# PRE – FEASIBILITY REPORT

Of

## ESTABLISHMENT OF SUGAR PLANT OF CANE CRUSHING CAPACITY 5000 TCD COGENERATION POWER PLANT OF 34MW & MOLASSES BASED DISTILLERY OF 60 KLD

AT

## TERDAL VILLAGE, JAMAKHANDI TALUKU, BAGALKOTE DISTRICT, KARNATAKA STATE

**PROPONENT**

## M/s. SOVEREIGN INDUSTRIES LIMITED

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**CHAPTERS**

## CHAPTER 1. EXECUTIVE SUMMARY

**M/s Sovereign Industries Limited (SIL, the company)**, is having an area of 32.02 Hectares (79.09 acres) in Survey Numbers 335/1+2, 336/1D, 336/2B, 336/2K, 337/2, 337/3, 337/4, 350, 351/1+A+B, 351/1A+1B, 351/1A+1B/A, 351/1B, 351/1B PIA, 351/1K, 351/3, 351/3A, 351/3B, 351/3B PIA, 351/4, 352/1A, 352/1B, 352/1K , 352/2A, 352/3 & parts thereof falling under the revenue limits of Terdal Village, Jamkhandi Taluku, Bagalkote district of Karnataka State. **SIL** is establishing a sugar Plant of sugar cane crushing capacity of 3500 TCD with cogeneration plant of 15 MWhr with valid consent for establishment obtained from Karnataka State Pollution Control Board (KSPCB). Based on the feasibility reports & availability of sugar cane, SIL has decided to upgrade the sugar cane crushing capacity to 5000 TCD, Cogeneration of power to 34 MWhr & establish a molasses based distillery of 60 KLD to manufacture Rectified Spirit / Ethanol / Extra Neutral Alcohol within the existing plant premises. Apart from this, SIL also proposes to produce 2MW hr from spentwash incineration boiler. The existing buildings & utilities are spread over an area of 7.68 Hectares (18.97 acres). Proposed expansion of sugar & cogeneration plants along with distillery shall be located in an area of 2.36 Hectares (5.83 Acres). Around 10.53 Hectares (26.0 acres) is being developed as green belt. The balance area of 11.46 Hectares (28.30 acres) shall be vacant land.

The project shall require sugar cane of 5000 to 5800 t/day & molasses of 210 to 240 MT/d. The total fresh water requirement shall be 1202$m^3$/d. The land requirement for the proposed expansion shall be 2.36 Hectares (5.83 Acres) which is already in possession of the company.

The wastewater generation shall be in the form of process wastewater from sugar & non process wastewater from cogeneration plant. Spent wash & spent lees shall be generated from the proposed distillery plant.

The summary of the proposed plant after the proposed expansion is given below:

### SUGAR PLANT OF CAPACITY 5000 TCD & COGENERATION OF POWER 34MW

| Particulars | Quantity | Transportation | Storage |
|---|---|---|---|
| Sugar cane (MT/d) | 5000 | By tractors/ trucks / bullock carts | Cane Yard |
| Bagasse (MT/d) (100% thru' bagasse mode)<br>Bagasse (MT/d) (85% thru' bagasse mode)<br>Coal (MT/d) (15% as an auxiliary fuel along with bagasse ) | 1471<br>1251<br>96 | By return bagasse carrier | Bagasse Storage yard |
| Sulphur (MT per month) | 70 to 80 | By trucks | HDPE bags in store |
| Lime (MT per month) | 280 to 300 | By trucks | -do- |
| Caustic Soda flakes (MT/month) | 6.0 to 7.0 | By trucks | -do- |
| Sodium Hydro Sulphite (MT/month) | 0.48 to 0.54 | By trucks | -do- |
| Bleaching powder (MT/month) | 0.2 to 0.3 | By trucks | -do- |
| Boiler chemicals like antiscalents etc. (kgs/month) | 2 to 3 | By trucks | -do- |
| Lubricants (Wheel bearing greases, lubricating oils etc.) | 10 to 12 (KL/month) | By trucks | Barrels / Tins in store |
| **Products / By-products** | | | |
| Sugar (MT/month) | 18000 | By trucks | Sugar godowns |
| Molasses (MT/month) | 6000 | Reused | Storage tanks |
| Bagasse (MT/month) | 48000 | Reused | Storage Yard |
| Press mud (MT/month) | 6000 | By tractors/ trucks | Storage Yard |

**RAW MATERIALS REQUIREMENT & PRODUCTS FOR PROPOSED 60 KLD DISTILLERY**

| **Raw materials** | **Quantity in MT/d** | **Transportation** | **Storage** |
|---|---|---|---|
| Molasses (Basic Raw material) | 210 to 240 | Pipeline | Mild Steel tanks |
| **Chemicals / Nutrients** | | | |
| Sulphuric acid | 0.12 | Lorry tanker | S.S. tank |
| DAP | 0.06 | Lorry | 50 kg bags |
| Urea | 0.22 | Lorry | 50 kg bags |
| Antifoam<br>HCl<br>Caustic soda | 0.06<br>0.22<br>0.22 | Lorry<br>Tanker<br>Lorry | 50 kg drums<br>Acid proof MS tank<br>50 kg bags |
| Yeast culture / Enzyme | 0.11 | Lorry | 10 kg drums |
| Coal as fuel for Incineration boiler along with spentwash slops (65% concentrated) having 55 to 60 brix | 58.0 | By Dumpers | Storage yard |
| Spentwash Slops (65% concentrated) having 55 to 60 brix | 168 | By Pipeline | Storage tank of five days capacity |
| **Products / By-products** | | | |
| Ethanol (RS/ENA/AA) | 60 KL/d | Lorry tanker | M.S. tanks |
| Yeast sludge | 6 | Tractor/Lorry | Bulk |

In India the annual per capita consumption of white crystal sugar and that of non-centrifugal sugar is 15 Kgs per annum and 23 Kgs per annum respectively. The annual overall consumption of the centrifugal & non-centrifugal sugar in the country comes to more than 25 million tonnes. Thus, there is vast untapped potential for growth in the area of sugar production.

Ethanol production is consumed by the industrial sector for production of ethanol based chemicals like acetaldehyde, acetic acid, esters, butanol, glycol, pentaerythritol, vinyl acetate etc. and also is utilized by the potable sector.

Transport of the raw material for sugar factory i.e. sugar cane shall be done by trucks & the finished product is transported by trucks / wagons. Excess power shall be exported via grid.

Transport of the raw material for distillery i.e. molasses shall be done by a pipeline & finished product is transported by tankers / trucks.

The proposed expansion of the unit will result in the following resource optimisation

a. Proposed plant shall be situated in the available land
b. Proximity to the availability of raw material area i.e. rich sugar cane area of Jamakhandi Taluku.
c. Availability of utilities such as transportation & water.
d. Ease of control over both sugar, cogeneration & distillery units by one management & sharing common facilities like workshop etc.

The project is based on zero discharge. The wastewater generated after the expansion of the sugar & cogeneration plants (quantity 865 KLD) shall be treated & reused for on land irrigation within the plant premises.

The spent wash generated from the distillery plant (quantity 480 KLD) shall be concentrated & incinerated. Spentlees generated from the distillery plant (quantity 144 KLD) shall be subjected to reverse osmosis (RO) treatment. RO reject shall be concentrated & incinerated.

Additional land is not required for the proposed expansion of the sugar & cogeneration plants & for establishment of distillery. **M/s Sovereign Industries Limited (SIL, the company)**, is having an area of 32.02 Hectares (79.09 acres) in Survey Numbers 335/1+2, 336/1D, 336/2B, 336/2K, 337/2, 337/3, 337/4, 350, 351/1+A+B, 351/1A+1B, 351/1A+1B/A, 351/1B, 351/1B PIA, 351/1K, 351/3, 351/3A, 351/3B, 351/3B PIA, 351/4, 352/1A, 352/1B, 352/1K , 352/2A, 352/3 & parts thereof falling under the revenue limits of Terdal Village, Jamkhandi Taluku, Bagalkote district of Karnataka State. Greenbelt is being developed in an area of 10.53 Hectares (26.0 acres).

The proposed water consumption after expansion in the sugar plant including power generation shall be 3720$m^3$/day. Of this total water requirement of 3720 $m^3$/day, about 3500 $m^3$/day shall be met from the cane juice of sugar plant and the balance requirement of 220$m^3$/day shall be drawn from River Krishna.

The proposed water consumption including domestic purpose in the distillery plant shall be 934$m^3$/d & the same shall be drawn from River Krishna.

SIL has already obtained the necessary permission for lifting the water from Department of irrigation, Government of Karnataka.

Following table shows the quantities of by products / solid waste generation from the proposed plant.

**Details of Solid Wastes / by products from Sugar & Cogeneration power plants after expansion**

| Sl. No. | Description of By products / Solid wastes | Quantity Per Month in MT | Mode of Disposal |
|---|---|---|---|
| 01 | Molasses | 6000 | Shall be used as raw material for manufacturing of Rectified Spirit or Ethanol |
| 02 | Bagasse | 48000 | Shall be used as fuel for captive power generation |
| 03 | Press mud | 6000 | Shall be mixed with boiler ash and given as manure to member farmers. |
| 04 | Wet bottom ash | 132.3 | Shall be mixed with press mud and given as manure to member farmers. |
| 05 | Dry fly ash | 531 | --do-- |
| 06 | ETP Sludge | 40 | Shall be used as manure within premises |

The following table shows the **solid wastes generation from the proposed distillery.**

| Solid Wastes | Quantity per day | Mode of disposal |
|---|---|---|
| Yeast Sludge | 9.00 MT | Shall be dried & sold as Cattle feed. |
| Bottom ash from incineration boiler | 4.20 MT | Shall be sold to brick manufacturers / cement plants |
| Fly ash from incineration boiler | 42.84 MT | Shall be given to farmers. |

The project will be implemented within 18 months after obtaining the environmental clearance. The project will be implemented at a project cost of Rs 87 crores. Out of Rs 87 crores, an amount of Rs. 27 crores will be spent towards implementation of Environmental Management Plan.

## CHAPTER 2. INTRODUCTION OF THE PROJECT / BACKGROUND INFORMATION

### 2.1 IDENTIFICATION OF PROJECT AND PROJECT PROPONENT, IN CASE OF MINING PROJECT, A COPY OF MINING LEASE / LETTER OF INTENT SHOULD BE GIVEN.

**M/s Sovereign Industries Limited (SIL, the company)**, is having an area of 32.02 Hectares (79.09 acres) in Survey Numbers 335/1+2, 336/1D, 336/2B, 336/2K, 337/2, 337/3, 337/4, 350, 351/1+A+B, 351/1A+1B, 351/1A+1B/A, 351/1B, 351/1B PIA, 351/1K, 351/3, 351/3A, 351/3B, 351/3B PIA, 351/4, 352/1A, 352/1B, 352/1K , 352/2A, 352/3 & parts thereof falling under the revenue limits of Terdal Village, Jamkhandi Taluku, Bagalkote district of Karnataka State. **SIL** is establishing a sugar Plant of sugar cane crushing capacity of 3500 TCD with cogeneration plant of 15 MWhr with valid consent for establishment obtained from Karnataka State Pollution Control Board (KSPCB). Based on the feasibility reports & availability of sugar cane, SIL has decided to upgrade the sugar cane crushing capacity to 5000 TCD, Cogeneration of power to 34 MWhr & establish a molasses based distillery of 60 KLD to manufacture Rectified Spirit / Ethanol / Extra Neutral Alcohol within the existing plant premises. Apart from this, SIL also proposes to produce 2MW hr from spentwash incineration boiler. The existing buildings & utilities are spread over an area of 7.68 Hectares (18.97 acres). Proposed expansion of sugar & cogeneration plants along with distillery shall be located in an area of 2.36 Hectares (5.83 Acres). Around 10.53 Hectares (26.0 acres) is being developed as green belt. The balance area of 11.46 Hectares (28.30 acres) shall be vacant land.

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The proposed water consumption including domestic purpose in the distillery plant shall be 934$m^3$/d & the same shall be drawn from River Krishna. SIL has already obtained the necessary permission for lifting the water from Department of irrigation, Government of Karnataka.

Proposed expansion of sugar & cogeneration plants along with distillery shall be located in an area of 2.36 Hectares (5.83 Acres). & the land is already in possession of the company.

The wastewater generation shall be in the form of process wastewater from sugar unit & non process wastewater from cogeneration plant. Spentwash & Spentlees shall be generated from the distillery. The summary of the proposed expansion is given in **Table 2.1**.

#### 2.1.1. PROJECT PROPONENT:

**Promoters Background**

The promoter's background in terms of present Board of directors and their bio-data is illustrated in the following sections:

**Present Board of Directors**

| Name of Directors | Designation |
|---|---|
| Shri. Shivkumar S. Malghan | Chairman |
| Shri. Gurappa Reddi | Director |
| Shri. N T Huggi | Director |

**Profile of Promoter & Board of Directors of SIL**

The Board of the Company consists of mix of youth and experience, with agricultural, social, industrial and sugar industry background. All the directors hold equity shares in the company resulting in sense of ownership and participation. The board consists of three directors; detailed profile of directors is given hereunder.

### 2.1.1.1. Mr. Shivakumar S. Malghan – Chairman & Managing Director

Mr. Shivakumar S. Malghan is the key person who is instrumental in conceptualization of the proposed project by the company. He is a qualified civil engineer and born and brought up in an agricultural family. He is 48 year's young energetic entrepreneur with strong experience in civil contract works. He has 20 years experience in the various businesses. He has done wholesale business in foreign liquors for eight years. He was also a partner in Mahalaxmi Motors, Mudhol. The unit was having dealership of Mahindra Tractors & since November 2005 till year 2009 firm has sold around 350 tractors.

He is also Managing Director and controls Lokapur Cements Ltd. He was also Director on the board of Raitara Sahakari Sakkare Karkhane Niyamit for the period of 5 years from 2004-2009. He is having good contacts with the engineer contractors, builder's developers, and dealers of cement and consumers of cement of North Karnataka and bordering Maharashtra State.

His family has long history of active involvement social and political arena. He was the Chairman of Bagalkot Zilla Panchayat during 2001-2005. As active political citizen, he has regular touch with many farmers. He also owns agriculture lands and jells very easily with farmers. His personal interaction over last 25 years has helped in developing personal reputation with farmers. Since majority of the farmers know him at personal levels, they have motivated him to supply cane to his factory only. His rich experience in managing the sugar industry and strong leadership qualities is of immense help for the growth of SIL.

### 2.1.1.2. Mr. Mallanna G. Molkeri – Technical Director

Mr. Mallanna G. Molkeri is a technical Director on the board. He is young and dynamic aged 42 years techno commercial professional in sugar & power industry. He is having total 18 years experience (12 years experience in power sector India/ Abroad and 6 year experience in sugar sector). In his previous assignments he was in charge of complete plant and reporting directly to the top management and he is Managing Director of V-MAS PRO-TECH ENERGY PVT LTD, having office in Mumbai.
His brief credentials are as under.

| | |
|---|---|
| Education Qualification | B.E. (Electrical) from Gulbarga University, Karnataka. |
| Management Qualification | Executive MBA program form ICFIA |
| Professional Qualification | Post graduate diploma in thermal power plant engineering from National power training institute Nagpur government of India organization under the ministry of power. |
| Computer experience | Auto Cad, Unix, C, C++, Ms-office |
| Total experience | 18 years |
| Field of experience | Power plant project (Execution, Erection, Commissioning, testing, operation & maintenance.) |

**Responsibilities held during previous assignments:**

18 years of experience in senior management level, mainly responsible for planning, execution, commissioning & operation & smooth functioning of power plant substation projects. Establish close coordination between maintenance & operation to ensure zero down time. Preparation of maintenance scheduled of the equipment to keep performance at optimum operational efficiency to deliver quality of power supply. Excellent liasoning skills and dealing with Government agencies and knowledge Indian electricity rules. Establishing the feasibility and getting in principle clearance for transmission and supply of power to industrial consumer under the Electricity Act 2003 as a group IPP/CPP.

**Previous Employment Details.**

- Worked as General Manager in M/s. Kedarnath Sugars Limited in 2010-11.
- Worked as General Manager in M/s. Lokamangal Sugars Limited worked in 2008-10.
- Worked as Chief Engineer in M/s. Nandi Sahakari Sakkare Karkhane Niyamit, in 2006-08.
- Worked as Deputy General Manager power plant in M/s. Egypt Electrical Holdings company Sidikrir Egypt Thermal power plants of capacity 2x 320 MW & 2 x 340 MW, for the period – 2003 to 2006.
- Worked as Senior Manager power plant in M/s. Alholmens kraft jakpbastad, Finland Thermal power plant of capacity 1 x 240 MW for the period – 2001 to 03.
- Worked as Manager power plant in M/s. Senko power company ltd., Singapore of capacity 2 x 424 MW for the period August 1998 to August 2001.

**3. Shri N.T. Huggi, Director**

Shri N.T. Huggi aged 71 years is an agriculturist and businessmen. He is born and bought up in agricultural family and having around 17 acres of irrigated land growing sugarcane and other crops. He is having 45 years of experience in agriculture and 10 years in business. He is having good contracts with the public of Bagalkot District. His rich experience in agriculture and local contacts is of immense help for the growth of SIL.

**TABLE 2.1**
**SUGAR PLANT OF CAPACITY 5000 TCD & COGENERATION OF POWER 34MW**

| Particulars | Quantity | Transportation | Storage |
|---|---|---|---|
| Sugar cane (MT/d) | 5000 | By tractors/ trucks / bullock carts | Cane Yard |
| Bagasse (MT/d) (100% thru' bagasse mode)<br>Bagasse (MT/d) (85% thru' bagasse mode) | 1471<br>1251 | By return bagasse carrier | Bagasse Storage yard |
| Coal (MT/d) (15% as an auxiliary fuel along with bagasse ) | 96 | | |
| Sulphur (MT per month) | 70 to 80 | By trucks | HDPE bags in store |
| Lime (MT per month) | 280 to 300 | By trucks | -do- |
| Caustic Soda flakes (MT/month) | 6.0 to 7.0 | By trucks | -do- |
| Sodium Hydro Sulphite (MT/month) | 0.48 to 0.54 | By trucks | -do- |
| Bleaching powder (MT/month) | 0.2 to 0.3 | By trucks | -do- |
| Boiler chemicals like antiscalents etc. (kgs/month) | 2 to 3 | By trucks | -do- |
| Lubricants (Wheel bearing greases, lubricating oils etc.) | 10 to 12 (KL/month) | By trucks | Barrels / Tins in store |
| **Products / By-products** | | | |
| Sugar (MT/month) | 18000 | By trucks | Sugar godowns |

| | | | |
|---|---|---|---|
| Molasses (MT/month) | 6000 | Reused | Storage tanks |
| Bagasse (MT/month) | 48000 | Reused | Storage Yard |
| Press mud (MT/month) | 6000 | By tractors/ trucks | Storage Yard |

**RAW MATERIALS REQUIREMENT & PRODUCTS FOR PROPOSED 60 KLD DISTILLERY**

| **Raw materials** | **Quantity in MT/d** | **Transportation** | **Storage** |
|---|---|---|---|
| Molasses (Basic Raw material) | 210 to 240 | Pipeline | Mild Steel tanks |
| **Chemicals / Nutrients** | | | |
| Sulphuric acid | 0.12 | Lorry tanker | S.S. tank |
| DAP | 0.06 | Lorry | 50 kg bags |
| Urea | 0.22 | Lorry | 50 kg bags |
| Antifoam<br>HCl<br>Caustic soda | 0.06<br>0.22<br>0.22 | Lorry<br>Tanker<br>Lorry | 50 kg drums<br>Acid proof MS tank<br>50 kg bags |
| Yeast culture / Enzyme | 0.11 | Lorry | 10 kg drums |
| Coal as fuel for Incineration boiler along with spentwash slops (65% concentrated) having 55-60 brix. | 58.0 | By Dumpers | Storage yard |
| Spentwash Slops (65% concentrated) having 55 to 60 brix. | 168 | By Pipeline | Storage tank of five days capacity |
| **Products / By-products** | | | |
| Ethanol (RS/ENA/AA) | 60 KL/d | Lorry tanker | M.S. tanks |
| Yeast sludge | 6 | Tractor/Lorry | Bulk |

On freezing their idea to diversify into sugar, cogeneration plant & molasses based distillery, their option for location of the plant has been decided to be in the state of Karnataka for various techno commercial reasons. **M/s Sovereign Industries Limited has selected suitable site** at **Terdal Village, Jamakhandi Taluku of Bagalkote District** in **Karnataka.** This area has been classified as high sugar recovery zone by the Government of India on account of its favourable climatic conditions for cultivation of sugarcane crop.

Establishment of the proposed expansion unit will contribute much for the rural area development. After the establishment of the factory, economy & the standard of living of the entire area will be enhanced. It will also provide employment directly and indirectly for 400 and 3000 persons respectively.

### 2.1.3 Company Details

| | |
|---|---|
| Name | M/s Sovereign Industries Limited |
| Registered Office | Triveni Towers, Yadwad Road, Mudhol, District Bagalkote, Karnataka State. |
| Plant Location | Survey Numbers 335/1+2, 336/1D, 336/2B, 336/2K, 337/2, 337/3, 337/4, 350, 351/1+A+B, 351/1A+1B, 351/1A+1B/A, 351/1B, 351/1B PIA, 351/1K, 351/3, 351/3A, 351/3B, 351/3B PIA, 351/4, 352/1A, 352/1B, 352/1K , 352/2A, 352/3 & parts thereof falling under the jurisdiction of Terdal village, Jamkhandi Taluku, Bagalkote District, Karnataka State. |
| Constitution | Public Limited Company |
| Business | Sugar manufacturing, power generation & distillery |

1. Staff Quarters: The Company has provided quarters to the Head of the Departments and chemists, manufacturing assistants and engineers in the factory premises. About 70

quarters are built. These quarters shall be provided with free water, dish antenna for entertainment and electricity for their use. Telephone facilities shall be provided with a security facility.

2. The company shall construct a temple in the office premises. This allows the staff, workers and their families to gather in the temple yard on festivals and other days.

3. The company shall develop greenery in the plant premises and also develop lawns near the factory and residential premises. The lush greenery shall give a very pleasant look and soothing effect. A rose garden is also planned.

4. The company shall financially contribute to some social organizations who conduct mass marriages, etc. Contributions shall be also made to various temples and special organizations for assisting the social activities of the public in nearby villages. The company shall also donate liberally for assisting the educational institutions, by contributing towards construction cost of school buildings.

To achieve "Zero Discharge" of effluent as per CREP norms, the proposed sugar & cogeneration plant shall utilize all the treated effluent for on land irrigation within the premises. Adequate land is available with the company for the same. The annual requirement of bagasse shall be available with the proposed sugar unit, which is sufficient to run the proposed cogeneration unit.

To exploit more benefit from this industrial complex, the management of the factory has planned to install a 60 KLD distillery based on Continuous fermentation and MPR distillation to produce industrial, potable Rectified Spirit and Potable Extra Neutral Alcohol from molasses. The annual requirement of molasses shall be available with the proposed sugar unit, which is sufficient to run the proposed distillery unit. All the spentwash generated from the distillery shall be incinerated.

In short, the performance of the proposed unit is expected to be quite impressive.

## 2.2 BRIEF DESCRIPTION OF NATURE OF THE PROJECT

**M/s Sovereign Industries Limited (SIL)** is establishing a Sugar Plant of sugar cane crushing capacity of 3500 TCD with cogeneration plant of 15 MWhr with valid consent for establishment obtained from Karnataka State Pollution Control Board (KSPCB). Based on the feasibility reports & availability of sugar cane SIL has decided to upgrade the sugar cane crushing capacity to 5000 TCD, Cogeneration of power to 34 MWhr & establish a molasses based distillery of 60 KLD to manufacture Rectified Spirit / Ethanol / Extra Neutral Alcohol within the existing plant premises. Apart from this SIL intends to generate 2 MWhr power from the spentwash incineration boiler.

M/s SIL is already in possession of required land in in Survey Numbers 335/1+2, 336/1D, 336/2B, 336/2K, 337/2, 337/3, 337/4, 350, 351/1+A+B, 351/1A+1B, 351/1A+1B/A, 351/1B, 351/1B PIA, 351/1K, 351/3, 351/3A, 351/3B, 351/3B PIA, 351/4, 352/1A, 352/1B, 352/1K , 352/2A, 352/3 & parts thereof falling under the revenue limits of Terdal Village, Jamkhandi Taluku, Bagalkote district of Karnataka State for the establishment of the proposed units. This area has been classified as high sugar recovery zone by the Government of India on account of its favourable climatic conditions for cultivation of sugarcane crop.

## 2.3 NEED FOR THE PROJECT & ITS IMPORTANCE TO THE COUNTRY & OR REGION

### 2.3.1 Indian Sugar Industry:

The world's largest consumers of sugar are India, China, Brazil, USA, Russia, Mexico, Pakistan, Indonesia, Germany & Egypt.

Brazil & India are the largest sugar producing countries followed by China, USA, Thailand, Australia, Mexico, Pakistan, France and Germany.

Global sugar production increased from approximately 125.88 MMT (Million Metric Tons) in 1995-1996 to 149.4 MMT in 2002-2003 and then declined to 143.7 MMT in 2003-2004, whereas consumption increased steadily from 118.1 MMT in 1995-1996 to 142.8 MMT in 2003-2004.

The world consumption is projected to grow to 160.7 MMT in 2010 and 176.1 MMT by 2015.

India is predominantly an agro based economy. Sugarcane plays a very vital role in this agro based economy by providing sugar, the main sweetener used in India. With the growing demand for sugar, the emphasis has been on increasing sugar production.

The Indian sugar industry is the country's second largest agro-processing industry with an annual production capacity of over 18 million tonnes of sugar. About 45 million farmers & their families depend directly on sugar industries. Only 2.5 % of the area is under cultivation of sugar cane of total cultivated area in India.

In India the annual per capita consumption of white crystal sugar and that of non-centrifugal sugar is 15 kg per annum and 23 kg per annum respectively. The annual overall consumption of the centrifugal and non-centrifugal sugar in the country comes to more than 25 million tonnes. Thus, there is vast untapped potential for growth in the area of sugar production.

India is a vast country with greatly varying economic patterns and parameters prevailing across the country. Such variations are highly pronounced, particularly between urban areas and rural areas. Income levels vary significantly. Almost 30% of the population is perceived to be in an extremely low income group. The effective per capita consumption of white sugar would work out to 24 kg and of total sweeteners (including gur and khandsari) to 32 kgs, about one and half times the world average.

A higher net per capita state domestic product and also a higher proportion of urban population, the consumption of sugar is significantly higher and compares favorably with developed countries such as the USA and countries of the EU. In fact, in urban areas of comparatively affluent Indian states like Punjab, Haryana etc., per capita consumption of sugar is substantially higher than even in developed countries.

Due to the switching over from other sweetening agents to sugar, the effect of population growth and increase in per capital consumption, the sugar consumption is likely to increase. Hence, there is a lot of scope for increasing the Sugar Manufacturing infra Structure. Hence, further addition of sugar manufacturing Infra-structure is envisaged in India.

Further the economical size of the sugar plant is shifting from 2500 TCD to 5000 TCD considering mainly the cost of production and economical and self sufficient downstream industries.

Considering the declining trend of world beet sugar production, more cane juice/sugar diversion to ethanol, India's larger agricultural base, irrigation resources etc. India is definitely going to be a major player in world sugar production.

Sugar industry gives a very important by product Molasses, which is gainfully converted into alcohol. In commercial and technical terms, Alcohol is known as Ethanol (Ethyl Alcohol),

made from fermented cane molasses. Ethanol industry has been in operation since 19th century, following the growth of sugar cane industry.

The Sugar cane and Molasses production in India during last 6 years has increased from 241.04 million tonnes to 269.38 million tonnes and 5.44 million tonnes to 8.29 million tonnes respectively.

In view of the existing surplus of Molasses, diversification is considered necessary to produce, among others: Liquid Sugar from Molasses, Mono sodium Glutamate (MSG), Alcohol fresh and Active Dry Yeasts, Animal feed yeast, Citric acid and Acetic acid alcohol. About 95% Molasses is used by distilleries and balance 5% is used for other purposes.

## 2.4. DEMAND– SUPPLY GAP POWER SECTOR IN INDIA

In India, the installed power plant capacity was approximately 1300 MW in 1947 and it is about 120,000 MW in 2006. Power has a significant role to play in industry and agriculture. Power demand increases continuously due to increase of the industrialization and per capita power consumption. At present, the per capita power consumption is about 600 KWHr. It is likely to increase to 1000 KWHr in 2012.

At present, the gap between the demand and supply is about 30% during the peak hours. The Central Government has notified on 12-02-05 that the availability of the power demand is to be fully met only by 2012. But to achieve, the country has to install 2,000,000 MW capacity. Per capita availability has to increase from the present level of 600 KWhr to 1000 KWhr in 2012.

Aggressive attitude of the country to grow in the power field to meet the level of infrastructure demand is required in the competitive international market.

### 2.4.1. NEED FOR BIO MASS BASED POWER PLANT

The ever growing energy demand and the steep depletion of fossil fuels have directed us to explore the possibility of developing other sources of energy particularly from non-conventional renewable energy sources, which is also environmental friendly.

Further, it is an undisputed fact that the present level of generation of power from Hydel, Thermal and nuclear sources could not meet the increasing demand due to various problems.

In order to reduce the Green House Gas Emission, the Non-Conventional Energy is to be utilized for the generation of electricity. One of the Non-Conventional renewable Energy source is Bagasse. So the Ministry of Non – Conventional Energy, the Government of India encourages Sugar Mills for Bagasse based Co-Generation by increasing the various subsidies.

We have to cross the hurdles such as lower growth rate i.e. around 5% against expected 12 % every year, lower PLF in the range of 75 % on an average, T&D losses varying in various.

In the above scenario the country has to necessarily to come out with innovative options to encourage the energy conservation measures, increasing the PLF, export of surplus power to the national purpose etc.

### 2.4.2. OVERVIEW OF POWER SITUATION & SUGAR PLANT CO-GENERATION PROJECTS, IN INDIA & IN THE STATE OF KARNATAKA.

The existing power shortages in peak demand and energy availability are quite higher, compared to the nation. It is necessary for the State Government to tap every possible alternate source of energy, from bio-mass or captive power. This is in view of the projections for requirement of power for sustained economic development of the State and shortages of funds for implementing conventional power projects. The Government of Karnataka has already acknowledged the grim situation and has decided to promote captive and cogeneration projects in private, joint, public and cooperative sectors.

### 2.4.3 POWER SCENARIO IN KARNATAKA

Karnataka has been facing shortage of power in the recent years and the power system is a mix of Thermal, Hydel, Gas, Co-generation, and Contribution from National Grid. Due to the continuous effect of Karnataka Electricity Board, the transmission loss, which is about 62 % in some states, is reduced to 25%. In spite of that there is power shortage.

### 2.4.4 CO-GENERATION

Due to shortage in the power supply during peak hours and also due to the Government policy of supplying power to the rural areas on priority, many industries and commercial establishments have started installing captive power generation facilities.

Such captive power generation comes under three categories. Category 1 is Co-generation, which is the simultaneous generation of process heat and electric power. Category 2 is standby captive generation, mainly as a back up in the event of utility power failure. Category 3 is the captive generation, used for augmenting or even substituting the utility power.

Co-generation increases the overall efficiency of the system and is desirable from the point of view of energy economy. It is estimated that such captive generation capacity in the country is about 10% of the total installed utility generating capacity.

### 2.4.5. BAGASSE BASED CO-GENERATION IN SUGAR INDUSTRY

Indian Sugar Industry has to improve the revenue by value addition to the by product. So by Cogeneration, Indian sugar Industry can be benefited and the revenue per ton of sugar cane can be enhanced.

Sugar mills have the capacity to export about 100 KWhr power per ton cane. This will increase the revenue by Rs. 300 per ton cane.

Cogeneration reduces the Green House Gas emission. This will reduce the global warming. So by co-generation, future generation will also be benefited.

All the Cane sugar plants have been using the cogeneration concept – dual use of energy in steam, for their own captive use. But the term " cogeneration" under the present context is used to denote the export of the surplus power to the grid or for selling to any other third party.

The cogeneration potential in the country in various industries, like petrochemical, paper, sugar, textile, cement etc., is around 12,000 MW. Out of this, it is estimated that the potential in the cane sugar factories is around 4000 MW.

Bagasse based cogeneration has the following advantages.

- The bagasse based cogeneration is eco-friendly as pollutants are negligible.

- Bagasse based cogeneration conserves fossil fuels.
- There is no need to transport the fuel to the generating station as the fuel i.e. bagasse is available in the factory itself.
- It does not increase any foreign exchange outflow, as all the plant and equipment required for setting up the cogeneration plants are indigenously available.
- The setting up of the cogeneration plants has a lower gestation period compared to the gestation period of the conventional thermal plants.
- It has lower installation and operating costs compared to the conventional fossil fuel thermal power plants.
- As the plants will be located invariably in the rural areas, the transmission and distribution losses are very much minimized. In addition, these plants increase the voltage level of the power supplied to the rural areas.
- Bagasse based cogeneration provides employment to rural folk.
- The cogeneration plants also improve the financial position of the sugar factories.

### 2.4.6. SUGAR CANE AS ENERGY CROP

Sugarcane is a tropical grass belonging to the same genes as sorghum and maize. It is an energy crop and the maximum converter of solar energy into bio-mass.

The trash free millable sugarcane stalk contains about 73% water and 27% solids. Sugarcane contains about 14% dissolved solids and about 13% fibre woody fibrous solids.

The woody fibre of the cane with the unextracted solids and moisture is known as bagasse. It is a residue of sugar milling plant. It is about 30 to 32% of the sugarcane. Bagasse shall be used as fuel for the boilers in the sugar mills.

Calorific value of the bagasse depends upon the moisture percentage in bagasse. It is about 2272 kcal per kg of bagasse.

As the selling of surplus power is now possible, high pressure energy efficient boilers & energy efficient turbines are being installed. More power per ton of cane is produced. Surplus power shall be exported. Conventional sugar mills generate about 35 KWhr power per ton cane and consume the entire generated power whereas the bagasse based cogeneration sugar mills generate about 130 to 140 KWhr power, consumes about 35 KWhr & export about 105 KWhr power per ton cane. Hence, the bagasse based cogeneration increases the profitability of the sugar mills.

Further cogeneration plants using bagasse as fuel are eco friendly and have the added advantages of relatively low capital cost as well as short gestation period. In addition, the other added advantages are also there, like reduction in the transportation of fuel & reduction in transmission losses. Cogeneration in sugar industries also raises a futuristic source in the way of India's self-reliance in the power sector particularly in the rural areas.

Keeping in view of the above, **M/s SIL** proposes to install sugar plant of capacity 5000 TCD along with a cogeneration plant of 34 MW from which sugar production is estimated to be about 0.108 Million Tons Per Annum.

### 2.5 NEED FOR THE DISTILLERY PROJECT

Ethyl Alcohol, Alcohol, Spirit, Denatured Spirit, there are myriad descriptions for this agriculture-based product. A globally traded commodity, Ethanol fires combustible engines in Brazil, slakes the thirst of many in Europe and finds its way in pharmaceutical and chemical industries, across the world.

Ethanol is made by two routes: either by synthetic one from petroleum substances or by fermentation from sugar bearing or starchy substrates using yeast.

Alcohol finds its use in diverse applications ranging from potable liquor to life saving drugs to paints & perfumery to renewable source of energy.

Ethyl Alcohol is an important feedstock for the manufacture of various chemicals. These chemicals are primarily the basic carbon based products like Acetic Acid, Butanol, Butadiene, Acetic Anhydride, PVC, etc.

Ethylene, Ethylene oxide are also produced from a petrochemical route, however this requires plants of huge scales and thus require substantially high investments.

The drug industry also uses alcohol as a raw material for production of Insulin, Antibiotics, tonics and several other essential bulk drugs & formulations.

**2.5.1 DISTILLERY INDUSTRY OVERVIEW**

India is the third largest market for alcoholic beverages in the world. The demand for spirits and beer is estimated to be around 373 million cases. There are around 12 Joint Venture Companies having a licensed capacity of 33919 Kilo-litres per annum for production of grain based alcoholic beverages. 56 units are manufacturing beer under license from the Government of India. (Source: Annual Report 2005-2006, Government of India, Ministry of Food Processing Industries).

The Alcohol Industry in India can be divided into the following five categories:

1. Industrial Alcohol
2. Potable Alcohol
3. Mixed Distilleries (Industrial and Potable Alcohol)
4. Bottling Plants (purchasing alcohol and bottling alcoholic beverages)
5. Distilleries producing alcohol from substrates other than molasses.

However, the majority of distilleries are producing alcohol from Sugarcane Molasses.

The distillery industry based on molasses consists of potable liquor and industrial alcohol. The potable distillery producing distillery producing Indian Made Foreign Liquor (IMFL) and Country Liquor has a steady but limited demand. The industrial alcohol, on the other hand, is showing a declining trend because of high price of molasses, which is invariantly used for the production of fuel alcohol. The Potable Alcohol segment comprises of categories such as Beer, Country Liquor, Indian Made Foreign Liquor (IMFL) and wine.

IMFL primarily comprises of wine, vodka, gin, whisky, rum and brandy. The Indian beer market reached about 94 million cases or 7.3 lakhs kilolitre (one case is 12 bottles each of 650 ml) in the financial year, 2004-05. Flavoured low alcohol beverages with new variants like the 330 ml beer pack have driven sales growth across the country. Strong beer, which has 5 percent of alcohol content, outsells mild beer in India and accounts for more than 68% of total sales. The country liquor is produced by a number of small and medium sized players, but a few organized players like Radico Khaitan, GM Breweries are also present in this low price high volume segment. The Country Liquor Market is estimated to be 175 million cases. The Indian wine market, estimated at 5 lakh cases annually, has witnessed robust 30% growth over the past few years. (Source: FICCI-Food & Beverages Survey, February 2006).

India consumes spirits / CL (hard liquor) at par with the world but consumes very little Beer /

Wine despite having large potential in tapping comparative advantage of agro-climatic conditions and a huge growing market.

The following are the key drives pushing demand for liquor in India:

Perception of alcohol has changed from taboo to a socially acceptable beverage, due to availability of wide range of products.

A large untapped segment exists for low priced brands in unorganized markets due to changes in taxation structure and opening of new distribution channels.

Keen competition in production and distribution attributable to growth in consumption habits and the entry of international brands / manufacturers which in turn has lead to further expansion of market.

The Alcoholic beverages industry is a State controlled subject. As per the All India Distillers' Association, it is the second largest source of revenue of the State Exchequer and is the only industry where inputs are de-controlled (free market price) and output is controlled (selling price is determined by State Excise in most states).

### 2.5.2. Ethanol / Alcohol production scenario

Molasses is a viscous by-product of the processing of sugarcane into sugar and is the raw material for manufacture of alcohol/ethanol.

India imports nearly 70% of its annual crude petroleum requirement which is appox.110 million tons. The prices are in the range of US$ 100 – 105 per barrel and the expenditure on crude purchase is in the range of Rs.800 – 1200 billions per year, impacting in a big way, the country's foreign exchange reserves.

The petroleum industry now looks very committed to the use of ethanol as fuel, as it is expected to benefit sugarcane farmers as well as the oil industry in the long run. Ethanol (FUEL GRADE) can also be produced from wheat, corn, beet, sweet sorghum, Cellulosic materials, etc. Ethanol is one of the best tools to fight vehicular pollution, contains 35% oxygen that helps complete combustion of fuel and this reduces harmful tailpipe emissions. It also reduces particulate emissions that pose a health hazard.

These information with an aim to promote the production of ethanol bring together all the information required (Ethanol Plant Machinery, Project Finance, Govt. schemes, Approvals, Fuel Ethanol Plants commissioned, Ethanol Distillation, Fermentation, Molecular Sieve Technology) for the ethanol producers. Plans are afoot to set up an online ethanol marketplace connecting buyers and suppliers.

### 2.5.3 Government Policy towards Ethanol

Environmental problems that arise from transportation have so far been dealt with from a narrow perspective. Clean fuel substitution as one of the strategies will help reduce emission levels. Though we can take advantage of the latest technologies available to improve efficiency o energy use, provided they are affordable, India should use resources that are available indigenously and adopt them to derive maximum benefit. At the same time, it must ensure that the environmental impact is minimized. Policy makers will have to put effective strategies and systems in place to ensure that India's energy needs are met.

Clean fuel intervention, at different stages of development, will play different roles. Petroleum conservation meeting energy demand and environment protection and combined with policy measures plays an important role in an intervention strategy. Besides the Government, the private sector has a critical part in redefining its role in helping for former bring benefits to society. Though indigenous resources are available, the government and the private sector must work together to explore and use them judiciously, so that dependence on import of oils is reduced. Ethanol is the need of the time.

Alcohol produced from sugarcane juice/molasses has a significant role to play. Alcohol is a by-product of sugar industry which is lined to agriculture. Sugarcane crop is replenishing able source of energy. Therefore alcohol produced from juice/molasses deserves the preferential place as a substitute feed stock to bring the gap in our energy needs.

In Brazil, ethanol was introduced as a motor fuel during the global oil crisis in 1970s, following which this fuel has been widely used in automobiles. In the USA the main considerations of the ethanol programme are to cut down on toxic emissions and to simultaneously improve rural economy and reduce dependence on oil import. In India, the story is different, despite heavy dependence on oil import and extreme vulnerability to any fluctuations in the global oil price the country has lately, only considered ethanol as an alternative transport fuel.

In the past, the Government of India has taken a number initiative to study the feasibility of using ethanol in 1979. The Ministry of Petroleum, Chemicals and fertilizers' constituted an inter-departmental committee to examine the use of ethanol as admixture with gasoline. Following this, R&D trails were conducted in collaboration with the Indian Institute of Petroleum (IIP) Dehradun. The study concluded satisfactory performance of vehicles with 10% to 20% ethanol blend in gasoline. It however, suggested examining issues related to storage, handling and distribution. In 1991, the Indian Institute of Technology (IIT) Delhi executed a project on ethanol sponsored by the Ministry of Non-conventional Energy Sources (MNES). In 1993-95 trails were conducted on 93 vehicles owned by the Delhi Administration, logging around 18 lakhs Kms.

In the above mentioned project team of Indian Oil Corporation (IOC) officials monitored storage of distribution of blended adducts for a period of two and half years, which included three rainy seasons. The results were very encouraging in terms of conservation of petrol, cooler and smoother operation of vehicles, no adverse effect on engine oil, and reduction of CO and HC emissions Tests conducted on engine in other R&D laboratories of the countries have also shown suitability of the 10% ethanol blends in existing engines.

As per Government of India's policy in parts of 4 states of Andhra Pradesh, Maharashtra, Punjab, Uttar Pradesh and Goa, 5% of ethanol blended petrol has already been started. Nagar Haveli, Daman & Diu and Pondicherry are also covered. The entire country will be covered in 2$^{nd}$ phase and ethanol content to be increased to 10% in 3$^{rd}$ phase.

### 2.5.4 Market survey of Alcohol

Alcohol has a great future as renewable source of energy. The latest trend for a fuel in the world is alcohol use as an alternative for mineral fuel oil, which is depleting as far as fuel oil is concerned. During the Second World War, alcohol in the form of power alcohol was used for blending with petrol in the proportion of 80% petrol and 20% power alcohol. This continued till 1960, when demand of alcohol for chemicals and plastics came up with establishment of alcohol based chemical industries. Because of shortage of alcohol the scheme of blending petrol with alcohol was given up. Brazil has developed technology which has made possible large scale substitution of petroleum derived fuel for automobiles.

Alcohol powered vehicles has taken the first position in Brazil and now accounts for 80% of overall sales or about 500000 alcohol powered units every years.

Ethanol as a fuel blend has distinct advantage because of its compatible blending with motor gasoline and diesel. In India, the demand for oil for the transport sector is estimated to triple over the next decade – being the largest consumer of petroleum products. This sector accounts for almost 50% of the total energy consumer. The compound annual growth rate of transport fuels is expected to be around 7.5% during the next 10 years. By 2011-12, demand for motor gasoline and diesel will touch 16 & 90 million tons respectively, which means huge demand for a large quantity of ethanol t produce the blend. This will help in the expansion of the ethanol industry. Moreover ethanol use in the transport sector has both forward & backward linkage – adoption of new ethanol production technologies, development of new automobiles engines, sales and service network, financing etc. represent the important forward linkage whereas sugarcane productivity, employment opportunities and the enhancement of rural purchasing power constitute backward linkage.

The contribution of gasoline engine powered two & three wheelers to vehicular pollution in India is of high concern. This category of vehicles comprises more than three-fourth (42 million) of the total vehicle population (53.1 million), contribution over 70% of the total hydrocarbon monoxide (CO) emission. Since ethanol use reduced CO and HC emissions, the two and three wheeler segments, including other passenger & commercial vehicles, will find a useful alternative in ethanol.

The present strategy worldwide is to opt for cleaner fuels, which are renewable as well as environment friendly. Today fuel ethanol accounts for roughly two-third of the world ethyl alcohol production. India is the fourth largest producer of ethanol in the world, yet it had not been able to utilize even one percent of this production as transport fuel. Considering the recent sharp hike in the world oil prices coupled with ever-growing demand for oil, India's economy will soon be under pressure if effective & immediate steps are not taken. Ethanol must be explored more seriously as a long term alternative fuel option.

Accordingly viable strategies are to be formulated & implemented so that rich benefit on all fronts – environmental, economic & social are reaped.

The situation demands urgent measures, which will reduce oil pool deficit as well as keep foreign exchange outgo within reasonable levels. Increasing the administered price of petroleum products is a short-time solution. A hike in the domestic price of petroleum products is also likely to be inflationary & affects consumers. The long-term option, requiring a more viable strategy would be to identify indigenous & alternative sources of energy. Ethanol is a major option, its potential gauged from the fact that nearly 800 million liters of gasoline per annum can be saved on a 10% blend in the existing engines. The current estimated gasoline consumption is more than 10,000 million liters per annum.

Diesel consumption in the country is almost seven times more than that of gasoline. Ethanol will dominate in the transport sector by substituting these petroleum based fuels that is gasoline and diesel, when India adopts appropriate policy measures. For both gasoline and diesel in the current consumption pattern, there is a potential of more than 4,000 million liters of ethanol substitution per annum.

From the above, it is clear that there is immense scope for fuel ethanol plants.

Therefore, it would be seen that demand for alcohol will be ever increasing and there would not be any problem of marketing alcohol, which would be produced by the distillery.

### 2.5.5 Consumption pattern of Alcohol

| Particulars | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|
| Opening stock | 483 | 747 | 1,396 | 1,673 | 1,243 | 1,143 |
| Production | 1,898 | 2,398 | 2,150 | 1,073 | 1,435 | 1,859 |
| Imports | 29 | 15 | 70 | 280 | 300 | 300 |
| Total supply | 2,410 | 3,150 | 3,616 | 3,026 | 2,978 | 3,304 |
| Exports | 24 | 14 | 3 | 3 | 3 | 10 |
| Industrial consumption | 619 | 650 | 700 | 700 | 720 | 750 |
| Potable liquor | 745 | 800 | 850 | 880 | 950 | 1010 |
| Blended petrol | 200 | 200 | 280 | 100 | 50 | 200 |
| Other use | 75 | 100 | 110 | 100 | 110 | 110 |
| Total consumption | 1639 | 1750 | 1940 | 1780 | 1830 | 1970 |
| Closing stock | 747 | 1396 | 1673 | 1243 | 1145 | 1224 |

### 2.5.6 DEMAND– SUPPLY GAP OF ETHANOL

The present supply and future projections in terms of fuel ethanol use in India:

| **Particulars** | **Quantity** |
|---|---|
| Ethanol required per Annum (considering 5% blend) | 450 million Liters |
| Ethanol required per Annum (considering 10 % blend) | 900 million Liters |
| Average Production of Alcohol per Annum | 1600 million liters |

The above table provides the projection per annum of Fuel ethanol required which @ 5% blending in Petrol is about 31% of the total alcohol production.

Considering, the move of the Government, to increase the blending to about 10%, the requirement will increase substantially and hence creation of new capacities also becomes necessary in order to cater the requirement of Fuel Ethanol.

**The demand of alcohol for industrial, potable and fuel alcohol in Karnataka as well as in whole country will increase significantly in coming years. The proposed installation of distillery by of M/s. Sovereign Industries Limited, will contribute to fulfil the demand for Rectified Spirit, ENA and fuel ethanol of Karnataka and neighbouring states.**

## 2.6 IMPORTS VERSUS INDIGENOUS PRODUCTION.

Of the world's sugar production of 220 Million Metric Tons, India is expected to have contributed 22 Million Metric Tons or a mere 10% of the world production.

Of the world's production of 35.6 billion liters of alcohol, India is expected to have contributed 1.69 billion liters or a mere 3.65% of the world production. Brazil produced about 14.0 billion liters i.e. about 42% of the world production, mainly from sugarcane i.e. from molasses and sugarcane juice. The US produces about 5.5 billion liters a year, mostly from corn. About 5% of the corn production in the US of America is used to make fuel ethanol.

## 2.7 EXPORT POSSIBILITY.

Export possibility for sugar is totally dependent on government's policies.

Export possibility of ethanol is not there in the present scenario. However, countries like Japan, South Korea, etc. are looking for import of Ethanol from India in near future.

## 2.8 DOMESTIC / EXPORT MARKETS

Indians by nature have a sweet tooth and sugar is a prime requirement in every household. Almost 75% of the sugar available in the open market is consumed by bulk consumers like bakeries, candy makers, sweet makers and soft drink manufacturers. Khandsari sugar is less refined and is typically consumed by sweet makers. Gur, an unrefined form of lumpy brown sugar, is mostly consumed in rural areas, with some quantities illegally diverted for alcohol production.

Greater urbanization and rising standard of living have sparked of a rising trend in usage of Sugar. Industrial consumption for sugar is also growing rapidly particularly from the food processing sector and sugar based bulk consumers such as soft drink and ice cream manufacturers.

Almost 50% of the ethanol production in India is consumed by the industrial sector for production of ethanol based chemicals like acetaldehyde, acetic acid, esters, butanol, glycol, pentaerythritol, vinyl acetate etc. The remaining 40-50% is utilized by the potable sector.

There are about 303 distilleries in the country with a total installed capacity of 3095 million litres per annum.

## 2.9 EMPLOYMENT GENERATION (DIRECT AND INDIRECT) DUE TO THE PROJECT.

Around 250 people shall be employed during construction. **M/s SIL** shall employ 400 persons during operational phase for the proposed establishment.

## CHAPTER - 3 PROJECT DESCRIPTION

### 3.1 TYPE OF PROJECT INCLUDING INTERLINKED AND INTERDEPENDENT PROJECTS, IF ANY.

**M/s SIL** is establishing a Sugar Plant of sugar cane crushing capacity of 3500 TCD with cogeneration plant of 15 MWhr with valid consent for establishment obtained from Karnataka State Pollution Control Board (KSPCB). Based on the feasibility reports & availability of sugar cane SIL has decided to upgrade the sugar cane crushing capacity to 5000 TCD, Cogeneration of power to 34 MWhr & establish a molasses based distillery of 60 KLD to manufacture Rectified Spirit / Ethanol / Extra neutral alcohol within the existing plant premises. Apart from this, SIL also proposes to produce 2MW hr from spentwash incineration boiler.

### 3.2 LOCATION (MAP SHOWING GENERAL LOCATION, SPECIFIC LOCATION, AND PROJECT BOUNDARY & PROJECT SITE LAYOUT) WITH COORDINATES.

The project site is located at Terdal village falling under the jurisdiction of Jamakhandi Taluku, Bagalkote District and Karnataka State with an average MSL of about 534.26 m. The site falls between $75^0$02' 35.1" & $75^0$02' 58.5" East longitude and $16^0$ 31' 26.9" & $16^0$ 31' 58.5" North latitude. Major part of the study area is covered under Survey of India Toposheet no. 47 P-2 [1:50000 scale]. Location of the project site is marked on combination of toposheets [1:50000 scale] published by Surveyor General of India. Toposheet showing 10 Kms radius study area is attached **as Figure 3.1** with this document. Location map is attached as **Figure 3.2.** Site plan showing project boundary, project site layout is attached as **Figure 3.3.**

The site is connected by broad gauge railway line of South Western railway on Hubli- Miraj section. The nearest railway station is Kudachi & is located at a distance of 28.5 Kms away from the project site.

River Krishna is the major river, experiencing perennial flow is located at a distance of 4.95 kms in the north east direction.

The nearest village to the project site is Terdal village located at a distance of 4.32 kms in the South direction.

Jamakhandi is the main town and market place which is located at about 25.14 Kms from the project site in the eastern direction. The area is well connected by road. State Highway (SH) 53 connecting Jamakhandi to Kagwad is at a distance of 2.67 Kms in the south western direction. State Highway (SH) 31 connecting Belagavi to Athani is at a distance of 8.91 Kms in the western direction.

The national highway connecting Bengaluru to Pune passes at a distance of 75.87 Kms in the western direction.

Bagalkote & Bijapur are the major cities and are located at a distance of about 76 Kms & 76.46 Kms respectively from the project site. The nearest airport is Belagavi (Sambra) airport at a distance of 100 Kms. Nearest reserve forests from the project site are given in the following table.

| | |
|---|---|
| Reserve forest (RF) near Terdal village | 3.6 Kms SE |
| Reserve forest near Hangandi village | 6.49 Kms SE |
| Reserve forest near Asangi village | 8.96 Kms SE |
| Reserve forest near Kaltippi village | 8.51 Kms SW |

There are no wild life sanctuaries, national parks and elephant / tiger reserves within 10 kms radius of the study area.

Nearest villages from the project site within 10 Kms radius are as follows.

Terdal - 4.32 kms S, Shegunshi - 4.57 Kms
Tamadaddi - 4.87 Kms, Halingali - 5.59 Kms
Doddawad- 6.09 Kms, Hanagandi - 6.18 Kms
Nandeshwar - 6.21 Kms, Satti - 6.59 Kms
Koligudda-6.92kms NW, Khavatakoppa– 7.16 Kms
Ebaratti – 7.23 kms W, Madalmatti – 7.88 Kms
Sankratti – 8.10 Kms, Sasalhatti – 8.43 Kms
Golbhavi – 8.48 Kms, Naganur – 8.58 Kms
Kaltippi – 8.61 Kms, Mahishwadgi - 8.71 kms SE
Rabkavi – 9.50 kms, Asangi – 9.57 Kms
Yargatti – 9.90 Kms, Harugeri – 10.0 Kms
Asagi – 10.0 Kms.

Salient features of plant site are given in **Table – 3.1**

**TABLE 3.1 SALIENT FEATURES OF THE PROJECT SITE**

| **Features** | **Details** |
|---|---|
| Altitude | 534.26 m above msl |
| Longitude | $75^0$02' 35.1" to $75^0$02' 58.5" East |
| Latitude | $16^0$ 31' 26.9" to $16^0$ 31' 58.5" North |
| Village, Taluk, District, State | Terdal village, Taluku Jamkhandi, Bagalkote District, Karnataka. |
| Max. Temp. | $45^oC$ |
| Min. Temp. | $14^oC$ |
| Relative Humidity | 38 to 69 % |
| Average annual rainfall | 600 mm |
| Land availability | 171 acres |
| Topography | Plain |
| Soil Type | Sandy Loam |
| Nearest River | Krishna River - 4.95 kms NE |
| Nearest Highway | Bengaluru to Pune (NH 4) at a distance of 75.87 Kms. |
| Nearest Railway station | Kudachi – 28.5 Kms |
| Nearest Railway Junction | None Within 10 km radius |
| Nearest Industries | None within 10 km radius |
| Nearest Village | Terdal - 4.32 kms S |
| Nearest City | Bagalkote - 76 Kms, Bijapur - 76.46 Kms |
| Nearest Air port | Belagavi ( Sambra) airport – 100 Kms |
| Historical places, Monuments, Heritage sites, wild life sanctuaries, national parks, elephant / tiger reserves, Eco Sensitive zones | None within 10 km radius |

- Note - All distances mentioned in the above table are aerial distances.

## 3.3 DETAILS OF ALTERNATE SITES CONSIDERED AND THE BASIS OF SELECTING THE PROPOSED SITE, PARTICULARLY THE ENVIRONMENTAL CONSIDERATIONS GONE INTO SHOULD BE HIGHLIGHTED.

The proposed expansion of sugar & cogeneration plants & distillery complex shall come up in an area available with the company. The area of 10 kms radius around the proposed project site is free from ecologically sensitive areas. The following factors have been considered initially.

a. Availability of suitable and adequate facilities.
b. Availability of water.
c. Proximity to highway.
d. Availability of raw materials, man power & land.
e. Suitability of land from geological and topographical aspects.
g. Environmental aspects etc.

Based on the above guidelines the site at Terdal village falling under the jurisdiction of Jamakhandi Taluku, Bagalkote District of Karnataka has been chosen for the expansion of sugar & cogeneration plants & establishment of molasses based distillery.

## 3.4 SIZE OR MAGNITUDE OF OPERATION.

**M/s SIL** is establishing a Sugar Plant of sugar cane crushing capacity of 3500 TCD with cogeneration plant of 15 MWhr with valid consent for establishment obtained from Karnataka State Pollution Control Board (KSPCB). Based on the feasibility reports & availability of sugar cane SIL has decided to upgrade the sugar cane crushing capacity to 5000 TCD, Cogeneration of power to 34 MWhr & establish a molasses based distillery of 60 KLD to manufacture Rectified Spirit / Ethanol / Extra neutral alcohol within the existing plant premises. Apart from this, SIL also proposes to produce 2MWhr from spentwash incineration boiler.

## 3.5 PROJECT DESCRIPTION WITH PROCESS DETAILS ( A SCHEMATIC DIAGRAM/ FLOW CHART SHOWING THE PROJECT LAYOUT, COMPONENTS OF THE PROJECT ETC. SHOULD BE GIVEN)

### 3.5.1 SUGAR MANUFACTURING PROCESS TECHNOLOGY

Indian sugar industry is engaged mainly in the production of direct consumption commercial plantation white sugar (99.8 % pure) sugar is produced in vacuum pan factories. M/s SIL shall adopt double sulphitation manufacturing process for production of sugar. Sugar production process mainly comprises of following five operations. The process flow diagram of the sugar manufacturing process integrated with power generation process is attached.

1. Extraction of juice (crushing)
2. Clarification of juice
3. Concentration of juice (juice to syrup) by evaporation
4. Boiling of Syrup to grain (crystallization)
5. Separation of crystals from mother liquor (centrifuging)

**Cane receiving:**

The sugar cane in the field is examined for its quality before harvesting and harvesting permits are given after its quality and maturity is found satisfactory. The sugar cane is then manually harvested and transported to factory by tractor trailers, trucks and bullock carts.

The farmers are supplied with steel wire rope slings to be placed below the cane in the vehicles to enable unloading by cranes. The vehicles bringing sugar cane are received at the factory cane yard.

**Sugarcane weighment:**

The vehicles carrying the sugar cane are weighed on the platform type electronic weighbridges and released for unloading. The gross weight is recorded and printed. After unloading the vehicles are once again weighed for the tare weight. These weights are printed on the weighment slips, which also carry the details of the farmer, cane etc.

**Sugarcane unloading:**

The cart cane is manually unloaded directly to the cane carrier. The cane from the trucks and tractor- trailers are unloaded with the help of cane un-loader crane. The cane is unloaded on to the feeder table.

**Sugarcane conveying:**

The cane from the feeder table is then dumped to the main cane carrier, which conveys the cane to the cane preparatory devices. Electronic devices, depending on the cane-crushing rate control the speed of the cane carrier, and level in the cane carrier etc.

**Sugarcane preparation:**

The sugar cane is passed through the cane preparatory devices called leveler, cutter and fibriser where in the cane is cut into small pieces to expose the juice cells for extraction. The preparatory index is about 85-90 %.

**Milling:**

The prepared cane then passes through the milling tandem having 4 mills of three roller and necessary feeding device. The mills run at about 4.5- 6.0 RPM driven through hydraulic motors or DC variable speed drives. The mills loaded hydraulically extract juice from the cane and is subjected for the extraction of juice aided by maceration water and compound imbibition. The cane is conveyed between mills with the help of rake type mechanical conveyors.

Screens then filter the extracted juice and filtered juice is pumped for further processing. The fibrous residue after juice extraction known as bagasse is withdrawn from the last mill and conveyed through drag type steel conveyors to boiler for steam generation. Surplus bagasse is withdrawn from the conveyor and stored for reuse when necessary. The bagasse conveyor also has return conveyor to feed the stored bagasse.

**Juice clarification:**

The mixed juice received from milling after filtration is weighed in a juice weighing scale or by a mass flow meter to know the quantity of juice flowing.

The juice contains certain undesirable impurities, which are removed before it is taken for concentration in evaporators. The juice is first heated to a temperature of 70°C in a tubular type vertical heater by using heat of vapours from the third effect of a quintuple effect evaporator. The use of third effect vapours resulted in steam economy.

The hot juice is then mixed with lime and sulphur dioxide gas maintaining a pH of 7.0. This process is carried out in a reaction vessel known as juice sulphiter. Any SO2 gas coming out of the vessel is again scrubbed though juice and no gas is allowed to atmosphere.

The treated juice is again heated to a temperature of 105°C in a similar tubular type heater using vapours from second and first effect of evaporators. The heated sulfated juice is then sent to a gravity settler known as clarifier wherein the mud flocs and settles. Chemical settling aids like “Magnafloc, Sedipur or Separan” may be added to improve settling rate.

The mud settled at bottom of each of the four compartments in the clarifier is withdrawn continuously and filtered in a rotary vacuum filter. The filtered mud after washing and removing residual juice in the filter is scraped from the filter drum and sent out. Fine bagasse is mixed with muddy juice as filter aid. The filtrate juice is returned to the raw juice tank and re-circulated. The mud is used as manure in fields because of its nutrient value.

**Evaporation:**

The clarified clear juice is withdrawn from the clarifier continuously and sent to evaporators after heating the juice further to 115°C in a plate type heater. The evaporators consist of 5 evaporator bodies arranged to work in series as a quintuple effect. The exhaust steam or the bled steam from steam turbines at powerhouse is supplied to the first body of the evaporator for heating. The vapours from second body are bled to pans for boiling. The raw juice heating is done with the vapours bled from 3rd effect, sulfated juice with vapours from $2^{nd}$ and $1^{st}$ effects of the evaporators. This type of quintuple effect evaporation and vapour bleeding achieves good steam economy. The exhaust steam condensate from the first body is withdrawn and sent to boiler condensate storage tank for use as boiler feed water. The condensate from all other evaporators is withdrawn individually and sent to hot water storage tank for use in various processes. The clear juice gets concentrated from a brix of 15 to 60 % and is withdrawn continuously from 5th body of the evaporators. The syrup thus, obtained from evaporators is passed through a continuous syrup sulphiter wherein SO2 gas is bubbled through syrup for bleaching purpose. The spurted syrup is then sent to pan floor storage tanks for further boiling.

**Pan boiling:**

A three stage boiling scheme is adopted to produce quality sugar with minimum sugar loss. The first massecuite (A-massecuite, sugar plus mother liquor) is boiled on hopper seed footing, syrup, melt, and A-light molasses. The A-heavy molasses is used for boiling B-massecuite and the A-light molasses is taken for A-massecuite boiling.

C- Massecuite is boiled using true seed along with B-heavy molasses and C-light molasses for complete exhaustion. B-massecuite is boiled using double cured C -sugar magma. This sugar is taken as seed for A boiling and surplus is melted and used along with A-light molasses and syrup to boil A- massecuite. The pans used for A-boiling are low head calandria type batch pans and for B and C boiling are fully automated continuous pans.

**Cooling and curing:**

The process of crystallization initiated in the pan is completed in the crystallizer (storage tank with mechanical stirring arrangement and air or water cooling arrangement). Air-cooled crystallizers are used for A-massecuite and water- cooled continuous type vertical crystallizers are used for B and C massecuites. A-massecuite is centrifuged in a fully automated high-speed batch type centrifugal machine to separate sugar and molasses. The sugar is washed with super heated water in the machine to get good quality white crystal sugar. The sugar is then discharged by a plough in the machine and dropped to a

grasshopper conveyor. The hopper is provided with facility to dry and cool the sugar before graining. The heavy and light molasses separated in the centrifugal are sent back for reprocessing at pans.

Continuous centrifugal machines are used for centrifuging B and C massecuites. The B-massecuite is cured in continuous centrifugal machines to separate B- heavy molasses and B- sugar. B-sugar thus obtained (B-fore sugar) is again made into magma with water and cured in a continuous centrifugal machine to separate B-light molasses and B- after sugar. Similarly C-massecuite is double cured in continuous centrifugal machines. The fore-worker molasses is the final molasses, which is sent to steel storage tanks. C-double cured sugar is melted and used for boiling B-massecuite.

The sugar discharged from A- centrifugal machines is conveyed through grasshopper conveyors wherein drying and cooling arrangements are provided. Sugar then passes through mechanical graders where the sugar is graded as per their sizes to confirm to the IS standard. The graded sugar is then sent to sugar storage bins with the help of bucket elevators. The storage capacity of these storage bins is enough to store 24 hours production. The sugar is discharged from bins to fill 50kg /100 kg bags and weighed automatically by electronic type automatic weighing machines. The sugar bags are transported to warehouse through belt conveyors.

The quantity of sugar produced by a 5000 TCD plant shall be 18000 MT per month at 12% recovery on cane.

### 3.5.2 COGENERATION PLANT - POWER PLANT

**M/s SIL** shall implement the cogeneration plant keeping in view of availability of bagasse from the Sugar plant The cogeneration plant shall mainly comprise of the following configuration:

a. Bagasse fired Steam Boilers of 125 TPH (01 no.)
b. Turbine generator – 34 MW

Power generation process shall be based on Rankine Steam cycle. The steam generated in the boiler when expanded through a turbine, turns the turbine shaft which is tandem coupled to an electric power generator. The exhaust steam coming out of the turbine shall be used for process (heating the juice heaters, evaporators and pans).

The process flow diagram for sugar & cogeneration is shown in **Figure 3.5.**

### 3.5.3. ALCOHOL MANUFACTURING PROCESS TECHNOLOGY

Rectified Spirit production is based on continuous Fermentation Technology with yeast recycle using yeast separators for production of RS / ENA / Absolute alcohol. Yeast strain used has property to form flocks and settle faster than sludge present in the medium. Thus separation and recycle of sludge is avoided employing the special strain of yeast. The yeast cream obtained by settling is subjected to centrifugal yeast separation, acidified and then reactivated in the dilute molasses medium. The reactivation stage brings back the yeast to normal stage and performs better compared to recycling yeast without reactivation stage. Yeast separation employing yeast separators ensures separation of maximum yeast bio-mass and maintenance of required Yeast concentration in the medium leading to higher fermentation efficiency, higher productivity and generation of less quantity of spent wash.
Adequate space has been provided for foaming to minimize the requirement of antifoam compound.

Effective wash cooling and monitoring of parameters viz. fermentation temperatures, pH, YCS, contamination level, residual sugars and alcohol concentration will ensure highest fermentation efficiency and better yield per MT of molasses.

**PROCESS DESCRIPTION – 60 KLD DISTILLERY BASED ON MOLASSES**

Rectified Spirit production in the plant is based on continuous Fermentation Technology with yeast recycle using yeast separators.

Production of Rectified spirit is mainly carried under the following three steps.

1. Dilution - Preparation of molasses for fermentation
2. Fermentation - Production of alcohol from fermentable sugars in molasses solution.
3. Distillation - Product Recovery

Each of the above steps of production are detailed below:

**Dilution**

Molasses available from sugar mill contains solid content between 76-90 % & sugar content varies between 45 & 50 %.

The main dilution operation occurs in a diluter where the solid concentration is brought down to 20 to 25$^{o}$ Brix. The bulk of this diluted molasses is fed to the fermentation tank while a small quantity is further diluted to 10 to 15$^{o}$ brix and used for preparation of the final yeast inoculum. Propagation of yeast for the final inoculation is done in successive stages in volumes of 10, 100, 1000 and 10,000 liters where in each stage 10 parts of diluted molasses is inoculated with 1 part yeast culture.

**Fermentation**

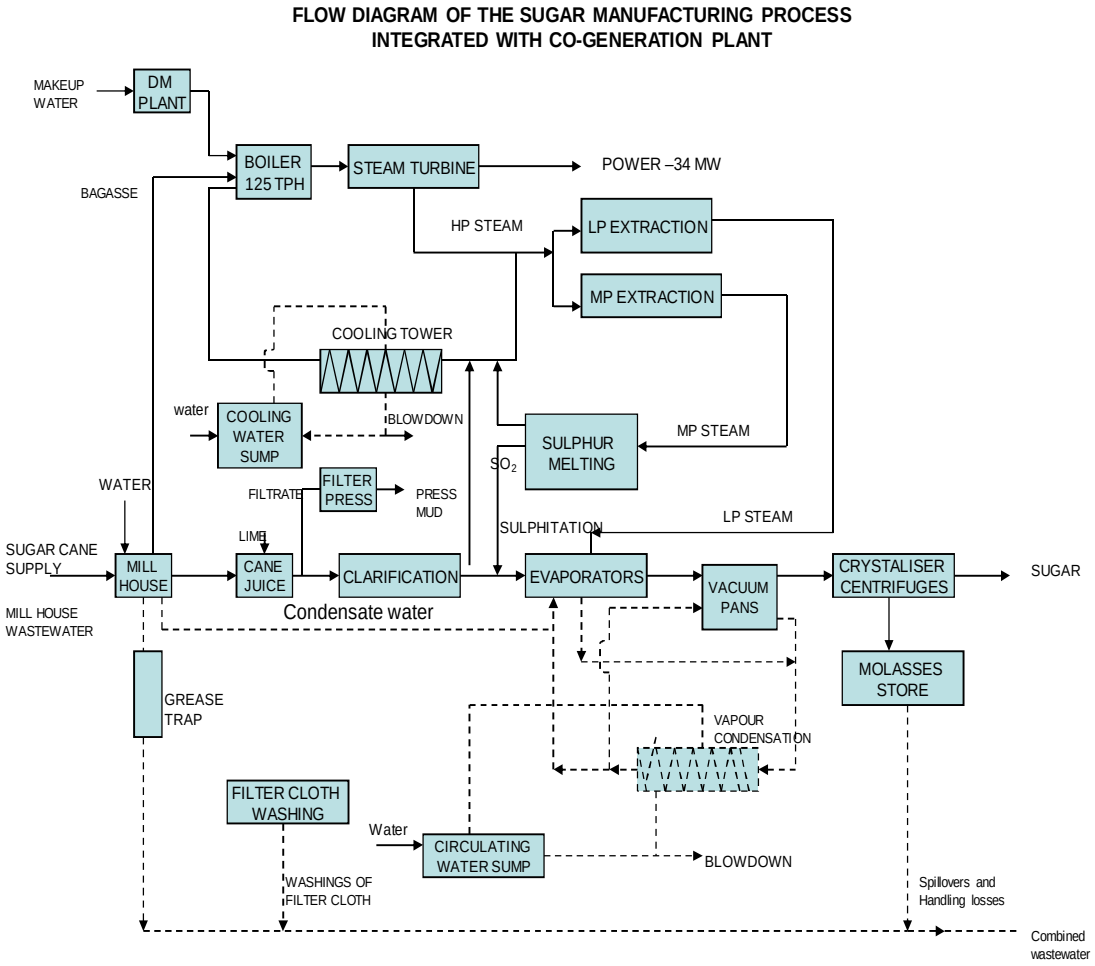
Fermentation in the fermentation tank continues for about 15 to 20 hours after the final inoculum is added to it. The basic reaction in the fermentation process is

$C_6H_{12}O_6 \longrightarrow 2\ C_2H_5OH + 2\ CO_2 + 26$ calories
Glucose — Ethyl Alcohol + Carbon dioxide + Energy

**Yeast Propagation**

Yeast seed material is prepared in water-cooled yeast vessels by inoculating molasses with yeast. The contents of the yeast vessel are then transferred to the yeast activation vessel. The purpose of aerated yeast activation vessel is to allow time for the yeast cell multiplication.

## FIG. 3.5 PROCESS FLOW CHART FOR SUGAR & COGENERATION



**Fermentation:**

The purpose of fermentation is to convert the fermentable sugars into alcohol. During Fermentation, sugars are broken down into alcohol and Carbon dioxide. Significant heat release takes place during Fermentation. Fermentation temperature is maintained at optimum level by forced recirculation heat exchangers.

At the end of fermentation, the wash is fed through a yeast separator where the yeast cream is separated, acidified in the yeast treatment tank and returned to the yeast activation vessel for activation. Sludge is separated in a sludge decanter. The clear wash from both the yeast separator and sludge separator flows to the clarified wash tank. The wash is then pumped to distillation.

**Distillation:**

Fermented wash is preheated in fermented wash preheater and fed to the analyzer column. The dilute alcohol water vapours from the analyzer top are fed to the Pre-Rectification column. An impure spirit draw of 3 % is drawn from this column. Bottom liquid from Pre-Rectified column is fed to the IS purification column. Draw from IS purification column is fed to purified column.

The purification column is operated under atmospheric pressure and is heated by using steam. The bottom of this column is maintained at 20%v/v alcohol and is fed to the rectification/ Exhaust column. A small draw from the top of the column is fed to the IS Purification column.

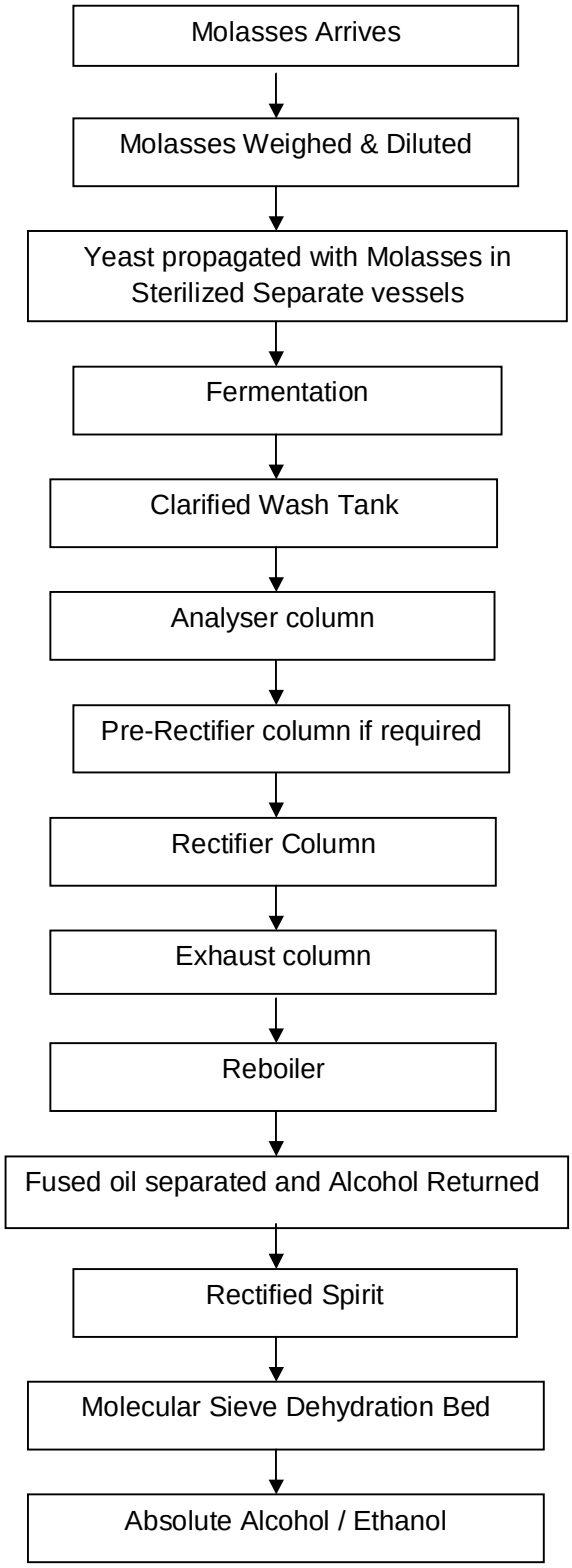
The purified rectified spirit is removed from the bottom of the purified column.

The Lees from the Exhaust column bottom is used to pre heat the heat from the purified bottom to the Rectifier/ Dilution water.

Lower side draws streams are taken from Rectified column to avoid fusel oil build up in the column. These streams are then taken to the IS Purification column.

The process flow diagram is shown in **Figure – 3.6.**

**FIG. 3.6 PROCESS FLOW CHART FOR DISTILLERY**



## 3.6 RAW MATERIAL REQUIRED ALONG WITH ESTIMATED QUANTITY, LIKELY SOURCE, MARKETING AREA OF FINAL PRODUCT/S, MODE OF TRANSPORT OF RAW MATERIAL AND FINISHED PRODUCT.

### RAW MATERIALS FOR THE PROPOSED 5000 TCD & 34 MW COGEN PLANT

| Particulars | Quantity | Transportation | Storage |
|---|---|---|---|
| Sugar cane (MT/d) | 5000 | By tractors/ trucks / bullock carts | Cane Yard |
| Bagasse (MT/d) (100% thru' bagasse mode)<br>Bagasse (MT/d) (85% thru' bagasse mode)<br>Coal (MT/d) (15% as an auxiliary fuel along with bagasse ) | 1471<br>1251<br>96 | By return bagasse carrier | Bagasse Storage yard |
| Sulphur (MT per month) | 70 to 80 | By trucks | HDPE bags in store |
| Lime (MT per month) | 280 to 300 | By trucks | -do- |
| Caustic Soda flakes (MT/month) | 6.0 to 7.0 | By trucks | -do- |
| Sodium Hydro Sulphite (MT/month) | 0.48 to 0.54 | By trucks | -do- |
| Bleaching powder (MT/month) | 0.2 to 0.3 | By trucks | -do- |
| Boiler chemicals like antiscalents etc. (kgs/month) | 2 to 3 | By trucks | -do- |
| Lubricants (Wheel bearing greases, lubricating oils etc.) | 10 to 12 (KL/month) | By trucks | Barrels / Tins in store |
| **Products / By-products** | | | |
| Sugar (MT/month) | 18000 | By trucks | Sugar godowns |
| Molasses (MT/month) | 6000 | Reused | Storage tanks |
| Bagasse (MT/month) | 48000 | Reused | Storage Yard |
| Press mud (MT/month) | 6000 | By tractors/ trucks | Storage Yard |

### RAW MATERIALS REQUIREMENT & PRODUCTS FOR PROPOSED 60 KLD DISTILLERY

| Raw materials | Quantity in MT/d | Transportation | Storage |
|---|---|---|---|
| Molasses (Basic Raw material) | 210 to 240 | Pipeline | Mild Steel tanks |
| **Chemicals / Nutrients** | | | |
| Sulphuric acid | 0.12 | Lorry tanker | S.S. tank |
| DAP | 0.06 | Lorry | 50 kg bags |
| Urea | 0.22 | Lorry | 50 kg bags |
| Antifoam<br>HCl<br>Caustic soda | 0.06<br>0.22<br>0.22 | Lorry<br>Tanker<br>Lorry | 50 kg drums<br>Acid proof MS tank<br>50 kg bags |
| Yeast culture / Enzyme | 0.11 | Lorry | 10 kg drums |
| Coal as fuel for Incineration boiler along with spentwash slops (65% concentrated) having 55-60 brix.* | 58.0 | By Dumpers | Storage yard |
| Bagasse as fuel for Incinerator boiler along with spentwash slops (65% concentrated) having 55 to 60 brix.* | 90.0 | By Dumpers | Storage yard |
| Spentwash Slops (65% concentrated) having 55-60 brix. | 168 | By Pipeline | storage tank of five days capacity |
| **Products / By-products** | | | |
| Ethanol (Rectified Spirit / Extra Neutral Alcohol / Absolute Alcohol) | 60 KL/d | Lorry tanker | M.S. tanks |
| Yeast sludge | 6 | Tractor/Lorry | Bulk |

* Note: Coal shall be used during the non availability of bagasse along with concentrated spentwash slops.

## 3.7 RESOURCE OPTIMIZATION / RECYCLING & REUSE ENVISAGED IN THE PROJECT, IF ANY, SHOULD BE BRIEFLY OUTLINED.

The proposed expansion of sugar & cogeneration plants & establishment of distillery project will result in the following resource optimisation

a. The project shall be situated in the available area of the company. No additional requirement of land.

b. Optimal utilisation of sugar unit's by products viz. bagasse as a raw material for cogeneration unit & molasses as a raw material for distillery unit.

## 3.8 AVAILABILITY OF WATER ITS SOURCE, ENERGY / POWER REQUIREMENT

The Proposed water consumption in the sugar plant including power generation is 3720$m^3$/day. Of this total water requirement of 3720 $m^3$/day, about 3500 $m^3$/day shall be met from the cane juice of sugar plant and the balance requirement of 220$m^3$/day shall be drawn from River Krishna.

The proposed power requirement of the sugar & cogeneration plant is 9 MW. This requirement shall be met from the cogeneration plant and around 18 MW shall be exported to the grid during season.

The proposed power requirement of the 60 KLD distillery plant is 1250KW. This requirement shall be met by generating 2 MW power from the incineration boiler. Remaining 750 KW shall be exported to the grid.

## 3.9 QUANTITY OF WASTES TO BE GENERATED (LIQUID & SOLID) & SCHEME FOR THEIR MANAGEMENT / DISPOSAL.

### 3.9.1 Quantity of wastewater generation From Sugar & Cogen Units

**WASTEWATER GENERATION ($m^3$/day)**

| Sl. No. | UNIT | | Segregation |
|---|---|---|---|
| **A** | **SUGAR PLANT** | | |
| 1 | Sugar Manufacturing Process | 500 | Process Wastewater |
| **B** | **COGENERATION PLANT** | | |
| 1 | Cooling tower blow down | 240 | Non Process Wastewater |
| 2 | Boiler blow down | 65 | |
| 3 | DM Plant – regeneration | 60 | |
| **E** | **DOMESTIC WASTEWATER** | 16 | Septic Tank & Soak Pit |
| **TOTAL WASTEWATER** | | **881** | |

The process wastewater from sugar unit shall be treated in a full fledged effluent treatment plant proposed with the following units

- Bar Screens and Grit chamber
- Oil traps
- Monthly wash tank
- Aeration Tank - I
- Secondary clarifier - I
- Aeration Tank - II

- Secondary clarifier - II
- Polishing pond
- Sludge drying beds

The treated process wastewater shall be diluted with the non process wastewater from cogeneration in polishing pond except for domestic wastewater which is treated in septic tank followed by soak pit. The outlet of the polishing pond confirming to the GSR 422 E on land discharge standards shall be utilized for greenbelt development and sugarcane cultivation within the premises. The project is based on zero discharge.

### 3.9.2 Quantity of wastewater generation From Distillery Unit

**WASTEWATER GENERATION ($m^3$/day)**

| Sl. No. | UNIT | | DISPOSAL |
|---|---|---|---|
| **A** | **DISTILLERY** | | |
| 1 | Spentwash | 480 | Process Wastewater |
| 2 | Spentlees | 144 | Low strength Wastewater |
| **B** | **UTILITIES** | | |
| 1 | Boiler blow down, Cooling tower blow down, Water treatment plant reject & floor wash | 54 | Non Process Wastewater |
| **C** | **DOMESTIC** | 4 | Septic tank followed by soak pit |
| **TOTAL WASTEWATER** | | **682** | |

#### 3.9.2.1 PROCESS WASTEWATER - SPENT WASH

Spent wash is the principal pollutant generated from the process from the analyser column. The total spentwash generation from the plant shall be about 480$m^3$/day. Spent wash generated will be subjected to concentration followed by incineration.

#### 3.9.2.2 PROCESS WASTEWATER - SPENT LEES

Around 144$m^3$/day of spent lees shall be generated from Pre rectifier column (PRC) & Fusel Oil recovery Column (FRC). Spent lees shall be subjected to RO & reused back in the unit for dilution of molasses (106$m^3$/day). Reject from RO (38$m^3$/day) shall be sent to incineration / sugar ETP for further treatment.

#### 3.9.2.3 NON PROCESS WASTWATER FROM DISTILLERY

Non process wastewater is mainly cooling tower blow down, DM Plant – regeneration and Floor wash. About 54$m^3$/day of wastewater shall be generated.

All the above streams will be routed to guard pond for mixing. The final quality of the wastewater will meet GSR 422 (E) on land discharge standards. This wastewater will be utilized for greenbelt development within the plant premises.

#### 3.9.2.4 DOMESTIC SEWAGE

The domestic sewage (4 $m^3$/day) generated from the industrial complex will be subjected to treatment in Septic tank followed by soak pit.

### 3.9.3 EFFLUENT STORAGE FACILITIES

The effluent storage facilities shall be of RCC and as per the guidelines of Central Pollution Control Board.

### 3.9.4 SOLID WASTE GENERATION (T/DAY)

Quantity of solid waste generation after expansion of sugar & cogeneration units & their disposal is shown below in the table

| **Source during Sugarcane crushing season** | **Name** | **Quantity** | **Mode of disposal** |
|---|---|---|---|
| Mill House | Bagasse | 1600 | Shall be used as boiler fuel |
| Process House | Press Mud | 200 | Shall be given to farmers. |
| | Molasses | 200 | Shall be used as raw material for distillery |
| Boiler House – Cogen Plant | Ash | 22 | Shall be given to farmers. |
| Effluent treatment Plant | Sludge | 1.0 | Used as manure within premises |

The following table shows the solid waste generation from the proposed distillery.

| Solid Waste | Quantity per day | Mode of disposal |
|---|---|---|
| Yeast Sludge | 6.00 MT | Shall be dried & sold as Cattle feed. |
| Bottom Ash from incineration boiler | 2.80 MT | Shall be sold to brick manufacturers / cement plants |
| Fly ash from incineration boiler | 28.56 MT | Shall be given to farmers. |

### 3.10 AIR POLLUTION CONTROL MEASURES

**CONSTRUCTION PHASE**

The construction of proposed units would result in the increase of SPM concentrations due to fugitive dust. Frequent water sprinkling in the vicinity of the construction sites would be undertaken and will be continued after the completion of plant construction as there is scope for heavy truck mobility. It will be ensured that both gasoline and diesel powered vehicles are properly maintained to comply with exhaust emission requirements. All the interior roads are metalled.

**OPERATIONAL PHASE**

The major emission is particulate matter from the sugar & cogeneration plant complex viz. from the Bagasse along with coal (15%) fired boilers. The proposed boiler of 125 TPH shall be provided with an ElectroStatic Precipitator which is designed to meet an outlet concentration of less than 150 mg/Nm$^3$. Adequate chimney above ground level is proposed for the boiler as per the CPCB norms.

The major emission is particulate matter from the distillery plant complex viz. from the spentwash slops along with bagasse / coal fired incinerator boiler. The proposed incineration boiler of 22 TPH shall be provided with Cyclone dust collector & and Electro Static Precipitator which are designed to meet an outlet concentration of less than 150 mg/Nm$^3$. Adequate chimney above ground level is proposed for the incineration boiler as per the CPCB norms.

The standby DG set of 1000 KVA shall be provided with adequate stack as per the CPCB norms.

### 3.11 SCHEMATIC REPRESENTATIONS OF THE FEASIBILITY DRAWING WHICH GIVE INFORMATION OF EIA PURPOSE.

Plant layout is attached as **Figure 3.3.**

# CHAPTER – 4 SITE ANALYSIS

## 4.1 CONNECTIVITY

The project site is located at Terdal village, falling under the jurisdiction of Jamkhandi Taluku of Bagalkote District in Karnataka State.

The site is connected by broad gauge railway line of South Western railway on Hubli- Miraj section. The nearest railway station is Kudachi & is located at a distance of 28.5 Kms away from the project site.

Jamakhandi is the main town and market place which is located at about 25.14 Kms from the project site in the eastern direction. The area is well connected by road. State Highway (SH) 53 connecting Jamakhandi to Kagwad is at a distance of 2.67 Kms in the south western direction. State Highway (SH) 31 connecting Belagavi to Athani is at a distance of 8.91 Kms in the western direction.

The national highway connecting Bengaluru to Pune passes at a distance of 75.87 Kms in the western direction.

Bagalkote & Bijapur are the major cities and are located at a distance of about 76 Kms & 76.46 Kms respectively from the project site.

The nearest airport is Belagavi (Sambra) airport at a distance of 100 Kms.

## 4.2 LAND FORM, LAND USE AND LAND OWNERSHIP

No additional land is required for the proposed expansion of sugar & cogeneration plants & establishment of distillery plant. M/s Sovereign Industries Limited **(SIL)**, is having an area of 32.02 Hectares (79.09 acres) in Survey Numbers 335/1+2, 336/1D, 336/2B, 336/2K, 337/2, 337/3, 337/4, 350, 351/1+A+B, 351/1A+1B, 351/1A+1B/A, 351/1B, 351/1B PIA, 351/1K, 351/3, 351/3A, 351/3B, 351/3B PIA, 351/4, 352/1A, 352/1B, 352/1K , 352/2A, 352/3 & parts thereof falling under the revenue limits of Terdal Village, Jamkhandi Taluku, Bagalkote district of Karnataka State. **SIL** is establishing a Sugar Plant of sugar cane crushing capacity of 3500 TCD with cogeneration plant of 15 MWhr with valid consent for establishment obtained from Karnataka State Pollution Control Board (KSPCB). Based on the feasibility reports & availability of sugar cane SIL has decided to upgrade the sugar cane crushing capacity to 5000 TCD, Cogeneration of power to 34 MWhr & establish a molasses based distillery of 60 KLD to manufacture Rectified Spirit / Ethanol / Extra Neutral Alcohol within the existing plant premises. Apart from this, SIL also proposes to produce 2MW hr from spentwash incineration boiler. The existing buildings & utilities are spread over an area of 7.68 Hectares (18.97 acres). Proposed expansion of sugar & cogeneration plant along with distillery shall be located in an area of 2.36 Hectares (5.83 Acres). Around 10.53 Hectares (26.0 acres) is being developed as green belt. The balance area of 11.46 Hectares (28.30 acres) shall be vacant land.

Land breakup of the proposed sugar & cogeneration plant is given in **Table 4.1.**

**TABLE 4.1 LAND BREAKUP OF THE EXISTING & PROPOSED PROJECT**

**EXISTING BUILDING & LAND USE PATTERN**

| Sr. No. | Building No. | Name of Building | Building Coverage Area in Sqm | Green Belt Area In Sqm | Vacant Area in Sqm | Survey Number Area In Sqm |
|---|---|---|---|---|---|---|
| 351 | 1 | Cane Carrier | 254.884 | | | |
| | 2 | Mill House | 1913.61 | | | |
| | 3 | Evaporation House | 1452.381 | | | |
| | 4 | Boiling House | 2199.686 | | | |
| | 5 | Sugar House | 733.098 | | | |
| | 6 | Clarification House | 737.173 | | | |
| | 7 | Boiler House | 756.54 | | | |
| | 8 | Power House | 869.61 | | | |
| | 9 | Retuen Baggasse Carrier | 604 | | | |
| | 10 | Spray Pond | 6207.551 | | | |
| | .11/1 | Mollasses Tank | 411.5 | | | |
| | .11/2 | Mollasses Tank | 411.5 | | | |
| | .11/3 | Mollasses Tank | 411.5 | | | |
| | 12 | Injection Pump House | 150.722 | | | |
| | 13 | Sulphur House | 282.474 | | | |
| | 14 | Store Godown | 647.963 | | | |
| | 15 | Open Yard | 648.025 | | | |
| | 16 | Fan House | 373.508 | | | |
| | 17 | Work Shop | 563.399 | | | |
| | 24/1p | Sugar Godown | 3862.927 | | | |
| | 25 | Lime & Sulphur Godown | 136.987 | | | |
| | 26 | Chief Chemist & Engineer | 186.917 | | | |
| | 27 | Chimeny | 9.578 | | | |
| | 29 | Mill Panel Room | 101.43 | | | |
| | 30 | DG set Shed | 48 | | | |
| | 31 | Swich Yard | 300 | | | |
| | 33 | Gunny Bag Godown | 98.996 | | | |
| | 34 | Cogen Cooling Tower | 857.283 | | | |
| | 36 | Coal Shed | 1250 | | | |
| | 41 | WTP | 1200 | | | |
| | 42 | | 309 | | | |
| | | **Total** | **27990.242** | **11910.682** | 81509.076 | **121410** |
| 352 | 19 | Cane Marshelling Yard | 15191.831 | | | |
| | 20 | Cane Office | 108.709 | | | |
| | 22 | Weigh Bridge | 343.852 | | | |
| | 24/1p | Sugar Godown | 2252.411 | | | |
| | 24/2 | Sugar Godown | 6109.524 | | | |
| | 28/1 | GSR | 962.016 | | | |
| | 28/2 | GSR | 481.008 | | | |
| | 32 | ETP | 1984.454 | | | |
| | | **Total** | **27433.805** | | 29224.195 | **56658** |
| 335 | 18p | Cane Yard | 6788.221 | | | |
| | | **Total** | **6788.221** | | 49869.779 | **56658** |
| 336 | 18p | Cane Yard | 7279 | | | |
| | | **Total** | **7279** | | 23781 | **31060** |
| 337 | 21 | Administrative Building | 501.508 | | | |
| | 23/1 | Security | 8.988 | | | |
| | 23/2 | Time Office & Security | 48 | | | |
| | 35 | Transformer unit | 20 | | | |
| | 37 | Staff Quarters-A | 2307.475 | | | |
| | 38 | Staff Quarters-B | 1720.9 | | | |
| | 39 | Staff Quarters-C | 1932.067 | | | |
| | 40 | Corporate Office | 735.565 | | | |
| | | **Total** | **7274.503** | **1891.299** | **25031.348** | **34197.15** |
| | | **Total** | **76765.771** | **13801.981** | **209415.398** | **299983.15** |

**PROPOSED BUILDING & LAND USE PATTERN**

| Sr. No. | Building No. | Name of Building | Proposed Building Coverage Area in Sqm | Exisitng Coverage Area in Sqm | Green Belt Area In Sqm | Vacant Area in Sqm | Survey Number Area In Sqm |
|---|---|---|---|---|---|---|---|
| 350 | A | Distellary | 17500 | | | | |
| | | **Total** | **17500** | **0** | | **2735** | **20235** |
| 352 | B | Sugar Godown | 4109 | | | | |
| | | **Total** | **4109** | **27433.805** | | **25115.195** | **56658** |
| 351 | B | Sugar Godown | 2000 | | | | |
| | | **Total** | **2000** | **27990.242** | **11910.68** | **79509.076** | **121410** |
| **Grand Total** | | | **23609** | **55424.047** | **11910.68** | **107359.271** | **198303** |

## 4.3 TOPOGRAPHY (ALONG WITH MAP)

**The plant layout is enclosed as Fig. 3.3.**

## 4.4 EXISTING LAND USE PATTERN (AGRICULTURE, NON-AGRICULTURE, FOREST, WATER BODIES (INCLUDING AREA UNDER CRZ), SHORTEST DISTANCES FROM THE PERIPHERY OF THE PROJECT TO PERIPHERY OF THE FORESTS, NATIONAL PARK, WILD LIFE SANCTUARY, ECO SENSITIVE AREAS, WATER BODIES (DISTANCE FROM THE HFL OF THE RIVER), CRZ, IN CASE OF NOTIFIED INDUSTRIAL AREA, A COPY OF THE GAZETTE NOTIFICATION SHOULD BE GIVEN.

No additional land is required for the proposed expansion of sugar & cogeneration plants & establishment of distillery plant. M/s Sovereign Industries Limited **(SIL)**, is having an area of 32.02 Hectares (79.09 acres) in Survey Numbers 335/1+2, 336/1D, 336/2B, 336/2K, 337/2, 337/3, 337/4, 350, 351/1+A+B, 351/1A+1B, 351/1A+1B/A, 351/1B, 351/1B PIA, 351/1K, 351/3, 351/3A, 351/3B, 351/3B PIA, 351/4, 352/1A, 352/1B, 352/1K , 352/2A, 352/3 & parts thereof falling under the revenue limits of Terdal Village, Jamkhandi Taluku, Bagalkote district of Karnataka State. **SIL** is establishing a Sugar Plant of sugar cane crushing capacity of 3500 TCD with cogeneration plant of 15 MWhr with valid consent for establishment obtained from Karnataka State Pollution Control Board (KSPCB). Based on the feasibility reports & availability of sugar cane SIL has decided to upgrade the sugar cane crushing capacity to 5000 TCD, Cogeneration of power to 34 MWhr & establish a molasses based distillery of 60 KLD to manufacture Rectified Spirit / Ethanol / Extra Neutral Alcohol within the existing plant premises. Apart from this, SIL also proposes to produce 2MW hr from spentwash incineration boiler. The existing buildings & utilities are spread over an area of 7.68 Hectares (18.97 acres). Proposed expansion of sugar & cogeneration plant along with distillery shall be located in an area of 2.36 Hectares (5.83 Acres). Around 10.53 Hectares (26.0 acres) is being developed as green belt. The balance area of 11.46 Hectares (28.30 acres) shall be vacant land.

The salient features of the site are already given in **Table – 3.1.**

There are no Historical places, monuments, heritage sites, wild life sanctuaries, national parks, elephant / tiger reserves, eco sensitive zones within the 10 Kms radius of the project site.

## 4.5 EXISTING INFRASTRUCTURE

At the site infrastructural facilities like roads & power supply are existing.

### 4.6 SOIL CLASSIFICATION

Soil of the area is predominantly black cotton soil.

### 4.7 CLIMATIC DATA FROM SECONDARY SOURCES

The nearest meteorological station is at Bijapur. The study area comes under semi arid to arid region. May is the hottest month of the year with mean daily maximum and mean daily minimum temperatures being 44 deg. C and 27 deg. C respectively. With the onset of monsoon, the temperature decreases appreciably in July but remains study thereafter till September. After monsoon the temperature decreases slightly.

The climate becomes cool in the month of December and continues upto February. December is the coldest month of the year with mean daily maximum temperature and mean daily minimum temperature being 27 $^{o}$C and 6.7$^{o}$C respectively.

The relative humidity depends not only on amount of water vapour in the atmosphere, but also on temperature. The humidity is generally high, being over 85% in the monsoon season and decreases in the post-monsoon period. The driest part of the year is the period from January to March, when the relative humidity in the afternoon is about 28%.

On an average the district receives a rainfall of about 600 mm.

The winds are generally light with some increase in speed during the late summer and monsoon seasons. The wind direction is mainly from southwest & west during the period from April to September. In October, winds blow from Northwest direction but on some days they are from southwest or west. During November and December the winds are mostly north – easterly or easterly. South westerly or westerly winds appear during the month January. During the month of February, the frequency of easterly wind decreases.

The predominant wind direction observed (obtained from secondary sources) during the summer was in East direction with 44.56% of the time observed with a maximum wind speed of 12 km/hr. The second dominant direction was West with 9.23% of the time observed having a wind speed of 6 km/hr. Calm conditions constituted about 21.73% of the total time observed.

### 4.8 SOCIAL INFRASTRUCTURE AVAILABLE

All infrastructure facilities such as education, health facilities and other social facilities are adequate at nearest town viz. Jamkhandi & district headquarters i.e. at Bagalkote.

Social Infrastructure proposed to be provided by M/s Sovereign Industries Limited is

1. Staff Quarters: The company shall provide quarters to the Head of the Departments and chemists, manufacturing assistants and engineers in the factory premises. About 70 quarters are being built. These quarters shall be provided with free water, dish antenna for entertainment and electricity for their use. Telephone facilities shall be provided with a security facility.

2. The company shall construct a temple in the office premises. This allows the staff, workers and their families to gather in the temple yard on festivals and other days.

3. The company shall develop greenery in the plant premises and also develop lawns near the factory and residential premises. The lush greenery shall give a very pleasant look and soothing effect. A rose garden is also planned.

4. The company shall financially contribute to some social organizations who conduct mass marriages, etc. Contributions shall also be made to various temples and special organizations for assisting the social activities of the public in nearby villages. The Company shall also donate liberally for assisting the educational institutions, by contributing towards construction cost of school buildings.

## CHAPTER – 5 PLANNING IN BRIEF

### 5.1 PLANNING CONCEPT (TYPE OF INDUSTRIES, FACILITIES, TRANSPORTATION ETC) TOWN AND COUNTRY PLANNING / DEVELOPMENT AUTHORITY CLASSIFICATION.

No additional land is required for the proposed expansion of sugar & cogeneration plants & establishment of distillery plant. M/s Sovereign Industries Limited **(SIL)**, is having an area of 32.02 Hectares (79.09 acres) in Survey Numbers 335/1+2, 336/1D, 336/2B, 336/2K, 337/2, 337/3, 337/4, 350, 351/1+A+B, 351/1A+1B, 351/1A+1B/A, 351/1B, 351/1B PIA, 351/1K, 351/3, 351/3A, 351/3B, 351/3B PIA, 351/4, 352/1A, 352/1B, 352/1K , 352/2A, 352/3 & parts thereof falling under the revenue limits of Terdal Village, Jamkhandi Taluku, Bagalkote district of Karnataka State. **SIL** is establishing a Sugar Plant of sugar cane crushing capacity of 3500 TCD with cogeneration plant of 15 MWhr with valid consent for establishment obtained from Karnataka State Pollution Control Board (KSPCB). Based on the feasibility reports & availability of sugar cane SIL has decided to upgrade the sugar cane crushing capacity to 5000 TCD, Cogeneration of power to 34 MWhr & establish a molasses based distillery of 60 KLD to manufacture Rectified Spirit / Ethanol / Extra Neutral Alcohol within the existing plant premises. Apart from this, SIL also proposes to produce 2MW hr from spentwash incineration boiler. The existing buildings & utilities are spread over an area of 7.68 Hectares (18.97 acres). Proposed expansion of sugar & cogeneration plant along with distillery shall be located in an area of 2.36 Hectares (5.83 Acres). Around 10.53 Hectares (26.0 acres) is being developed as green belt. The balance area of 11.46 Hectares (28.30 acres) shall be vacant land.

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### 5.2 POPULATION PROJECTION

Around 250 people shall be employed during construction. **SIL** shall employ 400 persons during operational phase for the proposed establishment of sugar, cogeneration & distillery plants. **SIL** shall provide quarters of various types in its premises during the operation phase with all the basic infrastructural facilities.

### 5.3 LAND USE PLANNING ( BREAKUP ALONG WITH GREENBELT ETC.,)

The land breakup of the plant layout is given in **Table 5.1**

## LAND BREAKUP OF THE EXISTING & PROPOSED PROJECT

## EXISTING BUILDING & LAND USE PATTERN - TABLE 5.1

| Sr. No. | Building No. | Name of Building | Building Coverage Area in Sqm | Green Belt Area In Sqm | Vacant Area in Sqm | Survey Number Area In Sqm |
|---|---|---|---|---|---|---|
| 351 | 1 | Cane Carrier | 254.884 | | | |
| | 2 | Mill House | 1913.61 | | | |
| | 3 | Evaporation House | 1452.381 | | | |
| | 4 | Boiling House | 2199.686 | | | |
| | 5 | Sugar House | 733.098 | | | |
| | 6 | Clarification House | 737.173 | | | |
| | 7 | Boiler House | 756.54 | | | |
| | 8 | Power House | 869.61 | | | |
| | 9 | Retuen Baggasse Carrier | 604 | | | |
| | 10 | Spray Pond | 6207.551 | | | |
| | .11/1 | Mollasses Tank | 411.5 | | | |
| | .11/2 | Mollasses Tank | 411.5 | | | |
| | .11/3 | Mollasses Tank | 411.5 | | | |
| | 12 | Injection Pump House | 150.722 | | | |
| | 13 | Sulphur House | 282.474 | | | |
| | 14 | Store Godown | 647.963 | | | |
| | 15 | Open Yard | 648.025 | | | |
| | 16 | Fan House | 373.508 | | | |
| | 17 | Work Shop | 563.399 | | | |
| | 24/1p | Sugar Godown | 3862.927 | | | |
| | 25 | Lime & Sulphur Godown | 136.987 | | | |
| | 26 | Chief Chemist & Engineer | 186.917 | | | |
| | 27 | Chimeny | 9.578 | | | |
| | 29 | Mill Panel Room | 101.43 | | | |
| | 30 | DG set Shed | 48 | | | |
| | 31 | Swich Yard | 300 | | | |
| | 33 | Gunny Bag Godown | 98.996 | | | |
| | 34 | Cogen Cooling Tower | 857.283 | | | |
| | 36 | Coal Shed | 1250 | | | |
| | 41 | WTP | 1200 | | | |
| | 42 | | 309 | | | |
| | | **Total** | **27990.242** | **11910.682** | 81509.076 | **121410** |
| 352 | 19 | Cane Marshelling Yard | 15191.831 | | | |
| | 20 | Cane Office | 108.709 | | | |
| | 22 | Weigh Bridge | 343.852 | | | |
| | 24/1p | Sugar Godown | 2252.411 | | | |
| | 24/2 | Sugar Godown | 6109.524 | | | |
| | 28/1 | GSR | 962.016 | | | |
| | 28/2 | GSR | 481.008 | | | |
| | 32 | ETP | 1984.454 | | | |
| | | **Total** | **27433.805** | | 29224.195 | **56658** |
| 335 | 18p | Cane Yard | 6788.221 | | | |
| | | **Total** | **6788.221** | | 49869.779 | **56658** |
| 336 | 18p | Cane Yard | 7279 | | | |
| | | **Total** | **7279** | | 23781 | **31060** |
| 337 | 21 | Administrative Building | 501.508 | | | |
| | 23/1 | Security | 8.988 | | | |
| | 23/2 | Time Office & Security | 48 | | | |
| | 35 | Transformer unit | 20 | | | |
| | 37 | Staff Quarters-A | 2307.475 | | | |
| | 38 | Staff Quarters-B | 1720.9 | | | |
| | 39 | Staff Quarters-C | 1932.067 | | | |
| | 40 | Corporate Office | 735.565 | | | |
| | | **Total** | **7274.503** | **1891.299** | **25031.348** | **34197.15** |
| | | **Total** | **76765.771** | **13801.981** | **209415.398** | **299983.15** |

**PROPOSED BUILDING & LAND USE PATTERN**

| Sr. No. | Building No. | Name of Building | Proposed Building Coverage Area in Sqm | Exisitng Coverage Area in Sqm | Green Belt Area In Sqm | Vacant Area in Sqm | Survey Number Area In Sqm |
|---|---|---|---|---|---|---|---|
| 350 | A | Distellary | 17500 | | | | |
| | | **Total** | **17500** | **0** | | **2735** | **20235** |
| 352 | B | Sugar Godown | 4109 | | | | |
| | | **Total** | **4109** | **27433.805** | | **25115.195** | **56658** |
| 351 | B | Sugar Godown | 2000 | | | | |
| | | **Total** | **2000** | **27990.242** | **11910.68** | **79509.076** | **121410** |
| **Grand Total** | | | **23609** | **55424.047** | **11910.68** | **107359.271** | **198303** |

## 5.4 ASSESSMENT OF INFRASTRUCTURE DEMAND (PHYSICAL & SOCIAL)

The project site is located at Terdal village, falling under the jurisdiction of Jamkhandi Taluku of Bagalkote District in Karnataka State. The plant site is located with all weather roads and the increased traffic can be easily met with this.

The site is connected by broad gauge railway line of South Western railway on Hubli- Miraj section. The nearest railway station is Kudachi & is located at a distance of 28.5 Kms away from the project site. The area is socially and physically well developed infrastructure wise.

Jamakhandi is the main town and market place which is located at about 25.14 Kms from the project site in the eastern direction. The area is well connected by road. State Highway (SH) 53 connecting Jamakhandi to Kagwad is at a distance of 2.67 Kms in the south western direction. State Highway (SH) 31 connecting Belagavi to Athani is at a distance of 8.91 Kms in the western direction.

The national highway connecting Bengaluru to Pune passes at a distance of 75.87 Kms in the western direction.

Bagalkote & Bijapur are the major cities and are located at a distance of about 76 Kms & 76.46 Kms respectively from the project site.

The nearest airport is Belagavi (Sambra) airport at a distance of 100 Kms.

## 5.5 AMENITIES / FACILITIES

All infrastructure facilities such as education, health facilities and other social facilities are adequate at nearest town viz. Jamkhandi & district headquarters i.e. at Bagalkote.

## CHAPTER – 6 PROPOSED INFRASTRUCTURE

### 6.1 INDUSTRIAL AREA ( PROCESSING AREA)

No additional land is required for the proposed expansion of sugar & cogeneration plants & establishment of distillery plant. M/s Sovereign Industries Limited **(SIL)**, is having an area of 32.02 Hectares (79.09 acres) in Survey Numbers 335/1+2, 336/1D, 336/2B, 336/2K, 337/2, 337/3, 337/4, 350, 351/1+A+B, 351/1A+1B, 351/1A+1B/A, 351/1B, 351/1B PIA, 351/1K, 351/3, 351/3A, 351/3B, 351/3B PIA, 351/4, 352/1A, 352/1B, 352/1K , 352/2A, 352/3 & parts thereof falling under the revenue limits of Terdal Village, Jamkhandi Taluku, Bagalkote district of Karnataka State. **SIL** is establishing a Sugar Plant of sugar cane crushing capacity of 3500 TCD with cogeneration plant of 15 MWhr with valid consent for establishment obtained from Karnataka State Pollution Control Board (KSPCB). Based on the feasibility reports & availability of sugar cane SIL has decided to upgrade the sugar cane crushing capacity to 5000 TCD, Cogeneration of power to 34 MWhr & establish a molasses based distillery of 60 KLD to manufacture Rectified Spirit / Ethanol / Extra Neutral Alcohol within the existing plant premises. Apart from this, SIL also proposes to produce 2MW hr from spentwash incineration boiler. The existing buildings & utilities are spread over an area of 7.68 Hectares (18.97 acres). Proposed expansion of sugar & cogeneration plant along with distillery shall be located in an area of 2.36 Hectares (5.83 Acres). The balance area of 11.46 Hectares (28.30 acres) shall be vacant land.

### 6.2 RESIDENTIAL AREA ( NON PROCESSING AREA)

No additional land is required. Around 70 quarters are being built within the vacant area of the existing premises.

### 6.3 GREEN BELT.

Around 10.53 Hectares (26.0 acres) is being developed as green belt.

### 6.4 SOCIAL INFRASTRUCTURE

All infrastructure facilities such as education, health facilities and other social facilities are adequate at nearest town viz. Jamkhandi & district headquarters i.e. at Bagalkote.

Social Infrastructure proposed to be provided by M/s Sovereign Industries Limited is

1. Staff Quarters: The company shall provide quarters to the Head of the Departments and chemists, manufacturing assistants and engineers in the factory premises. About 70 quarters are being built. These quarters shall be provided with free water, dish antenna for entertainment and electricity for their use. Telephone facilities shall be provided with a security facility.

2. The company shall construct a temple in the office premises. This allows the staff, workers and their families to gather in the temple yard on festivals and other days.

3. The company shall develop greenery in the plant premises and also develop lawns near the factory and residential premises. The lush greenery shall give a very pleasant look and soothing effect. A rose garden is also planned.

4. The company shall financially contribute to some social organizations who conduct mass marriages, etc. Contributions shall also be made to various temples and special organizations for assisting the social activities of the public in nearby villages. The Company

shall also donate liberally for assisting the educational institutions, by contributing towards construction cost of school buildings.

### 6.5 CONNECTIVITY (TRAFFIC & TRANSPORTATION ROAD / RAIL / METRO / WATER WAYS ETC.,)

The plant site is located with all weather roads and the increased traffic can be easily met with this. State Highway (SH) 53 connecting Jamakhandi to Kagwad is at a distance of 2.67 Kms in the south western direction. State Highway (SH) 31 connecting Belagavi to Athani is at a distance of 8.91 Kms in the western direction. The national highway connecting Bengaluru to Pune passes at a distance of 75.87 Kms in the western direction.

The site is connected by broad gauge railway line of South Western railway on Hubli- Miraj section. The nearest railway station is Kudachi & is located at a distance of 28.5 Kms away from the project site.

### 6.6 DRINKING WATER MANAGEMENT (SOURCE & SUPPLY OF WATER)

Domestic water consumption in the proposed plant shall be 20$m^3$/day and the requirement shall be met from river Krishna.

### 6.7 SEWERAGE SYSTEM

Domestic sewage of 16$m^3$/day shall be treated in Septic tank and soak pit.

### 6.8 INDUSTRIAL WASTE MANAGEMENT

#### 6.8.1 Sugar & Cogen Unit:

The water consumption and wastewater generation from the proposed plant after expanding to 5000 TCD & 34 MW are given in Table 6.1.

**TABLE 6.1 WATER BALANCE WITH CONSUMPTION & DISCHARGE DETAILS**

| Sl. No. | Particulars | **Quantity** |
|---|---|---|
| 1 | **WATER IN TO SYSTEM, $m^3$/d** | |
| **1A** | **Source :** Fresh water from river | 220 |
| | **Usage:** Domestic use in factory | 20 |
| | Water treatment plant | 200 |
| | **Total** | **220** |
| **1B** | Water from sugar cane at 70% (of 5000 Tons) on cane | 3500 |
| | **Total of 1A & 1B** | **3720** |
| **2** | **WATER OUT OF SYSTEM, $m^3$/d** | |
| **2A** | **Effluent** | |
| | i) Domestic sewage (80% of water used) | 16 |
| | ii) Factory effluent including floor wash & laboratory wastewater | 500 max |
| | v) WTP drain | 60 |
| | vi) Cooling tower blow down | 240 |
| | vii) Boiler Blow down | 65 |
| **2B** | **Excess vapour condensate recycled back** | 582 |
| **2C** | Water going along with Bagasse (Losses at 15% cane) | 750 |
| **2D** | Water going along with press mud & molasses (Losses) | 200 |
| **2E** | **LOSSES** | |
| | i) Vapour & drift loss from cooling tower | 575 |
| | ii) Vapour & drift loss at bearing (mill & turbine) cooling water | 338 |

| | | |
|---|---|---|
| | iii) Steam losses at traps & vent at 3% on cane | 150 |
| | iv) Domestic water loss | 04 |
| | v) Vapour loss at crystallization & centrifugation | 90 |
| | vi) Flash vapour loss at clarifier | 70 |
| | vii) Vapour loss at mill | 80 |
| | **Total of 2A, 2B, 2C,2D & 2E** | **3720** |

### 6.8.2 Distillery Unit:

The water consumption and wastewater generation from the proposed distillery plant of 60 KLD are given in Table 6.2.

**Table 6.2. WATER BALANCE FOR DISTILLERY**

| | | Requirement | Loss | Wastewater |
|---|---|---|---|---|
| Fermentation – Process makeup<br>Water present in molasses at 20% of 240 MT of molasses | | 500<br>48 | 104 | Spent wash - 480<br>Spent lees - 144 |
| Distillation | | 180 | | |
| Boiler makeup | Incineration Boiler | 32 | 26 | 6 (Blow down) |
| Cooling tower make up | Distillery & Incineration boiler | 184 | 164 | 20 (Blow down) |
| DM Plant reject | | 13 | 0 | 13 |
| Floor & equipment Wash | | 20 | 5 | 15 |
| Domestic | | 5 | 1 | 4 |
| **Total** | | **982** | **300** | **682** |
| **Recycled water from MEE** | | **(-) 409** | | |
| **Recycled treated spent lees** | | **(-) 106** | | |
| **Fresh water drawal from river** | | **467** | | |

## 6.9 EFFLUENT TREATMENT SYSTEM FROM THE PROPOSED TREATMENT PLANT

### 6.9.1 Quantity of wastewater generation from Sugar & Cogen Units

**WASTEWATER GENERATION ($m^3$/day)**

| Sl. No. | UNIT | | Segregation |
|---|---|---|---|
| **A** | **SUGAR PLANT** | | |
| 1 | Sugar Manufacturing Process | 500 | Process Wastewater |
| **B** | **COGENERATION PLANT** | | |
| 1 | Cooling tower blow down | 240 | Non Process Wastewater |
| 2 | Boiler blow down | 65 | |
| 3 | DM Plant – regeneration | 60 | |
| **E** | **DOMESTIC WASTEWATER** | 16 | Septic Tank & Soak Pit |
| **TOTAL WASTEWATER** | | **881** | |

The process wastewater from sugar unit shall be treated in a full fledged effluent treatment plant proposed with the following units

- Bar Screens and Grit chamber
- Oil traps
- Monthly wash tank
- Aeration Tank - I
- Secondary clarifier - I

- Aeration Tank - II
- Secondary clarifier - II
- Polishing pond
- Sludge drying beds

The treated process wastewater shall be diluted with the non process wastewater from cogeneration in polishing pond except for domestic wastewater which is treated in septic tank followed by soak pit. The outlet of the polishing pond confirming to the GSR 422 E on land discharge standards shall be utilized for greenbelt development and sugarcane cultivation within the premises. The project is based on zero discharge.

### 6.9.2 Quantity of wastewater generation From Distillery Unit

**WASTEWATER GENERATION ($m^3$/day)**

| Sl. No. | UNIT | | DISPOSAL |
|---|---|---|---|
| **A** | **DISTILLERY** | | |
| 1 | Spentwash | 480 | Process Wastewater |
| 2 | Spent lees | 144 | Low strength Wastewater |
| **B** | **UTILITIES** | | |
| 1 | Cooling tower blow down DM Plant regeneration and Floor wash | 28 | Non Process Wastewater |
| **TOTAL WASTEWATER** | | **652** | |

#### 6.9.2.1 PROCESS WASTEWATER - SPENT WASH

Spent wash is the principal pollutant generated from the process from the analyser column. The total spentwash generation from the plant shall be about 480$m^3$/day. Spent wash generated will be subjected to concentration followed by incineration.

#### 6.9.2.2 PROCESS WASTEWATER - SPENT LEES

Around 144$m^3$/day of spent lees shall be generated from Pre rectifier column (PRC) & Fusel Oil recovery Column (FRC). Spent lees shall be subjected to RO & reused back in the unit for dilution of molasses (106$m^3$/day). Reject from RO (38$m^3$/day) shall be sent for further treatment.

#### 6.9.2.3 NON PROCESS WASTWATER FROM DISTILLERY

Non process wastewater is mainly cooling tower blow down, DM Plant – regeneration and Floor wash. About 28$m^3$/day of wastewater shall be generated.

All the above streams will be routed to guard pond for mixing. The final quality of the wastewater will meet GSR 422 (E) on land discharge standards. This wastewater will be utilized for greenbelt development within the plant premises.

#### 6.9.2.4 DOMESTIC SEWAGE

The domestic sewage (20$m^3$/day) generated from the industrial complex will be subjected to treatment in Septic tank followed by soak pit.

### 6.9.3 EFFLUENT STORAGE FACILITIES

The effluent storage facilities shall be of RCC and as per the guidelines of Central Pollution Control Board.

### 6.9.4 SOLID WASTE GENERATION (T/DAY)

Quantity of solid waste generation after the expansion of sugar & cogeneration units & their disposal is shown below in the table

| **SOURCE** | **NAME** | **QUANTITY** | Mode of disposal |
|---|---|---|---|
| **CANE CRUSHING SEASON** | | | |
| Mill House | Bagasse | 1600 | Shall be used as boiler fuel |
| Process House | Press Mud | 200 | Shall be given to farmers. |
| | Molasses | 200 | Shall be used as raw material for distillery |
| Boiler House – Cogen Plant | Ash | 50.36 | Shall be given to farmers. |
| Effluent treatment Plant | Sludge | 1.30 | Used as manure within premises |

The following table shows the solid waste generation from the proposed **distillery.**

| | | |
|---|---|---|
| Yeast Sludge | 6.00 MT/day | Shall be dried & sold as cattle feed |
| Bottom Ash | 2.80 MT/day | Shall be given to farmers |
| Fly ash | 28.56 MT/ day | Shall be given to farmers |

### 6.10 AIR POLLUTION CONTROL MEASURES

**CONSTRUCTION PHASE**

The construction of proposed units would result in the increase of SPM concentrations due to fugitive dust. Frequent water sprinkling in the vicinity of the construction sites would be undertaken and will be continued after the completion of plant construction as there is scope for heavy truck mobility. It will be ensured that both gasoline and diesel powered vehicles are properly maintained to comply with exhaust emission requirements. All the interior roads shall be metalled.

**OPERATIONAL PHASE**

The major emission is particulate matter from the sugar & cogeneration plant complex viz. from the Bagasse along with coal (15%) fired boilers.

The proposed boiler of 125 TPH shall be provided with an Electro Static Precipitator which is designed to meet an outlet concentration of less than 150 mg/$Nm^3$. Adequate chimney above ground level is proposed for the boiler as per the CPCB norms.

The major emission is particulate matter from the distillery plant complex viz. from the spentwash slops along with bagasse / coal fired incinerator boiler. The proposed incineration boiler of 22 TPH shall be provided with Electro Static Precipitator which shall be designed to meet an outlet concentration of less than 150 mg/$Nm^3$. Adequate chimney above ground level is proposed for the incineration boiler as per the CPCB norms.

The standby DG set of 1000 KVA shall be provided with adequate stack as per the CPCB norms.

### 6.11 POWER REQUIREMENT & SUPPLY / SOURCE.

The proposed power requirement of the sugar & cogeneration plant after expansion is 9 MW. This requirement shall be met from the cogeneration plant and around 25 MW shall be exported to the grid during season.

The proposed power requirement of the 60 KLD distillery plant is 1250KW. This requirement shall be met by generating 2 MW power from the incineration boiler. Remaining 750 KW shall be exported to the grid.

## CHAPTER – 7

## REHABILITATION AND RESETTLEMENT (R & R) PLAN

### 7.1 POLICY TO BE ADOPTED (CENTRAL / STATE) IN RESPECT OF THE PROJECT AFFECTED PERSONS INCLUDING HOME OUSTEES, LAND OUSTEES AND LANDLESS LABOURERS (A BRIEF OUT LINE TO BE GIVEN).

No additional land is required for the proposed expansion of sugar & cogeneration plants & establishment of distillery plant. M/s Sovereign Industries Limited **(SIL)**, is having an area of 32.02 Hectares (79.09 acres) in Survey Numbers 335/1+2, 336/1D, 336/2B, 336/2K, 337/2, 337/3, 337/4, 350, 351/1+A+B, 351/1A+1B, 351/1A+1B/A, 351/1B, 351/1B PIA, 351/1K, 351/3, 351/3A, 351/3B, 351/3B PIA, 351/4, 352/1A, 352/1B, 352/1K , 352/2A, 352/3 & parts thereof falling under the revenue limits of Terdal Village, Jamkhandi Taluku, Bagalkote district of Karnataka State. **SIL** is establishing a Sugar Plant of sugar cane crushing capacity of 3500 TCD with cogeneration plant of 15 MWhr with valid consent for establishment obtained from Karnataka State Pollution Control Board (KSPCB). Based on the feasibility reports & availability of sugar cane SIL has decided to upgrade the sugar cane crushing capacity to 5000 TCD, Cogeneration of power to 34 MWhr & establish a molasses based distillery of 60 KLD to manufacture Rectified Spirit / Ethanol / Extra Neutral Alcohol within the existing plant premises. Apart from this, SIL also proposes to produce 2MW hr from spentwash incineration boiler. The existing buildings & utilities are spread over an area of 7.68 Hectares (18.97 acres). Proposed expansion of sugar & cogeneration plant along with distillery shall be located in an area of 2.36 Hectares (5.83 Acres). The balance area of 11.46 Hectares (28.30 acres) shall be vacant land.

Hence no rehabilitation & resettlement is involved.

## CHAPTER – 8 PROJECT SCHEDULE & COST ESTIMATES

### 8.1 LIKELY DATE OF START OF CONSTRUCTION AND LIKELY DATE OF COMPLETION (TIME SCHEDULE FOR THE PROJECT TO BE GIVEN).

The proposed expansion of sugar & cogeneration plants & establishment of distillery will be implemented within 18 months after obtaining the environmental clearance.

### 8.2 ESTIMATED PROJECT COST ALONG WITH ANALYSIS IN TERMS OF ECONOMIC VIABILITY OF THE PROJECT.

The estimated project cost of is Rs. 87 Crores.

### 8.2.1 PROJECT COST:

The project cost estimates of the present proposal considering new plant and machinery as per standard specifications, shall be purchased from the approved machinery suppliers in India. Whereas the civil construction of machineries foundations shall be carried out by the local contractor using locally available construction materials including brick, cement, steel etc. On the basis of present market price and anticipated escalation up to the scheduled date of commissioning, the capital cost of the proposed expansion of sugar & cogeneration plants & establishment of distillery of 60 KLD will be around Rs. 8700 Lacs.

| Sl. No. | Particulars | Amount in Lacs of Rs. |
|---|---|---|
| 1 | Buildings | 1437.10 |
| 2 | Plant and Machinery | 6385.00 |
| 3 | Miscellaneous Fixed Assets | 160.00 |
| 4 | Preliminary Expenses & Preoperative Expenses | 552.90 |
| 5 | Working Capital Margin | 80.00 |
| 6 | Others | 85.00 |
| | **Total** | **8700** |

### 8.3 MEANS OF FINANCE:

For the proposed sugar & cogeneration plant the financing pattern is proposed to be 70:30 i.e. debt – equity ratio. 71.11% of the project cost of Rs. 87 Crores i.e. Rs. 61 Crores is to be financed by Financial Instructions / Bank, whereas, 29.89% of the project cost of Rs. 80 Crores i.e. Rs. 26 Crores will be contributed from internal accruals of the company viz. M//s **M/s Sovereign Industries Limited (SIL).**

The financial pattern of the said scheme for M//s SIL at Survey Numbers 335/1+2, 336/1D, 336/2B, 336/2K, 337/2, 337/3, 337/4, 350, 351/1+A+B, 351/1A+1B, 351/1A+1B/A, 351/1B, 351/1B PIA, 351/1K, 351/3, 351/3A, 351/3B, 351/3B PIA, 351/4, 352/1A, 352/1B, 352/1K , 352/2A, 352/3 & parts thereof falling under the revenue limits of Terdal Village, Jamkhandi Taluku, Bagalkote district of Karnataka State is envisaged as under.

| Sr. No | Particulars | Rs. In Lacs | % |
|---|---|---|---|
| 1 | EQUITY Own Contribution of M/s SIL | 2600 | 29.89 |
| 2 | DEBT : Rupee Term Loan from Banks | 6100 | 71.11 |
| | **Total** | **8700** | **100%** |

## 8.4 ASSUMPTIONS UNDERLYING THE PROFITABILITY PROJECTIONS

The proposed sugar & cogeneration plant is expected to be completed by end of March, 2016 and production will start probably from September, 2016.

The projected profitability has been computed on the basis of incremental production.

| Sl. No. | Particulars | Values | | | | |
|---|---|---|---|---|---|---|
| | | Years | | | | |
| 1 | **Sugar Plant** | I | II | III | IV | V |
| 1.1 | Cane crushing capacity, TPD | 5000 | 5000 | 5000 | 5000 | 5000 |
| 1.2 | Net season days, nos. | 60 | 180 | 180 | 180 | 180 |
| 1.3 | Capacity Utilization in % | 85 | 90 | 95 | 95 | 95 |
| 1.4 | Cane crushed, Lacs Metric Tons | 2.55 | 8.10 | 8.55 | 8.55 | 8.55 |
| 1.5 | Recovery, % cane | 11.0 | 11.1 | 11.2 | 11.2 | 11.2 |
| 1.6 | Sugar production, MT | 28050 | 89910 | 95760 | 95760 | 95760 |
| 1.7 | Molasses, % cane<br>Lacs Metric Tons | 4%<br>(0.10) | 4%<br>(0.32) | 4%<br>(0.34) | 4%<br>(0.34) | 4%<br>(0.34) |
| 2 | **Cogeneration Plant** | | | | | |
| 2.1 | Power export, MW | 18.00 | 18.00 | 18.00 | 18.00 | 18.00 |
| 2.2 | No. of days | 60 | 180 | 180 | 180 | 180 |
| 2.3 | No. of hrs / day | 22 | 22 | 22 | 22 | 22 |
| 2.4 | Capacity Utilization in % | 85 | 90 | 95 | 95 | 95 |
| 3 | **Distillery Plant** | | | | | |
| 3.1 | **Capacity in KLD** | 60 | 60 | 60 | 60 | 60 |
| 3.2 | Capacity Utilization in % | 100 | 100 | 100 | 100 | 100 |
| 3.3 | Gross working Days | 300 | 300 | 300 | 300 | 300 |
| 3.4 | Estimated Production in Lac liters | 180 | 180 | 180 | 180 | 180 |

## 8.5. FINANCIAL VIABILITY, BASIS & INDICATORS

### 8.5.1 Basis

• Based on the appraised project design and expected outputs elaborated in the project report, as well as appraised capital cost for the integrated sugar, cogen power & distillery project the financial analysis was carried out. The following basis was considered, over and above the appraised project capital cost and design basis:

• It is envisaged that this loan amount will be repaid in 9 years in 12 equal half yearly installments and there will be an initial moratorium of 3 years on the loan including Construction period of 21 months. In other words, there will an effective moratorium of 15 months after the construction period. An Interest rate of 14% is assumed on Term Loans and it is assumed that the Interest payment and Principal Repayment will be quarterly

• The selling prices for levy (10%) and non levy sugar (90%) have been considered respectively at prevailing market prices of Rs.1879.85 / Quintal and Rs.2600 / Quintal, without any escalation over the 10 years period of operation.

• The price for exportable power to KPTCL has been taken at Rs. 3.61/ kWh with 2% escalation every year as per the prevailing policy in Karnataka state.

• The depreciation rates for straight line method and WDV have been taken as per prevailing rules.

• The purchase price of cane including harvesting / transportation and purchase tax has been considered at Rs.2000 / MT, over the entire 10 years of operation.

• The cost of chemicals and packing material for integrated project has been taken at prevailing market rates and consumption patterns for these items.

• The water requirement for sugar, cogen power plant & distillery of average 220 KL / day & 1164 KL / day respectively has been taken at Rs. 10/ KL with 5% escalation from 4th year.

• The direct labour requirement has been estimated at and the costs have been estimated based on prevailing market salaries, increments and welfare expenditure.

• Repairs and maintenance cost is assumed as 0.75% of the plant and machinery and building cost. Insurance on Building and machinery is assumed at 0.3% on its cost. Salaries and wages are calculated at 1.1% on sales.

• Other manufacturing overheads, administrative staff, salary & overheads and selling overheads have been adequately provided & assumed at 1% on sales.

• Working capital has been estimated based on 30 days consumables and packing expenses, 30 days molasses stock, 45 days of finished goods, 3 days WIP, 30 days debtors for sale of exportable power etc. No creditors have been considered. 25% margin and 75% working capital loan has been assumed at 14% interest rate.

• Income tax working has been based on prevailing IT rules for this kind of project.

**8.7 FINANCIAL PARAMETERS AND BENEFIT**

The financial viability indicators of average DSCR of 1.92 (min 1.46), payback period of 6 years and IRR of 22.98% on the total project capital expenditure indicate sound financial viability of the captioned integrated project. This is based on the appraised project design, outputs and capital costs, as well as assumption / basis indicated in the above section. Average increase in export power selling price, utilization levels, recovery, etc. will improve the project financial viability further.

**8.8 CONCLUSION**

Based on the techno-economic viability assessment carried out through the project report by MITCON Pune, the proposed integrated project of M/s Sovereign Industries Limited is found technically feasible and financially viable. It is recommended for equity participation and term loan / working capital financing.

THE RESULTS OF THE SENSITIVITY ANALYSIS SHOWS THAT, THE BENEFITS AND THE RETURNS FROM THE PROJECT OUTWEIGH THE RISK FACTORS ASSOCIATED WITH IT. HENCE IT IS RECOMMENDED THAT THIS PROJECT IS A VIABLE ONE AND CAN BE IMPLEMENTED.

# CHAPTER – 9

## ANALYSIS OF PROPOSAL (FINAL RECOMMENDATIONS)

### 9.1 FINANCIAL & SOCIAL BENEFITS WITH SPECIAL EMPHASIS ON THE BENEFIT TO THE LOCAL PEOPLE INCLUDING TRIBAL POPULATION, IF ANY, IN THE AREA.

**M/s SIL shall undertake the following social welfare measures**

| | | |
|---|---|---|
| Employment | : | Preference will be given for locals for employment based on qualifications & requirement. |
| Medical facilities | : | Medical facilities shall be provided for all employees. |
| Educational facilities | : | Basic educational and vocational facilities shall be provided for the children of employees as well as nearby villagers. |
| Infrastructure facilities | : | Approach roads shall be developed at par with plant roads |