PRE–FEASIBILITY REPORT & FORM–I

(For TOR & Scoping to Conduct EIA Studies & Preparation of EIA Report)

Submission to

MINISTRY OF ENVIRONMENT AND FORESTS

GOVT. OF INDIA, NEW DELHI

Project

Establishment of an Integrated Sugar Industry

(5000 TCD Sugar Plant, 35 MW Co-Generation Power Plant &
65 KLPD Distillery)

Project Proponents

M/s. MRN CANE POWER INDIA LIMITED

Project Location

Kallapur Village-Kulageri Hobli, Badami Taluk,
Bagalkot District, Karnataka State

Consultant

M/s ULTRA-TECH Environmental Consultancy &Laboratory
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Accreditation

Sl.No 93 of List A of MoEF - O.M. No. J-11013/77/2004/IA II(I) Dt.30.09.2011
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Chapter-1

EXECUTIVE SUMMARY

1.1 INTRODUCTION

M/s MRN Cane Power India Limited is a new company incorporated in the year 2011 to venture on agro based projects. The project promoters have long experience in sugar cane business and have already established and successfully running integrated sugar industries in the state. The Company has proposed to establish a sugar industrial complex consisting of Sugar, Cogeneration Power and Alcohol plants at Kallapur Village, Badami Taluk, Bagalkot District in Karnataka State. The location around the project site consisting of Bagalkot, Belgaum and Bijapur districts is basically in sugar cane cultivation zone with assured sugar cane supply due to adequate water availability and suitable climate conditions. The salient features of the proposed project are given in Table-1.1.

Sugarcane is one of the most important cash crops of India. The industry based on sugar cane and its allied products help farmers to realize higher economic returns and provide employment to the rural mass. The industry will be located in rural the rural background of the state and has a good scope for development of sugar cane with suitable climatic conditions and assured source of underground and surface water. At present there is no sugar industry in the region. The sugar cane cultivated in the region is transported through more than 30 km distance to other sugar industries located near Mudhol, Biligi and Manoli. There is good potential to develop more than 20 000 hectares of sugar cane cultivation in about 20 km area around the proposed site. As compared to other crops sugar cane cultivation gives higher returns to the farmers.

Sugar is an essential food product. Bagasse, press mud and molasses once thought to be unwanted waste products of sugar industry now have been used as a valuable resource. Press mud contains organic and inorganic plant nutrients and therefore it is used as a bio-manure as part or full substitute to chemical fertilizer. Molasses is a raw material for production of ethyl alcohol which, gains importance for its use as fuel in admixture with petrol, as a main ingredient in beverages and as a starting raw material for various organic chemicals. The molasses is a renewable resource and dispense the

use of petroleum for fuel and organic chemicals. Bagasse is used as fuel in the associated co-gen power plant. The surplus power from the co-gen plant after meeting its captive needs in the industry will be exported to public power distribution system. The co-gen power helps to overcome power shortage in the state. The bagasse is obtained from renewable source and is a substitute to fossil fuels such as coal or petroleum. Since sugar mills are located decentralized manner, the co-gen power plants become decentralized bio-mass based power station.

The establishment of the integrated sugar industry will thus meet the national interest of economical power and food. Further it helps to uplift the rural mass. The Government of Karnataka envisaged the policy to encourage co-gen sugar industries in the state with various incentives including power purchase agreement. Thus, the establishment of integrated sugar industries with sugar as a main product along with exportable co-gen power and ethanol has become an economical venture.

1.2 FEATURES OF PROPOSED PROJECT

- Barren or poorly cultivated land suitable for the industry is available
- There are no sugar industries in 15 km distance from the proposed site.
- The proposed site is well connected by Road and Railways.
- Irrigation potential from ground and surface water source for development of more than 20000 ha. .land for sugar cane cultivation. Sugarcane required for the proposed project will be available within 30 km region from the proposed site.
- Water requirement to the project will be met from the Malaprabha river located at 7 km from the site.
- Electric grid of 110 KVA capacity is available at Kulageri (3 Km) for the evacuation of exportable power.
- Manpower experienced in sugar, co-gen power plant and distillery is available locally (in Bagalkot and adjacent districts of Bijapur and Belgaum).

Table-1.1 Salient Features of the Proposed Project

Sl. No.	Features	Particulars	
1	Project	Establishment of a new integrated sugar industry consisting of sugar plant, co-gen power plant and distillery unit.	
2	Name and address of the project for correspondence	Kallapur Village-587 155, Kulageri Hobli, Badami Taluk, Bagalkot District, Karnataka State.	
3	Location of the proposed Unit	Kallapur Village-587 155, Kulageri Hobli, Badami Taluk, Bagalkot District, Karnataka State.	
4	Constitution of organization	Public limited company	
5	Capacity of Project	Sugar plant Cogeneration power plant Distillery	5000 TCD 35 MW 65 KLPD
6	Category of project	Category-A	
7	Investment on Project	40122.85 Lakhs	
8	No. of Working Days	Sugar Co-gen Power Plant Distillery	240 Days 330 Days 330 Days
9	Manpower	450 During operation 300 During Construction period	
10	Land area, acres	Total area	233
		1. Built up area	50
		2. Green belt	81
		3. Open area for future development	70
		4..Cultivated area for utilization treated effluent	32
11	Raw material requirement	Sugar unit : Sugar cane -5000 T/d Distillery : Molasses - 240 T/d Boiler : Bagasse -1500 T/d	
12	Products	White sugar Co-gen power Alcohol (ENA/RS/AA)	500 TCD 35 MW 65KLPD
13	Fresh water source	Malaprabha river at 7 Km from the site	
	Fresh water requirement	Co-gen sugar unit :1020 m^3 Distillery : 650 m^3	
14	Cogen power plant capacity	Power	35.0 MW
		Boiler	150 TPH
15	Distillery power plant capacity	Power	1.5 MW
		Boiler	16 TPH

16	Boiler fuel for co-gen power plant	During season	Boiler along with bagasse (up to 15 %)
		During Off season	Coal along with agro-waste bio-mass such as bagasse and cane thrash (whenever available)
17	Boiler fuel for distillery unit		Concentrated spent wash along with coal or agro-waste bio-mass as support fuel
18	Effluent treatment facility		**Co-gen sugar Unit** ETP consisting of bar screen, oil separator, neutralizer, ASP with aeration & clarifier. Effluent is treated to irrigation standards. **Distillery unit, spent wash treatment** 1. Spent Wash is concentrated in multi-effect evaporator. The concentrate is then burnt as fuel admixed with coal or agro-waste bio-mass as fuel.
19	APC facility to boiler		**Co-gen sugar Boiler of 150 T/h capacity** Stack of adequate height and ESP/Bag filter. **Distillery boiler of 16 T/h capacity** Stack of adequate height and ESP/Bag filter. **Diesel gen set of 1000 KVA** Stack of adequate height, anti-vibration pads & acoustic enclosures will be provided. **Fermenter vapors in distillery** Water scrubber and stack of adequate height.
20	Solid waste source and disposal		**Sugar plant** 1. Bagasse: Used as fuel in boiler 2. Press mud: to farmers for as manure/soil nutrient 3. Molasses: used raw material in the distillery **Distillery** 1. Yeast sludge: dried and sent for use as cattle feed. 2. Boiler ash from co-gen boiler is as soil nutrient.
21	Investment for pollution control facilities		2561 Lakhs

1.3 STATUS OF THE EXISTING INDUSTRY

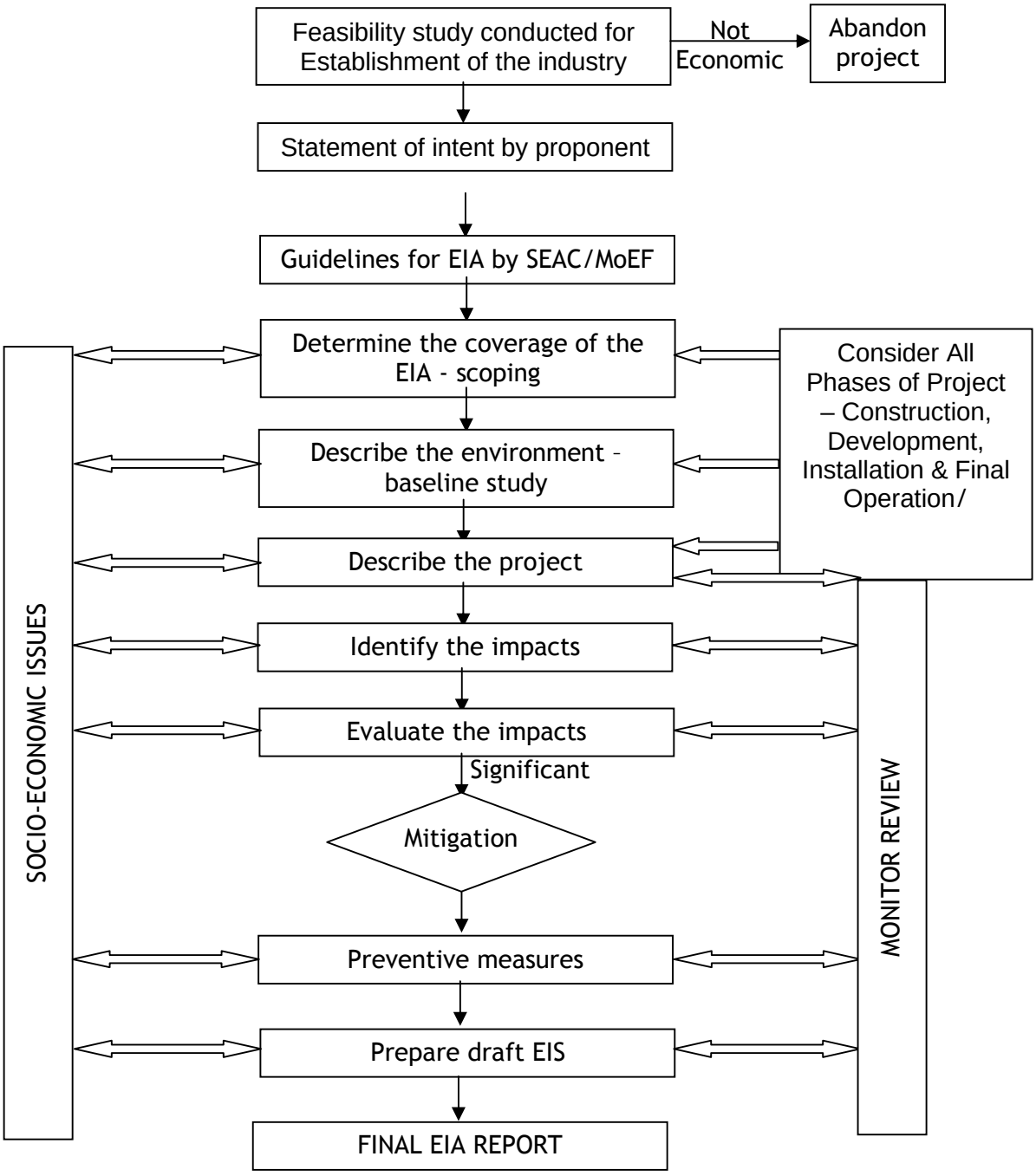
Table-1.2 Status of the Existing Industry

Sl. No.	Item	Detail
1	Company registration	MRN Cane Power India Ltd. is incorporated with ROC in the year 2011.
2	(IEM) with Govt of India	Industrial entrepreneur memoranda (IEM) are filed. i. NO. 2496/SIA/IMO/2011 ii. NO. 1554/STA/IMO/2011 iii. NO.1555/STA/IMO/2011
3	Single window clearance	Approvals obtained vide 25th State from High Level clearance Committee Government of Karnataka dated 14/07/11 approved • 233 acres land • 7500 m^3/d of water from Malaprabha river. • 6000 KVA power through HESCOM
5	Land purchase permission	From District Commissioner of Bagalkot for purchase of land under section 109 of KLR Act.

1.4 SCHEMATIC REPRESENTATIONS OF THE EIA STUDIES & EC PROCESS

A schematic representation of the overall environmental assessment & EC process is shown in Figure-1.1 below

Fig-1.1 Feasibility & Environmental Assessment Process



Chaper-2

INTRODUCTION OF THE PROJECT

2.1 IDENTIFICATION OF PROJECT

M/s MRN Cane Power India Ltd is a new company incorporated in the year 2011 to venture on agro based projects. The project promoters have long experience in sugar cane business and have already established and successfully running integrated sugar industries in the state. The Company has now proposed to establish a sugar industrial complex consisting of Sugar, Cogeneration Power and Alcohol plants at Kallapur Village, Badami Taluk, Bagalkot District in Karnataka State.

The company is now proposing to establish Sugar Unit of 5000 TCD capacity, 65 KLPD distillery & 35 MW cogeneration power plant with a view to export surplus power to the public power grid.

2.1.1 BACKGROUND OF PROJECT PROPONENTS

Shri. Murgesh R Nirani, chief promoter of M R N Cane Power India Ltd., an experienced sugar industry business man, and other businessmen and leading agriculturists of Badami Taluk have decide to establish a sugar factory for manufacture of crystal white sugar with a cane crushing capacity of 5000 TCD, and cogeneration of 35 MW power at Kallapur village, Kulageri Hobli in Badami Taluk of Bagalkot District of Karnataka.

MANAGEMENT

The overall activities of the company is managed by the Managing Director under the able guidance of the Board of Directors and Chairman of the Company. Chairman is also involved in planning, financial matters and framing the company policy. A team of highly motivated and qualified professionals will assist the Managing Director in day to day activities.

Directors

1.	Name	:	Murugesh R Nirani
	Status in the company	:	Director
	Address for correspondence	:	Nirani house, Mudhol
	Education	:	BE.DBM
	Age	:	48 years
2.	Name	:	Pundanagouda Ranganagouda Goudar
	Status in the company	:	Director
	Address for correspondence	:	P.O Kataraki, Badami Taluk, Bagalkot,District
	Education	:	BA.LLB
	Age	:	56 years
3.	Name	:	Sharanappa Veerabhadrappa Kariyannanavar
	Status in the company	:	Director
	Address for correspondence	:	No.4 Laxmi layout, Gokul raod, Basaveshwar nagar, Hubli,580 030
	Education	:	MA. HDC, DBM, KCS
	Age	:	64 years

1. SHRI MURGESH R NIRANI

Promoted by Mr. Murgesh R Nirani. BE. DBM aged 48 years, an engineering graduate. He got elected as MLA from Bilagi constituency for 2 terms and was Hon. Minister for large industries in Govt. of Karnataka from 2008 to 2013. He comes from an agricultural family from Bilagi Taluk of Bagalkot. He started as an industrialist with setting up of a modern Khandasari unit at Mudhol. He has been recognized and awarded Bharat udyog ratna award from Govt of India.

2. SHRI S. V. KARIYANNAVAR

S. V. Kariyannavar has been working as managing director of several well known co-operative sugar factories in Karnataka and carries with him rich experience in the sugar industry.

3. SHRI P. R GOUDAR

P. R Goudar was one of the promoters of Badami sugars Ltd and has experience of working as managing director for some time. He being a local farmer and a social worker is well known in Badami Taluk. His association in the management will benefit the company to develop relations with the local farmers and develop sugar cane in the Taluk.

2.2 BRIEF DESCRIPTION OF NATURE OF THE PROJECT

M/s MRN Cane Power India Ltd has proposed to establish a sugar industrial complex consisting of 5000 TCD capacity Sugar Unit along with 35 MW cogeneration power plant and 65 KLPD distillery at Kallapur Village, Badami Taluk, Bagalkot District in Karnataka State.

Bagasse generated in the sugar plant is used as a captive fuel for the generation of power in co-gen plant. And molasses generated as a byproduct is used as a raw material in distillery unit. Distillery is basically a Bio-chemical industry where in molasses is converted by bio-process in fementers in to alcohol. The aqueous alcohol mixture from fermenter is distilled in series of multi pressure distillation columns to produce pure alcohol of desired quality.

2.3 NEED FOR THE PROJECT AND ITS IMPORTANCE TO THE COUNTRY AND REGION

Belgaum, Bagalkot and Bijapur districts of North Karnataka have excelled in sugar cane agriculture due to added irrigation facility, favourable atmospheric conditions and most suitable soil present in the area. Farmers in all Taluks of Bagalkot District have taken to sugar cane agriculture largely due to water sources availability, higher yield of sugar cane and good rice for the sugar cane from sugar factories. The sugar cane in the area has also reached best levels in the country peaking to more than 13.0% in winter and averaging to 11.5 to 12%. The growth of sugar cane agriculture can be understood from the fact that there was only one sugar factory in Bagalkot District till 1996 with a cane crushing capacity of 6500 TCD and today there are more than 8 sugar factories. The farmers in the area are also well informed and adopt modern technology and grow better varieties of sugar cane.

The proposed factory is situated near sugar cane agricultural area surrounded by sugar cane rich areas. The site is well situated with Ghataprabha river on the north and Malaprabha river on the south. The entire large area of land between the two rivers is growing sugar cane as main crop, due to the assured returns from the crop.

There are 4 sugar factories nearby, namely

1. Badami Sugars Ltd
2. Sadashiv Sugars Ltd

3. Kedarnath Sugars Ltd
4. Dhanalakshmi sugars Ltd

The total agriculture of sugar cane in the district at present is about 75000 Ha, which @ 100 T/ha can produce about 75.0 Lakh T. There is very good potential for increasing per hectare yield and also to bring additional land into sugar cane agriculture.

The promoter felt the need for the establishment of a sugar factory in the sugar cane belt of Badami and adjacent Taluk, and is now venturing into this project. They also visualized the need to provide employment to the local population and improve the overall economy of the society in the area. After studying the necessity for such a factory and the profitability of the project especially with co-generation and sale power they decided to establish a sugar factory with cogeneration in the Badami Taluk at Kallapur village, Kulageri Hobli, the proposed site.

2.3.1 JUSTIFICATION FOR ESTABLISHMENT OF THE INDUSTRY

There is large potential to grow sugar cane in the Taluk. Sugar cane grown in the District is transported to other regions as there is much excess of sugar cane is available, than what the factories can crush and as such the farmers are put to loss. The sugar industry being agro based, serves as powerful medium for upliftment of the socio economic conditions of the farmers in the area of operation.

Agro climatic conditions like soil, water, solar radiation, rainfall, relative humidity and temperature within the state of Karnataka Particularly Badami Taluk and Bagalkot district for under taking sugarcane cultivation are most suited. The experience of the already existing sugar factory is economically viable mainly because the sugar recovery is high in the zone.

2.4 DEMAND SUPPLY GAP, IMPORTS V/S INDIGENOUS PRODUCTION

The main raw material required for manufacture of sugar is sugar cane, which is obtained from agricultural produce existing in the region of the factory. Chemicals such as lime, phosphorous acid etc are used in the process of purification of sugar cane juice. Sodium chloride, hydrochloric acid and caustic soda are used in water treatment. Chemicals and consumables will be obtained from Bangalore or Chennai.

Sugar is the main product in the industry. However, bagasse, molasses and press mud are produced as by-products in the process. Bagasse is used as fuel in the generation of captive electric power. The bagasse produces in the industry is consumed as fuel lint eh boiler. Other products like press mud and molasses, are advantageously utilized for profitable applications. Press mud is used as manure in agriculture. Molasses is used as raw material for manufacture of ethanol.

Table-2.1 Sugar Estimates for India

Particular	Quantity of sugar in lakh tons		
	2012-13	**2013-14** (average of last 3 yrs)	**August,2014** (Oct.2013 toAug.2014)
Opening Sugar stock	66.01	93.07	-
Production	251.83	252.55	241.31*
Imports	17.18	7.83	10.27*
Availability	**335.02**	**353.45**	-
Total Export	11.95	25.83	25.68*
Total Available for domestic consumption	323.07	327.62	-
Consumption	230.00	235.00	-
Ending Stock	93.07	92.62	-

(Source: Department of Food &Public Distribution, Dept. of Commerce)

Table-2.2 Trade Data of India for Last 5 Years

Year	Export, LT	Import, LT
2009-10	0.42	25.51
2010-11	17.11	11.98
2011-12	27.38	0.99
2012-13	27.91	11.21
2013-14	24.60	8.81

(Source: Department of commerce)

2.7 EMPLOYMENT GENERATION DUE TO THE PROJECT

The total direct employment opportunity from the integrated sugar industry will be 400 people in operation phase. Temporary employment of about 300 people will be generated during construction phase. Indirect employment in terms of transportation, vehicle maintenance and petty shops will employ about 500 people. Apart from this more than 10000 agriculture family will engaged in cultivation and harvesting of sugar cane.

Chapter-3
PROJECT DESCRIPTION

3.1 TYPE OF PROJECT

M/s MRN Cane Power India Ltd has proposed to establish a sugar industrial complex consisting of Sugar Unit distillery & cogeneration power plant at Kallapur Village, Badami Taluk, Bagalkot District in Karnataka State.

The main activities of the proposed industry consists of the following capacities

1. Manufacture of white sugar not exceeding cane crushing capacity of 5000 TCD
2. Manufacture of 65 KLPD of rectified spirit from distillery
3. 35 MW power generation from bagasse based cogeneration plant

INTERLINKED/INDEPENDENT PROJECT

Sugar cane crushing with sugar manufacture and Co-Gen power generation in the integrated Co-Gen sugar industrial complex are interdependent operations. Bagasse generated in sugar unit is utilized as fuel in the Co-Gen power unit. Similarly, the power generated in Co-Gen unit is utilized in the sugar unit.

3.2 LOCATION OF THE PROPOSED INDUSTRY

3.2.1 GENERAL LOCATION

The industry is located at Kallapur Village-Kulageri Hobli, Badami Taluk, Bagalkot District. The site is about 40 Km from Bagalkot and is well connected by rail and road. The co-ordinates of site are Latitude: 15^0 55' 21.30" N, Longitude: 75^0 30' 44.87" E and altitude of 577 m above MSL. The site is located adjacent to NH-218, Gulbarga-Bijapur-Hubli highway and Badami-Ramadurg road. The factory is surrounded by agricultural lands with sugar cane as main crop. Location of proposed project in district map of Bagalkot is shown in the Figure-3.1 &Google map showing the site locations given in Figure-3.2A & 3.2B.

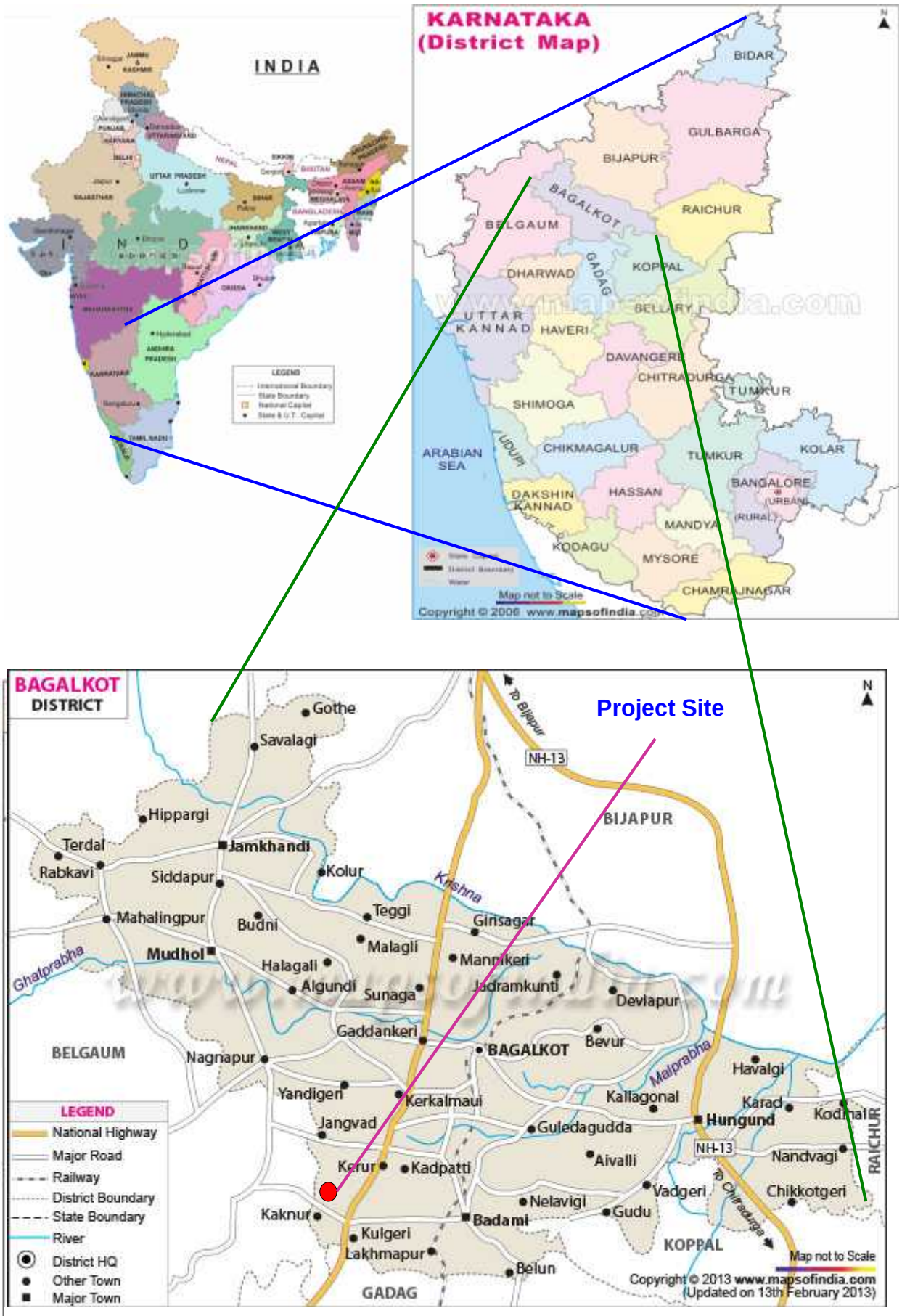


Figure-3.1 M/S MRN Cane Power India Ltd, Kallapur Village, Bagalkot District

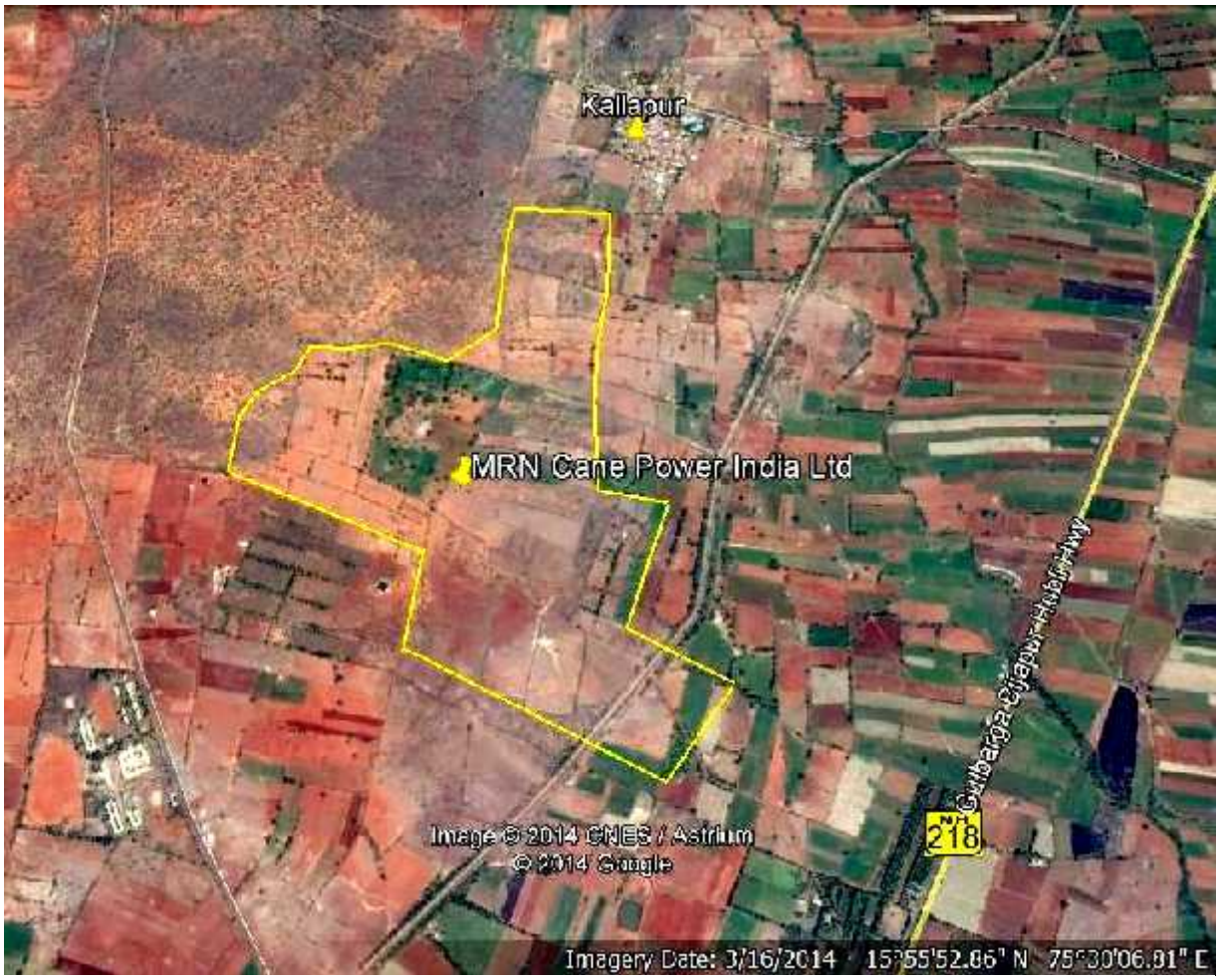


Figure-3.2A Google map showing plant site

Project site is as shown in the figure. The co-ordinates of the site are given in the table below

Direction	Latitude	Longitude
North	15^0 56’ 17.70”	75^0 30’ 04.47”
South	15^0 55’ 36.60”	75^0 29’ 59.46”
East	15^0 55’ 51.59”	75^0 30’ 12.74”
west	15^0 55’ 55.64”	75^0 29’ 38.09”

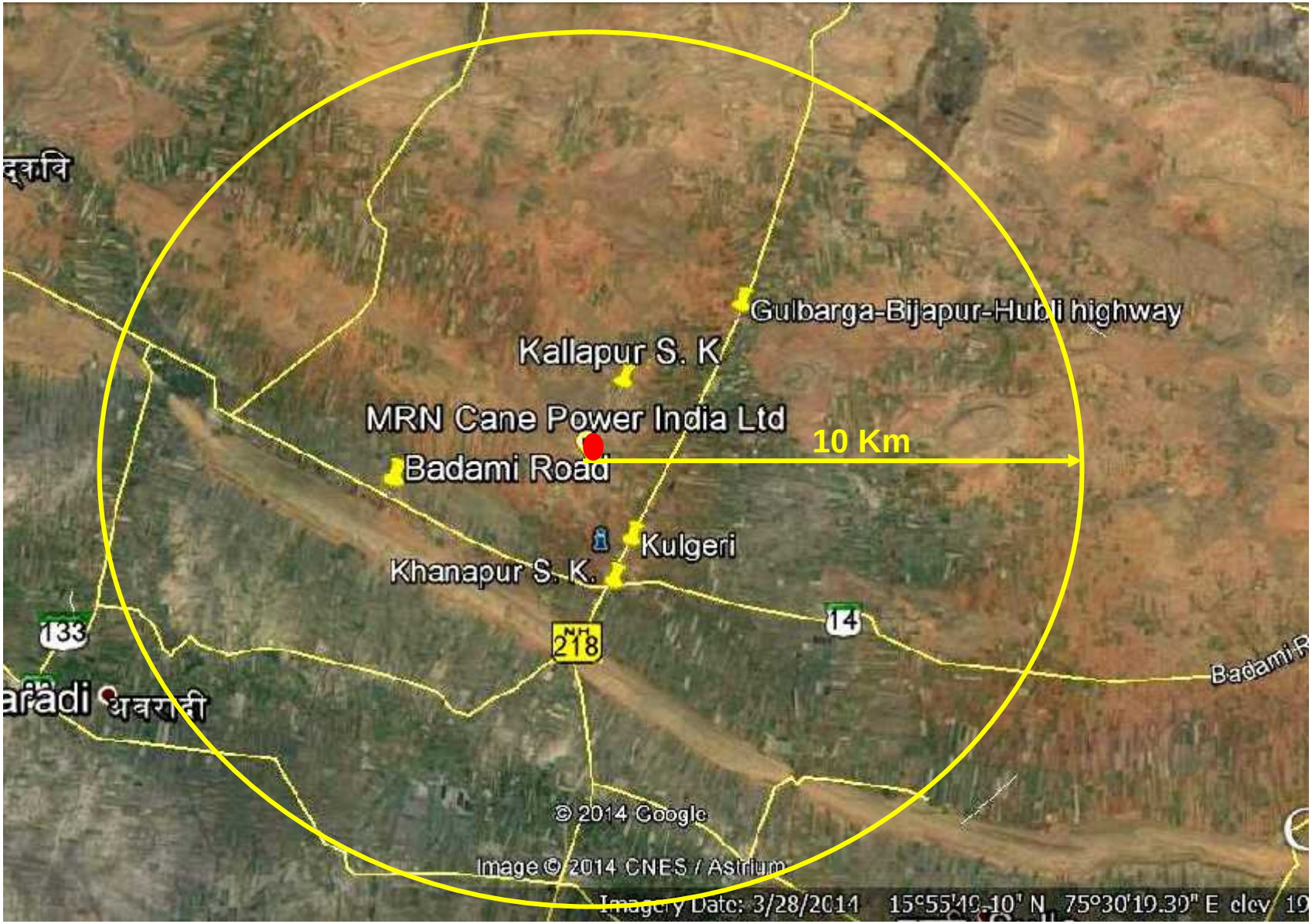


Figure-3.2B Google Map Showing Location of MRN Cane Power India Ltd

3.2.2 SPECIFIC LOCATION

The proposed industry at survey no Survey Nos. 64 to 70, 72, 73, 74 at Kallapur village-Kulageri Hobli, Badami Taluk, Bagalkot District, the location is 1.3 Km from NH-218, Gulbarga-Hubli road & a 3 Km from Badami-Ramadurga road. The proposed location is uncultivated or poorly cultivated agriculture land to be converted for industrial use. Google map showing the project boundary & site location is given in Figure-3.2A & map showing 10 Km radius area surrounding the plant is shown in Figure-3.2B.

3.3 BASIS OF SELECTING THE PROPOSED SITE

The selection of the site location for the industry depends mainly on the availability of resources such as raw materials, fuel, power, water, manpower, connectivity for transportation of man and material, market for the product and more important is environmental compatibility and sustainability. The industry is proposed to be established in Kallapur village-Kulageri Hobli, Badami Taluk, Bijapur district. The choice of land confers several advantages, which are summarized below.

1. No sugar industries are within the 20 km from the proposed site.
2. The site is in the vicinity of sugar cultivation area. The lands are irrigated through lift irrigation from river and streams and also from dam canals. The site is well connected to sugar cane cultivation lands through tar and metal roads.
3. Climatic condition of the location is good for sugar cane cultivation and human settlement. The average recovery of sugar from cane is 11.5 % in sugar industries located in the vicinity of proposed site.
4. No incidence of cyclone and earth quake and land slide has been reported.
5. Social infrastructure facility such as education institutes, hospital, banks, housing, recreational, marketing are available at nearby towns such as Badami 25 Km, Bagalkot 40 Km, Ramadurga at 25 Km.
6. There are no eco-sensitive locations such as national park, wild life sanctuary, bio-sphere reserve with in 20 km from the site.
7. The site is well connected by roadways. Location is at 1.3 km from NH-218 Bijapur-Hubli road and 3 km to Badami-Ramadurga road.

8. Water requirement is proposed to be met by Malaprabha river, located at a distance of 7 Km from the site.

3.4 SIZE AND MAGNITUDE OF OPERATION

The proposed project is establishment of integrated sugar industry consisting of sugar plant of 5000 TCD capacity, cogeneration plant 35 MW capacity & distillery of 65 KLPD capacity. The high level clearance committee, Govt of Karnataka had approved the project proposed and recommended 163 acres of land as per section 109 of the KLR Act. The magnitude of the proposed establishment is given below.

Project investment : 40122.85 Lakhs
Manpower : 300 in Construction phase
450 in operation phase
Water requirement : 1670 m^3/d
Power requirement : 7 MW
Total area : 233 acres.

3.4.1 LAND REQUIREMENT

Total land required is 233 acres. High level committee of Govt of Karnataka has approved & recommended for purchase of 163 acres of land as per Section 109 of KLR Act. And 70 acres to be acquired and allotted by KIADB as SUC at Kallapur & Khanapur villages, Badami Taluk, Bagalkot district. Land utilization is given in Table-3.1.

Table-3.1 Utilization of Land

Particular	Acres
Built-up area	50
Green belt area	81
Open vacant area for future development	70
Cultivated land area for utilization for treated effluent	32
Total	233

3.4.2 MAN POWER

OPERATION PERIOD

Total no. of employees during operation of the integrated sugar industry consisting of sugar, co-gen power and distillery will be 450. The employees include direct employment and contract labours. Residential facility will be provided to the essential

employees. The no. of residential quarters will be 60 and the total persons residing in quarters will be 240. The residential quarters will be constructed during initial stage of civil construction. The quarters will be provided with drinking water, lighting and sanitary facility as per the standard practices.

CONSTRUCTION PERIOD

Total manpower requirement during construction will be 300. Most of the labour force is available locally and they reside in villages.

Skilled and unskilled labourers and experienced in co-gen sugar industry and distillery are locally available around the project location. More than 85 % of the manpower requirement will be met from the local source.

3.4.3 HOUSING FACILITIES

The company will provide residential facilities to the essential workers and staff. Most of the workers come from nearby villages. A total of 60quarters will be provided during the start of the construction work. These will accommodate construction workers during construction phase and regular employees during operation phase. These quarters will be provided will all civic amenities.

No of residential quarters : 60
Persons residing in quarters : 240

3.4.4 CIVIL WORKS DURING CONSTRUCTION PHASE

1. Building and other construction: Sugar plant, boiler house, turbine house, distillery plant, sugar go downs and cooling tower.
2. Above ground building structures: 6 to 25 m height for buildings/structures.
3. Excavations: 1 to 3 m excavations for foundations of machinery such as turbine, mills and for water storage tanks.
4. Chimney height of 45 to 80 m is required in the project.
5. Constructed floor area of buildings and their structures will be 50 acres
6. Construction material

Size stones	:	3400 T
Sand	:	8500 T
Boulders	:	1200 T
Bricks	:	4500 T
Cement	:	6000 T
Steel	:	2000 T

3.4.5 PRODUCTION AND RELATED ACTIVITIES DURING OPERATION

1. 5000 TCD sugar cane crushing to produce white sugar
2. Co-gen power plant with 150 TPH boiler and 35 MW T.G. set Power
3. Power export: 28 MW (season) and 35 MW (off season)
4. 65 KLPD molasses based distillery with 16T/hr boiler and 1.5 MW captive T.G
5. Spent wash based Evaporator.
6. Water Treatment plant of 2000 m^3 /d capacity.
7. Effluent Treatment plant of 1000 m^3 /d for plant effluents & 1500 m^3 /d for condensate water treatment plant.

3.4.6 RESOURCES CONSUMED

1. Sugar cane : 12 Lakh T/yr
2. Water drawn from Malaprabha river : Average 1700 m^3 /d
3. Molasses (from captive source) : 60 000 T/yr
4. Power 7.0 MW (captive source)
5. Fuel
   - Bagasse (Captive source) : 360000 T/yr
   - Coal : 82473 T/yr

3.4.7 SUGAR CANE CULTIVTION AREA

Sugar cane cultivation area is about 15000 hectares spread in about 30 km distance from the site.

3.4.8 TRANSPORTATION

1. PERSONNEL

During construction a maximum of about 300 persons will be attending industry including, construction works, suppliers of material and related activities during the construction period. They use company vehicle facilities, public transportation and own vehicles. A total of about 24 buses/ cars and about 60 two wheelers will visit the industry for transportation of personnel.

During operation a maximum of about 450 persons are attending the industry including employees, farmers and other visitors. A total of about 20 buses/ cars and about 40 two wheelers will visit the industry for transportation of personnel.

2. MATERIAL

A maximum of construction material transported per day will be about 40 loads gravel, 40 loads sand, 40 loads boulders/jelly/bricks and 2 load steels in addition to about 5 loads of plant machinery.

During operation, a maximum of about 50 loads/hr (600 loads/d) of lorry/tractor/carts are moving to the industry to carry raw material sugar cane, products, sugar, bio-manure, alcohol and other material. In addition about 10 lorry/tractors are working in the industry for internal movement of material.

3.4.9 BULK STORAGE FACILITIES

1. Storage yards for storage of 30000 T Bagasse, 6000 T coal and 4000 T mud and 200 T boiler ash.
2. Sugars go down for storage of 60000 T of sugar.
3. Molasses storage tanks 2 No's, each of 10000 T capacity.
4. Ethanol storage tanks 12 No's, total 6000 m^3 capacity.
5. Spent wash storage tanks (2 No's), total capacity 6000 m^3
6. Water reservoir 3000 m^3

3.4.10 WASTE GENERATION FROM THE PROJECT

Liquid gaseous and solid wastes generated from co-gen sugar and distillery units are listed below. Management of these wastes is discussed as follows.

1. WASTE WATER

A. Co-Gen Sugar Unit

Domestic waste water
Industrial waste water
Excess condensate water

B. Distillery Unit

Domestic waste water
Spent wash
Miscellaneous waste water

2. GASEOUS MISSIONS

A. Co-Gen Sugar Unit

Boiler flue gases
Smoke from diesel generator
Fugitive emissions

B. Distillery Unit

Boiler flue gases
Smoke form diesel generator
Fermenter emissions

3. SOLID WASTES

A. Co-Gen Sugar Unit

Bagasse
Press mud
Molasses
Boiler ash
Lime sludge
ETP sludge

B. Distillery Unit

Yeast sludge
Boiler ash

3.4.11 PROJECT INVESTMENT

Total capital investment on project will be Rs 40122.8 Lakhs and the investment on Environmental management plan will be Rs 2561 Lakhs.

3.5 PROJECT DESCRIPTION

The project consists of following production activities.

1. Co-gen sugar unit with 5000 TCD sugar plant and 35 MW power plant
2. 65 KLPD molasses based distillery

3.5.1 CO-GEN SUGAR UNIT

A. SUGAR UNIT

Sugar cane is the raw material for manufacture of sugar. Juice is extracted from sugar cane, which is then processed to recover sugar. Bagasse, which is the left out fiber material after extraction of juice from sugarcane, is used as fuel in boiler to produce steam. Steam is used in sugar plant for evaporation of juice to recover sugar and in power plant for generation of captive electric power. Process flow charts for production of sugar and distillery are given in Figure-3.3 and Figure-3.4 respectively. A brief description of the process is given below.

Crushing Of Sugarcane

Sugarcane is harvested in the fields, dressed and bundled in small bundles, stacked in Lorries, tractor trailers or bullock carts, supplied to factories weighed and crushed in a set of mills.

Crushing takes place mainly in two stages: first the preparation and then milling. Milling takes place after preparing the cane in leveller, cutter and fibrizer. The prepared cane is then crushed by passing through 4 sets of mills. Hot water is added in the course of crushing as imbibition water for better extraction of juice from sugarcane. After crushing, the bagasse is sent to boiler as fuel and juice is sent for purification and recovery of sugar.

Juice Clarification

The weighed quantity of juice is primarily heated to 70-75 ^{0}C in juice heaters. It undergoes a process of lime treatment and sulphitation with the addition of lime and sulphur dioxide, respectively. The juice is heated again to 105 ^{0}C in another set of juice heaters. The hot juice is decanted out from the clarifier and sent for evaporation in a set of multiple effect evaporator bodies. In the evaporators the juice at 15% solids is concentrated in to syrup of 60% concentration.

Crystallization

The syrup is sent to pan floor for further concentration in vacuum pans. The syrup collected in supply tanks is taken to pans for boiling where the syrup concentrates and attains super saturation stage. In such a condition sugar grains are formed in the syrup. The syrup mass with sugar particles is called massecuite. The massecuite is dropped in crystallisers and cooled to complete the crystallization.

Centrifuge

Massecuite is taken into the high speed centrifuge. Sugar crystals are separated from mother liquor in the centrifuge. Non crystallisable matter from the syrup, called molasses, is drained out from the centrifuge. The molasses is weighed and sent to storage tank. The wet sugar from centrifuge is sent to driers.

Drying, Grading and Bagging

Sugar is dried in the vibrating tray drier and graded by passing though standard sieves. The graded sugar is bagged, weighed for 100 Kg net, stitched, numbered and stacked in sugar godown.

B. CO-GEN POWER PLANT

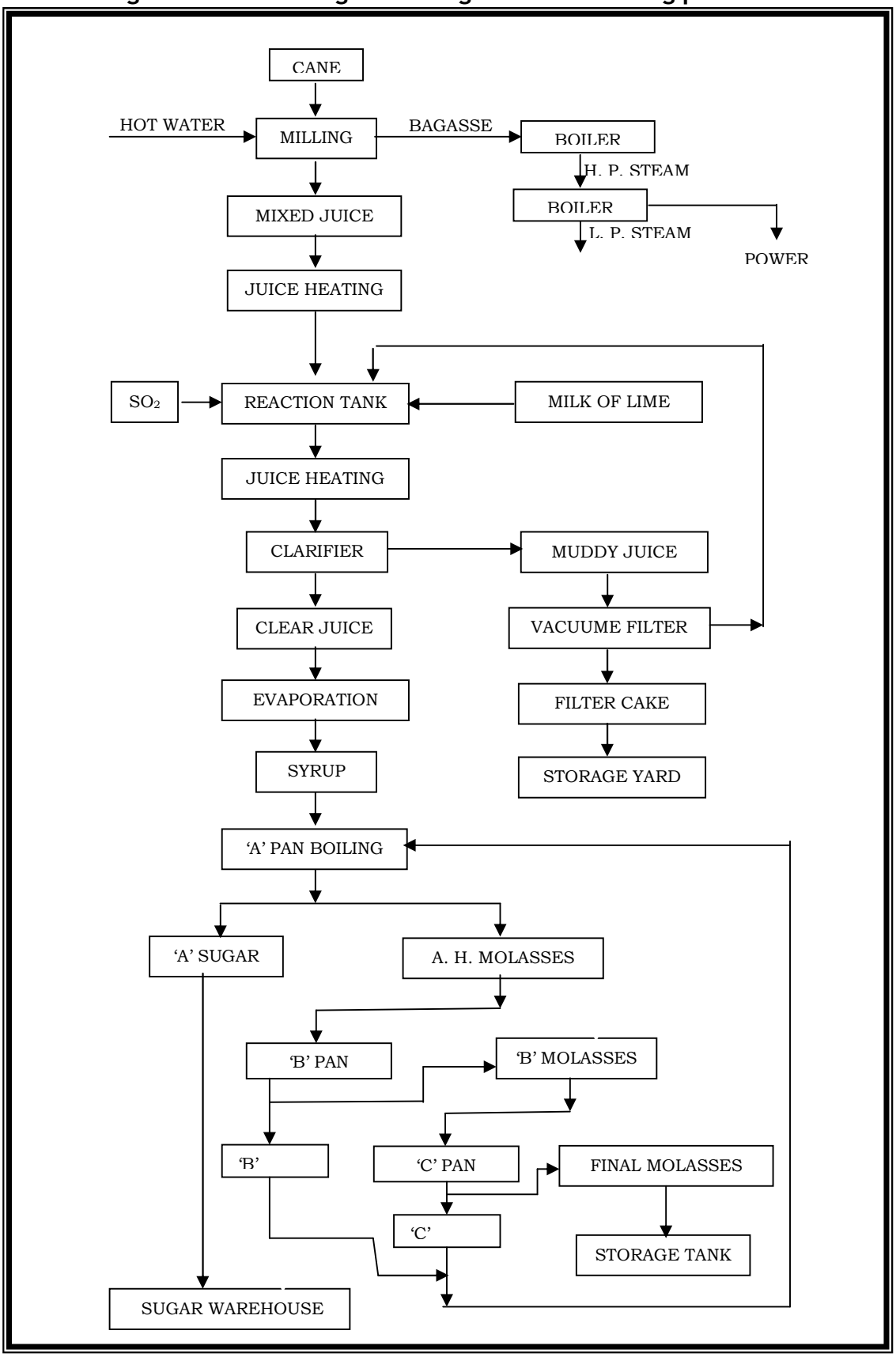
Boiler Plant

The industry shall be provided with a high pressure boiler with a capacity 150 T/h at 125 kg/cm^2 pressure and 540 ^{0}C temperature. The steam is required for both power and sugar plants. The boiler is fired with bagasse alone or with bagasse mixed with 15 % coal. Bagasse is available from sugar plant as captive source. The flue gas from the boiler is passed through ESP/Bag filter to free it from suspended particles and then vented through a chimney of adequate height. The boiler ash is quenched and is sent to bin through belt conveyor. Bagasse from mills or storage yard is sent to boiler through mechanical conveyor.

Electricity Generation (Steam turbine and Alternator)

The high pressure steam from the boiler is passed through the double extraction cum condensing type of turbine of 35 MW capacity. The turbine is run by the high pressure steam which in turn rotates alternator. The electric power produced is used to meet the captive power requirement of the sugar industry and co-gen plant. Surplus power from the industry is exported to KPTCL through distribution grid. The steam extracted at reduced pressure from turbine is used in sugar plant to meet its process requirement.

Figure-3.3 Flow diagram of sugar manufacturing process



3.5.2 DISTILLERY

Molasses is the chief raw material used in India for production of ethanol. Molasses contains about 45% total sugars, of which, 25 to 30% are cane sugar (sucrose) and the rest are reduced sugar. During the fermentation, yeast strains of the species Saccharomyces, a living micro organism belonging to class fungi converts sugar (sucrose) present in the molasses in to alcohol. Chemically, this transformation for sucrose to ethanol can be approximated by the equation.

I $C_{12}H_{22}O_{11} + H_2O = 2C_6H_{12}O_6$
Cane Sugar Water Glucose/Fructose
342 18 360

II $C_6H_{12}O_6 = 2C_2H_5OH + 2CO_2$
Glucose/Fructose Ethanol Carbon-dioxide
180 92 88

During fermentation, traces of higher alcohols like amyl alcohol lower aldehydes like acetaldehydes are also formed as impurities in the fermenter. A flow chart of manufacturing process of distillery is given in Figure-3.3.The manufacturing process consists of following stages,

- Feed preparation
- Yeast Propagation and continuous fermentation.
- Multi-pressure Distillation
- Molecular sieve dehydration for Fuel Alcohol

Feed Preparations and Weighing

Molasses stored in a storage tank is first weighed in a tank with load cells so that accurate quantity can be fed to the fermentation section. The weighed molasses then transferred from tank to the diluter in fermentation section where it is diluted with water and fed to the fermenter.

Yeast Propagation and Continuous Fermentation

Highly efficient yeast strain is propagated in the culture vessel under aseptic conditions. The ready yeast seed is then transferred from culture vessel to fermenter. The glucose in media gets converted to ethanol, in each of the 3 fermenters operating in continuous cascade mode. CO_2 liberated during reaction is sent to CO_2 scrubber for recovery of ethanol. The yeast sludge is separated from wash after fermentation in a

wash settling tank and clarifier. Part of the yeast sludge is reactivated and recycled back to the fermenter.

Multi-Pressure Distillation

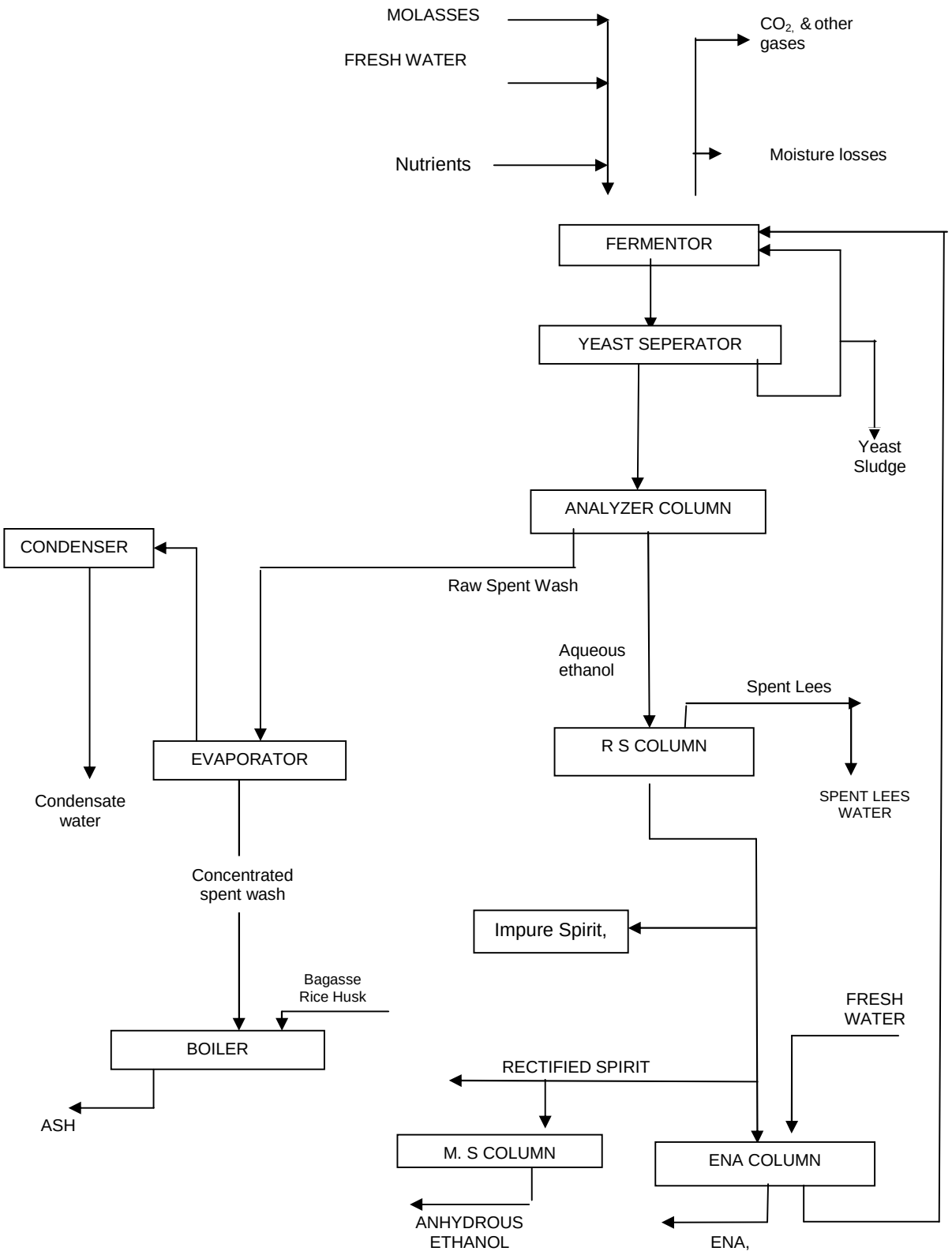
The fermented wash containing alcohol, non-fermentable solids and water is supplied to distillation columns to separate the alcohol from other impurities as a continuous flow. The distillation system is designed for premium quality extra neutral alcohol as briefed below.

The system consists of 7 columns, namely CO_2 stripper, Stripper column, Pre-reactor column, Extraction column, Rectification Column, Refining Column, Fusel Oil column.

Wash is fed to CO_2 stripper column to remove CO_2 gas present in wash. Alcohol is stripped off water in stripper column. The distillate from stripper column is fed to pre-rectifier column to remove most of fusel oil and the distillate from pre-rectifier column is fed to extraction column after dilution with soft water. Alcohol free aqueous solution is discharged from the bottom of the stipper column as spent wash or as process effluent. In extraction column most of the high boiling impurities separated from ethanol in presence of water. The bottom ethanol water mixture is pre-heated by system condensate and spent lees before being fed to rectifier column. In rectifier column, rectifier spirit (RS) is taken out from top tray and fed to refining column where mainly the methanol impurities are separated. Pure ENA is obtained at bottom, which is cooled and stored. The impure spirit from top of pre-rectifier column, extraction column, rectifier column and refining column and balance alcohol is recycled to pre-rectifier column. The alcohol containing fusel oil from pre-rectifier and rectifier column is also fed to fusel oil column.

Rectification column and pre-rectifier column works under positive pressure. The top vapors from rectifier column are condensed in stripper column for giving heat to stripper re-boiler. Other columns work under vacuum.

Figure-3.4 Process Flow Chart for Distillery



Molecular Sieve Dehydration for Fuel Grade Ethanol

Rectified spirit at azeotropic concentration is pumped to the dehydration plant consisting of Molecular Sieve columns. The rectified spirit is vaporized and superheated. The superheated vapour will pass through molecular sieve column which is already regenerated and pressurized to the working pressure. Water vapor is absorbed by the molecular sieve present in the column. Anhydrous ethanol is discharged from the column. After the cycle i.e. saturation of molecular sieve with water vapour, the flow will be shifted to the next molecular sieve column. The sieve column after completion of drying cycle is evacuated to remove the adsorbed water through an evacuation system via a condenser. The condensed mixture of alcohol and water is fed to a recovery column, which enriches the stream back to azeotropic composition.

3.6 RAW MATERIAL AND PRODUCTS

1. Co-gen sugar unit

The main raw material required for manufacture of sugar is sugarcane, which is obtained from agricultural source existing in the region of the factory. Chemicals such as lime, phosphoric acid etc. are used in the process for purification of sugarcane juice. Common salt, hydrochloric acid and caustic soda are used in water treatment plant. Lubricating oil and grease are also used as consumables in the industry. Chemicals and consumables are locally available in the country. The details of raw materials and products are given in Table-3.2 & Table-3.3.

Sugar is the main product in the industry. However, bagasse, molasses and press mud are also produced as by-products in the process. Bagasse is used as fuel in the boiler for production of high-pressure steam, which is used in generation of electric power. Major part of the bagasse produced in the industry is consumed as fuel in the boiler. Other products viz., press mud and molasses, which once thought to be waste products, are now utilized for profitable applications. Press mud is used as manure in agriculture. Molasses is used as raw material for manufacture of ethanol.

Table-3.2 Raw Materials and Products for Co-gen Sugar Unit

Sl. No	Item	% of	Quantity, T/d	Storage facility	Transportation
1	**Raw Material**				
	Sugarcane	100	5000	Cane yard	Lorry, tractors & bullock carts
2	**Consumable chemicals**				
	Lime	0.1	5	60 T, Go-down	Lorry
	Sulphur	0.0	1	20 T, Go-down	Lorry
	Phosphoric acid		0.10	5 T, 35 kg carboys	Lorry
3	**Oil, grease and oil coolant**		0. 02	6 T, 200 kg drums	Lorry
5	**PRODUCT,** Sugar	10	500	Go-down, 100 kg bags	Lorry
6	**By products**				
	Bagasse, 50% moisture	30	1500	Yard	Belt conveyor
	Press mud, 75 % moisture	4	200	Yard	Tractors
	Molasses, 20 % moisture	4.5	225	M.S. tank	Lorry tanker

Table-3.3 Raw Materials and Products for Distillery Unit

Sl. No.	Item	Quantity	Transportation	Storage
1	**Raw material**			
	Molasses	260	Lorry tanker/ Pipe line	MS Tank
2	**Nutrients/Consumables**			
	DAP	0.03 T/d	Lorry	50 Kg Bags
	Urea	0.08T/d	Lorry	50 KG Bags
	Antifoam oil	0.08T/d	Lorry	Drums
3	**Product/ By-product**			
	Alcohol, KL/d	65 (RS/ENA grades)	Lorry tanker	MS/SS Tank
	Yeast sludge, dry	2T/d (Dry)	Tractor	
	Boiler ash	30 T/d	Tractor	Constructed Yard

3.7 BOILER FUEL, CHARACTERISTICS AND UTILIZATION

Co-gen Sugar Power Plant

The 150 T/h boiler present in co-gen sugar power plant will be fired with bagasse during cane crushing season and with coal during off season. Bagasse is available as captive source from sugar plant. In case of bagasse shortage during season, coal up

to 15 % will be used as support fuel along with bagasse. In case of availability of agro waste such as cane thrash during off season, it will partly or fully substitute coal.

Bagasse and coal within the factory premise are transferred to the Boiler through enclosed belt conveyors to avoid fugitive emission. Adequate capacity of covered storage yards are provided for bagasse and Coal.

Table 3.4 Utilization of Fuel

Parameter	**Particulars**			
Co-gen Sugar Power Plant				
Boiler capacity	150 T/h of steam			
Fuel characteristics	**Parameter**	**Bagasse**	**Coal**	**Agro waste**
	GCV, kcal/kg	2270	5500	4000
	Ash content,	2.0 %	10.0 %	2.0 %
	Steam/fuel ratio	2.4 T/T	5.5 T/T	4.0
	Sulphur content	0.01%	1.0 %	0.01 %
Fuel utilization	Season	Bagasse:1275 T/d		
		Coal: 98.2 T/d		
	Off season	Coal: 654.5 T/d		
Boiler ash production	Season	35.3 T/d		
	Off season	Coal : 65.45 T/d		
Distillery Power Plant				
Capacity of boiler	16T/h of steam			
Characteristics of fuel	**Parameter**	**CSW**	**Bagasse**	**Coal**
	GCV, kcal/kg	1800	2.270	4000
	Ash content,	18 %	2.0 %	30.0 %
	Steam/fuel ratio	1.5 T/T	2.4 T/T	4.0 T/T
	Sulphur content	0.3 %	0.01%	0.5 %
Fuel utilization	CSW : 158 T/d and Bagasse : 61.2 T/d			
Ash generation	30 T/d			

Distillery Unit

The 16 T/h boiler present in sugar unit will be fired with concentrated spent wash (CSW) admixed with bagasse and/or cane thrash as support fuel. Spent wash generated as effluent in distillation plant is concentrated in evaporator. CSW has a heat value of 1800 kcal/kg. Coal will be used as support fuel in the event of agro

waste shortage. Bagasse will be available from captive source or will be bought from nearby sugar industries. Agro waste such as cane thrash is available from farmers in the region.

Availability and Utilization of Bagasse

Sugar plant has a crushing capacity of 5000 T/d. Sugar cane contains about 30 % of bagasse with 50 % moisture content. Bagasse has a heat value (GCV) of 2200 kcal/kg. Co-gen sugar plant boiler of 150 T/h capacity is fired with bagasse. During crushing season, 15 % of the bagasse requirement will be met with coal as support fuel. Excess bagasse saved after utilization in boiler will be saved for use during off season or it will be used in distillery boiler.

3.8 STEAM AND POWER

3.8.1 CO-GEN SUGAR UNIT

Sugar co-gen power plant includes high pressure boiler of 150T/h capacity with 125 kg/cm^2 pressure and 540^{0}C temperature. The generation and utilization of steam along with the generation and utilization of power is given in Table-3.5.

Table-3.5 Generation & Utilization of Power

Parameter	**Details**	
Co-gen Sugar Unit		
Steam generation at boiler	Season: 150 T/hat 125 kg/cm^2 & 540 ^{0}C	
	Off-Season: 126 T/hat 125 kg/cm^2 & 540 ^{0}C	
Steam utilization	Season	Condensing : 72 T/h
		Back pressure : 78 T/h
	Off-Season	Condensing : 126 T/h
Power generation MW	Season : 35.0 MW	Off-Season : 35.0 MW
Power utilization	Season : 35.0 MW	Sugar unit : 4.5 MW
		Auxiliary unit : 2.5 MW
		Power export: 28.0 MW
	Off-Season	Auxiliary unit : 2.5 MW
		Power export: 32.5 MW
Distillery		
Steam generation	16 T/h at 34 kg/cm^{2}360 ^{0}C	
Steam utilization	Back pressure	16 T/h
Power generation	1.5 MW	
Power utilization	Distillery unit	1.3 MW
	Auxiliary unit	0.2 MW

3.8.2 DISTILLERY UNIT

Distillery power plant includes medium pressure boiler of 16 T/h capacity with 34 kg/cm^2 pressure and 360 ^{0}C temperature. The generation and utilization of steam along with the generation and utilization of power is given in Table-3.5.

3.8.3 DIESEL GENERATOR

A diesel generator of 1000 KVA is provided with 22 m height (AGL) Chimney. The D. G. set is operated only during the emergency of power failure to run the essential services.

3.8.4 HESCOM POWER

The industry has permission to draw 6000 KVA from HESCOM source. During shortage or non availability of power supply from captive power plant source, the power will be drawn from HESCOM Power source. Supply HESCOM power is also needed during start up of sugar and power plants. The industry will provide power receiving station and transmitter to receive the power.

3.9 SOURCE AND QUANTITY OF WATER

Co-gen sugar and distillery units are water intensive and utilize large quantity of water for use in process, cooling water purge, boiler feed water make up and domestic applications. The utilization of fresh water will be considerably reduced by incorporating various conservation measures.

Large quantity of recycle water is available as condensate water from juice evaporator in the case of sugar unit and from spent wash evaporator in the case of distillery. This is will be treated and then reused as source of water in the industry. The source and quantity of fresh and recycled water at co-gen sugar and distillery units is given in Table- 3.6. The Karnataka Government has sanctioned 7500 KLD of water for the proposed project from river Malaprabha.

Table- 3.6 Source Quantity of Fresh and Recycle Water

Source of Water	Quantity, m^3/d		
	Co-gen Sugar Unit	**Distillery Unit**	**Total**
Fresh water from Malaprabha river	820	650	1670
Recycle water obtained as condensate from juice evaporator in case of sugar unit and spent wash evaporator in case of distillery unit.	3950	424	4174

3.9.1 FRESH WATER FROM RIVER SOURCE

Fresh water is required in the co-gen plant for boiler feed and condenser cooling water make up and in the sugar plant for process application, domestic use, and gardening. The quantity of water required by the industry will be drawn from the river and pumped to the site. The raw water will be is stored in the reservoir located at the highest level of the project site. The quality of water from river Malaprabha is given in Table-3.7.

Table-3.7 Quality of Malaprabha River Water

Parameter	Value
pH	7.4
Electrical Conductivity (Micro mho / cm)	249
Turbidity in NTU	15
Alkalinity (as Ca Co_3), mg / lit.	47
Dissolved Oxygen, mg / lit.	6.7
COD, mg / lit.	8
Total Kjeldahl Nitrogen, mg / lit.	3.2
Total Hardness as $CaCO_3$, mg / lit.	96
Total Suspended Solids, mg / lit.	22
Total dissolved Solids, mg / lit.	167
Chlorides (as Cl) ,mg / lit.	52
Sulphates (as SO_4) ,mg / lit.	16
Calcium (as Ca) ,mg / lit.	24
Magnesium (Mg) ,mg / lit.	9
Sodium (as Na) ,mg / lit.	32

3.9.2 FRESH WATER TREATMENT

The water has to be treated in a suitable water treatment plant. The extent of water treatment required for different applications is given below.

Boiler feed : De-mineralized water
Cooling water : Soft water
Domestic use : Clarified, filtered and chlorinated
Gardening : Raw water
Process in sugar plant & distillery : Soft water

Raw water from Malaprabha river is pumped to the main water reservoir of 3000 m^3 capacity. The reservoir is a rectangular tank constructed of stone masonry/RCC. The tank is divided in to three compartments by internal partition walls. The bottom flooring of each compartment is V shaped with central discharge gutter running along the length of the compartment for easy drainage of accumulated sludge. During rainy days the tank also serves the purpose of settling and clarification of the turbid water.

The water from reservoirs is pumped to chemical mixer and then to mechanical clariflocculator. The clarified water is collected in a clarified water treatment plant for further treatment. The clarified water is then passed through pressure filter and then water softening plant. The soft water is collected in soft water storage tank for use in cooling water make up and sugars plant and distillery applications. Part of the filter plant outlet water is directly taken to demineralised plant for use in boiler feed water makeup.

Water requirement for domestic use is drawn from filter plant outlet and collected in an overhead water storage tank. Chemicals such as lime, sodium carbonate, caustic soda, bleaching powder, flocculants and hydrochloric acids are used in water treatment plant.

3.10 WATER UTILIZATION

Utilization of fresh and recycle water at co-gen sugar and distillery units is given in Table-3.8. Water balance for co-gen sugar unit and distillery unit are given in Table-3.9.

3.10.1 CO-GEN SUGAR UNIT

Recycle Water

Sugar cane contains about 70 % of its weight as inherent water. Sugar cane is crushed in mills along with added 30 % added imbibition water. Juice collected from mills is clarified. 30 % of the water present in sugar cane (as % on sugar cane weight) will end up in bagasse (15 %), molasses, press mud and lime sludge together (5 %) and as vapor loss in mills and centrifuge (5%). The remaining water (75 % on sugar cane weight) is recovered as condensate water by vaporization of juice in evaporators and pan boiling. Total condensate water recovered from evaporation of juice in the

sugar unit of 5000 TCD will be 3950 m^3/d. The water, thus recovered is utilized in sugar industry as recycle water for use in imbibitions, cooling water make up, filter wash, lime flaking etc.

Fresh Water

The requirement of fresh water to the project is considerably reduced by adoption reduce, recycle and reuse measures. Fresh water is needed for use as boiler feed water make up, auxiliary cooling tower make up and domestic needs. Total fresh water requirement for the co-gen sugar unit will be 1670 m^3/d. The Karnataka Government has sanctioned 7500 KLD of water for the proposed project from river Malaprabha.

3.10.2 DISTILLERY UNIT

Recycle Water

Large quantity of effluent, with high organic and inorganic contamination is generated from distillery unit as spent wash. The spent wash is concentrated in multi effect evaporator. The vapor condensate water from the evaporator is acidic with pH of 6.2 to 6.6 and moderately contaminated with BOD with, COD. This will be treated by neutralization, aerobic treatment by ASP, clarification in sand and carbon filter. The treated effluent will be collected in storage tank as condensate water for use in process, cooling water make up etc.

Fresh Water

The requirement of fresh water to the project is considerably reduced by adoption reduce, recycle and reuse measures. Fresh water is mainly needed for use as process water; boiler feed water make up and cooling tower make up.

Table- 3.8A Utilization of Fresh and Recycle water in Co-gen Sugar Unit

Source of Water	Application		Quantity, m^3/d
Fresh Water, 1020 m^3/d			
Industrial	Sugar unit	WTP washing	40
		Plant washings	20
	Co-gen power unit	Boiler water make up	300
		Auxiliary cooling water make up	400
	Total industrial		**760**
Domestic	At industry for 450 persons		20
	Residential 300 persons		40
	Total domestic		**60**
	Total Fresh water		**820**
Recycle Water for Industrial Use			
Industrial	Sugar cooling water make up		1100
	Imbibition		1500
	Lime preparation		50
	Filter wash		250
	Pump sealing water		200
	Excess Condensate water		850
	Total recycle water		3950

Table- 3.8 B Utilization of Fresh and Recycle Water in Distillery Unit

Source of Water	Application	Quantity, m^3/d
Fresh water	Molasses dilution	360
	Plant washings	30
	Pump sealing water	120
	Boiler water make up	60
	Cooling water make up	80
	Total fresh Water	**650**
Recycle Water	Cooling water make up	408
	Total Recycle water	**408**

Table-3.9A Water Balance for Co-Gen Sugar Unit, m^3/d

Utilization	Water input		Water output		
	Fresh water	Sugar cane water	Effluent	Others	Vap. loss
Domestic	60	-	50	-	10
Plant wash	20	-	20	-	-
WTP washings	40	-	40	-	-
Boiler	300	-	72	-	228
Auxilliary cooling water	400	-	125	-	275
Pump sealing water	200	-	200		
Condensate water from juice evaporator	-	-	-	-	-
Imbition	-	-	-	-	-
Sugar plant cooling water	-	1450	150	-	1300
Lime preparation	-	-	-	-	-
Filter wash	-	250	250	-	-
Excess Condensate	-	850	850	-	-
Water with bagasse		750		750	
Water with press mud, molasses & lime sludge	-	200	-	200	-
Process (vapor loss in mills, centrifuge etc)	-	250	-	-	250
Total	**1020**	**3750**	**1757**	**950**	**2063**

Table-3.9B Water Balance for Distillery (m^3/d)

Water input					Water output			
Sl. No.	**Particulars**	**Fresh**	**Recycle**	**Others**	**Particulars**	**Effluent**	**Recycle**	**Vapour vent**
1	Water in molasses 240 x 0.15	--	--	36	Moisture loss from fermenter & other equipments	--	--	22
2	Fresh water for molasses dilution	360	--	--	Water in 585 m^3/d of spent wash (594 T/d at 16 % solids, & 1.025 S.G.)	464	--	--
3	ENA spent lees for molasses dilution	--	180	--	Spent Lees from RS column	90	--	--
4	Fresh water to ENA lees	180*	--	--	Lees water of ENA column	--	180	--
5	Boiler make up	60	--	--	Boiler blow down	24	--	
					Steam loss at vents & traps	--	--	36
8	Cooling water make up	80	--	408*	Purge from cooling water	100	--	--
					Evaporation loss	--	--	388
9	Pump sealing water	120	--	--	Pump sealing water	120	--	--
10	Plant wash	30	--	--	Washings from floor and equipment	30	--	--
TOTAL		**650**	**180**	**444**		**828**	**180**	**446**

408* : Condensate water from spent wash evaporator, after treatment

3.11 SOURCES OF POLLUTION AND THEIR MITIGATION MEASURES

The main objective of mitigation measures is to conserve the resources, minimise the waste generation, treatment of wastes, and recovery of by-products and recycling of material. Pollution sources are mainly due to generation and disposal of liquid, gaseous and solid waste products. The project itself will be incorporated with built in measures for waste minimisation, resource conservation and safe operation.

Built in Pollution Mitigation Measures in Industry

1. Recovery and reuse of inherent water present in sugarcane.
2. Complete recycle of vapour condensate water with cooling water.
3. Use of hydrated lime instead of lime to avoid lime sludge.
4. Treatment and reuse of vapour condensate for reuse as boiler feed.
5. ESP and stack for air pollution.
6. Dust control in sugar grader unit.

7. Spent oil and grease recovery in mill plant.
8. Use of hot vapour-condensate for imbibitions in mill.
9. Use of mechanical seals in pumps to avoid liquid leakages and noise.

3.11 EFFLUENT MANAGEMENT

3.11.1 QUANTITY OF EFFLUENT

Domestic Effluent

Domestic effluent is generated from residential quarters, factory canteen, rest rooms etc. The quantity of domestic effluent at different sources is given below.

Residential quarters	: 34 m^3/d
Factory canteen	: 8 m^3/d
Rest room washings in distillery unit	: 6 m^3/d
Rest room washings in Co-gen sugar unit	: 2 m^3/d
Total	**: 50 m^3/d**

Co-Gen Sugar Unit

In plant measures adopted in the factory as enumerated elsewhere to reduce the quantity and contamination of waste water. Oil traps are provided in the mill house to minimize the contamination of oil and grease in the waste water. Small lumps are provided at suitable location in the factory to receive the leakages, juice and syrup, which may be present at pumps and near some process equipment. The leakage of juice and syrup thus collected is recycled to process. Floor cleaning is done by dry baggage to minimize the quantity of waste water. Further hot condensates obtained from evaporators are recycled to the process to meet the requirement of imbibitions etc. in the process, and also to meet the makeup water requirement for cooling tower.

Evaporators, juice heaters, pans etc. are cleaned once in 50-60 days for removal of scale. To avoid shut down of production stand by evaporator and heaters are provided in the plant. These equipments are cleaned periodically. Chemicals such as caustic soda, Sodium carbonate and hydrochloric acid are used for scale removal. Washings generated during cleaning operation is about 20 m^3/d. Cleaning day effluent is highly contaminated with BOD, suspended solids and TDS. Cleaning day wastewater is

discharged to drains along with other effluents and then lead to effluent treatment plant.

Plant washings, cooling water purge, boiler blow down and pump sealing are the plant effluents generated in co-gen sugar unit. The total quantity of effluent generated is 370 m^3/d, further the quantity of condensate water generated after re-use in the plant is 1250 m^3/d. The quantity of effluent generated from different source is given in Table-3.10A.

Distillery

In plant measures adopted in the factory as enumerated elsewhere to reduce the quantity and contamination of waste water. Small sumps are provided at suitable location in spent wash evaporator house to receive the leakages which may be present at spent wash pumps. The leakage thus collected is recycled to evaporation feed vessel. Floor cleaning is done by dry baggage to minimize the quantity of waste water. Further hot condensate obtained from evaporators is treated and then recycled meet makeup water requirement in cooling tower.

Spent wash, plant washings, cooling water purge, boiler blow down, pump sealing and spent lees are the effluents generated in distillery. The total quantity of effluent generated in the plant is 364 m^3/d, further the condensate generated after re-use in the plant is 812 m^3/d. Details of effluent generated from different sources is given in Table-3.10B.

Table-3.10A Effluents at Cogen Sugar Unit

Sl.No.	Applications	Quantity, m^3/d
Co-Gen. Sugar Unit		
1.0	**Domestic Effluent**	**50**
2.0	**Sugar Plant Effluent**	
2.1	Plant washings	20
2.2	Pump gland sealing	200
2.3	Cooling water purge	150
2.4	Boiler blow down	72
	Total sugar plant unit	**370**
3.0	**WTP Effluent**	**40**
4.0	**Excess condensate water from juice evaporator**	**850**

Table-3.10 B Effluents at Distillery Unit

Sl.No.	Application	Quantity, m^3/d
1.0	**Spent wash**	**585**
2.0	**Plant effluent**	
	Spent lees from RS column	90
	Boiler blow down	24
	Purge from cooling water	100
	Pump sealing water	120
	Washings from floor and equipment	30
	Total plant effluent	**364**
3.0	**Condensate water from spent wash evaporator**	**424**

3.11.2 CHARACTERISTICS OF WASTE WATER

Co-Gen Sugar Unit

The waste water generated in sugar factory is relatively less toxic and less hazardous. Further the sugar processing does not involve any process water discharges. The waste water generated is mainly due to washing of floors and equipment in addition to boiler and cooling water purge.

Waste from domestic source is received in septic tanks. It has low dissolved solids and moderate BOD. The overflow from septic tank is sent to effluent treatment plant.

Evaporators, juice heaters, pans etc. are cleaned once in 50-60 days for removal of scale. To avoid shut down of production stand by evaporator and heaters are provided in the plant. These equipments are cleaned periodically. Chemicals such as caustic soda, Sodium carbonate and hydrochloric acid are used for scale removal. Washings generated during cleaning operation is about 20 m^3/d. This is highly alkaline and contains high concentration of BOD, suspended solids and TDS. This waste water is discharged to drains along with other effluents and then lead to effluent treatment plant. The characteristics of these effluent streams are given in Table-3.11A.

Distillery Unit

Spent wash is the process effluent from the distillery and it is highly contaminated with organic and inorganic matter. Wash water from water treatment plant contains significant concentration of dissolved and suspended solids. The characteristics of this

effluent stream is given in Table-3.11 B. Effluents from other sources such as boiler blow down, washings, pump gland sealing, cooling water purge and spent lease water are moderately contaminated and collected separately as distillery plant effluent in receiving tank. The characteristics of this effluent stream are given in Table-3.11 A.

Table-3.11 A Characteristics Of Waste Water

Parameters	Domestic	Sugar plant	Distillery	Sugar condensate	Distillery condensate
Flow rate, m^3/d	50	370	364	850	424
Temperature ^0c	32	38	32	72	72
pH	7.2	5.5	6.2	6.6	6.6
TDS, ppm	640	2270	1260	368	368
SS, ppm	56	88	75	36	36
BOD, ppm	330	2040	1420	480	480
COD, ppm	482	3150	2230	692	692
Oil, ppm	20	24	16	nil	nil

Table -3.11B Characteristics of Spent wash

Sl. No.	Parameter	Raw spent wash
1	pH	4.0 – 4.5
2	Total solids, mg/l	155600 – 165400
3	Volatile acids	76900-82800
4	Ash, mg/l	41200 – 44500
5	BOD, mg/l	51800 - 62100
6	COD, mg/l	135800 – 139100
7	Total nitrogen as N, mg/l	4490 – 4940
8	Potassium as K_2O, mg/l	9480 – 10600
9	Sodium as Na, , mg/l	240 – 280
10	Phosphorus as P_2O_5, mg/l	990 – 1120
11	Sulphate as SO_4, mg/l	2810 - 3145
12	Chloride as Cl , mg/l	5700 - 6070

All values except pH are in mg / litre.

3.11.3 EFFLUENT TREATMENT

The quantity of waste generated from different sources is given in Table 3.10A & B and their characteristics are given in Table 3.11A & B. for the ease of treatment and disposal effluent from different sources is segregated in to following streams.Table-3.12).

An ETP plant of 1000 m^3/d will be designed for the treatment of plant effluents & ETP plant of 1500 m^3/d will be designed for condensate water. The flow charts of effluent treatment scheme for plant effluent & condensate water are given Figure- 3.4A & B.

1. Domestic Effluent (Stream -A, 50 m^3/d)

Domestic effluent is generated at different locations in the industry. This is stabilized in septic tanks located near the sources. The over flow from septic tank is lead to sugar plant ETP for further treatment. Total quantity of domestic effluent will be 50 m^3/d. Septic tanks are designed as per BIS specifications.

2. Plant Effluent (Stream -B, 734 m^3/d)

Effluents to be treated in Sugar plant ETP consists of,

Plant effluents from sugar unit : 370 m^3/d
Plant effluents from Distillery unit : 364 m^3/d
Total : 734 m^3/d

The effluent plant will be designed with 15 % higher capacity to accommodate peak load and eventualities. The characteristics of treated & untreated effluent considered for design of ETP is given below.

Characteristics of Raw and Treated Effluent for Sugar ETP (Stream-A)

Sl. No.	Characteristics	Quality,	
		Raw effluent	Treated effluent
1	pH	5.5	5.5-9.0
2	Total suspended solids(mg/L)	350	100 max
3	Total dissolved solids (mg/L)	1500	2100 max
4	BOD (mg/L)	1800	100 max
5	COD (mg/L)	2700	250 max
6	Oil & grease (mg/L)	35	100 max

3. Condensate Treatment Plant (Stream-C, 734 m^3/d)

Effluents to be treated in Condensate ETP consists of,

Excess condensate water from juice evaporator of sugar unit : 850 m^3/d
Condensate water from spent wash evaporator of distillery unit : 424 m^3/d
Total : 1274 m^3/d

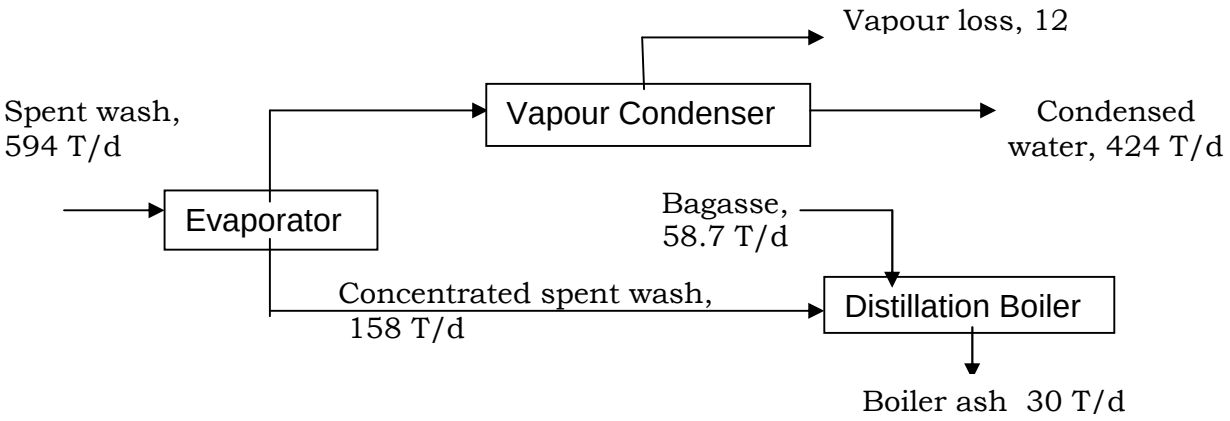
The effluent plant will be designed with 10 % higher capacity to accommodate peak load and eventualities.

Characteristics of Raw and Treated Effluent for Condensate ETP (Stream-B)

Sl. No.	Characteristics	Quality	
		Raw effluent	Treated effluent
1	pH	7.5 -9.0	5.5 -9.0
2	Total dissolved solids (mg/L)	750 -1900	< 2100
3	BOD (mg/L)	5-15	100
4	COD (mg/L)	60-100	250
5	Oil & grease	< 5	10 max

4. Spent wash (Stream -D, 585 m^3/d)

Spent wash of 594 T/d will be generated in the distillery unit. This is concentrated from 16 % solids to 60 % solids (CSW). The CSW is then used in boiler as fuel along with bagasse as supportive fuel. The process is show in flow chart below.



5. WTP Effluent (Stream-E, 40 m^3/d)

About 40 m^3/d of waste water will be generated from water treatment plant. This water is collected in a sump and used for ash quenching and dust suppression on roads. It can also be treated in ETP along with sugar unit effluents.

Table-3.12 Effluent Treatment Scheme

Sl.No.	Applications	Quantity, m^3/d	Treatment & Utilization
1.0	**Domestic Effluent, Stream -A**	50	Domestic effluent generated at different locations lead to common septic tanks and stabilized. The septic tank outlet is sent to sugar plant ETP for treatment.
2.0	**Plant Effluent, Stream -B**		
2.1	Plant effluents from sugar unit	370	Treated ETP consisting of bar screen, oil separator, equalization, neutralizer, anaerobic digester and aerobic reactor with secondary clarifier. Treated effluent is used land for green belt, greenery and sugar crop development. Stabilized domestic effluent and power plant effluents are treated along with plant effluents.
2.2	Plant effluents from distillery	364	
	Total plant effluents, Stream -B	734	
3.0	**Condensate water from evaporator, Stream-C**		
3.1	Condensate water from sugar plant evaporator	850	Treated to irrigation standards in condensate water treatment plant consisting of cooling unit, neutralizer and then treated in ASP consisting of bio-aeration tank and secondary clarifier. For reuse the clarified effluent is further treated in sand and carbon filter and then disinfected with sodium hypochlorite or bleaching powder solution. The treated condensate is used for greenery development or reused in plant for cooling water make up and other applications.
3.2	Condensate water from distillery evaporator	424	
	Total Condensate water, Stream-C	**1274**	
4.0	**Spent wash, Stream-D**	**585**	585 m^3/d ie. 594 T/d spent wash is concentrated from 16% to 60 % in multi-effect evaporator. It produces 158 T/d CSW and 424 m^3/d vapor condensate water. CSW is then admixed with bagasse and burnt as fuel in the boiler. Condensate water is treated in condensate water ETP and reused as cooling water makeup.
5.0	**WTP Effluent, Stream-E**	**40**	Collected in a sump and used for ash quenching and dust suppression on roads.

Figure-3.4A Effluent Treatment Flow Chart for Co-Gen Sugar Unit

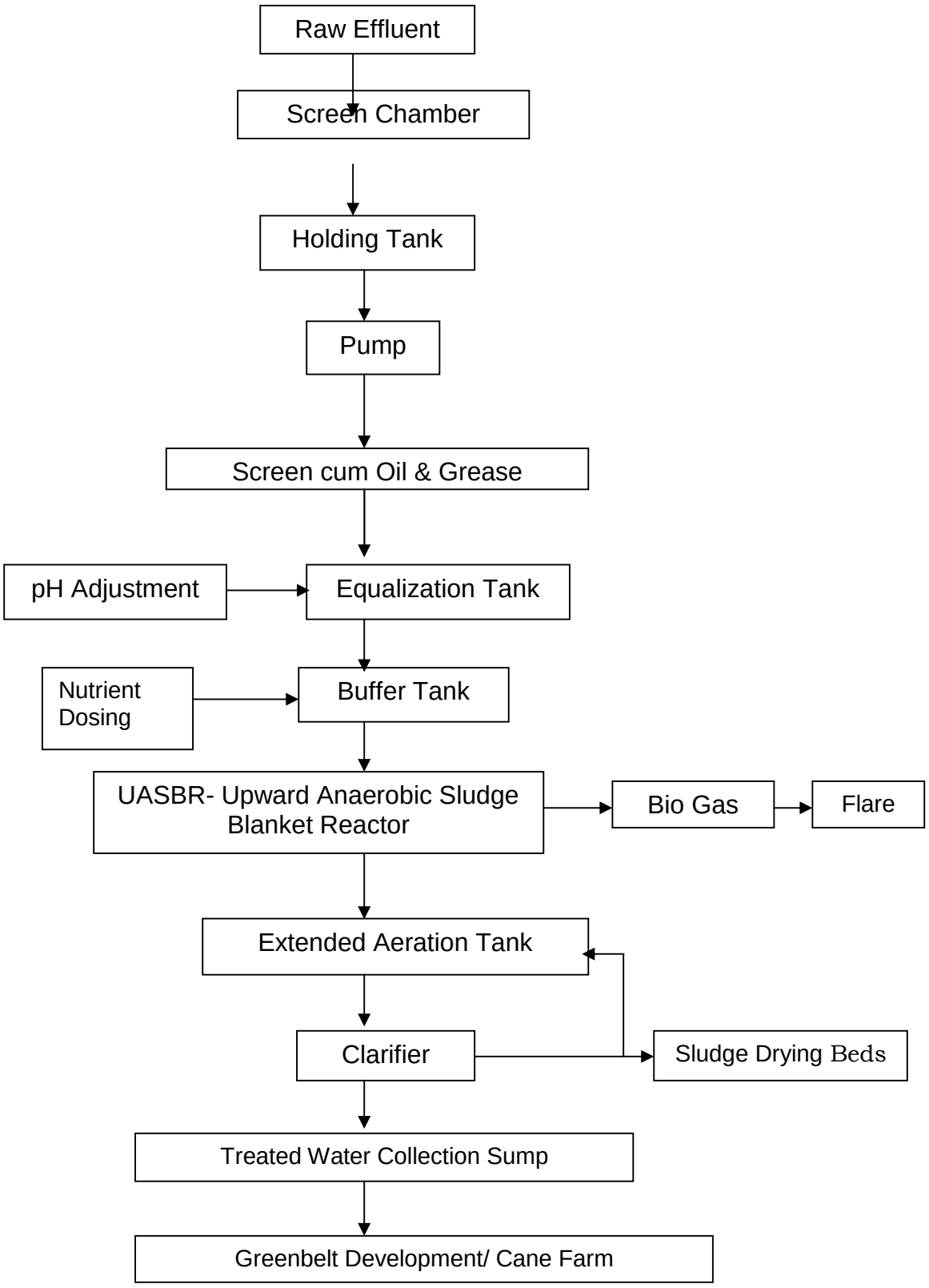
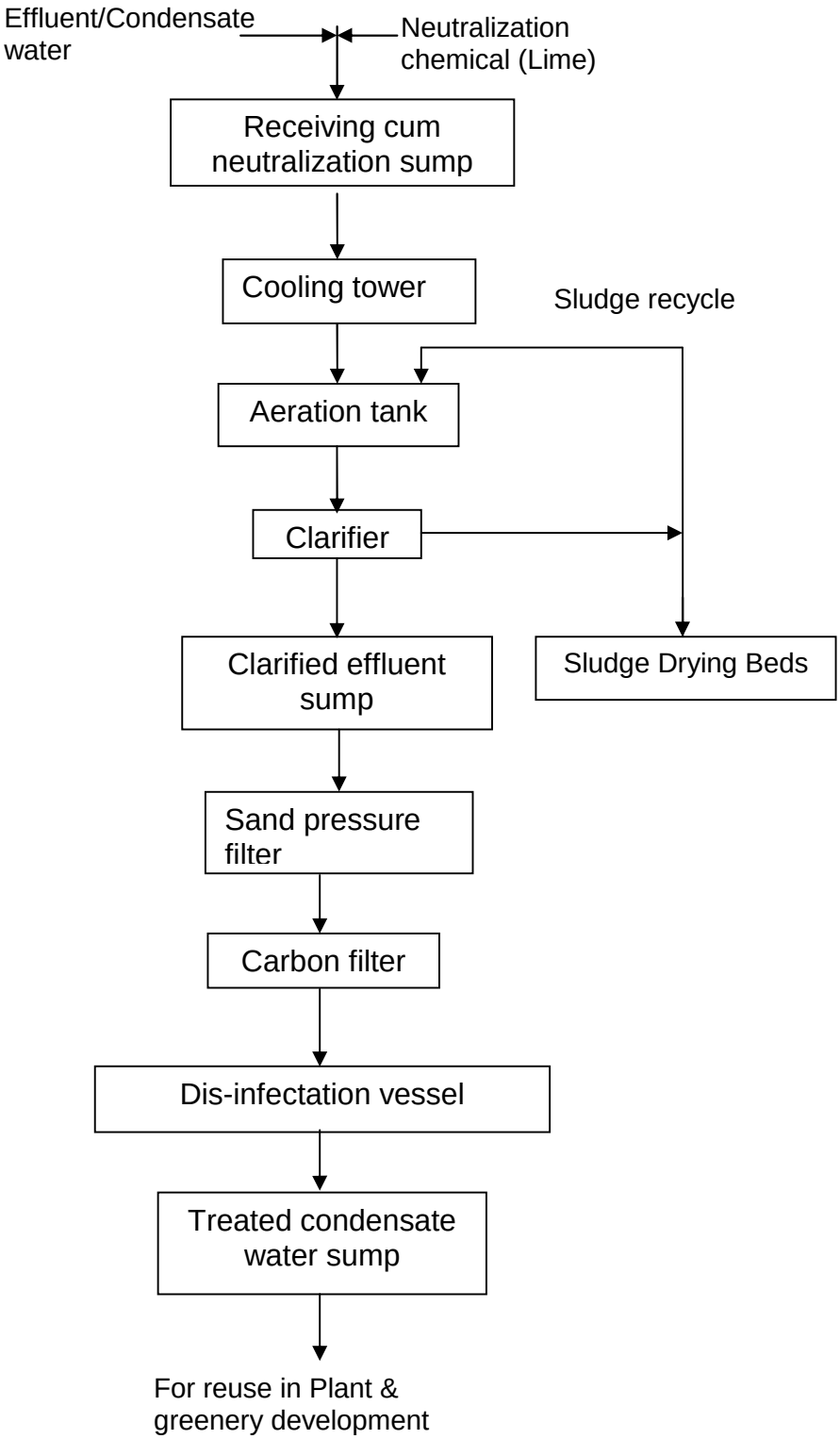


Figure-3.4B Effluent Treatment Flow Chart for Condensate Water



3.12 AIR EMISSION & AIR POLLUTION CONTROL MEASURES

1. Flue Gases from Boilers

Co-gen power plant is provided with high pressure boiler of 150 T/h capacity. The boiler is fired with bagasse during season and coal during off-season. Sulphur and nitrogen content in bagasse is less. SPM and sulphur dioxide are the main emission in flue gases. Sulphur in coal is significant. The boiler is provided with Electro Static Precipitator (ESP) to trap the SPM and a chimney of 90 m height to dissipate the emissions.

Distillery is provided with high pressure boiler of 16 T/h capacity. The boiler is fired with CSW admixed with coal or bagasse (or other bio-mass) as fuel. SPM and sulphur dioxide are the main emissions in the flue gas. The boiler is provided with high efficiency venturi type wet scrubber to trap the SPM and a chimney of 46 m height to dissipate the emissions.

2. Smoke from Diesel Generators

A diesel generator of 1000 KVA is provided at co-gen sugar unit and a diesel generator of 500 KVA is provided at distillery unit. The D. G. sets operate only during start up and during the emergency of power failure to run the essential services. The sources of emission and APC measures for boiler and diesel generator are given in Table-3.13.

Table- 3.13 Emissions and APC Measures for Boiler and Diesel Generators

Sl. No.	Source, air Pollution	Fuel, T/h	Emissions	Air pollution control system
1	150 T/h boiler at co-gen power unit	During season Bagasse: 1275 T/d Coal: 98.2 T/d	SPM, SO_2 and NO_x	Chimney of 90 m ht and ESP
		During off season Coal: 654.5 T/d	SPM, SO_2 and NO_x	
2	16T/h boiler at distillery unit	CSW : 144 T/d Bagasse: 100 T/d	SPM, SO_2 and NO_x	Chimney of 45 m ht. and high efficiency venturi type wet scrubber
3	1000 KVA D.G. Set	HSD	SPM, SO2 and NO_x	Chimney Ht :22 m AGL and acoustic control measures
4	500 KVA D.G. Set	HSD	SPM, SO2 and NO_x	Chimney Ht :8 m ARL and acoustic control measures

3. Fugitive Emission

The industry maintains utmost care to prevent fugitive emission in all possible sources. The main sources of fugitive emissions are storage and handling of fuel and movement of vehicles. Arrangements are made to sprinkle the water periodically on roads to avoid fugitive emission. In addition, fuel conveyors are covered with hoods which ensure no particles are escaping at the time of transportation. The boiler fly ash quenched periodically with water to suppress the fugitive emission. The fugitive emission from boiler bottom ash is controlled by submerged ash conveyor system.

4. Fermenter Vapors at Distillery Unit

3.13 NOISE LEVEL AND CONTROL MEASURES

1. SOURCES & NOISE LEVEL GENERATION

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

i.	Steam turbines	:	85-90 dB (A)
ii.	Diesel Generators	:	75-80 dB (A)
iii.	Fans, blowers and compressors	:	80-85 dB (A)
iv.	Sugar graders	:	85-90 dB (A)
v.	Centrifuges	:	80-85 dB (A)

The sound intensity appears to be at moderate level in co-gen power and distillery plants. In general at the locations of turbines, compressors, fans etc., the sound intensity generally exceeds the limit. Control measures will be adopted to reduce noise level within the permissible limits at the source itself. These machineries are installed on vibration proof foundation and base. Steam turbine and diesel generators are located in isolated and acoustic building. The workers engaged in such locations are provided with earmuffs to have additional safety against noise nuisance. These units will be manufactured to meet the noise levels as per MOEF/ CPCB guidelines.

DG sets will be provided with in-built acoustics measures. Also ambient noise levels will be ensured within the ambient standards by inbuilt design of mechanical equipment and building apart from vegetation (tree plantations) along the periphery and at various locations within the industry premises.

2. NOISE CONTROL MEASURES

- Acoustic barriers / shields provided to the machineries.
- Heavy foundations for vibration absorption of Steam Turbines, etc.
- Provision of Acoustical walls roofs to buildings.
- Segregation of machineries like Turbine having high noise level in a separate enclosure.
- Provision of Silencers and sound absorbers to inlet and outlet of fans, blowers and compressors.
- Sound control measures to steam vents.
- Proper maintenance of machineries especially oiling and greasing of bearing and gears etc.
- Use of personal protective aids to ear for the persons working in the boiler &turbine locations.
- Plantation of green trees around the factory building to absorb the intensity of noise carried to the surrounding premises.

3.14 SOLID WASTE AND THEIR MANAGEMENT

1. CO-GEN SUGAR UNIT

The solid wastes or by-products produced in sugar industry such as bagasse, press mud and molasses are made use as valuable resources as discussed bellow. Other solid wastes in the industry are boiler ash, lime sludge and ETP sludge. Spent lubricating and cooling oils produced in the industry are specified as hazardous wastes and these are disposed as per the prescribed guide lines.

Bagasse

Bagasse is the fibre material left out after extraction of the treated sugar cane juice. The average bagasse content in sugar cane is 30 %. Major quantity of the bagasse produced will be utilized in the plant itself as a boiler fuel. A small quantity of bagasse will also be used as filter aid in the plant. The saved bagasse will be stored on the storage yard for use in off season.

Molasses

250 T/d of Molasses is produced in the industry at average of 5 % on sugar cane crushed. It contains large percentage of non crystallisable sugar and is a valuable source of raw material for manufacture of ethyl alcohol or other products such as oxalic acid, lactic acid etc. Molasses is also used as nutritive additive in manufacture

of cattle feed. In the present industry the molasses is supplied mainly to distilleries for production of ethanol.

Press Mud

200 T/d of press mud is produced in the industry at an average 4 % on cane crushed in the sugar plant. It contains fibrous material and crop nutrients such as phosphorous and potassium and therefore it is disposed to farmers for use in agricultural land. The press mud will be composted along with spent wash generated from the distillery. The composted press mud is a bio- manure containing, fortified plant nutrient such as potassium, phosphorous and nitrogen.

Boiler ash

Boiler ash is un-burnt matter left out in the furnace after complete burning of bagasse in the boiler. Ash produced from bagasse will be 1.0 % on wet basis. Bagasse consumption in boiler is about 1400 T/d. The ash contains silica, and other metal oxides. It is a non-toxic material. It can be used as soil conditioner in agriculture land or in road formation. It can also be composted along with press mud to produce bio-manure.

ETP & lime sludge

Small quantity of sludge is produced from primary and secondary clarifiers in the industry. Major quantity of the sludge from secondary clarifiers is re-circulated to the aeration tank. Excess sludge of from clarifiers is dewatered and partially dried in sludge drying beds. The sludge with an average moisture content of 50 % produced from ETP will be 200 kg/d.

Hydrated lime is used in the plant for purification of juice and therefore, the quantity of lime sludge produced from the plant is small. The sludge with an average moisture content of 50 % produced from lime plant will be 5 % on lime utilized in the plant. A maximum of about 0.4 T /d of sludge will be produced from lime plant.

The quantities of various solid wastes produced from the sugar industry of 5000 TCD and for the annual cane crushing 10.5 lakh tons are summarized in Table-3.14.

Table-3.14 Solid Wastes from Co-gen Sugar Unit

Parameters	Bagasse	Press mud	Molasses	Boiler ash	ETP Sludge	Lime Sludge
i. Moister content %	50	75	20	--	50	50
ii. % of cane	30	4	5	1.0	-	-
iii. Tons per day	1500	200	250	14	0.1	0.4
iv. Tons for the season	315 000	42 000	42 000	4937	33	84

2. DISTILLERY UNIT

FERMENTER SLUDGE

The yeast and other sludge are obtained from the fermenter and bio-digester. The sludge is removed periodically from bio-digester and fermenter. The quantity of sludge after drying is about 2 T/month. The solids are mainly the spent yeast and other bio-mass. It contains plant nutrients such as phosphorus, potash, nitrogen and other bio materials. Hence, this is dried and then used in composting process along with the press mud. Dried sludge can also be used as cattle or poultry feed.

BOILER ASH

Potash and phosphate present in CSW will end up in boiler ash. Boiler ash is sent to farmers for use as soil nutrient. The quantity of boiler ash from distillery boiler will be 30 T/d.

SPENT OIL AND GREASE

Cooling and lubricating oils are used in diesel engine (D.G set), machinery gears in the plant and electric transformers. Spent oils of about 0.5 T/A will be generated from these units. Spent oil is sent to authorized reprocessors.

MUNICIPAL SOLIDS WASTE

Municipal solid waste is generated in residential quarters, factory office and store. The quantity will be about 200 kg per day. The solid waste collected will be segregated to separate glass. Plastic metal and other recyclable matter from bio-degradable matter. Bio-degradable matter, 60 kg/ d will be composted with agro mass such as press mud. The composted manure thus produced will be used in greenery development.

Chapter-4

SITE ANALYSIS

4.1 CONNECTIVITY

The project site is located at 1.3 Km from NH-218 (Bijapur-Hubli highway) and about 3 Km from Badami road. Nearest village is Kallapur-Kulageri Hobli. The proposed site is at a distance of 25 Km from Badami Taluk and about 40 Km form Bagalkot District. Nearest railway station is at 25 km at Badami Taluk. Nearest airport is in Hubli at 90 km & Belgaum at 120 Km from the project site. Google map showing the connectivity is given in Figure-4.1 and location features are given in Table-4.2

Table-4.1 Connectivity from the Project Site

Sl. No.	Road	Distance from the project site (km)
1	NH-218, Bijapur-Hubli road	1.3 Km, NE
2	SH-14 Badami road	3 Km, S
3	SH-133, Surebana-Kudalasangama road	5 Km, SW
4	SH-83, Manuli-Kotamachagi road	8 Km, SW
5	Badami railway station	25 Km, E
6	Malaprabha river	7 Km, S

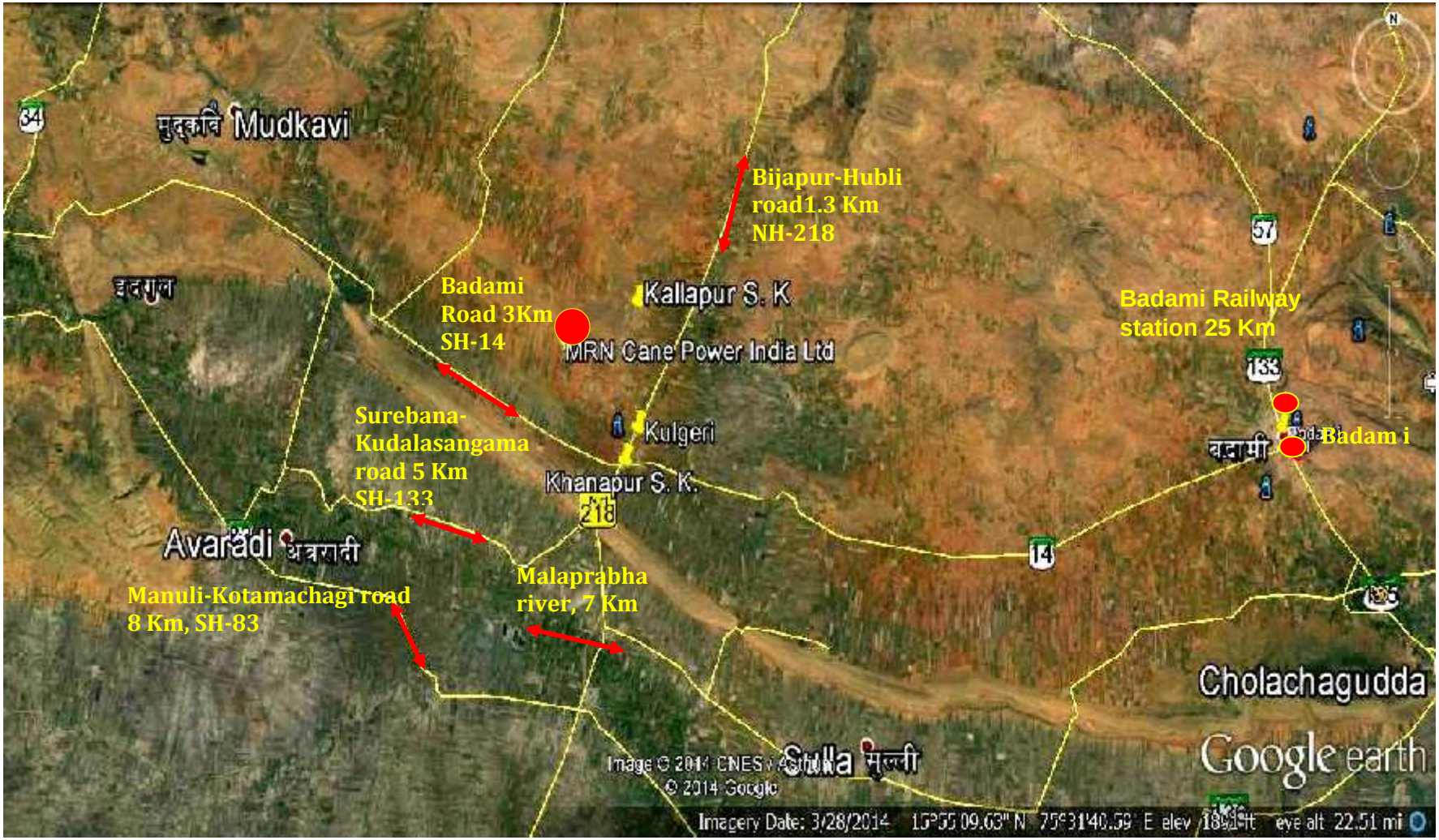


Figure-4.1 Google Map Showing Connectivity, MRN Cane Power India Ltd

Table-4.2 Location Features of the Project Site

Sl. No.	Features	Particulars
1	Location	Kallapur village-Kulageri Hobli, Badami Taluk, Bagalkot District, Karnataka
2	Latitude/Longitude	15° 15’ 21.30" N , 75° 30’ 44.87" E
3	Average altitude	577 m above MSL
4	Topography	Plain land
5	Temperature range	9.5^0C to 41.5^0C
6	Annual normal rain fall	579 mm
7	Average wind speed	5.8-7.65 km/hr
8	Predominant wind direction	W & SWW
9	Present land use	Proposed site is land converted to industrial area surrounded by irrigated agricultural land.
10	Nearest high ways	NH-218 at 1.3 km, SH-14 at 3 Km, SH-133 at 5 Km
11	Nearest Railway station	Badami at 25 Km
12	Nearest air strip	Hubli at 90 km & Belgaum at 120 Km
13	Nearest village	Kallapur village at 0.8 km to NNE
14	Nearest town	Badami at 25 Km
15	Nearest industries	Badami sugars Ltd, 15.80 Km Kedarnath sugars Ltd, 21.70 Km Dhanalakshmi sugars Ltd, 29.90 Km
16	Nearest water body /river	Malaprabha River at 7 Km, S
17	Nearest Archaeological place	Badami at 25 Km, E
18	Ecologically sensitive locations	No protected forest within 25 km, Badami is the Historical place at distance 25 km from the site.
19	Seismic characteristics	Seismic Zone-1 as per Indian Seismological Institute (relatively safe region)

4.2 LAND FORM, LAND USE & OWNWRSHIP

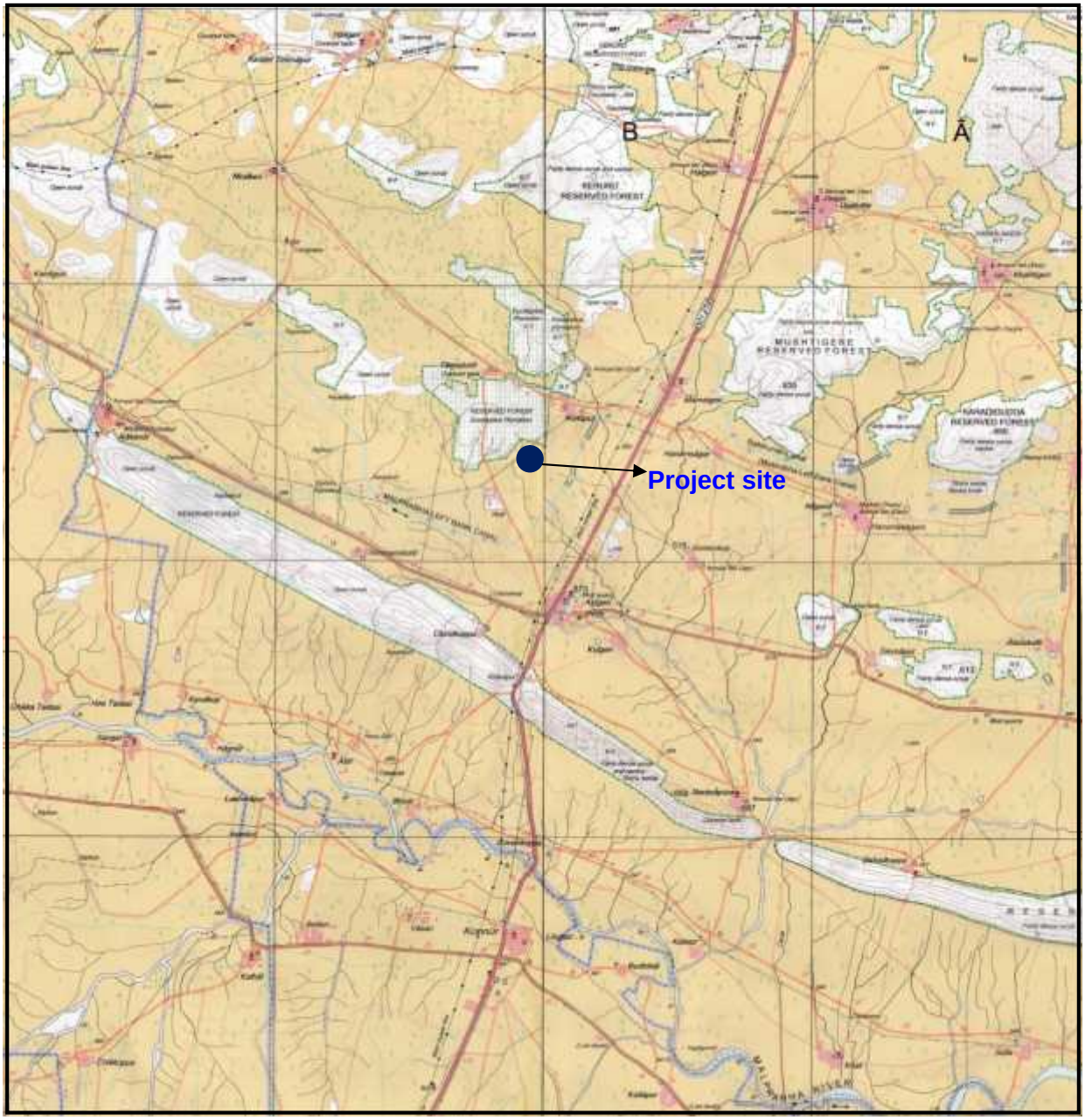
Total land required is 233 acres. High level committee of Govt of Karnataka has approved & recommended for purchase of land as per Section 109 of KLR Act. Land already purchased is 61 Acres & the balance land is in the process of procurement. M/s. MRN cane power LTD proposes to establish an integrated sugar unit of capacity 5000 TCD, Co-Generation Power Plant of 35 MW and Distillery of 65 KLPD capacity at Kulageri Hobli, Badami Taluk, Bagalkot District head quarters Karnataka. The site is Located between Kallapur and Khanapur villages and it is 40 km away from Bagalkot District. Nearest railway station is at Badami at a distance of 25 km from the site.

4.3 TOPOGRAPHY

The project site of M/s MRN Cane Power India Ltd is located at latitude of 15° 15' 21.30" N & longitude 75° 30' 44.87" E at an elevation of 577 m above MSL. The area around has normal flora consisting of Sugarcane, rabi and jowar, groundnut, cotton, maize, bajra, wheat, sugarcane and tobacco. Red sandy soil, red loamy soil & black cotton soil. Sugarcane is the most important crop in the area and dictates the economy of the farming community.

The Topo map showing the location of the project site is shown in Figure-4.2.

Figure-4.2 Topo Map Showing the Project Site



Lat: 15° 15’ 21.30" N, Long: 75° 30’ 44.87" E

(Source: Survey of India; Scale: 1:50000)

4.4 SOCIAL INFRASTRUCTURE IN THE REGION

Infrastructure is the basic physical and organizational structures needed for the operation of society or enterprise or the services and facilities necessary for an economy to function.

Social infrastructure typically refers to the technical structures that support a society, such as roads, water supply, sewers, electrical grids, telecommunications

and so forth and can be defined as "the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions.

Viewed functionally, infrastructure facilitates the production of goods and services, and also the distribution of finished products to markets, as well as basic social services such as schools and hospitals; for example, roads enable the transport of raw materials to a factory.

Education facilities are limited to primary and high schools. Primary education is available in most of the villages. For higher secondary and pre degree courses the villagers depend on nearby Kerur, Bagalkot and Hubli from project site. Higher education including engineering, medical and other professional facilities is available at Bagalkot (40 Km, N), Dharwad (70 Km, SW), Bijapur (NE) & Belgaum (W). Some of the villages in the vicinity are Kallapur (0.8 km, N), Kulageri (3 km S)Khanapur (3.5 km, S), Somapnakoppa (2.5 km, NE), Chimmanakatti (4 km, NW), Hanamsagar (3 km, NE).

Primary health centers are located in villages. For higher health care, people have to depend on nearby towns namely (25 km, E) & Ramadurga (25 km, W). Various private and public sector banks and also post offices are located in surrounding villages. Fire stations are available at Bagalkot, Jamakhandi, Hunagund & Mudhol. Railway stations are available at Badami & Bagalkot. Airports are available at Hubli & Belgaum. Highways NH-218 (1.3 km E) and SH-14 (3 km S) are adjacent to the proposed site.

4.5 METEROLOGICAL DATA.

The information in meteorological data of the region includes Temperature, Humidity, Rainfall and Wind velocity are essential before establishment of any project. Data for meteorological parameters will be collected within 10 km radius of the study area. The micro-meteorological parameters regulate the transport and diffusion of pollutants released into the atmosphere. The principal variables, which affect the micro-meteorology, are horizontal convection transport (average wind speed and directions) and vertical convection transport (atmospheric stability and inversion conditions) and topography of the area. The metrological data recorded

during the monitoring period is very useful for proper interpretation of the baseline information as well as for input to the predictive models of air quality dispersion. Historical data on meteorological parameters also play an important role in identifying the general meteorological status of the region.

The area experiences hot summer due to the topography and semiarid climate. The climate of the surrounding area is generally hot & dry except during the southwest monsoons. The whole year can be broadly divided into four seasons.

- Summer - March to June
- Spring - Jan to March
- Monsoons - July to October that contributes to rainfall
- Winter - November to Jan

Table-4.2 Rainfall details of Bagalkot district (10 years)

Taluk	Actual rainfall in mm										
	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**Average**
Badami	771	434	811	500	696	501	404	311	724	614	**576**
Bagalkot	836	619	892	676	488	433	381	236	421	509	**549**
Bilgi	791	643	844	665	617	479	412	239	501	474	**566**
Hungund	793	510	931	664	645	597	525	367	691	610	**633**
Jamkhandi	554	553	949	580	565	654	406	209	414	423	**530**
Mudhol	709	570	738	451	614	350	339	155	544	552	**502**
									District average		**579**

Table-4.3 Meteorological data of Bagalkot District (2003-2012)

Month	Temp, Avg		Relative humidity, Avg	
	Max.	**Min.**	**Max.**	**Min.**
Jan	30.1	14.0	66	30
Feb	32.2	15.1	61	30
Mar	35.0	18.0	62	32
Apr	35.7	19.5	72	46
May	34.0	20.6	78	58
Jun	27.5	20.6	85	76
Jul	25.2	19.8	90	92
Aug	25.6	19.4	92	87
Sep	27.0	19.0	89	81
Oct	30.1	18.6	81	64
Nov	29.3	17.1	70	47
Dec	29.3	13.9	67	35
Annual average	**30.1**	**18.0**	**76**	**57**

(Source: IMD Bangalore)

Chapter-5

PLANNING BRIEF

5.1 PLANNING CONCEPT

Sugar industry is an essential and sizable sector for industrialized economies. Since it is capital and energy extensive, companies have been putting consistent emphasis on technology advances in the production process to increase productivity and to save energy.

- Ensuring Complete Order Entry
- Ensuring Quality Assurance
- Production Execution & Energy Management
- Planning & Scheduling
- Decision Support

5.2 POPULATION PROJECTION

Total no. of people proposed for employment during operation phase in the proposed project will be 450. The employees stay mainly in nearby villages. With establishment of industry the associated activities and economy in the region is expected to increase. This is likely result in marginal enhancement in the population of the region.

5.3 LAND-USE PLANNING

The industry is envisaged adequate area for landscape, process section and utilities, storage areas for raw materials, finished products and internal movement of vehicles. The sugar cane cultivation area in the region will significantly increase.

5.4 ASSESSMENT OF INFRASTRUCTURE DEMAND

The infrastructure demand for M/s. MRN Cane Power India Ltd the project is detailed in the following sections.

5.4.1 ROADWAYS

Roadways are required for Transportation of employees to & from the industry during the operation phase. Transportation of raw materials to the industry during operation phase. Transportation of finished products from the industry during operation phase will be provided.

5.4.2 WATER SUPPLY & SEWERAGE INFRASTRUCTURE

Water demand for the industry will be met by Malaprabha river .The domestic sewage generated will be treated in septic tank and soak pit at respective places. The industrial waste water will be treated in ETP plant & re-used for green-belt development, dust suppression & road cleaning.

5.5 AMENITIES/FACILITIES

Amenities like, Library, Canteen, Toilets, Indoor Sports Room, Plant Medical Equipment, Drinking Water Facilities & usual Employee welfare activities will be provided for the proposed project.

Chapter 6
PROPOSED INFRASTRUCTURE

“M/s. MRN Cane Power India Ltd”, proposes to establish integrated sugar industry consisting of 5000 TCD sugar plant, 35MW co-gen power plant & 65 KLPD distillery. The infrastructure demand for the project is detailed in the following sections. The infrastructure facilities such as roads, greenery & green belt, storm water management, water supply, bulk storage facilities etc will be provided.

6.1 FACTORY PREMISES

The industrial processing premise will be provided with internal roads, road side gutters, Storm water gutters, sewage lines, Street lights, Flood lights, parking area.

- Landscaping, lawn and greenery will be developed in the premise.
- Rain water harvesting and rain water reservoir of adequate capacity will be built.
- Fire fighting and disaster management facility will be provided.

6.2 GREEN-BELT

Green belt and greenery will be developed in about 81 acres of land. The species developed will be as per CPCB guide lines. Assistance and guidelines will also be availed in development of greenery in the industry.

All the premise green belt of about 20 m will be developed. Line trees will be developed on either side of the internal roads as well on all approach roads to the industry. Lawns will be developed around plant and administrative buildings. Green belt of 10 to 20 m will be developed around open bulk storage yards.

6.3 SOCIAL INFRASTRUCTURE

Canteen, health care medical centre, Drinking water facility, transportation facility will be provided in the industry.

6.4 CONNECTIVITY

Good road facilities is needed around the project site for transportation of sugar cane, press mud, sugar etc. Existing roads around the project site will be upgraded.

6.5 ENVIRONMENTAL MANAGEMENT PLAN

A comprehensive environmental management plan will be adopted consisting of environmental protection and monitoring measures as indicated below.

- Establishment of pollution control facilities.
- Green belt and greenery development in and around the factory site
- Storm water management & Rain water harvesting
- Paving and lining of roads and fuel storage yards so as to avoid fugitive emissions.
- Fugitive emissions within the factory and storage yards are controlled by good housekeeping, water spraying and sprinkling.
- Regular Monitoring of stack emissions.
- Dust extraction at dust generating machinery/equipment.
- Safety & Occupational health care programs emergency management plan and safety management systems will be implemented in the distillery.

6.6 ENVIRONMENTAL MANAGEMENT SYSTEM

The industry will establish Environmental Management System to implement and monitor environmental policy and programs. It consists of the following.

6.6.1 ENVIRONMENTAL CELL

Environmental cell consisting of Unit Head and departmental heads. The responsibility of the Environmental cell is to effectively manage the environmental activities in the industry.

6.6.2 ENVIRONMENTAL DEPARTMENT

Environmental department consisting of Environmental Manager, laboratory chemists and operators. The responsibility of the Environmental department is to implement and operate pollution control and environmental protection measures.

6.7 ENVIRONMENTAL MONITORING PROGRAMME

The industry will implement self monitoring system with man power and facilities to ascertain the compliances of environmental norms and standards. A laboratory will be set up in the industry to analyze waste water, soil, stack emission, ambient air etc. The parameters will be regularly monitored as per MoEF/KSPCB guidelines during operation of the industry.

6.8 ENVIRONMENTAL RECORDS

Environmental department will maintain log sheets and manuals for operation and maintenance of pollution control and related facilities. Progress reports and statuary records as per environmental acts will also be maintained.

6.9 INVESTMENT ON POLLUTION CONTROL FACILITIES

Total cost of the project will be Rs. 40122 Lakhs. The investment to be made on EMP will be Rs. 2561 Lakhs. Recurring cost on EMP will be about Rs. 150 Lakhs per year.

6.10 SOCIO-WELFARE ACTIVITY

The Company will adopt a policy to involve in Socio Welfare Activities. The Sugar industry is basically agro based one and directly associated with farmers and other inhabitants of the region. The industry has proposed to take up socio-welfare activities as below over a period of 5 years.

Table-6.1 Socio Welfare Activity

Sl. No.	Particulars of activity	Budget, Rs. Lakhs
1	Drinking water facility with bore well, water storage tank and pump at isolated locations at 10 villages -Schools.	60.00
2	Assisting the village panchayat for cultural activities , 10 Nos.	60.00
3	Adopting school/students for development of quality education	150.00
4	Assisting local youths in development of technical skill and/vocational training, about 100 candidates	90 ,00
5	Assisting the village panchayat for development of greenery including medicinal and oil plants. 10 locations	60.00
6	Assisting the village panchayat for development Library facility, 10 locations	60.00
7	Need based assistance for benefit of the region	120.00
	Total	**600.00**

Chapter-7

REHABILITATION AND RESETTLEMENT PLAN

The Location of the proposed site and its immediate Vicinity does not involve human in habilitation or any other establishments. The proposed location is uncultivated or poorly cultivated agricultural land. The vegetation in the area is scanty which is proposed to be cleared. There are no existing trees.

In the view of above, the proposed project does not involve any displacement of persons and no rehabilitation of resettlements is necessary.

Chapter-8

PROJECT SCHEDULE AND COST ESTIMATES

8.1 PROJECT SCHEDULE

Time schedule for implementation of the project is given in Table-8.1

Table-8.1 Project Schedule

Sl. No.	Project Activity	Proposed time
1	Submission of EC application to MOEF GOI New Delhi	December 2014
2	TOR deliberations and approval of scoping and ToR for EIA studies from MOEF GOI New Delhi	January 2015
3	Conduct of EIA studies and preparation of Draft EIA	January-March 2015
4	Conduct of public Consultation	April 2015
5	Submission of final EIA report and Public Consultation proceedings to MOEF GOI New Delhi	May 2015
6	EIA deliberations and grant of EC	June 2015
7	Submission of CFE application to KSPCB Bangalore	July 2015
8	Deliberation of the proposal and grant of CFE to the industry.	August 2015
9	Commencement of proposed project construction	September 2015
10	Completion of project construction and submission of CFO application to KSPCB Bangalore	October 2016
11	Grant of CFO from KSPCB and the Commencement of commissioning and production	December 2016

8.1.1 IMPLEMENTATION SCHEDULE

The proposed project is schedule to be commissioned by January 2017. The following is the schedule of implementation.

Table-8.2 Project Schedule of Implementation

Sl.No	Project Activity	Proposed Time
1	Engineering & Design	July 2015
2	Enquiry and finalization of orders	September 2015
3	Supply	December 2015
4	Civil works	January 2016-June 2016
5	Installation	July 2016-October 2016
6	Trails and Commissioning	January 2017

8.2 COST ESTIMATES FOR EMP

Total investment towards environment management plan is given below.

Table-8.3 Cost Estimates of EMP for the Proposed Project

Sl. No.	Particulars	Amount, Rs. in Lakhs
1	Air pollution control	1045
2	Water pollution control	828
3	Green belt & greenery development, rain water harvesting, landscape development	88
4	CSR activity	600
	Total EMP cost	**2561**

8.2.1 ESTIMATED PROJECT COST

Total capital investment on the proposed industry is detailed as under

Table-8.4 Capital investment

Sl.No.	Particulars	Amount, Rs. in Lakhs
1.	Land	400.00
2.	Site development	154.00
3.	Total civil cost	5760.00
4.	Indigenous plant & machinery	29137.00
5.	Miscellaneous fixed assets	750.00
6.	Preliminary expenses	350.00
7.	Interest during construction	2100.00
8.	Contingencies	2171.85
Total Project Cost		**40122.85**

Chapter-9

CONCLUSIONS

M/s. MRN cane power LTD. has proposed to establish sugar industry of 5000 TCD along with 35 MW power generation and 65 KLPD distillery unit at Kulageri village, Badami taluk, Bagalkot district, Karnataka state.

1. The proposed agro based sugar industry with product and by products has national priority to overcome energy and food crisis. Sugar industry also has export potentials to earn foreign exchange.

2. Alcohol is widely used as ingredient in beverages and thereby a source revenue to the Government. As a substitute to petroleum, alcohol is used as fuel in automobiles and as raw material for many chemical products. Petroleum is scarce, costly and harmful to the environment.

3. The distillery involves an advanced alcohol technology with continuous fermentation and multi pressure vacuum distillation whereby resource consumption such as power, water, power and raw material molasses are considerably reduced. The distillery is associated with co-gen power plant and the total requirement of electric power will be met from captive source. The spent wash generated as process effluent from distillery is treated by concentration and burning along with bagasse or coal as fuel in the boiler to achieve zero discharge of spent wash.

4. The industry will be located in the rural backward region of the state. The site is about 3 km distance from the nearest village. The site and surrounding is dry land. There are no protected forests, sanctuary, archeological important structures or other sensitive locations in the vicinity of the factory. However, the perennial river Malaprabha is flowing at a distance of about 6 km from the site. Bagalkot district is identified for development of agro-based and specifically sugar cane and horticulture activities.

5. The land area of the proposed site is 163 acres and this adequate for locating plant facilities, green belt, bulk storage and locating pollution control facility and provision for miscellaneous need and future establishment. The lands identified for the project are uncultivated or poorly cultivated rain fed agriculture lands.

6. The industrial by-products produced such as Bagasse, Molasses, Press mud have been profitably utilized without letting them to environment. Bagasse is used as fuel in production of captive power. Molasses is used in the production of alcohol in distillery unit to use as raw material. Press mud is

used in the composting process of spent wash which, is used as bio-manure for the agriculture.

7. The concept of Reduce, Recycle and Reuse will be practiced in the industry. Water present in sugar cane (70 % on cane) is recovered and reused in the process.

8. Effluent generated in the industry is treated and reused for industrial purpose and the excess will be used for irrigating agricultural land for growing sugarcane. Condensate water generated from cane juice evaporator in the case of sugar unit and from spent wash evaporator in the case of distillery will be treated and reused in the industry.

9. Gaseous emissions from the industry are mainly from boilers. In the case of co-gen sugar the boiler is fired with agro-waste biomass (such as bagasse and cane thrash) along with coal as support fuel and in the case of distillery the boiler is fired with concentrated spent wash admixed with coal or agro waste biomass as support fuel. The boiler will be provided with air pollution control measures. Co-gen sugar boiler will be provided with ESP along with chimney. Distillery boiler will be provided with high efficiency venture type wet scrubber and chimney.

10. Boiler ash produced from bagasse fired boiler in the case of co-gen sugar unit and distillery boiler fired with spent wash will be used as soil conditioner and nutrient in agriculture lands.

11. The industry will adopt an effective environment management system and environment management plan to protect the environment. The management will incorporate health care and safety management schemes in the industry. The industry has proposed to storm water management, water harvesting plan and green belt/greenery development in the industry.

12. The industry has taken all the necessary preventive measures to mitigate even the small effects which may be caused by industrial activities. This industry will not produce any toxic products and will not have significant adverse effect on the quality of land, water and air. Therefore, the proposed industry will not have adverse effect on the environment or the eco system.

13. The project creates opportunity to farmers, to the local population and society will be benefited by the industry in terms of job opportunity to locals, scope for petty business near the project site, opportunity for transport activity and infrastructure development like road and water supply etc.