreign material including any caramalisation products and known inhibitory elements of Yeast metabolism such as lead, arsenic, polyelectrolytes etc. or micro-organisms producing side products.
- The process development and engineering designing of this project has been done in such a way that the whole operation of manufacturing can be carried out in a controlled system with no or low gaseous emissions, effluents, and minimum waste generation. The material handling and transfer of raw materials are also carried out in controlled and supervised system. Thus, the technology is not only cost-effective but also environment friendly.
- The industry proposes to employ following specialty in their manufacturing

The peculiarities of the molasses are as follows

Fermentable Sugar	Min. 40.0 %
F/N Ratio	Min. 0.9
Sulfated Ash	Max. 15 % (W/w)
Volatile Acid	Max. 5000 ppm
Butyric Acid	Max. 100 ppm
Total Viable Content	Max. 1000 Cfu/gm
Yeast Free Assimilable N- Content	Min. 500 ppm
Sludge Content	Max. 2.5 % (w/w)
Caramel in terms of Colour	Max. 0.3 Optical Density at 375 nm

- Selection of correct quality Molasses is possible because in addition to our own district Mills, there are a number of other in reachable distance in other neighboring District.
- When the weighing is done, the sucrose contents also will be recorded, which keeps an eye on recovery, resource conservation and waste minimization. This is prevention of pollution.
- Waste heat (exhaust steam) and wastewater (hot condensate) too is reused fully.
- The selection of hardware has offered further advantages which have typical environmental significance (A) Vacuum Distillation (B) Continuous Fermentation.

Environmental benefits of Vacuum Distillation:

1. Minimizes by-products
2. Less load passed to Rectifier column
3. Scaling minimized
4. Lower steam consumption

(B) Environmental Benefit by Continuous Fermentation

System of continuous fermentation is successfully adopted. Details are given below.

i) Instrumentation for Distillery

1. Steam flow-meter (integrating, indicating & recording)
2. Feed water flow-meter (integrating, indicating & recording)
3. Drum water level (indicating & recording)
4. Superheated steam pressure (indicating & recording)
5. Multipoint temperature scanner with thermocouple. All points indicating & recording. (all for steam, feed water, flue gas, air and furnace temperatures in and out)
6. Many draft gauges. (all for fans, flue gas, air and furnace temperatures in and out)
7. O_2analyser and data logger.
8. Pressure gauges 250 and 150 mm dia. & isolation valves (steam, economizer, feed water pumps etc)
9. Micro-processor based hooters for trips, low levels, high levels, high temperatures

ii) Instrumentation for Sugar & Co-gen

1. Pan Condenser Automation.
2. Decanter Control System.
3. Juice Stabilization VFD Based Control System.
4. Boiling House, Pan and Centrifugal Monitoring system.
5. DCH system for Boiling House.
6. Molasses Conditioner Automation.
7. Boiling House Juice Distribution Control System.
8. Sugar Bag Printing and Counting system.
9. Continuous Centrifugal Machine Automation.
10. Continuous Pan Automation.
11. RO plant flow and level monitoring system.

2.6 Cascading Pollution

This project has a limited aim of (1) consuming mainly the molasses with support from outsourcing, (2) utilizing the infrastructure of administration, and (3) reusing the spent steam for purpose of distillation and concentration

There is no further downstream industry based on alcohol here, as all will go for industrial or potable purposes outside. It may also go as additive to vehicle fuel.
Thus we do not foresee any cascading pollution load by this industry. What may be the coming up ancillaries will be small motor workshops, eating places and sundry retailers.

2.7 Proposed Schedule for Approval and Implementation

The Project proponents are law abiding people and will commence the implementation only after approval of all permits, consents from various departments, under laws of the land. They have already commenced the work in this direction and Project Proponent have already obtained various permits/NOCs such as:

- Industrial Entrepreneurial Memorandum from Govt. of India, Ministry of Industry, New Delhi.
- Central Sales Tax
- Water Drawl permission.
- VAT Documents
- NOC from Grampanchayat.
- Power sanction from MSEB
- Incorporation of company

It is anticipated that all the permissions will be in hand within three months and thereafter the implementation and operation will be commenced. This unit does not involve very heavy and time consuming construction and manufacturing process is also less complicated. Thus quick implantation is possible, with already having the infrastructure in this particular case.

2.8 Chapter Conclusion

After introducing the subject of study in Chapter One, in this Chapter Two additional points are covered. Type and need of the project is underlined. The location is described after mentioning what criterion of selection was kept before eyes. The Process is fully described and it may be seen that best environmental option is selected. All alternatives having considered, it is seen that "No Project" option or abandoning the project is not proper. Complete treatment and mitigation measures are described to get the Environmental Protection with sustainable development. Chapter Four will give more details.

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CHAPTER 3-DESCRIPTION OF THE ENVIRONMENT

Contents of this Chapter shall be :

A. Natural Environment: The Region, Topography, Geology, Rivers, Rainfall, water bodies, Flora, Fauna, Air climate, Temperature, Humidity, Cloudiness, Winds, Visibility, Soil, Forest, Irrigation Land-use.

B. Manmade Environment: Human settlement, Housing, habitation, Public Health, Employment & Wages, Occupation, Industries, Transport System, Heritage, Literacy, demography & Environmental Problems.

C. Both above for the Region-District as well as for 10 km radius study area.

D. Monitoring results of various facets of Environment in Study area.

3.1 Introduction:

This chapter illustrates the description of the existing environmental status of the study area with reference to the prominent environmental attributes. The environmental influence due to the project is likely to be restricted to project site and its surroundings consisting of about 10 km region around the factory premises. Therefore, the study area for monitoring of environmental parameters covers 10 km distance around the project site.

The existing environmental setting is considered to establish the baseline conditions which are described with respect to climate, hydro geological aspects, atmospheric conditions, water quality, soil quality, vegetation pattern, ecology, socio economic profile, land use, and places of archaeological importance. The baseline studies are carried out for one season covering variations in various domains of environment.

The data were collected from both primary and secondary sources. Primary source data were collected through environmental monitoring/ survey of the study area. For reconnaissance survey the sampling locations were identified based on:

- Existing topography and meteorological conditions
- Locations of water intake and waste disposal points.
- Location of human habilitation and other sensitive areas present in the vicinity of the proposed project site.
- Representative areas for baseline conditions.
- Accessibility for sampling

Secondary data were collected from various organizations to substantiate the primary data. The data thus collected were compared with the standards prescribed for the respective environmental parameters.

Information is first assembled for the Region-District and then narrowed down to 10 km radius with the Project as Centre. (The peripheral area is already discussed in Chapter two). In both the areas, both the components of Environment (i.e. Natural and Man-made) are covered. This is done in 2014, both for feasibility studies and for final EIA. The standard methodology is adopted and discussed in this chapter.

3.2 Materials, Method and Approach:

This Project believes strongly in "Development without pollution" and has undertaken the work of examining the project environmentally.

3.2.1 Materials:

The work involves three activities viz. (1) collection of dry data and statistics by literature survey, interviewing resource institutes and general public, (2) wet studies by sampling and laboratory analysis of ambient air, surface water, ground water, noise, soil, etc. and (3) logically analyzing the findings of dry and wet studies for interpretation, extrapolation and inference.

A number of officers/offices were contacted in the course of this study. Samples were collected in 2014; as follows, vide **Table 3.1.**

Table 3.1: Summary of Sampling

No.	Media	Stations	Parameters	Frequency
1	Surface Water	3	20	1
2	Ground Water	2	20	1
3	Ambient Air	7	7	3 months
4	Ambient Noise	7	2	1
5	Soil	3	26	1
6	Micro-met	1	3	3

All the samples were collected by Standard Practices and analyzed as per Indian Standard Specifications or by APHA (USA).

3.2.2 Method:

A twelve-step sequence model was generally adopted in this study while covering every facet of environment.

1. To fix up the scope of work (purpose and need of study).
2. The present human activities within 10 km radius and prepared EI (Environmental Inventory).
3. The present environmental status by sampling.
4. Establishing correlation between cause-effect of step 2 & 3 above.
5. To know the carrying capacity of Environment
6. Effect of proposed activities in the influence zone and ancillaries especially with respect to pollution.
7. How much will be the pollution created by the above said activity, totally after the Provision of effluent treatment plant (ETP) and emission control equipment (ECE).
8. Whether the carrying capacity has capability of absorbing the pollution stated at step No. 6
9. Whether this project be finally adopted /abandoned, at this site.
10. If decided to be adopted, what additional mitigation measures be further thought as last line of defense.

11. The legal provisions required to be obeyed.
12. Probable public acceptability.

3.2.3 Approach:

For a streamline work, a standard six-step model of working is adopted for this Project study. The six generic steps associated with environment impacts are:

(1) Identification of pollutant emissions and impact concerns related to the construction and operation of the development project,

(2) Description of the environmental setting in terms of existing environmental quality, emission inventory, and natural data in the project study area,

(3) Procurement of relevant laws, regulations or criteria related to environmental quality and/or pollution emission effluent standards,

(4) Conduction of impact prediction activities, including the use of simple dilution calculations, qualitative predictions based on case study and professional judgments,

(5) Use of pertinent information from step 3, along with professional judgment and public input to assess the significance of anticipated beneficial/ detrimental impacts, and

(6) Identification, development and incorporation of appropriate mitigation measures for the adverse impacts.

Figure below delineates the relationship between the six steps or activities in the suggested conceptual approach of Figure No.3.1

Step 1 : Identification of environment qualities impacts of proposed project

↓

Step 2 : Description of existing environment conditions

↓

Step 3 : Procurement of relevant environment quality standards and/or guidelines.

↓

Step 4 : Impact prediction

↓

Step 5 : Assessment of impact significance

↓

Step 6 : Identification and incorporation of mitigation measures

Fig. 3.1: Six-Step Approach

3.2.4 Delphi Technique:

For sitting of an activity, ***"Delphi Technique"*** is advised by MoEF. This study should serve as its background setting.

The Government of India has recommended this technique in the book on Sitting of Hazardous Waste Disposal Areas, prepared by **NEERI**, Nagpur and published by the Ministry of Environment and Forest (**MoEF**) in 1991. The same is proposed to be used with due improvisation, *mutatis mutandis,* covering other media of environment.

(a) The Delphi Technique considers 34 attributes and four weight ages i.e.:
7 attributes, Receptor related
10 attributes, Pathway related
8 attributes, Pollutant related
9 attributes, Waste management related.

(b) The modified Technique used here considers 23 attributes and four weight-ages
1. attributes, receptor related
2. attributes, pathway related
3. attributes, water pollution & waste management related
4. attributes, air pollution and waste management related
5. attributes, solid waste management related.

2. Four types of marks for each attribute like 0 to 0.25, 0.25 to 0.5, 0.5 to 0.75 and 0.75 to 1.0 depending on facts of situations, chemical properties of pollutants and quantification are considered. These marks are known as **Sensitivity Index** (**SI**).
3. combined consideration of (1) and (2) together gives attribute-wise weight-ages. These are the negative marks out of 1000 and ranking suitability of candidate sites is based on comparison of these marks.

3.2.5 Leopold Interaction Matrix:

Assessment of Impact significance is to be attempted by a Matrix Technique such as Leopold Interaction with about 100 attributes spread over 11 categories A to K as

A. Modification of Regime	B. Land Transformation and Construction
C. Resource extraction	D. Processing
E. Land alteration	F. Resource renewal
G. Changes in Traffic	H. Waste Replacement and Treatment
I. Chemical Treatment	J Accidents, and
K. Others	

This study shall be done on the basis of Environmental background setting of this Chapter, & on basis of our activities.

3.3 The Region & Eco-system

The activity of this Project is in the midst of a study area, which is spread in Taluka Daund in District Pune. The site is about 74 km away from Ahmednagar.

Pune district is located between 17 degrees 54' and 10 degrees 24' North latitude and 73 degrees19' and 75 degrees 10' East longitude. The district has geographical area of 15.642sq.km. Pune district is bound by Ahmadnagar district on north-east, Solapur district on the south-east, Satara district on south, Raigad district on the west and Thane district on the north-west. It is the second largest district in the state and covers 5.10% of the total geographical area of the state.
The People of Pune district played an important role in Independence Struggle.

3.3.1 Topography

The landscape of Pune district is distributed triangularly in western Maharashtra at the foothills of the Sahyadri Mountains and is divided into three parts: **"Ghatmatha", "Maval" and "Desh".** Pune district forms a part of the tropical monsoon land and therefore shows a significant seasonal variation in temperature as well as rainfall conditions. Climate of the western region of Pune is cool whereas the eastern part is hot and dry.

The river Bhima is the biggest river in the district, originating at Bhimashankar in Ambegaon taluka. Apart from Bhima, Mandawi, Kukdi, Meena, Ghod, Bhima, Bhama, Indrayani, Pavna, Mula, Mutha, Karha and Neera are the other major rivers in the district.

3.3.2 Geology

The district as a whole is monotonously covered by Deccan Trap basaltic lava flows. The lava flows are almost horizontal in disposition but local gentle tilting, undulations & minor flexures are sometimes seen. But for these, no major faulting or folding is seen in the area. The basalts are generally covered by a thin mantle of black soil of recent origin. Other recents deposits such as river alluvium, sands, grovels, silts & calcareons, known as Kankar are also found in the river basins.

Trap rocks are generally barren of any economically useful & important minerals. However, being hard, dense & durable, they are extensively used as building material & road metal. The pinkish colored vesicular variety is amenable to cutting into blocks of desired sizes. Kankar, on burning yields good lime & is locally used for the manufacture of lime especially around Ahmednagar city.

Representative Geological features are included. Though the rainfall is during limited season, government has worked out many irrigation schemes to feed the water. Zilla Parishad has assisted by providing percolation tanks to raise the Geo-hydrological status. We shall also help by our activity of rainwater harvesting and recharging.

3.3.3 Soil

The soils of the district can broadly be classified into three groups viz., black or kali, red or tambat & laterite & the gray of interior quality locally known as barad.

Pune district possesses mainly three types of soils, viz. black-fertile, brown and mixed type. In western region soil, type has brown and low quality while eastern region having fertile and plain type. The richest alluvial soil track found in the Valley of Bheema River. The rivers Velu, Ghod are left side of Bheema and Indrayani, Bhama, Mula-Mutha etc. are at right side. Each tahsil of the district have minimum one river. Therefore, the agro-climatic condition of district is favourable.

3.3.4 Water Phase of Environment:

3.3.4.1 Rivers

All the river in Pune District originate in the Western part of Sahyadri Hill ranges in Junnar, Ambegaon, Khed, Maval, Mulshi, Velhe and Bhor Taluka and flows through the Eastern part of the district.

The district is divided into two major river basins, Bhima and Nira. NorthEast, Eastern and Central part of the district comes under the Bhima river basin and the South-East and the Southern part of the district under the Nira river basin. River Bhima is the main river flowing through the district. River Bhima has its origin at `Bhimashankar' located in the Khed taluka and it flows through the central part of the district towards the South-East. The Ghod, Mula-Mutha and Nira are tributaries of river Bhima. River Ghod is a perennial river and flows across the Northern region of the district. River Kukdi and Mina are the two tributaries of river Ghod. Ghod river originates in the Ambegaon Taluka. The confluence of the Bhima and Nira is at Nira-Narsingpur in Indapur Taluka.

3.3.4.2 Rainfall

The average annual rainfall in the district is 800 mm. About 87 per cent of the annual normal rainfall in the district is received during the monsoon months June to September, July being the rainiest month generally. Some rainfall, mostly in the form of thundershowers is received during the pre-monsoon months of April and May and during the Post-monsoon months.

3.3.4.3 Climate

The climate of Pune is dry. The cold season from November to February is followed by the hot season lasting up to early June. The periods from early June to about the beginning of October constitute the southwest monsoon season. The Succeeding period up to November is the post-monsoon or transition season.

3.3.4.4 Forest

This includes all land classified as forest under any legal enactment dealing with forest or administered as forests. Whether State –Owned or private and wooded or simply maintained as forest land . Within the forest area itself there may be occasionally cultivated patches or grazing lands, but such areas too are shown under column 14 as forests .The process of land grants and effecting relevant charges in the basic records of survey and settlement are somewhat protracted and time consuming, Therefore the information based on records is in some cases at least, likely to be different when compared with the actual field situation.

The total forest area of the district is shown in column 14 of village Directory Statement. The forest area in the district is distributed among 1133 villages accounting for 61.44 percent of the villages in the district. The total area under forests in this district is about 169709 .88 hectares and social forestry area is about 1588 .74 hectares. Among the 14 tahsils of district, Ambegaon accounts for one sixth of the total forest area of the district .The forest produce is divided into two main classes, major and minor. The chief major forest produce is timber and firewood. The chief minor forest produce are Apta and Tembhurni leaves (useful in Bidi manufacturing) in addition to Babul, Tarwad, Barks, Hirda, Honey and wax etc.

3.3.4.5 Agriculture / Cultivation

The people in the district grow Kharif, Rabbi and perennial cash crops. Most predominant crop is groundnut and sugarcane. In addition wheat, coarse cereals, maize, rice, masur-arhar gram is taken.
In fruits Guava and mangoes are very famous. A lot of green vegetables too are grown in the area.
As there is only limited assured water supply, Rabbi crop is possible only partially. Wherever, there is only single crop and that too on limited land, the farmers are poor.

In the district, some crops are taken where water is available for all the months. These are **Sugarcane, Beetle leaves, Banana, Peru, Papai, Lemon etc.** Sugarcane is developing in places where it is assured to lift for sugar mills.

In Mawal and Mulshi, Kamod rice is grown in Kharif while on the eastern side Jowar is taken. There is a limitation due to water availability and soil type.

As a result of poverty and low purchasing power of the farmers, they appear to enter into a vicious circle. The fertilizer consumption is insignificant on the crop land. The use of pesticide/ insecticide is not popular. The crops grown can hardly support the people for the entire year. The situation is now improving, though largely depends on Rains.

Table 3.2: Pulses, Cereals, Spices, Oil Seeds And Other Crops Pune District.

PULSES	CROPS	SPICES	OIL SEEDS	FIBRES
Mug	Jawar	Chilies	Ground Nut	Cotton
Udid	Bajara	Garlic	Sunflower	Sunn Hemp
Hulge	Wheat	Coriander	Linseed	Ambadi
Tur	Rice		Sesame	
Gram	Maize			
a) Green Gram	Sugarcane			
b) Black Gram	Tobacco			

Table 3.3: Fruits and Vegetables Grown in Pune District

FRUITS	VEGETABLES
Banana	Onion
Mango	Brinjal
Gauva	Lady's Fingers
Papaya	Cabbage
Sweet Lime	Tomato
Citrus	
Grapes	
Figs	

3.3.4.6 Flora and Fauna

There are no National Parks or Wildlife Sanctuaries in the 10 Km. radius from the proposed plant site. There are no reports with the forest department of endangered species or notified protected species. Wildlife species, common almost all over rural India such are hare, jackalsm monkeys, pigs, several species of birds and reptiles are present. A list of birds and animals commonly found in the study area is presented in Table 3.5 & 3.6.

Table 3.4: List of Plants

Sr.No.	Botanical Name	Vernacular Name
1	*Acacia farnesiana*	Gukikar
2	*Acacia nilotica*	Babul
3	*Actiondaphne angustifolia*	Pisa

4	*Aegle marmelos*	Bael
5	*Albizia odoratissima*	Chinchava
6	*Albizia procera*	Kinhai
7	*Anthocephalus cadamba*	Kadamba
8	*Bauhinia purpurea*	Kanchan
9	*Bauhinia variegata*	Orchid Tree
10	*Butea monospenna*	Palas
11	*Caesalpinia pulcherrima*	Sankasura
12	*Callistemon citrinus*	Bottle brush
13	*Cassia fistula*	Bhava
14	*Chamaecrista pumila*	Sarmal
15	*Cassia grandis*	Pink shower
16	*Cassia siamea*	Kassod
17	*Cocus nucifera*	Naral
18	*Pongamia pinata*	Karanja
19	*Erythrina variegata*	Pangara
20	*Ficus religiosa*	Pimpal
21	*Gardenia jasminoides*	Gandroya
22	*Grevillea robusta*	Silver oak
23	*Lagerstroemia speciosa*	Taman
24	*Mallotus philippensis*	Shendri
25	*Mimusopes elenqi*	Bakuli
26	*Peltophorum pterocarpum*	Copper pod tree
27	*Pithecellobium dude*	Vilayati chinch
28	*Psidium auauava*	Peru
29	*Samanea saman*	Rain tree
30	*Saraca asoka*	*Asoka*
31	*Tamrindus indica*	Chinch

Table 3.5: List of Birds

Sr.No.	Common name	Scientific name
1	Indian night jar	*Caprimulgus asiatious*
2	House swift	*Apus abbinis*
3	Palm swift	*Cypsiurus parvus*
4	Whitebreasted kingfisher	*Halcyon smyrnehsis*
5	Lesserpied kingfisher	*Ceryle rudis*
6	Blue king fisher	*Alcedo atthis*
7	Bluecheeked Bee eater	*Merops superciliosus piriscus*
8	Small green bee eater	*Merops orientails*
9	Indian roller	*Coracias bengalensis*
10	Hoopoe	*Ipapa epops*
11	Gray hornbill	*Tockus bircstris*
12	Crimson breasted barbet	*Megalaima baemacephala*
13	Golden backed wood pecker	*Dinopium benghalense*
14	Ashycrowned find lark	*Eremopterix grisea*

15	Rufos-tailed finch lark	*Ammomanes phoenicurus*
16	Short toad lark	*Calandrella cinerea*
17	Crested lark	*Galerida cristata*
18	Small skylark	*Alauda gulgula*
19	Golden oriole	*Oriolus orolus*
20	Black drongo	*Dicrurus adsitilies*
21	Brahminy myna	*Starnus roseus*
22	Rosy pastor	*Acridotheres bistis*
23	Indian myna	*Riparia riparia*
24	Collared sand martin	*Hirundo rustica*
25	Dusky corg martin	*Rhipiduro albicollis*
26	Wire spotted fanclil plycatcher	*Lanius excubitor*

Table 3.6: List of Reptiles and Wild Animals

REPTILES	**WILD ANIMALS**
Kawadya	Spotted Deer
Iropeltis Species	Chital
Dutondya	Indian Gazelle
Ajgar	Chinkara
Dhaman	Wild Boar
Diwad	Jackals
Naneti	Fox
Manyar	Langur
Ghonas	Squirrel (Khadikhar)
Viper	Hare
Nag	Rabbit
Bomboo Pit Viper	

Description on flora and fauna (terrestrial and aquatic) is given. There is no rare, endemic and endangered species observed, as also Schedule-I fauna within the study area of wildlife. **(ToR 37)**

3.3.5 Air Phase of Environment

The natural setting will include discussions on environmental features like land, air, water, meteorology and man-made settings will include the socio-economic, demographic aspects and also the aesthetics.

Meteorology is dealt first. The climate of the district is characterized by a hot summer and general dryness except during the south-west monsoon. The year can be divided into four seasons. The cold season from December to February is followed by the hot season from March to the first week of June. The south West monsoon season is from the second week of June till the end of September while October and November constitute the post monsoon or retreating monsoon season.

Action plan is undertaken for Ambient Air quality Monitoring for PM_{10}, $PM_{2.5}$, So_2 & No_X as per GSR 826 (E). **(ToR 17)**

3.3.5.1 Temperature:

Seasonal variation in temperature is quite large. From March onwards is a period of continuous increase in day temperatures, the nights remaining comparatively cool. May is the hottest month of the year with the mean daily maximum temperature at 38.9^0 C. On individual days temperatures occasionally rise to 43^0 C or 44^0 C. With the onset of the south-west monsoons there is an appreciable drop in temperatures & the weather becomes pleasant. With the withdrawal of the monsoons day temperatures increases but night temperatures progressively decreases. From about the middle of November both day & night temperatures decreases rapidly. December is the coldest month of the year with the mean daily minimum temperature at 11.7^0 C. In association with the passage of western disturbances across north India during winter season, the minimum temperature in the district sometimes drops to 2 or 3^0 C.

3.3.5.2 Humidity:

The air is generally dry during the months from February to May and particularly so in the afternoons when the humidity is about 20 percent on the average. The relative humidity during south-west monsoon period are between 60 and 80 percent. Thereafter they decrease rapidly. Except during the south-west monsoon season the air generally dry particularly so in the afternoons. Skies are generally clear or lightly clouded during most of the year. During the south-west monsoon season the skies are heavily clouded to overcast. Winds are generally light to moderate in force with some strengthening during the monsoon season.

3.3.5.3 Cloudiness:

During the monsoon season the skies are generally heavily clouded or overcast. During the rest of the year the skies are mostly clear or lightly clouded. However, in the cold season, for brief spells of a day or two, occasionally, passing western disturbances cause cloudy weather. In the latter part of the summer season, especially the afternoons, clouding increases. In the post-monsoon months the cloudiness decreases. In the rest of the year the skies are clear or lightly clouded.

3.3.5.4. Wind

3.3.5.4.1 Wind speed and Wind direction

Depressions in the Arabian Sea during May and June, which move northwards, near the coast and depressions from the Bay of Bengal during the monsoon season moving across Madhya Pradesh affect the weather over the district causing local winds. Occasionally depressions from Bay of Bengal during October move westwards across the peninsula emerge into the Arabian Sea and move forwards the Gulf of Cambay. Such depressions also affect the district. Winds are generally light to moderate with increase in speed during half of summer and in monsoon season. The predominance is W and NW in summer months, SW and W in monsoon and post monsoon months and S and SE in winter months. The wind speed and percent number of days of wind direction are presented in a tabular form below:

Table 3.7: Wind Rose

Month	No. of Days with wind-speed (Kph)			Percentage Number of days with wind from								
	< 20	**1-19**	**0**	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**	**Calm**
January	0	21	10	4	5	12	6	2	6	22	10	33
February	1	20	7	6	5	9	4	2	6	27	18	23
March	1	25	5	5	6	6	2	2	6	34	25	14
April	1	26	3	6	3	2	2	2	6	37	33	9
May	4	26	1	5	2	1	1	1	6	50	30	4
June	6	23	1	0	0	1	0	2	18	66	11	2
July	4	27	0	0	0	0	0	0	17	77	7	2
August	3	27	1	0	0	0	0	0	10	78	8	4
September	1	27	2	1	1	1	0	1	8	62	18	8
October	0	21	10	3	9	14	5	1	6	18	12	32
November	0	18	12	3	8	28	11	2	1	3	2	42
December	0	19	12	4	10	25	9	1	3	6	4	40

It may be seen from above that there is less calm situation in Nov and the predominant direction is NW. In all the four months the wind speed was in the range of 1-5 & 6-10 km/hr in majority.

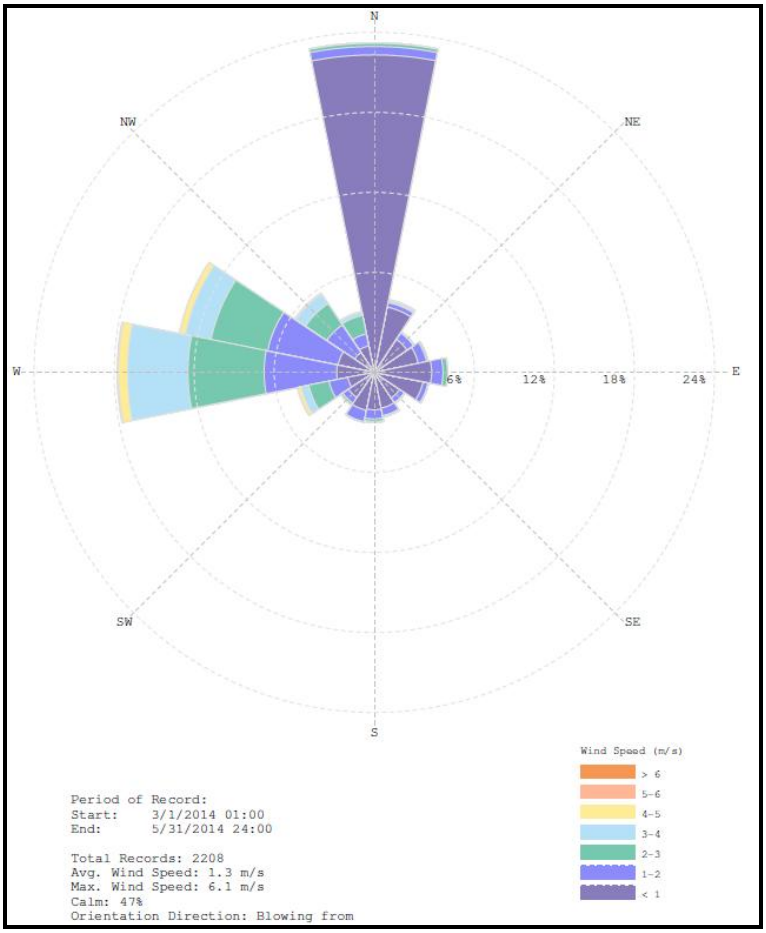

Fig. 3.2: Wind Rose –IMD Pune

3.3.6 Soil

The soils or the district are lighter in the west then in east and belong broadly to three main classes, namely, black, red and brown .in varying proportions and is in turn modified by sand gravel, lime salts and other ingredients.

Kali or black soils are nearly black in colour and sometimes have a grayish or bluish tinge. It is commonly found in layers several feet deep and occurs mostly in the eastern .potion of Khed, Sirur , Daund and Purandhar tahsils and the whole of Baramati and Indapur tahsils . Black soils are richer than either red or coarse grey soils are particularly suited for rabi crops because of their quality of retaining moisture for a longer time and crumbling instead of becoming hard due to the sun .Wheat gram ,rabi Jowar and sugarcane are amongst the important crops grown in these soils.

Brown or copper coloured soils, commonly known as tambvat, are found in the transition tract viz; the eastern parts of Khed and Haveli tahsils, and the western parts of Sirur, Daund and Purandhar tahsils .These soils are shallower and coarser than the black soils. They are often impaired by mixture of gravel, but when watered by frequent showers, are generally well suited for wheat and kharif crops particularly jowar and bajri.

Tambdi or red soils cover a considerable area in the district and are commonly found in the western portion of the district. It is found over the hill slopes east of the paddy lands in the north, central and middle portions of the district comprising the tahsils of Junnar, Ambegaon , Purandhar and the western portions of Shirur and Daund tahsils .These soils are generally rough and require deep ploughing. Red soils are suited for the cultivation of bajri, kulthi and matki, groundnuts and chilles. Soil erosion is accute in these soils because of the sloppy natural vegetation due to over –grazing.

In addition, paddy soils are found in the western portion of the district immediately to the east of the Western Ghats mainly in Mawal, Mulshi, Bhor, purandhar and Velhe tahsils and the western parts of Junnar, Ambegaon and Khed tahsils . Alluvial soils contain a considerable amount of vegetable matter and are regularly replenished by fresh deposits.

The soil is developed from Deccan Trap. These are generally alkaline in reaction. Clay loam in texture has high contents of Calcium carbonate and Magnesium carbonate. Soils of the district are light, medium or heavy according to depth, texture and location. Heavy soils are found near banks of river, where light soils are found away from river. Soil texture in the region varies from sandy loam, calyee loam, loam to clay in texture. These are brownish black to black in colour, under laid with murum that is derived from basalt rock. In the area that receives good rainfall, physical transfer of small particles in soil due to surface runoff and dissolution of mineral is seen moderate (that leads to more conductivity). Prominent cations are Calcium and Magnesium. In general the soils of the region has high adsorption capacity. The availability of nitrogen and phosphorous content of soil varies, and are generally moderate fertile. Potassium and organic matter is usually substantial. Trace metals are available for the microbes.

Soil samples are collected in the local zone and results produced later in this report.

3.4 Study Area:

Study area consists of area coming under 10 km radius with site as a centre. Various aspects are studied as environmental background for facets like Ambient Air, Noise, Ground water, Surface water, Soil, flora-fauna as well as man-made environment.

3.5 **AIR ENVIRONMENT**

3.5.1 Ambient Air Quality

Air is one of the most vital natural resource for existence of all the living organisms on the planet Earth. Good quality air is essential for the physiological process. Such as respiration and expiration of man, animals and plants. Ambient Air Quality is an indication of overall state of environment of a particular area. Ambient air quality (AAQ) is an important criterion for healthy environment and its degradation causes various long-term impacts on the human health.

The ambient air quality can be termed to be good only if it is having proportionate concentrations of natural gases like oxygen, nitrogen etc. Nature itself maintains the balance of constituents of atmospheric air but unfortunately, over a few decades; man is disturbing the3 process by introducing various air pollutants through industrialization and transportation.

Toxic gases like SO_2, NOx, CO, CO_2, Hydrocarbons, and chlorofluorocarbons; introduced through various polluting sources cause degradation of ambient air quality, which leads to various human diseases like asthma and other respiratory diseases. For example, the carbon monoxide; if exceeded in ambient air, mixes with human blood converting the hemoglobin into carboxyl hemoglobin; which is

toxic. In the present study, ambient air monitoring stations were determined on the basis of meteorological conditions, human settlement and the concentration of pollutants. Among the meteorological conditions, wind sped and wind directions were considered, whereas population density was given a top priority among other population characteristics for determining the monitoring station.

One season site specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall and AAQ data (except monsoon) at 8 locations for PM10, PM 2.5, SO2, NOx, CO and HC (methane & non-methane) is assembled as per ToR. The selection of monitoring stations is based on pre-dominant wind direction, population zone and sensitive receptors.

3.5.2 Procedure for Sampling and Analysis

During this study, High Volume Sampler (HVS) is used for ambient air monitoring as usual. The equipment is designed as per the specifications of the central board for the prevention and control of water pollution, New Delhi – emission regulations. It is used to monitor the ambient air quality for Suspended Particulate Matter (SPM).

Air is drawn into a covered housing and through a filter by a flow rate blower at 1.1 – 1.5 m3/min that allows total suspended particulate matters with diameter less than 100 um (stokes equivalent diameter) to collect on filter surface. Particles with diameter of 0.1 – 100 um are ordinarily collected on glass fiber filters. The particulate concentration (ug/m^3) n ambient air is computed by measuring the mass of SPM collected and the volume of air sampled. All the samples are collected over a period of 24 hours each as per the CPCB norms. Average values are given in the first Table below, followed by detailed observations; SPM appears contributed more by dusty natural environment.

The particulate concentration (ug/m^3) in ambient air is computed by measuring the mass of SPM collected and the volume of air sampled. The size of the sample collected is usually adequate for further analysis of trace elements. Sampling locations are shown in Table below and the monitoring data from 8 stations at 8 directions is found.

Summary of Ambient Air Quality Monitoring Results
(March 2014- May 2014)

Table 3.8: Analysis Result for Air monitoring of 10 km radius area around Project Site

Sr. No	Parameter	Site	Daund	Margal Wadi	Ravangaon	Kalewadi	Deulgaon Raja	Ajanuj Gaon	Unit	Standards as per The Environment (Protection) Rules, 1986
1	PARTICULATE MATTER (SIZE LESS THAN 10 μm)	71.43	72.34	65.60	69.14	67.18	64.86	64.72	$\mu g / m^3$	100
2	PARTICULATE MATTER (SIZE LESS THAN 2.5 μm)	39.58	38.77	34.22	37.33	37.82	35.82	35.72	$\mu g / m^3$	60
3	SULPHUR DI-OXIDE.	23.95	27.26	17.13	19.32	16.10	12.32	13.04	$\mu g / m^3$	80
4	NITROGEN DIOXIDE	32.65	36.18	26.19	26.82	22.60	18.71	23.07	$\mu g / m^3$	80
5.	CARBON MONOXIDE (8 HRS.)	0.31	0.37	0.04	0.23	0.10	0.06	0.12	mg / m^3	02
6	HYDROCARBON									
	METANE	Absent							$\mu g / m^3$	--
	NONMETHANE	Absent							$\mu g / m^3$	--

Note:

Each sample was sampled for 3 months. However in above table, average of three is reproduced. The details are also enclosed in Annexure. From the table it is clear that the parameters are not exceeding the limit.

3.6 **Noise Environment:-**

Noise level readings were recorded in five locations spread over in the 10 km radius centering the proposed unit. Noise levels were recorded by the use of a digital noise level meter, The instrument was calibrated before and after each set of readings. The monitoring was carried out on 24-hourly basis and the hourly Leq. Values were derived and reported.

The maximum daytime L_{eq} as well as nighttime L_{eq} values were found to be 73 and 66.3 dB(A) at site. The maximum daytime L_{eq} as well as nighttime L_{eq} values in residential area were found to be 66 and 41.65 dB(A) at site The maximum values may be attributed towards the nearby commercial activities and traffic movements.

Table 3.9: Noise Level Observations in dB

Hours	Site	Daund	Ravangaon	Kalewadi	Ajanuj Gaon
Day time Ld	73	66	55.90	54.30	56.54
Night Time Ln	66.30	41.65	37.28	38.82	38.12
Permissible Ld	75	55	55	55	55
Permissible Ln	65	45	45	45	45

The noise levels measured at the existing plant facility, proposed plant site and villages located within 10 Km. radius are presented in above Table.
No much change is expected as this industry is not a heavy engineering industry.

Noise levels monitoring at 8 locations within the study area is undertaken and so reported **(ToR 38).**

3.7 Ground Water Environment (Quality)

Ground water is the accumulation of water below the surface of earth, caused by the portion of rainfall that percolates through the soil pores and rock crevices, flown by natural gravity till it reaches an impervious stratum. Water samples were collected from bore/open wells located within 10 Km. radios from the proposed site. The study area receives limited rains, but has considerable groundwater presence. The quality of groundwater is examined by drawing samples from open dug wells as well as from deep wells from the study area. Analysis was done by Standard Methods. The results are summarized below in tabular form, and compared with limits of IS: 10500

Ground water monitoring at 2 locations are assessed. There will not be any large lagoon as used to be in earlier times for open anaerobic treatment **(ToR 23).**

Table 3.10: Analysis Result for Groundwater Sampling of 10 km Radius Area Around Project Site

DATE OF SAMPLING	07/04/2015	10/04/2015	LIMITS AS PER IS 10500:2012 [MAX]	UNIT
LOCATIONS PARAMETERS	DEULGAON RAJA	LONARWDI		
Colour	<5	<5	5	--
Odour	Agreeable	Agreeable	Agreeable	--
pH	7.51	7.45	6.5 to 8.5	--
Taste	Agreeable	Agreeable	Agreeable	--
Turbidity	0.3	0.4	1	NTU
TDS	758	236.9	500	mg/L
Calcium [as Ca]	88.74	72.6	75	mg/L
Chlorides [as Cl]	178.6	178.4	250	mg/L
Fluoride	Nil	Nil	1.0	mg/L
Boron (as B)	0.12	0.22	0.5	mg/l
Residual Free Chlorine	Nil	Nil	0.2 **[MIN]**	mg/L
Iron [as Fe]	0.022	0.022	0.3	mg/L
Magnesium [as Mg]	51.12	62.54	30	mg/L
Nitrate	10.14	12.9	45	mg/L
Sulphates [as SO_4]	174.12	154.39	200	mg/L
Total phosphate as PO_4	1.5	0.3	0.3	mg/L
Total Alkalinity as $CaCO_3$	178.55	178.5	200	mg/L
Total Hardness as $CaCO_3$	209.2	269.3	200	mg/L
Zinc as Zn	0.4	0.2	5	mg/L
E – Coli	Absent	Absent	Absent	MPN/100 ml

Water Quality Scenario:

Well water samples analyzed during the study period indicate that the water is free from the industrial pollution. Water from these wells is used for drinking, gardening, industrial and agricultural purposes. Concentrations of suspended solids and dissolved solids were low, BOD, COD levels which indicate organic pollution are also low. All the other parameters are within the prescribed limits.

3.8 Surface Water Environment (Quality)

The rivers draining Pune district rise in and near the sahyadris in and flow east and south –east across the district. During the rainy season all the rivers are flooded and carry vast volumes of cearse material including gravel and cobbles .but during the hot season they shrink to a narrow thread in broad stretches of gravel .At intervals barriers of rock cross the beds damming the streams into long pools.

The chief river of the district is the Bhima which rises at Bhimashankar on the erest of the sahyadris . The Bhimas course is very winding and it flows in a general south- easterly district boundary. The Vel and the Ghod are the main left bank tributaries of the Bhima . and the Bhama, the Indrayani, the Mula or Mula-Mutha and Nira are its main right bank tributaries.

Water sample were collected from river. The water sample collected were analyzed for pH, COD, BOD, Suspended solids, Oil and Grease, Chlorides, Sulphates and Total Hardness. The result are presented in Table 3.10, Methodologies employed in analyzing the samples for the parameters mentioned above were according to the APHA prescribed methods.

Table 3.11: Surface Water Quality

DATE OF SAMPLING	03/03/2014	03/03/2014	06/03/2014	LIMITS AS PER IS 10500:2012 [Max]	UNIT
LOCATIONS PARAMETERS	Bhima River Upstream	Bhima River Downstream	Ravangaon		
Colour	<5	<5	<5	5	--
Odour	Agreeable	Agreeable	Agreeable	Agreeable	--
pH	7.34	7.28	6.98	6.5 to 8.5	Hazen
Taste	Agreeable	Agreeable	Agreeable	Agreeable	--
Turbidity	0.3	0.7	0.5	1	NTU
TDS	248.21	178.9	641	500	mg/L
Calcium [as Ca]	68.4	45.2	82.36	75	mg/L
Chlorides [as Cl]	157.9	128.5	188.74	250	mg/L
Fluoride	Nil	Nil	Nil	1.0	mg/L
Boron (as B)	0.12	0.22	0.1	0.5	mg/l
Residual Free Chlorine	Nil	Nil	Nil	0.2 **[MIN]**	mg/L
Iron [as Fe]	0.026	0.009	0.024	0.3	mg/L
Magnesium [as Mg]	58.4	21.3	58.9	30	mg/L
Nitrate	10.7	2.49	8.16	45	mg/L
Sulphates [as SO4]	162.5	78.6	158.09	200	mg/L
Total phosphate as PO_4	0.09	0.02	0.04	0.3	mg/L
Total Alkalinity as $CaCO_3$	75.8	61.3	42.5	200	mg/L
Total Hardness as $CaCO_3$	269.3	122.6	263.2	200	mg/L
Zinc as Zn	0.4	0.6	0.3	5	mg/L
E – Coli	350	432	Absent	Absent	MPN/100 ml

Surface water quality of nearby river Bhima (upstream and downstream) and at Ravangaon is examined. All parameters except E-coli in Bhima River; Mg & Total Hardness in Bhima River and Ravangaon, and Cl in Ravangaon, are within the limit.

3.9 Soil Environment

The soil in and around the proposed site is formed due to weathering of rocks and can be classified as reddish gray / brown silky type. Rocks underneath are of volcanic origin. The rocks are dark colored of basaltic composition and mainly comprise of plagioclase, pyroxenes iron ores, primary glass and some secondary minerals.

Table 3.12: Analysis Result for Soil Sampling of 10 km Radius Area Around Project Site

DATE OF SAMPLING		03.03.2014	06.03.2014	10.03.2014	Unit
Sr. No.	Parameter	ON SITE	RAVANGAON	MARGALWADI	
01.	Bulk Density	1192	1123	1199	kg/m^3
02.	pH	7.5	7.9	7.2	--
03.	Electrical Conductivity	0.169	0.254	0.827	mS/cm
04.	Calcium as Ca	427	1286	852	mg/kg
05.	Magnesium as Mg	20	190	90	mg/kg
06.	Sodium as Na^+	30	91	108	mg/kg
07.	Potassium as K^+	62	30	105	mg/kg
08.	Exchangeable Calcium as Ca^{2+}	0.070	0.8	0.4	mol/kg
09.	Exchangeable Magnesium as Mg^{2+}	0.009	0.148	0.01	mol/kg
10.	Exchangeable Sodium as Na^+	0.069	0.189	0.127	mol/kg
11.	Exchangeable Potassium as K^+	0.009	0.006	0.005	mol/kg
12.	Cation Exchange Capacity	12	15.2	9.9	meq/100g
13.	Organic Matter	0.7	1.5	2.4	%
14.	Organic Carbon	0.6	0.5	1.1	%
15.	Nitrogen	144	133	200	kg/ha
16.	P_2O_5	0.7	0.5	0.9	kg/ha
17.	K_2O	183	122	1735	kg/ha
18.	Cadmium as Cd	< 0.5	< 0.5	< 0.5	mg/kg
19.	Chromium as Cr	128	201	182	mg/kg
20.	Copper as Cu	98	108	158	mg/kg
21.	Cobalt as Co	18	23	15	mg/kg
22.	Nickel as Ni	22	55	31	mg/kg
23.	Lead as Pb	< 10	< 10	< 10	mg/kg
24.	Manganese as Mn	645	704	686	mg/kg
25.	Zinc as Zn	72	81	93	mg/kg
26.	Iron Fe	29982	32568	40127	mg/kg

3.10 Summary

- The temperature fluctuates but the range is not so wide as to create anxiety.
- The humidity fluctuates but the range is not so wide as to create anxiety.
- Fear of inversion is limited.

- Fear of special weather phenomena like storm, visibility, cloudiness, hail is normal.
- Earthquakes are not noted.
- The surface water quality is in acceptable limits at upstream, but not so at downstream at some parameters.
- The Groundwater quality is in accepted limit (except sometimes in TDS, total hardness and coli form)
- Ambient air quality shows SPM as moderate, SO_2 as low and NOx as low, except a few urban points, especially near Roads.
- During the survey, the team never found the noise levels disturbing at majority of the residential stations.

3.11 Land Use

The main objective of this section is to provide a baseline status of the study area covering 10 km radius surrounding the proposed site, so that the changes in land use pattern due to the project activities can be assessed in future. It includes,

• To determine the present land use pattern

• To predict the changes expected in land use pattern due to the proposed project activities.

The land use pattern of the study area is studied by physical observations and analyzing available secondary data like agricultural, geological and land records. Topographical map of the study area is given Figure-3.1.

Land Use Pattern: (ToR 4)

The land-use pattern of the Influence Zone can be presented as follows:

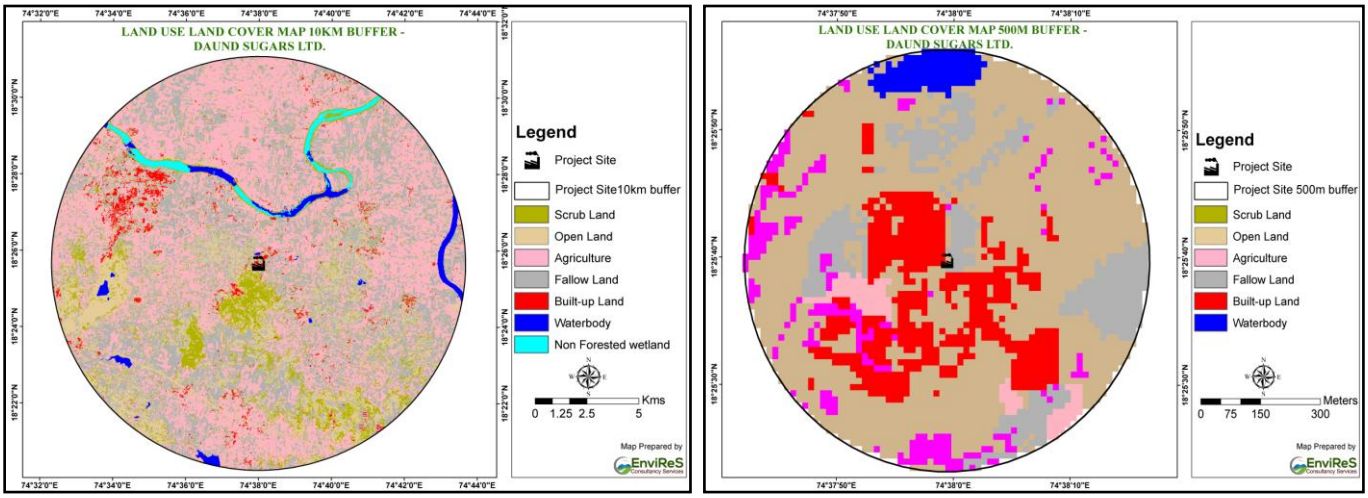

Fig. 3.3: Land Use Land Cover

Table 3.13: Land use pattern in study zone

10 Km Area		500m Area	
LULC Class	**Area (ha)**	**LULC Class**	**Area (ha)**
Shrub Land	821.7	Shrub Land	0.72
Open Land	12912.05	Open Land	51.7725
Agriculture	12678.21	Agriculture	4.95
Fallow Land	4139.775	Fallow Land	8.325
Habitation	24.7725	Habitation	8.7525
Waterbody	855.315	Waterbody	5.985

3.12. Man-made Environment; Socio-economic;

3.12.1 Introduction

Social and economical consideration is basic in the man-made environment. Any human activity is undertaken for a sole objective of economic benefit to the human society. In other words if the socio-economic impact is not positively beneficial, one will not enter into that activity at all. It is, therefore, worthwhile to make a socio-economic impact assessment (SIA) in advance before deciding on commencement of the activity. SIA is done honestly, keeping the following framework.

- SIA is a systematic effort to identify, analyze, and evaluate social impacts due to a proposed project or policy change on the individuals and social groups within a community or on an entire community in advance of the decision making process in order that the information derived from the SIA can actually influence decisions.
- SIA increase knowledge on the part of the project proponent and the impacted community.
- SIA raises consciousness and the level of understanding of the community and puts the residents in a better position to understand the broader implication of the proposed action.
- SIA includes within it a process to mitigate the social impacts likely to occur, if that action is desired by the impacted community. For further discussions this study area which is fully of rural component will be considered

3.12.2 Industries-:

- Industrially, Maharashtra is one of the advance states in the Country and Pune district is also one of the advanced districts of the state. The district is also rich with forest resources. There are few co-operative and private sugar factories and other some small scale industries in the district.
- The Industrial policy of the state is based on the basic decision to encourage Industries in the developing and under-developed areas in the district and to disperse industries from the heavily congested areas of Bombay, Thane and Pune city. In the district, there are industrial estates in Pune, Pimpri Chinchwad and Kurkumbh towns which has led to the industrial development not only of the town, but the district.
- The most important small scale industries in the district are handloom, craft and gur processing having a good demand in the national market. Other registered units are sugar mills,gur making, spinning pressing and weaving mills, pottery, brickmaking, carpentry, tanning, oil mills, distilleries and engineering units. Pune district is on the forefront of sugar production.

3.12.3 Road (Communication facilities) -:

District has road, rail and air travel facility. 68.44% villages or 80.23% villagers have some communication facility available. Next to Pune city tehsil, Baramati with 94.64% villages served is the best and Junnar tehsil with 21.21 is poorest. Villager with higher population get the roads quickly. Roads have acted as a pull factor for development and upliftment of the area.

Table No. 3.14: Roads

#	Type of Road	State PWD	Zilla Parishad	Municipal Body	Total
I. Surface wise					
1	Cement Concrete	23	--	12	35
2	Black Topped	1553	356	767	2676
3	Water Bound Macadam	568	2526	80	3174
4	Others	178	4236	43	4457
	Total	2322	7118	902	10342
II.	**Category wise**				
1	National Highway	311	--	50	361
2	State Highway	61	--	--	61
3	Other State Highway	1194	53	27	1274
4	Major District Road	754	1798	2552	5104
5	Other District Road	2	2042	2044	4088
6	Village Road	--	3225	1	3226
7	Other Developmental Road	--	--	805	805
	Total	2322	7118	902	10342

Mumbai-Bangalore and Mumbai-Hyderabad Highways pass via Pune. Of the roads 17% are National and 27% are State Highways. Almost all the villages are connected by either kaccha or good road. 59.56% of rural population is served by pucca roads, especially near urban centers. 92.19% of bigger villages (having population more than 5000) are connected by pucca road.

3.12.4 Population:

The district Pune is urbanized with 34 towns. It is noteworthy that 10% of the total number of towns of the State are located in this single district only. This tehsil khed, however, has a complete Rural background with all the habitation housed in 190 villages, none semi-urban CTs (Census Towns) and none Municipal Corporations, and only with one religious town. The study area too is comprised of villages 48 in number and none other. The houses in the study area are of variable description but more like hamlets. The Statistics of the vicinity area can be presented as –

#	Particulars	Study Area
1	Number of Houses	7587
2	Population/House	6.19

It may thus be seen that sector needs new houses as substantial population has no standard housing.
The population shows a growing trend anywhere in India. The decennial growth in the district is as high as 32.85%. However, it is noteworthy; the study area shows only 24.58% as decadal growth (many of them in slums). This indicates that the area can accommodate for some immigrants to come in. The situation remains so, in absence of any development of sources of livelihood and amenities coming along with it outside and away from the study area.

Another noteworthy point is about the schedule caste and schedule tribe brethrens. The percentage contribution in this study area is –

#	Particulars	District	Tehsil	Study Area
1	Scheduled Class %	11.41	3.80	3.57
2	Scheduled Tribe %	3.91	12.58	11.38
3	Less privileged Total	15.40	16.38	14.95

The Schedule Caste population here is lower than those in District, but comparable with the Tahsil. While the Scheduled Tribe population here in the study area is lower than the Tehsil and much higher than the District figures. This has historical and geographical reasons.

Livelihood: The main occupation in the study area is related to natural resources of land. The people are engaged in agriculture either of their own piece of land or on the masters'. The remaining, forest being limited source, family members get engaged in other activities else they cannot survive. Therefore non-worker percentage here is far low in Tehsil (46.34%) and 49.56% in study area than the non-workers non-employed people in Pune District as (59.68%). Though, presently this is a hand to mouth scenario, improvement in the situation is expected by developments.

3.12.5 Transportation & Communication:

- There is presence of this District on the railway map. There is also a good roads network. In the vicinity of the project there are good road connections and benefit will go to people. In the Influence Zone, major villages are connected by road network. However the surfacing is required to be improved in some villages. Smaller 'wadis' remain secluded. The presence of activities like this is catalytic to the road development.

3.12.6 Employment & Wages:

Following information was obtained during survey:

- Non-Worker percentage in study area is comparable with Tehsil. This can be improved by industry.
- The Total worker percentage in vocations of agriculture in the study area is overall comparable (though slightly lower) with the Tahsil figures. Thus agricultural support is less. Hence industry necessary.
- Whatever employment appears only restricted more to male population, as main workers.
- In Agricultural vocation too women participation is lower as cultivator, but higher as labour. In marginal employment, however female are engaged more. However this is exploitation without any financial intendance to women.
- There appears to be low for dependable livelihood for other avenues as livestock, forestry, fishing, hunting, plantation, orchards & allied activities, mining-quarrying, Manufacturing, Processing, Servicing & Repairs in Household Industries, Manufacturing, Processing, Servicing & Repairs in other than Household Industries, construction, trade & commerce, transport-storage & communication and other services at present.

All this leads to one conclusion that industrialization or activities of construction has to be stepped up

- To provide more livelihood
- To provide Male employment with Women participation
- By this activity of disciplined industry, the land use pattern is not affected.

3.12.7.1Community:

The people here are largely supported by agriculture. This has only rain-fed support and hence there is a limit for gainful employment. This will slowly improve as irrigation and industrialization may take place. In spite of this, when visited the area it was found that Government has supported this area by facilities.

This industry will also try to support the nearby villages as a part of CSR (Corporate Social Responsibility).

3.12.8 Heritage:

From this center of activity we do not have in proximity Archaeological, Monument, Airport, Ports, National Park, Religious places, Resorts, Other Historical places. As all these sensitive points are well outside the influence zone and as nature of production is not complex or chemical oriented, the proposed activity is not capable of creating any significant effect, let alone adverse.

Table 3.15: Heritage Details

#	Type	Name & Description
1	Archaeological	Karla caves Bhaje caves
2	Monument	Shaniwar Wada, Pune Sinhgad Fort Shivneri Fort Chakan Ground Fort Rajgad Fort Torana Fort Purundar Fort Wadhu Budruk, Samadhi
3	Defense installation	INS Shivaji Lonavala Southern Command, Pune
4	Airport	Lohogaon
5	Religion	Dehu Alandi Bhimashankar temple Sopandeo Samadhi Saswad Khandoba Temple Jejuri Ashta Vinayak Temple, Morgaon Ashta Vinayak Temple, Ranjangaon Ashta Vinayak Temple, Ozar Ashta Vinayak Temple, Theur Ashta Vinayak Temple, Lenyadri Bhulshwar temple Baneshwar Kamar Ali Darvesh Darga, Khed Shivapur
6	Sanctuary	Bhimashankar Supa

3.13 Chapter Conclusion:

In the last Chapter, the new activity and its environment friendly nature is examined. The present environmental setting is discussed in this Chapter. The new activity alters the land use planning for better, fits in present Government Policy and other related matters are shown. The existing environment (both natural and man-made) is discussed by collective information from many sources. Statistics is provided for various media such as air, noise, water, solids, soils and biology. Present

social and economic status is discussed and to what extent, if any, it is sensitive is found out. Now, this **Project** is already socially accepted organization and is committed to the ecological restoration and maximizes social benefits. The community development and rehabilitation efforts as may be reasonably expected will be undertaken.

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CHAPTER 4 - ANTICIPATED ENVIRONMENTAL IMPACT and MITIGATION MEASURES

Contents of this Chapter shall be:

Part A: Details of measures for minimizing and/or off setting adverse impacts) like all prevention-abatement-treatment-disposal-reuse-control and the mitigation strategy. Facets covered are Air, Water, Solid waste, and Aesthetics. .

Part B: These measures will minimize the possible Impacts. It is proposed to cover the investigated environmental impacts due to project location, possible accidents, project design, project construction and regular operation of a completed project subsequently. Standard Techniques are used.

PART "A" MITIGATION

4.1 Introduction:

Careless working may result in making significant adverse effect on environment.

Any activity making a significant effect is not permissible. This "significant effect" is required to be neutralized to a level of "insignificance". This can be brought about by various tools like: in plant measures, segregation, environment friendly process and collectively termed as pollution control say by providing Effluent Treatment Plant (ETP) and Emission Control Equipments (ECE) etc. and neutralize the situation further to a "low or no consequences". Thus logic Figure No.4.1:

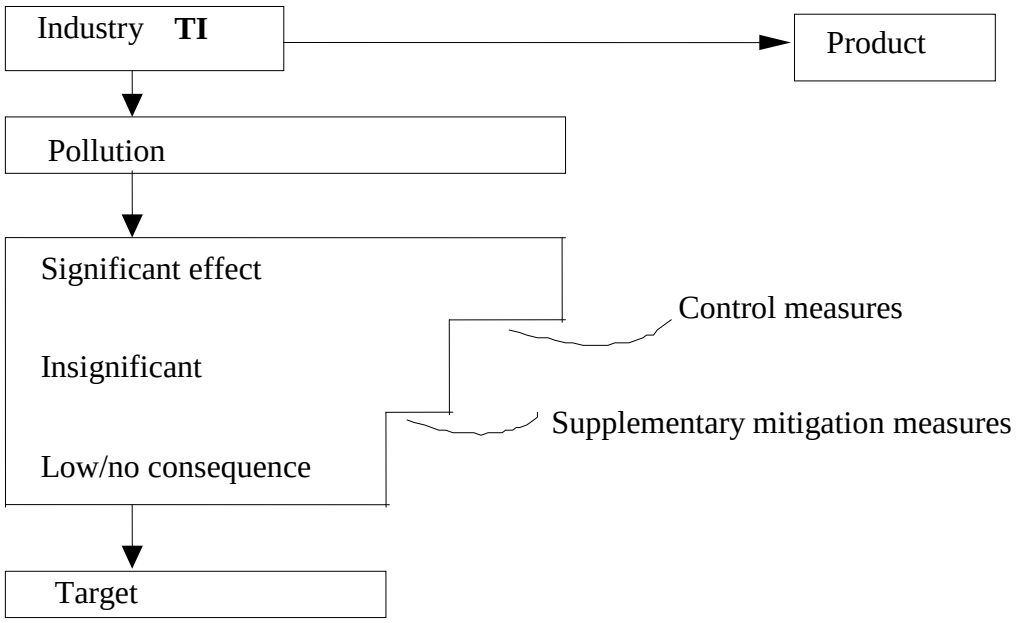


Fig. 4.1: Mitigation Logic

TI – **This Industry**

4.2 Control Measures (Natural Environment):

4.2.1 Air Environment:

Air quality criteria given by Central Pollution Control Boards are:

Table 4.1: National Ambient Air Quality Standards, 2009, in ug/m^3

Pollutant	**Particulate Matter (size ≤ 10 µm)or PM 10µgm^3**		**Particulate Matter (size ≤ 2.5µm) or PM25µgm^3**		**Sulphur Dioxide (SO_2)**		**Oxides of Nitrogen (NO_X)**	
Time Weighted Average	Annual Average	24 hours Average	Annual Average	24 hours Average	Annual Average	24 hours Average	Annual Average	24 hours Average
Industrial Area	60	100	40	60	50	80	40	80
Residential, Rural and other area	60	100	40	60	50	80	40	80
Sensitive area	60	100	40	60	20	80	30	80

(This is now changed with more emphasis on RSPM rather than on SPM)

4.2.2 Emission Control:

4.2.2.1 Emission Control Equipments (ECE):

The air pollution caused by this industry is mainly from dust as SPM from fuel. The dust is not predominantly due to the composition and handling of raw materials because those are largely controlled.

The efforts taken by the Industry in this respect are also indicated. Further, regarding the product looking to the description of manufacturing operations and the corresponding flow sheet, TI knows from which unit operation or process, air pollutants are expected. For the purpose of arresting and capturing the pollutants, measures are proposed and designed.

Table 4.2: Emission Control Equipments

.#	**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	Proposed Boiler	SPM, CO	Feed Bagasse/husk more dry, Improved quality of water Good quality coal	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	Other effluents	H_2O, CO_2	Closed transfer	Fully Aerobic regime.

(*) = The Dust Collector of suitable capacity, with hopper bottom. The dust-free air is sucked and thrown into stack through duct by I.D. Fan. The length of duct is kept very small. Instead of cyclone, ESP will be provided.

The care of emission is taken through by employing ESP.

Thus, action plan for control of standard ambient air quality parameters as per NAAQES is planned, which also includes fugitive emissions from all prominent sources. In due course, this will be discussed with visiting officers of SPCB. **(ToR 20, 21)**

4.2.2.2 Salient features of the proposed ESP

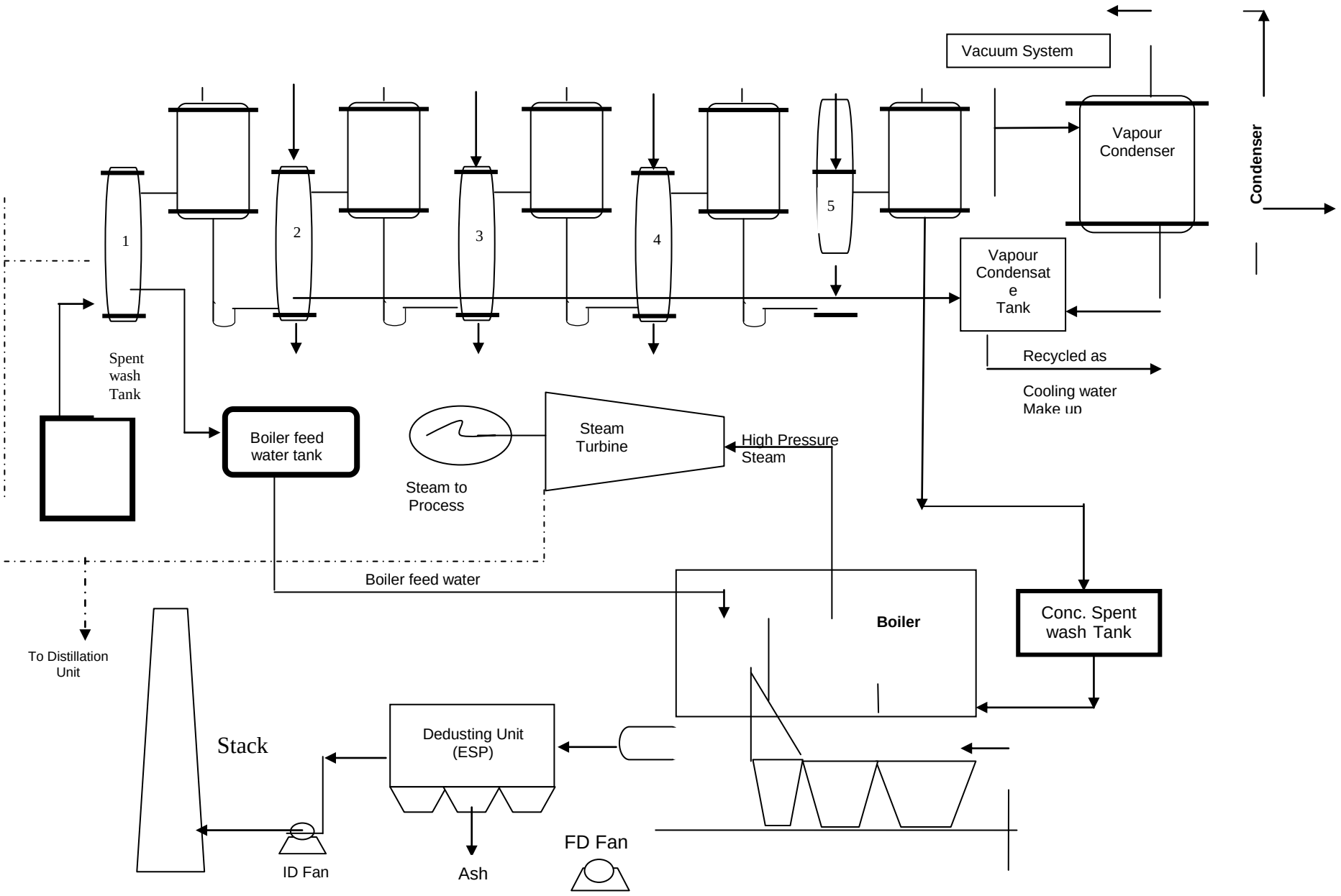
The boiler will be equipped with high efficiency three fields Electro Static Precipitator, which will remove the suspended particles and ash particles from the flue gas. The efficiency of the Unit 1 Co-gen boiler ESP is 99.2% and that of slop fired boiler will be 99.88 %. The dust concentration at the outlet of ESP of Co-gen boiler will be 50.0 mg/Nm³ and that of slop fired cogeneration boiler will be 100 mg/Nm3

i) Boiler: There is a 40 TPH dedicated boiler for distillery, based on coal and Concentrated Spent Wash (CSW). The 2 boilers of 100 and 15 TPH are serving sugar and co-gen unit and are selected with good features. 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.

.

Table 4.3: Operating Parameters of Boiler (with APC Measures)

#	**Parameter**	**Data**
1	Boiler capacity	40 TPH at 43 kg/cm^{2}and 390 ^{0}C temperature 100 & 15 TPH at 87 & 47 kg/cm2 pressure and 510 & 490^0 C temperature respectively
2	Fuel	
	Coal	96 T/d
	Bagasse	1176 T/d
	Spent Wash Concentrate (60 % conc,)	300 T/d
3	Chimney, ht	81 m, 70 m
4	APC device in boiler	ESP


Vacuum System
Vapour Condenser
Condenser
1
2
3
4
5
Vapour Condensate Tank
Recycled as
Cooling water Make up
Spent wash Tank
Boiler feed water tank
Steam Turbine
High Pressure Steam
Steam to Process
Boiler feed water
To Distillation Unit
Boiler
Conc. Spent wash Tank
Stack
Dedusting Unit (ESP)
ID Fan
Ash
FD Fan

4.2.2.3 Estimation of Chimney Height for Boiler

Chimney is fired with a mixed fuel consisting of bagasse and CSW. Chimney height is estimated for the boiler for the following situations.

1. Ht of Chimney for Sugar unit of capacity 115 TPH, Based on bagasse

Relation for estimation of stack height for boilers based on ash generated from bagasse

$H = 74(Q)^{0.27}$ for 115 TPH boiler with coal firing.

Where , H = Height of Chimney in m

Q = ash produced, TPH

= 1.2 TPH

Hence, $H = 74\ (0.73)^{0.27}$ = 67.7 m

Therefore 70 m stack provided

.

2. Ht of Chimney for Distillery Boiler of Total 40 TPH Based on SO_2 in flue gas. (Boiler is fired with CSW, coal)

Relation for estimation of stack height for boiler based on Sulphur di-oxide produced with bagasse

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

Where , H = Height of Chimney in m

Q = SO_2 kg/h

= 306.6 kg/h

Hence, $H = 14\ (306.6)^{0.3}$ = 78 m

Therefore 81 m stack provided.

Appropriate ladder, plat form and sampling arrangement will be provided as per CPCB Norms.

4.2.2.4 Diesel Generator, 1010 KVA (2 Nos.)

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. For pollution control, funds are earmarked.

i) 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 baggasse, husk, and molasses involved. Provided closed godowns, 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.

4.2.2.5 Ground Level Concentration (GLC) Of Air Pollutants By Mathematical Modeling

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 5000 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.

A) INPUT DATA

i) Gaseous Emissions from Boiler

The gaseous emission generated from boiler is given.

ii) Meteorological Data

The meteorological data available from secondary source and monitored at plant site during pre-monsoon. The data has been used for the modeling. The meteorological data used for modeling is given below:

Data recorded at the weather station on wind speed, direction and temperature (has been used for computations. This data has been used for establishing the hourly stability class. The Sigma theta method (USEPA) based on frequency distribution of wind direction in conjunction with wind speed has adopted for the establishing the hourly stability class. The mixing height data at the

nearest IMD Bangalore station is given in Table-4.5. As the site specific mixing height is not available, EPA approved general mixing heights as applicable for Industrial Source Complex model has been considered for modeling to establish the worst-case scenario. The data on ambient air quality is given in Table-4.4. The mixing heights considered for modeling is given below in Table

Table 4.4: 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 4.5: 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.

iii) Estimation of downwind ground level SPM concentration

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

$$Cx\ \text{distance} = \exp\left(\frac{Q\text{-}H2}{\pi u \delta y \delta z}\right) \quad 2\delta z2$$

Where,

Cx = 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 centre 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 Pune. 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, m						
	400	700m	1000 m	2000 m	4000 m	7000 m	10000 m
δy	44 m	74 m	105 m	200 m	370 m	610m	840 m
δz	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, m4/s
= gd2vs (Ts-Ta)/4Ts, m4/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.

Δh = Exb/ua , m

Where, E=1.6 F1/3, a=1 and b=2/3 for the conditions F > 55 and x < 119F0.4
E=38.7 F0.6, a=1 and b=0 for the conditions F > 55 and x >119F0.4
H = (h +Δ h),

Impact on Air Quality

Daund Sugars Ltd. is located at Alegaon village, Tal. Daund of Pune dist. in Maharashtra. It has proposed an expansion of Sugar production from 3500 TCD to 6000 TCD and distillery from 45 KLPD to 90 KLPD.

Air quality impact is envisaged due to operation of proposed incinerator of 40 TPH capacity. This will be operated either on 100% coal or combination of coal & CSW (Coal – 30% & CSW-70%). Hence, Particulate Matter (PM), Sulphur Dioxide (SO2) and Nitrogen oxides (NOx) are expected as pollutants.

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.

Input to Model

Two scenarios are considered for modeling:
Scenario 1: 100% Coal; and
Scenario 2: 30% coal & 70% CSW

The stack details and flue gas characteristics of incinerator are provided below:

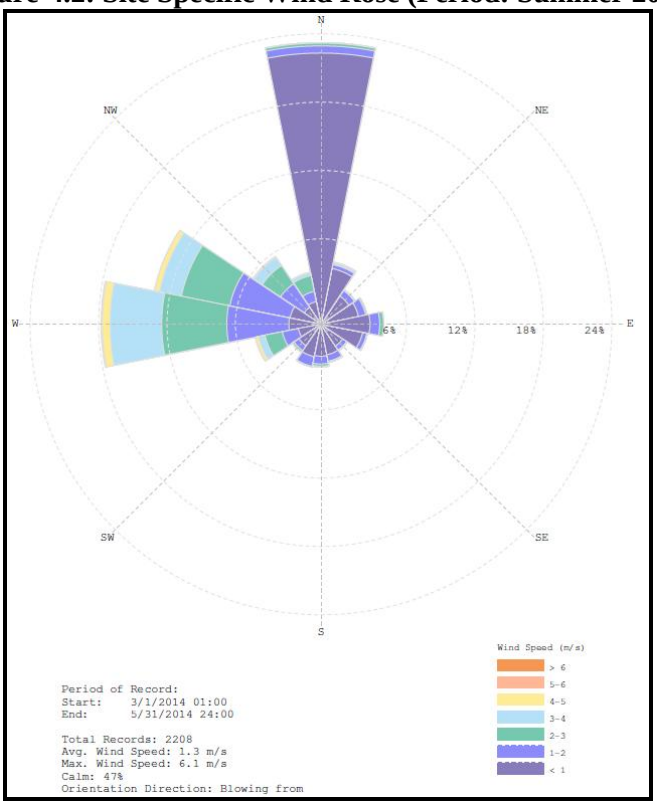
Table-4.6: Stack Emission

Parameters	Unit	Stack attached to Incinerator	
		Scenario 1	Scenario 2
Fuel used		Coal	Coal + CSW
Fuel Consumption	MTPM	3240 (Ash – 39.81% & S – 0.38%)	Coal : 972 (Ash – 39.81% & S – 0.38%) CSW: 6048 (S – 0.62%)
Stack height	m	81	81
Stack diameter at exit / top	m	1.7	1.7

Stack exit gas velocity	m/s	19	19
Stack gas temperature at exit	Deg. C	150	150
PM Emission	mg/Nm^3	70	70
	g/sec	1.46	1.46
SO_2 Emission	Kg/hr	41.04	137.30
	g/sec	11.4	38.14
NO_x emission	ppm	70	70
	g/sec	3.21	3.21
Air pollution control equipment		ESP having Efficiency 98%	ESP having Efficiency 98%

Hourly meteorological data recorded at site for summer season, March-Apr-May 2014 on wind speed, direction and temperature is used as input. Site specific wind-rose for this season is shown in **Figure-4.2**.

Figure-4.2: Site Specific Wind Rose (Period: Summer 2014)



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 to incinerator as centre.

Prediction

The predicted results are tabulated below in Table-2 while dispersion trend is shown as isopleths through Figure-2, 3, 4 & 5 for PM, SO2 (Scenario 1 & 2) and NO_x respectively.

Table-4.7: Predicted 24-Hourly Short Term Maximum Incremental Ground Level Concentration

Pollutants	Maximum Incremental Levels, µg/m^3	Distance, km	Direction
PM	0.7	1.5	ESE
NOx	1.62	1.5	ESE
SO_2 – Scenario 1	5.8	1.5	ESE
SO_2 – Scenario 2	19.3	1.5	ESE

The maximum incremental GLCs (Refer **Table-2**) of PM, SO_2 & NOx are superimposed on the baseline concentrations recorded during the study period to arrive at the likely resultant concentrations after operation of incinerator. The cumulative concentration (baseline + incremental) is tabulated below in **Table-4.8**.

Table-4.8: Resultant Concentrations Due To Incremental GLC's

Pollutants	Incremental Concen-trations	Baseline Concen-trations**	Resultant Concentrations	CPCB Limit for Industrial, Residential, Rural & Other Area
PM	0.7	71.43	72.13	100
NOx	1.62	32.65	34.27	80
SO_2 – Scenario 1	5.8	23.95	29.75	80
SO_2 – Scenario 2	19.3	23.95	43.25	80

Concentrations are expressed in **µg/m^3**

** - Avg. Baseline concentration in study area

Impact Assessment

Ambient air quality in study area w.r.t. PM, SO_2 & NOx is within NAAQS 2009 as seen from Table-3 above. Hence, any significant impact is not envisaged.

Mitigation Measures

Ambient air quality will be within NAAQS 2009 as mentioned above after operation of proposed incinerator. ESP is proposed air pollution control equipment and also, stack of adequate height, 81 m is proposed to disperse the flue gas adequately.

Figure-4.3: Short Term 24 Hourly Incremental GLCs of PM

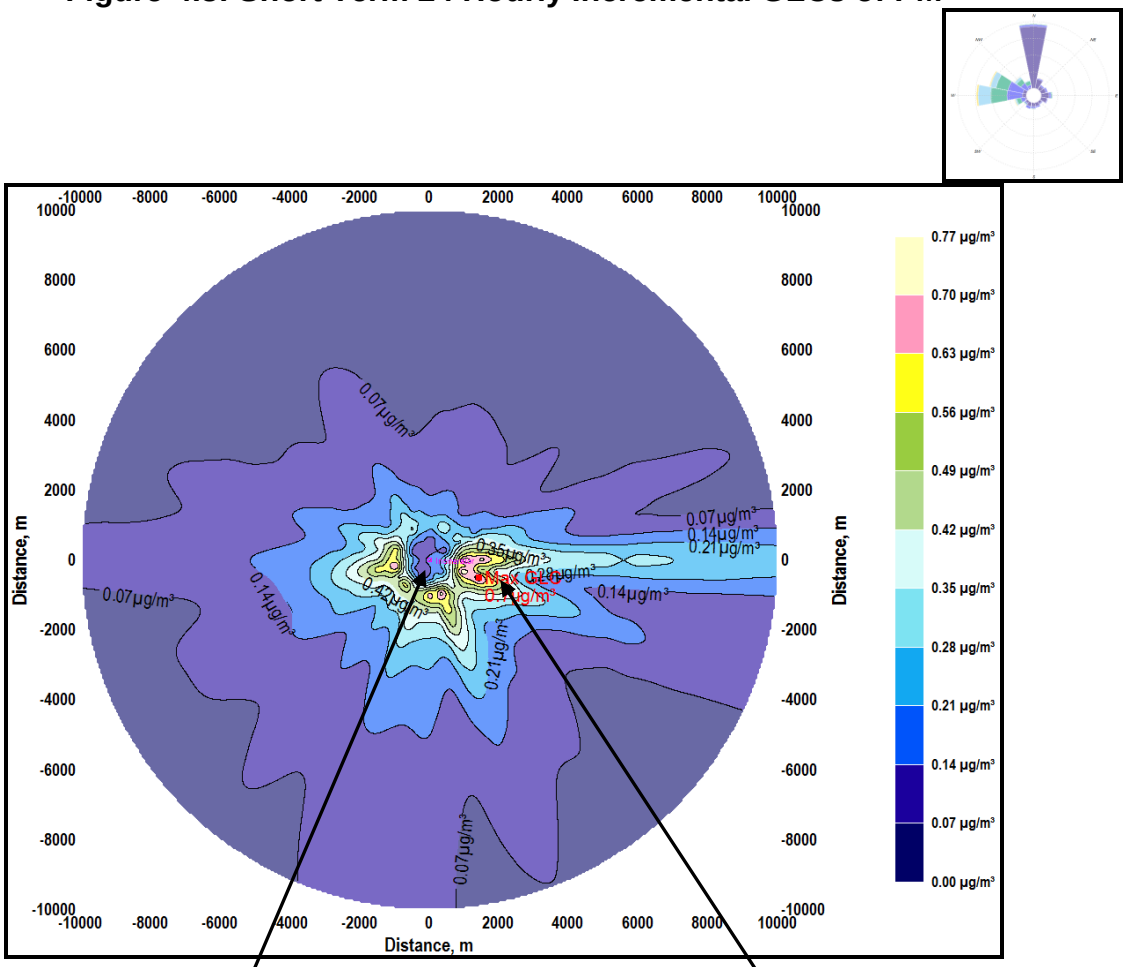
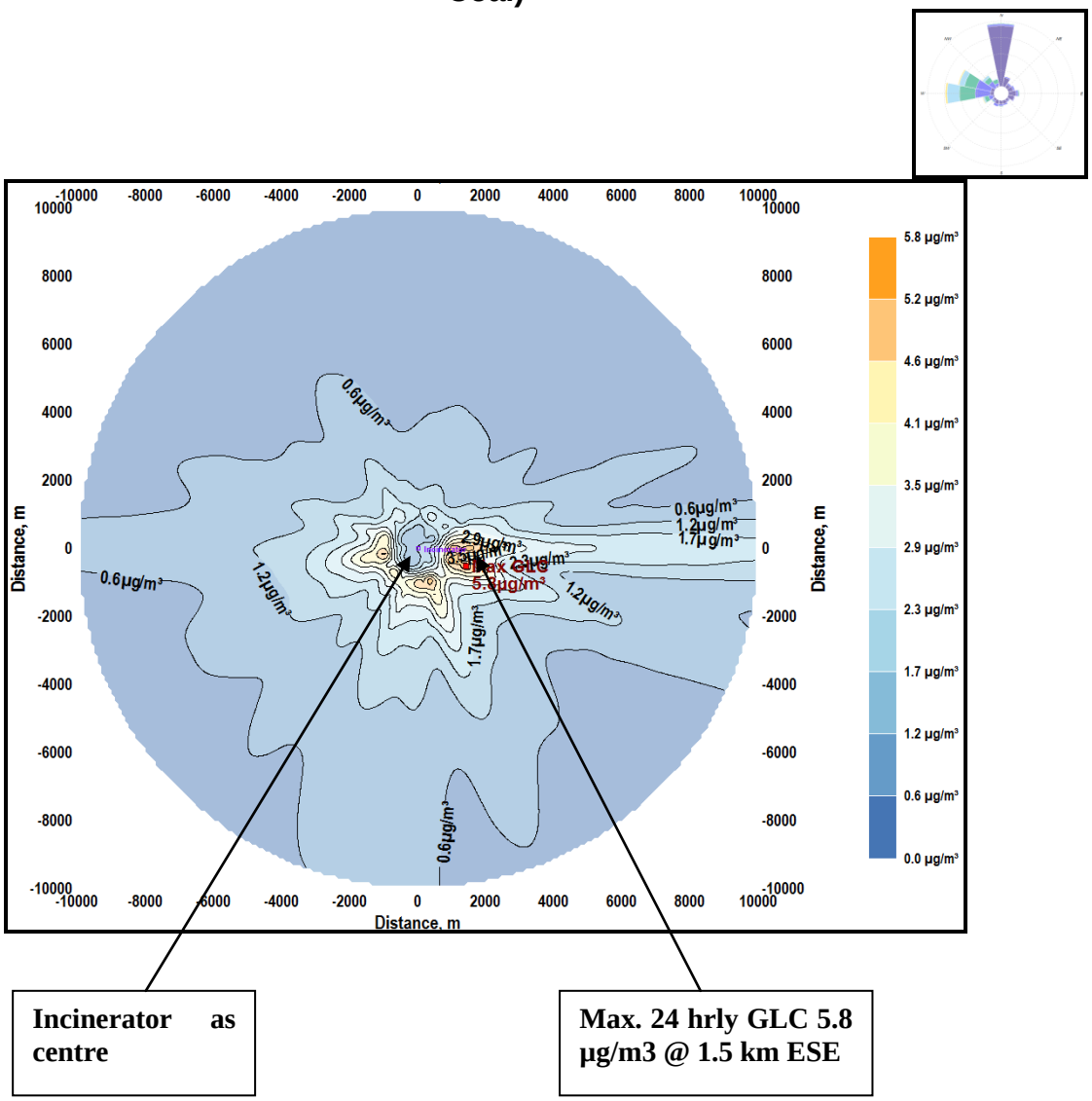


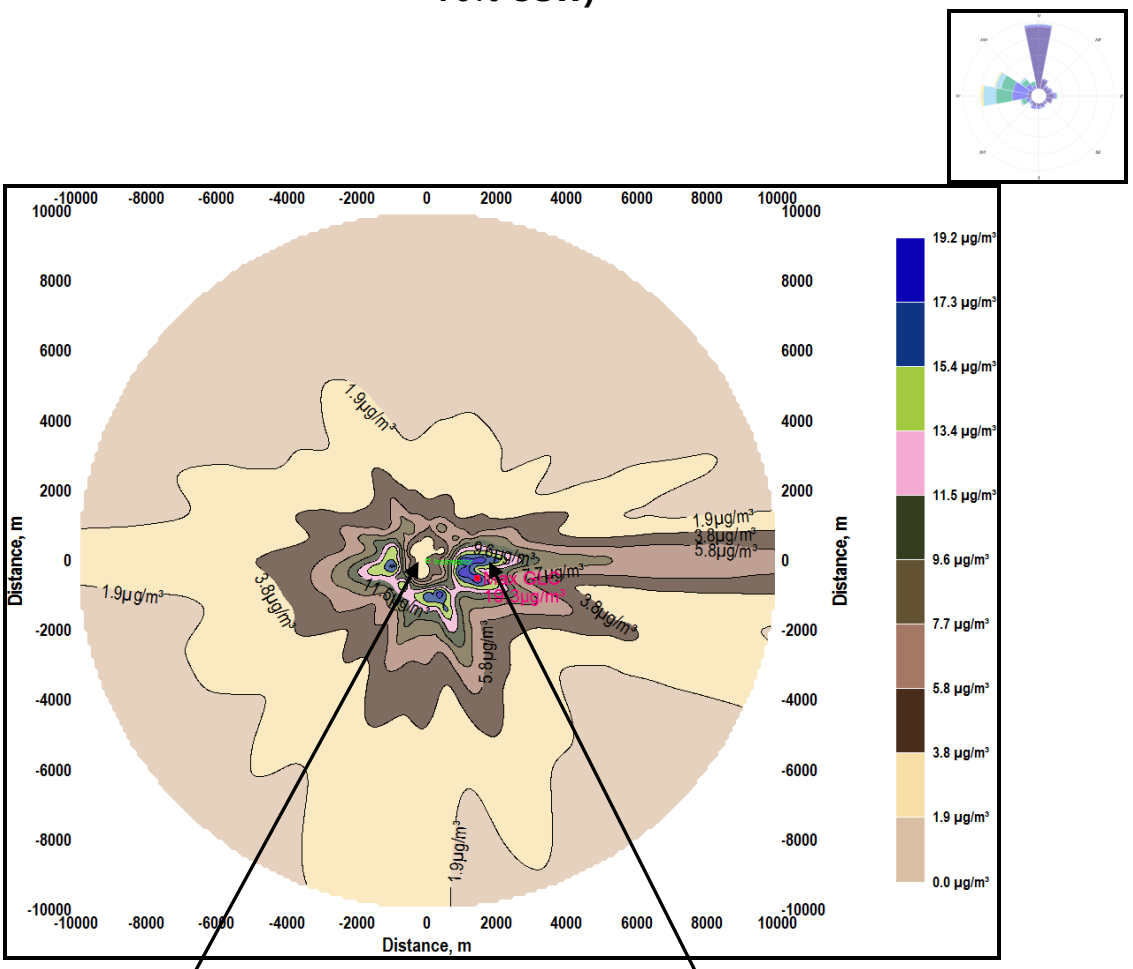
Figure-4.4: Short Term 24 Hourly Incremental GLCs of SO_2 – Scenario 1 (100% Coal)



Incinerator as centre

Max. 24 hrly GLC 5.8 µg/m3 @ 1.5 km ESE

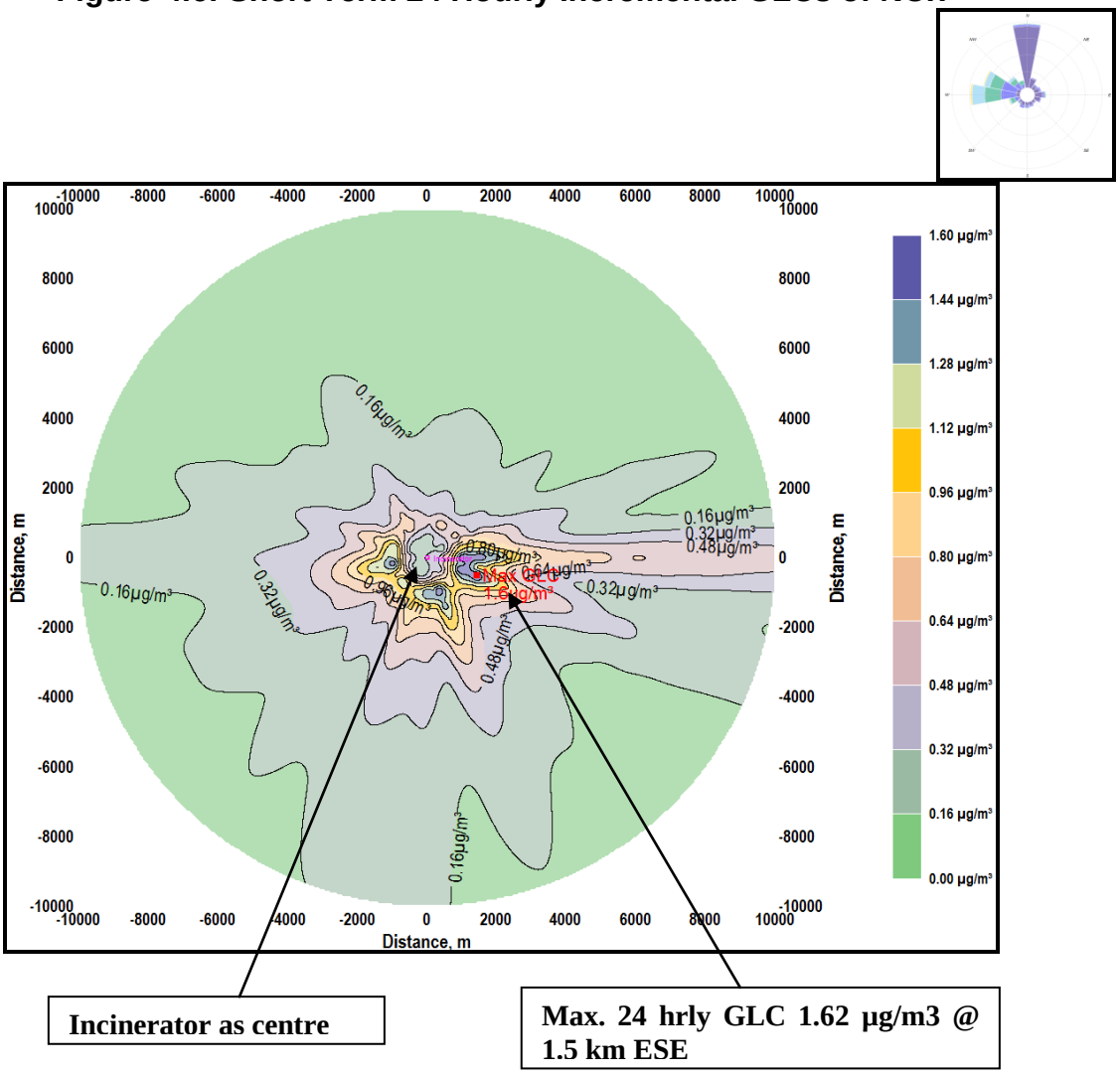
Figure-4.5: Short Term 24 Hourly Incremental GLCs of SO_2 – Scenario 2 (30% Coal + 70% CSW)



Incinerator as centre

Max. 24 hrly GLC 19.3 µg/m3 @ 1.5 km ESE

Figure-4.6: Short Term 24 Hourly Incremental GLCs of NOx



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

1. 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.
2. 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.
3. 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. The CO_2 is controlled. The greenery maintained around is capable to reduce above.

At this location there is no other CO_2 liberating activity. **(ToR 19)**

4.2.3 Water Environment

Introduction

It will be a logical analysis of any situation if a study is undertaken in following way:

- Incoming water quality.
- Water budgeting to estimate effluent quantity and quality.
- STP/ETP and its performance evaluation.
- Expected impact.

i) Key Central Legislation:

A comprehensive statute viz. Water (Prevention and Control of Pollution) Act stands promulgated in 1974 (amended twice in 1978 and 1988). The Statement of Object and Reasons annexed to the Bill, interalia states:

"Having considered the relevant local provisions existing in the country and recommendations of the aforesaid Committee, the Government came to the conclusion that the existing local provisions are neither adequate nor satisfactory. There is, therefore, an urgent need of introducing a comprehensive legislation which will establish unitary agencies in the Center and States to provide for the prevention, abatement and control of pollution of rivers and streams, for maintaining and restoring wholesomeness of such water courses and for controlling the existing and new discharges of domestic and industrial wastes".

The scope of the Act is quite wide. The object of this Water Act, 1974 is (1) to prevent and control of pollution of water as defined therein and (2) to maintain or restore wholesomeness of water.

The objective also appears to provide penalties after conviction that it will be deterrent to others who might indulge or tend to indulge in polluting the waters. The definition of water pollution, therefore, is kept quite wide and encompasses welfare of not only human beings but also the plants, animals and aquatic organisms. The definition is too comprehensive to allow anyone to escape the hands of this Act on pure technicalities. This Act considers the principle of vicarious liability in Section 47, and thus where the offense has been committed by a company (a body corporate, a firm or association of individuals), every person who at the time of offense was committed, was in-charge of and was responsible to the company, as well as the company, shall be deemed to be guilty of the offense. Furthermore, if it is proved that the offense has been committed with consent or connivance of or is attributable to any neglect on the part of any director, manager, secretary or other officer of the company then such person also shall be deemed to be guilty of the offense and shall be liable to be proceeded against.

The Scope of this Act is kept quite wide as to cover in Section 48, the offenses by the Government departments or undertakings and the head of the department shall be in normal course deemed to be guilty of offence, where an offense under this Act is committed. With the sole object to empower the Pollution Control Boards, (establishment of which is yet another object of this enactment), to keep the waters wholesome, the legislature have offered a wide scope under Section 60 which sanctions an over-riding status viz. "The provisions of the Act shall have effect not-with-standing anything inconsistent therewith contained in any other enactment other than this Act."

Therefore, in conclusion it can be said that in order to prevent and control pollution of water, to avoid nuisance, harm, injury to public health and safety and to maintain or restore quality of water, this Act confers a number of powers on Pollution Control Boards and expects specific functions from them. To protect a guilty person against double jeopardy, the Act puts a bar by Section 49 on cognizance of offence, that no Court shall take cognizance of any offense under this Act except; (1) on a complaint made by or (2) on a complaint made with previous sanction in writing of the State Board. By a recent amendment public participation is encouraged and prior sanction is not insisted.

4.2.3.1 Water Quality:

i) Raw Water:

The water used for this Unit plant is already available, assured and dependable. Our source is granted by Govt. of Maharashtra from River Bhima about 3.5 km from the site and Khadakwasla dam canal near to the site. 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.

ii) Water Budgeting

For Sugar:

Table 4.9 Water Budgeting for Sugar Unit

#	Use station	Input	Loss	Effluent	
				Sober	Moderate
1	Milling	105	10	-	95
2	In preparation of sulfur and lime solution	20	5	-	15
3	process	575	25	-	550
4	Floor and vessel washing	30	5	-	25
5	Cooling etc	50	5	45	-
	Total	**780**	**50**	**45**	**685**

Input side (Industrial):

Fresh Water for Industry,(Sugar) - 780 cum/d

Total Input **- 780 cum/d**

Output side:

a. Loss from Industrial Use - 50 cum/d
b. Effluent sober nature sent for ETP - 45 cum/d
c. Effluent Moderate in nature - 685 cum/d

Total Output **- 780 cum/d**

The Sober & moderately polluted effluent after ETP will be recycled collectively

For Distillery

ii) Water Budgeting for Distillery:

Table 4.10: Details of water balance for Distillery.

#	Station	input	Loss	Wastewater	
				Quantity	Nature
1	Boiler	Make up: 41	9	32	Sober
2	Cooling	Make-up= 150	100	50	Sober
3	Fermentation	664 Feed = 90 Recycle =58 Recycle = 30	10	832	Recycle
4	Distillation	832	4	720 50 58	High BOD Moderate Recycle
5	CO_2 Scrubbing	30	-	30	Recycle
6	Floor and vessel washing	10	3	7	Moderate

Input side **(Industrial):**

a. Fresh Water for Industry - 895 cum/d
b. Moisture from feed - 90 cum/d
c. Internal recycle - 88 cum/d

Total Input - 1073 cum/d

Output side:

a. Loss from Industrial Use - 126 cum/d
b. Effluent sober nature - 82 cum/d
c. Effluent Moderately polluted - 57 cum/d
d. Effluent Highly polluted spent wash - 720 cum/d
e. Recycle inside - 88 cum/d

Total Output - 1073 cum/d

Internal recycling is Condensate water, CO2 scrubbing, steam, and spent lees.

In addition to this water is needed for domestic use (worker's personal hygiene and canteen / colony), Greening drive and partly power plant. The recovered waste water is treated and recycled. 20 m3 is used as domestic for workers hygiene and 200 m3 fresh for greening.

The industrial high BOD effluent is 720 m^3/day.

ii) Segregation:

As MoEF desires, **TI** has decided to bring the segregation principle in practice. Now, the industrial waste water streams are segregated first in three branches as (A) Sober, (B) Moderately Polluted and (C) High BOD polluted. The first two are then combined. It shall help in many ways for ease of treatment.

Stream (A) Sober

The Sober wastewater stream (82 m3) comes from boiler blow down and cooling purging water. Except temperature, it has little other objectionable characteristic. This can be cooled and used. However, taken for treatment with Stream, the quantity and pollution load is small, and independent ETP is untenable. Thus with small collection tank, it is allowed to mix with moderately polluted Stream B. This too serves as diluents.

Stream (B) Moderately Polluted
Moderately polluted wastewater (57 m3) comes from process, excess spent lees and floor- vessel washings. This needs Biological treatment. This is provided by way of aeration followed by tertiary treatment, along with stream A

Stream (C) High BOD Spent wash
The Industrial wastewater (720 m^3) is acidic in pH, has deep color, and has high BOD, COD and TDS. However, it is neither poisonous, nor toxic, nor hazardous, is highly biodegradable, and has good calorific value. It is proposed to treat the effluent employing two different avenues for existing and proposed 45 KLPD as
(C-1) Existing 45 KLPD = Bio-methanation and bio-composting, working for 270 days with 30 days lagoon
(C-2) New 45 KLPD = Evaporation (MEE) and concentration, as fuel. Working for 300 days.

The Characteristics of this effluent stream are expected to be:

Table 4.11: Characteristics of Effluents

#	**Parameter**	**(C) Spent wash**	**(A +B) Sober and Moderate**
1	pH	4.0 – 4.5	5.5 – 6.5
2	Temperature	90-95^o C	45-85^{0}C
3	Color	Dark brown	Faint
4	Total Solids	125000-137000	1300-1500
5	BOD	50000-55000	500-700
6	COD	120000-130000	1200-2000
7	Quantity CMD	720	139 (82 + 57)

(All Values from serial No. 4-6 are in mg/l)
The treatment trains will be

(a) For stream (A) Sober effluent 82 cum/d – Physical treatment by bringing down the temperature to ambient and then joining to Stream (B) as diluent
(b) For stream (B) Moderately polluted effluent Floor washing 7 and spent lees 50 cum/d (Totaling 570 Cum/d) added to stream (A) Sober effluent 82 cum/d as; Equalization cum buffer followed by aerobic treatment and tertiary treatment.

(c) For stream (C) high BOD spent wash, 720 cum/day;
(C-1) 360 cum/d Existing 45 KLPD = Bio-methanation, MEE and bio-composting, working for 270 days with 30 days lagoon
(C-2) 360 cum/d New 45 KLPD = Evaporation and concentration, as fuel. Working for 300 days.

The steam requirement is provided with a pressure of 3.5 kg/cm2(g) and temperature 127 to 148 ^{o} C at a normal rate of operation as 20,000 kg/hr. This is available.

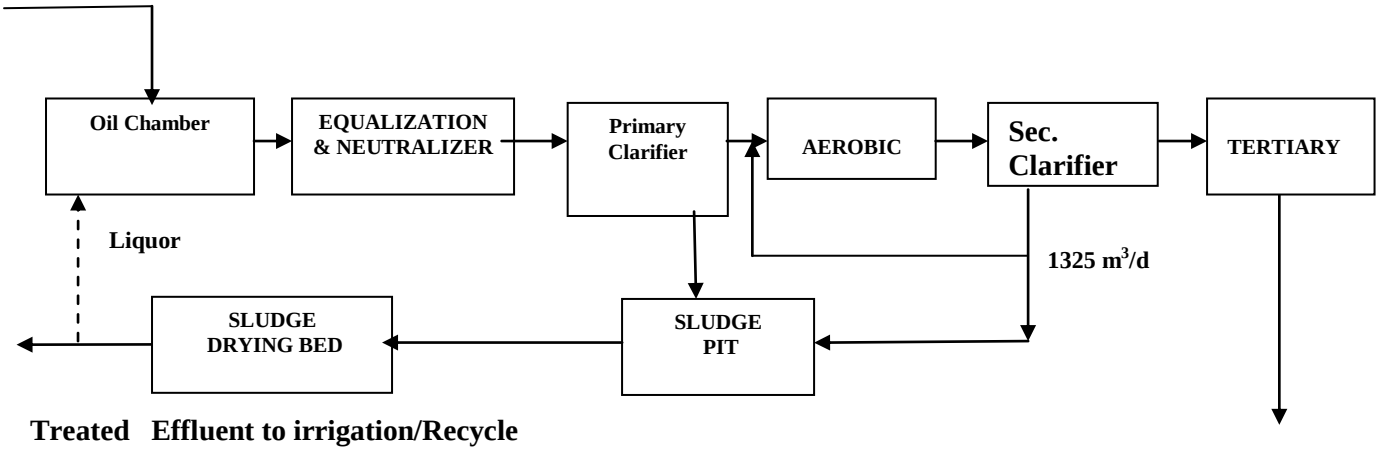
The summary of water and waste water can be submitted as follows:

#	**Plant**	**Input**	**Effluent**	
			Sober	**Moderate**
1	Sugar	780	45	685
2	Distillery	895	82	57
3	Distillery MEE	-	-	180
4	Distillery Concentration	276	-	276
	Sub-Total	1951	127	1198
	Total		**1325**	

The schematic is

EFFLUENT A and B

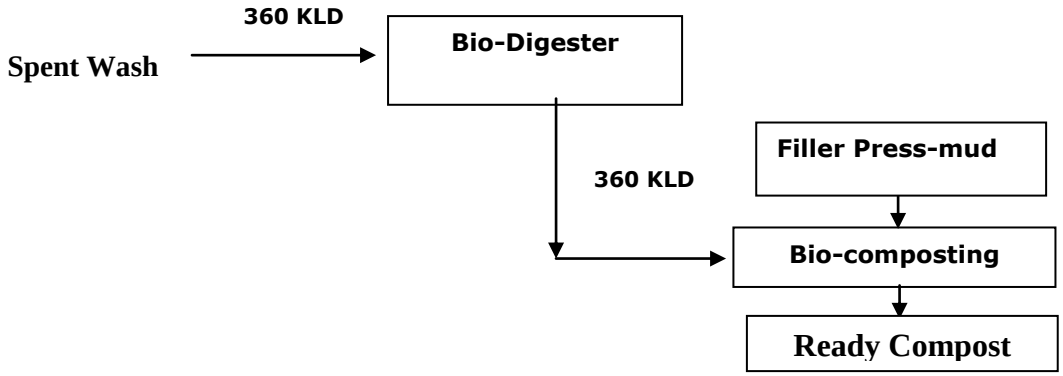
Sober, Moderate Effluent and Condensate water, 127 + 742 + 180 + 276 = 1325 m^3/d



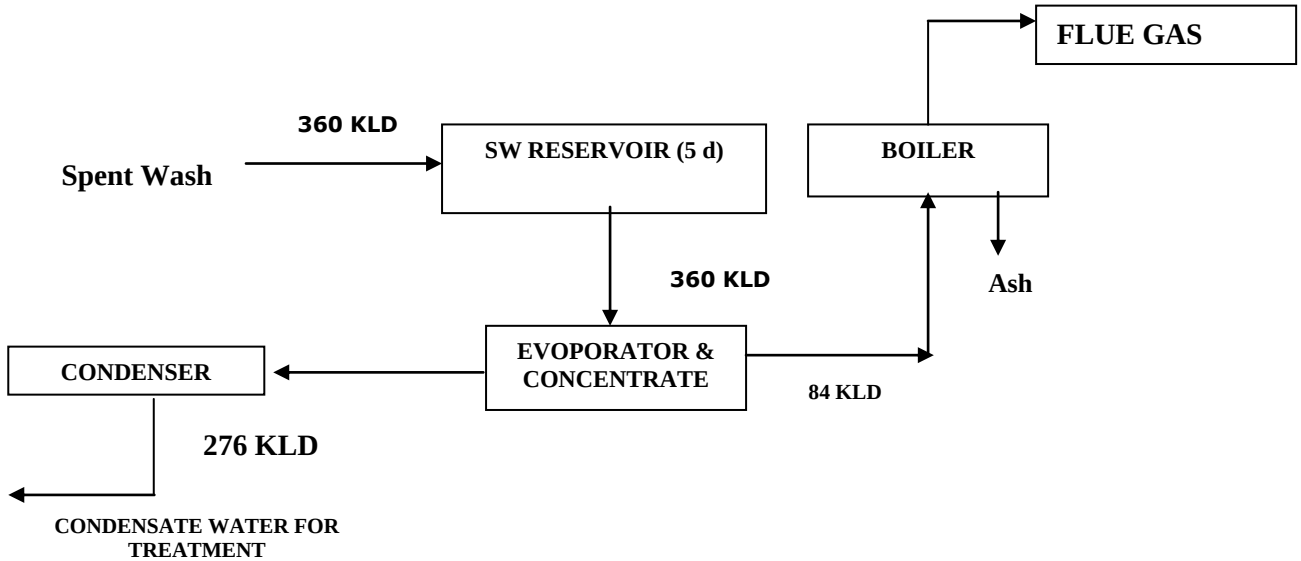
Treated Effluent to irrigation/Recycle

EFFLUENT C

(C-1) 360 cum/d Existing 45 KLPD = Bio-methanation and bio-composting, working for 270 days with 30 days lagoon



(C-2) 360 cum/d New 45 KLPD = Evaporation (MEE) and concentration, as fuel. Working for 300 days.



Effluent Domestic

iii) Storage for Spent Wash

Storage reservoir will be provided for storage of spent wash. The specification and capacity of the storage tanks is given bellow.

Particulars	Spent Wash Storage (C-1)	Spent Wash Storage (C-2)
Capacity	30 d	5 d
Volume m^3	5400 (2 Nos.)	1800
Size of Tank	62.5m X 43.5m X 2.5 each	18m X 43.5m X 2.5m each

The tanks are 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 30 days detention in case of bio-composting and 5 days detention in case of evaporation concentration. Ours are not exceeding. 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.

We already have an arrangement for bio-composting with own self-sufficiency in filler press-mud. It can serve as stand-by safety.

a) Evaporation Plant

The spent wash will be concentrated in multi-effect evaporation (MEE) plant and then utilized as Boiler feed. The evaporators operate under vacuum and are integrated with distillation columns. The vapors from distillation column are used as heating media in evaporators to concentrate spent wash upto 60 %. Additional steam will be required for concentration of spent wash and is so provided. Water vapors from evaporator are condensed in surface condenser and the condensate water after treatment in CPU will be recycled to cooling tower as make up water.

Table 4.12: Operating Parameters of Evaporator

#	Parameter	Data C-1	Data C-2
1	Type of Evaporator		Falling film followed by forced circulation multiple effect Evaporators
2	Spent wash at inlet	360 T/d	360 T/d
3	Spent wash (Conc.) at outlet	360 T/d (to Biocompost)	84 T/d
4	Total water evaporated	--	276 T/d
5	Steam requirement	--	3.5 Kg/T
6	Characteristics of CSW	*	Solids: 60 %, GCV: 1600 Kcal/Kg.

*The compost has proper characteristics as per consent.

Mitigation:

As additional mitigation measures, **TI** 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 of 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. Fresh water input for distillery is kept limited to 10 KL/KL. Spent wash generation will be 8 KL/KL of alcohol production. Capacity for spent wash holding tank is kept much below than normally permitted & will be constructed water-tight as per CPCB norms **(ToR 24, 25, 26, 27, 28, 30)**

4.2.4 Rain Water Harvesting

This is designed as per CPCB Publication. The site has 510 mm rainfall with wet month as July (30 %) and wet days are about 10. Thus, the maximum wet day with a factor of safety as 2, we have rains on that day as 27 mm. The rain water harvesting is planned, on Q= CIA basis.

#	**Particulars**	**Area Sq.m.**	**Coefficient**	**Intensity m**	**Quantity Cum**
A	Pre-project				
1	Open land	194210	0.5	0.03	2913.15
B	Post-project				
1	Roof	20675	0.9	0.03	558.22
2	Utilities	44361	0.8	0.03	1064.66
3	Roads	44644	0.85	0.03	1138.42
4	Parking & Yard	29901	0.6	0.03	538.22
5	Vegetated	54629	0.15	0.03	245.8
	Total	**194210**			**3545.32**

It may be seen that there is small incremental rain run-off, due to our efforts for vegetation. Further when once roof water will be collected and used for ground water recharging through 10 soak pits of size 4x10x3 m, the storm water will not be a cause of anxiety.

The storm water is collected by garland built in gutters and led to the natural drain.

Action plan as based on CPCB guidelines for rain water harvesting is prepared and included above. This will be partly used for ground water 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 **(ToR 41)**

4.2.5 Soil and Biological Environment

4.2.5.1 Introduction:

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 down stream. Sometimes the rapid congregation of water becomes too high for the carrying capacity of channels/ nallas giving rise to build-up of back waters.

4.2.5.2 Borrow Pits:

The present plot for development of **TI** 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 so 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.

4.2.6 Solid Waste Management:

4.2.6.1 Introduction:

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 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 TI 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 4.13: Solid Waste per Day

#	Waste	Quantity	Disposal	Remark
1	Canteen	2.0 CuM	Own garden	Organic
2	Colony	4 CuM	Own garden	Mixed
3	ETP	85 kg	On Land	Organic, Non-Haz
4	Office	2 CuM	Sales	Non-Haz.
5	Packing Sec.	1 CuM	Sales	Non-Haz.
6	Yeast Sludge	10 kg	On greening belt	Organic, and Non-Haz.
7	Ash	47 T	Sales	Takers available
8	Lube oil	25 Kg	Carts	In season

For ash handling system engaged is:

1) Submerged Belt Conveyor:
   It includes Idlers, Pulleys with bearing and Plummer block ,skirting, complete drive assembly, Belting of all conveyor, Structures such as stringer with short Supports Head, Tail, Drive Base Frame, Take up Frames, Drive Base Frame, connecting chutes, both side walkways ,safety switches ,water inlet and outlet drain Nozzles.
2) Ash Belt Conveyor
   It includes Idlers, Pulleys with bearing and plummer block, skirting, complete drive assembly, Belting of all conveyor, Structures such as stringer with short Supports, Head, Tail, Drive Base Frame ,Take up Frames, Discharge chute, connecting chutes.
3) Screw Belt Conveyor
   It includes complete drive assembly, screw flight pipe shaft, trough, trough cover, end seals, Structures, drive Base Frame, inlet chute, Discharge chute, connecting chutes.

(B) Hazardous Waste:

The relevant summary of above reads as:

Table 4.14: Summary of Hazardous Waste

S. 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 baggasse. 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. **(ToR 33)**

4.2.7 Noise

4.2.7.1 Noise source and control measures

1. Sources of noise

The source and quality of noise in the distillery are given bellow.

i. Steam turbines : 85-90 dB (A)
ii. Diesel Generators : 75-80 dB (A)
iii. 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/ CPCB guide lines.

2. Noise control measures

Workers at these equipments are provided with 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.

i. Diesel Generator

Diesel generator capacity : 1010 KVA (2 Nos.)

Diesel generators will meet the Specification of MoEF. 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.

ii. Fan. Blower and Compressor

Water sealed vacuum pump and air blowers are used in fermentation, distillation and evaporator plants. Air fans are used at boiler house

In addition to above plantation is done for mitigation.

4.3 Traffic Management

Traffic Density and Its Impact

Raw materials (molasses), fuels (Bagasse) will be procured from various locations of this and adjacent district and transported to the factory through lorry transport. Similarly alcohol produced in the factory is transported to various consumers through lorry tankers. The vehicles will move mainly through district roads from Rashin to Ahmadnagar/Daund 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.

4.3.1 Traffic Due To Project Activities

i) Personnel:

During operation a maximum of about 602 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 Pune office and not from site. Only nominal few 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.

- Molasses 350 T/d, major portion locally from sugar unit. 10 heavy duty tanker lorries per day and empty return
- Alcohol 90 KL/d, 6 heavy duty tanker lorries per day and empty return

- Boiler ash to vicinity farmers 47 T/d, 4 heavy duty lorries per day and empty return
- Miscellaneous storages 1 truck per day and empty return
- Trucks for transport of sugar bags: 50 per day during season
- Sugarcane tractors 75 Nos.

If spread over 14 hrs. the frequency may be 15 minutes, one way

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 79 short distance (local) vehicles and 46 long distance 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 Rice husk and Bagasse 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 only from local bullock carts 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 35-50 long distance trucks. Night transport will be generally avoided and this will be placed in 14 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 **(ToR 44).**

4.4 Greening Drive:

4.4.1 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 Bhima. CPCB has further divided this region in sub-zones. The peculiarities of this subzone is identified as follows

- Rainfall 500-600 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, Nariyal/coconut, Nilgiri, Sitafal, Badam/Almond, Gulmohar, Pimpal, Chinch, Umbar, Babhul, Santra/Orange, Papaya, Lemon, Jamb/Guava, Sag, Aavla.

We currently have around 13,000 nos. of trees. We propose to plant 20,000 more trees in the near future during this expansion.

Action plan for green belt is based on CPCB guidelines and in 33% area. The unit has already planted about 13,000 trees and further plan will be as detailed in Chapter on EMP. **(Tor 36).**

4.5 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 Daund, Pune and Ahmednagar. 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.

Care Taken for Handling and Transportation of Molasses

Molasses will be outsourced partly 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.

PART "B" MITIGATION

Environmental Impacts due to project location, possible accidents, project design, project construction, regular operations, final decommissioning or rehabilitation of a completed project

It is our endeavor to minimize the impact. Impact can normally be caused due to various reasons namely (1) by wrong site selection, (2) by accidents during construction, (3) by accidents during operation, (4) by accidents during decommissioning or (5) by accidents during rehabilitation of the project.

i) Location is so selected as should not create environmental issues much on downstream and downwind directions. The area involved is moderate in size, and already made NA and obtained NOC from District Collector. Public acceptability is also ascertained by discussions in advance. The target is shielded, and normal mitigation measures will prove adequate.

ii) Construction phase is of moderately small duration. Heavy civil construction is not involved, it is more of a fabrication needing less building materials to be borrowed from nature. Existing infrastructure of local body, and Government will serve the purpose. Large labour camp is not necessary, because skilled and unskilled people are available in the nearby villages. All due precautions will be taken for noise, dust and wastewaters. Commensurate with small-volume, day-time, machinery-assisted, expert-handled construction involved there are very low/no chances of accidents. No significant long range impact will be felt and normal mitigation measures will prove adequate.

iii) Operation phase shows a relatively safe expectation, as compared with many other types of chemical industries. Only one Raw Material, simple three steps manufacturing process and only one finished product, makes this aspect easy and devoid of apprehended accidents. The raw material is brought on JIT (Just In Time) principle from this District adjoining and neighboring Mills, largely, and there will be a tank farm to store it. There is a cladding to main shed and temperature of this location does not go very high. The finished product is much in demand in market and hence no need of having over-storage. Usual precautions as per Factory Act shall be taken. Fire protection system will be in place as per Acts and Insurance Companies. Normal precautions will prove adequate.

If ever it becomes necessary to **Decommission or Rehabilitate** the Industry, the experience gained by this industry here and elsewhere will be able to handle this without aftermaths of accidents.

Low incidences are possible because many measures for minimization are designed.

iv) Measures Built In the Process

Built in measures for resource conservation and pollution control in the industry are discussed along with project details in Chapter-2. The main objective is to follow environments friendly process, with efficient utilisation of resources, minimum waste generation and built in waste treatment and operation safety. The measures adopted are,

i. Continuous fermentation to improve alcohol yield and recovery and thereby molasses consumption reduced.
ii. Separation, recovery and recycle of yeast present in fermenter wash for reuse in fermenter. This reduces the use of fresh culture and nutrients in the fermenter and also improves ethanol yield.
iii. Use of live steam is avoided by employing re-boiler in distillation columns. This reduces the generation of wastewater.
iv. Multi pressure distillation system is used to reduce the consumption of steam and quantity of effluent.
v. Use of pumps with mechanical seals to avoid liquid leakages.
vi. Scrubbing of fermenter vent gases containing CO2 to recover traces of alcohol present in it.
vii. Water utilization reduced by 1. Evaporation of spent wash with recovery condensate water for use in cooling tower. 2. Re-boiler reduces water utilization 3. Recycle of lees water for dilution of molasses 4. Decanter centrifuge and recycle of thin yeast slurry saves water and improves alcohol recovery.
viii. Concentrated spent wash is used as fuel in boiler.

This can be analyzed by

(1) first identifying the various affectable facets of environment,
(2) measures for minimizing the cause of impact, (3) measures for minimizing the impact in general, (4) measures for minimizing the impact in particular that are irreversible and irretrievable and (5) finally assessing its significance.

Impact on Environment can happen by many ways as –

A. Modification of Regime
B. Land Transformation and Construction
C. Resource extraction
D. Processing
E. Land alteration
F. Resource renewal
G. Changes in Traffic
H. Waste Replacement and Treatment
I. Chemical Treatment
J Accidents, and
K. Others

The above eleven attributes can be further subdivided for better analysis. As an example the first attribute "Modification of Regime" can be sub-divided in twelve consideration aspects as –

a. Exotic fauna introduction,
b. Biological controls,
c. Modification of habitat,
d. Alteration of ground cover,
e. Alteration of groundwater hydrology,
f. Alteration of drainage,
g. River control and flow modification,
h. Canalization,
i. Irrigation,
j. Weather modification,
k. Burning,
l. Surface paving

Similarly for other attributes also subdivisions are made for better analysis. This follows.

The degree of impact as well as the nature of Impact (i.e. direct/ indirect, adverse/ beneficial, tangible/ intangible, reversible/irreversible, local/global retrievable/retrievable) will be dependent on the success of our pollution control and mitigation practices.

4.6 Measures for minimization

The principles of minimization or off-setting mal-effects are based on the principle of prevention, abatement, treatment, reuse, and smooth disposal of wastes. These are indicated herein below and dealt in details later in this Chapter.

Table 4.15: Minimization Efforts

#	**Regarding**	**Measure/ effort**	**Remark**
1	Raw Material	Obtained clean	Less loss, less load to environment.
		Dependable source	Continuity assured. No shock load to environment by make and break.
		Inventory	Only small as assured source. No fear of degrading.
2	Land	Limited. Already industrial.	No rehabilitation pending. No leveling necessary. No prime agricultural land. Not used previously general public. Already in possession.
3	Water	Safe, reliable dependent source	No encroachment on source of others. Not a process stoppage risk. Own efforts of recharging and reusing..
4	Groundwater	Available.	In fact by rain harvesting, recharging is made. Wells are existing and usable. No new tapping.
5	Air pollution	No gas as raw	Not likely to increase over routine. Satisfactory

		material, no gas generated in process (except CO2, SPM)and effluent treatment (except CO2)	monitoring schedule. ESP and stacks scientifically provided.
6	Wastewater	Both the Domestic and Industrial effluents fully taken care of making zero discharge outside	Water use minimized. Harsh industrial Wastewater is used for fuel and fertilizer generation. Other waste water treated and recycled to plant and plantation. Domestic effluent reasonably low in quantity. No discharge to any surface water, nor any percolation to groundwater.
7	Soil	MSW, Haz Waste, attended.	Soil is not spoilt. Landscaping is done. Organic solid waste is locally garden composted. Inorganic segregated. Saleable to fixed authorized vendors. Remaining either for sanitary or secured landfill. No hospital to create bio-medical waste.
8	Aesthetics	Noise	No big machinery kept near boundary, shed at central part of plot, sturdy foundations, no vibrations. Greenery maintained. In closed, covered sheds.
		Odour	Various measures are taken as – • Water use minimized. Wastewater minimum. • Lagoons are kept normally dry. • Secondary treatment is fully aerobic/ thermal. • No evaporation solar ponds • No disposal on land with cess pools.
9	Community	Acceptability	The economic situation is very harsh for the local neighbors. Very low livelihood. Lands only rain-fed. People are anxious to have at least some development. Assistance offered.
10	Track record	Social work and Law-abiding	Project proponents are keen on matters environmental and have good past record. They wish to continue the same. The society has respect for them.

With the mitigation measures proposed above with subsequent efforts of implementation, the potential impact (especially irreversible and irretrievable) should become very low / insignificant / nominal or none.

This concept of waste minimization, recycle/reuse/recover technique, energy conservation and natural resource conservation is also included as a part of EMP. This will simultaneously mitigate the adverse impacts. Funds are provided for environmental pollution control & waste minimization measures.

4.7 Irreversible and irretrievable commitments of environmental components.

Assessment of environmental components is done.

Table 4.16: Potential Impacts

#	Component	Discussion on potential Impact	Whether is it relevant from point of irreversible/ irretrievable effect?
1	Land	Area is compact and Limited. It is already an industrial one (NA). Thus there is no change in land-use pattern.	Not relevant
2	Water	No encroachment on source of others. Not a process stoppage risk. Own efforts of recharging and reusing. Water use minimized. No harsh industrial Wastewater after treatment. Domestic effluent very low in quantity. No discharge to any surface water, or any percolation to groundwater.	Not relevant
	Groundwater	Available. In fact by rain harvesting, recharging is made. No new tapping. Surface water available.	Not relevant. In fact improved.
3	Ambient Air Quality	Not likely to increase over routine. Satisfactory monitoring schedule. ESP and stacks scientifically provided.	Not relevant.
4	Soil	MSW, Non Haz. and Haz Waste, attended. Soil is not spoilt. Landscaping is done. Organic solid waste is garden-composted. Inorganic segregated. Saleable to fixed authorized vendors. Remaining either for sanitary or secured landfill. No hospital to create bio-medical waste.	Not relevant. In fact improved.
5	Aesthetics	Noise. No big machinery kept near boundary, shed at central part of plot, sturdy foundations, no vibrations. Greenery maintained. In closed, covered sheds, with cladding	Not relevant.
		Odour. Various measures are taken to make 'non-relevant' -- • Water use minimized. Wastewater minimum. • Lagoons are kept normally dry. • Secondary treatment is fully aerobic/ thermal • No evaporation solar ponds • No disposal on land with cess pools.	Not relevant.
5	Community	Acceptability. The economic situation is very harsh for the local neighbors. Very low livelihood. Lands only rain-fed. People are anxious to have at least some development.	Not relevant

It may thus be seen that the potential impact is neither *Irreversible nor irretrievable* to any degree of significance. It may be adverse on some consideration and even beneficial in some other. This is discussed in details later in this Chapter in ten levels of Hierarchy.

4.8 Assessment of significance of Impacts

For such assessment of significance of Impacts, Magnitude and Importance of 100 impact potential considerations (Grouped in 11 categories A to K) are considered taking Guidance from **Leopold Interaction Matrix**, (Source: Handbook of EIA, Scientific Publishers (India), Jodhpur), and modified to suit the present purpose. The categories A to K are

A. Modification of Regime	B. Land Transformation and Construction
C. Resource extraction	D. Processing
E. Land alteration	F. Resource renewal
G. Changes in Traffic	H. Waste Replacement and Treatment
I. Chemical Treatment	J Accidents, and
K. Others	

The above eleven attributes are further subdivided for better analysis, totaling to 100 consideration aspects. For the scenario of this present proposal, this is worked out in details and presented below.

Table 4.17: Impact Attributes

	Description	**Impact Potential**	**Explanation**
Category A. Modification of Regime			
a.	Exotic fauna introduction	Nominal, nearly nil	This is a compact area and is already permitted for industrial use.
b.	Biological controls	Nil	There is no discharge of untreated effluent or of watery sludge from the premises
c.	Modification of habitat	Nominal, but beneficial	This is a nearly barren land, with no trees or greenery. We have planted about 13000 trees and plan for another 20000 trees. No release of liquid effluents, nor any excessive air pollutants after ECE. So habitat will improve for avifauna.
d.	Alteration of ground cover	Nominal, but beneficial	Barren area is now being converted to greenery. Previous rain run-off now collected and used for Groundwater recharge.
e.	Alteration of groundwater hydrology	Nominal, but beneficial	We do not draw any groundwater. Required water is available from irrigation dept. (Government Dam) and part recycled with treatment. (our effort of Roof rainwater harvesting in fact may give some recharging beneficial effect)
f.	Alteration of drainage	Nil	This is a plain level land. The built-up area requirement is very small. The natural drain pattern is not disturbed.
g.	River control and flow modification	Nil	We do not release any wastewater into river. Hence no flow modification by us either.
h.	Canalisation	Nil	Neither the topography is disturbed for bringing water, nor for sending wastewater, nor for erecting buildings, nor for constructing any new roads-culverts.
i.	Irrigation	Nil	We do not release any raw wastewater on irrigated land or canal. Hence no irrigation effect by us either. We shall developed our own greenery inside
j.	Weather modification	Nominal, but adverse.	This activity is temperature oriented but only to limited heating to a level. This thermal activity is likely to modify the weather to a small extent. This will be in the work zone. As the shed is fully cladded and as the shed is centrally placed in a 98 acre plot, the micro-climate of outside the premises however may not get significantly moderated.
k.	Burning	Nominal, but adverse.	Explained as above, and kept controlled.

l.	Surface paving	Nominal, but beneficial	Within the already industrial area. The footprint plinth is very limited. Paving is done to arrest any possibility of groundwater percolation/ pollution. Thus beneficial. With RWH, Rain run-off is not increasing.
Category B. Land Transformation and Construction			
a.	Urbanization	Nil	This is a reasonably small plot. This is located in a village background. The labour force is divided in shifts. As such the mofussil nature continues. Colony, guest house is small and self-contained.
b.	Industrial sites and buildings	Nominal but marginally beneficial	This is an Agro-based industry. As such sheds with few warehouse and store will be needed. Other infrastructure like office, guesthouse, time office can be common and small facility. Hence not a substantial impact. In fact, by our presence, safety, law & order, facilities and rise in land-prices will increase .
c.	Airports	Nil	Once streamline with steady state production, only local traffic by surface will be undertaken. No air traffic.
d.	Highways & Bridges	Nominal and adverse	The traffic will be increased (majority with about average 92 kilometer age each). However precautions taken for good wide roads, guarded junctions, parking and illumination
e.	Roads and trails	Nominal and adverse	The traffic will be increased (majority with about average 92 kilometer age each). However precautions taken for good wide roads, guarded junctions, parking and illumination
f.	Railroad	Nominal nearly Nil	Neither the raw materials, nor finished products, nor by-products, nor waste nor passenger traffic related to this activity go by rail, as they prefer road.
g.	Cables and lifts	Nil	Neither the raw material, nor finished products, nor by-products, nor waste nor passenger traffic related to this activity go cables or lift.
h.	Transmission lines, pipelines and cowherds	Nil	Neither the raw materials, nor finished products, nor by-products, nor waste nor passenger traffic related to this activity go by or disturb or overload the transmission lines, pipelines or cowherds. MSEB (Govt.) as permitted use of their power transmission lines.
i.	Barriers incl fencing	Nil	Neither the raw materials, nor finished products, nor by-products, nor waste nor passenger traffic related to this activity go by or disturb or overload the barriers & fencing.
j.	Channel dredging & straightening	Nil	Neither the raw materials, nor finished products, nor by-products, nor waste nor passenger traffic related to this activity use any channel and hence neither dredging nor straightening involved.
k.	Channel revertments	Nil	Neither the raw materials, nor finished products, nor by-products, nor waste nor passenger traffic nor water supply related to this activity use any channel and hence no channel revertment is involved.
l.	Canals	Nil	Neither the raw materials, nor finished products, nor by-products, nor waste nor passenger traffic nor wastewater release related to this activity use canal and hence not involved.

m.	Dams and impoundments	Nominal but beneficial	This is small activity with small area involved. There are small undulations and rain is medium. However it is decided to create some impoundment for water harvesting. This will recharge the groundwater hence beneficial.
n.	Piers, seawalls, marinas & sea terminal	Nil	This is located in landlocked area.
o.	Offshore structures	Nil	This is located in landlocked area.
p.	Recreational structures	Nil	This is located in landlocked area.
q.	Blasting & drilling	Nil	This is located in landlocked area.
r.	Cut & fill	Nominal and beneficial on 2 counts	This is small activity with small area involved in a plot. There are no undulations and site is plain. Care is taken to orient the buildings such as to balance the cutting and filling. No borrowing of material from outside needed. Some surplus cutting material of top soil will be used for greening landscaping as good soil not to be imported. Hence doubly beneficial.
s.	Tunnels & underground structures	Nil	There is neither a tunnel nor any underground structure involved
Category C. Resource extraction			
a.	Blasting & Drilling	Nil	This is an Agro-based industry and not engaged in any activity like Blasting & Drilling (even during construction).
b.	Surface excavation	Nominal nearly Nil	This is an Agro-based industry. As such sheds with few tanks and store will be needed. Other infrastructure like office, guesthouse, time office can be common. Hence not a substantial impact. Nominal excavation to reach foundation will be made, but will be internal not sending any impact outside the premises. Hence nominal nearly nil.
c.	Sub Surface excavation & retorting	Nil	For foundation only surface excavation as covered above. No any other. Sub Surface excavation & retorting
d.	Well dredging & fluid removal	Nil	This is an Agro-based industry and not engaged in any activity like Well dredging & fluid removal
e.	Dredging	Nil	This is an Agro-based industry and not engaged in any activity like Dredging
f.	Clear cutting and other lumbering	Nil	This is an Agro-based industry and not engaged in any activity like Clear cutting and other lumbering. There is no much use of timber except door frames. No trees are coming in construction area. In fact about 13000 trees are already planted and 20000 more are proposed.
g.	Commercial fishing and hunting	Nil	This is an Agro-based industry and not engaged in any activity like Commercial fishing and hunting
Category D. Processing			
a.	Farming	Nil	This is an Agro-based industry and not engaged in any activity like Farming of our own.
b.	Ranching & Grazing	Nil	This is an Agro-based industry and not engaged in any activity like ranching and grazing

c.	Feedlots	Nil	This is an Agro-based industry and not engaged in any activity like feedlots
d.	Dairying	Nil	This is an Agro-based industry and not engaged in any activity like feedlots.
e.	Energy generation	Highly Beneficial	This is an Agro-based industry and engaged in producing energy. This is much beneficial to the State.
f.	Mineral processing	Nil	This is an Agro-based industry and not engaged in any activity like mineral processing
g.	Metallurgical industry	Nil	This is an Agro-based industry and engaged in an activity like metallurgical industry
h.	Chemical industry	Nominal nearly Nil	This is an Agro-based industry and not engaged in any harsh chemicals, but kept in control.
i.	Textile industry	Nil	This is an Agro-based industry and not engaged in any activity like textile industry
j.	Auto and aircraft	Nil	This is an Agro-based industry and not engaged in any activity like auto and aircraft industry
k.	Oil refinery	Nil	This is an Agro-based industry and not engaged in any activity like oil refinery
l.	Food	Significantly Beneficial	This is an Agro-based industry and engaged in activity useful in food, food processing. Care taken.
m.	Lumbering	Nil	This is an Agro-based industry and not engaged in any activity like lumbering
n.	Pulp and paper	Nil	This is an Agro-based industry and not engaged in any activity like pulping-papering..
o.	Product storage	Nominal nearly Nil	This is an Agro-based industry and product will be in good demand thus stored for short time. Full precautions taken as per factory Act. Hence no impact.
Category E. Land alteration			
a.	Erosion control & terracing	Marginal but beneficial	This is an Agro-based industry and not engaged in any activity that will create land erosion or there will be any need demanding controlling it. However for rainwater harvesting, we have planned terracing contour bunding etc. which will benefit halting any erosion. There is no incremental rain run off by our development.
b.	Mine sealing and waste control	Nil	This is an Agro-based industry and not engaged in any activity like mine or its waste
c.	Strip mining rehabilitation	Nil	This is an Agro-based industry and not engaged in any activity like mine or its rehabilitation, remediation
d.	Landscaping	Marginal but beneficial	This area under this unit and is already in the possession of industry. Thus there will be no change in land use pattern or on landscape. However, we shall be growing additional trees and lawns, and landscape will be more aesthetically pleasant
e.	Harbour dredging	Nil	This is a land-locked industry and not engaged in any activity like Harbouring or dredging
f.	Marshfill and drainange	Nil	This is a land-locked industry in dry climate land with low to moderate rainfall. Thus marshafiling and drainange not involved.
Category F. Resource renewal			
	Description	Impact	Explanation
a.	Reforestation	Marginally beneficial	This is a moderate sized area, and is already an industrial land. No forest is involved, nor even cutting or disturbing any trees or greenery. In fact we shall plant a commensurate number of trees and lawns.

b.	Wildlife stocking & management	Marginally beneficial	This is an area away from forests, and is already an industrial land. No forest is involved, nor any fauna met here. However, birds will be attracted to our greenery.
c.	Groundwater recharge	Significant magnitude	Special efforts are taken for rain harvesting, hence significant magnitude
d.	Fertilization application	Nominal nearly Nil	This is an Agro-based unit with commensurate small gardening. Thus any fertilization application has no much potential.
e.	Waste recycling	significant and beneficial magnitude	The raw material itself is supplied by neighbouring Sugar Mills. The waste generated by them is used to produce this product for reusing again. Our own waste too is recycled by ourselves.
Category G. Changes in Traffic			
	Description	Impact	Explanation
a.	Railway	Nil	Neither the raw materials, nor finished products, nor by-products, nor waste nor passenger traffic related to this activity give preference to road rather than rail.
b.	Automobile	Nominal but adverse	The traffic will be increased (majority with about average 92 kilometer each). However precautions taken for good wide roads, guarded junctions, parking and illumination
c.	Trucking	Nominal but adverse	The traffic will be increased (majority with about average 92 kilometer each). However precautions taken for good wide roads, guarded junctions, parking and illumination
d.	Shipping	Nil	Neither the raw materials, nor finished products, nor by-products, nor waste nor passenger traffic related to this activity go by shipping.
e.	Aircraft	Nil	Once streamline with steady state production, only local traffic by surface will be undertaken. No air traffic.
f.	River, Canal traffic	Nil	Neither the raw materials, nor finished products, nor by-products, nor waste nor passenger traffic nor wastewater release related to this activity use canal and hence not involved.
g.	Pleasure Boating	Nil	This is located in landlocked area.
h.	Traits	Nil	This is located in plain land area.
i.	Cables and lifts	Nil	Neither the raw material, nor finished products, nor by-products, nor waste nor passenger traffic related to this activity go cables or lifts.
j.	Communication	Nominal nearly nil	The proposal is an Agro-based industry with local base. Its infrastructure is small for communication. Hence no new burden except nominal. In fact, we shall extend our facilities to the people as well.
k.	Pipeline	Nil	Neither the raw materials, nor finished products, nor by-products, nor waste nor passenger traffic related to this activity go by or disturb or overload the existing ,pipelines..
Category H. Waste Replacement and Treatment			
	Description	Impact	Explanation
a.	Ocean Dumping	Nil	This is a land-locked industry and not engaged in any activity like Ocean Dumping
b.	Landfill	Nominal nearly Nil	Landfill in a small way only, because Solid Waste is nearly fully recycled.

c.	Emplacement of tailings, spoils and overburden	Nil	This is an Agro-based industry and not engaged in any activity like Emplacement of tailings, spoils and overburden
d.	Underground storage	Nil	This is an Agro-based industry and not engaged in any activity like Underground storage
e.	Junk disposal	Nominal nearly nil	This is an Agro-based industry and nominally involved with ferrous scrap. If it occurs it is in small quantity and is recycled forthwith. This is only in initial construction phase.
f.	Oil well flooding	Nil	This is an Agro-based industry and not engaged in any activity like Oil well flooding
g.	Deep well emplacement	Nil	This is an Agro-based industry and not engaged in any activity like Deep well emplacement
h.	Cooling water discharge	Nil	This is an Agro-based industry and though engaged in activity like Cooling water, the discharge is absorbed locally for greening
i.	Municipal waste discharge including spray irrigation	Nil	This is an Agro-based industry and not faced with high Municipal waste. Taken precautions. Locally absorbed.
j.	Liquid effluent discharge	Nil	This is an Agro-based industry. Converts the liquid waste into usable farming water and power. Thus zero outside discharge and not engaged in any activity like Liquid effluent discharge
k.	Stabilization and oxidation pond	Nil	There is no such Stabilization and oxidation pond.
l.	Septic tank, commercial and domestic	Nil	There is well designed septic tank with proper sub-soil irrigation. .
m.	Stack and exhaust emission	Nominal but nearly nil	The plant has moderately sized boilers. The emissions are captured in a duct and lead to ESP followed by tall stack as per MPCB Consent.
n.	Spent lubricants	Nominal but nearly nil	Spent lubricants will be collected. As the quantity is not significant, it will be used internally with SPCB consent.
Category I. Chemical Treatment			
	Description	Impact	Explanation
a.	Fertilization	Nil	This is an industry not engaged in any activity like using of harsh Fertilizer
b.	Chemical deicing of highways	Nil	This is an industry and not engaged in any activity like using of Chemical deicing of highways. In any case this is not relevant to this part of the country.
c.	Chemical stabilization of soil	Nil	This is an industry and not engaged in any activity like using of Chemical stabilization of soil
d.	Weed control	Nil	This is an industry and not engaged in any activity like using of Weed control. Greening is only attendant activity.
e.	Insect control (Pesticides)	Nil	This is an Agro-based industry and not engaged in any activity like using of Insect control (Pesticides)
Category J. Accidents			
	Description	Impact	Explanation
a.	Explosions	Nil	This is an Agro-based industry and not related to any potential explosion from distillery and co-gen unit

b.	Spills and leaks	Nil	This is an Agro-based industry and not engaged in any handling of fluids and so not related to any uncontrolled spills.
c.	Operational failure	Nil	This is simple few step process. No operational failures are foreseen as to create any accidents. If at all it may give less production by lower efficiency.
Category K. Others			
	Description	Impact	Explanation
a.	Fire Hazard	Nil	Raw material or finished goods can catch fire. Full precautions taken.
b.	Public acceptability	Significant and beneficial	The economic situation is very harsh for the local neighbours. Very low livelihood. Nearby lands only rain-fed. People are anxious to have at least some development.
c.	SPCB acceptability	Significant and beneficial	The industry will be working with consent to operate and generally obeys all the conditions. Hence, SPCB has accepted the application for an Agro-based industry for favorable consideration.
d.	Salability of product	Significant and beneficial	The product Alcohol is a desirable substitute and a specialty chemical needed in many industries like pharmaceutical, food, petrol-substitute etc. and hence much in demand. This also means that there will not be any need of unnecessary undue long storage of these products in this premise. Early dispatch without storage is environmentally beneficial and less risky. The products are useful to the society. Power is transmitted to MSEB.

Having done above exercise for a matrix with 100 considerations, marks are allotted depending on the hierarchy of impact potentiality. The hierarchy starts from *"Totally Adverse irreversible"* impact with minimum marks as 1 and ranging upto maximum of 10 for *"High with beneficial magnitude and importance",* being –

Table 4.18: Yardstick for Mark – Giving

Where the impact potential is this	**Allot marks**
Totally Adverse irreversible	1
Totally Adverse reversible	2
Nominal but adverse	3
Nominal, nearly nil	4
Nil	5
Nominal, but Marginally beneficial	6
Nominal, and beneficial	7
Nominal, and beneficial on two counts	8
Significant beneficial impact	9
High beneficial in magnitude and importance	10

The marks allotted to these 11 attributes for total 101 considerations are tabulated below –

Table 4.19: Impact Matrix

#	Attribute → / Impact ↓	A	B	C	D	E	F	G	H	I	J	K	Total no.	Marks	
														Per No.	Total
1	Adverse irreversible	0	0	0	0	0	0	0	0	0	0	0	0	1	0
2	Adverse reversible	0	0	0	0	0	0	0	0	0	0	0	1	2	2
3	Nominal but adverse	2	2	0	0	0	0	2	0	0	0	0	6	3	18
4	Nominal, nearly nil	1	1	1	2	0	1	1	4	0	0	0	10	4	40
5	Nil	5	13	6	11	4	0	8	10	5	3	1	66	5	330
6	Nominal, but marginally beneficial	1	1	0	0	2	2	0	0	0	0	0	6	6	36
7	Nominal but beneficial	3	1	0	0	0	0	0	0	0	0	0	4	7	28
8	Nominal, but beneficial on more counts	0	1	0	0	0	0	0	0	0	0	0	1	8	8
9	Significant beneficial impact	0	0	0	1	0	2	0	0	0	0	3	6	9	54
10	High beneficial magnitude & importance.	0	0	0	1	0	0	0	0	0	0	0	1	10	10
	Items considered	12	19	7	15	6	5	11	14	5	3	4	101		526

Legend of attributes –

A. Modification of Regime B. Land Transformation and Construction C. Resource extraction D. Processing E. Land alteration F. Resource renewal Changes in Traffic H. Waste Replacement and Treatment I. Chemical Treatment J. Accidents K. Others

Thus, the marks obtained are **526**. Acceptability of a Project or a decision of "No Project" depends on the marks obtained as –

Table 4.20: Yard-Stick for Ranking

Score 750 to 1000	=	Environmental Acceptability is Very High
Score 600 to 750	=	Environmental Acceptability High
Score 450 to 600	=	Environmental Acceptability Moderate
Score 300 to 450	=	Environmental Acceptability Low
Score Below 300	=	Environmental Acceptability Very Low

This yard stick is the same as is approved by MoEF in Delphi Technique made applicable for Hazardous Waste site selection. With the methodical working of network matrix, considering both magnitude and importance of one hundred attributes, the environmental impact at this Site is expected to be in the middle bracket of "**moderate"**. Below 450 marks will have some anxiety.

This Site selection is also based on another accredited practice. This is discussed below.

4.9 Integration:

Technique: For sitting of an activity, ***"Delphi Technique"*** is advised by MoEF. The Government of India, has recommended this technique in the book on Siting of Hazardous Waste Disposal Areas, prepared by NEERI, Nagpur and published by the Ministry of Environment and Forest (MoEF) in 1991. The same is proposed to be used with due improvisation, *mutatis mutandis*, covering other media of environment.

1. (a) The Delphi Technique considers the following 34 attributes and four weight-ages i.e.:
7 attributes, receptor related
10 attributes, pathway related
8 attributes, pollutant related
9 attributes, waste management related.

(b) The modified Technique used here considers 23 attributes and four weight-ages i.e.:
7 attributes, receptor related
5 attributes, pathway related
5 attributes, water pollution & waste management related
4 attributes, air pollution and waste management related
2 attributes, solid waste management related.

2. Four types of marks for each attribute like 0 to 0.25, 0.25 to 0.5, 0.5 to 0.75 and 0.75 to 1.0 depending on facts of situations, chemical properties of pollutants and quantification are considered. These marks are known as **Sensitivity Index** (**SI**).

3. Combined consideration of (1) and (2) together gives attribute-wise weight-ages. These are the negative marks out of 1000 and ranking of candidate sites is based on comparison of these marks.

Finding the sensitivity index (SI) shall be first task and is done in the table below.
The attribute measurements or values or description are known as the team has traversed the area. The sensitivity index is awarded based on attribute properties in above table. The attribute wise score is arrived at by multiplying the sensitivity index and the weight-age of each attribute and is given.

Table 4.21: Integration Consideration

Attribute	**Sensitivity Index**			
	0.0 - 0.25	**0.25 - 0.5**	**0.5 - 0.75**	**0.75 - 1.0**
Receptor Related				
Population within 500 meters	0 to 100	100 to 250	250 to 1000	> 1000
Distance to nearest drinking water well	> 5000 m	2500 to 5000 m	1000 to 2500 m	< 1000 m
Use of site by nearby residents	No used	Occasional	Moderate	Regular
Distance to nearest off site building	> 3000 m	1500 to 3000 m	500 to 1500 m	< 500 m
Presence of major transportation routes	Airport	Internal road	Highway	Rail
Land use/ Zoning	Completely remote (Zoning not applicable)	Agricultural	Commercial or industrial	Residential
Critical environments	Not a critical environmental element	Pristine natural areas	Wetlands, flood plains, & preserved areas	Major habitat or endangered or threatened species
Pathway Related				
Distance to nearest surface water	> 8000 m	1500 to 8000 m	500 to 1500 m	< 500 m

Ground water depth	> 30 m	15 to 30 m	5 to 15 m	< 5 m
Type of contamination	No Contamination	Soil Contamination only	Biota contamination	Air, Water or food contamination
Precipitation effectiveness index	Semi arid	Semi humid	Humid	Wet
Susceptibility to erosion & run-off problem	0 - 0.25 not susceptible	0.25 - 0.50 Potential	0.50 - 0.75 Moderate	0.75 - 1 Severe
Waste Related				
Water				
BOD generation level	< 250 mg/l	250- 500 mg/l	500- 1000 mg/l	Above 1000 mg/l
Treatability COD-BOD	< 2.5	2.5 – 3.5	3.5 - 5	Above 5
Treatment	Tertiary	Secondary	Primary	No
Disposal	Land assured & crop perennial	Land seasonal	Stream up to 5km	Riparian
pH	6 - 8	5- 6 or 8 - 9	3 - 5 or 9- 11	<3 or >11
Air				
Industrial mix Fuel	Electricity	Oil	Bagasse	Coal
Control equipment	All including ESP or wet scrubber	Bag filter	Cyclone, Fly ash arrestor	None though required
Stacks heights	As per Act	30	< 30	None though required
Noise at boundary	upto 55 dB(A)	55 to 70 dB(A)	70 to 85 dB(A)	Above 85 dB(A)
Solid Waste				
Industrial mix (waste type)	None	Non-hazardous	Hazardous & Non-hazardous	Hazardous
Treatment - • Non hazardous • Hazardous	Recycle/sale Recycle/ Incinerator	Secured landfill Secured landfill	Low landfill Sanitary landfill	None though required None though required

And now ranking:

Table No. 4.22: Attribute Ranking

Attribute	Attribute Measurement	Sensitivity Index	Weight-age	Attribute Score
Receptor Related				
Population within 500 meters	Nil	0.05	80	4
Distance to nearest drinking water well, m	1000	0.75	60	45
Use of site by nearby residents	No	Zero	50	0
Distance to nearest off site building	4 km	0.5	40	20
Land use/ Zoning	Industrial	0.63	30	18.9
Presence of transportation	State Highway	0.37	30	11.10

routes				
Critical environments	No	Zero	30	0
Sub total			320	**99.00**
Pathway Related				
Distance to nearest surface water	2.5 km	0.5	55	30.25
Depth of ground water	> 30 m	0.25	45	11.25
Type of contamination	Air, water	0.75	45	33.75
Precipitation effectiveness index	Semi Arid/ Arid	0.12	25	3
Susceptibility to erosion and runoff problems	Not susceptible	0.12	25	3
Sub total			195	**81.25**
Waste related				
BOD, mg/l	> 1000	1	40	40
PH	6-8	0.1	20	2
Treatability (COD:BOD)	About 2.5	0.05	40	2
Treatment	Thermal & III	0.1	50	5
Disposals	Secured	0.05	50	2.5
Air				
Industrial mix (Fuel)	Mixed	0.25	70	17.5
Control equipment	ESP	0.1	50	5
Stacks	As per Consent	0.05	50	2.5
Noise at boundary	70-85	0.67	30	21
Solid Waste				
Mix	Non-Hazardous	0.25	45	11.25
Facilities	Sale	0.10	40	4
Sub total			485	**147.75**
Total				**328**

From the above considerations we have to place our present Project site at appropriate level as per following slabs.

Yard-Stick for Ranking

Score 750 to 1000 = Pollution Potential Very High
Score 600 to 750 = Pollution Potential High
Score 450 to 600 = Pollution Potential Moderate
Score 300 to 450 = Pollution Potential Low

- Score Below 300 = Pollution Potential Very Low

Since with the methodical working of sensitivity index and weight-ages, the total scope of pollution potential has come to 328, the site fits into "**LOW**" Pollution Potential.

4.10 Chapter Conclusion

On the background of known Environmental Status of the area, and having known the pollution potential of the manufacturing process, efforts are now made to minimize the pollution to such an extent that the impact on environment will be most minimum. This is done methodically with accredited methods and found a satisfactory situation in this particular case.

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CHAPTER 5 - ANALYSIS OF ALTERNATIVES

(TECHNOLOGY & SITE)

Contents of this Chapter shall be:

Various alternatives for various considerations, Pros and Cons, Environmental Significance, ranking and Selection Or "No Project" Option

5.1 Introduction

It is necessary that one should try to find various alternatives and what is environmentally best be preferred. There can be many points for which alternatives must be found. This is attempted here, irrespective of whether scoping has asked so or not. This is done voluntarily and submitted herein below.

5.2 Alternatives:

Any proposed human activity is never a simple straightforward matter. A number of decisions are required to be taken and for each step a number of alternatives are available. Selection is thus all the more critical in an industrial development where time, money, environment and natural resources are at stake.

This Industry decided to undertake an "Alternative Analysis (AA)" for this project. The various alternatives are (1) Product (2) Raw materials, (3) Technology, Engineering & Hardware, (4) Site, and (5) 'No-Project'.

Highlights of the final selection can be summarized as:

- The unit will be with latest technology including continuous fermentation and multi pressure vacuum distillation system.
- Large quantity of condensate water will be recovered from integrated-evaporators which will be utilized in the plant itself for dilution molasses and make up of cooling water.
- Provision of re-boiler, which has resulted in reduction of effluent generation and fresh water requirement.
- Spent wash is treated through evaporation cum incineration.
- Boiler ash contains plant nutrients such as potash and phosphate. This will be given to farmers as plant nutrients.
- The distillery will be with zero discharge of spent wash.
- Sugar and co-gen units will support distillery.

5.3 Product

Proponents have opted to produce three products, of which one product variety is Ethyl Alcohol. This option is selected with some consideration. This comes from molasses which is otherwise a waste from our Ahmadnagar District sugar units and is an environment risk with high BOD (900000 mg/lit.) and auto-combustion nature. On the other hand, the product alcohol is useful in pharmaceutical, food and as petrol-substitute. It is in demand. This is evident from Indian manufacture statistics. There are more than 300 such distilleries in the country with a total installed capacity of 3500 million liters per annum. However, though such abundant licensed capacity the production is only about 1900-2000 million liters per annum. Department of Chemicals & Petrochemicals Government of India has kept an aim of at least 2710 million liters per annum. This shows how much the chemicals are in great demand both in India and abroad. Though the global recession has thrown that industry out of balance, in India the demand continues. This industry with wide support of research then decided to Ethyl Alcohol. This has given a versatile look to this industry. Now we can cater to many fields which are as say acetic acid, acetaldehyde, acetic anhydride, VAM, Ethyl acetate, and many similar.

While producing alcohol in its fermentation step CO2 is liberated by microbiological activity. We have adopted a practice to scrub it in water. While producing alcohol in its distillation step liquid effluent spent wash is generated. This is a nuisance creating foul odour and large scale fish mortality. To avoid this we are using this to get valuable gas and burnable concentration with calorific value.

5.4 Raw Material Area Alternative:

The raw materials required are available with us and additional if needed are from assured vendors in this and adjoining district where much sugarcane based agro-industries are working. There is also good road connectivity. Some other helping substances also will be needed in minor quantities on occasions such as acid etc., as also lubricating oil. The choice of source, as mentioned above was adopted because there the materials are in purer forms. If raw material is purer and is in the desirable form, it avoids a probability of discards or non-specification outcome. It also obeys the mass balance more faithfully than when impurities are involved. No problem of any empty containers or bags is encountered.

There is a possibility of selecting excellent molasses.

5.5 Technology Alternatives:

The technology is very simple and straightforward with only few steps involved viz. Fig. 5.1: Simplified Flow Sheet

(A) Co-gen

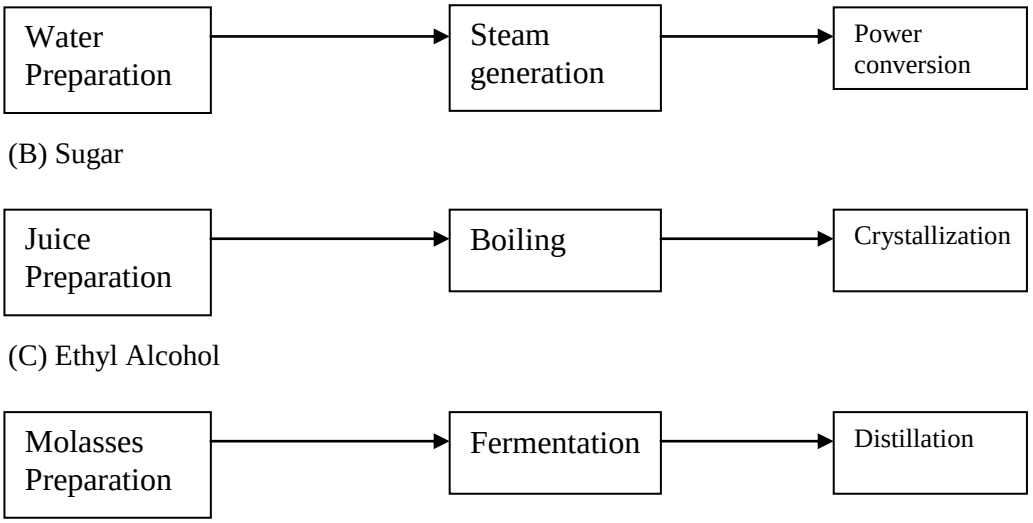

Fig. 5.1: Simplified Flow diagram

The technology of making these products has been developed over the years, and refined indigenously in well equipped Research and Development Laboratories of Government and private Institutes and Private Vendors etc., in which devoted scientists, engineers, skilled and experienced staff is working, to find the best alternatives, addressing the above enquiries.

i) Engineering & Hardware Options:

However especially regarding process of product C, there is still scope of improvement and minimize the requirement of inputs and energy. The process development and engineering designing of this project has been done in such a way that the whole operation of manufacturing can be carried out in a controlled system with no or low gaseous emissions, effluents, and minimum waste generation. The material handling and transfer of raw materials are also carried out in controlled and supervised system. Thus, the technology is not only cost-effective but also environment friendly.

The process involves three main steps each, as depicted above. Improvements are done by modernization such as Dehydration. There are many ways and environmentally the best one is selected. It is note- worthy that

- Rectified spirit feed is pretreated by product vapour.
- Evaporator column gets energy from free boiler
- Steam condensate is feed back to boiler
- Twin adsorbents beds. One in dehydration mode, other is regeneration mode.
- Switching of beds by Automation.

The **raw material** is basically a product derived as waste from sugar mill i.e. molasses. we already have made a dialogue. If extra is needed, it is always desirable to have listed suppliers. This ensures continuous and clean supply of choice. This also makes it easier to maintain a schedule of despatch. Here, the stocks to be maintained are very low. High stock in waiting not only involves blocked money but also is a hanging sword from point of view of (1) hydro-carbons becoming air-borne, (2) High SPM Fugitives, and (3) fear of combustion. The excess entails wastage too.
The process development and engineering designing of this project has been done and the industry proposes to employ following specialty in their manufacturing

The peculiarities of this processing unit are as follows

- The first peculiarity is this, that the Project Proponent has made a provision for pollution control and greening drive in the outset itself.
- The raw material is used immediately after procuring. This is transported and also transferred without any chance of fugitives. This has become possible due to nearness of site to the raw materials fields and tar roads in the vicinity. The size is controllable.
- It is possible to select good and uncontaminated, materials answering particular specifications, as free from any foreign material including any undesired admixtures.
- Selection of correct quality raw material is possible because three inspections are done in time.
- When the procurement is done, the quality also will be recorded, which keeps an eye on recovery, resource conservation and waste minimization. This is prevention of pollution.

It may be summed up as –

1. Incoming Raw Materials: This is Selected from known vendors, nearest area with quick transport and quickly used on arrival inspection. The Prompt use prevents wastage, rain-washed pollutants escaping out, and ease of keeping record of losses and check.
2. Weighing & Lab Analysis: This is regularly done. This ensures better check on mass balance. Purer material means less discards.
3. In Process design, following **Technology absorption,** is planned as built in measures for resource conservation and pollution control in the industry. The main objective is to follow environments friendly process, with efficient utilisation of resources, minimum waste generation and built in waste treatment and operation safety. The measures adopted are,
    - Continuous fermentation to improve alcohol yield and recovery and thereby molasses consumption reduced.
    - Separation, recovery and recycle of yeast present in fermenter wash for reuse in fermenter. This reduces the use of fresh culture and nutrients in the fermenter and also improves ethanol yield.
    - Use of live steam is avoided by employing re-boiler in distillation columns. This reduces the generation of wastewater.
    - Multi pressure distillation system is used to reduce the consumption of steam and quantity of effluent.
    - Use of pumps with mechanical seals to avoid liquid leakages.

- Scrubbing of fermenter vent gases containing CO_2 to recover traces of alcohol present in it.
- Water utilization reduced by 1. Evaporation of spent wash with recovery condensate water for use in cooling tower. 2. Re boiler reduces water utilization 3. Recycle of lees water for dilution of molasses 4. Decanter centrifuge and recycle of thin yeast slurry saves water and improves alcohol recovery.
- Concentrated spent wash is used as fuel in boiler.

4. In Process operation, following **hardware,** is planned as –
   - Water feed to boiler is especially kept of good quality.
   - Combustion efficiency is raised by feeding ample air and this air is pre-heated by using the waste heat which is present while cooling

5. **Energy Conservation** option is also kept in mind and it is planned to see –
   - Electrical load management to restrict maximum demand
   - Optimum utilization of steam
   - Power factor improvement
   - Energy management.
   - Improving thermal efficiency of boiler.
   - Change to more energy efficient motors
   - Variable frequency drive application for motors
   - Energy conservation awareness training

6. Supervisory Control is important. Training is imparted, Documentation is designed, and Indicator chart, hourly reading charts are provided. Best operational control and retrieval of information results in better checks.

These are the points of Environmental Significance. In brief it may be summarized.

a. **Fermentation:**
   - Molasses handling: To be fed carefully with dilution
   - Yeast Propagation: Special Yeast is supplied by principal vendor and is developed further in–situ. Precautions of adding measured quantity of sterilized molasses substrate, aeration, taken and needed time for multiplication given. For this provision of Yeast Activation Vessels.
   - Fermentation: Yeast works on sugars contained in molasses, breaks down the sugar into alcohol and carbon dioxide and significant heat. Temperature controlled to 33-35^{o}C (by circulating cooling water). A series of tank to secure more percentage of alcohol. From last tank CO_2 collected and directed to scrubber. What remains is now known as wash.

b. **Distillation (Multi-Pressure)**
   - The wash comes here. The hardware contains columns basically for two functions, namely Stripping and Rectification. Thus
     1. Analyzer column – Operated under vacuum
     2. Rectifier cum Exhaust column- Operated under pressure

     (Additional columns only for refinement)
   - The wash is first preheated in beer heater and fed to Analyzer column
   - Vapour draw-containing alcohol from wash from Analyzer column top is fed to Pre-rectifier column (if required), which too is working under vacuum. Liquid is refluxed. The impure spirit is drawn from top of column and that collected at bottom is fed to top of the Exhaust portion of the Rectifier cum Exhaust column. Under pressure heat is given through Re-boiler. Alcohol is enriched towards the top and drawn out as Rectified Spirit about 95% v/v concentration.

- To avoid build-up of fusel oil, fusel oil is drawn out to a tank, diluted with water, decanted, layers separated and alcohol layer returned as recovery

c. **Dehydration**

- This is to produce anhydrous Alcohol from Rectified Spirit
- Rectified Spirit is preheated and fed to evaporation/ regeneration column. Vapours drawn, sent to Sieve Bed, dehydrated, condensed and cooled. Thus forms Absolute Alcohol of desired 99.8% v/v purity.

There is alternate Sieve Bed 2 ready for next operation.

5.6 Site Alternatives:

The criteria kept for candidate sites included:

- Nearness of raw materials
- Purity of raw materials
- Ease of conveyance of raw materials
- Desire of Government for industrialization in that area
- Nearness of market
- Dispatch facilities
- Less Undulation of site
- Power and water supply, without encroaching on need of others
- Remoteness of target
- Not Destroying prime agricultural lands
- Maximizing infrastructure capacity utilization
- No forest land is involved
- No Revenue land is involved
- No tribal land is involved
- No R & R dis-satisfaction.

Existing site is passed by local body office for establishing this unit. It was our endeavor to strike such a balance that the environmentally best should also have acceptability commercially. Study of many existing units brought out an interesting point that they are required to haul raw materials from long distances to keep it running. This ends up in delay and vehicular pollution. In this unit the material flow is so kept to get an advantage that the requirement is fulfilled by quick haulage.

The site should be well connected by Road, so that both the raw materials and finished goods can be conveniently handled. The Road is neither too busy, so as to have a fear of accidents, nor is too away from network. Area requirement and built-up area requirement in this industry is only moderate. We have made a survey of a few existing units to find the "Use Factor" of their built-up area. Accordingly the Architects have designed a least- plinth outlay. Less buildings and less roads means saving of rubble, sand, bricks, etc, which otherwise has to be procured by robbing nature. We have some infrastructure already.

Some part of this District is socio-economically backward and the government has a desire to improve its status. The land of the District as a whole cannot be said to be of a prime agricultural importance. The pollution generation from this industry is finally made insignificant having taken all the precautions from raw material selection up to low or no waste generation and conversion. This site has a connecting road and has approachability. This site is connected with State Electricity Board power. When various sites were seen, this site appeared to be environmentally best as also from the business angle and therefore this option was finally adopted.

On the four sides of this particular site we have only open fields. There is no habitation within one km. There is no sensitive establishment in the vicinity such as health resort, hospital, archaeological

monuments, sanctuaries, etc. The normal wind direction is found to be favorable at this site. There are 38 villages in the study zone and are examined. It is found that:

1. Majority of the villages are engaged in agriculture.
2. All these villages have road network connected.
3. None of these villages have fully satisfactory amenities like medical facilities. education, employment, transportation, communication. They would like to have this through media of industry.
4. All are provided with drinking water from wells or Government Water Supply Schemes RWS. Hence **TI** does not encroach upon their supply.
5. The population is limited.

With all this consideration, this site was ranked first and adopted.

A) Waste Water (Spent Wash) Treatment Options:

1. Spent Wash Treatment Methods

In earlier days the spent wash was treated by primary and secondary biological treatment processes to reduce its BOD content and then let out on land for agriculture usages. However the treated spent wash contained high inorganic salts and therefore caused the serious problem of pollution to ground water, surface water and soil. In recent days, technology has developed for utilization of spent wash in composting of bio-waste such as press mud, municipal waste, or other organic solid waste to produce bio-manure. Composting process results into zero effluent and it does not produce harmful wastes. Bio-manure is an environmental friendly fertilizer suitable for crops and plantation. However, the adoption of composting process depends on the availability of press mud in adequate quantities. Further, compost process cannot be operated during rainy period and it requires large storage capacity for spent wash. It involves the risk of surface and ground water contamination. Alternatively, the spent wash can also be managed by the following methods,

i. Concentration and incineration

Spent wash is concentrated in multi-effect evaporators. The concentrated spent wash rich in organic matter has a high heat value. Hence, this may be used as fuel in the boiler. The ash produced in the boiler contains mainly potassium and phosphate salts and therefore, it can be used as plant nutrient in agriculture.

ii. Ferti-irrigation

It is a post sown application of spent wash along with irrigation water on agricultural land. The spent wash contains plant nutrients such as potassium, phosphate and nitrogen. It may be dosed admixture with irrigation water. However, the ferti-irrigation depends on the availability of assured irrigation water throughout the year.

iii. One time land application

It is a pre sown one time application of spent wash on agricultural lands. It enhances the nutrient value of the soil. One time land application of spent wash has to be practiced scientifically to avoid possible adverse effects to soil, crop and nearby water bodies.

2. Choice of spent wash treatment Method

A maximum of 720 KLD spent wash is generated from the proposed 90 KLD alcohol/ethanol plant. The spent wash is pre-treated. Out of this, 360 KLD spent wash will follow the existing route of bio-digester, MEE and bio-composting with distillery closed in monsoon. For the expansion, spent wash generation is 360 KLD. This spent wash is then concentrated to 55% solids in multi-effect evaporators. The concentrated spent wash contains significant quantity of organic matter and has a GCV of about 1600 kcal/kg. It is admixed with bio mass and used as fuel in the boiler. Ash from the

boiler is rich in potash and phosphorus and therefore it can be used as a soil nutrient. Thus, the ethanol plant will be with zero discharge of effluent and can work satisfactorily for 300- 330 days per year.

5.7 'NO-PROJECT' Option:

In this option, it is required to be considered as to whether it is more advantageous to the Nation; not to commence at all the production proposed.

The district statistical Census report and Gazetteer of the District clearly states that the socio-economic conditions in this district are very low. They will, therefore, need a reasonable industrialization.

On this background in order to support the national requirement, **TI** has proposed this activity to produce national wealth from waste. In other words if a "No Project" option is selected the repercussions will be widely felt around. Therefore, No Project option cannot be entertained.

It is noteworthy that the activity now proposed will support this cause of National productivity, of saving the foreign exchange, of providing employment and in an environmentally friendly manner.

This project, as it will be soon shown, keeps an aim of sustainable development. 'No-Project' option is adopted only in an extreme last step of negative listing and is not warranted at all in the present case.

5.8 Chapter Conclusion:

In any human activity there are always possibilities of finding various options. **TI** decided to examine and adopt one such option that will be both environment friendly and best suited for production. Various alternatives in terms of product, raw material selection, technology, engineering and equipment are considered. A final selection is thus arrived.

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CHAPTER 6 - ENVIRONMENTAL MONITORING PROGRAMME

Contents of this Chapter shall be :
Managerial and Technical aspects of monitoring the effectiveness of mitigation measures (incl. measurement methodologies, frequency, location, data analysis, reporting schedule, emergency procedure. Detailed budget and procurement schedules).

6.1 Introduction

The Objective of this Study is to minimize or off-set the adverse impacts that might be created due to this project. Various mitigation measures are designed and described. In operation phase we shall have to check continuously as to (1) whether our measures are being taken as per design and (2) whether the resultant impacts are coming inside the tolerance limits. This can happen only if we have a specialized cell, higher management support for the cell, adequate funding, support of library-laboratory, open dialogue corridor with all the stake-holders and authorities, and if the success indicators are in agreement with our findings. As no job is complete unless paper work is complete, documentation will be necessary along with periodic Reporting to MoEF.

6.2 What will be Monitored

It is seen that the ultimate aim is to have the congenial environment. Hence the environment is required to be monitored. The stations will be the same as where the samples are taken while preparing this EIA, or as may be by SPCB

Table No.6.1: Summary of Sampling

No.	Media	Stations	Parameters	Frequency
1	Surface Water	3	6	Half- Yearly
2	Ground Water	3	6	Half- Yearly
3	Ambient Air	3	6	Half- Yearly
4	Ambient Noise	3	2	Half- Yearly

The above shows only the natural environment. For assessment of impact on manmade environment, statistics will be assembled especially about literacy, employment and wages for the people of this village. For this purpose Public opinion will be assessed by our PRO, whose study will also include smoothness of traffic, parking problems outside, and need of any other assistance to villages.

Environmental Protection will be met only if the pollution control units work with capability. For this, performance efficiency of each unit of ETP and ECE (effluent treatment plant and emission control equipments) will be assessed. Help of laboratory is necessary to run a plant. CPCB has published many booklets related to various industries and have given certain monitoring schedule. Here is one example from book **COINDS/9/1980-81.**

Table No.6.2: ETP Units operation monitoring

#	Station	Frequency	Examine (*)
1	Screen	Weekly	SS
2	Oil-Grease Trap	Weekly	Oil & Grease
3	Anaerobic Lagoon	Every third day	BOD, SS
4	Activated Sludge	Daily	DO, pH, MLSS
		Every third day	BOD, SS
		Fortnightly	Microscopy
5	Trickling Filter	Every third day	BOD, SS
		Fortnightly	Microscopy
6	After final treatment	Monthly	All consented
7	Disposal land	Monthly	% Sodium, pH, Dissolved Solids

(*) Whatever applicable to our ETP units will be taken up with suitable frequency.

The ETPs and ECEs must be maintained properly and this too must be monitored. Instead of emergency maintenance, preventive maintenance is better. The modern concept is predictive maintenance. Suggested schedule is :

Table 6.3: ETP units Maintenance Monitoring

#	Part	See (*)	Frequency
1	Bearings	See temperature	Daily
		Change grease	2-monthly
2	Gland	Change packing	2-monthly /as reqd
3	Indicators	Pressure gauge, vacuum gauge calibration of	3-monthly
4	All type valves	Change packing	6-monthly
5	Impellor	Check all blades, sleeves, bearing, impel nut check	Yearly, change if reqd
6	Electric motor	Open side doors, blow dust, check air gap	Monthly
7	Motor winding	Blow off dust, test insulation	2- Yearly
8	All hand carts, wheel barrows	Grease wheels	Monthly
		Change rubber tyres	6-monthly if reqd
9	Gear box	Oil level	Check every week, replenish 3-monthly
10	Scraper shoe	Tighten nut bolts, change broken-bent members, change leather-rubber shoes	3-monthly
11	Central turn table	See oil level	Weekly
		Check chain of sprocket, steel balls, gear	Yearly
12	Aerator	See oil and grease	Weekly
		Painting-coating blades	Yearly

(*) Whatever applicable to our ETP units will be taken up with suitable frequency.

The above table may be readjusted according to the catalogues of the suppliers.

Reports of the findings will be useful for rectification internally. The same will be submitted in the format as may be asked by MoEF and SPCB with due frequency.

Six monthly watch will be kept as a self-discipline on our working as post project environmental monitoring and the same will be duly submitted to MoEF, CPCB and MPCB **(ToR 45).**

6.3 Special Cell & Funds

Environmental organization will have an environmental cell responsible for pollution control and also for self-examination through monitoring. Such massive work cannot be conceived unless a framework of men, material and money is specially earmarked. This is done by establishing a Environment Monitoring Schedule first and then an Environment Management Cell. The cell shall be backed by the highest person of the Organization.

The structure:

Table 6.4: Environment Management Cell

#	Level	Designation	Purpose
1	Highest	Managing Director	Policy
2	Top	Gen Manager	Guide
3	Overview	Watch Dog Committee	Super-Check
4	Manager	Chief Engineer/ Chief Chemist/ Environmental Scientist	Job (*)
5	Executive	Shift-in-charge	Implement

(*) The Jobs are described below:

Table 6.5: Job (*) of Environment Management Cell

#	Facet	Aspects
1	Construction Phase	Material waste minimization, labour camp sanitation, Noise, oil-grease and vibration nuisance control, accident prevention.
	Post-construction	Remediation of ugly sites, if any
2	Air	Car/ truck census, PUC control, Noise & Odour mitigation, Dust control
	Water	Water budget, O & M of Water Purification and Wastewater Treatment Plants.
	Solid waste	Segregation, Collection, Composting, Carting
	Greening	Tree Census, Tree Planting, Lawn Development, RWH and Storm water, Agri. Return water, Control on use of pesticides, nursery
	Monitoring	Field observations, laboratory tests, interpretation & Reporting
	Public relations & Press	Documentation, Updating, rehabilitation, training, Meetings, Rapport
3	Occupational Health	Routine surveillance, prevention, accident relief, Snake bite remedies.

The Cell working under Chief Engineer/ Chief Chemist /Environmental Engineer shall fulfill these jobs.

The personnel required to man this cell as stated above, may be tailored according to need. As long as the activity is of smaller scale the jobs can be combined and entrusted to lesser number of people.

i) Investment on Matters Environmental

For the purpose of Pollution Control, Resource Conservation and Environmental Protection, the Project Proponents PP has decided to set aside suitable amount as capital expenditure, with a due provision for likely recurring expenditure per year. The work on Project will continue over years and the amount of total capitalization will be released**,** in due course without delay.

Table 6.6: Funds for Environmental Care

#	Environmental Aspect	Capital Expenditure Rs in Crores	Recurring Expenditure Rs in Crores
1	Emission control Engineering	12.00	3
2	Water & Wastewater management	25.00	4.5
3	Solid Waste	9.00	1.50
4	Greening Drive	3.0	0.90
5	Monitoring	1.01	0.54
6	Environmental Cell & PR	0.50	0.50
7	Other aspects like Rain Water Harvesting, Safety, Security etc.	1.9	0.30
	Total	52.41	11.24

The funds will also take care of Ambient Air quality Monitoring for PM_{10}, $PM_{2.5}$, So_2&No_Xper GSR 826 (E) and monitoring of other phases of environment **(ToR 17).**

6.4 Stake-holders & Stakes

Generally there can be many stake-holders to whom a project may either give comfort or may give nuisance. These issues are identified first and then discussed as –

Table no. 6.7: Environmental ramification points

#	Aspect needing monitoring	Stake for
1	Water source encroachment	Villages
2	Power load shedding	Villages
3	Construction phase disturbances	Villages & Government
4	Rehabilitation	Villages
5	Storm-water	Villages & Government
6	Transparency	All. Villagers, Our staff & Colony Residents, Government

- **Sources of Water:**

  Issue can be whether **TI** is robbing someone else's water for its own benefit and encroaching on right of others. The Answer is No.

  For **TI**, there is assured and dependable source of fresh and recycled water source and sumptuous water is available from Government. We do not need much water for process as such, and hence we are not encroaching on anybody else's water source. In addition we are going to do harvesting of rain on roof waters. This is reserve force. Our own treated wastewater is another source and is reused to a substantial extent.

- **Construction Phase Disturbances**

  On many occasions it is seen that there can be a ramification at construction phase, in case proper precautions are neglected at this early phase. In this particular case, more anxiety is not there because construction phase is going to be a limited and short-lived matter. This is given due thought, as it deserves. Cutting- filling nearly balances. Construction debris may be recycled. Local people and material will be encouraged.

- **Compensation Package**

There is a peculiar situation here, where there acquisition of land is a smooth matter. It may be seen that

- No forest land is procured
- No Revenue land is procured
- Private land is not procured from tribal
- No person was actually required to vacate his dwelling and shift away.
- Extra precaution taken to see that the Scheduled Tribes and Scheduled Cast brethren are not facing any forcible evacuation or unwilling compromise, but there was none

  As full precautions are taken as above there cannot be any cause for restlessness of any sort, and is not.

- **Transparent Public Relations**

In this particular case, the PP is signing as an Occupier on the Application for Consent to establish and hence is answerable to the SPCB, Government and all concerned for a very long tenure, almost perpetually. We, therefore, will have to have sustainable relations with all levels of Government Departments on one hand and the local sons of the soil and the work-force, on other. We have given a thought to this balancing act and hence have established a Public Relations Office (PR) already. Matters are proposed to be handled smoothly.

Industry shall have four major wings viz. Administration, Technical, Legal and Public Relations. A person of high caliber shall be heading each of these for cells, and work with imagination.

- The conditions laid in all the permits, licenses, consents, N.O.C.s shall be minutely studied and compliance shall be commenced.
- Periodically Reports shall be submitted
- The inspectors of various Departments shall be periodically invited to examine the status of our compliance and guidance shall be obtained.
- Corridors of dialogue and communication shall be kept open with the people, peoples' representatives, NGOs, Public Interest Groups, so that any social suffering grievance shall not become a complaint, a conflict and end up in litigation.
- Various departments with whom rapport will be kept are --

Table 6.8: Interface – This New Industry's Administration

Deals with Sector of	#	Dept. / Organization
Government	1	Forest Dept.
	2	Dept. of Environment
	3	Dept. of Industries
	4	Revenue Dept.
	5	Urban Development Dept.
	6	Town Planning Dept.
Semi-Government	7	Zillah Parishad
	8	State Road Development Corporation
	9	State Pollution Control Board
	10	Gram Panchayats
Non-Government	11	Non-Government Organizations
	12	Peoples' representatives MLA, MP
	13	Tribal & Local Community
	14	Clients

6.5 Action

6.5.1 Environmental Monitoring Schedule:

The monitoring schedule is decided as under (or as may be specified by Authorities):

Table 6.9: Monitoring Schedule

#	Facet	Stations at	Parameters	Frequency
1	Surface water	One upstream One downstream One nalla	BOD, pH, SS, TDS, Colour	H-Y
2	Groundwater	One up-gradient Two down-gradient	BOD, pH, SS, TDS, Colour	H-Y
3	AAQ (Ambient Air Quality)	Three directions @ 120 degrees	RSPM, SO2, NOx	H-Y
4	Noise	Three directions @ 120 degrees	Decibel	H-Y day and night

Legend: H-Y = Half-Yearly

6.5.2 Action Schedules:

There will be three facets to design and follow the schedules viz.: (A) for compliance of responsibilities, (B) for day-to-day operation and management of ETP and ECE, and (C) for routine environmental monitoring, to assess the impact and take timely warning. First two are already explained above by **CPCB Publications**. The schedule, for third aspect is:

a) Daily Compliance:

1. Take the meter readings - initial and final, for checking the water consumption.
2. Maintain the electricity consumption record for pollution control.
3. Monitor ambient air periodically as per Consent.

b) Monthly Compliance:

1. Monitor the emission sources through the competent authority and submit the analysis reports to the board.
2. Monitor ambient/work zone noise levels & ensure conformance to standards.

c) Quarterly Compliance:

1. Monitor the ambient air quality at upwind and downwind locations of the factory.
2. Review the Water Reuse performance.

d) Yearly Compliance:

1. Carryout "Environmental Audit Statement" of various environmental aspects, review the environmental policies with the help of experts and make the up gradation /changes accordingly.
2. Submit the "Environmental Statement" to the State Pollution Control Board in Form V under Rule 14 of the Environment (Protection) Second Amendment Rules 1992 of the Environment (Protection) Act, 1986.
3. Renew the Consent to Operate under the Water and Air Acts.
4. File the Cess returns to the State PCB under the Water (Prevention and Control of Pollution) Cess Act, 1977.
5. Renew the Hazardous Waste Authorization under sub-rule 3 of the Hazardous Waste (Management and Handling) Rules, 1989.

Daily, monthly, quarterly and yearly schedule of inspection and monitoring is worked out as a part of Environmental Management plan (EMP) with specific reference to air pollution control system, water & waste water management , monitoring frequency , responsibility and time bound implementation plan for mitigation measures **(ToR 39).**

6.6 Success Indicators

The success of the sincere and honest efforts the PP is putting in, will be judged by various indicators, such as –

- There is no complaint of the villagers/ neighbors
- There is no complaint of the customers regarding quality of product and delivery schedule.
- No complaints from Government, semi-Government or Non Government Departments or Organizations
- Statistics of Health, Safety and Environment will be maintained and will be without blemish.
- Other Industries come to seek our advice.
- Demonstration to others for Rainwater harvesting, Groundwater Recharging, sand-substitute ash, building materials from ISO 14001 certified units, care for beet-growing etc.

6.7 Environment Monitoring Hierarchy:

TI is aware that environmental monitoring is not a job, which can be handled without a careful planning. The success lies if three components are simultaneously present viz. (1) management support, (2) efficiency of the environment management cell and (3) acceptability of resulting environmental quality, both by SPCB and by public. A structure of this plan and hierarchy of process flow for environmental management is prepared and enclosed as logics, which is self-explanatory. **TI** will adopt this structure and hierarchy, which is akin to principles and practice.

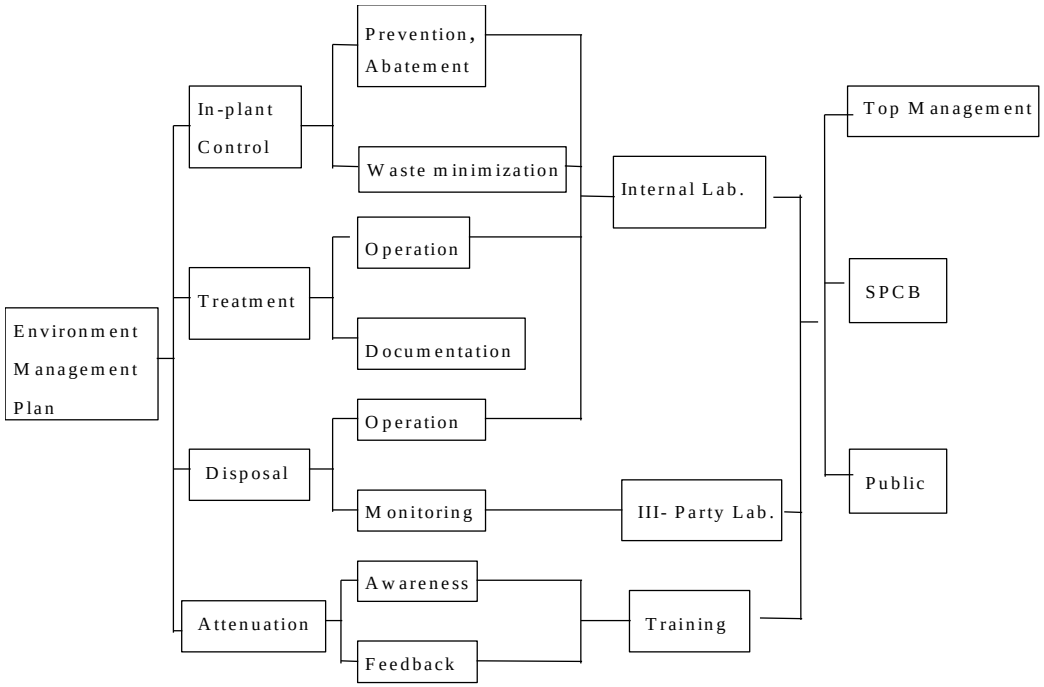

Fig. 6.1: Structures

The ultimate aim is that the Proponents and Public make a combined effort in the same direction of **Sustainable Development.**

For prevention, abetment and control, followed by mitigation, proper hierarchical system or Administrative order of the company is maintained with Director reporting to the Managing Director. For day to day control, General Manager & Environmental Scientist are responsible and they are supported by field officers, field inspectors, laboratory staff, garden supervisors, mechanical and electrical fitters and CSR/CER in-charge.

6.8 Chapter Conclusion

It is proposed to frame an Environmental Monitoring programme both in Construction and Operational stages to monitor the effectiveness of the mitigation measures by judging the impact on environment. A separate budget is proposed for the same as also a dedicated Cell. A transparent approach will be kept with documentation and Reporting with statistical treatment to the data. **Checklist of Statutory Obligations** will be maintained and compliance with it will be monitored.

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CHAPTER 7 - ADDITIONAL STUDIES

Contents of this Chapter shall be:

ABOUT Public Acceptability, Public Relations, Disaster management, Anticipated Social Impact and rehabilitation/ resettlement

7.1 Public Opinion

7.1.1 Local Contacts

The villagers from this village had a poor socio-economic status. Majority of the youths had no means of livelihood. Agriculture was not supported by irrigation. Ground water wells were limited. Hence only single rain-fed crop was the maximum possibility. The present project proponent, understood their plight. He brought villager – groups together for this National Productivity and local Development. The village Grampanchyat conducted a General Body of residents and conveyed their NOC for this project.

In order to ascertain the concern of the other persons who have plausible stake in the environmental impact of this project, the Proponents thought it fit to interview some people as sample survey basis. These interviews were oral and informal. This was not to meet any statutory requirement or a mechanical formality. Proponent really wanted to know as to whether this project is a welcome addition in the minds of surrounding people. They never wanted to force their presence.

The interviews generally brought out the following points –

- The working of existing unit of the proponents is working well to give benefit to the local people.
- The payment of materials and wages here will be satisfactory.
- There is a constant rapport, open corridors for discussion and transparency in transactions.
- No odour or noise nuisance is likely to be felt.
- Sons of soil will employed and benefited.
- Establishing new venture to convert waste into wealth is a step in right direction for the small suppliers.
- It is however, necessary to see that no water pollution and odour nuisance is created by the unit, for which the proposed arrangement appears to be satisfactory.

The local people and Proponents are generally comfortable with each other.

7.1.2 Public Consultation

As per requirement of the Notification, MPCB has conducted public consultation and the report is submitted to MoEF. Summary is presented in Chapter 1.

7.2 Risk assessment

The Environmental risks are inherent in operation of any industry, or any human activity for that matter. Any system failure can lead to disaster.

These Organic Chemicals manufacturing is a simple three step process, as seen earlier. However Risk is posed by (1) Dust in various operational steps and (2) Fuel, which here is in the form of power and coal/bagasse.

Dust is generated in many steps from raw material handling, transfer, heating, cooling, transporting out and waste treatment. In order to reduce this risk, steps like capturing the same, conveying through ducts, and controlling by ESP are attempted. Conveying by smooth internal roads, watering the roads, regular and quick sweeping and monitoring the efforts, are the minimum actions to be taken.

Fuel used here is coal/ bagasse. Fuel can give rise to one Risks, namely Fire. As full fire protection and extinguishing gadgets are provided, any risk from fuel stands automatically covered. All motors are kept TEFC (totally enclosed fan cooled). Temperature and Carbon Monoxide control is undertaken by arranging carbon dioxide correct percent. This minimizes the Risk to a very great extent.

- Vehicles bringing in the materials are run at slow speed. It is neatly tied and secured to the vehicles. Guards patrol the entire length, throughout day and night. There is no public traffic here and warning signals are painted on boards.
- For other raw materials, it is a policy to bring the same in small doses and in closed containers. If sundry raw material comes in bags, hooks and other sharp equipment is not to be used on bags or unit loads. Cranes, tackles and forklift trucks are used for unloading and loading.
- Before storage all units are to be inspected for cleanliness and for damage.
- All bags are to be stacked on pallets. All damaged bags are to be repaired. a second impermeable bag which would be sealed properly and kept separately for use.
- Dyke walls, smooth sloping floors provided around storage tanks.
- Emergency Management Training
  The key personnel would undergo special courses on Emergency, Disaster management & Occupational Health. This may preferably be in-plant training. The Managers, Senior Officers & involved staff would undergo a course on the use of personal protective equipment also. In addition, special courses will be designed team-wise. In such training, outside government agencies also will be invited to be familiar with the plant layout.

Study is undertaken for emergency measures and Risk assessment for storage and handling of alcohol and mitigation measure due to fire and explosion including foam system to concerned handling areas **(Tor 34, 35).**

7.2.1 Stocking at work place, loading and maintenance of floor area:

- The raw materials are to be placed very near to the feeding point.
- Housekeeping is most important of all dust control methods.
- Simply cleaning of all possible emission sources as quickly as possible.

7.2.2 Work Environment:

Dust and Heat free work environment is maintained in view of workers' safety, Health and Hygiene. The efforts taken in this respect are:

#	Source	Attenuation by
1.	Scrap Yard	Avoided by adopting smooth roads and yard.
2.	Plant	Avoided by adopting good foundation, good alignment, well lubricated.
3.	Generators	Fitted enclosure and tall stack
4.	Vibrations	Proper sturdy foundation provided for all the machines and equipments to avoid fugitive escapes.
5	fumes	Closed, covered and carried through ducts

Table No. 7.1: Work Environment Care.

7.3 Disaster Management Plan:

7.3.1 Objectives

- To localise the emergency
- To minimise the consequences
- To ensure that following concepts are considered, namely rescue, first aid, evacuation, rehabilitation, spreading the information

7.3.2 Elements of On-Site Plan:

- Assess the size of event
- Plan formulation and liaison
- Action like: Raise alarm, communication within and outside
- Appoint key personnel and deploy. Appoint Controller.
- Emergency Control Center
- Action on site
- Action off-site.
- Alarm and visual signals at strategic point, first alert sent to Incidence Controller.

7.3.3 Organization

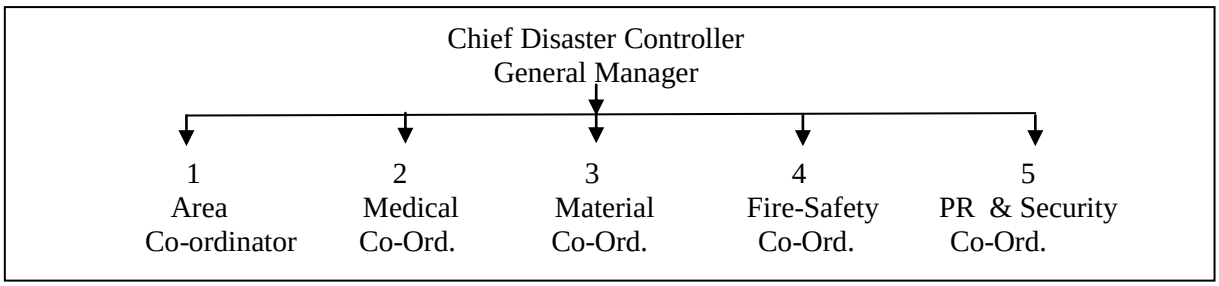

Table No.7.2: Organization Chart

7.3.4 Duty Allocation

i) Chief Disaster Controller (General Manager)

- Take control and declare emergency
- Be there
- Contact Authorities

1 Area Co-Ordinator

- Take steps. Make Emergency shut-down of activities. Put everything in Safe condition.
- Evacuate.
- Commence initial fire-fighting, till Fire Department comes to take up.
- Identify materials requirements and call Material Manager.

2. **Medical Co-ordinator**
   - Establish Emergency Center. Treat people, Transfer – Remove patients.
   - Assign Deploy staff
   - Arrange medical supplies
   - Summon outside help

3. **Material Co-ordinator:**
   - Despatch necessary supplies
   - Arrange purchases

4. **Fire-Safety Co-ordinator:**
   - Be Overall incharge for Fire and Safety.
   - Coordinate with Area Coordinator and Direct the Operations
   - Cordinate with City and Other Fire-tenderers.

5. **PR & Security Co-Ordinator**
   - Remove Crowd
   - Arrange Gate security
   - Contact Police
   - Arrange evacuation
   - Contact outside Agencies if asked.
   - Handle news media
   - Mobilise vehicles
   - Arrange Food, clothing to Officers inside.

6. **Emergency Control Center**
   - Adequate Internal phones
   - Adequate external phones
   - Workers Tally
   - Map showing hazardous storages, Fire horns, Safety equipments, Gates and side gates, Assembly points, List of persons.

7. **Action on Site**
   - Evacuate. Non-essential people first at Assembly point
   - Persons Accounting
   - Record of Next-of-kins
   - Public Relations

8. **Post Disaster Analysis.**
   - Why happened
   - How to avoid in future
   - Whether on-site operations failed? In what respect?
   - How to avoid such failure in future
   - Report to be submitted in detail to Authorities
   - Compensation arrangements if any, commenced?
   - Call suggestions on shortfalls observed.
   - Give rewards openly, pull defaulters individually

Safety & Health Policy:

This is studied by Approved Specialist consultants and have advised certain Responsibilities and duties of all personnel:

- Report promptly any abnormal situation seen.
- Lookout for safety signs.
- Any injury must be reported.
- Intoxicants strictly prohibited.
- Walk on road keeping right and face approaching vehicles.
- Never use compressed air.
- Keep work place clean and hygienic
- Keep floor dry and non-slippery.
- No obstacle as tripping hazard.
- Safety committee to meet at least once in 3 months.

ii) Hazard Analysis

This is studied by Approved Specialist consultants.

They have studied 'hazard' that include human injury, property damage, damage to environment and lessening the ability to perform a prescribed function.

Situation is studied for all abnormalities caused by and as –

Caused in	By abnormality as
Flow	More, Less, No, Reverse
Level	More, Less
Pressure	More, Less
Temperature	More, Less

- Preliminary hazard analysis (PHA) made for alcohol storage needing care indicates –
- As Vapour explosion may create formation of explosive atmosphere outside storage tank due to faulty valve, corroded tank and leakages.
- As fire may create formation of vapour/ air mixture with reference to flammability due to loose pipe or flange joints, leaking pipe lines
- Ensure that (a) spark arrestor is attached to the exhaust of the road tanker, (b) start transfer of alcohol to the storage tank from plant by ensuring non-accumulation of static charge.
- HAZOP work-sheets are prepared for each of the distillation columns for deviations of various parameters for causes, consequences and provisions. These to be observed.

Preliminary Hazard analysis is used to identify typical and often relatively apparent risk sources and damage events in a system. A characteristic of Alcohol is a clear, colorless and flammable liquid. It has the boiling point of 78^0 C, ignition point of 363 ^{0}C and explosive limits of 3.3 % - 19.0 % by volume. It is listed as hazardous substance by ACGIH, DOT, NFPA, MSIHC Rules and NIOSH and is regulated by OSHA.

It is important to control or eliminate all potential ignition sources in areas that might lead to ignition of vapour. The potential sources of ignition are: Open flames, Electrical wiring / devices, Smoking, Heat sources / hot surfaces, Welding and cutting, Friction, Sparks and Arcs, Static sparks, Gas Compression. Following are the precautions that will be taken to minimize the probability of ignition:

- Electrical equipment and wiring should be suitable for the hazard.
- If a heating operation is necessary, use only indirect heating methods.
- Do not allow any open flames.
- Provide grounding and bonding for all equipment handling using these liquids.
- Maintenance program will be established to assure that all equipment and safety controls are functioning satisfactorily.

a) Characteristics of Ethanol

Rectified spirit (RS), Absolute Alcohol and Extra Neutral Alcohol (ENA) are basically ethanol of different grades and have the same hazard characteristics. Hence, all these products are considered as ethanol in hazard analysis. Ethanol is a clear, colorless and flammable liquid. It has the boiling point of 78^0 C, ignition point of 363 ^{0}C and explosive limits of 3.3 % - 19.0 % by volume. It is listed as hazardous substance by ACGIH, DOT, NFPA and NIOSH and is regulated by OSHA. The characteristics of ethanol are given below.

Properties of Ethanol

Physical State	Liquid
Appearance	Clear
Color	Colorless
Physical Form	Volatile Liquid
Odour	Alcohol odour
Taste	Burning taste
Molecular Weight	46.07
Molecular Formula	C_2H_5OH
Boiling Point	172^0F (78^0 C)
Freezing point	-179^0F (-117^0C)
Vapor Pressure	40 mm Hg @ 19 C
Vapor Density	1.59
Specific Gravity	0.789
Water Solubility	Soluble
Volatility	100 %
Odour Threshold	5 – 10 ppm
Viscosity	1.22 – 1.41 cp @ 20^0C
Solvent Solubility	Benzene, ether, acetone, chloroform, methanol, organic solvents

iii) Hazard Rating of Alcohol is based on flammability, reactivity and toxicity as given in National Fire Protection Association codes 49 and 345 M as

CHEMICAL	**NH (Health Factor)**	**NF (Fire Factor)**	**NR (Reactivity)**
Ethanol	2	3	0

(Least-0, Slight-1, Moderate-2, High-3, Extreme-4)

Based on Manufacture, Storage and Import of Hazardous Chemical Rules, GOI Rules 1989, we find applicability of GOI Rules 1989 to the notified threshold quantities, analysis of products and quantities of storage in the plant has been carried out.

Product	**Listed In Schedule**	**Total Quantity**	**Threshold Quantity**		**Applicable Rule**
			Rules 5,7-9 and 13-15	**Rule 10-12**	
Ethanol	1 (2)	7190 KL (5745 T)	1000 t	50000 t	Rule 5, 7-9 and 13-15

Based on the above, it is noted that alcohol produced and stored in the plant attract the rules of GOI 1989.

Degree of Hazard based on Fire explosion and Toxicity indices for the storages:

Section	**Fire Explosion**	**Toxicity**
Ethanol	Intermediate	Light

Thus, the following minimum preventive and protective measures are recommended.

Features	FE & I Rating	
	Light	Intermediate
Fire Proofing	2	3
Water Spray Directional	2	3
Curtain Special Instr.	1	2
Flow Control	2	4
Blow down-spill	1	3
Internal Explosion	2	3
Combustible gas Monitors	1	3
Remote Operation	1	2
Dyking	4	4
Blast and Barrier wall separation	1	3

(1= optional, 2= suggested, 3= recommended, and 4= required)

Maximum Credible Accident Analysis (MCA Analysis) is one of methodologies evolved to identify worst credible accident with maximum damage distance which is still believed to be probable.

The probable fire hazard in the plant is in the area of ethanol and is due to storage and handling. It is proposed to store about 60 day's production of both the products within a dyke of 25x30 m and 15x22m, separately. As a worst case it is assumed that the entire contents are leaked out. In the event of spilling its contents through a small leakage or due to rupture of the pipeline connecting the tank and on ignition fire will eventually forming pool of fire. In order to assess the radiation levels, Heat Radiation model has been used the algorithm of the models is based on the formulae published in the yellow book by the TNO, Netherlands.

Alcohol Storage is as Day receiver, IS Receiver, Fusel alcohol, Bulk receiver, IS Bulk Storage and DN Spirit, as totally 22 tanks with capacity of 7190 KL

With a dyke area as 40 x 50 m., the results are computed for Pool Fire Scenarios and Distances and accordingly fire protection is designed.

iv) Site Specific Consequences: In order to assess the site-specific consequences, information pertaining to the site such as nearest habitation, nearest industry etc was collected. The nearest village to the plant site is Baradgaon Sudrik village with a population of about a 3539 located at distance of 1.0 km from the plant site in the East direction. **Consequences of Heat Radiation** is also seen**.** As the project is located for away from any human habitation and surrounded by dry lands & hillocks with scrubs the offsite damage to the general public and property is negligible.

7.3.5 Fire Fighting Facilities In Ethanol Plant (ToR 33)

1. Possible Fire Hazards

i. Fire in fuel/bio-mass storage yard
ii. Fire in Alcohol storage tanks Electric static electricity and consequent fire accident.

2. Fire Fighting Facilities

Elaborate firefighting system will be made available in any corner of the plant. Fire detection is also envisaged.

- Fire water storage tanks
- Fire water pump house containing combination of diesel & electrically driven pumps.
- Hydrant system with piping, valves, instrumentation, hoses, nozzles etc.

- Foam injection system for fuel oil tanks of foam concentrate tanks, foam pumps, in-line inductors, valves, piping & instrumentation
- Automatic high velocity water spray system consisting of detectors. Deluge valve projectors, valves, piping & instrumentation
- Automatic medium velocity water spray system consisting of QB (Quartzoid Bulb)
- Linear heat sensing cable detectors, deluge valves, isolation valves, nozzles, piping & instrumentation
- Suitable 'Halon Substitutes' such as INERGEN or FM:200 or AGGONITE for protection of Control-equipment-computer – electronic equipment rules
- Early warning fire detection & alarm system
- Portable & mobile extinguishers of type –Pressurized water, Co2, foam, DCP (Dry Chemical Powder) at strategic locations throughout the plant.

a. Water Hydrant System

Fire hydrant system with hose pipe of 7 kg/cm^2 pressure with hydrants are located at in bio-mass yard, distillery house, ethanol storage area

- A jockey pump and accessories. 50 m^3/hr at 90 m head
- Corrosion protected M.S. underground piping 150 mm dia. and 100 mm and around the plant as closed loop
- 8 nos. single headed hydrants distributed around the plant at about 30 m spacing to supply pressurized water for fire fighting.
- 10nos. m. s. hydrant nose cabinet adjacent to each cabinet.

b. Fire Extinguishers

Type	**No.**	**At**
Foam water	4 each	Main office and store.
CO_2 type	12 each	Departmental office and electrical installations.
DCP type	16 each	Distillery plant and power plant.
Sand buckets	various	Different locations

c. Fire Protective Appliances

Two sets of fire safety appliances each consisting of following units are located at store and alcohol storage, respectively, such as Face masks & gas masks (2), Face shield (2), Helmet (6), Safety belts (2) and Safety ladder (1)

d. Fire Brigade

Fire brigade facilities available at Daund and Ahmadnagar shall be utilized whenever need arises. Contacts are already established.

On site emergency plan is in place. **Emergency Organization** is constituted.

#	**Designation**	**Person**	**Alternate person**
1	Declarer of Emergency	General Manager(Prod)	General Manager (Adm.)
2	Incidence Controller	Manager Engineering	Manager (Prod)
2.1	Evacuation and Rescue Team	Production Manager	Production
2.2	Repair Team	Boiler Supervisor	Plant Supervisor
2.3	Essential Service Team	Lab. Chemist	Electrical Supervisor
3.0	Emergency coordinator	Boiler Supervisor	Power plant Supervisor
3.1	Transportation Vehicle Team	Personal Officer	Office Clerk
3.2	Medical Services Team	Environmental Manager	Digester Supervisor
3.3	Security	Security Officer	Security Supervisor
3.4	Communication	Gen. Manager (Adm.)	Gen. Manager (Prod.)

i) Safety Equipments And Appliances will be kept at administrative building/stores building and are under the control of emergency Co-ordinator, namely First AID medical units, 4 units at store and 4 units at ECR, Safety belts, Ear muffs, Noise muffs, against dusts, Aprons against chemical spillage, Shock proof gloves and mats, Leather Aprons, and Leather gloves, Safety items against chemicals like gum shoes, hand gloves, helmets, goggles, Safety ladder, Breathing apparatus, Stretchers and oxygen cylinder, Emergency lighting facilities and Air life line for working in vessels and tanks.

As **Emergency Transport Vehicle,** One vehicle along with driver is always made available at the factory premise for emergency needs. Ambulance facilities available at general hospitals of Daund will be made use whenever necessary.

Assistance of District Fire Brigade and Central Labour Institution shall be utilized for conducting training programmes arranged every year.

Once the emergency is controlled the Declarer of Emergency assesses the situation along with other team heads. If he is satisfied that normalcy is regained and no further hazards involved, he shall arrange **all clear signal** by giving one minute continuous siren at high pitch. All Authorities will be informed about this episode including Police Station, Revenue Department, Factory Inspectorate, SPCB and others. The incidence will be reviewed. After emergency situation is over, the Declarer of Emergency should appoint an expert committee of two to three members to,

i. Identify the causes lead to the emergency situation.
ii. Preventive measures to avoid recurrence of such situations in future.
iii. Identifying the areas of lapses in implementation emergency plan so that the same can be improved in future.
iv. Recommendation for further strengthening of EMP

i) **Heat Radiation**

As a worst case, it is assumed that the entire contents are leaked out & on ignition, fire will eventually form a pool of fire. The resultant radiation has to be assessed of the pool fire.

The heat load on objects outside the burning pool of liquid can be calculated with the heat radiation model. This model uses an average radiation intensity which is dependent on the liquid. Account is also taken of the diameter to height ratio of the fire, which depends on the burning liquid. In addition, the heat load is also influences by the following factors:

ii) Distance from the fire

The relative humidity of the air (water vapour has a relatively high heat absorbing capacity)

iii) Visualization and Simulation of Maximum Accidental Scenarios

The worst case scenario which is considered for MCA analysis is Pool fire due to failure of storage of ethanol storage tanks in the farm area. The proposed industry will provide 15 days storage of the final product within the plant premises. The following table provides the storage details of ethanol and Rectified spirit.

Alcohol Storage Details

Product	**Particulars**	**Existing (**BL)	**Nos.**	**Proposed (**BL)	**Nos.**
Alcohol	R.S.&E.N.A. Bulk Storage tank	740000	4	360000	4
	A.A. Bulk Storage tank (Proposed)	-	-	90000	1
	I.S. Bulk Storage tank	204863	2	90000	1
Molasses tank	Storage Tank	9500	2	9500	1

Note: There will be supporting attendant small capacity tanks to hold R.S., E.N.A., A.A., I.S. Receiver as also fusel oil and de-natured spirit.

As a worst case it is assumed that the entire contents are leaked out. In the event of spilling its contents through a small leakage or due to rupture of the pipeline connecting the tank and on ignition fire will eventuate forming pool fire. As the tanks are provided within the dyke the fire will be confined within the dyke wall.

Fires affect surroundings primarily through radiated heat, which is emitted. If the level of heat radiation is sufficiently high, other objects, which are inflammable, can be ignited. In addition, any living organism may be burned by heat radiation. The damage caused by heat radiation can be calculated from the dose of radiation received, a measure of dose is the energy per unit area of surface exposed to radiation over the duration of exposure.

iv) Effect of Pool Fire

Pool fire may result when bulk storage tanks will leak/burst, and the material released is ignited. As these tanks are provided with dyke walls to contain the leak and avoid spreading of flammable material, the pool fire will be confined to the dyke area only. However, the effects of radiation may be felt to larger area depending upon the size of the plant and quantity of material involved.

Thermal radiation due to pool fire may cause various degrees of burns of human bodies.

More ever, their effects on objects like piping, equipment are severe depending upon the intensity. The heat radiation intensities due to the pool fire of the above tank farms are computed using the pool fire model. The results obtained are presented in the following Table.

Pool Fire Scenarios and Radiation Distances

Alcohol Storage Tanks Farm	**Quantity of Storage : 7190 KL**
	Dyke area : 40 m x 50 m
Damage Criteria	**Damage Distance (m)**
100 % Leathality (35.5 kW/m^2)	5.0
50% Lethality (25.0 kW/m^2)	25.0
1 % Lethality (12.5 kW/m^2)	65.0
First Degree burns (4.5 kW/m^2)	140
Normal Intensity with no discomfort (1.6 kW/m^2)	170

7.4 Social Impact Assessment,

In such assessment, generally three aspects are considered namely (1) how and to what extent this project will alter the society status, (2) how and to what extent this project will affect the structures of heritage (like monuments, temples etc) that are of emotional local attachments, and (3) how and to what extent this project will solve the delicate issue of ousters.

These points will be dealt herein below, but as a summary it can be stated that

1) **Society status** needs an improvement because the unemployed youths are in majority, agricultural employment is limited, and future is bleak without such Industrial developmental efforts.
2) **Heritage** structures are too far away as to get any impact and
3) This site being already in the possession of Proponents with due respect paid to earlier land holders and made Industrial, question of **Rehabilitation** does not now arise.

i) Society Status

The earlier Chapter Three serves to describe in details the existing Social Status in great details as to **Population** (decadal growth, sex ratio, village sizes, literacy rate), **Transportation & Communication** (bus stop or a railway station, road network, surfacing), **Public Health (**Medical facilities, Primary Health Centre, Primary Health Sub centre, dispensaries, attending Registered Practitioners)Drinking water, **Land Use Pattern (**irrigation area, land cultivable but waste and land not available for cultivation), **Agriculture (**Kharif, Rabbi and perennial), **Animal Husbandry,** employment, and industries. It is stated at all the levels like the State, District, Tehsil and the Study Area of 10 km radius around. The needs of developmental efforts are arrived and on that background, this Project may be seen.

ii) Employment & Wages:
Coming nearer to the study zone of 10 Km diameter (Split in Sectors A, and C, rural and urban), we find –

#	**Particulars**	**Daund Tehsil**	**Study Area**
1	Main Workers to total population %	48.00	49.13
2	Non-workers to total population %	53.09	41.72
3	Cultivators & Agricultural labours to total population %	33.67	47.46
4	Cultivators & Agricultural Labour to total workers %	83.07	89.11
5	Other occupation (*) to total workers. %	16.93	10.89
6	Ratio male to Female Main workers	2.28	1.97
7	Ratio male to Female Marginal workers	1.33	0.67

Note*- (*) Other occupations means Livestock, Forestry, Fishing, Hunting, Plantation, Orchards & Allied activities, mining & quarrying, Manufacturing, processing, servicing, repairs in household and in other than household industries, construction, transport, storage, communication, trade & commerce.*

As would be seen from the table:

- The Total worker percentage in vocations of agriculture in the study area is overall comparable (though slightly higher) with the Tahsil figures
- The Total worker percentage in vocations other than agriculture is low as compared with both the Tehsil and the districts.
- In Agricultural vocation, too women participation is lower as cultivator, but higher as labour. In marginal employment, however female are engaged. However this is exploitation without any financial intendance to women.
- There appears to be low for dependable livelihood for other avenues as livestock, forestry, fishing, hunting, plantation, orchards & allied activities, mining-quarrying, Manufacturing, Processing, Servicing & Repairs in Household Industries, Manufacturing, Processing, Servicing & Repairs in other than Household Industries, construction, trade & commerce, transport-storage & communication and other services at present.

All this leads to one conclusion that industrialization or activities of construction has to be stepped up

- To provide more livelihood
- To provide Male employment with Women participation
- By this activity of disciplined industry, the land use pattern is not affected much.

iii) Rehabilitation:
The proposal is unique in the sense that –

1. The land is already in possession with good faith.

2. The extent of required land is limited
3. The land is not prime agricultural land, which can utilized for the new proposal aims a
4. There is no uncared ousters or displaced person here
5. No rehabilitation or resettlement remains to be done on the above background.

7.4.6 Occupational Health & Safety

During operation stage, dust, gas cutting, welding may cause hazards, micro-ambient conditions near border, platforms etc. Periodical examination of workers' occupational health is necessary. Health evaluation should do:

#	Occupation	Type of Evaluation	Frequency Pre-placement & Thereafter		
			For Age <30 every (years)	For Age 30-40 every (Years)	For Age 41-50 every (years)
1	Cane crushing area	Chest X-ray, Spirometry & vision testing	5	4	2
2	Sugar Process area & Co-generation Area	Chest X-ray, Spirometry & vision testing	5	4	2
3	Main Control Room	Far & Near Vision, colour vision and hearing test	5	4	2
4	Ash & Bagasse handling area	Chest X-ray, Spirometry, vision & Hearing testing	5	4	2
5	Noise prone area	Audiometry	Annually		

Note: All workers engaged in material handling system will be regularly examined for lung diseases such as PFT (Pulmonary Function Test).

With the present level of production and products, existing Occupational & Safety Hazards are indeed limited as compared to the future alcohol plant. For the present, it is found that the situation is within Permissible Exposure level (PEL). In order to maintain the same, what measures the company has adopted to keep them within PEL so that health of the workers can be preserved is mentioned. For future work, namely exposure specific health status evaluation of worker, we propose to conduct health evaluation on a pre-designed format for chest X rays, Audiometry, Spirometry, Vision testing (Far & Near vision, colour vision and any other ocular defect), ECG during pre placement and periodical examinations as per Factory Act & Rules, as detailed above. This will be for future working when alcohol manufacturing is involved, with an aim of maintaining OHS standards as per OSHAS/USEPA. Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers is separately earmarked **(ToR 42).**

7.5 Chapter Conclusion:

Having analyzed the Project so far, in this Chapter it is shown that this project will meet the public acceptability (now and in future) as the proponent has kept cordial and pollution-free relations around. Whatever are the possible risks due to unforeseen act or events are apprehended now and a Management Plan prepared. Any damage to structures of Heritage importance can create sensitive situation. This is studied and results entered. Society needs such development based on the statistics assembled. It is seen that no R & R efforts are freshly required as the land is in peaceful possession of the Proponents.

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CHAPTER 8 - PROJECT BENEFITS

Contents of this Chapter shall be:

Improvements in the physical infrastructure, Improvements in the social infrastructure, Employment potential – skilled, semi-skilled and unskilled And other tangible benefit from this Project

It is seen that the Project is aimed to fulfill the objective of Sustainable Development. It will certainly improve social status. In what way and to what extent this will reach is submitted herein below.

8.1 Improvements in the physical infrastructure

This Project will improve the physical infrastructure of this area.

- It will not disturb the existing pattern of drainage, because the building construction is not massive. It is more a steel structure not preventing the natural flow of rain water. There will neither be any inundation nor any erosion. As roof rain harvesting is proposed, there will not be any incremental run-off causing floods downstream. The nearby nalla is trained by good civil engineering practice and hence physical infrastructure will improve.
- Rain harvesting will improve the groundwater table. On the other hand no groundwater is consumed by us as we are either dependent on authorized surface water source or on recycled wastewater after full treatment. The enhanced groundwater will be indeed useful to the surrounding farmers who are down gradient. The green crops in their fields on such groundwater will improve the physical infrastructure.
- The industry is dependent on raw materials and helping chemicals, which arrives by road. The finished goods too is dispatched by goods. All the labour force will come by road. Thus we shall have to maintain the roads in good conditions. Road connectivity thus will improve. This improved physical infrastructure will be an added facility to the community for surface transport.
- Greening drive in the premises will give a pleasant look to the land. It will absorb some portion of the CO2 produced by fuel burning (utilities). For greening fresh water is not proposed to be used. The treated wastewater will be recycled and its CNPK contents will be useful as nutrients. Canopy of trees will arrest dust fugitive SPM as well as the noise.
- When we are developing our own tree plantation, concept of bio-diversity will be kept in mind. This will need many species. These will be made available to us only through nursery. Nursery once so established will be useful in turn for others too who need. The nursery available with us may inspire others to plant more trees in this area in their compounds. This physical infrastructure will available to them.
- Whether by a particular activity the physical infrastructure is improving or deteriorating is best judged by the change in prevailing land prices. Generally the land prices get appreciated based on two factors namely (1) the comfort that it offers and (2) the occupation that it serves. On both these counts, this distillery activity downstream of nearby sugar units is desirable. This consideration is also reflected when the people are contacted to know about their opinion on the new venture here.

8.2 Improvements in the social infrastructure

This Project will improve the social infrastructure of this area.

- It will not disturb the existing pattern of social relations and democratic set up. In the District similar industries are already running their units over the years. These are not only running with efficiency but are running with no disturbance from the local people. Local people have even encouraged the expansion of such mills for production. The same is the case for diversification. This mainly because they are accepted by local culture, without any disturbance to the existing pattern of social relations or hierarchy. Likewise the same Gram Panchayat continues with same members and it gets support from this unit and the unit gets encouragement from the Panchayat. The peoples' democratic set up is undisturbed.
- It is evident from a short history of last 5-6 years that the Zilla Parishad has become somewhat stronger since the inception of similar units in the district here. The proponent's management consists of good-meaning people. They will employ proper sons of the soil without discrimination, wherever feasible. The buildings of the unit have significant ratable value and substantial raw material comes into the premises of local body. The Proponent's management keeps the transparent account. This will further enhance with diversification and the Panchayat will have a continued benefit of taxes and cess.
- Time management is of importance especially in industrialized community though may not be so in agriculture oriented society. In rural background much of the time and energy is wasted in reaching from one place to another. This is due to lack of swift mode of transport. By the presence of this industry, number of vehicles in this area will generally improve (both private and public-owned). This will help shorten the time reaching destination and utilize it for some fruitful productive work. As people will more know about the importance of time, more vehicles will come on the roads.
- Society and this Industry are interdependent. Industry gets strength from the villagers and they get livelihood and amenity support. Both of them can get better future. To maintain this continuity, this is based on "Symbiosis", as also timely funds.
- The rural economy is found generally dwindling because farmers depend only on one single source of livelihood namely conventional agriculture. With support of funds and amenities by our help, perhaps they will have more purchasing power and more use of domestic animals. The increased greenery and farming with support of the grass production can increase and animal husbandry will enhance. Buffalos, sheep and poultry can be a good business and work for ladies and elderly persons.
- Upliftment of rural sector is slow because of lack of amenities and facilities. If there is a nucleus of industry or steady support of money-flow, such utilities can come to that area and sustain. By presence of similar units, already we are seeing the availability of Banking services and Government Post Office. With the advent of unit like ours, these services will be used more and more advance facilities will come to the horizon. Fire fighting tenders will be now more easily available as also the Police Protection.
- In the study zone of 10 km radius, there was previously hardly any purchasing power and people had hardly any materials for sale. As a result even weekly bazaar markets were very scanty. It is now foreseen that there will be a well disciplines bazaar in the vicinity either to sell or purchase the needed commodities, without waiting for weekly bazaar or walking over there. The agricultural implements, agro-chemicals and vehicles will be in more demand and village grown milk products, vegetables and agricultural proceeds can be for sale.
- Education level goes along with flow of funds and avenue of livelihood. Dependence on Government subsidy also goes along with political stability of the area. The level of

education and literacy (especially rural and women) is very poor, needing improvement. This activity by this Proponent will certainly play a catalytic role in this.

- Likewise the health level goes along with flow of funds and avenue of livelihood. Dependence on Government institutes like PHC (Primary Health Centre) also goes along with political stability of the area. The level of health and medication (especially children and women) is very poor, needing improvement. This activity by this Proponent will certainly play a catalytic role in this.
- Health awareness and economic independence may also help in Family Planning decision-making.
- What is stated above about the human health is equally true about animal husbandry and veterinary assistance. This may improve now.
- Living in harmony is an important aspect of the society. This can happen only if all the components are comfortably placed. Persons engaged in their respective vocation and accruing job satisfaction leads to this. This will become possible by this venture.
- It may not be out of place if we point out that the sister concerns of **TI** have already demonstrated their interest in community development. The group is associated **(ToR 43)** with local social bodies, educational institutes, credit societies and developmental societies. The corporate social responsibility initiatives are focused on employees, the community around its facilities and the environment. Running of the activities include
    - Running of community centers which employ the wives of the employees, where they are provided vocational training to make them self-sufficient and uniforms and hand gloves stitched by them can be used here.
    - Activities conducted by the employees focus on three groups: women, senior citizens and underprivileged children wherein each department in the company adopt an institution around here. These are schools, old age homes and remand homes.
    - Unit will actively support the efforts of primary education to children of economically weaker section of society.
    - On the environment front active drives of tree plantations across villages and training lectures in-house undertaken
    - Construction of Hospital, Shopping Centre and Community Hall.

8.3 Employment potential – skilled, semi-skilled and unskilled

The industry and its supporting activity need many types of people right from manual to managerial strength, in a pyramid, totally 602 persons. The raw material carting may need unskilled workers with people on tractors tankers, trucks and tractor repairers as skilled ones. So in manufacturing activity all three types i.e. skilled, semi skilled and unskilled people are required. The overall potential including the garages, loading-unloading actions, eateries, small shop owners is substantial. The local people can get a good share out of this. In the factory, science and technology prevails and there some outsiders will have to be engaged at least for the time being. If the second generation local people acquire that skill, they too will be able to fill the gap and accrue benefit of higher jobs. If the activity becomes stable by that time, perhaps expansion may become possible further and then employment availability may further enhance.

It can be stated that by this activity employment potential is certainly increasing in all walks of life – skilled, semi-skilled and unskilled

8.4 Other tangible benefits

Both tangible and non-tangible benefits will result from this activity and many of those are described above. Apart from direct employment, many other benefits will accrue like

- Erosion control by nalla training, terracing and bunding
- Flood control by rain-water arresting, and harvesting
- Groundwater level enhancing by recharging
- Time saving by quicker transport
- Aesthetics improvement by general greening with emphasis on biodiversity
- Availability of nursery facilitates plantation
- Developed economy strengthens democratic set-up.
- Strengthened democratic set-up will bring weightage to secure better school-subsidy and health-institutes
- Developed economy brings with it literacy and healthful living.
- Improved safety-security in surrounding with better Law and Order.
- Symbiosis and sustainable development will be the ultimate objective.

8.5 Chapter Conclusion

All these social benefits will come in reality by Project like this.

CHAPTER 9 - ENVIRONMENTAL COST-BENEFIT ANALYSIS

Contents of this Chapter shall be:

If recommended at the Scoping stage and By Voluntary Submission

9.1 Introduction

Industry while making production also generates pollution. Production is beneficial to the Industry. Pollution is a diseconomy to the general public, by way of mal-effect on health and well-being. Industry is asked to internalize this external diseconomy by designing pollution mitigation measures. Then this is an extra cost to the Industry. However, if this cost is supported by the Industry then benefit will go to the public around. This is a cost-benefit relation. Cost and benefit are in inverse proportion. More mitigation cost to Industry is more benefit to society. Less mitigation cost to Industry is benefit saving to Industry but adverse to society. Best solution is Industry gets the production (albeit with lesser margin due to spending on environmental protection) and society gets the benefit (from employment and reasonably safe environment). This also comes under overall justification for the project.

9.2 If recommended at the Scoping stage

MoEF in its Scoping stage has not asked the Proponents to dwell on the cost-benefit aspect. However, briefly this can be mentioned that this study has taken full responsible care to see that the Industry does not wish to gain profit at the cost of comfort of the society. In fact it is the endeavor of the Proponents

- To reduce the pollution created by this new factory by utilizing it in the boilers, and to recycle as usable matter.
- In the final analysis (1) society to get pollution-free environment, (2) neighboring people getting useful amenities and (3) Indian community getting useful material as Alcohol and Power.
- This could be a win-win situation with benefit to Proponents, benefit to the Public and no (or low) harm to the environment. More of this finds place in Chapter Ten.
- All this is possible for which Environment Management Plan as worked out is scrupulously obeyed.

9.3 Voluntary Submission:

However, briefly this can be mentioned that this study has taken full responsible care to see that the proponent group does not wish to gain profit at the cost of comfort of the society.

In fact it is the endeavor of the Proponents

- To keep transparent relations with the neighbors in the area
- To strengthen the Gram Panchayat democratic set up, by paying taxes.
- Not to disturb any prime agricultural land
- Not to encroach on others' existing water source
- Not to overload the existing power supply, causing load-shedding to the villagers
- To remove the barrenness of the land and prevent wasting of rainwater.

- To Recharge the groundwater
- To strengthen the physical infrastructure
- To create greenery within our premises and even outside to some extent
- To reduce the wastewater pollution created by this new activity by utilizing it (1) as boiler feed after concentration, (2) as recycled water for other purposes, and (3) organic solid waste as manure in our own fields as water to grow plantation and landscaping.
- To reduce the solid waste pollution created by this new activity by utilizing it in the fields of our own community land development.
- In the final analysis society to get pollution-free environment, farmers to get cash payment to their sales proceeds (whether crop, vegetables, milk etc) and Proponent getting comfortable peaceful neighbors for his residents.

9.4 Chapter Conclusion:

Pollution control is nothing but internalizing external diseconomy. This is in line with Polluter to Pay principle adopted by Supreme Court. This cost-benefit work, though not asked specifically in scoping, is discussed. Though this many look ideal on paper, it will not serve the purpose unless Environmental Management Plan is prepared and got approved. To support the Plan, administrative set up is necessary and the same is described.

The immediate earlier Chapter had indicated as to what steps are designed in the working of new project. This, however, is required to be manned properly. Unless an EMP is prepared in advance, as like production campaign the environmental protection will not automatically happen. For such EMP, fixing of objectives is the first step and ensures its implementation is the last step. This is designed in this Chapter and we have a commitment from the higher management to stick to this design. This will meet the objectives of fulfilling the legal requirements and not causing any hardships to people, whether it is only formulation extension or a technical grade manufacture.

CHAPTER 10 - ENVIRONMENT MANAGEMENT PLAN (EMP)

Contents of this Chapter shall be:
Environment Management:
Need, Objective, Components, Legal Obligations, Compliance, Watch-dog, Construction Phase

10.1 Need:

Environmental management is a crucial segment of Industrial Management, in view of the global concept of sustainable development. Apart from the social obligation, the industries are liable to suffer a series of drastic actions by statutory authorities, if the former ignore the above said aspect. At its worst, the running factories may be brought to a grinding halt by the pollution control authorities that possess the requisite powers.

Therefore, preparation of Environmental Management Plan is a must to fulfill bifocal aspect of the statutory compliance as well as that of social concern.

Water needs of **TI** may be small or reasonably low, but generally this resource is dwindling. Thus, on one hand one should use it less and on the other the source should not be left polluted for others. Air environment needs to be continuously managed, because man needs inhalation every moment, so also is Flora and Fauna dependent on it. The biological aspects, soil and ground water are all interdependent. Thus need of proper environmental management and conscious plan for it.

To draw a rigid EMP is especially important for us because India has to support 16.1% of the world's population only on 2.3 % of the global area with 0.4% only of energy reserve. This point of Low Energy Reserve is especially taken note by the PP Project Proponents. In this respect here efforts are oriented towards:

- Effluent of moderate BOD is aerobically treated and used for trees under our supervision for distribution or for utilities as recycle.
- The solid waste boiler ash itself serves as building material.
- The high BOD effluent will serve to give calorific value to the boiler as SW concentrate.
- The yeast sludge will be useful as manure.

10.2 Objectives:

a. To define the components of environmental management.
b. To prepare an environmental hierarchy.
c. To prepare a checklist for statutory compliance.
d. To prepare environmental organization.
e. To prepare a schedule for monitoring and compliance.
f. To establish a watchdog committee voluntarily.

The Company has an environment policy, which basically includes all these objectives. The administrative hierarchy is so kept that any untoward incident will be reported directly to the Managing Director. This has avoided generation of complaints or environmental misbehavior like violations. For prevention, abetment and control, followed by mitigation, proper hierarchical system or Administrative order of the company is maintained with Director reporting to the Managing Director. For day to day control, General Manager & Environmental Scientist are responsible and they are supported by field officers, field inspectors, laboratory staff, garden supervisors, mechanical and electrical fitters and CSR/CER in-charge. For this purpose, adequate

funds for capital cost & recurring cost/annum for environmental pollution control measures are earmarked and will be spent. This will also include Corporate Social Responsibility & Corporate Environment Responsibility (ToR A 43, B 46, B 47, B 49).

10.2.1 Environment Components:

TI is aware that environmental management is not a job, which can be handled without a careful planning. The success lies if three components are simultaneously present viz. (1) management support, (2) efficiency of the environment management cell and (3) acceptability of resulting environmental quality, both by SPCB and by public. A structure of this plan and hierarchy of process flow for environmental management is prepared and enclosed as logics, which is self-explanatory. **TI** will adopt this structure and hierarchy, which is akin to principles and practice.

i) Air Environment:

a) Monitor the consented parameters at ambient stations.
b) Monitor the work zone at various stations to satisfy the corporate requirements for health and environment.
c) Maintain a record of running of DG (diesel generating) sets
d) Monitor the stacks or vents fitted to sections of raw material, manufacture, thermal and DG power plants.

ii) Water Environment:

a) Keep record of input water every day for quantity and periodically of quality..
b) Measures are taken to segregate the sub-streams of effluent as per their characterization.
c) Water conservation is accorded high priority in every section of the factory.
d) Keep record of wastewater returned back to process, to utilities and to gardening, both the quantity and quality details.

iii) Aesthetic (Noise & Odour) Environment:

a) Monitor the ambient noise level and work zone noise level to conform the stipulated norms.
b) Creation of awareness for noise attenuation and mitigation program.
c) Monitor the ambient Odour level and work zone Odour level by sensing.
d) Creation of awareness for Odour attenuation and mitigation program

iv) Biological Environment:

a) Special attention is planned to maintain green belt in and around the factory premises.
b) Adequate provisions are made to facilitate daily watering of all plants and lawns. Special attention provided during summer to ensure that the green belt does not suffer from water shortage.
c) Development & maintenance of green belt to be considered as a priority issue.
d) No outside soil is brought for any building/ greenery developments.

v) Work-zone Comfort Environment:

a) Monitor the work zone temperature levels.
b) Monitor the work zone humidity.
c) Examine the health of workers and keep record.

vi) Socio- Economic Environment:

a) The operators and workers are trained in various aspects of ESH (Environment, Safety and Health).
b) The managers and officers involved in Environment Management Cell shall undergo refresher workshop and up gradation of information on various environmental issues.
c) The industry shall help in promoting the activities related to environmental awareness in nearby villages/ neighbors.
d) The industry shall help in promoting local people for livelihood commensurate with their will, skill and abilities.

10.2.2 Environmental Monitoring Schedule:

A judgment can become truncated if it is not scientifically supported. This work is done by an appropriate monitoring which is a technique of drawing a sample and deriving inferences from the same for knowledge and improvements.

A scheme for this is already prepared and presented in chapter Six above. Watch-dog committee will also help in examining this physically for organolyptic tests.

Monitoring is a technique of drawing a sample and understanding from it the universe. The sampling station, the parameters and frequency is of extreme importance as also the careful analysis, reporting and interpretation. The schedule decided for a small activity like that of **TI** is as given in chapter six:

Daily, monthly, quarterly and yearly schedule of inspection and monitoring is worked out as a part of Environmental Management plan (EMP) with specific reference to air pollution control system, water & waste water management , monitoring frequency , responsibility and time bound implementation plan for mitigation measures **(ToR 39).**

10.2.3 Schedules:

There will be three facets to design and follow the schedules viz.: (A) for compliance of responsibilities, (B) for day-to-day operation and management of ETP and ECE, and (C) for routine environmental monitoring, to assess the impact and take timely warning. The schedule:

i) Daily Compliance:

1. Take the meter readings - initial and final, for checking the water consumption.
2. Maintain the electricity consumption record for pollution control.
3. Monitor ambient air periodically as per Consent.

ii) Monthly Compliance:

1. Monitor the emission sources through the competent authority and submit the analysis reports to the board.
2. Monitor ambient/work zone noise levels & ensure conformance to standards.

iii)Quarterly Compliance:

1. Monitor the ambient air quality at upwind and downwind locations of the factory.
2. Review the Water Reuse performance.

iv) Yearly Compliance:

1. Carryout "Environmental Audit Statement" of various environmental aspects, review the environmental policies with the help of experts and make the upgradation /changes accordingly.

2. Submit the "Environmental Statement" to the State Pollution Control Board in Form V under Rule 14 of the Environment (Protection) Second Amendment Rules 1992 of the Environment (Protection) Act, 1986.
3. Renew the Consent to Operate under the Water and Air Acts.
4. File the Cess returns to the State PCB under the Water (Prevention and Control of Pollution) Cess Act, 1977.
5. Renew the Hazardous Waste Authorization under sub-rule 3 of the Hazardous Waste (Management and Handling) Rules, 1989.

v) Consent Compliance

TI undertakes to comply the conditions prescribed by the Consent. In this direction, the following discipline will be followed:

#	**Condition Regarding**	**Mode of Compliance**
1	Validity Period	Keeping a watch, Application for renewal will be submitted in advance
2	Production Quantity	Not to exceed the permitted quantity.
3	Quantity of Effluent	To be measured daily and in-plant control. Not to exceed any time
4	Quantity of Sewage	To be measured periodically. Not to exceed
5	Total water input	To be measured daily. Repair meters. Not to exceed. Make break-up as per usages. Fill monthly Cess returns. Pay as per assessment
6	Quality of Effluents	By running ETP in correct fashion. Monitor. Report
7	Disposal of treated effluent	Not over application. No percolation, no spillages. Monitor.
8	Fuel Quantity	Not to exceed permitted quantity
9	Emission System	Control Boiler dampers, ID/FD fans, CO_2 %, Monitor
10	Ambient	Keep monitoring.
11	Noise levels	Check foundation for vibrations, Tree plantation
12	Solid Waste	Quantity to be measured & record kept. Bagasse to be baled. Molasses not in open pits. Press Mud to be carted out every day
13	Environ. Audit	To be complied every year before 30th sept.
14	Inspections	Inspection Book to be opened. Instructions given by SPCB visiting officer to be complied and reported.

Table No.10.1: Consent Compliance

For above compliance Action will be taken by the Cell under the Managing Director himself.

10.2.4 Watch-dog Committee:

A high power watch dog committee will be set up which will have a power of sudden spot inspections, checking of documents and listening to complaints if any. This committee will supervise over the monitoring and environmental management cell as may be necessary, generally over the following facets of works:

1. Permit management
2. Construction management
3. Treatment and emission management
4. Transport management

5. Disposal management
6. Monitoring
7. Documentation
8. Law enforcement

Watch-dog committee will also keep a watch on implementation of socioeconomic welfare activity,
Compliances of public hearing issues, waste minimization, recycle/reuse/recover techniques, energy conservation, & natural resources conservation, Occupation Health & safety and provisions regarding infrastructure facilities such as sanitation, fuel, restroom etc. to the labour force during construction as well as to the casual workers including truck drivers during operation phase **(ToR 40, 43, 48).**

10.2.5 Construction Phase Management:

i) Site Preparation:

The clearance of site may involve the movement of soil. No major leveling operations are envisaged. During dry weather conditions it is necessary to control dust nuisance created by excavation and transportation activities. However, because the proposed built-up area is of considerable low requirement, this problem should not be insurmountable or else some water sprinkling will be resorted to.

ii) Sanitation:

The construction site shall be provided with sufficient and suitable toilet facilities for construction workers to allow proper standards of personal hygiene. These facilities shall be connected to a septic tank and maintained to ensure minimum or no environmental impact.

iii) Noise:

Though the noise effect on the nearest inhabitants due to construction activity will be negligible (being away) it is advisable that on site workers using high noise equipment adopt noise protection devices like earmuffs.

iv) Construction Equipment and Waste:

It shall be ensured that both gasoline and diesel powered construction vehicles are properly maintained to minimize smoke in the exhaust emissions. The vehicle maintenance area shall be located in such a manner to avoid sources by accidental spillage of oil. Unauthorized dumping of waste oil should be prohibited. Wastes shall be disposed off at an approved site.

v) Storage of Hazardous Material:

The following hazardous materials if used for site preparation and construction activity, shall be stored as per international standards.

1. Explosives for rock blasting (This will not be permitted)
2. Petrol and diesel
3. LPG
4. Painting materials
5. Asbestos products

vi) Site Security:

Construction site is a potential hazardous environment. To ensure that the local inhabitants and stray cattle are not exposed to these hazards, the site shall be secured by fencing and manned entry points. It will be fully illuminated.

vii) Land Environment:

An inventory shall be prepared of standing trees and bushes of significance. To prevent unauthorized felling of trees by construction workers for their fuel needs it will be ensured that the contractor provides fuel to them.

10.3 Chapter Conclusion:

Commencing from Introductory, this EIA study has reported the details on Proponents, Project, Natural and Manmade facets of background environment, how and how much residual pollution will be added after prevention, abatement, control and mitigation. Whether the overall impact will be adverse, beneficial or marginal is found out by two accredited systems. Justification of the Project or "No Project" is also considered. This, however, is required to be manned properly. Unless an EMP is prepared in advance, as like production campaign the environmental protection will not automatically happen. Such EMP and its implementation with commitment from the higher management are stated. This Study when scrupulously followed, will meet the objectives of fulfilling the legal requirements and not causing any hardships to people.

All the norms laid by MoEF in Environmental Clearance and by SPCB in Consent to Operate will be sticky followed as is promised to the people in the neighborhood.

The summary is given below for EMP.

[a] On Land-Use

The material covering the land, site, study zone, location, layout, selection, break-up and land-use is assembled at entered at various appropriate places in this EIA. PP will be benefitted to refer these points and work for environmental protection as suggested with imagination. PP should keep good record with more photographs.

[b] On Baseline Data Interpretation.

This is assembled as based on EAC MoEF ToR points. The findings are easy to understand and interpret, as the standard limits are entered. PP to check the same in future monitoring.

[c] On Impact Quantification

For impact calculations and comparison, we have examined 101 attributes for 10 ranking level marks in Leopold matrix and examined 38 attributes for 4 ranking level marks in Delphi Technique (which is once suggested by NEERI & approved by MOEF). PP can improve the rank now shown by quantification, by attempting to bring the lower bracket to higher bracket by EMP.

[d] On Social Responsibility

In this respect we have considered three stake-holders namely (i) neighbouring community, (ii) welfare of our own employees and (iii) serving the need of consumer public. This should be further improved by utilizing 2% of PAT (Profit After Tax) and measure the effect on HDI (Human Development Index) locally.

[e] On EMP Time Frame

PP (Project Proponents) to finalize on environmental policy, environmental cell and watch dog committee within two months. Provide the funds as per EIA within that period in steps and consumed in first year itself. Funds should not be diverted elsewhere. This should be reported to MOEF SPCB CPCB.

[f] On Green-Belt Time-Frame and Ecological Responsibility

PP (Project Proponents) to finalize on species selection within 2 months, finalize modality of arranging the needed water before monsoon. For trees to be planted, time-table be 50, 30 and 20% in next three years. Record of sustenance and beneficial effect on ecology be recorded.

CHAPTER 11- EXECUTIVE SUMMARY

i. Project name and location (Village, Dist, State, Industrial State (if applicable)

M/s Daund Sugar Ltd., At Post Alegaon, Tehsil Daund, District Pune, State Maharashtra

ii. Address for Correspondence (Name, Designation and complete address)

Shri. Charudatta N Deshpande, Managing Director,
M/s Daund Sugar Ltd., At Post Alegaon, Tehsil Daund, District Pune, State Maharashtra

iii. Products and capacities. If expansion proposal then existing products with capacities and reference to early EC.

#	Product	Production			Unit
		Existing	New	Total	
1	Crystalline Sugar	3500	2500	6000	TCD
2	Co-gen power	18	-	18	MW
3	Ethyl Alcohol	45	45	90	KLPD

Previously, we have received EC for 45 KLPD Distillery and 18 MW Co-gen in 2009.

iv. Requirement of land, raw material, water, power, fuel with source of supply (Quantitative)

- Land: The Company owns 5,73,804 m^2 land. The proposed project will be commissioned in the premises of existing factory.
- Water: Water need daily is 1953 m^3. Permission if Irrigation Department is obtained. Water source is New Mutha right bank canal.
- Power: 2000 kW power needed. Available through Govt. Electricity Board and own generation.
- Fuel: Bagasse, 1176 TPD, available with self and in the vicinity. Coal 150 TPD and Spent Wash Concentrate 300 TPD

- **Raw material:**

Item	Quantity			Unit	Particulars
	Existing	Additional	Total		
Sugarcane	3500	2500	6000	MT/D	Self & Available in District. Local transport will be by tractors, carts and tankers.
Molasses	175	175	350	MT/D	
Lime	7	5	12	MT/D	Available from nearby Pune and Mumbai market. Brought by road or railway.
Phosphoric acid	0.5	0.3	0.8	MT/D	
Sulphur	2.5	1.0	3.5	MT/D	
Nutrients N, P	50	50	100	Kg/day	
Turky Red Oil (TRO)	36	36	72	Kg/day	

v. Process description in brief, specifically indication the gaseous emission, liquid effluent and solid and hazardous wastes.

Process:

Co-gen: Steam is generated from boiler at high pressure. This high pressure steam is then supplied to turbines to produce electricity.

Sugar: Sugar is prepared in five steps. (a) Juice extraction from sugarcane, (b) Clarification of juice, (c) Evaporation of water from juice, (d) Crystallization of sugar syrup and (e) Centrifugation of massecuite.

Distillery: There are four major steps in preparation of alcohol. (a) Substrate (feed) preparation of fermentation, (b) Yeast propagation and continuous fermentation, (c) Multi-pressure distillation and (d) Dehydration of RS to anhydrous alcohol

Gaseous Emission:

.#	Source	Pollutant	In-plant Measures	Control Equipment
1	Molasses Yard	SPM road dust, HC	Levelled Roads and land, rubber tire, slow speed. Less waiting	--
2	Boiler	SPM, CO, SO_2	Feed Bagasse/husk more dry, 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, CO2, H2S	Covered transfer	Fully closed
6	Other effluents	H_2O, CO_2	Closed transfer	Fully Aerobic regime.

Liquid Effluent: There will be four types of effluent. (a) Sober effluent from cooling, boiler blow down, purging water, (b) Moderate effluent from vessel/floor washing, process, spent lees stream, (c) Condensate water from MEE and (d) Industrial highly polluted water (spent wash) from distillery

Solid waste:

#	Waste	Quantity	Disposal	Remark
#	**Waste**	**Quantity**	**Disposal**	**Remark**
1	Canteen	2.0 CuM	Own garden	Organic
2	Colony	4 CuM	Own garden	Mixed
3	ETP	85 kg	On Land	Organic, Non-Haz
4	Office	2 CuM	Sales	Non-Haz.
5	Packing Sec.	1 CuM	Sales	Non-Haz.
6	Yeast Sludge	10 kg	On greening belt	Organic, and Non-Haz.
7	Ash	47 T	Sales	Takers available

Hazardous waste:

#	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.

vi. Measures for mitigating the impact on the environment and mode of discharge or disposal.

- Air pollution: Air pollution control equipments like ESP, ID Fan, dampers. Stack of appropriate height installed.
- Water pollution: This is Zero Liquid Discharge unit. No water is discharged from the site to surrounding area. The sober effluent is given physic-chemical treatment. Then this water is combined with Moderate effluent which is treated with equalization, neutralization, aeration, secondary clarifier and tertiary treatment.
- Spent wash generated in proposed project will be used as fuel in incinerator along with the coal.
- Noise: Sturdy foundation provided for machines, personal protective equipment like ear plugs given to workers, tree belt as sound barrier around factory.

vii. In case of hazardous operation, safety systems incorporate.

Sugar and Co-gen operation is not hazardous. However, there is risk of fire while preparation and storage of alcohol. The study is done for pool fire and appropriate fire fighting equipment are provided throughout the factory premises. Workers are trained for safety and emergency cases.

viii. Capital cost of the project, estimated time of completion.

Capital cost of proposed project is Rs. 118 Crores. Rs. 52 Crores are earmarked for environmental care for existing as well as proposed project. The estimated time for completion is 5 years.

ix. Site selected for the project – Nature of land – Agricultural (single/double crop), barren, Govt/private land, status of is acquisition, nearby (in 2-3 km.) water body, population, with in 10km other industries, forest , eco-sensitive zones, accessibility, (note – in case of industrial estate this information may not be necessary)

Site selected for project is already being used as industrial land. The proposed project will be established in premises of existing industry. The land of area 5,73,804 m^2 is owned by company. There is no surface water body within 2 Km from the factory. Within the study area, there are no forests eco-sensitive zones and major industries. The project location has good accessibility. State Highway Pune - Solapur is 6.5 km away from site.

x. Baseline environmental data – air quality, surface and ground water quality, soil characteristic, flora and fauna, socio-economic condition of the nearby population

Baseline environmental data is collected by monitoring. Quality of surface water, ground water, air is found to be within limit. Soil characteristics are also agreeable.

There are no eco-sensitive areas and endangered species of flora & fauna within 10 km area.

People in study area are mainly dependant on agriculture. For improving their status, big industries like this are required.

xi. Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.

There is risk of fire while preparation and storage of alcohol. The study is done for pool fire and appropriate fire fighting equipment are provided throughout the factory premises. Workers are trained for safety and emergency cases. Precautions suggested by Factory Inspectors, MPCB and Experts are taken into account while preparing the Disaster Management Plan for the factory.

xii. Likely impact of the project on air, water, land, flora-fauna and nearby population

There are minimal impacts on air, water land, flora-fauna and nearby population. The emissions in air are controlled by air pollution equipment like ESP, dampers, ID Fans, Stack. As this is ZLD, surface or ground water is not polluted. All waste

water generated is treated and recycled. There are no endangered species of flora-fauna in study area. Air modelling is done to study Ground Level Concentration. The incremental concentration is very small and resultant concentration is well within limit.

xiii. Emergency preparedness plan in case of natural or in plant emergencies

Disaster management cell and plan is prepared to tackle man-made and natural disaster. People in this cell are trained to face emergency cases. Safety equipments are also provided to workers and installed in the premises. Workers are also trained to avoid accidents during operation.

xiv. Issues raised during public hearing (if applicable) and response given

SN	Name	Regarding	Remark/ Reply
1	Shri Suhas Jagdale Local Resident	Whether plant species will be made available to local farmers also?	Plant species will be made available to local farmers.
2	Shri. Vasant Dhumal Local Resident	How the increased effluent will be treated?	Employing modern ETP, 80% of the effluent will be recycled and 20% used for gardening. No discharge outside.
3	Shri. Bhagwan Jagtap Local Resident	What will be the benefits to local people due to expansion?	More sugarcane will be used for production. It will be beneficial to local farmers and young people.
4	Shri. Milind Salunkhe Local Resident	Whether we will get electricity produced in the project?	The produced electricity will have to be connected to he MSEB grid only.
5	Chairman of the Committee	• How you have made provision for extra water? • What steps are taken to control air pollution?	• We have obtained permission from the Government. In addition, we shall be doing rain water harvesting from roof. • Modern new ESP (Electrostatic Precipitator) will be installed with 81 m stack.

xv. CSR plan

CSR plan is being prepared as per Govt. Regulations. Suggestions received during Public Hearing are also incorporated in the CSR Plan. Major facets are given below.

#	Particulars
1	Education and Boarding for children of Workers
2	Seminars and training for farmers
3	Health camp, medical facilities
4	Tree plantation and providing saplings
5	Women empowerment
6	Vocational training for youth
7	Funds for facilities in village and surrounding area
8	Funds to Chief Minister/Prime Minister Relief Fund

Suggestions given in Company Act, 1956 and its amendments will also be taken into account. The fund allocation will be finalized after discussion with society.

xvi. Occupational Health Measures

For the present, it is found that the situation is within Permissible Exposure level (PEL). In order to maintain the same, what measures the company has adopted to keep them within PEL so that health of the workers can be preserved is mentioned. For future work, namely exposure specific health status evaluation of worker, we propose to conduct health evaluation on a pre-designed format for chest X rays, Audiometry, Spirometry, Vision testing (Far & Near vision, colour vision and any other ocular defect), ECG during pre placement and periodical examinations as per Factory Act & Rules. This will be for future working when alcohol manufacturing is involved, with an aim of maintaining OHS standards as per OSHAS/USEPA. Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers is separately earmarked

#	Occupation	Type of Evaluation	Frequency Pre-placement & Thereafter		
			For Age <30 every (years)	For Age 30-40 every (Years)	For Age 41-50 every (years)
1	Cane crushing area	Chest X-ray, Spirometry & vision testing	5	4	2
2	Sugar Process area & Co-generation Area	Chest X-ray, Spirometry & vision testing	5	4	2
3	Main Control Room	Far & Near Vision, colour vision and hearing test	5	4	2
4	Ash & Bagasse handling area	Chest X-ray, Spirometry, vision & Hearing testing	5	4	2
5	Noise prone area	Audiometry	Annually		

xvii. Post project monitoring plan

#	Facet	Stations at	Parameters	Frequency
1	Surface water	One upstream One downstream One nalla	BOD, pH, SS, TDS, Colour	H-Y
2	Groundwater	One up-gradient Two down-gradient near the lagoon & compost yard	BOD, pH, SS, TDS, Colour	H-Y
3	AAQ (Ambient Air Quality)	Three directions @ 120 degrees, one of it especially covering the spot indicated by mathematical modelling	RSPM, SO2, NOx	H-Y
4	Noise	Three directions @ 120 degrees, as may be advised by	Decibel	H-Y day and night

		MPCB		

Above mentioned facets will be monitored regularly and compliance reports will be submitted regularly to MoEF.

CHAPTER 12-CONSULTANTS ENGAGED

This EIA report is prepared on behalf of the proponents, taking inputs from proponent's office staff, their R & D wing, Architects, Project Management Professionals etc. by Environmental Consultants M/s. Ultra-Tech Environmental Consultancy & Laboratory, Thane, Mumbai , who have been accredited by QCI-NABET vide official memorandum of MoEF S.N. 93 of LIST 'A' of MoEF - O.M. No. J 11013/77/2004/IA II(I) dated September 30, 2011, S. No.158 of list of Consultants with Provisional Accreditation * (Rev.31 A) of dated 11th June 2015.

M/s Ultra-Tech Environmental Consultancy & Laboratory:

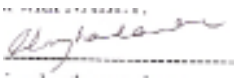
Ultra-Tech Environmental Consultancy & Laboratory [Lab Gazetted by MoEF – Govt. of India] not only give environmental solutions for sustainable development, but make sure that they are economically feasible. With innovative ideas and impact mitigation measures offered, make them distinguished in environmental consulting business. The completion of tasks in record time is the key feature of Ultra-Tech. A team of more than hundred environmental brigadiers consists of engineers, experts, ecologists, hydrologists, geologists, socio-economic experts, solid waste and hazard waste experts apart from environmental media sampling and monitoring experts and management experts , strive hard to serve clients with up to mark and best services.

Ultra-Tech offers environmental consultancy services to assist its clients to obtain environmental clearance for their large buildings, construction, CRZ, SEZ, high rise buildings, township projects and industries covering sugar and distilleries from respective authorities. Ultra-Tech is in the process of getting QCI-NABET final accreditation for its EIA organization.

Ultra-Tech also provide STP/ETP /WTP project consultancy on turn-key basis apart from Operation and Maintenance of these projects on annual contract basis. Also, having MoEF approved environmental laboratory, Ultra-Tech provide laboratory services for monitoring and analysis of various environmental media like air, water, waste water, stack, noise and meteorological data to its clients all over India and abroad.

Functional area experts and assistance to FAE involved in the EIA study for "**M/s Daund Sugar Ltd.** at Alegaon, Daund Tehsil, Pune District, Maharashtra," is as follows:

EIA COORDINATOR

NAME	:	MR. A.K.MHASKAR
SIGNATURE	:	
PERIOD OF INVOLVEMENT	:	March 2014 – May 2014
CONTACT INFORMATION	:	ULTRA-TECH Environmental consultancy & Laboratory,

FUNCTIONAL AREA EXPERTS INVOLVED IN THE EIA:

#	NAME OF SECTOR	NAME OF PROJECT	NAME OF CLIENT	NAME OF EIA COORDINATOR	FUNCTIONAL AREA EXPERTS INVOLVED		
					FA	NAME/S	SIGN
1.	Distilleries 5 (g), Sugar 5 (j)	Industrial Project	**M/s Daund Sugar Ltd.** at Alegaon, Daund Tehsil, Pune District, Maharashtra,	Mr. A.K. Mhaskar Team Member Mrs. Pradnya Parkhii	LU	Mr. Swapnil Awaghade	
					AQ	Mrs. Anjali Singum	
					AP	Mr. Shekhar Tamhane	
					WP	Mrs. Deepa Karnik Team Member : Mrs. Sampada Shidid	
					EB	Dr. T.K.Ghosh Team member : Ms. Swati Bopinwar	
					SE	Mr. Kishore Wankhede	
					NV	Mr. Chintan Athaley	
					GEO	Not involved	
					HG	Not involved	
					RH	Dr. Ravindra Kode	
					SHW	Mr. Santosh Gupta Team Member : Mrs. Sampada Shidid	

Table No. 12.1: List of Functional Area Experts

Team Members

1	AQ, NV	Akshay Kulkarni
2	LU	Prasad Khedkar
3	SHW	Kafila S., Pradnya Parkhi
4	EB	Ms. Bharati Khairnar
5	SE	Mr. Shrikrishna Kulkarni
6	WP	Mrs. Sampada Shidid

LABORATORY FOR ANALYSIS:

NAME OF LABORATORY	SCOPE OF SERVICES	ACCREDITATION STATUS
Akanksha Analytical and research Lab	**Monitoring and Analysis of:** 1. Ambient Air Quality Monitoring 2. Ground and Surface Water Quality Monitoring 3. Noise Level Monitoring and 4. Soil Quality Monitoring 5. Metrological data collection	Gazetted by MoEF- Govt. of India

Table No. 12.2: Laboratory Details