PREFEASIBILITY REPORT

for

M/s SHRI SAI PRIYA SUGARS LTD

for

Expansion of existing molasses (B&C) /cane juice based distillery of 120 KLPD to 240 KLPD in the existing premises of 10000 TCD sugar unit, 65 MW cogeneration, 5 MW from incineration boiler

at

Sy No 148, 144-151 of Maigur Village, and Sy no 238, 239 of Hippargi and Sy No 26, 27 Albal village, Jamakhandi Taluk, Bagalkot District, Karnataka State

PREPARED BY

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1. Executive Summary

M/s Shri Sai Priya Sugars Ltd., have already obtained Environmental Clearance for the establishment of 120 KLPD distillery in the existing premises of 10000 TCD sugar unit, 65 MW cogeneration, 5 MW from incineration boiler. Now based on the demand, management has decided to expand the Molasses (B&C) /Cane Juice based distillery to 240 KLPD.

Sl.No	Items	Particulars
1	Objective of the Project	Expansion of existing molasses (B&C) /cane juice based distillery of 120 KLPD to 240 KLPD in the existing premises of 10000 TCD sugar unit, 65 MW cogeneration, 5 MW from incineration boiler
2	Promoters	M/s Shri Sai Priya Sugars Ltd
3	Total Investment	Rs. 465.1 Crores (Rs. 165.1 Crores for the expansion)
4	Project location	Sy No 148, 144-151 of Maigur Village, and Sy no 238, 239 of Hippargi and Sy No 26, 27 Albal village, Jamakhandi Taluk, Bagalkot District, Karnataka State
5	Extent of land	140 Acres 28 Guntas. No additional land required for the proposed expansion.
6	Man Power	Existing: 119No's, Expansion: 119 No's
7	Water demand and Source	Fresh water requirement for 240 KLPD distillery: 1140 KLD; Source : Krishna River
8	Power supply	The total power required for the proposed project will be 500 kwh – for construction phase from KPTCL/in-house During operation phase, power is obtained from existing incineration unit
9	Latitude	16°34'26.65"N
10	Longitude	75°12'30.66"E

Comparison statement

Sl No	Particulars	Existing EC	After expansion	Difference
1	Promoters	M/s Shri Sai Priya sugars Ltd		
2	Location	Sy No 148, 144-151 of Maigur Village, and Sy no 238, 239 of Hippargi and Sy No 26, 27 Albal village, Jamakhandi Taluk, Bagalkot District, Karnataka State		
3	Objective	10000 TCD of sugar plant, 65 MW Cogeneration unit + 5 MW from incineration	Expansion of existing molasses(B &C)/cane juice based distillery of 120	Additional 120 KLPD

		boiler and 120 KLPD distillery	KLPD to 240 KLPD in the existing premises of 10000 TCD sugar unit, 65 MW cogeneration, 5 MW from incineration boiler	
4	Plot area	140 Acres 28 Guntas.		No additional requirement
5	Total Man power including sugar cane crushing	119 nos	238 nos	+ 119 nos
6	Total Investment, Rs	Rs. 300 Crores	Rs.465.1 Crores for distillery only	+ 134.9Crores
7	Raw material	Molasses (B &C) : 480 TPD Concentrated Spent wash: 264 TPD Bagasse: 445TPD Coal:246TPD	Molasses (B&C): 960 TPD Concentrated Spent wash: 528TPD Bagasse: 890TPD Coal:492TPD	Additional: Molasses (B&C): 480 TPD Concentrated spent wash: 264 TPD Bagasse: 445TPD Coal:246TPD
8	Product	Ethanol -120 KLPD	Ethanol -240 KLPD	Additional: Ethanol 120 KLPD
9	Water requirement and source	Fresh water requirement: 720 KLD Krishna River	Fresh water requirement: 1440 KLPD Krishna River	+ 720KLD
10	Spent wash generation	720KLD	1440 KLD	+720KLD
11	Spent wash treatment	Concentration in Multi-effect evaporator followed by incineration		Capacity adequate
12	Air pollution control management	Bag filter	Bag filter	No additional requirement of boiler
13	CPU	1500KLD	2500 KLD	**+ 1000 KLD**

14	Solid waste	Boiler ash/Spent wash ash: 10TPD Yeast sludge:10TPD	Boiler ash/Spent wash ash: 20 TPD Yeast sludge:20 TPD	Boiler ash: 9TPD Yeast sludge: 12 TPD

2. Introduction of the Project/ Background Information

2.1 Identification of project and project proponent.

Shri Sai Priya Sugar Ltd. is a limited company registered in the state of Karnataka with Corporate Identity No. CIN-U15429KA20022PLC030008 dated: 17.01.2002

Board of Director of the company is as follows:

- Mr. Murugesh Nirani- Chairman & MD
- Mr. SK Savadi- Director
- Mr. RV Karehonna- Director

Shri Sai Priya Sugar Ltd. is a limited company proposed to expand the existing molasses/cane juice based distillery of 120 KLPD to 240 KLPD in the existing premises of 10000 TCD sugar unit, 65 MW cogeneration, 5 MW from incineration boiler at Sy No 148, 144-151 of Maigur Village, and Sy no 238, 239 of Hippargi and Sy No 26, 27 Albal village, Jamakhandi Taluk, Bagalkot District, Karnataka State.

Total land area required is 140 acres 28 Guntas of land has been purchased in the name of M/s Shri Sai Priya Sugars Ltd.,. Total capital investment on the proposed project is Rs. 465.1 Crores (for expansion Rs.165.1 Crores).

The nearest town ship with residential area is Jamkhandi, which is at 8 Km away from the proposed project site. The commercial & social infrastructure around the proposed site is considered quite well for setting up the proposed integrated project.

The integrated project comprises of a sugar factory for the manufacture of white plantation sugar, thereby making available required bagasse for the cogen power plant. Raw sugar for refinery will be imported. The command area of the proposed sugar mill has excellent irrigation facilities from Krishna River, availability and potential for sustained cane supply & biomass materials like cane trash etc. and imported coal for operating the cogen power plant during off-season.

2.2. Brief description of nature of the project.

The present proposal is expansion of existing molasses (B&C) /cane juice based distillery of 120 KLPD to 240 KLPD in the existing premises of 10000 TCD sugar unit, 65 MW cogeneration, 5 MW from incineration boiler.

The proposed expansion project is located in Sy No 148, 144-151 of Maigur Village, and Sy no 238, 239 of Hippargi and Sy No 26, 27 Albal village, Jamakhandi Taluk, Bagalkot District, Karnataka State. This is flat Land whereby Cutting-filling will be balanced and there will be No/Low Borrowing from Nature.

The area of operation and cane cultivation is mostly irrigated by lifts, wells, and canals, & Krishna river is at a distance of 5 kms from the site. The climate, soil, rains are favorable for sugarcane growth and sugar cane yield.

Within 10 km Influence Zone, there is no Tropical Forest, Biosphere Reserve, National Park, Wild Life sanctuary and Coral Formation Reserve. Banhatti RF is located at a distance of 9.Km, South. The river Krishna is 5.0 Km away from the proposed site and the State Highway -53 & 34 is located at 8 Km, 8.3Km from the project site respectively.

2.3. Need for the project and its importance to the country and / or region.

Alcohol has assumed a very important place in the economy of the country. It is used as a raw material for number of chemicals, as a potential fuel in the form of Ethanol blended with petrol and as an ingredient in Alcoholic Beverages. Use of alcohol 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 importance and utility of alcohol as an industrial raw material for manufacture of variety of 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 and abnormal increase in crude oil prices. Crude oil which was sold at 3 dollars per barrel in 1969 is more than 100 dollars. The price is predicted to increase further depending upon international situation and with depletion/exhaustion of petroleum resources of the world. The location of the distillery slated for expansion is at rural, agro-based and economically backward region. The proposed expansion programme will fetch better realization to the molasses and in turn to sugar cane grown in the region.

Alcohol is an eco-friendly product. As a substitute to petroleum, the distillery helps to reduce the dependency on petroleum and has potential to save foreign exchange. Petroleum is a scarce, non-renewable and fastly depleting product. Under the National Ethanol Programme, there is a mandate to blend 5 % ethanol, in petrol in nine sugar producing states. This programme was started on 1st October 2003.

This amounts to a demand of 360 million litres of ethanol per year. In addition, the Government of India has directed for introduction of gasoline and diesel confirming to Euro-3 fuel standards in India. The Euro-3 standard specifies the presence of an oxidant in the fuel, which minimizes the emissions due to the combustions of

these fuels. Alcohol being one of the most viable additives available, the oil companies has to use alcohol for blending with petrol. With this, the demand for ethanol would be more than doubled.

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. 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 by best utilization of the existing resources. Hence, it is proposed to expand the capacity of the existing distillery

2.4. Demand-Supply

The Government of India proposes to increase blending from 5% to 10%. Therefore, the demand of ethanol from 2008-09 is growing substantially. Total ethanol production increased from 1,435 million litres in 2009-10 to 1,934 million litres in 2010-11 on account of higher sugarcane and sugar production and the estimated ethanol production in 2011-12 is pegged at 2,130 million litres. Ethanol consumption increased from 1,780 million litres in 2009-10 to 2,010 million litres in 2010-11, owing to improved molasses supply and steady ethanol demand from competing industries.

Since 1977, several technical committees and study groups have examined the issue of blend of Ethanol with petrol. Announcements were made on this issue in Parliament in December 2001 and March 2002. Auto fuel policy was declared in August 2002.

The Ministry of Petroleum, recently issued a gazette notification, dated 11th of January, 2013 making 5% ethanol blending with petrol mandatory across the country. The 5% ethanol blending programme was so far made applicable in only 13 states of the country with blending level of about 2% against a mandatory target of 5%, but with this gazette notification it becomes mandatory for OMCs to achieve 5% ethanol blending programme for the entire country

The Report of the Committee on Development of Biofuels was published by the Planning Commission of India. It gave projections of demand and supply of ethanol for India for the end of each five-year plan.

2.5. Imports vs. Indigenous production

Not Applicable

2.6. Export possibility and Domestic / Export markets.

Not applicable. Will be used for domestic use.

2.7. Employment Generation (Direct and Indirect) due to the project.

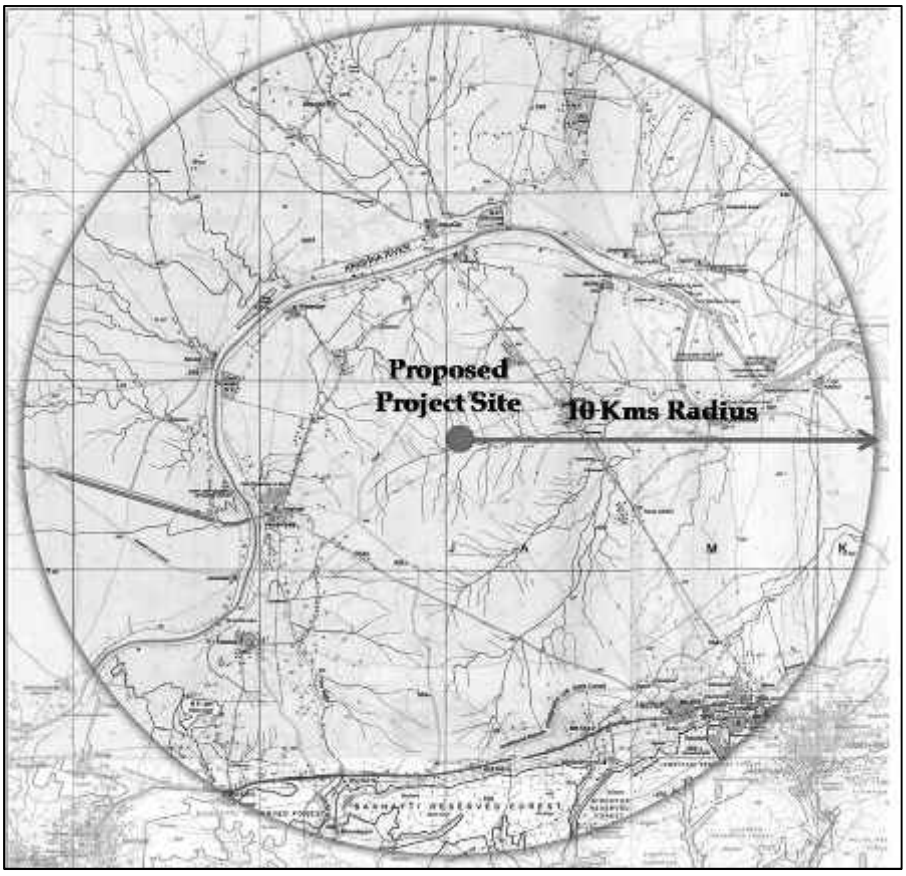
About 119 no of additional employees of all categories will be employed additional for the expansion proposal.

3. Project Description

3.1. Type of project including interlinked and interdependent project, if any.

Not applicable

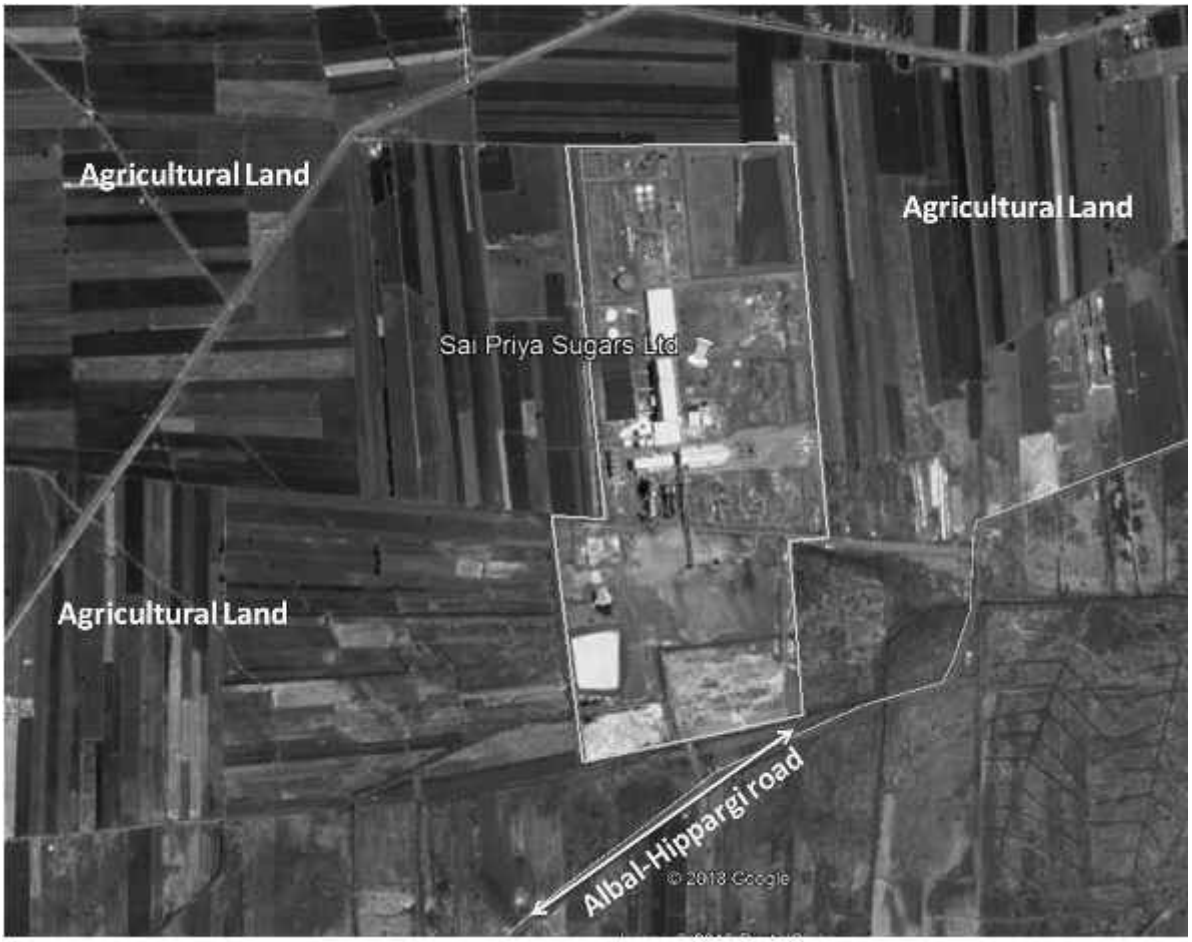
3.2. Location (map showing general location, specific location, and project boundary & project site layout) with coordinates.



Location of the Project site on Toposheet with 10 Kms radius demarcation (Toposheet No: 47 P/6, 47 P/7, 47 P/2, 47 P/3) Scale: 1:50,000)




Project Site Photographs



Aerial View of the proposed project site

3.3. Details of alternative sites, considered and the basis of selecting the proposed site particularly the environmental considerations gone into should be highlighted.

Not applicable as the project is an expansion proposal.

3.4. Size & magnitude of operation

The company is an established 120 KLPD distillery along with 10000 TCD sugar unit, 65 MW cogeneration, 5 MW from incineration boiler., wherein the expansion is proposed within the same premises.

3.5. Project description with process details (a schematic diagram/flow chart showing the project layout, components of the project etc) should be given.

Process Description

This is a simple three step process namely molasses preparation, fermentation and distillation.

General Process of Alcohol Production:

Fuel Ethanol of 120 KLPD capacity, with Cane Juice, B-Heavy & C- molasses as feed stock

The process envisages use of own Cane Juice & B-Heavy Molasses as well as procured C- molasses from nearby sugar factory, for manufacture of alcohol during sugar mill season and during off-season days.

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

I) $C_{12}H_{22}O_{11}+H2O=2C_6H_{12}O_6$
Cane Sugar Glucose

II) $C_6H_{12}O_6 = 2C_2H_5OH + 2CO_2$
180 = 2x46 + 2x44
Glucose Ethyl Alcohol Carbon-dioxide

The 180gm of sugars on reaction gives 92gm of alcohol. Therefore, 1tonne of sugar gives 511kgs of alcohol. The sq. gravity of alcohol is 0.7934. Therefore, 511kg of alcohol is equivalent to 511/0.7934=644 liters of Alcohol. During fermentation other by7-products like glycerin, succinine acid etc. Are also formed form sugars. Therefore, actually 94.5% total fermentable sugars are available for alcohol, under ideal condition theoretically. Normally only 80 to 82% efficiencies are realized on plant. One tone of molasses containing 45% F sugars given alcoholic yield 255-265 litres per ton.

For bringing out above biochemical reaction, we require proper and careful handling of yeast, optimum parameters like pH and temperature control and substrate concentration, which results into effective conversion of sugars to alcohol. For manufacture of yeast, separate equipment known as pure yeast culture apparatus is required. Initially, yeast is developed in the laboratory from the single cell yeast culture. In the laboratory, yeast is propagated in a test tube 10ml. Then it is transferred to a bigger flask of 500 ml flask, and transferred to 5litre flask containing the sterilized molasses solution. It is necessary to adjust the pH of the molasses solution in the range etc. Each stage of development of yeast propagation, namely 100 litres, 500 litres and 5000 litres. All these equipment's are designed so as to facilitate boiling molasses solution in order to sterilize it and also cooing o bring it to the proper temperature of 33^{o}C and letting in culture and taking out culture. Boiling, cooling introducing culture, Etc. is done in aseptic manner, i.e keeping the fermentation medium free from any kind of infection. Further, stages of yeast propagation are done in open tanks i.e pre-fomenter requires about 8 hours in order

to build up necessary concentration of yeast in them. Finally, pre-fomenter is emptied in an empty fomenter, which is previously cleaned and kept ready. Dilute molasses solution is allowed to flow in this fomenter so as to fill it to its working capacity, say about one lakh litre.

The average efficiency of conversion of sugars in molasses to alcohol is 80 to 85% of theoretical value. All the sugars are not converted to alcohol during the process of fermentation because chemicals like glycerin; succinine acid, etc. are also produced by yeast during their metabolic process. Therefore, it is not possible to have 100% efficiency of conversion of sugars to alcohol. The average yield of alcohol from molasses is about 250 liters from 1 MT of molasses.

Recently, attractive developments have taken place in the field of fermentation and distillation whereby one can get high yield of 270 to 285 litres per tone of molasses.

The next stage in the manufacture of alcohol is to separate alcohol from fermented wash and to concentrate it to 95% alcohol called as rectified spirit. For this purpose, method of distillation is employed. The distillation columns consists number of SIEVE plates where wash is boiled and alcoholic vapours are separated and concentrated on each place stage by stage.

PROCESS DESCRIPTION:

We have adopted HIFERM-GR and Multi Pressure Technology in our distillery. The details are as below:

FERMENTATION SECTION:

HIFERM-GR fermentation technology uses Granulating Yeast, which settles under gravity. Section-wise description is as below:

Molasses free from suspended particles is transferred to molasses receiving taken and is weighed. Weighed molasses is distributed to cell mass propagation, fermentation and yeast activation section.

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

Dilute molasses media is prepared in yeast vessel by recirculation of media through molasses diluter. Laboratory propagated cell mass is scaled up in series of yeast vessels. Air is sparged in pasteurized and cooled dilute molasses medium for optimum growth of GR yeast. The Temperature is maintained at $32^{o}C$ by re circulating cooling water through jacket of yeast vessels. Cell mass from Yeast vessel is transferred to yeast activation vessel to built up cell mass required for fermentation (during start up only) by cell mass transfer pump.

At steady stage, activated cell mass from yeast activation vessel is transferred continuously to fermentor-I. Molasses, process water and vinasse recycle stream from distillation is added to fermentor. Fermented wash from fermentor-I overflows continuously to fermentor-II & then to yeast settling tank.

As fermentation is exothermic process, optimum temperature required for yeast activity is maintained by forced recirculation through fermentor wash coolers. Efficient mixers are provided in both fermentors.

Fermented wash from Fermentor-II is sent to yeast setting tank for separation of yeast under gravity. Vinasse stream from distillation is recycled to fermentor depending on solids concentration in fermented wash and molasses composition.

GR yeast having granulation property, settles in yeast settling tank under gravity, while fermented wash overflows to wash holding tank. Settled yeast is transferred at rated flow to yeast activation vessel with screw pump.

In yeast activation vessel, molasses, process water, nutrients and additive are added for activation of recycled cell mass. Filtered air is sparged as required for re-activation of cell membranes and other cell components.

Mixer is provided for better mass transfer in yeast activation vessel. Activated cell mass is transferred to fermenter-I to maintain desired cell mass concentration in fermenter.

Carbon dioxide generated in fermentation is entrained with alcohol vapours. Alcohol from Carbon dioxide is scrubbed with water in gas scrubber. The scrubber water is transferred to wash charger. Fermented wash from wash charger is fed to Analyzer column.

DISTILLATION

Technology offered (multi-Pressure)

This technology is based on heat recovery principle.

The system comprises of 7 columns operating at different pressures and is designed to produce Rectified Spirit/ENA.

The columns in order of flow are as follows:

- Analyzer cum Degasifying (Column (operating under vacuum)
- Aldehyde Column (operating under Vacuum)
- Pre- rectifier column
- Extractive distillation column
- Rectifier cum Exhaust Column (Operative under Pressure)

- Refining column
- Recovery column

RECTIFIED SPIRIT PRODUCTION:

Fermented wash from the clarified wash tank is pumped to the fermented wash pre-heater and preheated to about 68-70^{o}C by circulating hot spent wash on other side. Incoming spent wash temperature is 80-82^{o}C and after exchanging heat with fermented wash out let lamp of spent washes remains at 35-40^{o}C this hot fermented wash is then feed at the top of Degasifying column.

Analyzer column cum Degasifying Column:

Analyzer column strips the fermented wash before discharging the rest of the material as spent wash. Metered flow of fermented wash is feed to the top of the analyzer column. Vapours of Rectifier column provide energy to Analyzer column through a evaporator. Rectifier top vapours are condensed on the shell side of the evaporator and spent wash is getting re-circulated on tube side. Vapours generated from the re-boiler are used in the analyzer column now consist approximately 50% alcohol and 50% water with impurities such as higher alcohols, aldehydes, acids, sulphur dioxide, etc.

Spent wash from the analyzer column bottom is sent for treatment to the Effluent Treatment Plant. The level in the column bottom is controlled to ensure proper distillation and correct concentration of the spent wash. The vapour drawn from top of the Analyzer is condensed in forth stage of evaporator system and pumped to Rectifier column for concentration. Analyzer column is operating under vacuum. Using water ring vacuum pump creates vacuum and the vacuum in the column is maintained by manual valve, which bleeds extra air in the system.

Aldehyde Column:

Aldehyde column is principally used for removal of low boiling impurities. Vapours from degasifying column are fed to Aldehyde column. The vapours coming out of the top of the Aldehyde column are fed to the condenser-I where they are partially condensed bypassing cooling water on the tube side. Balance alcohol vapours are condensed in the condenser-II. Water is used for the Condensation. From aldehyde column top Technical Alcohol cut of 2% of total plant capacity is taken out. Aldehyde column works under vacuum.

Rectifier cum Exhaust Column:

Analyzer column top vapours condensed in forth stage of evaporator and fed to Rectified column for further concentration. Rectifier column designed in sieve trays construction and operates under pressure for obtaining desired strength of alcohol. Condensing steam provides heat to Rectifier column.

Fusel Oil draws are taken from Rectifier column and are send to fusel oil decanter. The fusel oil stream is diluted with water for separation of fusel oils. The aqueous layer sends backs to Rectifier column and fusel oil are sent to storage.

Technical Alcohol cut of 3% of total plant capacity is taken out from top of Rectifier Column. Rectified Spirit of 95% v/v concentration is drawn from one of the upper trays of Rectifier Column and sends to storage after cooling.

Multipressure Distillation

The fermenter wash is fed to CO_2 stripper column to remove CO_2 to remove in wash. Alcohol is stripped off water in stripper column. The top vapours feed to calendria for heat source to concentrate the spent wash and the stream from calendria will be fed to Extraction column. In extraction column most of the high boiling impurities separated from ethanol in presence of water. The bottom ethanol water mixture is preheated by steam condensate and spent lees before being fed to rectifier column. In rectified column RS is taken out from top tray. The impure spirit from top of CO_2 stripper column, extraction column, rectified column are led to fusel oil column. The final impure spirit cut is taken out from the fusel oil column and partly alcohol is recycled to extraction column. The alcohol containing fusel oil from oil column.

Rectification column works under pressure. The CO_2 stripper, stripping column and extraction works under vacuum and fusel oil column works under atmospheric condition.

The top vapours from rectifier column are condensed in stripper Reboiler. The alcohol water vapours from stripping column are partly sent to CO_2 stripper bottom for heating. The rectifier column, extraction column and fusel oil column gets heat from steam.

The distillation process is operated through PLC.

MOLECULAR SIEVE DEHYDRATION SECTION (MSDH)

The Dehydration system is configured as a stand-alone unit and is capable of operating independently from any other process equipment, once properly connected to the utilities. The unit basically consists of two beds of desiccant, and an evaporation/regeneration column. While one bed is on line, the other is regenerated for an equal period. A computer-controlled control System actuates the required valves operation, switching the flow from one bed to the other in a continuous operation, at the same time constantly monitoring all process, quality and safety parameters.

The feed is pre-heated, (when operating as a standalone unit) and fed to the evaporation/regeneration column. The resulting overhead vapours is superheated

and send to Sieve Bed 1, where the vapour is dehydrated i.e. moisture is absorbed from feed alcohol and dry product vapours come out from the bottom of sieve bed. Product vapours are then condensed and cooled, and pumped to storage. A portion of the dry product vapour is circulated through Sieve Bed 2, under vacuum, to regenerate the bed in preparation for cycle changeover when Bed 2 goes on line.

The regeneration operation forces the release of the moisture from the desiccant, making the bed 2 ready for the next cycle. The recovered low strength vapours are condensed and recycled back to a new Recovery column.

The stream (less) from the bottom of recovery column, containing a maximum of 500 ppm of ethanol, is pumped to battery limits.

The chemistry behind this with controlling equations can be presented as

Controlling Equations:

1. $C_{12}H_{22}O_{11} + H_2O \longrightarrow 2C_6H_{12}O_6$

Sucrose + Water $\longrightarrow$ Invert Sugar

342 + 18 $\longrightarrow$ 360

1 + 0.05263 $\longrightarrow$ 1.05263

2. $C_6H_{12}O_6 \longrightarrow 2C_2H_5OH + 2CO_2$

Invert Sugar $\longrightarrow$ Ethyl Alcohol + Carbon Dioxide

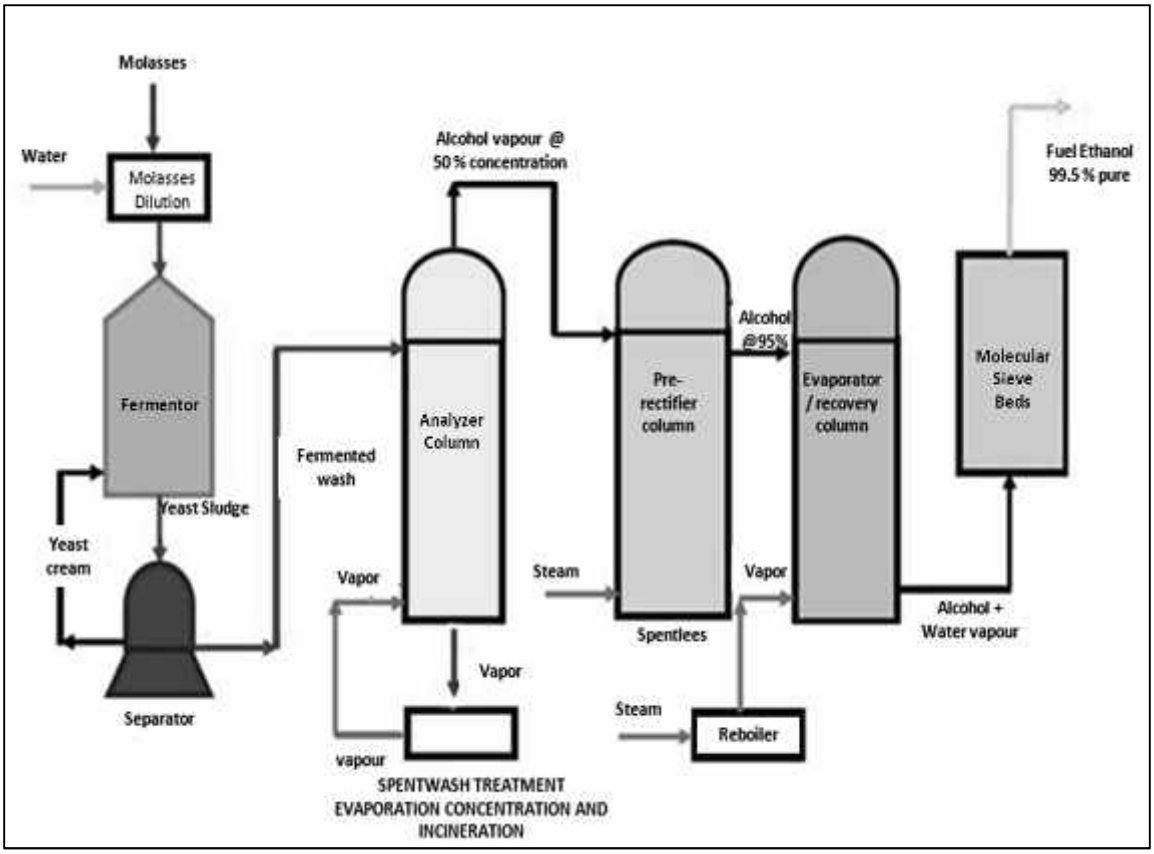
180 $\longrightarrow$ 92 + 88

1 $\longrightarrow$ 0.5111 + 0.4889

1.05263 $\longrightarrow$ 0.53978 + 0.51462

Thus,

	Input	**Output Alcohol**
1.	1 kg Reducing Sugar	0.511 kg by Equation
2.	463.68 kg Reducing Sugar	298.23 Lit. by Equation
3.	463.68 kg Reducing Sugar	259.46 Lit. Actually (87% η)



Process flow diagram - Distillery section

3.6. Raw material required along with estimated quantity, likely source, marketing area of final products, mode of transport of raw material and finished products.

Cane Crushing, Raw Material Generation & Availability

Particulars	**Quantity**	**Existing**	**Proposed**
Ethanol Capacity, KLPD	240	120	120
Ethanol Yield, Litre/ Litre of Juice	70	70	70
Sugar Plant Capacity for which Juice to be converted to Ethanol, TCD	3429	1714	1714
No of Operation of Distillery on Cane Juice, Days	**140**	**140**	**140**
Annual Installed Capacity of Ethanol on juice, KL	33600	16800	16800
Quantity of Cane Juice to be converted, KL	480000	240000	240000
Sugar Plant Capacity for which B-Heavy to be converted to Ethanol, TCD	9268	4634	4634
B-Heavy Molasses Production due to Diversion of B-Heavy Molasses, MT	103797	51899	51899
Ethanol Yield, Lit/ MT of B-Heavy	330	330	330
No. of Operation of Distillery on B-Heavy Molasses	143	143	143
Balance Sugar Plant capacity for C-	2304	1152	1152

Molasses			
C- Molasses generated, MT	16588	8294	8294
Yield of C- Molasses Lit/MT	250	250	250
No. of Operation of Distillery on Own C-Molasses	17	17	17
Total Operational Days	300	300	300

Product Details

1	**Products / By Products**	
1	Ethanol	240 KL/Day
2	Yeast Sludge	20 MT / Day
3	Boiler ash/Spent wash ash: 20 TPD	20 MT / Day

3.7. Resource optimization/recycling and reuse envisaged in the project, if any, should be briefly outlined.

The generated spent lees sent to cooling tower and reused within the process. Similarly, condensate available being treated in RO and re-used in the process thereby reducing the freshwater requirement.

3.8. Availability of water its source, Energy/power requirement and sources should be given.

Water Requirement

Water requirement :

- Distillery: 3218 KLD; **Fresh water requirement: 1140KLD**

The power requirement will be met through own cogeneration power plant.

Power Requirement

Power met from own cogeneration power plant

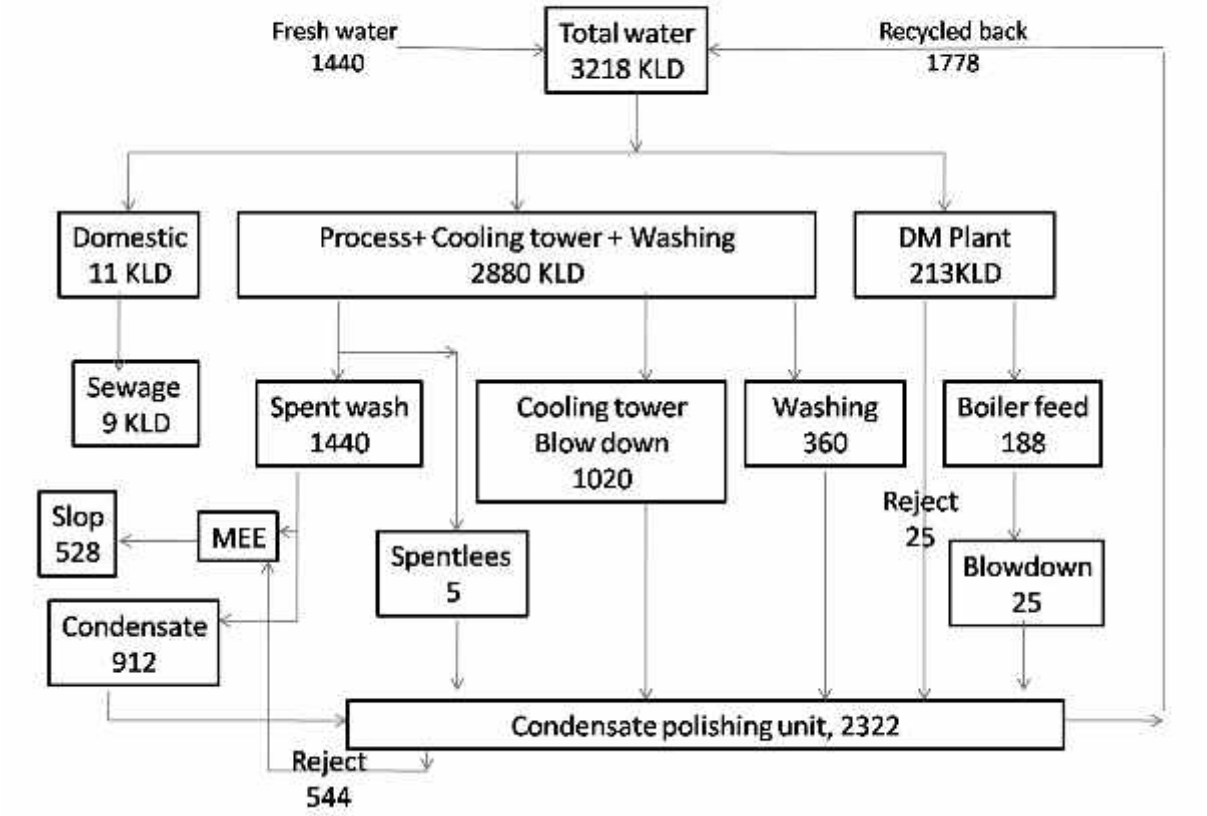
3.9. Quantity of wastes to be generated (liquid and solid) and scheme for their Management/disposal.

Water requirement for distillery

Sl. No.	Description	Water Quantity m^3/day
1.	Process + Cooling Tower+ Washing	2880
2.	DM plant	213
3.	Domestic	11
	Total	**3218**

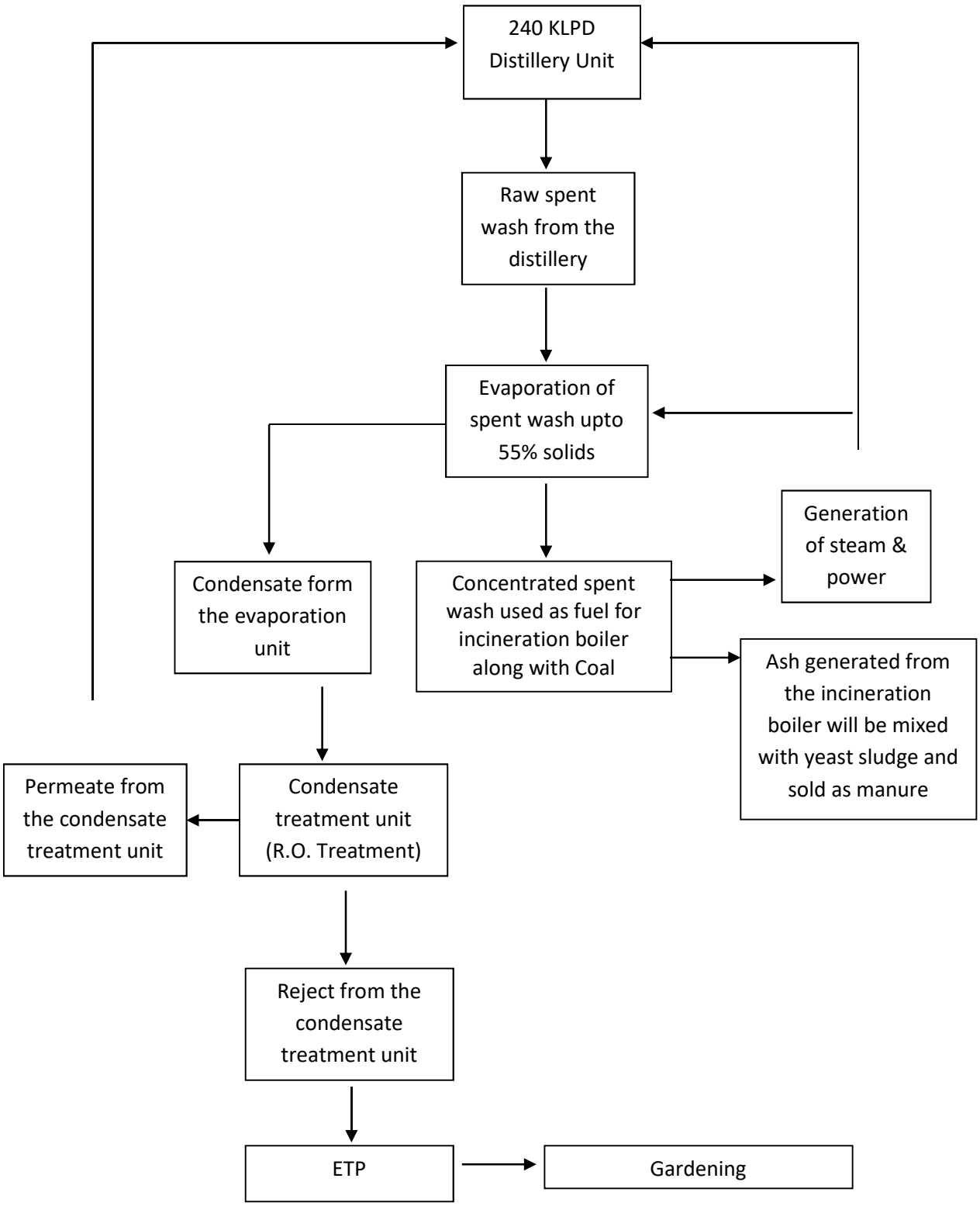
Total fresh water requirement	1440	KLD
Spent lees	5	KLD
Spent wash	1440	KLD
Concentrated spent wash	528	KLD
Condensate	912	KLD
Cooling tower blowdown	1020	KLD
Boiler Blowdown	25	KLD
To Condensate polishing unit	2322	KLD
Recycled to the process	1778	KLD

Water consumption details **For Distillery**



Hence, total water requirement for the industry is 3218KLD. Out of which, 912 KLD will be from the utilisation of treated Condensate water. Maximum fresh water requirement is 1440 KLD met from Krishna River

Spent wash will be stored in the impervious storage tank and will be concentrated and used as fuel in the slop fired boiler. Spentlees along with condensate, boiler blow down, cooling tower blow down and washing will be treated in the CPU of 2500 KLD capacity and recycled back in the process.



Spent wash and condensate treatment flow chart

Evaporation:

Principle: We have adopted ECOVAP-FB evaporation system based in unique fluidized bed heat exchanger '' FLUBEX'' in which fluidizing media (metallic, ceramic or glass) is added to impart gentle scouring action on tube surface, while moving with the liquid to be evaporated. This keeps the tube clean. Media are

being de-fluidized in the top disengagement zone before being re circulated for re-fluidization.

The system consists of single or multiple effect evaporators and can be operated under vacuum or pressure. Fully automated systems are also available to ensure consistent product quality and efficient performance. Process fluids with higher viscosities can also be handled effectively.

Operation: The fouling liquid is fed from an inlet nozzle into the lower section by a specially designed plate, with nozzles having dome shaped caps placed over them to prevent backflow of the solid fluidizing medium. The liquid along with solid media is then distributed uniformly through all the tubes. The solid media is maintained in a fluidized state, which imparts a slight scouring effect on the inside of the tube walls while moving upward through the tubes. This also enhances the heat transfer coefficient without any damage to the tube material while simultaneously keeping the tube walls free of scales. T the top of the channel, a disengagement zone is provided which separates the solid particles from the liquid. The solid are then re circulated to the inlet chamber through several down comer tube bundles. The fluidizing media is selected according to the requirements of the process. The material can be metal, gravel, ceramic or glass in spherical or cylindrical shapes. A minor topping up is required annually.

Cleaning of evaporation unit: CIP of evaporator is mandatory and will be done in as below:

- CIP of falling film effect will be done in every 15 days
- CIP of finisher effect will be done in every 10 days.
- CIP of flubex effect will be done in every 35 days.

ECOVAP - FB*

Fluidized Bed Evaporator

A number of industries involved in the processing of fouling liquids lose productivity due to scaling problems in the conventional tubular evaporator. This results in loss of efficiency of the evaporator. Removing scales is a very cumbersome process and involves considerable down time for cleaning. Alternatively, one can keep another unit as stand-by, which would involve substantial investment. To overcome these problems, the technique of solid-liquid fluidization in heat exchangers has been successfully employed on a commercial scale by PRAJ.

A revolutionary Self-Cleaning Fluidized Bed Evaporator From PRAJ

PRAJ

PRINCIPLE OF ECOVAP-FB SYSTEM

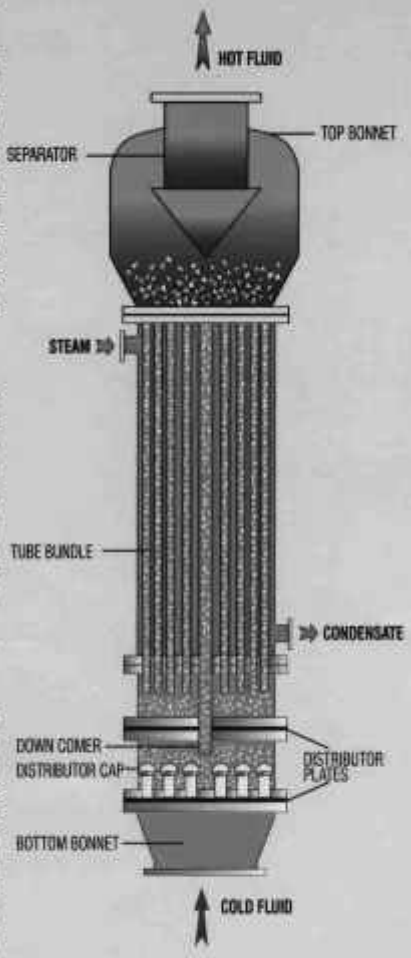
ECOVAP-FB evaporation system is based on unique fluidized bed heat exchanger "FLUBEX*" in which fluidizing media (metallic, ceramic or glass) is added to impart gentle scouring action on tube surface, while moving with the liquid to be evaporated. This keeps the tubes clean. Media are being de-fluidized in the top disengagement zone before being recirculated for re-fluidization.

SPECIAL FEATURES

The system consists of single or multiple effect evaporator and can be operated under vacuum or pressure. Fully automated systems are also available to ensure consistent product quality and efficient performance. Process fluids with higher viscosities can also be handled effectively.

OPERATION OF FLUBEX HEAT EXCHANGER

The fouling liquid is fed from an inlet nozzle into the lower section by a specially designed plate, with nozzles having dome shaped caps placed over them to prevent backflow of the solid Fluidizing medium. The liquid along with solid media is then distributed uniformly through all the tubes. The solid media is maintained in a fluidized state, which imparts a slight scouring effect on the inside of the tube walls while moving upward through the tubes. This also enhances the heat transfer coefficient without any damage to the tube material while simultaneously keeping the tube walls free of scales.



At the top of the channel, a disengagement zone is provided which separates the solid particles from the liquid. The solid are then recirculated to the inlet chamber through several downcomer tube bundles. The fluidizing media is selected according to the requirements of the process. The material can be metal, gravel, ceramic or glass in spherical or cylindrical shapes. A minor topping up is required annually.

BENEFITS

- No loss in production time since downtime is virtually nil.
- Maintenance costs are practically nil, since there is no tube cleaning required.
- Initial investment would be generally lower since lower heat transfer areas are required.
- Standby unit, related piping and frequent CIP is not required.
- Lesser floor space as compared to conventional system.
- Disposal problem of CIP effluent is avoided.

APPLICATIONS

Waste water Evaporation

- Cane Molasses based Distillery spent wash.
- Fermented mash.
- Yeast plant effluent.
- Black liquor from paper mills.
- Tannin liquors.

PRAJ provides complete system with accessories according to your requirements. For trouble free continuous operation, ECOVAP-FB Fluidized Bed Evaporator is the right choice for you!

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PRAJ

Alcohol Plants | Fuel Ethanol Plants | Bio-diesel Plants | Brewery Plants | Waste Water Systems | Bio-nutrients

Benefits:

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- Lesser floor space as compared to conventional system.
- Disposal problem of CIP effluent is avoided.

Incineration:

The spent wash which is generated after recovery of alcohol from the distillery is a highly pollutant liquid which will cause great pollution to receiving body like land or water. Hence this needs to be taken care. The latest technology developed to achieve the zero discharge is spent wash incineration boiler. This is a specially designed boiler which will burn the concentrated spent wash along with the Bagasse as supporting fuel. The ratio of this spent wash to coal is 70 : 30.

In this specially designed boiler after burning the spent wash we can generate the steam which is required to run the distillery. In turn, we can save bagasse upto some extent. The calorific value of the concentrated spent wash is around 1800 K Cal. Hence this special technology helps us in achieving zero discharge of spent wash. The air pollution causing from this boiler is also very minimum and normal Electrostatic Precipitator can be used as air pollution control equipment to achieve SPM <100µgm/Nm^3. The ash collected from the ESP will be utilized as manure.

This technology helps us in generating steam, power and most important is achieving zero discharge of spent wash.

Salient Features of Incineration boiler:

The proposed Boiler has the following features

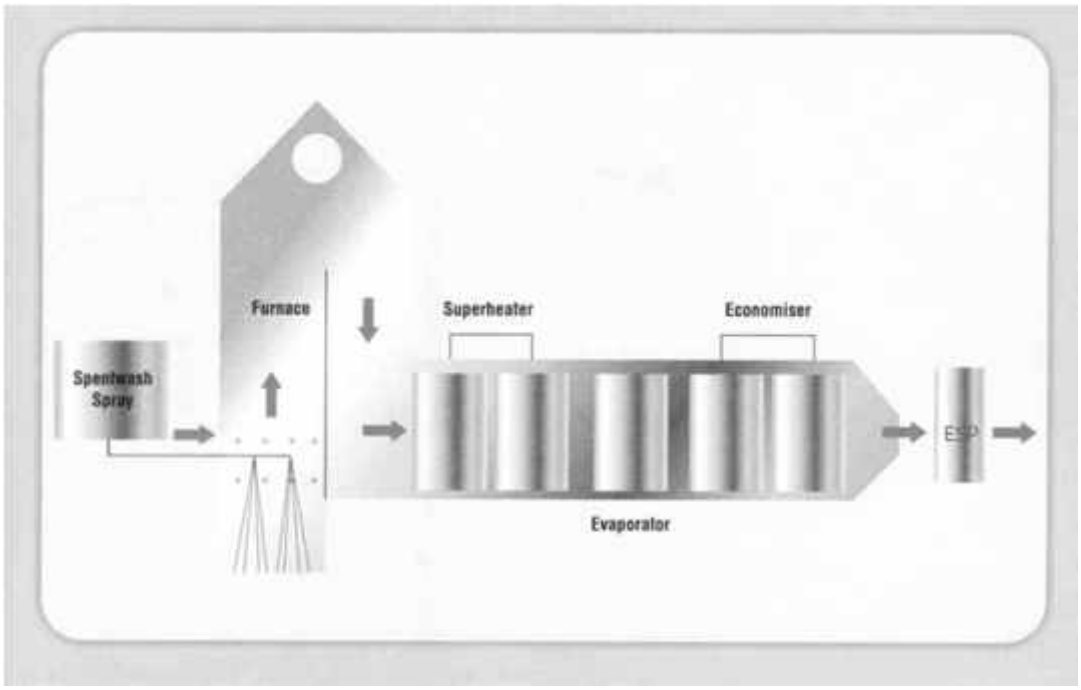
Capacity	Pressure	Temperature	Qty	Type
52 TPH	45 kg/cm^2	400 ^0C	1 no	70 % concentrated Spent wash and 30 % Coal/Bagasse slop fired boiler

- The construction of the boiler is such that the fouling potential is minimized through multi- pass design.
- The boiler is designed such that it is easily maintainable.
- The convective section of the boiler (consisting of Economiser, Superheater and

Evaporator) are of vertical tubes.

- A Steam Coil Air Preheater is provided to preheat combustion air. This is required to Maintain the bed from quenching.
- Deep Fluidised bed construction to improve combustion efficiency.
- Fluidised bed combustor ensures complete combustion.
- Special On-line cleaning devices are provided.
- Stack height provided is 68 meters.

The boiler will need off-line cleaning once in 30 days of operation. The cleaning will include the water wall, super-heater, evaporator and economiser section. The total time required will be 2-3 days. The cleaning frequency and duration is an estimated one, and will be decided based on the actual operating parameters condition.



Typical Boiler Schematic

Solid waste generated from different operations

- Yeast sludge & Boiler ash will be generated from the 240 KLPD distillery unit.
- Domestic Solid waste (Garbage/ Trash/ garden litters) will be stored in Garbage collection pits and disposed to nearby municipality
- Used Oil generated from the industry will be collected and stored in barrels/drums and later disposed to the Karnataka State Pollution Control Board approved waste oil reprocessors/dealers.
- Any other solid waste generated from the facility will be disposed off by using proper disposal mechanism.

3.10. Schematic representations of the feasibility drawing which give information of EIA purpose

As per EIA notification, 2006 and further amendments the proposal is 5 (g)- 150 KLPD molasses based distillery

4. Site Analysis

4.1 Connectivity

The Proposed project will be located at Sy No 148, 144-151 of Maigur Village, and Sy no 238, 239 of Hippargi and Sy No 26, 27 Albal village, Jamakhandi Taluk, Bagalkot District, Karnataka State.

The total land area for the proposed project is 140Acres 28 Guntas. This is flat Land whereby Cutting-filling will be balanced and there will be No/Low Borrowing from Nature.

Within 10 km Influence Zone, there is no Tropical Forest, Biosphere Reserve, National Park, Wild Life sanctuary and Coral Formation Reserve. Banhatti RF is located at a distance of 9.Km, South. The river Krishna is 5.0 Km away from the proposed site and the State Highway -53 & 34 is located at 8 Km, 8.3Km from the project site respectively.

Location features of the proposed project site

Sl.No	Features	Particulars
1	Location	Sy No 148, 144-151 of Maigur Village, and Sy no 238, 239 of Hippargi and Sy No 26, 27 Albal village, Jamakhandi Taluk, Bagalkot District, Karnataka State
2	Present Land use	Industrial
3	Temp., Max and Min	10°C to 42°C
4	Average Humidity	65%
5	Annual Rainfall	586 mm (average of 10 years)
6	Soil Type	Black cotton soil
7	Topography	Undulating terrain
8	Nearest Village	Albal Village- -2.5 Km, E
9	Nearest Town	Jamakhandi -7.92 Km, SE
10	Latitude	16°34'26.65"N
11	Longitude	75°12'30.66"E

Environmental Settings around the proposed project site (Within 10 Kms Radius)

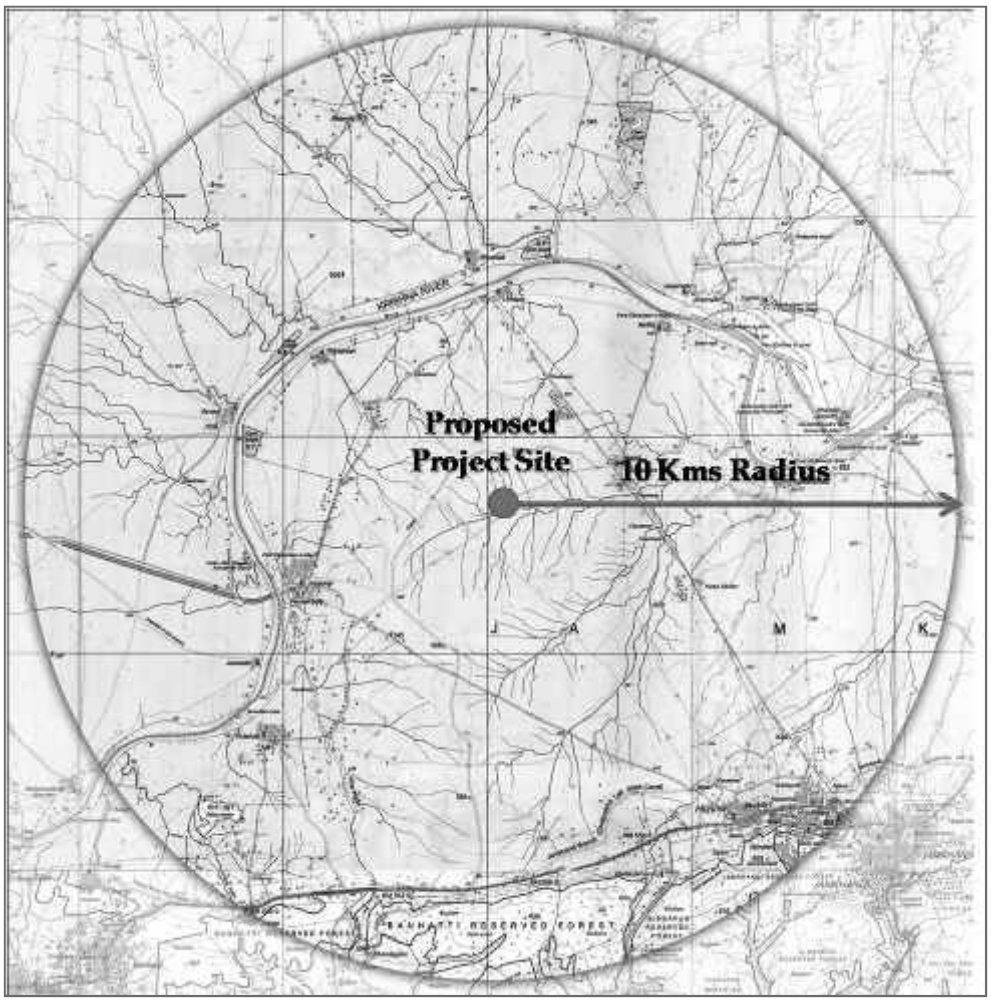
Sl.No	Description	Details
1	Nearest Reservoir	Almatti Dam- 58 Km, SE
2	Nearest Railway lines	Bagalkot railway station-68 Km,SE
3	Nearest Airport	Belgaum airport-100 Km, SW Hubli Airport -134 Km, SW
4	Nearest National park / Reserved Forest	Three RFs (open jungle) found on left side of the Krishna River at a distance of 5 Km near Savadi, Shiraguppi and Shirahatti respectively. Also, Banhatti RF is located south of the project site at a distance of 9.Km
5	Nearest Biosphere Reserve	Nil
6	Nearest Wildlife Sanctuary	Nil
7	Nearest Defense Installation	Nil
8	Nearest Highway	State Highway 53 – 8 Km, S State Highway 34 –-8.3 Km, S
9	Nearest Water body	Krishna River–-5.0 Kms, N
10	Nearest densely populated place	Jamakhandi Taluk -7.92 Km, SE
11	Nearest High Level Canal	Almatti Dam- 58Km, SE
12	Nearest Village	Albal Village- -2.5 Km, E Hipparagi village - 4.3 Km- SW

4.2. Land form, land use and land ownership.

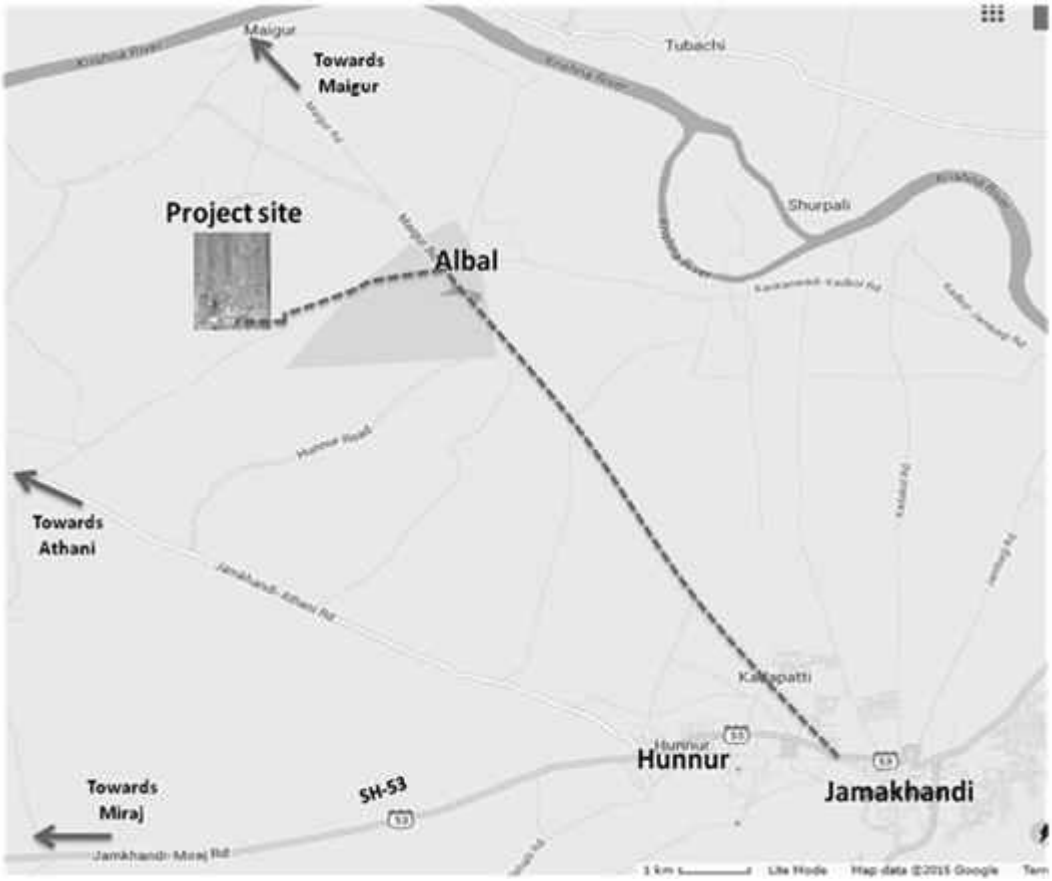
M/s. Sai Priya Sugars Ltd, established the 10000 TCD of sugar plant, 65 MW Cogeneration unit + 5 MW from incineration boiler and 120 KLPD distillery at Sy No 148, 144-151 of Maigur Village, and Sy no 238, 239 of Hippargi and Sy No 26, 27 Albal village, Jamakhandi Taluk, Bagalkot District, Karnataka State.

The total land area of the industry is 140 acres 28 Guntas and no additional land required for the present proposal of expansion to 240 KLPD.

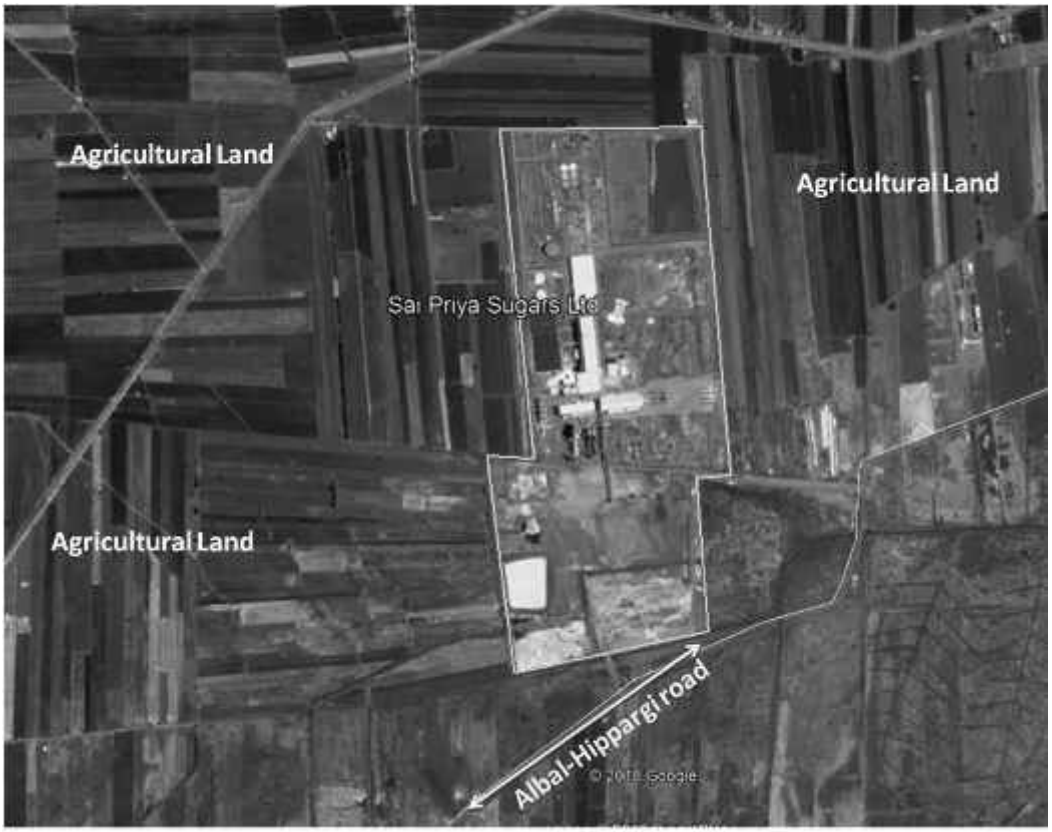
4.3. Topography (along with map)



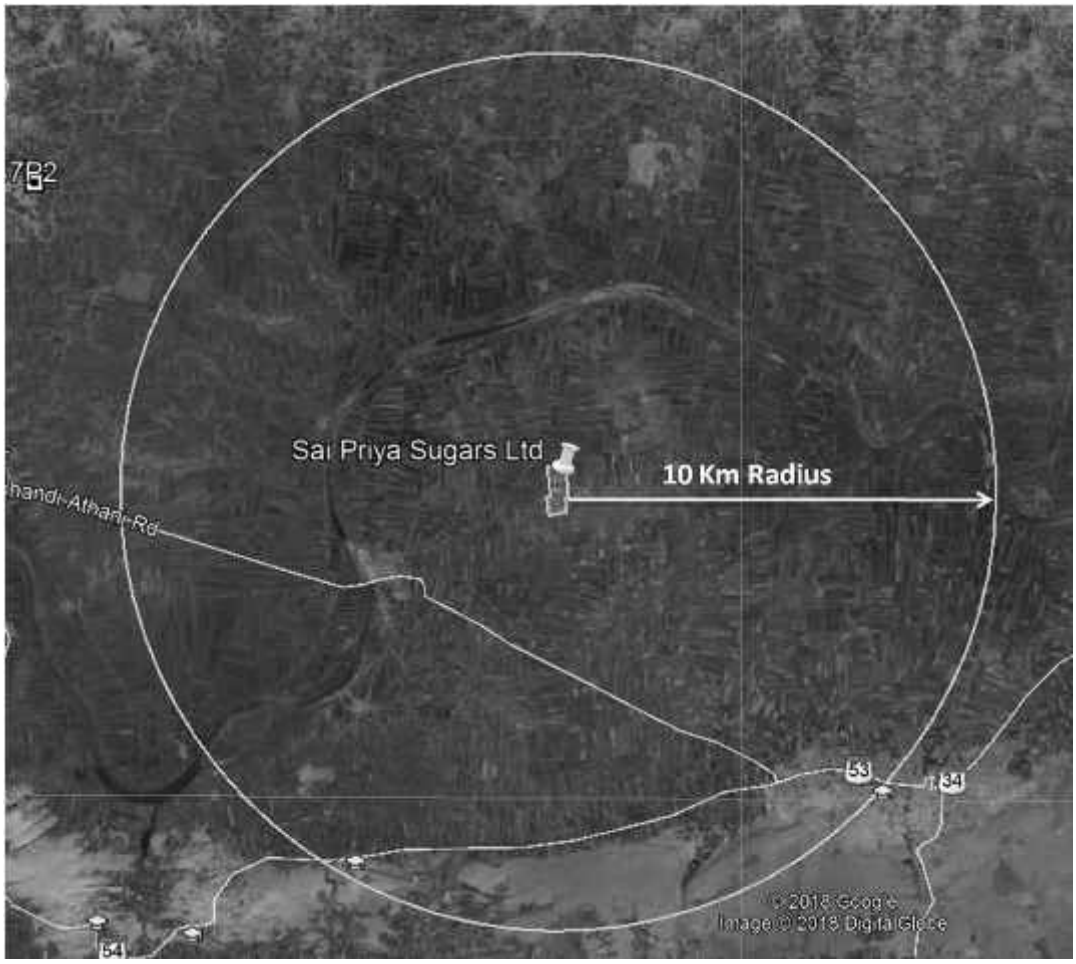
Location of the Proposed Project site on Toposheet with 10 Kms radius demarcation (Toposheet No: 46P/6, 46P/10 Scale: 1:50,000)



Location map of the project site



Aerial view of the project site



Aerial view of the project site showing 10 kms radius

4.4. Existing land use pattern (agriculture, non agriculture, forest, water bodies (including area under CRZ), shortest distances from the periphery of the project to periphery of the forest, national parks, wild life sanctuary, eco sensitive areas, water bodies (distance from, the HFL of the river)). In case of notified industrial area a copy of the Gazette notification should be given.

Agriculture is the most important means of survival in the district. Over 60% of the working people in Bagalkot district are engaged in agriculture.

Land utilization pattern of the Bagalkot District

Sl.No	Land classification	Area (in Sqkms)
1.	Forest	811.26
2.	Net area sown	4697.83
3.	Cultivable area	4754.59

4.5. Existing Infrastructure

The proposed site is well accessed by Hippargi- Albal road. Bagalkot city situated at 64 Km from site and is well connected by road and rail. The nearest railway station for the factory is Bagalkot which is about 68 Kms from site. The nearest airport is Belgaum airport-100 Km SW & Hubli Airport -134 Km, SW

4.6. Soil Classification

The district is occupied by three types of soils viz. Black soils, Red sandy soils and mixed soils. Formation of various types of soils is a complex function of chemical weathering of bedrocks, vegetative decay and circulation of precipitated water. Soils are mostly insitu in nature.

Black soils derived from basaltic bedrock. These soils in upland areas are shallower and are deeper in valley portions. The Don River valley has plains and consisting of rich tracks of deep black cotton soils stretching from west to east in the central part of the district. The infiltration characteristics are poor to moderate. The constant rate of infiltration in these soils varies from 0.75 to 2.5 cm/hr. These soils are alkaline in nature, low in potassium and nitrogen. Black cotton soils with high clay and humus content in low-lying areas. They have high moisture holding capacity and on drying up these soils develop open cracks. Red soils, which are sandy in nature derived from granites, gneisses and sandstones, are found in southern part of Muddebihal taluk of the district. The infiltration rates of these soils range from 2.6 to 3.8 cm/hr.

Mixed soils are derived from the fringe areas of Deccan traps and granites, gneisses, lime stones and sandstones in Muddebial and Basavana Bagewadi taluks of Bijapur district. These are dark greyish brown and dark brown to dark reddish brown in colour. Their texture varies from loam to clay. The infiltration characteristics of these soils are moderate to good in nature.

The proposed project site has Black Cotton Soil and is suitable for agriculture and horticulture crops

4.7. Climatic and Rainfall data from secondary sources

The climate of the district is hot and dry. Hot season starts from middle of the February to end of May. Post monsoon is during October and November. Cold season is from December to middle of February. The normal average rainfall is 560 mm and number of rainy days are 35.

4.8. Social Infrastructure available

The proposed site is well accessed by Hippargi- Albal road. Bagalkot city situated at 80 Km from site and is well connected by road and rail. The nearest railway station for the factory is Bagalkot which is about 68 Kms from site. The nearest airport is Belgaum airport-100 Km SW & Hubli Airport -134 Km, SW

5. Planning

5.1. Planning concept (type of industries, facilities, transportation, etc.,) Town and Country Planning Development authority classification.

The proposed site is well accessed by Hippargi- Albal road. The nearest townships with residential areas are Shiraguppi Thota (Maddi), Albal , Hipparagi, Savadi, which are at a distance of 2.2 Km, 2.5 Km, 4.3 Km & 5.44 Km away from the plant respectively. Bagalkot city situated at 64 Km from site and is well connected by road and rail. The nearest railway station for the factory is Bagalkot which is about 68 Kms from site. The nearest airport is Belgaum airport-100 Km SW & Hubli Airport - 134 Km, SW.

5.2. Population Projection:

As of 2011 Census of India, Bagalkot had a population of 18,89,752 stands in the 11th position in terms of population in the State. The district ranks 12th in terms of rural population and 11th in terms of urban population. Bagalkot district accounts for 3.1 percent of the total population of the State. With the decadal growth rate of 14.4 percent, it ranks 10th in the State in terms of decadal growth rate. The district with a Sex ratio of 989 holds 11th rank in the State. The district with a Sex ratio of 935 among the child population in the age-group 0-6 holds the antepenultimate rank of 28th in the State. The proportion of child population, (0-6 age-group) is 14.3 percent in the district and ranks 5th in the State. The district has a literacy rate of 68.8 percent and is placed at 23rd rank in the State. The male literacy rate in the district is 79.2 percent and the female literacy rate is 58.4 percent. The male – female literacy gap in the district is 20.8 percentage points, which is higher than the male – female literacy gap registered by the State (14.4 percentage points)

5.3. Land use planning (breakup along with green belt etc.)

Table showing Break up of present land use

Sl No	Land Description	Area (acres)
1	Factory	
	Raw material storage yard	10.0
	Sugar Unit	30.0
	Distillery	15.0
	Power plant	20.0
	Admin, repair shop, lab	5.0
	Internal Road	5.0
2	Landscape, garden	47
3	For future development	8A 28 G
Total		**140 A 28 G**

5.4. Assessment of infrastructure Demand (Physical & Social).

There will not be any negative effect on the living conditions of people. Due to project activities, the surrounding areas are expected to improve by way of socio-economic development due to direct and indirect employment and the project will also lead to supporting utilities by improving business opportunities in the locality.

5.5. Amenities/facilities

Basic amenities and facilities will be provided for all workers working at site.

6. Proposed Infrastructure

6.1. Industrial Area (Processing area)

Sl No	Land Description	Area (acres)
1	Factory	
	Raw material storage yard	10.0
	Sugar Unit	30.0
	Distillery	15.0
	Power plant	20.0
	Admin, repair shop, lab	5.0
	Internal Road	5.0
2	Landscape, garden	47
3	For future development	8A 28 G
Total		**140 A 28 G**

6.2. Residential Area (non processing area)

Housing facility are provided for working staff.

6.3. Green Belt

33% of total area, 47 Acres is provided for green belt development

6.4. Social Infrastructure

Good infrastructure facilities seen around the unit.

6.5. Connectivity Traffic and Transportation Road/Rail/Metro/Water ways etc

The proposed site is well accessed by Hippargi- Albal road. The nearest townships with residential areas are Shiraguppi Thota (Maddi), Albal , Hipparagi, Savadi, which are at a distance of 2.2 Km, 2.5 Km, 4.3 Km & 5.44 Km away from the plant respectively. Bagalkot city situated at 64 Km from site and is well connected by road and rail. The nearest railway station for the factory is Bagalkot which is about 68 Kms from site. The nearest airport is Belgaum airport-100 Km SW & Hubli Airport - 134 Km, SW.

6.6. Drinking Water Management (Source & Supply of water)

Drinking water is met through Krishna River located at 5.0Km from the site.

6.7. Sewerage System

Domestic sewage is treated in septic tank and soak pit. Industrial effluent will be treated in the ETP through internal sewer network

6.8. Industrial Waste Management

Spent wash will be treated in Multi-effect evaporator followed by incineration

6.9. Solid Waste Management

Solid waste generated from the expansion of Distillery plant is yeast sludge which is used in the composting process with RO rejects & spent wash during the maintenance of the incineration boiler. Boiler ash generated will be mixed with yeast sludge and given to farmers as manure.

6.10. Power Requirement & Supply/Source

Power requirement will be met through incineration unit.

7. Rehabilitation and Resettlement (R&R) Plan

7.1. Policy to be adopted (Central/State) in respect of the project affected persons including home oustees, land oustees, and landless labourers (a brief outline to be given).

Not applicable.

8. Project Schedule & Cost Estimation

8.1. Project Schedule

The company is an established 120 KLPD distillery unit. Now proposes to expand the distillery unit to 240 KLPD within the same premises after obtaining Environmental Clearance and Consent for establishment.

8.2. Cost Estimates

Rs 465.1 Crores (Rs. 165.1Crores as estimated for the expansion).

9. Analysis of proposal (Final recommendation)

9.1. Financial and social benefits with special emphasis on the benefit to the local people including tribal population, if any, in the area

The socio-economic benefits arising out of this project for the local populace will include creation of direct and indirect jobs and consequent rise in the income levels, associated commercial and social infrastructure development in the rural areas and higher returns for the cane crop.

119 nos of additional employees will be required for the expansion, the company provides all necessary basic amenities to the workers of the industry.