



PRE-FEASIBILITY REPORT

FOR

PROPOSED CAPACITY EXPANSION OF MOLASSES BASED DISTILLERY

FROM 45 KLPD TO 120 KLPD

AND

CAPTIVE POWER GENERATION FROM 1.5 MW TO 6.5 MW

OF

Harinagar Sugar Mills Ltd.

(Distillery Division)

Vill + P.O.: Harinagar,

Dist. West Champaran, Bihar

PIN : 845 103

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1. EXECUTIVE SUMMARY :

Location:

Harinagar Sugar Mills Ltd. (HSML), is situated at Harinagar, P.O. Harinagar, Block Ramnagar in District West Champaran, Bihar having Latitude 27° 9'13.67"N & Longitude 84°19'46.85"E at 102.4 m. above MSL. The Project Site is connected to NH-28 B via Lauriya - Ramnagar Road. It is about 50 kms. from district head quarter at Bettiah and is well connected by NH – 28B. HSML is about 0.5 Km. (SE) from Harinagar Railway Station on Bagaha - Narkatiaganj Sec. of ECR.

General Details:

Harinagar Sugar Mills Limited is a Public incorporated on **03 January 1933**. It is classified as Non-govt company and is registered at Registrar of Companies, Mumbai. Its authorized share capital is Rs. 10,000,000 and its paid up capital is Rs. 9,599,520. It is involved in manufacture of other food products.

Harinagar Sugar Mills Limited's Annual General Meeting (AGM) was last held on 30 September 2016 and as per records from Ministry of Corporate Affairs (MCA), its balance sheet was last filed on 31 March 2016.

- The Directors of Harinagar Sugar Mills Limited are :
 - Sh. Vivek Madhavlal Pittie,
 - Sh. Madhavlal Narayanlal Pittie,
 - Smt. Radha Balkrishnalal Pittie,
 - Sh. Laxminarayan Babulal Agrawal,
 - Sh. Ajaykumar Malchand Sharma,
 - Sh. Prakash Shankarappa Goud,
 - Smt. Damyanti Madhusudanlal Pittie.
- Corporate Identification Number is (CIN) : U15420MH1933PLC001918
- Company Registration number : 1918.
- Email address : hsmlho@gmail.com and harinagarsugar@gmail.com
- Registered Address : 207, Kalbadevi Road, Mumbai, Maharashtra – 400002.

HSML owns a total land of 42.99 Acres at Mauza Harinagar, Khata No. 618 Khsera Nos. 537, 591, 598, 629, 636, 650, 687. The total land area is 42.99 acres. About 33% of total land area will be developed as green belt within existing premises. Out of this, at present about 8 Acres is already developed as Green Belt.

The existing Distillery Plant and Machinery has been set up in about **12 Acres** of Land, including Bio-Methanation and about **8 Acres** of Green Belt.

Total Land area developed for Bio-Composting is ~ **23 Acres** plus **3 acres for Press Mud Storage** and **about 2 acres for 30 days lagoon**. Ample space within existing Distillery complex is available for proposed expansion project. There will **not** be any need to purchase additional land. All necessary infrastructures are available in the existing plant premises.

Manufacturing & Production Details;

Manufacturing Facilities	Product	Existing	Proposed	Total
Distillery	Ethanol	45 KLPD	75 KLPD	120 KLPD
Captive Power generation	Power	1.5 MW	5 MW	6.5 MW

Raw Material Requirement ;

Item	Raw Material Requirement	
	Existing	After Proposed Expansion
Molasses	201 MT/Day	536 MT/Day
No. Of Days Operation / Annum	270 Days	270 Days

Pollution Control Measures:

The major sources of pollution in Molasses Distillery project are Waste Water - **Spent Wash** and Boiler Emissions from Stack.

- **Spent Wash** is and will be Anaerobically Treated in Bio-Methanation Plant followed by volume reduction in MEE (as per latest CPCB directive) followed by Bio-Composting. Our own Press Mud as well as developed Bio-compost Yard is adequate for the purpose and expanded capacity.
- The Stack Emission will be controlled and minimized through use of Electrostatic Precipitator (ESP) and water sprinkling system on Ash.

Waste Water Generation & Treatment ;

In the existing project all generated waste water (spent wash) is being treated bio-digester followed by Multiple Effect Evaporator followed by Bio-composting. Process condensate from MEE is also being treated through Stripper and condensate Water is recycled back in the process.

After proposed expansion same methodology for treatment of Distillery waste water will be implemented to achieve ZLD.

Air Pollution :

Presently HSML Distillery project has 14 TPH boiler attached with multi cyclone and 45 m height stack for wider dispersion of pollutants. Own Bio-gas and Bagasse are being used as boiler fuel.

For proposed expansion and captive Power Generation of additional 5 MW, one new boiler of **35 TPH** capacity will be installed. To minimize air pollution load from new boiler, an ESP will be installed followed by a new ~ 65 m height stack for wider dispersion of pollutants.

Solid Waste Management:

In the existing & proposed Distillery project, the Boiler ash and Decanter sludge are generated as Solid Waste. The same will be utilized in Bio-composting process as per present practice and CPCB guidelines.

Project Cost :

Total cost of the proposed expansion project is estimated to be Rs. 4500 Lacs (Rs. 45 Crores).



PROJECT DETAILS

2. INTRODUCTION OF THE PROJECT/BACKGROUND INFORMATION :

(i) Identification of Project & Project Proponent

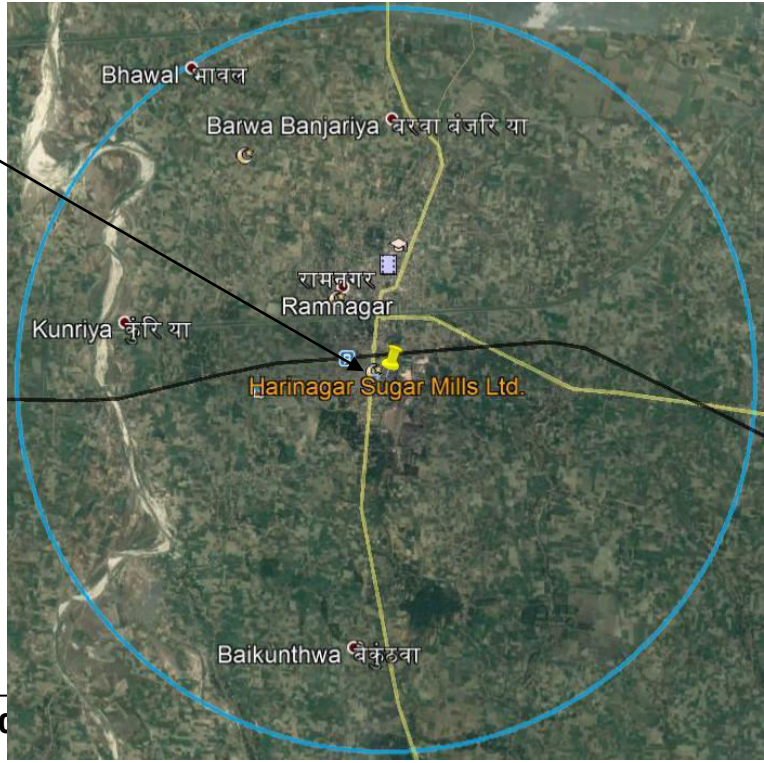
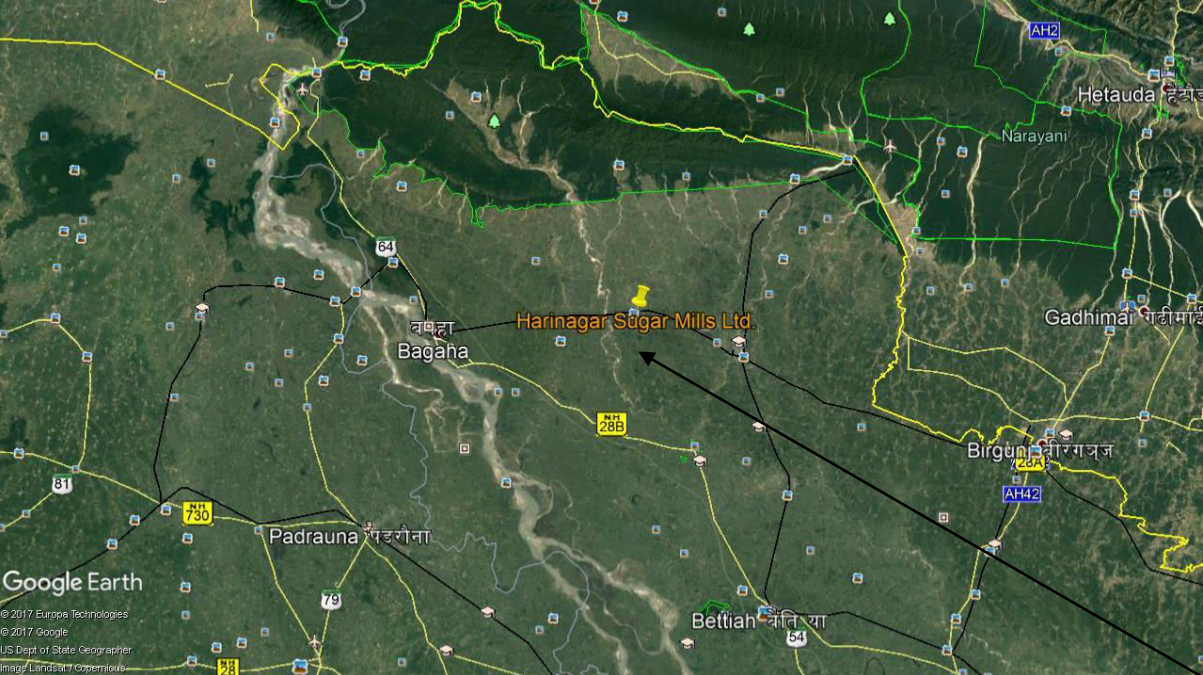
S.L. Baheti

Chief General Manager
Harinagar Sugar Mills Ltd.
Vill + P.O : Harinagar
Dist- West Champaran – 845 103, Bihar
Ph No- 06254 - 224223

Location of the Project :

Harinagar Sugar Mills Ltd. (HSML), is situated at Harinagar, P.O. Harinagar, Block Ramnagar in District West Champaran, Bihar having Latitude 27° 9'13.67"N & Longitude 84°19'46.85"E at 102.4 m. above MSL. The project site is connected to NH-28 B via Lauriya-Ramnagar Road. It is about 50 kms. from district head quarter at Bettiah and is well connected by NH – 28B. HSML is about 0.5 Km. (SE) from Harinagar Railway Station on Bagaha - Narkatiaganj Sec. of ECR.

PROJECT LOCATION MAP



(ii) Brief description of nature of project :

M/s Harinagar Sugar Mills Ltd., have been a pioneer in Sugar manufacturing and one of the best Units in the state of Bihar. The unit have been constantly achieving laurels in the field of Efficient Production, Quality and Environmental Management. The unit has the licensed capacity of **10,000 TCD**.

The unit is facing serious hardship for storage of Bagasse and Molasses in their premises. In view of above, the management of HSML desires to use own molasses, Bagasse and the Press Mud of Sugar Mill for manufacturing of downstream products which is mainly Fuel Ethanol and Bio-Compost Fertilizer. HSML has established this Distillery Project of 45 KLPD based on Molasses in the year 2006 for production of Rectified Spirit, Absolute Alcohol, Fuel Ethanol and Extra Neutral Alcohol (ENA). However, after implementation of the Bihar State Prohibition and Excise Bill - 2016, at present HSML Distillery Division is producing only **Fuel Grade Ethanol** (Absolute Alcohol) only.

The Distillery is being operated for **270 days** on molasses produced at Harinagar Sugar Mills. The Press mud, surplus Bagasse and Boiler Ash produced in Sugar Mill is being utilised for making Bio-compost Fertilizer by spraying Anaerobically Treated Spent Wash (after Bio-Methanation).

Now, to meet the increasing national demand of Fuel Grade Ethanol (Absolute Alcohol) and surplus availability of Molasses from Own as well as nearby Sugar Mills, the management of HSML has embarked upon expansion of existing Distillery project alongwith captive Power generation plant of upto **6.5 MW** by adding another 35 TPH Boiler and 5 MW Steam Turbine.

During proposed expansion all existing facilities will be utilized. In addition to existing 14 TPH Boiler and 1.5 MW Turbine, one new boiler of 35 TPH and 5 MW Steam Turbine will be installed for continuous operation in meeting the Steam and Power requirement of Distillery. Surplus Power will be utilized in own Sugar Mill and / or exported to State Grid as per feasibility.

(iii) **Need for the project and its importance to the country and or region**

With a view to give boost to agriculture sector and reduce environmental pollution, the Government of India have been examining for quite some time supply of ethanol-doped-petrol in the country. In order to ascertain financial and operational aspects of **blending 5% ethanol with Petrol** as allowed in the specifications of Bureau of Indian Standards for petrol. Government had launched three pilot projects; two in Maharashtra and one in Uttar Pradesh during April and June 2001 and these pilot projects have been supplying 5% ethanol-doped-petrol only to the retail outlets under their respective supply areas since than. Apart from the aforesaid field through pilot projects, R & D studies also were undertaken simultaneously. Both pilot projects and R & D studies have been successful and established blending of ethanol up to 5% with petrol and usage of ethanol-doped-petrol in vehicles.

Discussions were held with concerned agencies including the Governments of major sugar producing States. While the Society for Indian Automobile Manufacturers (SIAM) has confirmed the acceptance for use of 5% ethanol-doped-petrol in vehicles. State Governments of major sugar producing States and the representatives of sugar/distillery industries have confirmed availability / capacity to produce ethanol.

In its bid to increase use of ethanol and other alternate fuel for transportation, government will come out with a new ethanol policy focusing on producing more ethanol. Against the present annual demand of about 460 crore litres annually for different purposes, only 250 crore litres is available in the country.

In view of the above scenario, proposed expansion project of HSML is justified and it will help in bridging the demand supply gap of ethanol.

(iv) **Demand Supply Gap :**

Against the present annual demand of about 460 crore litres of Ethanol annually for different purposes, only 250 crore litres is available in the country. Hence, the projected demand of Fuel Ethanol is huge and encourages such proposed capacity expansion.

(v) **Imports vs. Indigenous Production:**

Indian market could not meet present alcohol demand. So they import alcohol 5-7% of total demand. As far as ENA production is concerned, Indian market play a vital role at both domestic & international level. So they require produce the more alcohol to meet the demand.

(vi) **Export Possibility:**

There is no export possibility of ethanol produced by HSML, as, the indigenous demand is very high.

(vii) **Domestic/Export Market:**

Domestic/Export market depends on policy of government.

(viii) **Employment Generation (Direct & Indirect)**

The proposed expansion of project will generate employment opportunities both in direct and indirect manner. In direct mode people will get additional jobs in proposed expansion project and in indirect mode people will be appointed as company authorized dealers & sellers.

3. **Project Description:**

(i) **Type of project including interlinked and inter dependent project:**

HSML has established a Distillery Project of 45 KLD based on Molasses in the year 2006 for production of Rectified Spirit, Absolute Alcohol, Fuel Ethanol and Extra Neutral Alcohol (ENA). After implementation of the Bihar State Prohibition and Excise Bill - 2016, at present HSML distillery project is producing Fuel Grade Ethanol (Absolute Alcohol) only.

Now, to meet the increasing demand of Fuel Grade Ethanol and surplus availability of Molasses from own and nearby Sugar Mills, the management of HSML has embarked upon expansion of its existing distillery project alongwith captive Power generation of upto 6.5 MW.

(ii) **Location:**

Village : Harinagar
Block : Ramnagar
District : West Champaran
State : Bihar

(iii) **Details of alternate sites Considered and the basis of selecting the proposed site, particularly the environment consideration gone into should be highlighted.**

No alternate sites have been considered for the proposed expansion project as all the expansion activities will be carried out within existing premises and no additional land will be required for the proposed expansion project.

(iv) **Size or magnitude of operation:**

The project capacity after proposed expansion will be **120 KLPD** based on Molasses and 6.5 MW captive power generation from existing 1.5 MW and new 5 MW Steam Turbine. In view of rapid increase in the demand of Fuel Ethanol and Electricity from year to year and availability of own main Raw Materials i.e. Molasses within premises and adjoining areas, the project proponent has decided to expand its existing production capacity.

(v) **Project description with process details: (a schematic diagram/flowchart layout, components of the project)**

I. FERMENTATION SECTION

Fermentation Section is based on HIFERM Fermentation Process – FED BATCH mode of operation with cane molasses as raw material.

The fermentation plant is incorporated of 4 Fermenters and the individual fermenter is equipped with molasses mixing system, Agitator for mixing, safety system etc. In Fed Batch mode of operation, freshly grown cultured yeast, process water and molasses are added to fermenter. After reaction completion the individual fermenter is harvested. The process utilizes special culture yeast. Fermented wash from last fermenter is pumped directly to Wash Holding Tank.

FED BATCH 'HIFERM' FERMETATION

This system caters molasses distribution in yeast propagation, yeast activation and fermentation section. Also it measures the molasses consumption of fermentation section.

It includes Molasses Weighing System, Molasses Receiving Tank and Weighed Molasses Tank, Weighed Molasses Pumps. The Molasses Weighing System works in batch mode. Pre-defined amount of molasses is weighed in batches and the total numbers of bathes are summed to estimate the daily consumption of molasses. Raw molasses is pumped from the molasses day tank by using existing molasses transfer pump to the molasses receiving tank. Raw molasses quantity is measured and totalize by using the molasses weighing system before feeding to weighed molasses tank.

CELL MASS PROPAGATION

For start up of fermentation process, yeast cell mass is required. The required yeast cell mass is inoculated and grown here. The required yeast cell mass is inoculated and grown in various stages of cell mass propagation, which starts in laboratory and completes in the yeast culture vessels. Air is sparged; Urea and

DAP is added to the yeast culture vessel- CV1, with adequate quantity of sulphuric acid (H₂SO₄) to maintain the pH in the range of 4.0 to 4.2.

Steam is passed through air sparger to heat and sterilize the empty vessel and through cooling water jacket to pasteurize the dilute molasses media content in the Yeast Culture Vessel at 85°C to 90°C with 30 minutes hold up time (Before starting steam through air sparger make sure that air isolation valve must be closed). After pasteurization passing-cooling water through the vessel jacket cools the content. After content temperature reaches to 32°C, yeast culture from the laboratory stage is transferred aseptically in the vessel and grown till the specific gravity of the content reduces approximately to 1.025. Normally about 24 hour period will be required for this stage.

YEAST ACTIVATION SYSTEM

This system consists of Yeast Activation Vessel along with circulation pump and PHE for cooling purpose Raw molasses from Weighed Molasses Tank is pumped in to the Molasses diluter along with process water and dilute molasses solution is prepared in the Yeast Activation Vessel.

DISTILLATION SECTION

ECOFINE – TVSF DISTILLATION

The process of distillation is continuous and is under Vacuum, ECOFINE-TVSF Distillation has 4 columns operating under vacuum.

DEGASIFYING COLUMN

This column has sieve trays and strips out dissolved gases mainly CO₂ from the feed Fermented Wash Stream. Fermented Wash from Wash Charger is preheated to 60°C and is fed at the top of the column. Ethanol and water vapors from Analyzer Column enter at the bottom of column and strip the fermented Wash of the dissolved gases and low boiling compounds like aldehydes. Vapors containing ethanol from this column top are fed to Aldehyde Column and fermented Wash is fed to the top of Analyzer Column.

ANALYSER COLUMN

This column has provided with 18 sieve trays with one vapor disengagement tray and vaporizes ethanol to concentration at the top. Part of the column top

vapors is fed to Degasifying Column and rest is fed to the Rectifier Column bottom. The heat from low pressure steam is used to strip off the alcohol from wash and remove the rest as Spent Wash from the Analyzer Column bottom. This Spent Wash, which contains most of the solids from the fermented wash, is sent to the Bio-digester.

ALDEHYDE COLUMN

This column has been provided with bubble-cap trays and concentrates ethanol to @ 95% v/v along with Aldehydes as Impure Ethanol cut at top. Vapors from the Degasifying Column are fed at the tray of Aldehyde Column. Vapors from top of the column are condensed in two condensers with cooling water flow in tubes. Reflux rate is maintained to concentrate the low boiling compounds along with ethanol at the top of column and are removed as impure ethanol. The bottom of this column is dilute ethanol, which is fed back to the Exhaust Column for ethanol recovery.

RECTIFIER-EXHAUST COLUMN

This column has been provided with 44 bubble cap trays and concentrates ethanol-water vapors from Analyzer Column to about 95% v/v ethanol at top. Spent lees are removed as an effluent from bottom. Analyzer Column vapors enters at the bottom of the rectifier section of the column. Vapors from the top of rectifier section of the column are condensed in the three condensers using cooling water. A reflux ratio of around 4 is maintained and ethanol of @ 95% v/v is taken out as product. Fusel oils are concentrated at the mid section of this column and are separated as mixture of higher alcohols by the side tapings provided on the column. The fusel oil stream so removed is cooled and washed with water in Fusel Oil Decanter. Fusel oils, which are less soluble in water than ethanol separate out in this decanter and are removed. The dilute ethanol from decanter is goes to fusel oil washing tank.

MOLECULAR SIEVE DEHYDRATION UNIT (MSDH)

Molecular Sieve Dehydration Unit (MSDH) is a modularized, stand alone equipment package composed of a distillation system and a molecular sieve dehydration system, along with interconnecting piping and support equipment. The distillation system utilizes a single distillation column to

1. Vaporize the 95% v/v ethanol liquid feed.
2. Redistill 75% to 85% v/v ethanol liquid stream produced during regeneration of the dehydration beds.

The distillation column, depending upon operator adjustment will output approximately 95% v/v ethanol overhead vapor, while maintaining 0.05% ethanol concentration in the bottoms. The 115-118 °C column effluent will be discharged to the client's sewer. For production of anhydrous ethanol the 95% v/v ethanol column overhead vapor flows to the dehydration section where molecular sieve beds remove excess water by the process of adsorption. The MSDH performs the adsorption in vessels filled with molecular sieve desiccant in combination with strictly controlled pressure and temperature cycles.

II. EQUIPMENT INSTALLED FOR ACHIEVING ZERO DISCHARGE:

The plant produces spent wash at an average of approx. 9 KL/KL of alcohol produced with solid contents of 16–17%. Spent wash generated. There are three stages of treatment for the Spent Wash to achieve Zero Liquid Discharge. Detailed ETP process :

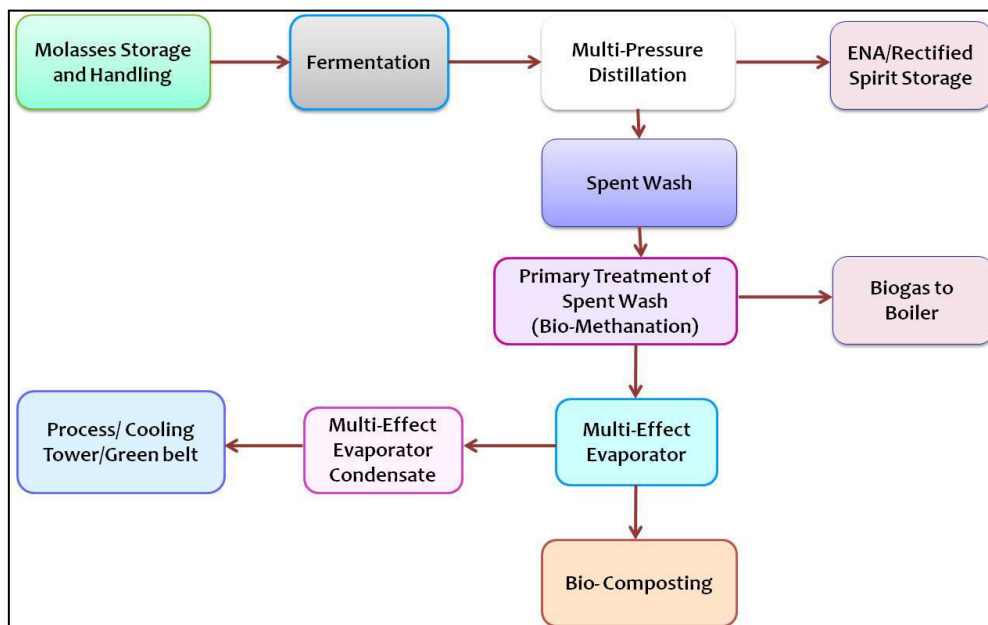
- i. **Bio-methanation** - For the purpose, raw spent wash from distillation plant is passed through two sets of Decanters to impervious spent wash settling tank of 686 m³ capacity. Sludge from decanters and spent wash settling tank goes to sludge drying bed from where it is send for bio-composting. By Bio-methanation (CSTR process) anaerobic digestion process converts the spent wash into biogas.
- ii. **Multiple Effect Evaporator (MEE)** - Multiple Effect Evaporator System (MEE) commissioned in the month of January 2017 as per directive of CPCB.
Process Description – 6 Effect Evaporator (5 + 1)

Bio-methanated Spent Wash coming from Anaerobic reactor followed by Lamella Clarifier (Bio-methanation process) shall be fed to MEE through Degasification System to remove dissolved gases. It is essential to remove maximum amount of dissolved gases. It helps to reduce foaming/carry over in evaporator and get desired performance. Before Degasification, Feed is preheated in Shell and Tube Pre-heaters which shall be mounted on calendrias. After Degasification feed is introduced to Effect 1 Partially concentrated spent wash from E1 is transferred to further effects. Low pressure steam is used as heating media. Vapors separated in vapor separator of E1 are used as heating media in E2, Vapor generated in Degasification System are used in the system for energy recovery; vapors generated in E2 are used as heating media in E3 and so on. Finally the vapors separated in Vapor Separator of E6 are connected to a surface condenser.

- iii. **Bio-composting** - The Spent wash from Lagoon is taken for Bio-composting in the compost yard for bio-composting with press-mud. Around **55000 MT** of Press Mud is available factory from sugar factory/per season. Thus Spent wash from lagoon is pumped and sprayed over press mud taken from the sugar unit. Bio-composting is carried out on a bricked and membrane lined floor for a cycle period of 60 days in windrows which is frequently mixed using Aerotiller.

The entire quantity of spent wash is consumed in bio-composting. The compost produced contains 30-35 % moisture and is packaged in 50 kg poly-propylene bags. The packaged compost is sold after marking its contents on the bags.

Flow Diagram



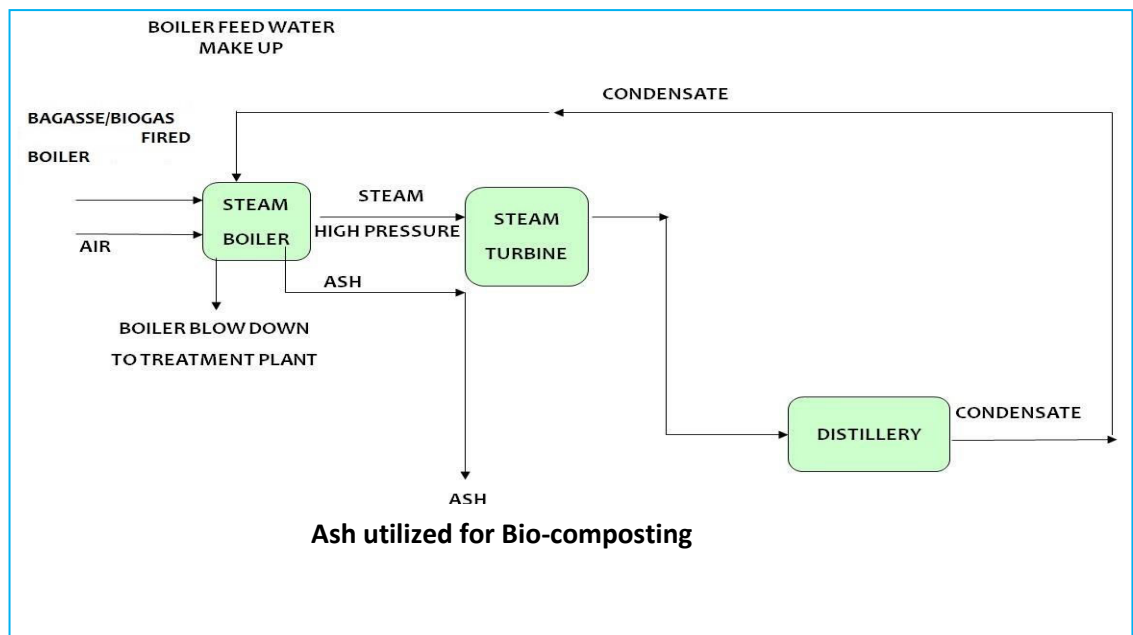
III. CAPTIVE POWER GENERATION:

During proposed expansion, an additional Boiler of 35 TPH and 5 MW new Turbine will be installed based on Bagasse and Biogas as available fuel options. The Boiler will operate mainly to feed steam to Molasses based operations and 6.5 MW power generations from Steam Turbine.

Proposed new 5 MW power generation comprises of a high pressure water tube steam boiler extraction cum condensing steam turbine. Fuel in the steam boiler will be burnt with the help of air in the boiler furnace. Water will be circulated in the boiler drum and tubes thus getting heated by the flame burning in the boiler furnace. Water comes out of the boiler drum located at the top of the boiler as steam. Flue gases rise in the boiler furnace and come in contact with the steam coming out of boiler drum. Steam after coming in contact with flue gases gets heated up further thus getting superheated. Super heated steam leaves the boiler in a pipe. Flue gases after super heating the steam pass through economizer where they pre-heat the boiler feed water before it enters the boiler drum.

After economizer, flue gases pass through air pre-heaters where they heat the air which is fed to the boiler furnace for burning the fuel.

After air pre heaters flue gases pass through Multi Cyclone where the dust particles are collected. The dust is collected from here. High pressure superheated steam from boiler is passed through a steam turbine, which is used for distillery process operations. While passing through the turbine, the high pressure and temperature steam rotates the turbine rotor and an electric alternator mounted on the same shaft. Electric power is generated by the alternator. This electric power generated is consumed in house i.e. for running the distillery and utilities like boilers auxiliaries etc.



(vi) **Raw Material required along with estimated Quantity, likely source, marketing area of final products, mode of Transport of raw material & finished product.**

Item	Raw Material Requirement	
	Existing	Proposed
Molasses	201 MT/Day	536 MT/Day

(vii) Resources optimization/recycling and reuse envisaged in the project, if any, should be briefly outlined.

Water as a resource is recycled at each possible step of the process and latest technology and methodology will be adopted to conserve and reuse the resources.

Waste water generated from the process goes to MEE and condensate water is used back again into the various processes and remaining is used for the horticulture purposes.

(viii) Availability of Water its source, Energy/Power requirement and source should be given

a. Water Requirement for Proposed "expanded" Capacity 120 KLPD

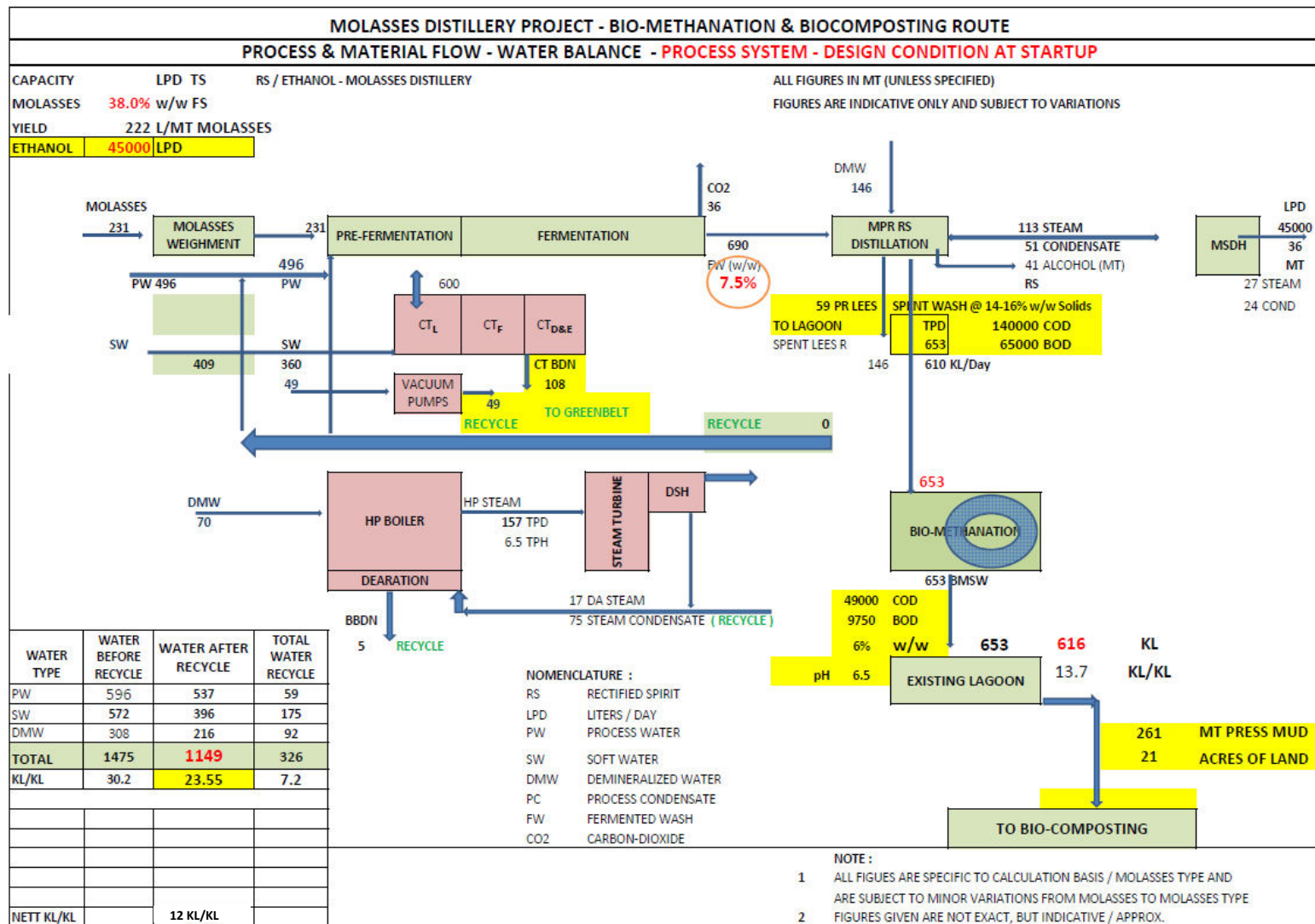
At present & after expansion in future also, water requirement is fulfilled through existing borewells inside premises. Water requirement details for post expansion project are as under ;

Components	Total Water Requirement (KLD)	Fresh Water Requirement (KLD)	Recycle Water Usage (KLD)
Process Water	734	332	402
Soft Water	842	327	515
DM Water	862	361	501
TOTAL	2438	1020	1418

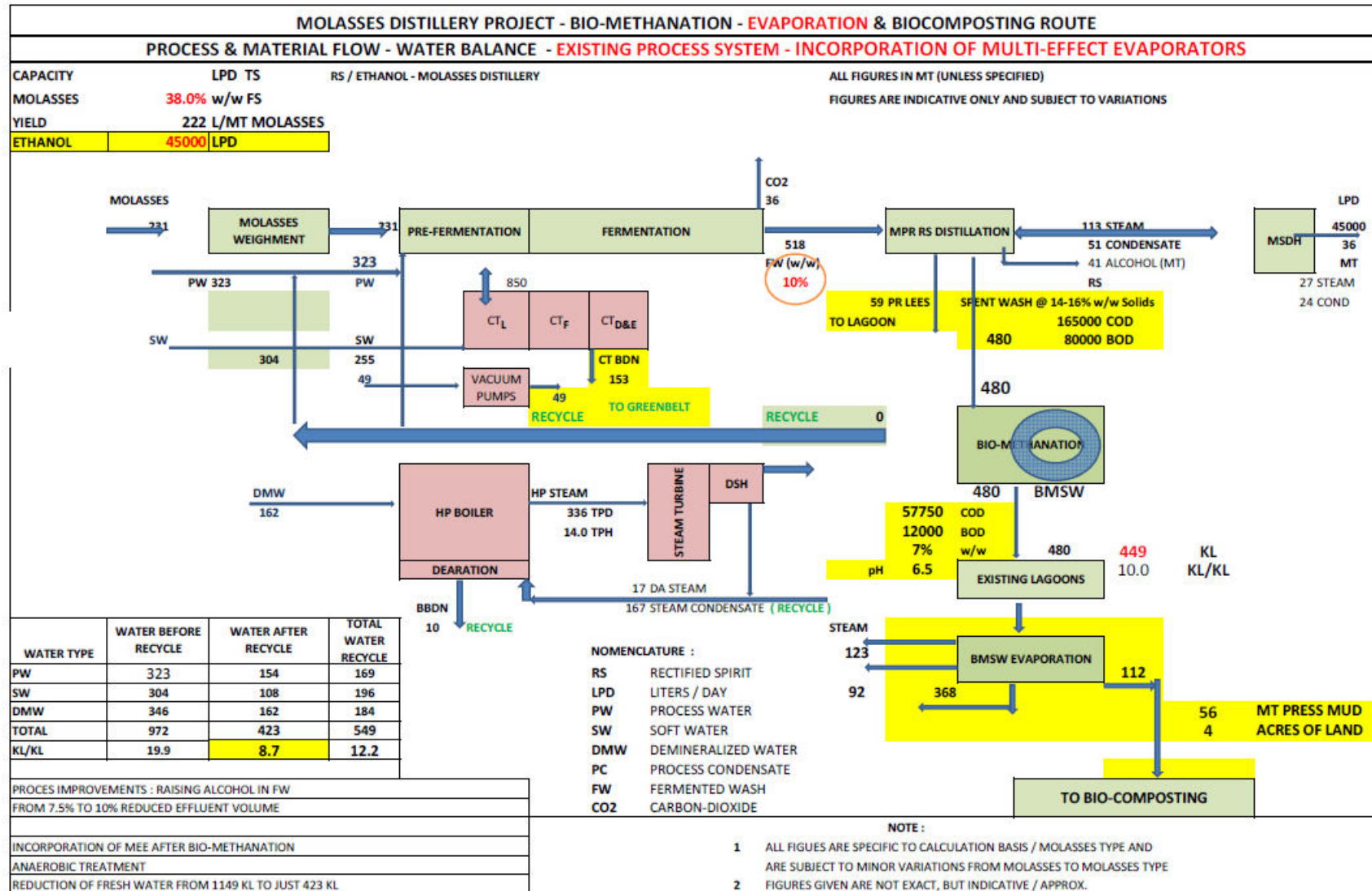
Hence, fresh water Requirement is **1020 KLD (8.5 KL/KL of Product Alcohol)**. Water requirement for first run would be **2438 KLD, of which 1418 KLD (~ 58%) will be Recycled.**

(Water Balance Flow Sheet attached)

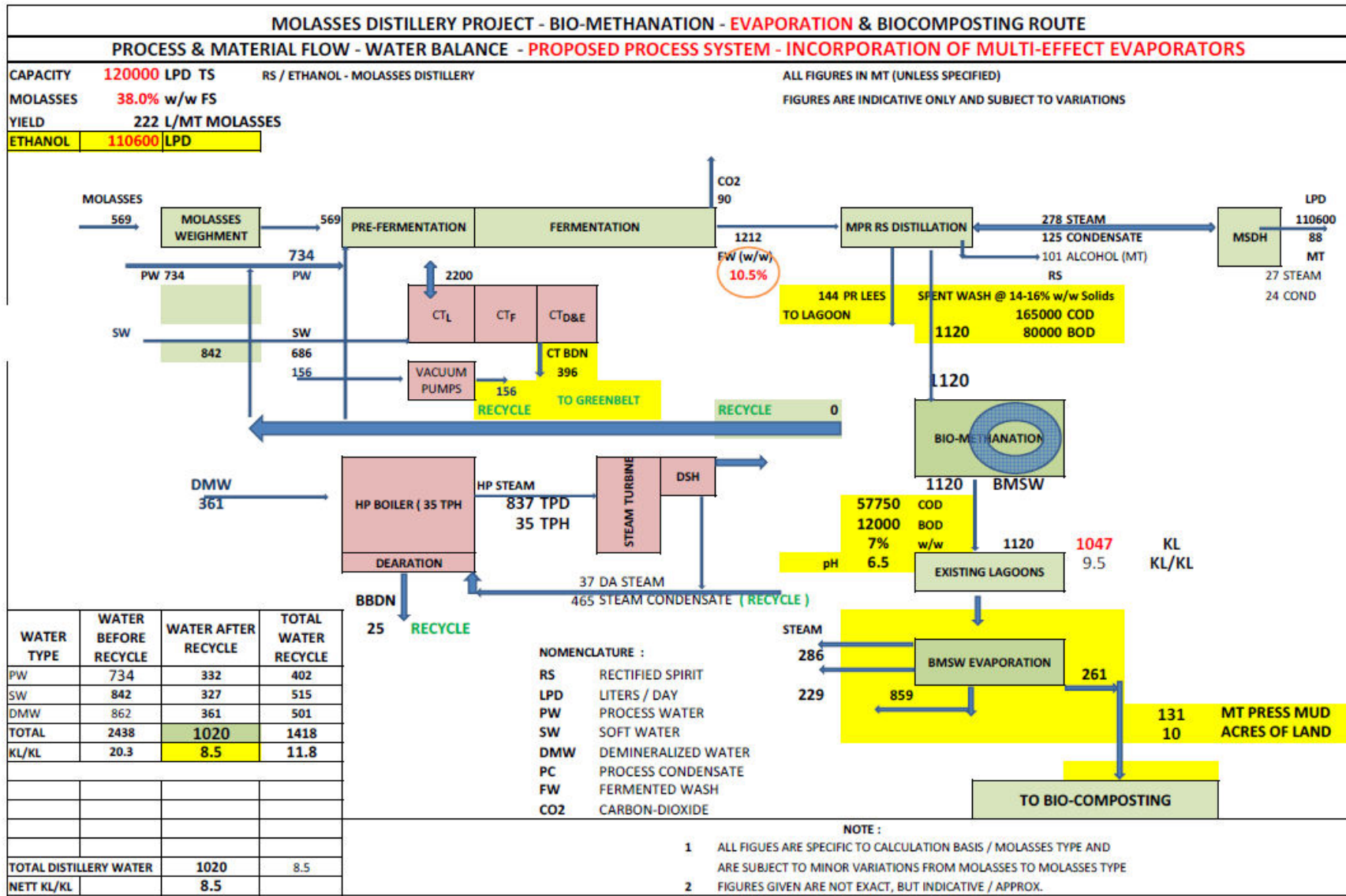
(A)



(B)



(C)



(b) Power Requirement and Source after proposed expansion :

The Unit's own total captive Power generation after proposed expansion to **120 KLPD** and installation of new **35 TPH** Boiler with new **5 MW Steam Turbine** (and existing 1.5 mw Steam Turbine) will increase to upto **6.5 MW**. Out of this generation, ~ **3.0 MW** will be utilized in the Distillery, while the balance **3.5 MW** will be utilized in HSML's own Sugar Mill in adjoining complex. It may be economically feasible later to export any surplus Power to Bihar State Electricity Grid, which will be explored independently later.

(c) Steam Requirement after proposed expansion :

The HP Steam generated from the new **35 TPH Bagasse cum Biogas fired Boiler** will be utilized in the generation of **5 MW Power** which will be for the own consumption and also for pre-heating & de-aeration of Boiler Feed Water and in various processes in Distillery. The existing 14 TPH Boiler will act as standby and be run for Sugar Mill's requirement during Sugar Season only.

STEAM REQUIREMENT AFTER PROPOSED EXPANSION

S. No.	Purpose	Steam Required (TPH)
1.	Multi-pressure Distillation	12
2.	MSDH Ethanol	3
3.	Multi Effect Evaporator	12
4.	Boiler Deaeration	4
5.	Condensing for Power	4
Total Steam		35

(d) Boiler Details

After proposed expansion, modernization & installation of new Biogas cum Bagasse fired HP Boiler of 35 TPH capacity alongwith Electrostatic Precipitator (ESP) as Air Pollution Control Equipment followed by adequate Stack height will be installed as per CPCB & BSPCB guidelines. Details regarding proposed boiler are mentioned in the table given below :

PROPOSED BOILER DETAILS

S. No.		Details
1.	Type of Fuel	Bagasse / Biogas
2.	Capacity of Boiler	35 TPH
3.	Stack Height	65 m
4.	Pollution Control Equipment Measures	ESP

(ix) Quantity of waste to be generated (Liquid and solid) and scheme for their management.

The major sources of pollution in Molasses Distillery project are Waste Water - **Spent Wash** and Boiler Emissions from Stack.

Spent Wash is being at present and will be after expansion, Anaerobically Treated first in Bio-Methanation Plant followed by volume reduction in Multi-Effect Evaporators (MEE) (as per latest CPCB's & BSPCB's directive) followed by Bio-Composting. Our own Press Mud as well as developed Bio-compost Yard is adequate for the purpose for expanded capacity.

Waste Water Generation & Treatment :

In the existing project operations, the entire Spent Wash is being treated Anaerobically in Bio-digester followed by volume reduction through a Multiple-Effect Evaporator followed by Bio-composting. The Process condensate from MEE is also being treated through Stripper and condensate Water is recycled back in the Fermentation process & makeup for cooling water.

After proposed expansion same methodology for treatment of Distillery waste water will be implemented to achieve Zero Liquid Discharge norms.

Air Pollution :

At present, HSML Distillery project has 14 TPH Boiler attached with multi cyclone and 45 m height stack for wider dispersion of pollutants. Own Bio-gas and Bagasse are being used as boiler fuel.

For proposed expansion and captive Power Generation of additional 5 MW, one new boiler of **35 TPH** capacity will be installed. To minimize air pollution load from new boiler, an ESP will be installed followed by a new ~ 65 m height stack for wider dispersion of pollutants.

Solid Waste Management:

In the existing & proposed Distillery project, the Boiler ash and Decanter sludge are generated as Solid Waste. The same will be utilized in Bio-composting process as per present practice and CPCB guidelines.

4. **Site Analysis:**

(i) **Connectivity:**

Harinagar Sugar Mills Ltd. (HSML), is situated at Harinagar, P.O. Harinagar, Block Ramnagar in District West Champaran, Bihar having Latitude 27° 9'13.67"N & Longitude 84°19'46.85"E at 102.4 m. above MSL. The project site is connected to NH-28 B via Lauriya-Ramnagar Road. It is about 50 kms. from district head quarter at Bettiah and is well connected by NH – 28B. HSML is about 0.5 Km. (SE) from Harinagar Railway Station on Bagaha - Narkatiaganj Sec. of ECR.

ii) **Land Form, Land use & Land ownership:**

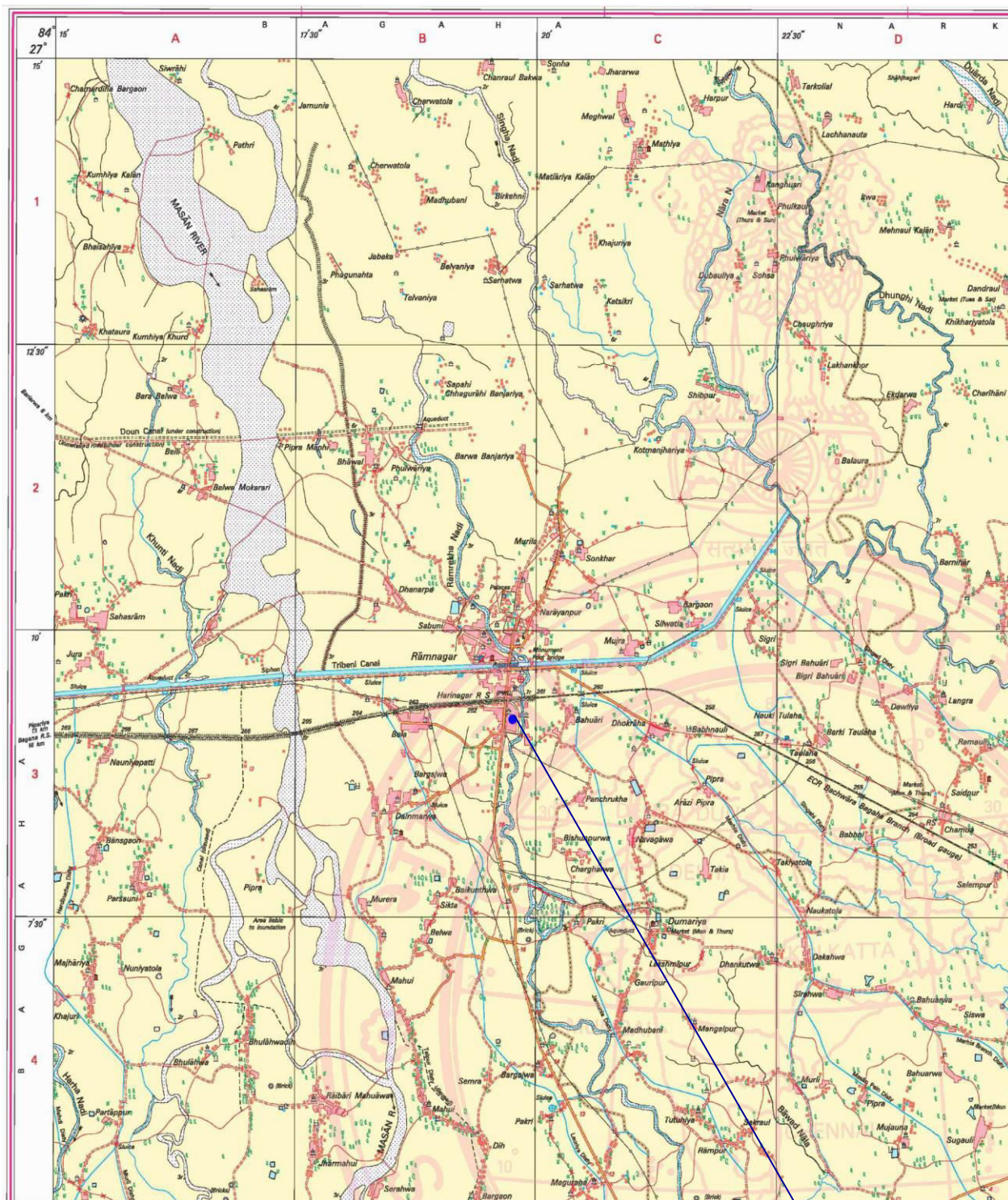
Within 10 Km. Area	Sensitive targets are safe away
<ul style="list-style-type: none"> • There is no reserved forest area • There is no biosphere reserve • There is no national park • There is no wildlife sanctuary 	<ul style="list-style-type: none"> • NH 28 B approx. 20 km. away • River Masan at a distance of 5.3 Km. • Population - Vill. Ramnagar : 500 m.

The expansion project is proposed within existing premises, the land is already used for industrial purpose. It is owned by the HSML. The terrain is almost plain area. Project site is already under ownership of HSML.

iii) **Topography (along with map):**

The terrain is plain. Toposheet of project area is shown herewith.

10 KM. RADIUS TOPOSHEET OF PROJECT AREA



**Project Location of
Harinagar Sugar Mills Ltd.,
Distillery Project**

- iv) **Existing land use pattern (Agriculture, non agriculture, forest, water bodies including CRZ), shortest distance from the periphery of the project forest, national park, wild life sanctuary, eco- sensitivity area, water bodies Distance from HFL line, CRZ notification for notified industrial area.**

At present existing land use of the project area is industrial in nature.

- v) **Existing Infrastructure :**

Land for the proposed expansion is available within the existing premises. All necessary infrastructure are available within premises.

- vi) **Soil Classification:**

Calcareous alluvial soil containing a high content of carbonate of lime and is found in a vast patch in W. Champaran, district. **Young alluvium calcareous** soil is found in the districts. It is coarse to heavy textured, containing moderate (10%) to high amount (60% or more) of free calcium carbonate (CaCo₃) in their silt and clay fractions. These are highly fertile soils.

- vii) **Climatic Data :**

The temperature variations in different three seasons are given in table below :

Period	Min ^m . Temperature	Max ^m . Temperature
Mar. – June	20 °C – 25 °C	35 °C – 40 °C
Jul. – Oct.	16 °C – 18 °C	30 °C – 35 °C
Nov.- Feb.	5 °C – 12 °C	15 °C – 25 °C

- Rainfall in Study Area :**

Period	Rainfall in mm. (Source : IMD Report)
2011	1505.4
2012	1446.7
2013	1375.7
2014	1404.7
2015	1068.4

viii) **Social Infrastructure available :**

- Schools (Primary as well as secondary)
- Colleges (Science, commerce, Arts, engineering, medical, pharmacy, education)
- Health centers, dispensaries, hospitals
- Electricity
- Drinking water supply
- Banks (Cooperative as well as nationalized) and credit societies

5. **Planning Brief :**

i) **Planning concept (type of Industries, facilities, transportation etc) Town and country planning/Development authority classification.**

Type of Industry :

M/s Harinagar Sugar Mills Ltd., is a pioneer in Sugar manufacturing unit and one of the best unit in Bihar. The unit has constantly been achieving laurels in the field of production, quality and Environmental Management. The unit has the licensed capacity of 10000 TCD.

The unit is facing serious hardship for storing of Bagasse and Molasses in their premises. In view of above, the management of HSML desires to use the molasses, Bagasse and the press mud of Sugar Mill for manufacturing of down product which is mainly Ethanol and Bio Compost Fertilizer. HSML has established a Distillery Project of 45 KLD based on Molasses in the year 2006 for production of Rectified Spirit, Absolute Alcohol, Fuel Ethanol and Extra Neutral Alcohol (ENA). After implementation of Bihar Prohibition and Excise Bill-2016, at present HSML Distillery project is producing Fuel Grade Ethanol only.

Now, to meet the increasing demand of fuel grade Ethanol and surplus availability of Molasses from nearby sugar mills, management of HSML has embarked upon expansion of its existing Distillery project along with Captive Power Generation plant.

Facilities:

Manufacturing Facilities	Product	Existing	Proposed	Total
Distillery	Ethanol	45 KLD	75 KLD	120 KLD Total Spirit
Captive Power Generation	Power	1.5 MW	5 MW	6.5 MW

Transportation:

Mode of transport of raw materials & finished products will be road through closed tankers.

Town/Country Planning/Development authority Classification:

The project is located near village Ramnagar, P.O.: Harinagar. Ramnagar Grampanchayat is the local authority. HSML project was established in 1933 & since, then the land is being used for industrial purpose and will be used for the same purpose only.

ii) **Population Projection:**

No major population influx is anticipated due to the proposed expansion project.

iii) **Land Use Planning :** Site Layout Plan enclosed.

iv) **Assessment of Infrastructure demand (physical & social) :**

The basic infrastructure such as roads, electricity, transportation, drinking water supply, health centers and hospitals, school, colleges, sanitation facilities are available in the vicinity. The proposed project is not going to exert any unbearable load on any of these resources.

v) **Amenities/Facilities :** Canteen, rest room, medical facilities, drinking water, etc. are available within existing project premises.

6. **PROPOSED INFRASTRUCTURE :**

No new infrastructure is planned for the proposed expansion project.

i) **Residential Area (Non-Processing Area):**

No new residential area is envisaged in the proposed project.

ii) **Green Belt Area :**

Overall green belt within the HSML premises is approx. **8 acres**. Additional ~ **6 acres** of Land will be developed as Green Belt during proposed expansion program.

iii) **Social Infrastructure:**

All infrastructure facilities are existing in the vicinity of the HSML.

iv) **Connectivity**

Harinagar Sugar Mills Ltd. (HSML), is situated at Harinagar, P.O. Harinagar, District West Champaran, Bihar having Latitude 27° 9'13.67"N & Longitude 84°19'46.85"E at 102.4 m. above MSL near by NH-28B (Bagaha-Dhala Road). It is about 43 kms. from district head quarter Bettiah and is well connected by NH – 28B. HSML is about 0.5 Km. (SE) from Harinagar Railway Station on Bagaha - Narkatiaganj Sec. of ECR.

v) **Drinking Water Management :**

Existing borewells will be continued to be used for drinking water requirement.

vi) **Sewerage System :**

All the domestic waste water will be disposed off through septic tank followed by soak pit inside premises.

vii) **Industrial Waste Management :**

Waste Water Generation & Treatment ;

In the existing project all generated waste water (spent wash) is being treated bio-digester followed by Multiple Effect Evaporator followed by Bio-composting. Process condensate from MEE is also being treated through stripper and recycled back in the process.

After proposed expansion same methodology for treatment of Distillery waste water will be implemented to achieve ZLD.

Air Pollution:

Presently HSML Distillery project has 14 TPH boiler attached with multi cyclone and 45 m. height stack for wider dispersion of pollutants. Bio-gas and Bagasse is being used as boiler fuel.

During proposed expansion, one new boiler of 35 TPH capacity will be installed. To minimize air pollution load from new boiler ESP will be installed followed by 65 m. height stack for wider dispersion of pollutants.

Solid Waste Management:

In the existing & proposed Distillery project Boiler Ash and Decanter sludge are generated as solid waste. The Boiler Ash will be utilized in bio-composting process and Decanter sludge is first dried and also used in bio-composting.

Power Requirement & Supply/Source:

5 MW of captive power generation is envisaged from new 35 TPH Boiler for Distillery operation after proposed expansion project and part supply of Power to own Sugar Mill in adjoining complex.

7) **REHABILITATION & RESETTLEMENT (R & R) PLAN :**

As there is no requirement of additional land for the proposed expansion project & HSML distillery is already a running project which is under operation, so there is no need of any Rehabilitation and Resettlement (R&R) Plan.

8) **PROJECT SCHEDULE & COST ESTIMATES :**

i) **Likely date of start of construction & likely date of completion.**

Expansion activities will be started immediately after obtaining Environmental Clearance. Expansion activities will be completed **within 12 months** time after construction start-up.

ii) **Estimated Project cost along with analysis in terms of economic validity**

Expansion Project Cost Details are as under ;

Particulars	Estimated Cost (in Lakh Rs.)
Land & land Development	Existing
Civil & Structural Works	300
Plant & Machineries	3800
Pollution Control Measures	200
Operative /other Expenses	100
Contingencies	100
GRAND TOTAL	4500.00

9) **Analysis of Proposal (Final Recommendation):**

(Financial & Social benefits with special emphasis on the benefit to the local people including tribal population, if any, in the area.)

To meet the increasing demand of **Fuel Grade Ethanol** and surplus availability of Molasses from nearby sugar mills, management of HSML has embarked upon expansion of its Existing Distillery Project along with Captive Power Generation Plant.

No power will be outsourced from outside agencies. Power requirement will be met by own captive power generation plant.

After proposed expansion, Distillery water requirement will be considerably reduced from 9.1 KL/KL of product to 8.5 KL/KL of product.

New employment opportunities may be generated due to proposed expansion activities.

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