PRE- FEASIBILITY REPORT

For

Proposed expansion of
Sugar Plant from 6000 TCD to 11500 TCD
Cogeneration power from 37 MW to 57 MW

E.I.D.-Parry (India) Limited

Hullatti Village, Haliyal Taluk
Uttara Kanada District, Karnataka

1.0 EXECUTIVE SUMMARY

E.I.D.-Parry (India) Limited is an existing Integrated Sugar Complex operating at Hullati Village, Haliyal Taluk, Uttara Kannada District.

The following is the capacity of the existing Integrated Sugar Complex

Sr. No	Unit	Capacity
1.	Sugar	6000 TCD
2.	Co-gen Power plant	37 MW
3.	Distillery	90 KLPD

Total area already in possession of the management is 226 acres.

Now the company has proposed to enhance the capacity of the Integrated Sugar Complex. The proposed expansion will be taken up in the existing plant premises only.

The following will be the capacities after proposed expansion

Sr. No	Unit	Capacity		
		Existing	Expansion	Total
1.	Sugar	6000 TCD	5500TCD	11500 TCD
2.	Co-gen Power plant including power from Distillery	37 MW	20 MW	57 MW
3	Distillery	90 KLPD	--	90 KLPD

The following is the summary of the proposed expansion project

S. No.	Parameters	Description
1.	Existing Plant capacity	Sugar – 6000 TCD Co-gen power – 37 MW Distillery – 90 KLPD
2.	Proposed expansion	

Sr. No	Unit	Capacity		
		Existing	Expansion	Total
1.	Sugar	6000 TCD	5500 TCD	11500 TCD
2.	Co-gen Power plant including power from Distillery	37 MW	20 MW	57 MW
3.	Distillery	90 KLPD	--	90 KLPD

S. No.	Parameters	Description
3.	Total area already in possession	226 acres
4.	Sy. No. of the land	**survey no. of Hullatti Village** 6/1 part, 6/2 part, 7/1 part, 7/2, 9 part, 10, 11 part, 12/1, 12/2, 12/3, 13/1, 13/2, 13/3, 13/4, 14/1 part, 14/2 part, 16/1, 17, 18/1, 18/2, 18/3, 19, 20/1, 21/1, 20/2, 21/2, 22, 23, 24, 25, 26, 27/1, 27/2 A, 27/2B, 28, 30, 31/1, 31/2, 80 part, 81/1, 81/2 A, 81/2B, 81/2C, 81/2D, 82, 83/1, 86 Part, 90, 115/3 Part, 122/A3, 123/2 Part, 124 part, 125/1A Part, 125/1B, 126/part and **Survey no. of Alloli village** 18/1, 18/2.
5.	Project cost (expansion)	Rs. 230 Crores
6.	**Water requirement**	
a.	Water requirement for existing plant	3161 KLD (Sugar+ Cogen+ Distillery as Complex)
b.	Water requirement for the proposed expansion	330 KLD
c.	Total water requirement	3491 KLD
d.	Source of water	Kali River Permission for drawing 3491 KLD of water from Kali River has already been obtained
7.	Waste water generation	
a.	Effluent generation from the existing plant	2169 KLD
b.	Effluent generation from the expansion	1191 KLD
8.	Existing Effluent treatment	**Sugar Plant** Effluent generated from the Sugar plant is being treated in specially designed ETP and treated effluent is being utilized for greenbelt development after ensuring quality of treated effluent with standards stipulated for onland for irrigation by CPCB / KSPCB. **Power Plant** Cooling tower blowdown and DM plant regeneration water is being recycled into process. Boiler blowdown and service water effluent is being treated in neutralization tank and treated effluent is being utilized for greenbelt development / ash conditioning / dust suppression in the plant premises after ensuring quality of treated effluent with standards stipulated for onland for irrigation by CPCB / KSPCB

S. No.	Parameters	Description
		Distillery Plant Spent wash is being concentrated through Multiple Effect Evaporators and concentrated Spent wash thus obtained is being incinerated in 15 TPH Boiler. The condensate generated during evaporation is being treated in Sugar Plant ETP and being utilized for greenbelt development / ash conditioning / dust suppression in the plant premises after ensuring quality of treated effluent with standards stipulated for onland for irrigation by CPCB / KSPCB
9.	Effluent treatment (proposed expansion)	**Sugar Plant** Effluent generated from the Sugar plant will be treated in specially designed ETP and treated effluent will be utilized for greenbelt development after ensuring quality of treated effluent with standards stipulated for onland irrigation by CPCB / KSPCB. **Power Plant** Cooling tower blowdown and DM plant regeneration water will be recycled into process. Boiler blowdown and service water effluent will be treated in neutralization tank and treated effluent will be utilized for greenbelt development / ash conditioning / dust suppression in the plant premises after ensuring quality of treated effluent with standards stipulated for onland irrigation by CPCB / KSPCB
10.	Steam requirement (existing)	Steam requirement existing sugar plant is being met from existing 165 TPH Cogeneration power plant Boilers (1x 120 TPH+ 1 X 45 TPH)
11.	Steam requirement (expansion)	Steam required sugar plant will be met from proposed 100 TPH Cogeneration power plant Boiler and steam available in the existing boilers
12.	Air emissions (existing)	Emissions from Project are Particulate matter, SO_2 and NOx ESP has been provided to boiler to bring down the particulate matter to below 150 mg/Nm^3. The exhaust gases from the boiler are being discharged into the atmosphere through TWO stacks of 72 m and 45 m height respectively for effective dispersion of gases into the atmosphere.
13.	Air emissions (expansion)	Emissions from Project will be Particulate matter, SO_2 and NOx ESP will be provided to 100 TPH Boiler to bring down the particulate matter to below 50 mg/Nm^3. The exhaust gases from the boiler will be discharged into

S. No.	Parameters	Description
		the atmosphere through a stack of 72 m height for effective dispersion of gases into the atmosphere.
14.	Noise levels	Ambient Noise levels are within the standards prescribed by MoE&F Notification and its amendments and after proposed expansion also similar practice will be followed.
15.	Solid waste generation (existing)	**Sugar Plant** Mud generated from the Sugar plant is being recycled to diffusers Bagasse generated from the Plant is being utilized as fuel for power generation in Co-generation plant boiler ETP sludge generated is being utilized as manure **Power Plant** Ash generated from the power plant is being given to farmers as organic manure when bagasse / biomass is used as fuel and being to disposed off to brick manufacturers, when coal is used as a fuel. **Distillery** Yeast sludge generated is being incinerated along with concentrated spent wash Ash generated from incineration boiler is being sent to Group Fertilizer units
16.	Solid waste generation (expansion)	**Sugar Plant** Mud generated from the Sugar plant will be converted to press mud in suitably sized rotary vacuum filter Bagasse generated from the Plant will be utilized as fuel for power generation in Co-generation plant boiler ETP sludge generated will be utilized as manure **Power Plant** Ash generated form the power plant will be given to farmers as organic manure when bagasse / biomass is used as fuel and will be disposed off to brick/cement manufacturers when coal is used as fuel.
17.	Noise levels	Ambient Noise levels are within the standards prescribed by MoE&F Notification and its amendments and after proposed expansion also similar practice will be followed.

2.0 INTRODUCTION:

2.1 Identification of project and Project Proponent

EID Parry (India) Limited is a distinguished and rapidly expanding sugar producer in India. Our sugar manufacturing facility is certified ISO 9001:2008, FSSC:22000:2005 and the distillery is certified "zero-effluent."

We are deeply committed to a larger vision of our social responsibility, of looking after the needs and quality of life of the farmers and local communities. Through our effective farmer partnership model we provide assistance in farming practices and undertake various economic initiatives for the benefit of the local communities.

The Promoters

The following is the list of promoters of the group

S.No	Name	Designation
1.	Mr. A.Vellayan	Chairman
2.	Mr. V.Ravichandran	Vice Chairman
3.	Mr. Anand Narayan Bhatia	Director
4.	Mr. V.Manickam	Director
5.	Mr. M.B.N.Rao	Director
6.	Mr. Rca Godbole	Director
7.	Mr. V.Ramesh	Managing Director
8.	Mr. S.Suresh	Dy. Managing Director

2.2 Brief Description of nature of Product:

2.2.1 Sugar

Sugar known as sucrose or saccharose is an anhydrous crystalline organic product of comparatively 99.96% purity. The physical properties of sucrose are defined as follows

CRYSTALLINE NATURE:

Sucrose crystals are hard and belong to the mono-clinic system, characterized by three axes of unequal length. Density of sucrose is equal to 1.606 gm/cu.cm. The presence of impurities in sugar have a remarkable influence on the formation of the crystals.

SOLUBILITY:

Sucrose is very soluble in water and in dilute ordinary alcohol. The solubility in water increases with the rise in temperature, such that for a 10% sucrose solution, the boiling point is 100.04 Deg.C and for a 90% sucrose solution the boiling point is 130 Deg.C. It is insoluble in chloroform, in cold absolute alcohol, either and glycerine.

SPECIFIC GRAVITY:

The specific gravity of sucrose varies from 1.033 to 1.106 according to the concentration of the solution. The density of the sugar solution is determined in practice by brix and baume spindles or balling saccharimeter.

OPTICAL ROTATION:

Sucrose and glucose rotate the plane of the polarised light in a `clockwise' direction or to the right and is called dextro-rotatory. Fructose, rotate in a `counter clock wise' direction or to the left and is known as levo-rotatory. The specific rotation of sucrose is 66.5 Deg.

CHEMICAL PROPERTIES:

Dry sugar (sucrose) melts at 160 Deg.C into a thick transparent liquid which on cooling again becomes crystalline. If heated for a long time at 160 Deg.C sucrose splits up into glucose and levulosane. At higher temperatures between 190 to 220 Deg.C the decomposition is more complete and caramel is produced. On further, heating, carbondioxide, carbon monoxide, acetic acid and acetone are produced.

In the presence of moisture, sucrose decomposes at 100 Deg.C and becomes dark in colour liberating water. On prolonged heating of sucrose at the boiling point and at ordinary pressures, the dissolved sucrose combines with water and breaks up into glucose and fructose in equal parts and the phenomenon is called Hydrolysis of Inversion.

APPLICATIONS:

The principal use of sugar as explained is as the sweetening agent in foods. The consumption of sugar is distributed in the various sectors such as for daily human consumption in household sector for food processing industries, beverages, baking industry, confectioneries and miscellaneous users. Sucrose serves as raw materials for manufacture of glucose, fructose, invert sugar syrups etc.

Non-food uses of sugar constitute a small amount of total sugar consumption. They include use of sugar as a octacetate, a denaturant in ethyl alcohol, as sucrose diacetate, Hexa-isobutyrate, octa benzoate, as mono and difatty acid esters for surfactants, as allyl sucrose, in plasticisers and as raw materials for manufacture of various chemicals like glycerol, mannitol etc.

Dextran is a polysaccharide produced from sucrose by the biological process and is a very effective plasma volume expander. Sucrose when administered by intravenous infusion relieves shock and prevents loss of body fluids after excessive burns, wounds or infectious diseases. Other industries wherein sucrose is finding application towards drying oil esters for surface coating industries and sugar derived detergents.

PRODUCT SPECIFICATIONS:

The specifications required for white sugar complying with Indian sugar standards are defined as follows :

Characteristics	Requirements
Moisture (%) weight	0.05% Max.
Pol	99.5% Min.
Reducing sugars (%) by weight	0.10% max.
Conductivity x $[10^6]$	100 max.
Sulphur dioxide (ppm)	70 max.
Calcium oxide (CaO) (mg/100gm)	30 max.
Turbidity, (%) by weight	15 max.

2.2.2 Power

Power is generated by converting the thermal energy of steam into electrical energy through Turbo-generator.

The power generated will be utilized for meeting the power requirements for sugar, Distillery and other auxiliaries. Remaining power after meeting the power requirement for the project, will be exported to Haliyal sub-station.

2.3 Demand – Supply Gap:

The sugar industry today is facing fierce competitive situation due to fluctuations in sugar prices in the national & international markets, higher cane prices to be paid to the cane growers, rising input costs, etc. The survival and growth of this industry depends on energy efficiency, cost optimization and revenue generation from bi-products and down steam products including power, ethanol, chemicals, etc.

The implementation of co-gen power plant concurrently with the sugar modernization cum expansion project along with other by-products, right from the beginning goes a long way to integrate the operations and improve sustainability.

Sugar Industry Overview, India & Karnataka

The origin of Indian sugar industry dates back to 1930, when the first sugar factory was set up in the pre-independence era. Over the last 76 years, the sugar industry has steadily grown and has become the backbone of the agricultural and rural economy in India. Today, sugar is the second largest agro processing industry, next to the textile industry. India is one of the largest producers of sugar in the world, with a production of over 15 million tones. Sugar factories are located mostly in the rural India. They act as centers of development, provide largest direct employment in the rural areas and contribute substantially to the Central and State exchequers. The prospects of earning foreign exchange from export of sugar are also quite high.

Sugar factories in India have capacities ranging from 1250 TCD to 10000 TCD. The Indian sugar industry has developed indigenous capabilities for design, manufacture, supply, operation and maintenance, R&D and cane development. The major stakeholders of this industry in India are Ministry of Agriculture, Govt. of India, Ministry of Consumer Affairs, Food and Public Distribution, federations of co-operative and private sector sugar factories at the national and the State levels, sugarcane growing farmers, equipment and technology suppliers, research institutions, consultants and service providers, financial institutions and Central / State Governments.

A total of 727 sugar factories are in operation today, with additional few new sugar factories under implementation in different parts of the nation. The area under sugar cane cultivation, sugar cane production, sugar cane crushing in sugar factories, average season days, sugar recovery and sugar production has increased steadily over the years. The crop yield per hectare and recovery has improved, particularly in the last decade.

Following Table shows the distribution of sugar factories all over India.

Status of Sugar Factories in India

State	Private	Public	Co-op	Total
Assam	1		2	3
Orissa	4		4	8
Bihar	13	15		28
Uttar Pradesh	116	14	28	158

State	Private	Public	Co-op	Total
Uttarakhand	4	2	4	10
Punjab	8		16	24
Haryana	3		13	16
Andhra Pradesh	20	1	12	33
Telangana	10		1	11
Tamilnadu	27	3	16	46
Maharashtra	80		169	249
Gujarat	5		22	27
Madhya Pradesh	16	2	5	23
Kerala	1		1	2
Rajasthan	**1**	**1**	**1**	**3**
Karnataka	48	3	25	76
Pondicherry	1		1	2
Goa			1	1
Chattisgarh			1	1
Dadra Nagar & Haveli			1	1
West Bengal	**2**	**1**		**3**
All India Total	**360**	**42**	**325**	**727**

Source: Sugar India Year book, 2016

The Ministry of Consumer Affairs, Food & Public Distribution, and Government of India revised the standard specifications for sugar plant & equipment, in the year 1987. The special committee finalized specifications for economical capacity of 2500 TCD, expandable to 3500 TCD, employing higher-pressure boiler and turbine configuration and efficient equipment, with a potential to export incidental surplus power to the grid.

The Indian sugar industry was de licensed in the year 1998 vide press note No. 12 issued by the Government of India, Ministry of Industry, Department of Industrial Policy and Promotion, on August 31, 1998. The salient features of de licensing are as follows:

- The sugar industry stands deleted from the list of industries requiring compulsory licensing under the provisions of Industries Development and Regulation Act, 1951. However, in order to avoid unhealthy competition among sugar factories to procure sugarcane, a minimum distance of 15 km would continue to be observed between and existing sugar factory and a new factory, by exercise of powers under the Sugar Control Order, 1966.
- The entrepreneurs, who wish to de-license their sugar factory, would require filing an Industrial Entrepreneur Memoranda (IEM) with the secretariat of industrial assistance in the Ministry of Industry, as laid down for all de-licensed industries, in terms of the press note dated August 2, 1991, as amended from time to time.

- Entrepreneurs who have been issued Letter of Intent (LoI) for manufacture of sugar need not file an initial IEM. In such cases, the LoI holder shall only file Part B of the IEM at the time of commencement of commercial production against the LoI issued to them. It is however open to entrepreneurs to file an initial IEM (in lieu of LoI / industrial license held by them) if they so desire, whenever any variation from the conditions and parameters stipulated in the LoI / industrial license is contemplated.

The statistics on economic and commercial performance for the industry is quite fluctuating. The changes in the agro climatic conditions and sugarcane crop production, as well as the sugar markets have been mainly responsible for these fluctuations. Efficiency, quality, and integration have become order of the day for this industry. The industry has grown till today over the last seven decades. The strength and capacity built so far will surely help meet these challenges. The following are major options to meet these challenges:

a. Effecting substantial improvement in cane development and management, including cultivation practices, varietals and water management, so as to improve yield and recovery, without affecting the average fibre content.
b. Effecting visible improvement in the operational efficiencies and reduction of sugar losses.
c. Effecting and sustaining improvement in energy efficiency, both in steam and power, for saving of additional bagasse, for both sugar and by-products manufacture.
d. Effecting adequate capacity building within and without.
e. Maximizing sugar exports for value addition.
f. Effective marketing in the national and international markets.
g. Product quality and diversification.
h. Commercializing the excess power capacity by exporting to utilities or to other bulk power consumers.

Ministry of Consumer Affairs, Food & Public Distribution Department of Food & Public Distribution Government of India has issued a revised order dated November 10, 2006, amending Sugarcane (Control) Order, 1966. The key provisions of this order are outlined below:

a. No new sugar factory shall be set up within a radius of 15 km of any existing sugar factory or another new sugar factory in a State or two or more States.
b. Before filing the Industrial Entrepreneur Memorandum (IEM) with a Central Govt., a certificate from the Cane Commissioner or Director Sugar or specified authority of the

concerned State Govt. shall be obtained regarding the distance criteria re-defined as above.

c. Submission of performance guarantee of Rs. 1 crore to Chief Director, Sugar, Dept. of Food & Public Distribution, within 30 days of filing the IEM, as a surety for implementation of the IEM within the stipulated or extended time.
d. The stipulated time for taking effective steps shall be 2 years and commercial production shall commence within 4 years from the date of filing of the IEM, failing which the IEM shall stand de-recognized and performance guarantee shall be forfeited.
e. If an IEM remains un-implemented within the stipulated or extended time limits, the performance guarantee shall be forfeited after giving a reasonable opportunity of being heard.
f. The above clauses will be applicable for IEM already acknowledged as on the date of this notification, but who have not taken effective steps for its implementation, duly defined, shall furnish a performance guarantee of Rs. 1 crore to the Chief Director, Sugar.

Power Sector Review

The maximum demand met by the state has increased from 7,815 MW in FY 2011 to 9,549 MW in FY 2015 showing a growth of 22% during the 4 year period, while energy requirement has increased by 29% during the same period. The maximum demand deficit has however reduced due to many DSM activities undertaken by DISCOMs and sourcing of power on short term basis to meet the need.

The average daily consumption of registered rural domestic consumers has increased to 1.19 kWh in FY 2015 at CAGR of 4% during the last 6 years. On the other hand, the average daily consumption of registered domestic urban consumers has increased to 3.00 kWh in FY 2015 at CAGR of 3% during the same period.

As per projections made in 18th EPS of CEA, the projected energy demand and maximum demand for the state of Karnataka was 89,285 MU and 14,945 MW in FY 2019 as against the now calculated energy requirement of 87,626 MU and maximum demand of 14,710 MW in FY 2019.

2.4 Employment generation (Direct & Indirect):

The man power required for the industry is 1153 Nos. which is inclusive of 268 nos. on permanent basis and rest all will on Temporary or contract basis.

S.No.	Particulars	No. Employees	
		Existing	Expansion
1.	Technical & Administrative Staff	228	40
2.	Skilled & Semi Skilled (Contract basis)	180	120
3.	Unskilled & Helpers (Contract basis)	385	200
Total		**793**	**360**

3.0 PROJECT DESCRIPTION:

3.1 Type of the Project:

The proposed Project mainly involves

- ⇒ Production of Sugar from Sugarcane
- ⇒ Power generation using Bagasse / Coal as fuel

3.2 Location:

E.I.D.-Parry (India) Limited is an existing Integrated Sugar Complex operating at Hullati & Alloli Villages, Haliyal Taluk, Uttara Kannada District.

Now the company has proposed to enhance the capacity of the whole Integrated Sugar complex. The proposed expansion will be taken up in the existing plant premises only.

3.3 Details of the Alternate sites:

No Alternate sites have been examined as existing premises has been given permission to set up Integrated Sugar Complex.

3.4 Size or Magnitude of Operation:

The following will be the capacities after proposed expansion

Sr. No	Unit	Capacity		
		Existing	Expansion	Total
1.	Sugar	6000 TCD	5500 TCD	11500 TCD
2.	Co-gen Power plant including power from Distillery	37 MW	20 MW	57 MW
4.	Distillery	90 KLPD	-	90 KLPD

3.5 Process details:

3.5.1 Sugar Process Description

Cane diffusion & Juice Extraction:

Sugarcane from the fields are weighed and fed in cane carrier by means of cane unloaders. The cane is passed through Whole cane shredder. The Shredder improves the extraction of the juice in Diffuser by extraction through osmosis/leaching. The magasse coming out of diffuser with about 80% moisture will be de-watered with the help of two de-watering mills to

bring down the moisture to about 48-50% enabling it to be fed to the boiler for steam generation

Boilers:

In boilers, condensate water is converted into steam by burning bagasse as fuel. Steam produced in boilers is used in the steam turbine to generate power and the exhaust steam coming out from the turbine is used in the process for sugar manufacturing.

Power House:

Power House consists of steam turbine and alternator. The alternator is driven by steam turbine and power is generated. The generated power is used to meet the in-house power requirement of the factory and the surplus power is exported to grid. The in-house LP steam from the steam turbine is used for sugar processing at the boiling house.

Clarification:

The extracted juice from Diffusor is called as raw juice and it is heated to 70 – 75 Deg. C. in juice heaters and treated simultaneously with the milk of lime and sulphur dioxide gas in order to separate the impurities. The sulphited juice is again heated to 102 Deg. C through juice heaters and allowed to settle in the clarifier. The purified juice, which comes out from clarifier, is called as clear juice and is sent to evaporator for concentration. The settled impurities are called mud. The mud contains small amount of juice and mud recycled to diffuser.

Evaporation:

The clear juice after clarification is concentrated in evaporators by evaporating the 75% of the water present in it. Evaporators are huge vessels consist of calendria where the juice is made to flow through the tubes and around which steam is passed. The clear juice of 14 – 15 Brix is concentrated to 60 Brix. Concentrated juice is then called syrup. The syrup is again treated with sulphur dioxide (Bleaching agent).

Crystallisation:

The sulphited syrup is concentrated further in the vessels called pans. During the above process, sugar crystals are developed by means of exhaustion. The formed crystals are then

cooled in crystallisers. The crystals are surrounded by thin film liquid called as mother liquor. The crystal along with the mother liquor (Molasses) is called as massecuite.

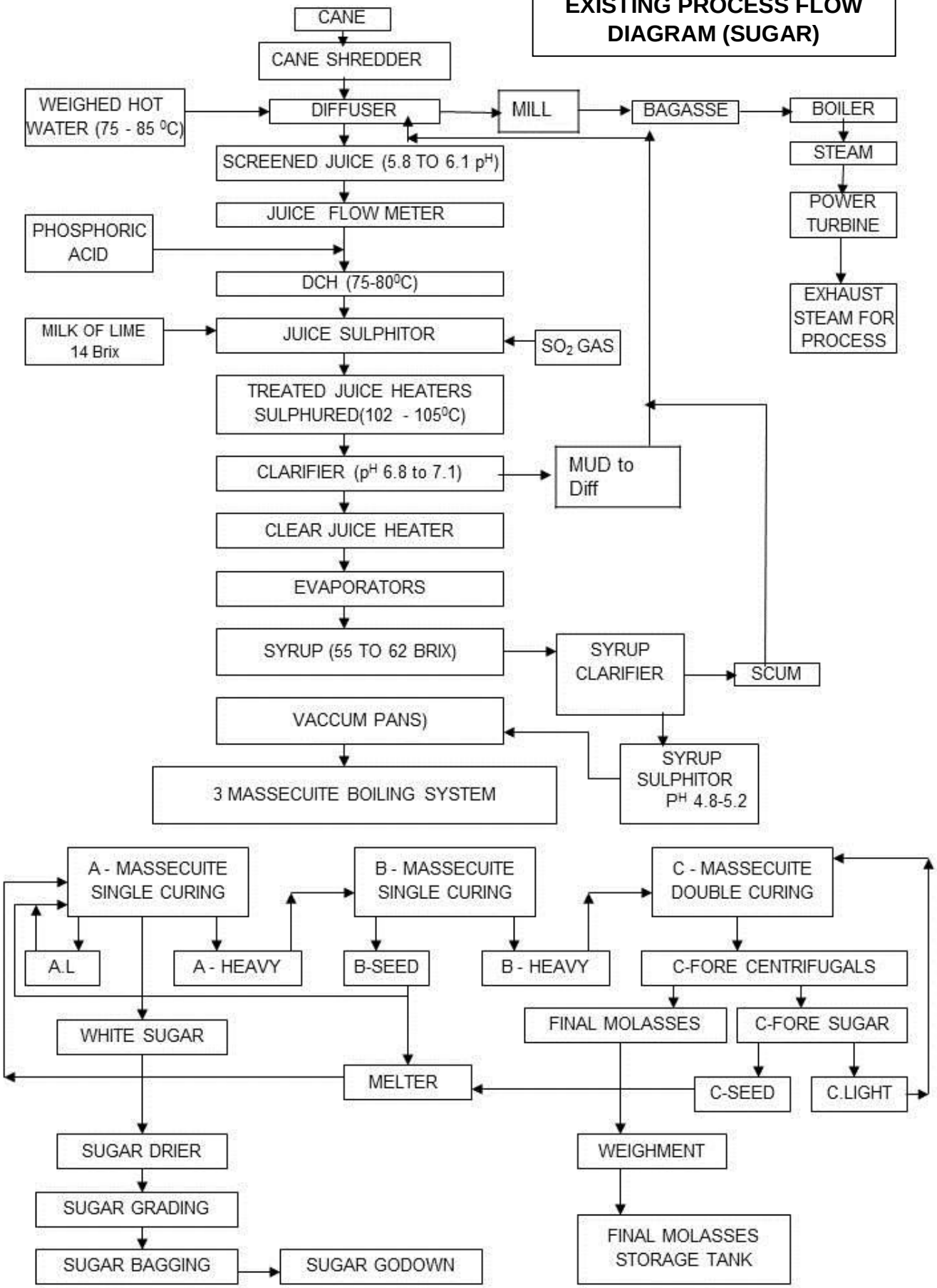
Curing:

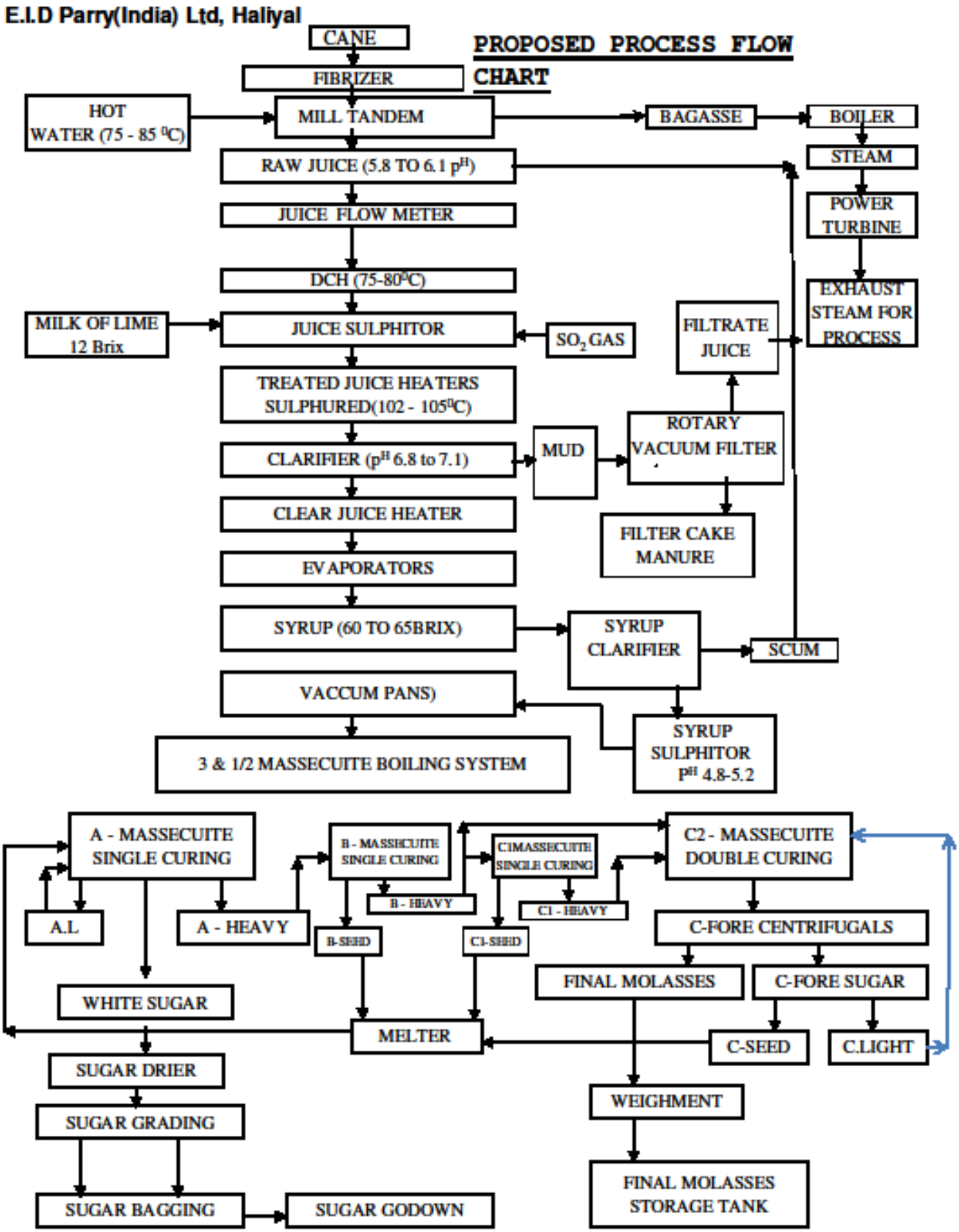
The above massecuites are centrifuged in centrifugal machines, where crystals are separated from the mother liquor. Separated mother liquor of A & B massecuites are again used for boiling and maximum exhausted mother liquor is called as Final Molasses, which is stored in the steel tanks and sent to distillery for manufacture of Ethyl alcohol. The separated sugar crystals are dried in hopper, sieved in graders and bagged.

Bagging:

Sugar is bagged in PP bags and each bag contains 50 kg sugar net. The bags are stacked in sugar godowns and are dispatched based on the orders.

EXISTING PROCESS FLOW DIAGRAM (SUGAR)




E.I.D Parry(India) Ltd, Haliyal
PROPOSED PROCESS FLOW CHART
CANE
FIBRIZER
HOT WATER (75 - 85 °C)
MILL TANDEM
BAGASSE
BOILER
STEAM
POWER TURBINE
EXHAUST STEAM FOR PROCESS
RAW JUICE (5.8 TO 6.1 pH)
JUICE FLOW METER
DCH (75-80°C)
MILK OF LIME 12 Brix
JUICE SULPHITOR
SO2 GAS
FILTRATE JUICE
TREATED JUICE HEATERS SULPHURED(102 - 105°C)
CLARIFIER (pH 6.8 to 7.1)
MUD
ROTARY VACUUM FILTER
FILTER CAKE MANURE
CLEAR JUICE HEATER
EVAPORATORS
SYRUP (60 TO 65BRIX)
SYRUP CLARIFIER
SCUM
VACCUM PANS)
SYRUP SULPHITOR pH 4.8-5.2
3 & 1/2 MASSECUITE BOILING SYSTEM
A - MASSECUITE SINGLE CURING
A.L
A - HEAVY
WHITE SUGAR
B - MASSECUITE SINGLE CURING
B - HEAVY
B-SEED
C1MASSECUITE SINGLE CURING
C1 - HEAVY
C1-SEED
C2 - MASSECUITE DOUBLE CURING
C-FORE CENTRIFUGALS
FINAL MOLASSES
C-FORE SUGAR
C-SEED
C.LIGHT
MELTER
SUGAR DRIER
SUGAR GRADING
SUGAR BAGGING
SUGAR GODOWN
WEIGHMENT
FINAL MOLASSES STORAGE TANK

3.5.2 Co-generation Power Plant

Sugar plant will be expanded to 11500 TCD from 6000 TCD. The cogeneration capacity is so designed that the plant will be able to feed steam and power requirements entire Sugar Complex. The capacity of the boiler will be 100 TPH at 110 ata and 540+/- 5 deg C. The turbine capacity would be 20 MW at 110 ata and 545 ºC steam parameters. Cogeneration plant will be expanded from existing 37MW to 57 MW. The new turbine will be of Extraction-cum-condensing type.

For off-season operation, we will utilize the purchased biomass fuel, saved bagasse and imported coal. The season period will be 5 to 6 months and off-season will be 3 to 4 months depending on the availability of fuels at economical price.

3.6 Raw Materials

The following will be the raw material requirement for the for the existing and proposed expansion project

S.NO	RAW MATERIAL	SOURCE	QUANTITY (TPD)			METHOD OF TRANSPORT
			Existing	Expansion	Total	
Sugar plant :						
1	Sugar Cane	Local area	6000	5500	11500	By trucks, tractors& bullock carts
2	Lime (0.165 % on cane)	Local area	9.9	9.075	18.075	Through covered trucks by Road
3	Sulphur (0.05% on cane)	Local area	3.0	2.75	5.75	Through covered trucks by Road
Co-gen power plant :						
1	**Fuel**					
	Bagasse (2.75 S/F Existing) (2.4 S/F for proposed)	From Sugar plant	1440	1000	2440	Conveyor
			(or)			
	Coal	Imported	576	480	1056	By Sea/ Rail/Road Covered trucks

3.7 Resource Optimization / recycling and reuse:

Sugar Plant

Condensate from the Sugar Plant will be utilized for Cooling tower make up

Power Plant

The effluent generated from the Plant will be treated in Neutralization pits and will be utilized for dust suppression, ash conditioning and Greenbelt development after ensuring compliance with stipulation for on land irrigation by MoEF / CPCB

3.8 Availability of Water:

Water requirement for the existing and proposed Plant is being met form the Kali River. Prior permission from Irrigation Department has already been obtained.

WATER REQUIREMENT FOR SUGAR & CO-GEN POWER PLANT

WATER CONSUMPTION (in KLD)						
Section		**Sugar**		**Co-gen**		**Total after expansion**
		Existing (6000 TCD)	**Expansion (5500 TCD)**	**Existing (34 MW)**	**Expansion (20 MW)**	
a)Domestic		10	10	15	10	45
b)Industrial purpose						
1.	Process water	72	70	--	--	142
2.	Boiler feed			428	240	668
3.	DM plant regeneration			256	40	296
4.	Cooling water make up			1700	--	1700
5.	Service water			15	--	15
Total		**82**	**80**	**2414**	**290**	**2866**

WATER REQUIREMENT

Water requirement for Sugar (Existing) : 82 KLD
Water requirement for Sugar (Expansion) : 80 KLD
Water requirement for Co-gen power (existing) : 2414 KLD
Water requirement for Co-gen power (expansion) : 290 KLD
Water requirement for Distillery (Existing) : 1820 KLD

Total water requirement for after proposed expansion will be : 4686 cum/day

Total water recycled : 1195 cum/day
Net water requirement : 3491 cum/day

3.9 Power Requirement:

The power required for the existing project will be met from the Co-generation Power plant.

3.10 Quantity of wastes generated:

3.10.1 Waste water generation

Waste water generation from the existing Integrated Sugar complex 1519 KLD. Waste water generation from the proposed expansion Integrated Sugar Plant will be 1100 KLD. Hence total waste water generation after proposed expansion will be 2619 KLD, includes existing 90 KLPD distillery waste water of 540 KLD.

WASTE WATER GENERATION FROM SUGAR & CO-GEN POWER PLANT

SECTION		SUGAR		CO-GEN		Total after proposed expansion
		Existing (6000 TCD)	Expansion (5500 TCD)	Existing (34 MW)	Expansion (20 MW)	
a)Domestic		8	8	12	8	36
b)Industrial purpose						
1.	Process & Washings	584	1064	--	--	1648
2.	Boiler Blow down	--	--	24	36	60
3.	DM plant regeneration	--	--	256	40	296
4.	Cooling tower blow down	--	--	100	35 *	135
5.	Service water	--	--	15	--	15
Total		**592**	**1072**	**407**	**119**	**2190**

* Cooling tower blow down of 35 KLD will be used for sugar service water tank.

Domestic water 36 KLD will be passed through septic tank and soak pit.

Waste water generation from Sugar (Existing) : 592

Waste water generation from Sugar (Expansion) : 1072

Waste water generation from Co-gen power (existing) : 407

Waste water generation from Co-gen power (expansion) : 119

Waste water generation from Distillery (existing) : 1170

3.10.2 Waste water Treatment:

Sugar Plant & Distillery

Total wastewater generation will be 2190 Cum/day. Effluent generation per ton of cane crushed will be as per CREP recommendations. The following is the ETP description.

Design Data & Performance Projections

This Wastewater Treatment plant (sugar + Cogeneration + distillery) is designed for following parameters & shall perform as under upon reaching steady state of its operation:

PARAMETER	RAW WASTE WATER	TREATED WASTEWATER
Flow (m^3/Day)	3000	3000
pH	5.0 – 6.5	6.5 – 8.0
BOD (mg/l)	3000	< 100
COD (mg/l)	6000	< 250
TDS mg/L	2000	< 2100
TSS mg/L	500	< 100
Oil & Grease mg/L	100	< 10

Note: The existing ETP is designed for 1600 KLD. Now we propose to install a new ETP suitable for 1400 KLD as per the details given below:

PROCESS DESCRIPTION

The proposed wastewater treatment plant shall consist of following treatment units.

PRIMARY TREATMENT

- Screen
- Oil & Grease trap
- pH adjustment
- Equalization Tank

SECONDARY TREATMENT

- UASB Anaerobic reactor
- Aeration Tank
- Secondary Clarifier
- Sludge Drying Beds

Screen Chamber:

Screen chamber constructed in RCC shall be provided with **SS 304** fabricated bar screen for removal of free and floating material. The screen shall be inclined at 45 Deg with horizontal.

Oil & Grease Trap:

Oil and grease trap constructed in RCC shall be provided for removal of free and floating oil from the Wastewater. The oil trap shall of gravity type and shall be provided with Belt type oil Skimmer.

Lime Preparation Tank:

A lime preparation tank constructed in RCC. In this tank is used for lime solution preparation and continuous mixing of lime. Lime solution is then feed to equalization tank for pH correction in a required proportion. 1 HP agitator shall be provided for mixing in the tank content.

Equalization:

Wastewater emanating from sugar has fluctuations in wastewater quality and quantity. Equalization tank shall be provided for dampening these fluctuations. In equalization tank the raw effluent is collected and equalized for adequate time. An equalization tank shall be provided with an agitator to mix the tank content thoroughly. The equalized effluent from equalization tank shall then be pumped to buffer tank. A stand by floating mixer shall also be provided for equalization tank

Buffer Tank:

Buffer tank constructed in RCC shall be provided for preconditioning / pre-acidification of the raw effluent. In buffer tank the Raw Effluent is mixed with treated effluent form UASB Reactor. The nutrient required for the process will also be added to the effluent in Buffer tank. The content of buffer tank shall be mixed hydraulically using UASB Reactor feed pumps. The tank content will then be pumped to UASB Reactor for first stage biological treatment.

UASB Reactor:

Upflow **A**naerobic **S**ludge **B**lanket reactor is provided for anaerobic treatment of dairy effluent. The UASB reactor shall be constructed in RCC M-25. The reactor consists of three zones viz. Influent distribution zone, Reaction zone, Gas solid liquid separation zone.

Influent Distribution zone: The raw wastewater enters into the at the bottom through influent distribution zone. A sophisticatedly designed piping net work is provided for uniform distribution of the effluent in the tank. The effluent then travels upward in the reactor.

Reaction Zone: In the reaction zone the anaerobic bacteria are maintained in the form of sludge blanket. The organic matter in the wastewater comes in contact with the bacterial population and is degraded anaerobically to methane rich biogas, the end product of anaerobic digestion. The

process of conversion of organic matter in to the biogas is a two-stage process. In the first stage the organic matter in the raw effluent is converted in to the volatile acids by acid forming bacteria. In the second stage the acid produced in the first stage are converted in to methane by another group of bacteria i.e. methane formers. In UASB process both the stages are completed in single reactor. The biogas so produced is bubbled through the effluent and is separated out in the third section i.e. Gas-Solid-Liquid separation zone. The suspended solids are also separated to prevent escape of solids from the reactor.

Gas-Solid – Liquid Separation: In gas solid liquid separation a hood fabricated in M S and duly painted with corrosion resistant paint is provided. The hood separates the solid from the overflowing reactor content. Gas collectors are provided for collection and conveyance of gas. The treated effluent overflows through a launder and will take to a secondary treatment.

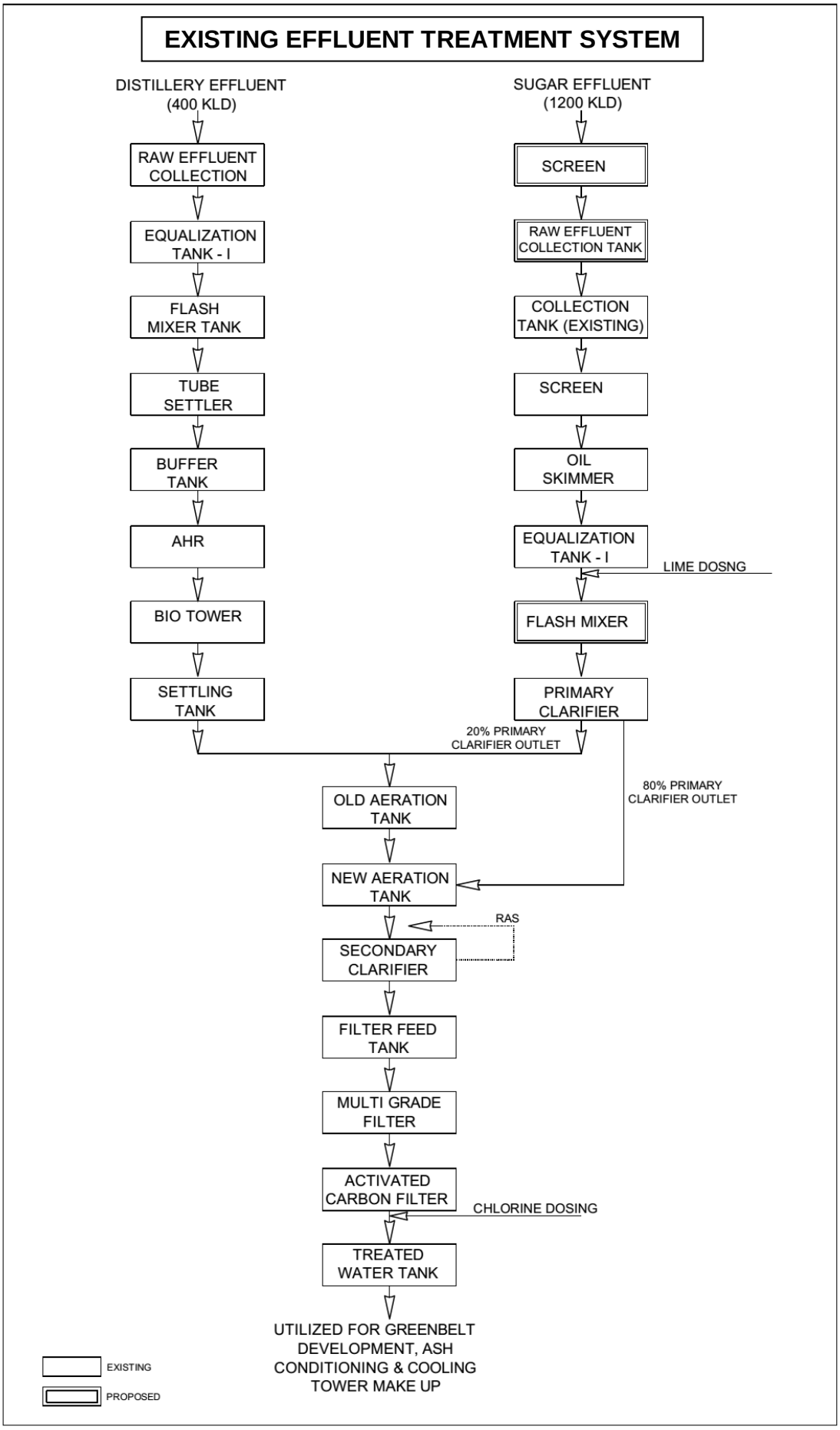
Aeration tank:

The partially treated effluent from UASB shall then be subject to activated sludge process for further reduction of organic matter. Aeration tanks are provided for degradation of organic matter through biological process. Microorganism in the controlled environment carries out the biodegradation process. The container i.e aeration tank of requisite capacity is provided for this purpose. The tank shall be provided with an aeration mechanism to transfer the oxygen from air to tank content for survival for microorganisms. Slow speed fixed type surface aerators shall be provided for this purpose. The content in the aeration tank is kept under constant aeration and mixing. The aeration thank shall be constructed in RCC.

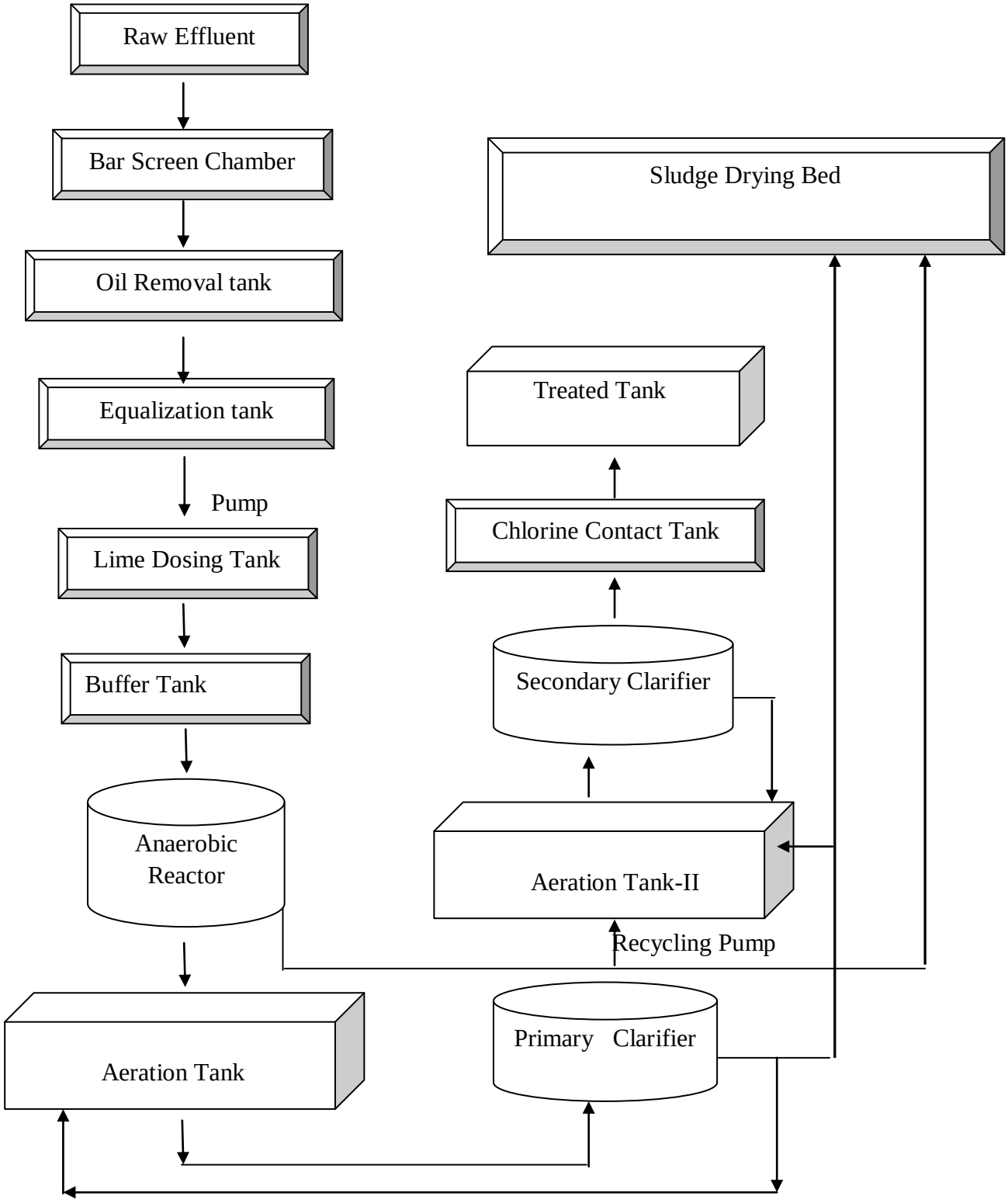
Secondary Clarifier:

A secondary Clarifier in the form of circular tank shall be provided for settlement of fully aerated Effluent from the aeration tank. The tank shall be provided with centrally driven fixed bridge type clarifier mechanism. Part of the settled sludge at the bottom of the settling tank will be pumped to the aeration tank and part of it will be discharged on sludge drying beds as per operational requirement. This sludge being fully mineralized is suitable for sun drying on sand drying beds.

Sludge Drying Beds: In aeration system the sludge is sufficiently mineralized and does not need any further treatment before dewatering and disposal. Sand filtration drying beds will be provided, where sludge will be dewatered by filtration through sand bed and sun drying of the dewatered sludge is scraped & may be used as manure after composting.


EXISTING EFFLUENT TREATMENT SYSTEM
DISTILLERY EFFLUENT (400 KLD)
SUGAR EFFLUENT (1200 KLD)
RAW EFFLUENT COLLECTION
EQUALIZATION TANK - I
FLASH MIXER TANK
TUBE SETTLER
BUFFER TANK
AHR
BIO TOWER
SETTLING TANK
SCREEN
RAW EFFLUENT COLLECTION TANK
COLLECTION TANK (EXISTING)
SCREEN
OIL SKIMMER
EQUALIZATION TANK - I
LIME DOSNG
FLASH MIXER
PRIMARY CLARIFIER
20% PRIMARY CLARIFIER OUTLET
80% PRIMARY CLARIFIER OUTLET
OLD AERATION TANK
NEW AERATION TANK
RAS
SECONDARY CLARIFIER
FILTER FEED TANK
MULTI GRADE FILTER
ACTIVATED CARBON FILTER
CHLORINE DOSING
TREATED WATER TANK
UTILIZED FOR GREENBELT DEVELOPMENT, ASH CONDITIONING & COOLING TOWER MAKE UP
EXISTING
PROPOSED

PROPOSED EFFLUENT TREATMENT PLANT FLOW CHART (1400 KLD)



Cogeneration Power Plant

Total wastewater generation from power plant will be 526 Cum/day (including expansion). The effluent generated from the power plant will be treated and utilized as following.

Cooling tower blow down and DM plant regeneration will be recycled back into process. Boiler blow down and Service water will be neutralized and after treatment it will be utilized for ash quenching, dust suppression and greenbelt development.

Sanitary waste water will be treated in septic tank followed by soak pit. Hence there will not be any adverse impact on environment due to the proposed activities.

Non Process Effluent Treatment & Disposal:

The boiler blow down will be treated in a neutralization tank and after treatment it will be mixed with CT Blow down. All these treated effluent streams will be stored in a Central Monitoring Basin (CMB). The treated effluent will be used for dust suppression / ash conditioning and onland for irrigation within the premises after ensuring compliance with CPCB / KSPCB standards. The scrubbed water from CO_2 Scrubber will be consumed in the Fermentation section. The effluent will be used for greenbelt development within the plant premises after ensuring the compliance with CPCB/KSPCB standards.

3.11 Solid Waste:

The following are the solid waste generation & disposal.

S.No	Solid waste	Quantity (TPD)			Disposal
		Existing	Expansion	Total	
Sugar Plant					
1.	Bagasse (27%)	1620	1485	3105	Will be used as fuel in Co-gen Boiler (265TPH)
2.	Molasses (4.5%)	270.	248.	518	Will be used in the Distillery
3.	Filter cake	0.00	220	220.00	As mud is recycled to diffusor, No Filter cake generation presently, for expansion , it will be given to farmers as manure
4.	ETP Sludge	0.24	0.22	0.46	Will be used as manure
Cogeneration Power plant					
5.	Ash generated when Bagasse used as fuel in Boiler	28.8	17.45	46.25	Ash generated Will be disposed to farmers to use as manure in Agricultural lands
	Ash generated when Coal used as fuel in Boiler	46	38	84	Will be given to cement plants/brick manufactures

4.0 SITE ANALYSIS

4.1 Connectivity:

Component	Description
Road	The site can be well approached by a SH # 39 which is at a distance of 1.2 Kms.
Rail	Nearest Railway station located at 14 Km in North Direction
Air port	Nearest Airport located at Belgaum which is at distance of 64 Kms from the Plant site
Sea Port	Karwar port is at a distance of 90 Kms from the Plant site

4.2 Land form, Land use and Land ownership:

The present use of the land is Industrial as existing Integrated sugar complex is under operation. Now the proposed expansion integrated sugar complex activities will be taken in the existing plant premises only.

4.3 Topography:

The topography of the land is more or less flat without undulations.

4.4 Existing land use pattern:

The present use of the land is Industrial

4.5 Existing Infrastructure:

The infrastructure required for operating the Integrated sugar complex exists at the site

4.6 Soil classification:

The soil at the site is Sandy loam

4.7 Climatologically data:

The Uttara Kannada District experiences tropical monsoon climate. Generally the weather is hot and humid on the coastal areas throughout the year. The district falls under the Hilly agroclimatic zone except for western parts of Karwar, Ankola, Kumta, Honnavar and Bhatkal taluks which fall under coastal agro-climatical zone. The temperatures start rising from January to peak in May, around 30 degrees is common. The highest day time temperatures rise some time up to 38^{o}C. Thereafter they will decline during the monsoons. As can be expected, the humidity is lowest during the dry season

and highest during the monsoons. The winds are predominantly south westerly during the summer monsoon and northeasterly during the winter monsoon. The year may broadly be classified into four seasons. The dry season is from January to February with clear and bright weather. It is followed by hot weather from March to May. During this season thunderstorms are common in the month of May. The monsoon season is from June to September. This season yields around 75% (Halyal taluk) to 90% (Karwar taluk) of the annual rainfall. The period from

October to December may be termed as the post monsoon season. On an average the district receives annually around 2750 mm rainfall occurs in nearly 103 rainy days. The rainfall decreases from over 3230 mm in west to less than 1207 mm in east. The coefficient of variability of pre-monsoon season rainfall is high indicating erratic rainfall. The same is the case during the post monsoon season. The variability is 30 to 40 % during the monsoon season, which is normal. The same is the case on an annual basis it being around 30%. July is the wettest month with normal monthly rainfall in all stations is recorded in excess of 300mm. Annual rainfall in the district varies from 1176.8 mm in Mundgod taluk to around 4145.6 m.m in Bhatkal.

4.8 Social Infrastructure Available:

Human resources available in the district not only provides labour force for under taking economic activities but also serves as a market for the industrial produce. Since about 144 Kms of the Arabian sea coast borders Uttara Kannada District, fisheries has been the mainstay of the district economy. Development of Tadri Port and Railway Line connecting Ankola & Hubli will help in total economic development of the District.

ROADS AND TRANSPORT

The west coast Highway N.H.-17 runs through the district covering a total length of 162 KM. from Bhatkal to Majaii. The total length of roads including National Highway, State Highway, roads in charge of PWD , Village roads is 7975 KM. The communication roads in the rural areas and coastal areas are extensively damaged during rainy season. The length of National Highway is 238 KM and State Highway is 741 KM.

RAILWAYS

Konkan Railway line passes through the coastal belt connecting important villages and Taluk Head quarters. Apart from this Railway Line about 46 KM connecting Dandeli to Alnawar on the Puna Bangalore section of South Central Railway and a line from Londa to Castlerock in Joida Taluka. Total Railway track is 179 KM with fifteen No. Railway Stations.

PORTS AND AIR PORTS.

14 Minor and Small ports of which Karwar, Belekeri, Bhatkal and Honnavar are very important as they provide good potential for the development of trade and Industries particularly Marine Based Industries.

The Karwar port being one of the best natural harbours, is being upgraded under Port Development Project and on its completion will offer better and increased berthing and docking facilities to large sea faring vessels. The port has considerable potential for the movement of the container cargo as it i!§ found to be logistically viable. The state Govt. has decided to start container handling facility at the port. The port has handled total import and export of 2.22 lakh tonnes and 2.37 lakh tonnes of cargo during 1999-2000 respectively. The port has earned a revenue of Rs. 251.25 lakh in 1999-2000. The State Govt. has earmarked Rs. 85 crore towards expansion plans for the development of Karwar port into one of the modern minor port.

There is no Air Port in the District. Dabolium Air Port of Goa is about 95 K.M. away from Karwar.

TELECOMMUNICATION

Information Technology is still to be picked up in the district. There are 495 Post Offices and 230 Telegraph Office. The number of Telephones in the district is 61809. Public STD Booths are 614. No. of Telephone Exchanges 120.

POWER

Uttara Kannada is known for power generation. The district is blessed with good hydro power potential. The kali Hydro electric project is being developed in three stages to generate 1640 mw. Of power. Under the first stage installed capacity of 910mw, has been developed at a cost of Rs.460.47 crore. Kaiga Atomic Power Project with an installed capacity of 4 x 235 mw. Is under implementation. In this Atomic Power Project Two generators of 235 mw. Are in operation. Kadra Dam Power House is being developed in three stages to generate 1.50 mw. Of power which is fully operational. Three more power projects have been proposed in the private sector in the district with a capacity of 160 mw. 14 towns and 2306 villages have been electrified in the district.

EDUCATION

There are 2162 Primary Schools, 234 High Schools, 28 Junior Colleges, 20 Colleges, 2 TCH Schools, 3 C. P. Ed. Schools, 13 Polytechnics, 6 ltis, One law College and One Engineering College in the District. Besides these there are 107 Libraries.

TOURISM

With a very long unexploited coastal line and beautiful beaches, island lush green forest and meadow, vivid and typical culture and a number of religious places, Uttara'Kannada District has a very High Potential for Tourism. The rivers of the District, Western Ghats and the Sands of the coast offer a lot of adventure to Tourist Resorts and Health Camps. Wild life safaris, Jungle Camps, Trekking Bird Watching and many more Adventure Activities can be taken up in the District.

There are 24 Hotels in the District approved by the Tourism Department. Most of the Hotels are in the coastal Talukas and at Sirsi. Baison Resort near Ganeshgudi of Joida Taluk is approved by Toursim Department.

CREDIT FACILITIES AND FINANCE

The most important factor for setting up of any industry is provision of credit facilities. These facilities are provided by financial institutions. In Uttara Kannada District Commercial Bank Branches and Co-op Banks are spread all over the area. There are 137 Branches of Commercial Banks in the District. The lead bank of this district is Syndicate Bank. R.R.B. i.e Varada Grameen Bank is having 27 branches all over the district. K.S.F.C. is having its branch at Karwar. All the Taluks are having PCARD Banks. There are 5 Industrial Co-op Bank Branches in the district. KDCC Bank is having 43 branches and there are 12 Urban Co-op Bank branches in the District.

HEALTH AND FAMILY WELFARE

Health and family welfare is one of the important civic amenity for the public. There are 15 Govt. Hospitals, 56 Primary Health Centers, 19 Primary Health Units, Ill Private Hospitals and Nursing Homes and 244 Medical Shops in the district.

TRAINING INFRASTRUCTURE

- Artisan Training Institute Kumta
- Artisan Training Institute, Honnavar
- GTTC, Dandeli
- Coir Training cum production centers at Honnavar and Shedgeri of Coir Corporation..
- Training cum production center at Herwatta, Hiregutti, Gundbal & Honnavar of Coir Co-operative Federation Ltd.,
- SIRD (Syndicate Institute of Rural Development)
  Syndicate Institute of Rural Entrepreneurship Development promoted by Syndicate Rural Development Trust of Syndicate Bank. Training is residential and intake capacity is 30-40 members. The services of this training Centre is toward to train P.M.R.Y., S.H.Gs and for entrepreneurship development programs.

MARKETING AGENCIES

a. Karnataka Small Industries Marketing Corporation, Karwar Branch.
b. District Supply & Marketing Society of U.K. District, Karwar.

INDUSTRIAL AREA & INDUSTRIAL ESTATES

INDUSTRIAL AREA

There is one Industrial Area at Shirwad Karwar. It was established during the year l991. Total area is 35 acres. KIADB has developed 50 plots. All the 50 plots have been allotted. 30 units are working. No plot or land is available for further allotment.

INDUSTRIAL ESTATE.

In Uttara Kannada there are eight Industrial Estates. Land is available at Ramanagar, Yellapur and Haliyal Industrial Estates.

INDUSTRIAL AREA AND INDUSTRIAL ESTATES PROPOSED

One Industrial Area at Karwar and six Industrial Estate in other places have been started long ago. In view of the recent developments like Konkan Railway, Sea-Bird and Other Mega Project, there are demands for New Industrial Estate in the following places.

Karwar: 200 Acres of land has been identified by KIADB In Mudgeri Vilage and about 400 Acres at Tadari

Ankola: 100 Acres in Hattikeri for industrial estate. 200 Acres of land near Agsur for a Trauck Terminal and Medium Industries.

Honnavar: 100 Acres of land for Industrial Area near Kasarkod.

Siddapur: 100 Acres of land in Hosur Village for Industrial Estate.

Mundgod: 100 Acres of land near Mundgod for Industial Estate.

DOORDARSHAN / ALL INDIA RADIO

At present there is a relay centre of 100 Watts capacity at Karwar. All India Radio has set up F.M. Transmission Station at Karwar. These media is being used by D.I.C. to create awareness among entrepreneurs.

WATER SUPPLY

Since the District receives good rain fall, availability of ground water is good and five important rivers are flowing through the District, there is no dearth of water for industrial development in the

District. At present the requirement of water for Karwar & Ankola Town is being met by water pumping plant set at Agasu by K.U.W.S. & S.Board.

5.0 PLANNING BRIEF

5.1 Planning Concept:

The integrated complex will be of Sugar & Co-gen. Project at EIDPIL will integrate sugar mill operations with enhanced energy efficiency measures and optimum usage of Molasses and Bagasse. During season, the Co-gen Plant will be operated on bagasse generated in the Plant and coal when necessary.

All excess available power will be exported to the KPTCL grid. During off-season based on the availability of Bagasse / biomass from nearby sugar mills power will be generated. KPTCL has an attractive policy on the guidelines of MNES, to buy power from sugar cogenerations.

Further, the integrated Sugar & Co-gen projects will improve the overall profitability of EIDPIL, through its additional revenue generation. This will enable EIDPIL to give higher dividend to promoters & higher price per ton of cane to its cane growers. Also the project will help to improve Karnataka State's power situation.

5.2 Population Projection:

Unskilled Man Power required for the proposed expansion Project will be met from the local villages completely. Qualified semi-skilled man power required will be met from local villages if available. Hence there will not be much population increase in the area.

5.3 Land use Planning:

The following is the Land use Planning of the area

ITEM	EXTENT OF LAND (ACRES)		
	Existing	Expansion	After expansion
Built up area of Sugar plant	6.23	6.00	12.23
Built up area of Co-Gen Power plant	20.74	15.00	35.74
Built up area of Distillery plant	6.00	-	6.00
Internal roads	4.00	2.50	6.50
Green belt area	85.00		85.00
Vacant area	104.03		80.53.
Total	**226.00**		**226.00**

5.4 Amenities / Facilities:

Facilities like canteen, rest rooms and recreation facilities will be provided in the proposed expansion project. No other additional facilities are proposed.

6.0 PROPOSED INFRASTRUCTURE:

6.1 Industrial area

The following Plant and machinery will be installed in the Industrial processing area

List of Plant and Machinery for proposed expansion

Sugar Plant

The existing sugar plant of 6000 TCD capacity will be scaled up to 8000 TCD by debottlenecking of some of the equipment and by adding another 3500 TCD, ultimate capacity of the sugar plant will be 11500 TCD.

For the proposed expansion, the following additional machinery is proposed for Sugar plant

JUICE EXTRACTION WITH INLINE SHREDDER WITH TWO / THREE ROLLER MILLING

1.0 CANE WEIGHING AND HANDLING

2 Nos	**50 ton capacity weigh bridges** with platform size of 3.2 Mtr x 11 Mtr for weighment of cane trailors, trucks.
1 No	**50 ton capacity weigh bridge** with platform size of 3.2 Mtr x 11 Mtr for weighment of general purpose trailors.
1 No	**Cane truck tippler** shall be of all steel construction suitable for 50T load handling capacity with an angle of tilt of 55 degree. The tippler shall have mild steel fabricated platform size 11000 mm long x 3200 mm wide suitable to handle 2 – 4 axle trucks and shall be complete with suitable main drive motor, pump with drive, valves, hydraulic tilting arrangement, hydraulic power pack with suitable operating pressure.
1 Set	2 motion, 10.0 T SWL **cane unloaders** and the unloader bridge consists of 2 Nos of trolleys with sling type attachment, in each lift sling will lift at least 7.5 T of cane, centralized cabin operation, 20 lifts per hour, conforming to Class IV duty, IS 3177 and IS 807 with supporting structure suitable for 30 Mtr span and crane gantry with suitable height of the lift.
2 Nos	**Feeder tables** of size 7 M wide x 8 M long with 8 strands of 150 mm pitch chains having breaking strength of 40,000 Kgs with suitable drive of 11.5 kW planetary geared motors with VFD drives. The Feeder Table shall be of mild Steel construction. Feeder tables shall be operated from centralized operator's cabin provided for cane Unloaders.

2.0 CANE CONVEYING AND CANE PREPERATION

1 No **Cane Carrier** – 1980 mm wide, 59 Mtr (approx.) horizontal centre distance between sprockets to suit 34 Mtr loading length fitted with triple strands of 200 mm pitch 80000 Kg breaking strength chains, C45 shafts, mild steel construction, anti-friction bearings and driven by 75 kW motor drive, variable frequency drive and suitable foot mounted planetary gear box. The range of speed shall be 3 – 10m/min.

1 No Carding drum / Cane Chopper of 2500 mm Dia. X 1980 mm wide over cane carrier and driven by 1 No 75 kW, 1440 rpm TEFC Sq. cage motor and helical gear box for a final speed of 25 RPM.

1 No **Feeder drum** of Ø 2200 mm x 1980 mm wide driven by 75 KW motor with helical / planetary gear box and VFD drive with torque arm to get an approximate speed of 2 RPM. It is of mild steel construction with C45 central shaft.

1 No Ø1680 x 1980 mm wide **In-Line shredder / Cane fibrizor** fitted with 111 hammers in six rows each hammer weighing around 22 Kg having 45 mm thickness, anvil plate and driven by 1 No of 1500 kW, 1000 RPM (CACW) 11 KV TEFC slip ring H.T motor.

1 No Ø1200mm X 1980mm wide **shredder kicker** driven by 1 No.30 KW, 1450 rpm motor with suitable gearbox at a final speed of 60 rpm.

1 No **Slat cleaning brush** assembly with 5.5 kW geared motor.

1 No 2000 mm wide (effective width) 45 Mtr long **flat type inclined belt conveyor** having inclination of 15º with suitable drive consisting of motor with VFD drive, supporting structure, walkway on both sides, ladders, platform around staging of equalizer etc. Speed of belt conveyor shall be 6 - 60 m/min.

1 No Ø700 x 1980mm size **cane equalizer** with 7.5 kW, 1440 rpm motor & gear box.

1 No **Over band type magnetic tramp iron separator** with suitable chute and staging capable to lift minimum 25 Kg of tramp iron pieces from a distance of 300 mm over the belt conveyor from a prepared cane blanket of 200 mm thickness over the belt conveyor.

3.0 CANE MILLING TANDEM

4 Nos Ø 36" x 78" wide **two / Three roller Mills** with feeder rollers, SS 304 juice trays and re-absorption limiting devices with hydraulic cylinder having working pressure of 10 to 90 bar and hydraulic pumping unit & dual centralized lube system for mill bearings and SS409M juice trays.

1 Set Juice receiving gutters of SS 409M for connecting mills juice tray and whirler tanks.

1 Set Mill gangway and Interconnecting platforms of mild steel construction having 1000 mm wide with handrails and ladders suitable for a mill centre distance of 12.5 Mtr for four mill tandem.

4 Nos **Donnelley chutes** over 36" x 78" size two roller mills made out of 6 mm thk SS 409M plate with minimum feeding height of 3.0 M above top roller centre.

Mill Drives – Four Sets

4 Nos **450 kW, 1000 rpm, 690 Volts A.C TEFC Sq. Cage motors**, class V duty with variable frequency controller and suitable for mill drive application.

4 Nos **Four stage helical / planetary gear boxes** to transmit 450 kW at base speed of the motor with safety factor 2.0, input coupling, centralized forced lubrication cum cooling system and control panel. Final speed will be 5.5 RPM.

4 Nos **Rope couplings** to transmit a torque of 800 kNm with a service factor of 2.0 suitable for square end size of 36" x 78" size two roller mills.

3 Sets 1980 mm wide **rake type Inter carriers** of mild steel construction fitted with 229 mm pitch 80Tonnes breaking strength forged block chain and driven by 30 kW elec. drive, and Helical / planetary gear boxes. Linear speed of the carrier is 25m/min (approx.) and span to suit the Centre-to-Centre distance of mill i.e. 14.0 Mtr. Bottom plate and runners are made of 8 mm thick SS 409M plate and side plates shall be made with 6 mm carbon steel plate.

1 No 3 motion, 35 T SWL capacity, **E.O.T Crane** suitable for building span of 26 Mtr with 5 T manually operated auxiliary hoist.

1 No **Mill house Lathe machine** suitable for turning the 36" x 78" size mill rollers with suitable drive.

1 Set **First fill lubrication oils** for all gear boxes.

4.0 JUICE SCREENING AND IMBIBITION EQUIPMENT

1 No **Rotary juice screen** of size Ø 1800 mm x 3600 mm long fitted with cylindrical wedge wire screen of S.S.304 having 0.45 mm aperture and driven by suitable motor with mild steel staging for screening mixed juice. It shall be located on 1st inter carrier.

1 No 20 Cu.M capacity **screened raw juice tank** of SS 409 M construction.

2 Nos 180 Cu.M/hr capacity, 60 m head **screened raw juice pumps** of SS body and SS Impeller and driven by suitable Squirrel Cage Motor. The motors will be suitable for VFD application. The material of construction is SS body with SS internals and the mild steel base frame & coupling. (1W + 1SB)

1 No Ø1500mm x 1500 mm ht. **whirler tank** of cylindrical, vertical, conical bottom type for collecting mixed juice from 1st & 2nd Mills. It is made of SS 409M.

2 Nos Ø1200mm x 1500 mm ht. **whirler tanks** of cylindrical, vertical, conical bottom type for collecting mixed juice from 3rd, 4th mills. It is made of SS 409 M construction.

2 Nos 180 Cu.M/hr capacity **mixed juice pumps** (For transferring juice received from 1^{st} & 2^{nd} mills) plus 50% solids at 15 m head driven by suitable Squirrel Cage motors. The material of construction is SS body with SS internals and the accessories are mild steel base frame and coupling. (1W + 1 SB)

2 Nos 100 Cu.M/hr. capacity **imbibition juice pumps** (For transferring juice received from 3^{rd}, 4^{th} mills), 15 m head driven by suitable Squirrel cage induction motors. The material of construction is SS body with SS internals and the accessories, i.e. mild steel base frame and coupling. (All pumps are working)

1 No 10 Cu.M capacity Imbibition water tank of mild steel construction, vertical, cylindrical and top open type.

2 Nos 100 Cu.M/hr, 50 m head imbibition water pumps made of CI body, SS Impeller, driven by suitable Squirrel cage induction motors. The accessories are mild

steel base frame and coupling. (1W + 1 SB)

1 Set SS 304 juice piping between pumps and mills.
Mild steel construction imbibition water piping, juice distribution boxes.

5.0 AUTOMATION (PLC based)

1 Set **Automation** of cane-feeding & control system suitable to feed uniform cane flow to mills, PLC based. The system shall ensure the uniform feed rate to the 1st mill with provision to change the feed rate at any time having a variation not more than ± 5% set rate. Primary cane carrier will follow the speed of secondary cane carrier in a fixed ratio. Load of all the preparation devises shall override the speed signal of each cane carrier and carrier speed is reduced proportionally when the load on the preparation devices exceeds 80% of rated load. When the load exceeds 100% the cane carrier will stops and restarts automatically when becomes normal. The system consists of sensors for load sensing in the motors of preparation devices and load sensing sensors in all donnelly chutes. The system should be provided with ON – OFF control actions. Proportional control as per 1st mill load

6.0 ELECTRICALS

1 No MCC for cane handling, cane preparation equipments.
1 No MCC for mill house equipments, pumps, crane.
1 No HT Breaker panel for 1 No of 1500 KW Inline Shredder HT Motor.
1 No ASR panel for 1 No of 1500 KW Inline Shredder HT Motor.
1 No Capacitor panel for 1 No of 1500 KW Inline Shredder HT Motor.
2 Nos VFD panel of 6 pulse type suitable for 11.5 KW, 380V feeder table drive motors.
1 No VFD panel of 6 pulse type suitable for 75 KW, 380V cane carrier drive motor.
1 No VFD panel of 6 pulse type suitable for 75 KW, 380V feeder drum drive motor.
1 No VFD panel of 6 pulse type suitable for 30 KW, 380V belt conveyor drive motor.
1 No VFD panel of 6 pulse type suitable for 75 KW, 380V screened juice pump drive motors.
4 No VFD panels of 12 pulse type suitable for 450 KW, 690V mill drive motors.
1 Lot LT aluminium Cables from MCC's to all equipment motors.
1 Lot Local control Push Button boards for all equipment motors.
1 Lot All equipment motors as per scope

SECTION : II – PROCESS HOUSE PLANT

1.0 RAW JUICE HEATING AND SULPHITED JUICE

Raw Juice Heaters

1 No **Stage 1**: 240 Sq.M heating surface mild steel construction, vertical, and multi pass, vapor line type tubular Juice heater fitted with SS 304 ERW type tubes of OD 45mm x 18 SWG x 4100 mm long. The heating medium is 5th vapor.

1 No **Stage 2**: 240 Sq.M heating surface mild steel construction, tubular type juice heater heated with final condensate fitted with SS 304 ERW type tubes of OD

45mm x 18 SWG x 4100 mm long.

1 No **Stage 3:** DCH suitable for a raw juice flow of 180 Cu.M/hr. to raise the raw juice temperature from 57 deg.C to 75 deg.C using 4th vapor. It is of SS304 construction.

Sulphited Juice Heaters

1 No **Stage.1:** DCH suitable for a sulphited juice flow of 200 Cu.m/hr. to raise the defecated juice temperature from 73 deg.C to 90 deg.C using 3rd vapor. It is of SS304 construction.

1 No **Stage.2:** DCH suitable for a defecated juice flow of 200 Cu.m/hr. to raise the defecated juice temperature from 90 deg.C to 103 deg.C using 2nd vapor. It is of SS304 construction.

Clear Juice Heaters

1 No **Stage.1**: DCH suitable for a clear juice flow of 180 Cu.m/hr. to raise the clear juice temperature from 97 deg.C to 104 deg.C using 2nd vapor. It is of SS304 construction.

1 No **Stage.2**: DCH suitable for a clear juice flow of 180 Cu.M/hr. to raise the clear juice temperature from 104 deg.C to 113 deg.C using 1st vapor. It is of SS304 construction.

1 No **Condensate collection tank** of capacity 2 Cu.M of mild steel construction for collection of condensate from raw juice stage.1 juice heater.

2 Sets **Condensate water pumps** of capacity 10 Cu.M/hr, 30 Mtr head for pumping the condensate received from raw juice stage.1 juice heater to overhead hot water tank driven by suitable squirrel cage induction motors. The material of construction is CI body with SS internals and the accessories are mild steel base frames and CI flexible couplings. (1W + 1SB).

Juice Sulphitation

1 No 240 HL capacity **juice Sulphitor** of mild steel construction with stirrer for juice defecation. It is of mild steel construction to be driven by 5 KW planetary geared motor.

1 No 1 Cu.M capacity **MOL proportioning unit** of mild steel construction with circular cross section for feeding MOL by gravity into juice defecator.

1 No 100 HL capacity mild steel construction **sulphited juice receiving tank** for receiving sulphited juice.

2 Sets **Sulphited juice pumps** of capacity 200 Cu.M/hr, 40 Mtr head for pumping defecated juice from juice runoff tank to juice clarifier flash tank through the defecated juice heaters driven by suitable motors. The material of construction is CI body with SS internals and mild steel base frames and couplings. (1W + 1 SB).

MOL Preparation

1 No **Lime bucket elevator** of mild steel construction having the capacity of 600 Kg/hr to feed lime into lime slacker.

1 No **Lime slacker** of mild steel construction suitable to handle 600 Kg/hr. lime powder for preparation of milk of lime driven by suitable drive consists of planetary gear box and AC squirrel cage induction motor.

1 No Koran type **lime classifier** of mild steel construction with SS Screen having size of Ø1400 mm with suitable drive and with suitable grit separator.

2 Nos **Milk of lime tanks** of capacity 200 HL for holding and supplying milk of lime. These will be mild steel construction complete with stirrer driven by suitable squirrel cage motor & gear box.

2 Nos **Milk of lime dosing pumps** of capacity 6 Cu.M/hr, 20 m head for pumping MOL with suitable drive.(1W + 1SB)

2.0 JUICE CLARIFICATION

1 No Dia 8.5 Mtr **SRT type juice clarifier** with mud scraping arrangement, juice distributor, juice & mud draw off boxes, suitable flash tank and connected piping. It will be mild steel construction with bottom is 10 mm and shell will be 8mm. Mud scrappers will be driven by suitable planetary geared motor. The clarifier is totally mild steel construction apart from all the internal juice distribution & mud collection launders will be SS304 construction.

1 No 50 Cu.M capacity, mild steel construction, vertical, cylindrical, top closed type **clear juice tank.**

2 Sets **Clear juice pumps** of capacity 180 Cu.M/hr., 30m head driven by suitable squirrel cage induction motors. The material of construction is CI body with SS internals and the accessories are mild steel base frame and coupling.
(1W + 1 SB).

1 No Mild steel construction **mud receiving tank** of capacity 40HL for receiving mud juice from clarifier.

2 Sets **Mud pumps** of capacity 25 Cu.M/hr., 20 Mtr head for pumping mud juice from mud tank to vacuum filter driven by suitable motors. The material of construction is CI body with SS internals and the accessories are mild steel base frame and coupling. (1W + 1 SB).

2 Nos 1 No **flocculent preparation tank** & 1 No **flocculent dosing tank** of 1.5 Cu.M capacity driven by suitable planetary geared motors.

2 Sets 300 – 800 Lt/hr metering type **flocculent dosing pumps** with suitable drive motors. (1W +1SB)

1 Set 14" x 28" **vacuum filter** with suitable capacity mud mixer, entrainment separators, vacuum pump, condensers etc.

1 Set **Bagacillo blower** of mild steel construction with GI **bagacillo piping** with cyclones of suitable capacity.

1 No Mild steel construction **filtrate tank** of capacity 4 Cu.M for receiving filtrate juice form vacuum filters.

2 Sets **Filtrate juice pumps** of capacity 25 Cu.M/hr, 20m head for pumping the filtrate juice to juice defecator driven by suitable motors. The material of construction is CI body with SS internals and the accessories are mild steel base frame and coupling. (1W + 1 SB)

1 No 10 T/hr **belt conveyor** of 650 mm wide x 20 Mtr long flat type with both sides skirt flats for transferring filter cake from vacuum filters to mud bin.

1 No 10 Cu.M capacity **mud bin** for receiving the filter cake from vacuum filters and feeding into trucks. It is of mild steel construction supported at suitable elevation by mild steel staging.

1 No **Wash water runoff tank** of mild steel construction having the capacity 1 Cu.M for hot water spraying pumps of vacuum filters.

2 Sets **Wash water pumps** of capacity 20 Cu.M/hr, 50m head for spraying hot water on to vacuum filters driven by suitable squirrel cage induction motors. The material of construction is CI body with SS internals and mild steel base frame and coupling. (1W +1SB)

3.0 EVAPORATION STATION (Quintuple Effect)

Q1 : 2000 Sq.M Semi Kestner type Evaporator

Q2 : 2000 Sq.M Robert type Evaporator

Q3 : 2400 Sq.M Robert type Evaporator

Q4 : 600 Sq.M Robert type Evaporator

Q5 : 500 Sq.M Robert type Evaporator

Bleeding Scheme:

1st Vapor : CJ2 heating, pan washing, melt heating, sweet water heating & sugar melting.

2nd Vapor : SJ2 heating, CJ1 heating.

3rd vapor : SJ1 heating, A massecuite boiling, B massecuite boiling, C massecuite boiling, C grain boiling.

4th vapor : RJ3 heating.

5th vapor : RJ1 heating.

1 No 2000 Sq.M semi kestner type **1st body evaporator** of mild steel construction fitted with SS304 ERW type tubes of OD 45 mm x 18 SWG x 4.90 Mtr long.

1 No 2000 Sq.M Robert type **2nd body evaporator** of mild steel construction fitted with SS304 ERW type tubes of OD 45 mm x 18 SWG x 2.00 Mtr long.

1 No 2400 Sq.M Robert type **3rd body evaporator** of mild steel construction fitted with SS304 ERW type tubes of OD 45 mm x 18 SWG x 2.0 Mtr long.

1 No 600 Sq.M Robert type **4th body evaporator** of mild steel construction fitted with SS304 tubes of OD 45 mm x 18 SWGx 2 Mtr long.

1 No 500 Sq.M Robert type **5th Body evaporator** of mild steel construction fitted with SS304 tubes of OD 45 mm x 18 SWG x 2 Mtr long.

1 No **Multi jet condenser** of SS304 contact parts and having a capacity to condense 2 - 10 T/hr. vapor from last body evaporator.

1 No Mild steel construction **syrup extraction tank** of capacity 2 Cu.M for receiving syrup from last body evaporator.

2 Sets **Syrup extraction pumps** of capacity 40 Cu.M/hr., 20m head liquid column for pumping syrup to syrup storage tanks at pan floor driven by suitable squirrel cage induction motors. The material of construction is CI body with SS internals and the accessories are mild steel base frame and coupling.(1W +1SB)

1 No Mild steel construction **exhaust condensate runoff tank** of capacity 2 Cu.M for receiving condensate from 1st body evaporator. It will be vertical, cylindrical, top closed tank.

2 Sets **Exhaust condensate pumps** of capacity 70 Cu.M/hr., 40 Mtr head for transferring exhaust condensate to boiler feed water tank driven by suitable squirrel cage induction motors. The material of construction is CI body with SS internals and the accessories are mild steel base frame and coupling.
(1W +1SB)

1 No **Flashing Cigar Tank** for flashing the evaporator, juice heater & pan condensates. It is of SS 304 construction with mild steel supports.

2 Sets **Final vapor condensate pumps** of capacity 150 Cu.M/hr., 60 Mtr head for transferring final vapor Condensate to overhead hot water tank through condensate heater driven by suitable motors. The material of construction is CI body with SS internals and mild steel base frame and coupling. (1W + 1SB)

1 No 25 Cu.M capacity mild steel construction **caustic soda preparation tank** for preparing and supplying caustic soda solution to evaporators.

2 Nos **Caustic Soda pumps** of capacity 50 Cum/hr, 15m head for transferring caustic soda solution to evaporators driven by suitable squirrel cage induction motors. The material of construction is CI body with SS internals and the accessories, i.e. mild steel base frame and coupling. (1W +1 SB)

4.0 PAN HOUSE

3 Nos 30 Cu.M capacity **syrup storage tanks** for storing and supplying syrup to feed to A vacuum panS. These are of mild steel construction, vertical, rectangular

cross section, top open type.

2 Nos 30 Cu.M capacity **A heavy storage tanks** for storing and supplying A heavy molasses to B continuous vacuum pan. These are of mild steel construction, vertical, rectangular cross section, top open type.

2 Nos 30 Cu.M capacity **B heavy storage tanks** for storing and supplying B heavy molasses to C continuous vacuum pan. These are of mild steel construction, vertical, rectangular cross section, top open type.

1 No 30 Cu.M capacity **storage tank** for storing and supplying C Light molasses n. These are of mild steel construction, vertical, rectangular cross section, top open type.

1 No 500 HL capacity vertical tube **horizontal layout, vertical tube type continuous vacuum pan for 'B' massecuite boiling** fitted with S304 ERW tubes of OD 102 x 16 SWG x 1400 mm long. It is of mild steel construction.

1 No 500 HL capacity vertical tube **horizontal layout, vertical tube type continuous vacuum pan for 'C' massecuite boiling** fitted with S304 ERW tubes of OD 102 x 16 SWG x 1400 mm long. It is of mild steel construction.

2 Nos **40 Ton capacity batch type vacuum pan** for B grain & C Grain boiling fitted with SS304 ERW tubes of size OD 102 x 16 SWG x 900 mm long. It is of mild steel construction.

2 Nos **80 Ton capacity batch type vacuum pan** for 'A' massecuite boiling fitted with SS304 ERW tubes of size OD 102 x 16 SWG x 900 mm long. It is of mild steel construction.

2 Nos **50 Ton capacity air cooled crystallizers** for receiving massecuite from 'B' grain / 'C' grain massecuite driven by 5.5 kW / 1 rpm planetary drive. It is of mild steel construction.

1 No **40 Ton capacity air cooled crystallizer** driven by 5.5 kW / 1 rpm planetary drive for receiving 'C seed' sugar. It is of mild steel construction.

2 Sets **Grain magma transfer pumps** of capacity 10 Ton/hr., 20m head liquid column for pumping 'C' grain from 'C' grain receiving crystallizer to C CVP driven by suitable motors & common VFD. The material of construction is CI body, CI rotor fitted with gun metal tips and mild steel base frame & coupling. (1W+1SB).

2 Sets **Grain magma transfer pumps** of capacity 10 Ton/hr., 20m head liquid column for pumping 'B' grain from 'B' grain receiving crystallizer to B CVP driven by suitable motors & common VFD. The material of construction is CI body, CI rotor fitted with gun metal tips and mild steel base frame & coupling. (1W+1SB).

1 No 20 Ton capacity **C Massecuite receiving crystallizer** with stirrer driven by 3.7 kW / 1 rpm planetary geared motor for receiving C massecuite from C CVP. It is of mild steel construction.

1 No 20 Ton capacity **B massecuite receiving crystallizer** with stirrer driven by 3.7 kW /1 rpm planetary geared motor for receiving massecuite from B CVP. It is of

mild steel construction.

2 Sets **C Massecuite transfer pumps** of capacity 20 Ton/hr., 20 m head liquid column for transferring massecuite from 'C' CVP driven by suitable motors with gear boxes. These are Roto type with material of construction is CI body with CI rotor fitted with gun metal tips and the accessories are mild steel base frame and coupling. (1W + 1SB).

2 Sets **B Massecuite transfer pumps of capacity 25 Ton/hr, 20m head** liquid column for transferring massecuite from 'B' CVP driven by suitable motors with gear boxes. These are Roto type with material of construction is CI body with CI rotor fitted with gun metal tips and the accessories are mild steel base frame and coupling. (1W + 1SB).

2 Nos **90 Ton capacity air cooled crystallizers** with stirrer driven by 5.5 kW /1 rpm planetary geared motor for receiving and cooling A massecuite. These are of mild steel construction.

2 Nos **Pans vapor condensate tanks** of capacity 50HL for receiving condensate from all batch and continuous vacuum pans. These are of mild steel construction.

3 Sets **Pans vapor condensate pumps** of capacity 50 Cu.M/hr., 30m head liquid column for pumping pans vapor condensate from pan condensate tanks to flashing system (or) overhead hot water storage tank driven by suitable electric motors. The material of construction is CI body with SS internals and the accessories are mild steel base frame & coupling. (2W + 1 SB).

4 Nos **Multi jet condensers** of SS304 make having the capacity to condense the maximum vapor flow of 8 to 15 T/hr from all batch pans.

2 Nos **Multi jet condensers** of SS304 make having the capacity to condense the maximum vapor flow of 25 T/hr from 'B' CVP & 'C' CVP.

1 No **Air ejector** of suitable capacity for ejection of incondensable gases from all condensers.

1 No **Air ejector** of suitable for all vacuum crystallizers.

3 Nos **Injection water pumps** of capacity 2000 Cu.M/hr, 22 m head for pumping cold water to condensers driven by suitable drive motors. The material of construction is CI body with SS internals and the accessories are mild steel base frame and coupling. (2W + 1SB)

1 No **Vacuum pump** of capacity 100 Cu.M/hr for Injection water pumps priming. The material of construction is CI body with SS internals and the accessories are mild steel base frame and coupling.

1 Set **Cooling Tower** of total capacity of 1500 Cu.M/Hr with two working cells of each 2000 Cu.M/hr. It is induced draft type and top mounted fan and wooden construction.

3 Nos **Cooling Tower pumps** of capacity 1500 Cu.M/hr, 12 m head for pumping hot water to top of cooling tower driven by suitable drive motors. The material of construction is CI body with SS internals and mild steel base frame & coupling. (

2W + 1SB)

1 No **60 ton capacity vacuum crystallizer** for storing A massecuite with 10 hp/1rpm shaft mounted planetary drive. It is of mild steel construction.

1 No **60 ton capacity seed crystallizer** with 10 hp/1rpm shaft mounted planetary drive for receiving & storing dry seed magma. It is of mild steel construction.

1 No **350 ton capacity mono vertical crystallizer** for 'C' massecuite with stirrer driven by 15 kW / 0.33 rpm planetary gear motor suitable for shaft mounting. It is of mild steel construction and supported by skirt.

1 No **250 ton capacity mono vertical crystallizer** for 'B' massecuite with stirrer driven by 11 kW / 0.33 rpm planetary gear motor suitable for shaft mounting. It is of mild steel construction and supported by skirt.

1 No **FRP make cooling tower** suitable to cool 50 T/hr water from both the vertical crystallizers.

1 No **Mild steel construction cold water runoff & makeup tank** of 10 Cu.M capacity for receiving cold water from cooling tower and also adding makeup water and feeding to cold water pumps of vertical crystallizers.

3 Sets **Cold water pumps** of capacity 40 Cu.M/hr, 50 mtr head for pumping cold water from FRP cooling tower outlet water tank to both the vertical crystallizers driven by suitable squirrel cage induction motors. The material of construction is CI body with SS internals and the accessories are mild steel base frame and coupling. (2 W + 1SB)

2 Set **Massecuite Liquidation pumps** of capacity 30 Ton/hr, 30m head for liquidating Massecuite from both the vertical Crystallizers driven by suitable motors. The material of construction is CI body with CI rotor fitted with gun metal tips and the accessories are mild steel base frame and coupling.

1 Set **Sugar melter of capacity 5 Cu.M** for melting sugar lumps & dust. It is of mild steel construction consists of stirrer driven by a planetary geared motor.

2 Nos **Melt transfer pumps** of capacity 10 Cu.M/hr., 30m head for pumping sugar melt driven by suitable motors. The material of construction is CI body with SS screw & rubber stator and mild steel base frame & universal, joint type coupling. (1W + 1 SB).

5.0 CENTRIFUGAL STATION

A Centrifugals

3 Nos **1750 kg/charge,** flat bottom plough discharge fully automatic centrifugal machines with 220kw A.C. motor and VFD drives. (2W + 1SB)

1 No **3 m/c open type pug mill** of mild steel construction, U type, and top open with agitator driven by 3.7 kW/3.55 rpm planetary gear motor. It is of mild steel construction.

1 No **3 machine supporting structural staging** of mild steel construction for 1250 kg/charge batch type centrifugal machines.

2 Nos **Molasses runoff tanks** of mild steel construction, vertical, bottom conical, top open type having capacity 3 Cu.M for receiving 'A' heavy & 'A' light molasses.

2 Sets '**A' heavy molasses transfer pumps** of capacity 30 Cu.M/hr, 20m head liquid column for pumping 'A' heavy molasses to 'A' heavy molasses storage tanks at pan floor driven by suitable motors. The material of construction is CI body with SS screw & rubber stator and the accessories are mild steel base frame and universal, joint type coupling. (1W + 1 SB).

2 Sets '**A' light molasses transfer pumps** of capacity 20 Cu.M/hr, 20m head liquid column for pumping 'A' light molasses to 'A' light molasses storage tanks at pan floor driven by suitable motors. The material of construction is CI body with SS screw & rubber stator and the accessories are mild steel base frame and universal, joint type coupling. (1W + 1 SB).

1 Set **Super-heated wash water system** of 36 Cu.M/hr with wash water pumps of capacity of 36 Cu.M/hr and 60 Mtr head for pumping wash water into 'A' centrifugal machines.

1 No **Monorail supporting structure** of mild steel construction supported from pan floor columns with manually operated 5 Ton capacity chain pulley block suitable for lifting 3 Nos. of 1750 kg/charge batch centrifugal machines.

"B" & CA Centrifugal machines

4 Nos **Ø1500 Continuous centrifugal machines** with 110 kW induction motor and star delta type control panel for "B" massecuite curing. (2 for B , 1 for CA & 1 for SB)

1 No **4 machine supporting structural staging** of mild steel construction for supporting Ø1500 continuous type centrifugal machines.

1 No **4 machine open type pug mill** with partition plate for supplying B and C massecuite to B centrifugal machines and C centrifugal machines driven by planetary gear motor. It is of mild steel construction.

2 Nos **Magma mixers** suitable for 2 No's of 1500 machines with mild steel construction consists of double paddle type agitator driven by planetary geared motor for 'B' magma & C magma. These are of mild steel construction, U trough, double paddle type, top open and both ends closed with flat plates.

2 Nos **Molasses runoff tanks** of mild steel construction, vertical, bottom conical, top open type having capacity 3 Cu.M for receiving 'B' heavy & C light molasses.

2 sets '**B" heavy molasses transfer pumps** of capacity 20 cum/hr, 20m head liquid column for pumping 'B' heavy molasses to pan floor molasses storage tanks driven by suitable motors. The material of construction is CI body with SS screw & rubber stator and the accessories are mild steel base frame and universal, joint type coupling. (1W + 1SB)

2 sets '**C" Light molasses transfer pumps** of capacity 15 cum/hr, 20m head liquid column for pumping 'C' light molasses to pan floor molasses storage tanks

driven by suitable motors. The material of construction is CI body with SS screw & rubber stator and the accessories are mild steel base frame and universal, joint type coupling. (1W + 1SB)

2 Sets '**B' seed magma transfer pumps** of Rota type having the capacity of 20 T/hr, 20m head liquid column for pumping 'B' seed magma driven by suitable motors. The material of construction is CI body with CI rotor with gun metal tip and the accessories are mild steel base frame and coupling. (1W + 1SB)

2 Sets '**C' seed magma transfer pumps** of Rota type having the capacity of 20 T/hr, 20m head liquid column for pumping 'C' seed magma driven by suitable motors. The material of construction is CI body with CI rotor with gun metal tip and the accessories are mild steel base frame and coupling. (1W + 1SB)

C fore Centrifugal Machines

3 Nos **Ø1500 size continuous centrifugal machines** with 110 KW AC Motor and Control Panel for C Massecuite curing.(2 W + 1 SB)

1 No **Massecuite Header** of horizontal & Cylindrical type with support structure suitable for 3 No's of C fore Centrifugal Machines.

3 Nos 8 to 9 T/Hr capacity **Transient heaters** for C centrifugal machines. These are of mild steel construction.

1 No 8 Mtr long **magma mixer** of mild steel construction suitable for 3 Nos of C Fore Centrifugal Machines with agitator driven by suitable capacity Planetary geared motor. It is of mild steel construction, U trough, double paddle type, top open and both ends closed with flat plates.

1 No **Structural staging** of mild steel construction for 3 Nos of C Fore continuous centrifugal machines.

1 No **Molasses runoff tank** of mild steel construction, vertical, bottom conical, top open type having capacity 3 Cu.M for receiving 'Final' molasses.

2 Sets **Final molasses transfer pumps** of capacity 15 Cu.M/hr, 20m head liquid column driven by suitable drive motors for pumping final molasses. The material of construction is CI body with SS screw & rubber stator and mild steel base frame universal, joint type coupling. (1W + 1 SB).

2 Sets **C fore magma pumps** of rota type of capacity 15 Cu.M/hr, 20m head liquid column for pumping C seed magma driven by suitable motors . The material of construction is CI body with CI rotor with gun metal tip and mild steel base frame & coupling. (1W + 1 SB).

2 Sets 7Kg/Sq.cm(g), 180 CFM reciprocating type **air compressors** with drive motors and all accessories consists of one no of common air receiver and air filters to supply moist free air and necessary gauges & valves, piping.

6.0 SUGAR HOUSE

1 No 2.0 Mtr wide x 12 Mtr long **Plain tray grass hopper** of M.S. construction.

2 Nos 2.0 Mtr wide x 12 Mtr long **Multi tray grass hoppers** of M.S. construction with hot air blower & cold air blowers.

1 No 25 T/hr capacity **bucket elevator** for transferring sugar from sugar hopper to Sizer. The casing is mild steel construction fitted with GI buckets fixed to 40 ton breaking strength chain and driven by suitable planetary geared motor.

1 No 35 T/hr capacity **sugar Sizer / sugar grader** with inlet feed distributor. It is having five screens for separating lumps, dry seed, L sugar, M sugar & S sugar and sugar dust.

2 Nos 80 Ton capacity mild steel construction, vertical, cylindrical, top closed type blending **sugar bins** with suitable supporting structure.

2 Nos **Sugar auto weighing machines** of 600 Bags per hour capacity.

2 Nos **Sugar bag stitching machines with slat conveyors** of 600 bags per hour capacity.

1 No 5 Mtr long x 1.5 mtr wide **magma mixer** suitable for mixing sugar dust & lumps with hot water and it is driven by suitable capacity planetary gear motor. It is of mild steel construction, U trough, double paddle type, top open and both ends closed with flat plates.

2 Nos **Sugar dust and lumps magma transfer pumps** of capacity 20 T/hr, 20 Mtr liquid column driven by suitable drive.(1W + 1SB)

1 Set **Sugar dust collection system** suitable for 3500 TCD Sugar plant.

7.0 SERVICE EWATER TANKS & PUMPS

3 Nos 300 HL capacity mild steel construction **overhead hot & cold water tanks**. 1 for cold water & 2 for hot water.

2 Sets **Service water pumps** of capacity 200 Cu.M/hr, 30m head for pumping cold water from ground raw cold water storage tank to top over head cold water storage tank with suitable motor. The material of construction is CI body with SS internals and mild steel base frame & coupling. (1W + 1 SB)

8.0 **FINAL MOLASSES STORAGE SYSTEM**

1 No **6000 Cu.M capacity final molasses storage tank. It** is of mild steel construction and consists of cooling water coil around the tank.

1 Set **Final molasses recirculation and loading pump** of capacity 30 Cu.M/hr, 20m liquid column driven by suitable drive. The material of construction is CI body with SS screw & rubber stator and the accessories are mild steel base frame and universal, joint type coupling.

1 No **Molasses loading tank** of capacity 10 Cu.M for loading molasses into trucks. It is of mild steel construction, vertical, bottom conical, top open, supported by mild steel staging.

9.0 **MISCALLANEOUS ITEMS**

1 No **Excess condensate cooling tower** suitable to cool of 50 T/hr of hot water for a temperature drop from 80 deg.C to 35 deg.C.

1 Lot **Complete process piping** of mild steel construction with supports etc. suitable for 159 TCH.

1 Lot **Complete steel staging** of mild steel construction with chequered plate / MS grills, flooring, hand railing, toe board suitable for 3500TCD capacity in process house.

1 No **Insulation** of mineral wool with 22 SWG aluminum cladding for exhaust steam piping, vapor piping and heat exchanging equipment with connected piping wherever required in the process house as per standard.

10.0 **Automation / Instrumentation for Process House**

PLC's based automation consisting one operating station at mill house and one operating station at evaporator station and one operating station at pan station

1 No 0 - 200 Cu.M/hr online type screened juice mass flow meter for measuring screened raw juice flow going to process.

1 No Automation of pH control system for juice sulphitation consists of control of MOL flow based on PH sensor in outlet juice.

1 No Automation of Flocculent Flow to Juice clarifier in proportion to inlet juice flow using VFD of flocculent dosing pumps. (Input signal from raw juice flow meter)

1 No Magnetic flow meter of capacity 100 Cu.M/hr for measuring condensate from 1st body evaporator outlet pump to boiler feed water tank.

1 No Automation of exhaust steam flow to 1st body evaporator based on pressure in the 1st body evaporator. It consists of one loop with pressure transmitter and control valve in the exhaust steam line to 1st body evaporator.

1 No Indication of syrup brix using brix transmitter.

1 No Online Measurement of conductivity of 1st body condensate going to boilers by online conductivity transmitter.

4 Nos Automation of all batch vacuum pans for Feed control using control valve in inlet feed line based on level transmitter and conductivity transmitter.

2 Nos Automation of all continuous vacuum pans for

- Magma flow control in proportion to inlet liquor flow consists of magma flow meter (magnetic type) and liquor flow meter (magnetic type) by VFD

drive of magma pumps.

- Liquor flow control by control valves in each liquor inlet line based on conductivity of massecuite in compartments using brix transmitters fixed to respective compartments.

- Vapor flow control by control valve based on the pressure in calendria of each continuous pan.

1 Lot Automation of all Pans & Evaporator Condensers for Inlet water Flow control by sensing temperature in condenser for maintain preset vacuum.

6 Nos 0 – 50 Cu.M/hr magnetic flow meters for measuring Pans outlet condensate water.

1 Lot Automation of Sugar Melter

- Hot Water Flow Control by sensing conductivity. It consists of control valve (50 DN) and brix transmitter.
- Steam / Vapor Flow Control by sensing temperature. It consists of temperature transmitter and control valve (50DN)

1 No 0 – 25 Cu.M/hr capacity magnetic type flow meter for measuring the final molasses.

Miscellaneous Indicating Field Instruments

1 Lot Pressure Gauges in all centrifugal process pump delivery lines for discharge pressure indication.

1 Lot Pressure and temperature Gauges in all vapor inlet lines to Juice heaters.

1 Lot Temperature Gauges in all juice inlet and outlet lines of juice heaters.

1 Lot Pressure and temperature Gauges in all vapor inlet lines to evaporators.

1 Lot Pressure and temperature Gauges in the vapor outlet line from evaporators going to condensers.

1 Lot Pressure and temperature Gauges in the vapor space of all evaporators.

1 Lot RTD type transmitters for all evaporator's calendria and vapor space with digital indication by indicators fixed to panel board.

1 Lot Pressure and temperature gauges in pans vapor header line.

1 Lot Pressure / compound and temperature Gauges in the vapor space and heating space of all vacuum pans.

1 Lot Pressure / compound and temperature Gauges in the vapor piping going to condensers.

1 No Pressure and temperature Gauges for injection water header pipe line.

Co-generation power plant

STEAM GENERATION PLANT

One number single drum, Natural circulation, Balanced draft, Outdoor installation, Water tube type, Continuous ash discharge Travelling Grate Spreader Stoker boiler suitable for firing 100% Bagasse / Combination of bagasse with 10% biomass (wood chips, sugar cane trash, Cane trash, bagasse pith, future provision for firing Imported Coal-80% MCR Only)

Boiler Parameters (100% BMCR)

S.No	Parameters	Specification
a.	Number of boilers	One No.
b.	Steam flow at main steam stop valve outlet for Bagasse	100000 kg / hr
c.	Peak Generation (½ hour in a shift of 8 hours) for Bagasse	110000 kg / hr
d.	Steam Pressure at Main Steam Stop Valve outlet	110 kg/cm^2 (a)
e.	Superheated steam temperature at Main Steam Stop Valve outlet	540 ± 5 Deg. C
f.	Superheated steam temperature Control range for Bagasse	70 – 100 % MCR
g.	Feed Water Temperature at inlet of Economizer (Two HP heaters are in service)	210 Deg. C
h.	Feed water temperature at de-aerator outlet	130 Deg.C
i.	Flue gas outlet temperature leaving air heater	150 Deg.C (for bagasse)

Pressure Parts

- Steam drum of fusion welded construction provided with necessary nozzles and with dished ends on both side with man ways.
- Steam drum internals comprising of cyclones, scrubbers and demisters.
- Water-cooled membrane wall furnace complete with manifolds / headers and connecting piping.
- Necessary openings in the furnace for access doors peep holes, fuel distributors, etc.
- Modular bank tubes complete with manifolds / headers.
- Three stage of Super heater arrangement consisting of primary, intermittent and final super heater with required piping and headers.
- Two nos. of desuperheating system between Primary, Intermittent and final heaters comprising of fixed orifice type desuperheater, other accessories including spray water piping for steam temperature control within +/-5 ℃ between 70 – 100% MCR for bagasse firing.

- Economizer complete with inlet and outlet manifolds, coil supports, casing and insulation.
- All pressure parts tube materials will be of hot finished seamless construction.

Feed Water system

- Feed water piping from deaerator outlet to boiler feed water pump inlet (including suction header).
- Feed water piping from boiler feed water pump discharge (including discharge header) to Feed control station through HP heaters and from Feed control station to economizer inlet
- HP Heaters inlet, outlet and bypass piping.
- Feed water piping from economizer outlet to steam drum.
- Spray water piping from boiler feed pump discharge to boiler attemperator.
- Minimum recirculation piping, balance leak off piping from individual boiler feed water pump to inlet of deaerator storage tank.

Steam system

- Down Comer, Riser and distributor piping for water and steam circulation.
- Saturated steam piping from steam drum to primary super heater.
- Steam piping link between Primary and Secondary Super heaters through spray type
- Attemperator (Fixed type).
- Main Steam piping from Final Super heater outlet Header to Main Steam Stop valve (Total 10 mtrs developed length).
- Soot blower steam piping from primary superheater outlet header to respective soot blowers in superheater, modular bank and economiser zones.

Drain and vent & others piping

- Safety valve exhausts/ vents piping up to a safe elevation of 1m above roof.
- Boiler blow down piping up to common blow down tank.
- Drain piping from individual drains to drain header and from drain header to blow down tank.
- Piping from blow down tank to nearest drain trench.
- Raw water quenching line to BD tank from terminal point.

- Cooling water piping from one point local to boiler sample coolers.
- Overflow piping from deaerator to terminal point (max. 5 meter length is considered).
- Instrument air piping from terminal point near boiler to all equipment with in boiler island requiring instrument air.

Non Pressure parts

- Boiler supporting steel work of bolted / welded construction starting from finished floor level (+300 mm) including platforms, stairs and handrails, tie beams, necessary foundation bolts, nuts, as required. (Firing floor will be MS fabricated grating with synthetic enamel final painting).
- One no. staircase from finished floor level to steam drum operating floor level.
- Galleries, ladders, platform and stairways for access to essential level of the steam generator and auxiliaries. Platform, walkway, stair treads, gratings and handrails are of carbon steel construction.
- Buck stays, tie bars as required.
- Canopy for boiler, Side cladding up to steam drum operating floor level from the top of boiler. (Canopy and side cladding of metapoly sheets of 24 SWG thickness).
- Rain water down pipes.
- Tubular Air heater assembly with casing and structural supports. Last five rows of air heater tubes are provided with corten steel to avoid cold end corrosion during boiler start up and part load operation. Air heater is also provided with bypass ducting with manual damper (at FD air side).
- Air ducting of 4 mm thick and Flue gas ducting of 5 mm thick with required stiffeners and expansion joints.
- All air and gas ducting expansion joints are of carbon steel.
- Ash hoppers under furnace, economizer / air preheater and ESP.
- Manually operated plate gates below furnace, economizer / air heater & ESP ash hoppers.
- Front ash discharge chute submerged into the submerged ash conveyor along with manually operated plate gate. (Submerged ash conveyor in Purchaser's Scope)
- Refractory and lightly resin bonded mineral wool insulation for the boiler, forced flow section, air heater, ducting, piping deaerator and ESP etc. with 24 SWG thick plain aluminium cladding and necessary fixing components.
- Castings for doors and spy holes / peep holes.

- OFA nozzles at required elevation in Furnace Walls.
- Boiler rough mountings including access/inspection doors peep holes with necessary frames and fittings.
- Weather protection hoods for outdoor motors.
- Chimney connecting flanges, counter flanges, expansion joints near chimney and all fasteners for the connection.

Fuel feeding & firing system

Bagasse Feeding system

- Bagasse husk feeding system consisting of
- Silos (approx. 6 min. total storage).
- VFD driven 3 drum feeder with connecting chute to common pneumatic spreader.
- Manually operated Rack & Pinion gates at the inlet of silos.
- Necessary viewing ports on silos.
- Pneumatic spreaders and Rotary damper to feed Bagasse in the furnace.

Travelling grate

Travelling grate complete with variable frequency drive and planetary gearbox arrangement & supports, bottom air compartments, tensioning devices and sealing system. Thermocouples provided on the skid bar below the grate for monitoring grate bar temperature. Self-lubricating graphite bearings provided for traveling grate. The grate bars can be replaced with boiler off load.

Auxiliaries

- One nos. (2 x 50% MCR) radial, backward curved Forced Draught (FD) fans with motor suitable for variable frequency drive and pneumatic power cylinder mechanism through IGV at inlet and manual dampers at outlet including base frame, coupling, bird screen etc. Speed of FD fan will be 1440 rpm.
- One nos. (2 x 60% MCR) capacity radial, backward curved Induced Draught (ID) fans with variable frequency drive and pneumatic power cylinder operation mechanism through IDC at inlet and manual dampers at outlet including, base frame, coupling. Speed of ID fan will be 1000 rpm.
- One nos. (2 x 50% MCR) radial, backward curved Secondary Air (SA) fans, taking suction from atmosphere with constant speed motor including base frame, coupling, bird screen etc. pneumatically operated guide vane at inlet and manual dampers at outlet.

- 3 nos. (3 x 50% design capacity, 2W + 1S) centrifugal, multistage, ring section type Boiler feed water pumps with constant speed drives complete with base frame, coupling, connecting flange, automatic recirculation valves, mechanical seals, lift off devices and suction strainers.
- 2 Nos (2 x 50% design capacity) radial, backward curved fans for cinder re-firing system.
- Suitable operating mechanisms complete in all respect with access for operation for all manual and power cylinder operated dampers.
- Electrically operated long retractable soot blowers for super heater zone and rotary soot blowers for economizer and modular bank zone complete with PRS and other accessories, valves/fittings. Sequential operation of soot blowers will be realized in Purchaser's DCS.
- Silencers for startup vent valve and super heater safety valves to limit noise level of 110 dBA at 1 m distance
- One no. common blow down tank (Common for CBD & IBD).
- Valves, mountings and fittings including the following :
- Two nos. Spring loaded safety valves on steam drum and one no safety valve on SH main steam line.
- One no. motorized isolation at the upstream of start up vent.
- One no. pneumatically start-up vent valve.
- One no motorized main steam stop valve with motorized integral bypass.
- Manual isolation valve at HP heater – I inlet (1no.), HP Heater I outlet (1no.) and HP heater – I bypass (1no.)
- Manual isolation valve at HP heater – II inlet (1no.), HP Heater – II outlet (1no.) and HP heater – II bypass (1no.)
- One no. Manual blow down valve each for CBD & IBD.
- Manual isolation valve at upstream of soot blowers PCV.
- One no NRV in feed water line before economizer.
- Three nos. manual isolation valves at feed pump discharge.
- One no 100% & One no. 30% pneumatically operated feed control valves with manual isolation valves at upstream and manual isolation valve at downstream.
- One no. 100% manually operated bypass valve for feed control valve.
- One no. 100% pneumatically operated spray control valve for boiler attemperator & consisting of manual isolation valve at upstream & downstream and One no. 100% manually operated bypass valve.

Deaerator cum Storage Tank

- One no. Spray cum tray type thermal deaerator of 110 % deaerating capacity with deaerator storage tank suitable for 20 minutes storage (NWL to LWL) with necessary valves, fitting platform, ladders and instruments. 1 x 100% pneumatically operated Level Control valve and 1 x100% pneumatically operated pressure Control valve with manual isolation valves at upstream and downstream and manual bypass valve. (Deaerator is mounted on top of Control room).

Chemical dosing system

- One no Skid mounted LP dosing system comprising of one no. mixing cum storage tank (SS tank) with motorized agitator and 2 nos. positive displacement pumps (1W + 1S).
- One no. Skid mounted HP dosing system comprising of one no. mixing cum storage tank (SS tank) with motorized agitator and 2 nos. positive displacement pumps (1W + 1S).
- HP and LP dosing system piping from dosing skid to economiser outlet and feed pump suction respectively.

Dust Collection System

- One no. Electrostatic precipitator of single stream type to limit the emission level to 100 mg/Nm3 at the outlet of ESP with all fields in service complete with accessories including manually operated plate gates. Emitting & collecting electrodes, hoppers, hopper level indicators, gas distribution screens, hopper heater, rapping mechanism, T/R sets, supporting structures, stairways, walkways, handrails, housing, expansion joints, insulation/cladding, inlet and outlet funnels, lifting/handling arrangement for T-R sets.

Instrumentation

- Local field mounted instruments.
- Compensating cables from thermocouples to field junction boxes including junction box.
- Impulse piping wherever necessary for the items which are under our scope of supply.
- Field instruments required for the following control loops:
- Three Element Drum Level Control

- Furnace Draught Control
- Auto Combustion Control
- Deaerator Level & Pressure Control
- Superheater steam temperature Control
- Soot blower steam pressure control
- Instrument cables and cable trays from field instruments to local junction boxes.
- One no. O2 analyzer in flue gas line placed after economizer.
- 2 nos. direct water level gauges and one number remote water level gauge for boiler drum.

General

- Initial fill of chemicals and lubricants for boiler.
- Chemicals for alkali boil out.
- Two coats of red oxide primer painting at shop prior to dispatch & supply and application of final painting at site (Finish paint synthetic enamel).
- Commissioning spares.
- Maintenance tools and tackles.

POWER GENERATION & BALANCE OF PLANT

TURBINE –GENERATOR SET (20 MW – EXTRACTION CUM CONDENSING TYPE)

1 x 20 MW (Gross) Bottom exhaust extraction cum condensing steam turbine generator set with emergency stop valves, gland sealing system, extraction steam systems, all control, protection & monitoring devices, Turbine lubricating & control oil system equipment complete with oil storage tank, main and auxiliary oil pumps, emergency oil pump, oil purification unit, oil coolers and HP heater.

Water-cooled condenser with steam jet air evacuation system and horizontal condensate extraction pumps.

Turbo Generator Set:

Parameters	**Specification**
Number of Turbine	1 No.
Type of Turbine	Multistage, Extraction cum Condensing Type
Rated Capacity	20 MW
Superheated steam Pressure at Turbine Inlet	104 Kg/cm^2 (g)

Superheated steam temperature at Turbine inlet	535 ± 5 °C
Min. safe continuous load permissible	30%
Type of Cooling & Type of Condenser	Water Cooled, Surface Condenser
Rated speed	6800 RPM

Alternator

Parameters	**Specification**
Protection class	IP-54
Rated apparent power	25000 kVA
Rated power factor	0.8 cos Ø
Rated active power	20,000 kW
Rated voltage	11 kV
Rated frequency	50 Hz
Rated speed	1500 RPM
Max. noise level at a distance of 1.0 m	90 dB
Insulation type	Class F
Temperature rise	Temperature rise as per Class B

MAIN COOLING TOWER FOR TURBINE – ONE NO.

RCC construction, three shell type cooling tower having each cell of 1600 M3/hr. capacity shall be provided for turbo generator set. RCC work for cooling tower shall be in PURCHASER's scope.

The brief technical specifications are as follows:

Type	:	Induced draught rectangular counter flow
No. of cells	:	Three
No. of	:	One
Tentative Overall dimensions	:	41640 x 14000 x 9710 MM (LxWxH)

Design per Cell:

Water circulation rate	:	1600 CMH
Temperature Inlet / Outlet	:	40ºC / 32ºC
Wet Bulb temperature	:	28 ºC
Pressure at Inlet Flange	:	3.00 MWC

Cooling Tower Pumps – Four Nos.

Spray water pumps each capable of delivering 1600 Cu.M/Hr of water, suitable for 15 M head, of CI body & GM/SS Impeller, with drive motor.

Priming Pump – One No.

Priming pump for injection pumps shall be of suitable capacity.

Ash Handling System – 1 Set

Bottom ash handling consisting of

- Submerged belt conveyor to collect bottom ash from traveling grate front and discharge in to main belt conveyor.
- All drive assembly with gear box, drive unit, coupling base frame, guards and local push button station.
- All necessary safety devices.

Fly ash handling consisting of

- Screw conveyor to collect fly ash from Bank tubes, Economizer / Air Heater hopper, and discharge onto main belt conveyor.
- Screw conveyors to collect fly ash from ESP hoppers and discharge onto main belt conveyor.
- Main belt conveyor to collect front ash & fly ash from respective screw conveyors and discharge in to fly ash silo.
- One suitable capacity RCC steel fly ash storage silo with RCC structure with manual isolation gate at exit, ash conditioner, rotary vane feeder etc.
- All drive assembly with gear box, drive unit, coupling base frame, guards and local push button station
- All necessary safety devices
- One no. dust conditioner for fly ash silo shall be provided.
- One no level switch shall be provided for fly ash silo.

Air compressors – 3 Nos (2W +1SB)

- Three Nos. (2W+1SB) suitable capacity, 7Kg/cm² (g) pressure, non-lubricated type, screw type air compressors with refrigerant type air dryer shall be provided for requirement of instrumentation air.

- One no. 2 cum capacity carbon steel construction air receiver for instrumentation air and two nos. 3 cum capacity carbon steel construction air receiver for service air shall be provided.

6.4 Social Infrastructure:

Social infrastructure will be developed as per need based in the nearby Villages.

6.5 Connectivity:

Component	Description
Road	The site can be well approached by a SH # 39 which is at a distance of
Rail	Nearest Railway station located at 14 Km in North Direction
Air port	Nearest Airport located at Belgaum which is at distance of 64 Kms from the Plant site
Sea Port	Karwar port is at a distance of 90 Kms from the Plant site

6.6 Drinking water management:

Drinking water required for the workers will be met from ground water resources.

6.7 Sewerage system:

Domestic waste water generated will be treated in septic tank followed by soak pit.

6.8 Industrial waste management:

6.8.1 Waste Water Management

Waste water generated from the proposed Project will be treated in Effluent Treatment proposed which is furnished under paragraph 3.10.2

6.8.2 Solid Waste Management

Solid wastes disposal in the existing and expansion project is discussed in paragraph 3.11

6.9 Power requirement & Supply / Source:

The power required for the project will be co-gen power plant during season and captive power plant of Distillery during off season.

7.0 REHABILITATION AND RESETTLEMENT (R & R) PLAN

No rehabilitation or resettlement plan is proposed as there are no habitations in the in the Plant site.

8.0 PROJECT SCHEDULE & COST ESTIMATES

The total cost of the project has been estimated at Rs. 230 Crores. The Project Cost estimates include all expenses to be incurred towards the entire project development including Site Development Expenses, Payments to EPC Contractor, Non EPC Expenses, Pre-Operating Expenses, Start-Up Fuel & Commissioning Expenses, Contingency, Margin Money for Working Capital and Financing Expenses including Interest During Construction (IDC).

Detailed breakup of the Cost is given below.

S.NO.	DESCRIPTION	RS. Crores
1	Sugar Plant 5500 TCD	89.67
2	Cogen Plant 20 MW	87.45
3	Civil Sugar & Co-gen (30.33 + 22.55)	52.88
	Total project cost	**230.00**

9.0 ANALYSIS OF PROPOSAL (FINAL RECOMMENDATIONS)

With the implementation of the proposed expansion project, the socio-economic status of the local people will improve substantially. The land rates in the area will improve in the nearby areas due to the proposed activity. This will help in upliftment of the social status of the people in the area. Educational institutions will also come-up and will lead to improvement of educational status of the people in the area. Primary health centre will also come-up and the medical facilities will certainly improve due to the proposed expansion project.

EMPLOYMENT POTENTIAL

The following will be the man power requirement for existing and expansion Project

S.No.	Particulars	No. Employees	
		Existing	Expansion
1.	Technical & Administrative Staff	228	40
2.	Skilled & Semi Skilled (Contract basis)	180	120
3.	Unskilled & Helpers (Contract basis)	385	200
Total		**793**	**360**

OTHER TANGIBLE BENEFITS

The following are the other benefits to the area due to the proposed project.

- Educational status will improve in the area
- Medical standards will improve due to the proposed project.
- Overall economic up-liftment of socio-economic status of people in the area.
- Ancillary developmental activities like CO_2 plant, Cattle feed plants will be created due to the establishment of the proposed unit.

SOCIO-ECONOMIC DEVELOPMENTAL ACTIVITIES

The management is committed to uplift the standards of living of the villagers by undertaking following activities / responsibilities.

- Health & hygiene
- Drinking water
- Education for poor
- Village roads
- Lighting
- Creating harmonious relationships
- Helping locals to conduct sports

- Training to the unskilled manpower

HEALTH & HYGINE

1. Personal and domestic hygiene,
2. Maintaining clean neighborhood,
3. Weekly health camps offering free-check up & medicines
4. Ambulance services
5. Education & drug de-addiction, aids.

DRINKING WATER

Making drinking water available at centralized locations in the village,

SUPPORTING EDUCATION

1. Providing books to all poor children,
2. Conducting annual sports festival in the village schools,
3. Providing amenities like fans, lavatories,
4. Maintain play ground etc.