PRE – FEASIBILITY REPORT

Of

PROPOSED EXPANSION OF SUGAR PLANT CANE CRUSHING CAPACITY FROM 10000 TCD TO 15000 TCD COGENERATION POWER PLANT FROM 45 MW TO 80 MW

&

EXPANSION OF MOLASSES BASED DISTILLERY FROM 60 KLD TO 120 KLD & GENERATION OF 4 MW POWER FROM SPENT WASH INCINERATION BOILERS

AT

BEERANGADDI & HUNSHYAL P.G. VILLAGES, GOKAK TALUKA, BELAGAVI DISTRICT, KARNATAKA STATE

FOR

M/s SATISH SUGARS LIMITED

Prepared by
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QCI, NABET,
Accreditation No. NABET/EIA/1011/021

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CHAPTERS

CHAPTER 1. EXECUTIVE SUMMARY

M/s Satish Sugars Limited (SSL, The company) has an existing area of **159.30 Acres** (64.498 Hectares) in Survey Nos. 366, 367, 368, 369, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 385, 389, 390 & 391 & parts there of Beerangaddi Village and 85, 86/1+3/A, 86/1+3/B, 86/1+3/K, 86/2+4/A, 86/2+4/B, 86/2+4/K, 86/2+4/D, 88/1/ABK/2AB, 90/1A, 90/1B, 90/1K, 90/2A, 90/2B, 90/3, 90/4A, 90/4B, 90/4K, 98/1A, 98/1B, 98/1K, 98/2+3A, 98/2+3B, 98/4, 99/1, 99/2, 99/3, 99/4, 100/2, 100/3, 100/4, 101/1+2+3A, 101/4A, 101/4B, 101/5, 102/3+4A, 102/4B, 102/4K+5,104,109,119,120/1 & parts there of Hunshyal PG Village falling under the revenue limits of Gokak Taluk, District Belagavi, Karnataka State. **SSL** is operating a Sugar Plant of sugar cane crushing capacity of 10000 TCD along with cogeneration plant of 45 MW power & 60 KLD molasses based distillery. Based on the feasibility reports & availability of sugar cane in the area, **SSL** has decided to upgrade the sugar cane crushing capacity from 10000 to 15000 TCD, Cogeneration of power from 45 MW to 80 MW. In view of the additional molasses availability in house after the expansion, **SSL** proposes to expand the manufacturing capacity of existing molasses based distillery from 60 KLD to 120 KLD to manufacture Rectified Spirit / Ethanol / Extra Neutral Alcohol at a project cost of **Rs. 266 Crores.**

The existing buildings of Sugar, Cogeneration & distillery units are spread over an area of **48.66 acres** (19.70 hectares). This includes the composting facilities of distillery, ETP for sugar & cogeneration units and utilities. Existing green belt area is being developed over an area of **49.90 acres** (20.22 hectares). An area of **9.97 acres** (4.036 hectares) is covered by roads & pavements. Vacant area available with the unit is **50.733 acres** (20.54 hectares).
Proposed up gradation of the sugar cane crushing capacity from 10000 to 15000 TCD, expansion of Cogeneration of power from 45 MW to 80 MW & expansion of molasses based distillery from 60 KLD to 120 KLD shall be located in an area of **4.203 Acres** within the vacant area of the existing premises.

Additional area for green belt is not proposed. The balance area of **46.53 acres** shall be vacant land.

The proposed expansion project shall require sugar cane of 15000 to 16500 t/day & molasses of 420 to 480 MT/d. The total fresh water requirement shall be 3630m^3/d.

The wastewater generation shall be in the form of process wastewater from sugar unit. Process wastewater from distillery shall be in the form of spent wash & spent lees. Non process wastewater (cooling purging, boiler blow down, DM plant regeneration) is / shall be generated from sugar, cogeneration & distillery plants.

The summary of the proposed expansion of sugar, cogeneration & distillery plants is given in the following tables.

SUGAR PLANT OF CAPACITY 15000 TCD & COGENERATION OF POWER 80 MW

Particulars	Quantity	Transportation	Storage
Sugar cane (MT/d)	15000	By tractors/ trucks / bullock carts	Cane Yard
Bagasse (MT/d) (100% thru' bagasse mode)	4000	By return bagasse carrier	Bagasse Storage yard
Bagasse (MT/d) (85% heat input thru' bagasse mode)	2677	-do-	-do-
Coal (MT/d) (15% heat input as an auxiliary fuel along with bagasse)	297	By Rail / trucks	Coal Storage yard
Coal (MT/d) (100% heat input thru' Coal)	1980	By Rail / trucks	-do-
Sulphur (MT per month)	160 to 240	By trucks	HDPE bags in sulphur store
Lime (MT per month)	700 to 800	By trucks	HDPE bags in Lime store
Caustic Soda flakes(MT/month)	13 to 18	By trucks	HDPE bags in store
Sodium Hydro Sulphite (MT/month)	1.3 to 1.35	By trucks	-do-
Bleaching powder (MT/month)	0.40 to 0.45	By trucks	-do-
Boiler chemicals like antiscalents etc. (kgs/month)	4.0 to 4.5	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)	54000	By trucks	Sugar godowns
Molasses (MT/month)	18000	Reused as raw material for distillery	Storage tanks
Bagasse (MT/month)	144000	Reused as fuel for boiler	Storage Yard
Press mud (MT/month)	18000	By tractors/ trucks	Storage Yard

RAW MATERIALS REQUIREMENT & PRODUCTS FOR PROPOSED EXPANSION OF DISTILLERY FROM 60 TO 120 KLD.

Raw materials	Quantity	Transportation	Storage
Basic Raw material			
Molasses	420 to 480T/d	Pipeline	Mild Steel tanks
Chemicals / Nutrients			
Sulphuric acid	0.24 T/d	Lorry tanker	S.S. tank
DAP	0.12 T/d	Lorry	50 kg bags
Urea	0.44 T/d	Lorry	50 kg bags
Antifoam HCL Caustic soda	0.12 T/d 0.44 T/d 0.44 T/d	Lorry Tanker Lorry	50 kg drum Acid proof MS tank 50 kg bags
Yeast culture / Enzyme	0.22 T/d	Lorry	10 kg drum
Coal as fuel for Incinerator Boiler*	106.0 T/d	By Dumpers	Storage yard
Bagasse as fuel for Incinerator Boiler	180.0 T/d	By Dumpers	Storage yard
Products / By-product			
Ethanol (RS/ENA/AA)	120 KL/d	Lorry tanker	M.S. tanks
Yeast sludge	12T/d	Tractor/Lorry	Bulk

* Note: Coal shall be used during the non availability of Bagasse.

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.

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 and 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 is done / shall be done by a pipeline and finished product is / shall be transported by tankers / trucks.

The proposed unit will result in the following resource optimisation

a. Proposed expansion & distillery plant shall be situated in the existing premises.
b. Proximity to the availability of raw material area i.e. rich sugar cane area of Gokak, Hukkeri, Chikodi, Raibag & Athani Taluks of Belagavi District of Karnataka.
c. Availability of utilities such as transportation & water.
d. Ease of control over sugar, cogeneration & distillery units by one management & sharing of common facilities like workshop etc.

The project is based on zero discharge. The wastewater generated from the proposed expansion of sugar & cogeneration plant (quantity 923 KLD) shall be treated & reused for on land irrigation within the plant premises. The spent wash generated from the expansion of the distillery plant (quantity 480 KLD) shall be concentrated & incinerated.

Additional land is not required for the proposed plant. **SSL** is having an area of **159.30 Acres** (64.498 Hectares) in Survey Nos. 366, 367, 368, 369, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 385, 389, 390 & 391 & parts there of Beerangaddi Village and 85, 86/1+3/A, 86/1+3/B, 86/1+3/K, 86/2+4/A, 86/2+4/B, 86/2+4/K, 86/2+4/D, 88/1/ABK/2AB, 90/1A, 90/1B, 90/1K, 90/2A, 90/2B, 90/3, 90/4A, 90/4B, 90/4K, 98/1A, 98/1B, 98/1K, 98/2+3A, 98/2+3B, 98/4, 99/1, 99/2, 99/3, 99/4, 100/2, 100/3, 100/4, 101/1+2+3A, 101/4A, 101/4B, 101/5, 102/3+4A, 102/4B, 102/4K+5,104,109,119,120/1 & parts there of Hunshyal PG Village falling under the revenue limits of Gokak Taluk, District Belagavi, Karnataka State.

Existing green belt area is being developed over an area of **49.90 acres** (20.22 hectares). Additional area for green belt is not proposed.

The existing water consumption in the sugar plant including power generation is 7927m^3/day. Of this total water requirement of 7927 m^3/day, about 7000m^3/day is being met from the cane juice of sugar plant and the balance requirement of 927m^3/day is drawn from River Ghataprabha.

After the proposed expansion, water consumption in the sugar plant including power generation shall be 11976m^3/day. Of this total water requirement of 11976 m^3/day, about 10500 m^3/day shall be met from the cane juice of sugar plant and the balance requirement of 1476m^3/day shall be drawn from River Ghataprabha.

The existing water consumption in the distillery is 1077m^3/day. Of this total water requirement of 1077 m^3/day, about 94m^3/day is being met from the treated spent lees and the balance requirement of 983m^3/day is drawn from River Ghataprabha.

After the proposed expansion to 120KLD, water consumption in the distillery shall be 2154 m^3/day. Of this total water requirement of 2154 m^3/day, about 188 m^3/day shall be met from the treated spent lees and the balance requirement of 1966m^3/day shall be drawn from River Ghataprabha.

SSL has the necessary permission from Government of Karnataka for lifting the water from River Ghataprabha.

Following table shows the quantities of by products / solid waste generation from the proposed expansion of sugar & cogeneration units.

Details of Solid Wastes / By Products for Sugar & Cogeneration Power Plant

Sl. No.	Description of By products / Solid Wastes	Quantity Per Month in MT		Mode of Disposal
		Existing	After Expansion	
01	Molasses	12000	18000	Shall be used as raw material for manufacturing of Rectified Spirit or Ethanol
02	Bagasse	96000	144000	Shall be used as fuel for captive power generation
03	Press mud	12000	18000	Shall be mixed with boiler ash and given as manure to member farmers.
04	Boiler ash	720	1374	Shall be mixed with press mud and given as manure to member farmers.
05	ETP Sludge	60.0	90.0	Shall be used as manure within premises

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

	Quantity in TPD		Mode of disposal
	Existing for 60 KLD	Proposed for 120 KLD	
Yeast Sludge	6.00	12.00	Shall be dried & sold as cattle feed.
Bottom Ash	0.33	5.60	Shall be sold to brick manufacturers / cement plants
Fly ash	1.21	57.10	Shall be given to farmers.

The hazardous waste generation shall be in the form of used oil from the DG sets. Used oil from DG sets shall be used as lubricant within premises / if in excess shall be sold to authorized recyclers.

The project will be implemented within 12 months after obtaining the environmental clearance.

The proposed expansion will be implemented at a project cost of Rs 266 crores. Out of Rs 266 crores, an amount of Rs 45 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.

2.1.1 M/s Satish Sugars Limited (SSL, The company) has an existing area of **159.30 Acres** (64.498 Hectares) in Survey Nos. 366, 367, 368, 369, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 385, 389, 390 & 391 & parts there of Beerangaddi Village and 85, 86/1+3/A, 86/1+3/B, 86/1+3/K, 86/2+4/A, 86/2+4/B, 86/2+4/K, 86/2+4/D, 88/1/ABK/2AB, 90/1A, 90/1B, 90/1K, 90/2A, 90/2B, 90/3, 90/4A, 90/4B, 90/4K, 98/1A, 98/1B, 98/1K, 98/2+3A, 98/2+3B, 98/4, 99/1, 99/2, 99/3, 99/4, 100/2, 100/3, 100/4, 101/1+2+3A, 101/4A, 101/4B, 101/5, 102/3+4A, 102/4B, 102/4K+5,104,109,119,120/1 & parts there of Hunshyal PG Village falling under the revenue limits of Gokak Taluk, District Belagavi, Karnataka State. **SSL** is operating a Sugar Plant of sugar cane crushing capacity of 10000 TCD along with cogeneration plant of 45 MW power & 60 KLD molasses based distillery. Based on the feasibility reports & availability of sugar cane in the area **SSL** has decided to upgrade the sugar cane crushing capacity from 10000 to 15000 TCD, Cogeneration of power from 45 MW to 80 MW. In view of the additional molasses availability in house after the expansion, **SSL** proposes to expand the manufacturing capacity of existing molasses based distillery from 60 KLD to 120 KLD to manufacture Rectified Spirit / Ethanol / Extra Neutral Alcohol at a project cost of **Rs. 266 Crores.** From the proposed spent wash incineration boilers, around 4 MW power generation is anticipated.

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SSL has the necessary permission from Government of Karnataka for lifting the water from River Ghataprabha.

The land requirement for the proposed expansion and distillery is 4.203 acres & shall be located within the vacant area of the existing premises.

The wastewater generation shall be in the form of process wastewater from sugar unit. Process wastewater from distillery shall be in the form of spent wash & spent lees. Non process wastewater (cooling purging, boiler blow down, DM plant regeneration) is / shall be generated from sugar, cogeneration & distillery plants.

The summary of the proposed plants is given in **Table 2.1**.

2.1.2. PROJECT PROPONENT:

- **Shri Satish L. Jarakiholi, Chairman & Managing Director**

M/s Satish Sugars Ltd. is being promoted by active social leader Shri Satish Laxmanrao Jarakiholi, who has experience of setting up educational institutions namely "Laxmi Educational Trust", "Nayak Student Federation". He is ex-director of The Ghataprabha Sahakari Sakkare Karkhane Niyamit, Gokak. Having a good experience of running the institutions, presently he is the Chairman & Managing Director of M/s Satish Sugars Limited.

Present Board of Directors of the company is as follows:

- Shri. Satish Jarakiholi (Chairman & Managing Director)
- Smt. S. S. Jarakiholi (Executive Director)
- Shri. V.R. Parasannavar (Executive Director)
- Shri. P.M. Indi (Director)

Under the overall supervision and guidance of Shri Satish Jarakiholi, the factory management team has already carried out several activities in the command area, including cane development etc.

Proposed expansion of sugar plant cane crushing capacity, cogeneration of power & distillery units will contribute much for the rural area development. After the proposed expansion, the standard of living of the entire area will be further enhanced.

It will also provide employment directly and indirectly for 235 and 1000 persons respectively.

After the establishment of the factory, Economy, Culture and Standard of living in the area will improve.

2.1.3 Company Details

Name	M/s Satish Sugars Limited,
Registered Office	"Hill Garden", Anna Road, Gokak. District Belagavi, Karnataka State.
Plant Location	Beerangaddi & Hunshyal P.G. villages falling under the revenue limits of Gokak Taluk, District Belagavi, Karnataka State.
Constitution	Public Limited Company
Business	Sugar manufacturing, power generation & distillery

1. Staff Quarters: The Company has provided bachelors quarters in the factory premises. These quarters are provided with free water, dish antenna for entertainment and electricity for their use. Telephone facilities are provided with a security facility.

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

3. The company has developed and is further developing greenery in the plant premises and lawns near the factory and residential premises. The lush greenery shall give a very pleasant look and soothing effect.

TABLE 2.1
SUGAR PLANT OF CAPACITY 15000 TCD & COGENERATION OF POWER 80 MW

Particulars	Quantity	Transportation	Storage
Sugar cane (MT/d)	15000	By tractors/ trucks / bullock carts	Cane Yard
Bagasse (MT/d) (100% thru' bagasse mode)	4000	By return bagasse carrier	Bagasse Storage yard
Bagasse (MT/d) (85% heat input thru' bagasse mode)	2677	-do-	-do-
Coal (MT/d) (15% heat input as an auxiliary fuel along with bagasse)	297	By Rail / trucks	Coal Storage yard
Coal (MT/d) (100% heat input thru' Coal)	1980	By Rail / trucks	-do-
Sulphur (MT per month)	160 to 240	By trucks	HDPE bags in sulphur store
Lime (MT per month)	700 to 800	By trucks	HDPE bags in Lime store
Caustic Soda flakes(MT/month)	13 to 18	By trucks	HDPE bags in store
Sodium Hydro Sulphite (MT/month)	1.3 to 1.35	By trucks	-do-
Bleaching powder (MT/month)	0.40 to 0.45	By trucks	-do-
Boiler chemicals like antiscalents etc. (kgs/month)	4.0 to 4.5	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)	54000	By trucks	Sugar godowns
Molasses (MT/month)	18000	Reused as raw material for distillery	Storage tanks
Bagasse (MT/month)	144000	Reused as fuel for boiler	Storage Yard
Press mud (MT/month)	18000	By tractors/ trucks	Storage Yard

RAW MATERIALS REQUIREMENT & PRODUCTS FOR PROPOSED EXPANSION OF DISTILLERY FROM 60 TO 120 KLD.

Raw materials	Quantity	Transportation	Storage
Basic Raw material			
Molasses	420 to 480T/d	Pipeline	Mild Steel tanks
Chemicals / Nutrients			
Sulphuric acid	0.24 T/d	Lorry tanker	S.S. tank
DAP	0.12 T/d	Lorry	50 kg bags
Urea	0.44 T/d	Lorry	50 kg bags
Antifoam HCL Caustic soda	0.12 T/d 0.44 T/d 0.44 T/d	Lorry Tanker Lorry	50 kg drum Acid proof MS tank 50 kg bags
Yeast culture / Enzyme	0.22 T/d	Lorry	10 kg drum
Coal as fuel for Incinerator Boiler*	106.0 T/d	By Dumpers	Storage yard
Bagasse as fuel for Incinerator Boiler	180.0 T/d	By Dumpers	Storage yard
Products / By-product			
Ethanol (RS/ENA/AA)	120 KL/d	Lorry tanker	M.S. tanks
Yeast sludge	12T/d	Tractor/Lorry	Bulk

* Note: Coal shall be used during the non availability of Bagasse.

4. The company has financially contributed to various social organizations who conduct mass marriages, etc. Contributions are also made to various temples and special organizations for assisting the social activities of the public in nearby villages. The Company has also donated liberally for assisting the educational institutions, by contributing towards construction cost of school buildings. SSL is conducting every year a program called 'Satish Sugar Awards'. This program is aimed at bringing out the talent of rural children. SSL conducts National Body Building Championship to promote awareness of health among the rural youth.

To achieve "Zero Discharge" of effluent as per CREP norms, SSL shall treat and utilize all the effluent resulting from the proposed expansion of the sugar & cogeneration plant 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 expansion of sugar unit, which is sufficient to run the enhanced capacity of the cogeneration unit.

Based on the availability of excess molasses from sugar unit expansion & to exploit more benefit from the industrial complex, the management of the factory has decided to expand the molasses based distillery from 60 KLD to 120 KLD distillery based on Continuous fermentation and MPR distillation to produce industrial, potable Rectified Spirit and Potable Extra Neutral Alcohol.

All the spentwash generated from the proposed expansion of the distillery shall be incinerated.

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

2.2 BRIEF DESCRIPTION OF NATURE OF THE PROJECT

M/s Satish Sugars Limited (SSL, The company) has an existing area of **159.30 Acres** (64.498 Hectares) in Survey Nos. 366, 367, 368, 369, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 385, 389, 390 & 391 & parts there of Beerangaddi Village and 85, 86/1+3/A, 86/1+3/B, 86/1+3/K, 86/2+4/A, 86/2+4/B, 86/2+4/K, 86/2+4/D, 88/1/ABK/2AB, 90/1A, 90/1B, 90/1K, 90/2A, 90/2B, 90/3, 90/4A, 90/4B, 90/4K, 98/1A, 98/1B, 98/1K, 98/2+3A, 98/2+3B, 98/4, 99/1, 99/2, 99/3, 99/4, 100/2, 100/3, 100/4, 101/1+2+3A, 101/4A, 101/4B, 101/5, 102/3+4A, 102/4B, 102/4K+5,104,109,119,120/1 & parts there of Hunshyal PG Village falling under the revenue limits of Gokak Taluk, District Belagavi, Karnataka State. **SSL** is operating a Sugar Plant of sugar cane crushing capacity of 10000 TCD along with cogeneration plant of 45 MW power & 60 KLD molasses based distillery. Based on the feasibility reports & availability of sugar cane in the area **SSL** has decided to upgrade the sugar cane crushing capacity from 10000 to 15000 TCD, Cogeneration of power from 45 MW to 80 MW. In view of the additional molasses availability in house after the expansion, **SSL** proposes to expand the manufacturing capacity of existing molasses based distillery from 60 KLD to 120 KLD to manufacture Rectified Spirit / Ethanol / Extra Neutral Alcohol at a project cost of **Rs. 266 Crores.** From the proposed spent wash incineration boilers, around 4 MW power generation is anticipated.

The proposed expansion of all the units shall be located within the vacant area of the existing premises.

2.3 NEED FOR THE PROJECT AND ITS IMPORTANCE TO THE COUNTRY AND 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 and Egypt.

Brazil and 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 and 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 Kgs per annum and 23 Kgs 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 Kgs 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 European Union. 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 3500 TCD to higher capacities 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 Cogeneration 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 Power Transmission Corporation Limited (KPTCL), the transmission loss, which is about 62 % in some states, is reduced to 25%. In spite of that there is a 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.

Cogeneration 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 Co-Generation Indian sugar Industry can be benefited and the revenue per ton of 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.

Co-Generation 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 Co-generation concept – dual use of energy in Steam, for their own captive use. But the term “Co-generation” 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.

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 Co-generation has the following advantages.

- The bagasse based Co-generation is eco-friendly as pollutants are negligible.
- Bagasse based Co-Generation 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 Co-generation plants are indigenously available.
- The setting up of the Co-generation 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 Co-Generation provides employment to rural folk.
- The Co-generation 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. Cane 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. The bagasse is being used as the fuel for the boilers in the sugar mills.

Calorific Value of the Bagasse depends upon the moisture content in bagasse. It is about 2272 to 3000 kcal per kg of bagasse.

With the selling of surplus power made possible, high pressure energy efficient boilers and energy efficient turbines are installed. More power per ton of cane is produced.

Surplus power shall be exported. Conventional Sugar Mills generate about 35 KWHr power per ton of cane and consume the entire generated power. Whereas the bagasse based Co-generation sugar mills generate about 130 to 140 KWHr power, consume about 35 KWHr and export about 105 KWHr power per ton of 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, there are other added advantages, like reduction in the transportation of fuel and 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, SSL proposes to increase the sugar plant cane crushing capacity from 10000 TCD to 15000 TCD, increase the power generating capacity of the cogeneration plant from 45 MW to 80 MW from which sugar production is estimated to be about 0.324 Million Tons Per Annum (MTPA) (based on 180 days operation in a year) & the power production shall be 518.4 Million Units (based on 270 days operation in a year).

2.5 NEED FOR EXPANSION OF EXISTING CAPACITY OF DISTILLERY

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 the world 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, 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 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 lakhs cases annually, has witnessed robust 30% growth over the past few years.(Source: FICCI Food & Beverages Survey).

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:

Changing perception of alcohol: 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 approximately 110 million tons. The prices are in the range of US$ 100 to 105 per barrel and the expenditure on crude purchase is in the range of Rs.800 to1200 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.

With an aim to bring together all the information required to promote the production of ethanol (Ethanol Plant Machinery, Project Finance, Government schemes, Approvals, Fuel Ethanol Plants commissioned, Ethanol Distillation, Fermentation, Molecular Sieve Technology) the machinery companies are providing all the information to ethanol producers on a single platform. 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 of 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 the 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 replenishable 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, considered ethanol as an alternative transport fuel.

In the past, the Government of India has taken a number of initiatives 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). During the period of 1993 to 95, trials 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 five states of Andhra Pradesh, Maharashtra, Punjab, Uttar Pradesh and Goa, 5% of ethanol blended petrol has already been started. Union territories like Dadra Nagar Haveli, Daman & Diu and Pondicherry are also covered. The entire country will be covered in 2nd phase and ethanol content to be increased to 10% in 3rd 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, the large scale substitution of petroleum derived fuel for automobiles. Alcohol powered vehicles have taken the first position in Brazil and now account for 80% of overall sales (about 500000 alcohol powered units) every year.

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 and 90 million tons respectively, which means huge demand for a large quantity of ethanol to produce the blend. This will help in the expansion of the ethanol industry. Moreover ethanol use in the transport sector has both forward and backward linkages viz. 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 the backward linkage.

The contribution of gasoline engine powered two and three wheelers to vehicular pollution in India are of high concern. This category of vehicles comprises more than three fourth (42 million) of the total vehicle population (53.1 million) & contributes over 70% of the total hydrocarbon monoxide (CO) emission. Since ethanol use reduced CO and HC emissions, the two and three wheeler segment, including other passenger and 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 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 and 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 and implemented so that rich benefits on all fronts viz. environmental, economic and social are reaped.

The situation demands urgent measures, which will reduce oil pool deficit and keep the 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 and affects consumers. The long-term option, requiring a more viable strategy would be to identify indigenous and 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 viz. 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 become 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 expansion of distillery by of M/s Satish Sugars Limited, will contribute to fulfil the demand for Rectified Spirit, ENA and fuel ethanol of Karnataka and neighbouring states.

2.6 IMPORTS VS. INDIGENOUS PRODUCTION.

Of the world 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 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 cane 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 drinks 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 to 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 300 people shall be employed during construction. SSL shall employ 235 persons during operational phase for the proposed expansion.

CHAPTER - 3 PROJECT DESCRIPTION

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

M/s Satish Sugars Limited (SSL) is operating a Sugar Plant of sugar cane crushing capacity of 10000 TCD with cogeneration plant of 45 MW & a 60 KLD molasses based distillery at Beerangaddi & Hunshyal P.G. villages, Sangankeri Yadwad Road, Gokak Taluk, Belagavi District, Karnataka State. Based on the feasibility reports & availability of sugar cane SSL has decided to upgrade the sugar cane crushing capacity from 10000 TCD to 15000 TCD, Cogeneration of power from 45 MW to 80 MW. In view of the additional molasses availability in house after the expansion, **SSL** proposes to expand the manufacturing capacity of molasses based distillery from 60 KLD to 120 KLD to manufacture Rectified Spirit / Ethanol / Extra Neutral Alcohol.

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

The factory site is located in Beerangaddi & Hunshyal P.G. villages, Sangankeri Yadwad Road, Gokak Taluk, Belagavi District, Karnataka State with at an average elevation of 574.612 m to 574.994 above MSL**. Fig – 3.1** shows the location map of the project site. The site falls between 74^0 53' 12" and 74^0 53' 55" East longitudes and $16^0$14'24" & $16^0$14'58" North latitude. Part of the study area falls within the Survey of India Toposheet No. E43U16 (Scale: 1:50000).

The study area of 10 Kms radius is covered under Survey of India Toposheet nos. E43U15 & E43U16 [1:50000 scale]. Combination of toposheets showing 10 Kms radius study area is attached **as Figure 3.2** with this document. Key map is attached as **Figure 3.3.** Site plan showing project boundary, project site layout is attached as **Figure 3.4.**

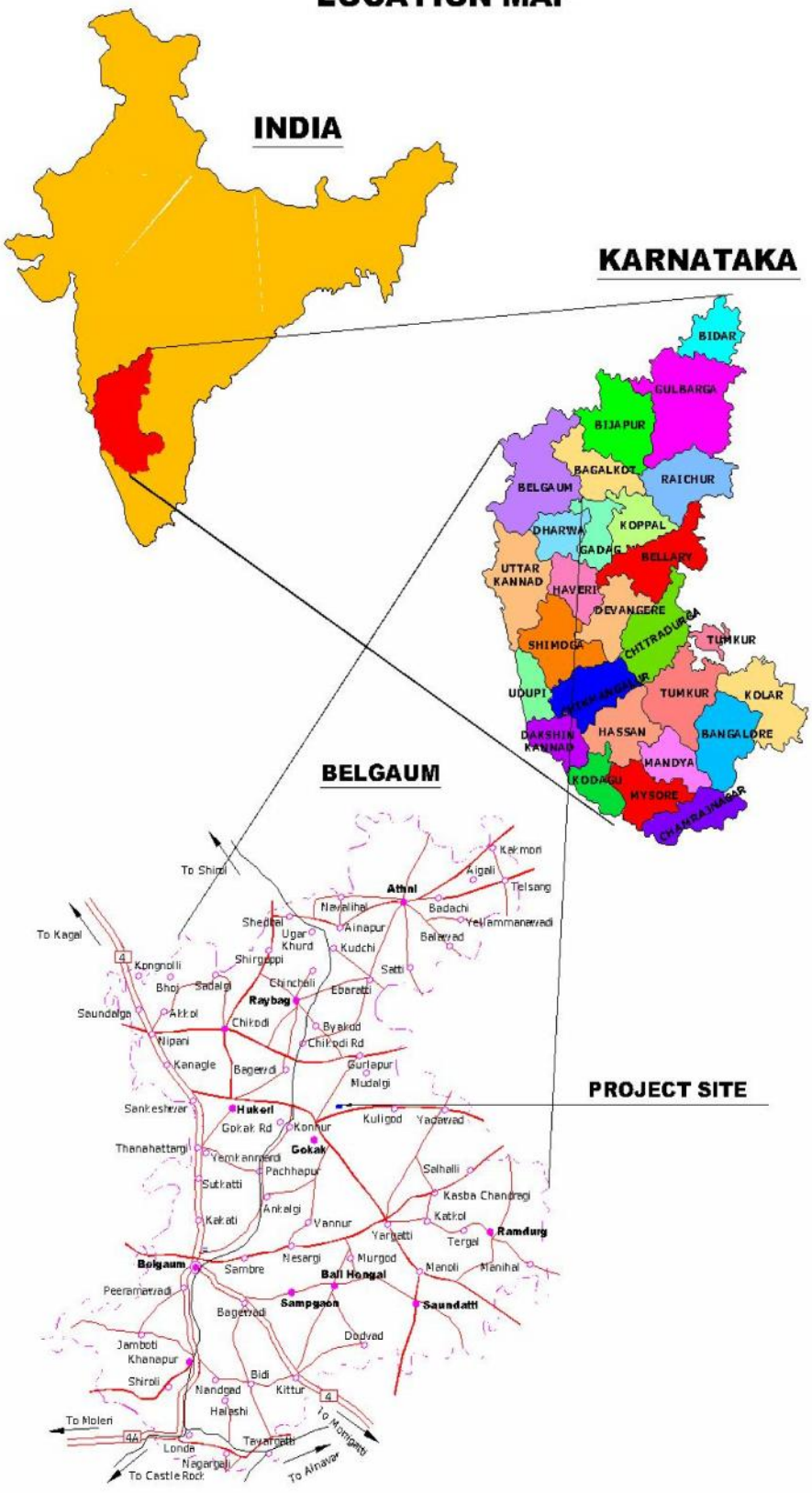
The factory site is connected by broad gauge railway line of South Western railway on Hubli-Miraj section. Nearest railway line connecting Hubli to Miraj of South Western Railway line is located at a distance of 13 kms in W direction from the site. The nearest railway station is Ghataprabha which is at 13 kms in W direction from the factory site. Belagavi is the district place & has a major railway station which is at a distance of 72 kms in SW direction to the project site.

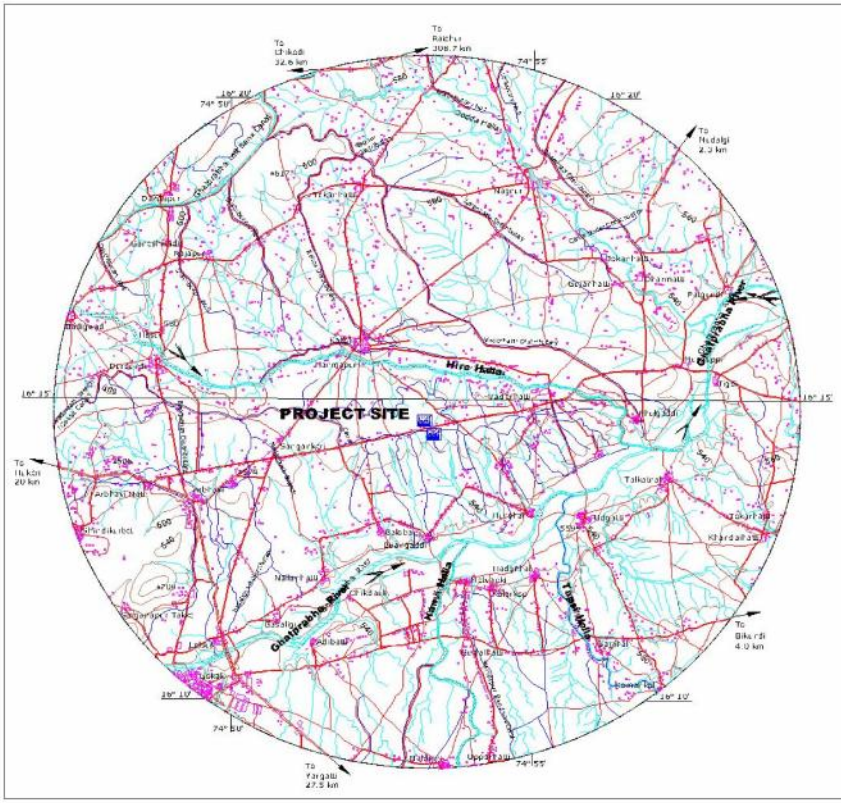
River Ghataprabha is the major river, experiencing perennial flow is flowing from W to E with respect to the factory site and is at a distance of 3.45 kms in south direction to the project site. Hire Halla is at a distance of 5.5 kms in East direction to the project site. Gokak Canal is at a distance of 12.10 Kms in W direction to the project site. There are other small distributory canals within a radius of 500m to 5 Kms.

Nearest Settlements from the project site:

- Nagnur village – 7.65 kms N
- Vaderhatti village – 2 kms NE
- Phulgaddi village – 6 kms E
- Hunshyal village - 3.75 kms SE
- Beerangaddi village – 3.25 kms S
- Balobal village – 3.35 kms SW
- Sangankeri village – 4.5 kms W
- Kalloli village – 2.75 Kms NW
- Tigadi village - 4.75 kms NE

FIG - 3.1
LOCATION MAP





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LEGEND

- ROADS
- CONTOURS
- STREAMS / TANKS
- RIVER
- CANAL
- SETTLEMENTS
- △574 SPOT HEIGHT
- PROJECT SITE

Index to Survey of India Toposheets

SCALE

0 3 6km

Figure 3.2

PROJECT :

M/s.SATISH SUGARS LIMITED

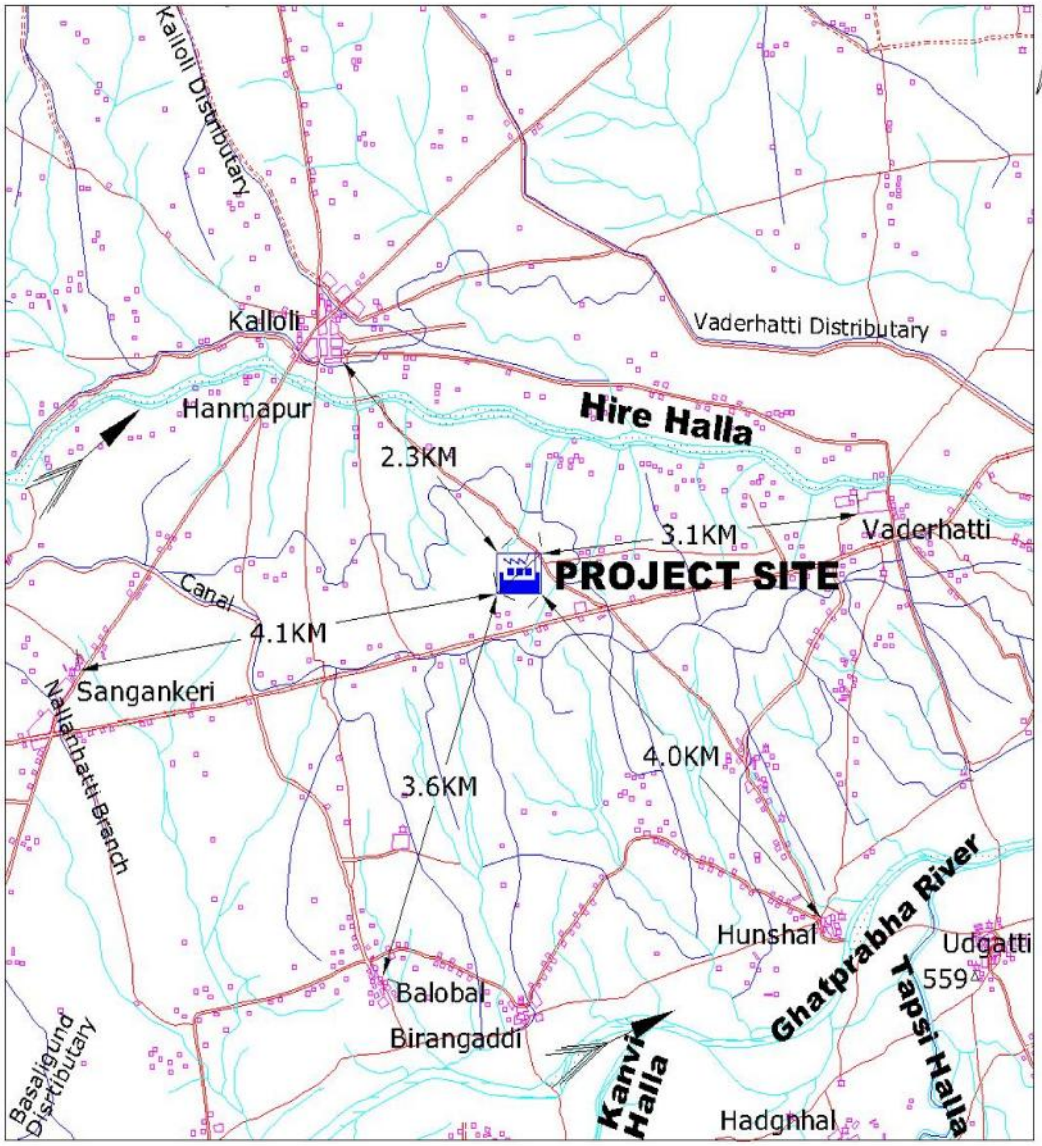
Near Kalloli Village, Gokak Taluk, Belgaum District, Karnataka

TITLE :

TOPOGRAPHICAL MAP SHOWING 10 KM RADIUS

PREPARED BY

B.S.ENVI-TECH (P) LTD., HYDERABAD



SCALE

0 1 2km

LEGEND

- ROADS
- STREAMS / TANKS
- RIVER
- CANAL
- SETTLEMENTS
- PROJECT SITE

FIG - 3.3

PROJECT :

M/s. SATISH SUGARS LIMITED

Near Kalloli Village, Gokak Taluk, Belgaum District, Karnataka

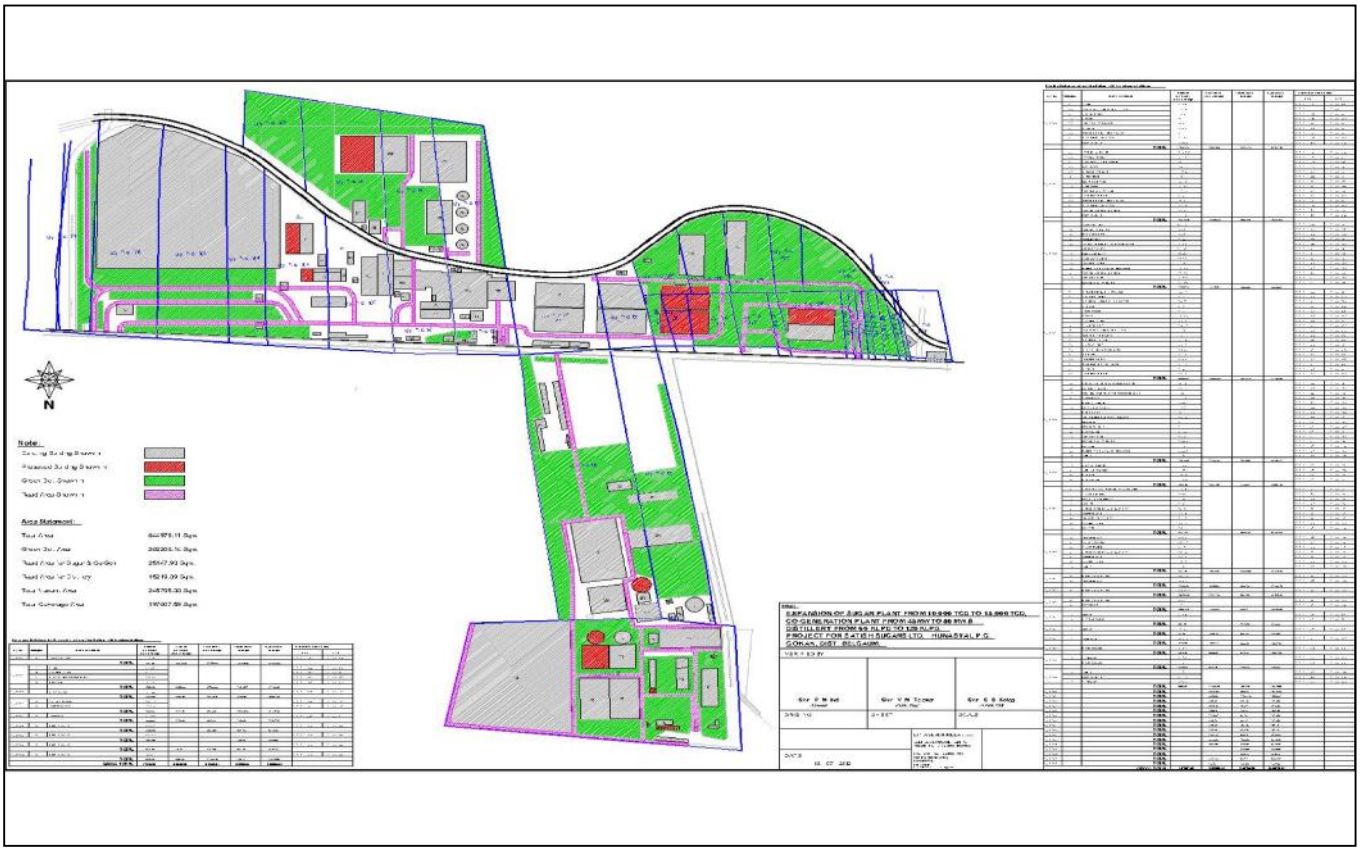
TITLE :

KEYMAP

PREPARED BY

B.S.ENVI-TECH (P) LTD.,
HYDERABAD

Figure 3.4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Note:
Area Statement:
EXPANSION OF SUGAR PLANT FROM 10,000 TCD TO 12,500 TCD,
CO-GENERATION PLANT FROM 64 MW TO 80 MW &
DISTILLERY FROM 90 KLPD TO 120 KLPD.
PROJECT FOR SATISH SUGARS LTD. HUNASYAL P.B.
GOKAK, DIST. BELGAUM.

- Musguppi village – 4.95 kms NE
- Udagatti village – 5.25kms SE
- Durdundi village – 5.25 kms NW
- Nallanhatti village – 5.5 kms SW
- Dharmatti village – 6.75 kms NE
- Arabhavi village – 7.15 kms W
- Ghataprabha town panchayat – 13 kms W
- Gokak town – 10.25 kms SW

The area is well connected by road. State Highway (SH-44) connecting Sanganakeri to Yadwad is passing adjacent to the plant site. State Highway (SH-31) connecting Jamboti to Jath at a distance of 4.1 Kms in Western direction. National Highway (NH 4) connecting Bengaluru to Pune is at a distance of 40 Kms in Western direction

Belagavi is the district head quarters located at a distance of about 72 kms in SW from the project site.

The nearest airport Belagavi (Sambra) is at a distance of 72 Kms in SW direction.

Gokak Reserve forest (RF) is at a distance of 12 kms in South Western direction to the project site.

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

Key map showing the location of various features around the Plant is depicted in **Fig – 3.3.** Salient features of plant site are given in **Table – 3.1.**

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 & distillery plants shall come up in the existing premises of the company. The area of 10 kms radius around the existing premises 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 considering geological and topographical aspects.
g. Environmental aspects etc.

3.4 SIZE OR MAGNITUDE OF OPERATION.

M/s Satish Sugars Limited (SSL) is operating a Sugar Plant of sugar cane crushing capacity of 10000 TCD with cogeneration plant of 45 MW & a 60 KLD molasses based distillery at Beerangaddi & Hunshyal P.G. villages, Sangankeri Yadwad Road, Gokak Taluk, Belagavi District, Karnataka State. Based on the feasibility reports & availability of sugar cane SSL has decided to upgrade the sugar cane crushing capacity from 10000 TCD to 15000 TCD, Cogeneration of power from 45 MW to 80 MW. In view of the additional molasses availability in house after the expansion, **SSL** proposes to expand the manufacturing capacity of molasses based distillery from 60 KLD to 120 KLD to manufacture Rectified Spirit / Ethanol / Extra Neutral Alcohol.

TABLE 3.1 SALIENT FEATURES OF THE PROJECT SITE

Features	**PROJECT SITE**
Altitude	574.612 m to 574.994 above MSL
Longitude	At 74^0 53' 12" and 74^0 53' 55" East
Latitude	At $16^0$14'24" & $16^0$14'58" North
Village, Taluk, District, State	Beerangaddi & Hunshyal P.G. villages, Gokak Taluk, Belagavi District, Karnataka
Max. Temp. (^{0}C)	40.0
Min. Temp. (^{0}C)	7.7
Relative Humidity %	26 to 91
Annual rainfall mm	525 mm
Land availability	159.30 Acres (64.498 Hectares)
Topography	Plain
Soil Type	Predominantly clayey
Nearest Water bodies	River Ghataprabha - 3.45 kms in S direction Hire Halla - 5.5 kms in East direction Gokak Canal - 12.10 Kms in W direction Small Distributory Canals in the surroundings of 500m to 5 Kms
Nearest Highway	Bengaluru to Pune 40 km - W
Nearest Railway station	Ghataprabha – 13 kms W
Nearest Villages	Nagnur village – 7.65 kms N Vaderhatti village – 2 kms NE Phulgaddi village – 6 kms E Hunshyal village - 3.75 kms SE Beerangaddi village – 3.25 kms S Balobal village – 3.35 kms SW Sangankeri village – 4.5 kms W Kalloli village – 2.75 Kms NW Tigadi village - 4.75 kms NE Musguppi village – 4.95 kms NE Udagatti village – 5.25kms SE Durdundi village – 5.25 kms NW Nallanhatti village – 5.5 kms SW Dharmatti village – 6.75 kms NE Arabhavi village – 7.15 kms W
District Place	Belagavi – 72 kms - SW
Nearest Air ports	Belagavi airport – 72 kms – SW
Nearest reserve Forest	Gokak Reserve forest (RF) - 12 kms SW
Historical places, Monuments, Heritage sites, wild life sanctuaries, national parks, elephant / tiger reserves, Eco Sensitive zones	None within 10 km Radius

*All distances mentioned in the above table are aerial distances

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. SSL has adopted double sulphitation manufacturing process for production of sugar. For the expansion the same process shall be adopted. 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 as Figure 3.5.

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 to 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 15000 TCD plant shall be 54000 MT per month at 12% recovery on cane.

3.5.2 COGENERATION PLANT - POWER PLANT

SSL is currently operating boilers of 90 TPH (01 No.) & 130 TPH (01 No.) capacity. **SSL** shall implement the expansion of cogeneration power plant keeping in view of availability of additional bagasse from the expansion of sugar plant.

The expansion of cogeneration plant shall mainly comprise of the following configuration:

a. Bagasse / biomass (85% or 100% heat input) & Coal (15% or 100% heat input) fired steam boilers of 100 TPH (02 Nos.)
b. Turbine generator – 35 MW (20 MW - 01 No. & 15 MW - 01 No.)

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.

3.5.3.1. PROCESS DESCRIPTION – 120 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 is detailed below:

Dilution

Molasses available from sugar mill (Satish Sugars Limited) contains solid content between 76 to 90 % and sugar content varies between 45 and 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.

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.

Fermentation:

Fermentation in the fermentation tank continues for about 20 to 24 hours after the final inoculum is added to it. The basic reaction in the fermentation process is

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

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. 3.5 PROCESS FLOW CHART FOR SUGAR & COGENERATION

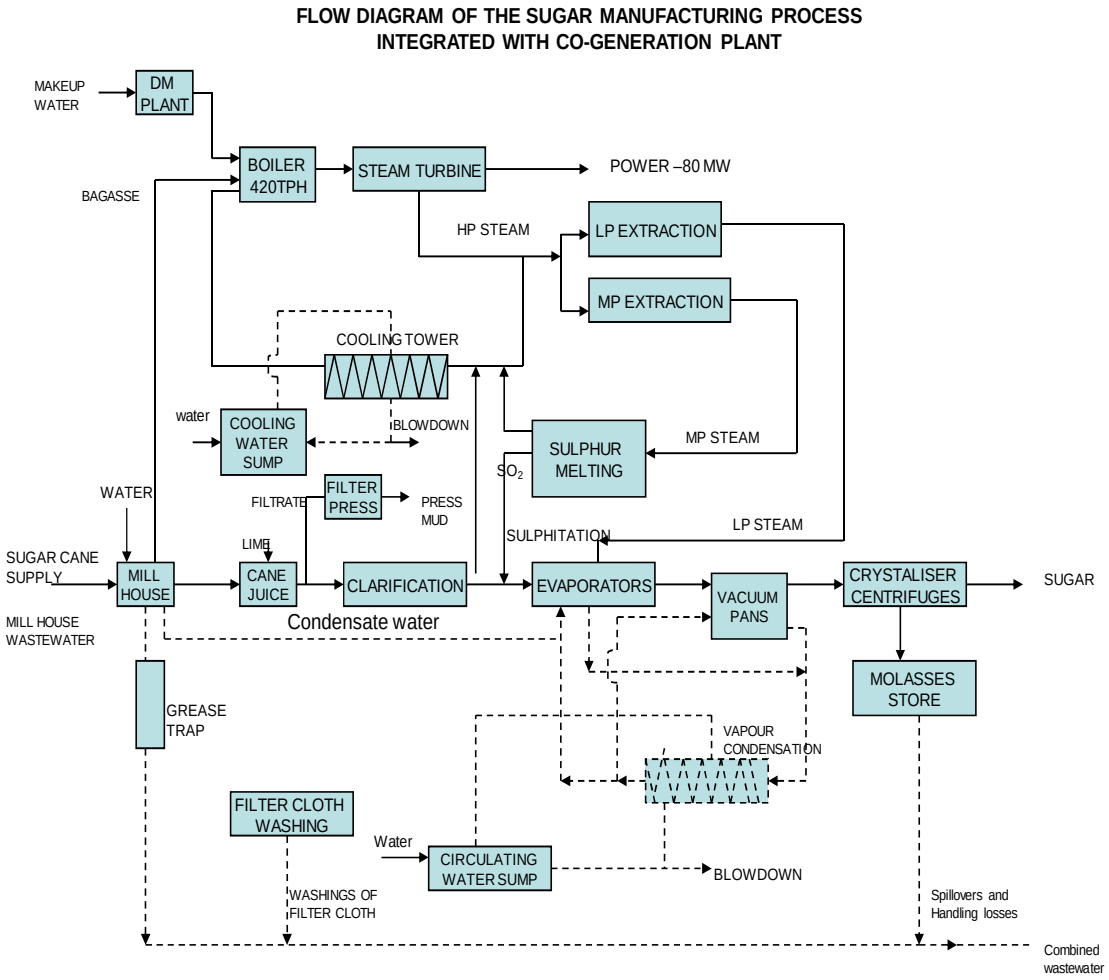
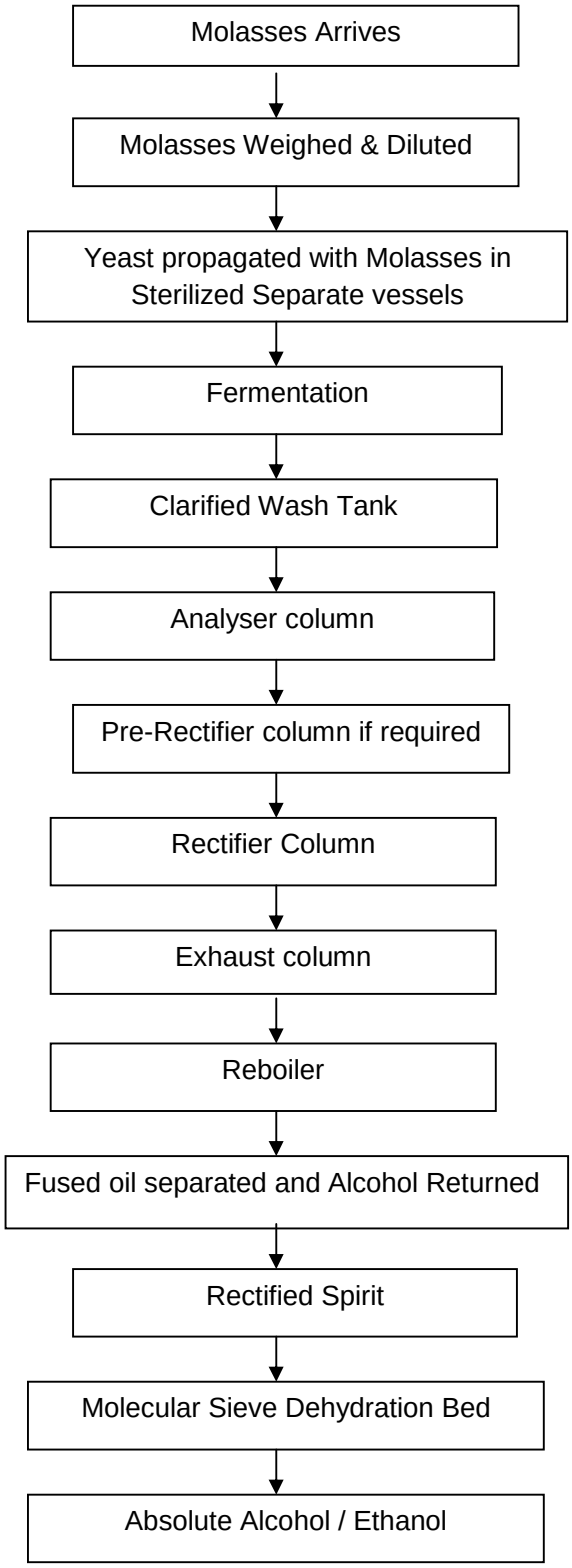


FIG. 3.6 PROCESS FLOW CHART FOR DISTILLERY MOLASSES BASED



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.

SUGAR PLANT OF CAPACITY 15000 TCD & COGENERATION OF POWER 80 MW

Particulars	Quantity	Transportation	Storage
Sugar cane (MT/d)	15000	By tractors/ trucks / bullock carts	Cane Yard
Bagasse (MT/d) (100% thru' bagasse mode)	4000	By return bagasse carrier	Bagasse Storage yard
Bagasse (MT/d) (85% heat input thru' bagasse mode)	2677	-do-	-do-
Coal (MT/d) (15% heat input as an auxiliary fuel along with bagasse)	297	By Rail / trucks	Coal Storage yard
Coal (MT/d) (100% heat input thru' Coal)	1980	By Rail / trucks	-do-
Sulphur (MT per month)	160 to 240	By trucks	HDPE bags in sulphur store
Lime (MT per month)	700 to 800	By trucks	HDPE bags in Lime store
Caustic Soda flakes(MT/month)	13 to 18	By trucks	HDPE bags in store
Sodium Hydro Sulphite (MT/month)	1.3 to 1.35	By trucks	-do-
Bleaching powder (MT/month)	0.40 to 0.45	By trucks	-do-
Boiler chemicals like antiscalents etc. (kgs/month)	4.0 to 4.5	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)	54000	By trucks	Sugar godowns
Molasses (MT/month)	18000	Reused as raw material for distillery	Storage tanks
Bagasse (MT/month)	144000	Reused as fuel for boiler	Storage Yard
Press mud (MT/month)	18000	By tractors/ trucks	Storage Yard

RAW MATERIALS REQUIREMENT & PRODUCTS FOR PROPOSED EXPANSION OF DISTILLERY FROM 60 TO 120 KLD

Raw materials	Quantity	Transportation	Storage
Basic Raw material			
Molasses	420 to 480T/d	Pipeline	Mild Steel tanks
Chemicals / Nutrients			
Sulphuric acid	0.24 T/d	Lorry tanker	S.S. tank
DAP	0.12 T/d	Lorry	50 kg bags
Urea	0.44 T/d	Lorry	50 kg bags
Antifoam	0.12 T/d	Lorry	50 kg drum
HCL	0.44 T/d	Tanker	Acid proof MS tank
Caustic soda	0.44 T/d	Lorry	50 kg bags
Yeast culture / Enzyme	0.22 T/d	Lorry	10 kg drum
Coal as fuel for Incinerator Boiler*	106.0 T/d	By Dumpers	Storage yard
Bagasse as fuel for Incinerator Boiler	180.0 T/d	By Dumpers	Storage yard
Products / By-product			
Ethanol (RS/ENA/AA)	120 KL/d	Lorry tanker	M.S. tanks
Yeast sludge	12T/d	Tractor/Lorry	Bulk

* Note: Coal shall be used during the non availability of Bagasse.

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

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

a. The expansion project of all the plants shall be situated in the existing premises 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 existing water consumption in the sugar plant including power generation is 7927m^3/day. Of this total water requirement of 7927 m^3/day, about 7000m^3/day is being met from the cane juice of sugar plant and the balance requirement of 927m^3/day is drawn from River Ghataprabha.

After the proposed expansion, water consumption in the sugar plant including power generation shall be 11976m^3/day. Of this total water requirement of 11976 m^3/day, about 10500 m^3/day shall be met from the cane juice of sugar plant and the balance requirement of 1476m^3/day shall be drawn from River Ghataprabha.

The existing water consumption in the distillery is 1077m^3/day. Of this total water requirement of 1077 m^3/day, about 94m^3/day is being met from the treated spentlees and the balance requirement of 983m^3/day is drawn from River Ghataprabha.

After the proposed expansion, water consumption in the distillery shall be 2154 m^3/day. Of this total water requirement of 2154 m^3/day, about 188 m^3/day shall be met from the treated spentlees and the balance requirement of 1966m^3/day shall be drawn from River Ghataprabha.

SSL has the necessary permission for lifting the water from River Ghataprabha.

The proposed power requirement of the sugar & cogeneration plant after expansion shall be 20 MW. This requirement shall be met from the cogeneration plant and around 60 MW shall be exported to the grid during season.

The power requirement of the distillery plant after expansion shall be 2 MW. This requirement shall be met by generating 4 MW power from the proposed incineration boilers of 20 TPH capacity (02 Nos.).

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

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

WASTEWATER GENERATION (m^3/day)

Sl. No.	UNIT	Quantity		Segregation
		Existing	After Expansion	
A	**SUGAR PLANT**			
1	Sugar Manufacturing Process & Washings	1000	1500	Process Wastewater
B	**COGENERATION PLANT**			
1	Cooling tower blow down	208	282	Non Process Wastewater
2	Boiler blow down	53	101	
3	DM Plant – drain	261	562	
E	**DOMESTIC WASTEWATER**	50	58	Septic Tank & Soak Pit
TOTAL WASTEWATER		**1572**	**2503**	

EFFLUENT FROM SUGAR & COGENERATION UNITS:

The wastewater from the existing plant (1000 m^3/d) is being treated in an elaborate ETP (Capacity 1000 m^3/d) consisting of the following treatment units.

a. Screen cum grit removal
b. Oil and Grease Removal
c. Neutralisation tank
d. Lime preparation tank
e. Monthly wash tank
f. Upflow Anaerobic Sludge Blanket Reactor
g. Extended Aeration tank followed by secondary clarifier
h. Sludge Pit
i. Sludge Drying Beds
j. Dilution with other wastewater streams in Polishing pond.

After expansion the quantity of process effluent from the sugar unit shall increase to 1500 m^3/d. The additional process effluent of 500 m^3/d shall be treated in an elaborate proposed ETP (Capacity 500 m^3/d) based on the activated sludge process.

Non process wastewater streams (522m^3/day) except for domestic wastewater are being neutralized & routed to polishing pond for dilution with each other. The final quality of the wastewater at the outlet of the polishing pond is meeting GSR 422 (E) on land discharge standards. This wastewater along with the treated sugar plant wastewater totalling to 1522 m^3/day is being utilized for on land irrigation & ash quenching within the premises.

After expansion, the quantity of non process wastewater streams shall increase to 945m^3/day. These streams shall be neutralized & routed to polishing pond for dilution with each other. The final quality of the wastewater at the outlet of the polishing pond shall meet GSR 422 (E) on land discharge standards.

After expansion, non process wastewater along with the treated sugar plant wastewater totalling to 2445m^3/day shall be utilized for on land irrigation & ash quenching within the premises. The project is based on zero discharge.

3.9.2 Quantity of wastewater generation From Proposed Expansion of Distillery

WASTEWATER GENERATION (m^3/day)

Sl. No.	UNIT	Quantity		DISPOSAL
		Existing for 60 KLD	Proposed for 120 KLD	
A	**DISTILLERY**			
1	Spentwash	480	960	Process Wastewater
2	Spentlees	126	252	Low strength Wastewater
B	**UTILITIES**			
1	Cooling tower blow down DM Plant regeneration	33	66	Non Process Wastewater
TOTAL WASTEWATER		**639**	**1278**	

3.9.2.1 PROCESS WASTEWATER - SPENT WASH

EFFLUENT FROM DISTILLERY
SSL has adopted the following method for treatment of spent wash:

The industry is currently subjecting the process effluents from distillery for bio composting along with press mud & boiler ash. The area of the compost yard is 18 acres including storage area. Compost yard provided is as per the MOEF / CPCB guidelines. **SSL** has provided necessary storage facilities for the storage of spent wash generated over a period of 30 days.

SSL shall create additional storage facilities for the storage of spent wash generated over a period of 05 days from the proposed expansion.

SSL shall adopt concentration followed by incineration for the treatment of spent wash ($480m^3$/d) generated from the proposed expansion.

3.9.2.2 PROCESS WASTEWATER - SPENT LEES

Around $126m^3$/day of spent lees shall be generated in the proposed expansion 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 ($94m^3$/day). Reject from RO ($32m^3$/day) shall be sent to sugar ETP for further treatment. The project is based on zero discharge.

3.9.2.3 NON PROCESS WASTWATER FROM DISTILLERY

Quantity of effluent of sober nature from the distillery (cooling purging, blow down) is around $33m^3$/d. These are neutralized and used for gardening within the premises.

After expansion, the quantity of non process wastewater streams from distillery is expected to increase to $66m^3$/day. All the above streams will be routed to guard pond for mixing. These streams shall be neutralized. 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 wastewater $50m^3$/day generated from the entire industrial complex is being subjected to treatment in Septic tank followed by soak pit.

After expansion, the quantity of domestic wastewater from the entire industrial complex is expected to increase to 58m^3/day. Additional Septic tank followed by soak pit shall be provided for the incremental quantity of 8m^3/day.

3.9.3 EFFLUENT STORAGE FACILITIES

The effluent storage facilities for the proposed expansion 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 from sugar & cogeneration units during the season & their disposal is shown below in the table

SOURCES	**NAME**	**QUANTITY IN TPD**		Mode of disposal
CANE CRUSHING SEASON		**Existing**	**After Expansion**	
Mill House	Bagasse	3200	4800	Used / Shall be used as boiler fuel
Process House	Press Mud	400	600	Subjected to bio composting along with spent wash. Excess press mud resulting from expansion shall be given to member farmers.
	Molasses	400	600	Shall be used as raw material for distillery
Boiler House Cogen Plant	Ash	24	45.8	Subjected to bio composting along with spent wash. Excess boiler ash resulting from expansion shall be given to member farmers.
Effluent treatment Plant	Sludge	2.0	3.0	Used as manure within premises & the same shall be continued

The hazardous waste generation shall be in the form of used oil from the DG sets & compressors. Used oil from DG sets & compressors shall be used as lubricant within premises / if in excess shall be sold to authorized recyclers.

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

Solid Wastes	Quantity Tons per day		Mode of disposal
	Existing	Proposed	
Yeast Sludge	6.00	12.00	Being dried / Shall be dried & sold as Cattle feed.
Bottom ash from existing boiler / proposed incineration boiler	0.33	5.60	Being sold / shall be sold to brick manufacturers / cement plants
Fly ash from existing boiler / proposed incineration boiler	1.21	57.10	Being given / Shall be given to farmers.

3.10 AIR POLLUTION CONTROL MEASURES

CONSTRUCTION PHASE

The construction activities in the proposed expansion of all the 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 boilers fired with Bagasse& coal.

The proposed boilers of 100 TPH (02 Nos.) shall be provided with Electro Static Precipitators which shall be designed to meet an outlet concentration of less than 150 mg/Nm^3. Adequate stacks above ground level are proposed for the boilers as per the CPCB norms.

The standby DG sets shall be provided with adequate stack 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 boilers.

The proposed incineration boilers of 20 TPH (02 Nos.) shall be provided with Cyclone dust collectors which are designed to meet an outlet concentration of less than 150 mg/Nm^3. Adequate stack/s above ground level is/ are proposed for the incineration boilers 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 3.4.**

The factory site is located in Beerangaddi & Hunshyal P.G. villages, Sangankeri Yadwad Road, Gokak Taluk, Belagavi District, Karnataka State with at an average elevation of 574.612 m to 574.994 above MSL**. Fig – 3.1** shows the location map of the project site. The site falls between 74^0 53' 12" and 74^0 53' 55" East longitudes and $16^0$14'24" & $16^0$14'58" North latitude. Part of the study area falls within the Survey of India Toposheet No. E43U16 (Scale: 1:50000).

The study area of 10 Kms radius is covered under Survey of India Toposheet nos. E43U15 & E43U16 [1:50000 scale]. Combination of toposheets showing 10 Kms radius study area is attached **as Figure 3.2** with this document. Key map is attached as **Figure 3.3.** Site plan showing project boundary, project site layout is attached as **Figure 3.4.**

The factory site is connected by broad gauge railway line of South Western railway on Hubli-Miraj section. Nearest railway line connecting Hubli to Miraj of South Western Railway line is located at a distance of 13 kms in W direction from the site. The nearest railway station is Ghataprabha which is at 13 kms in W direction from the factory site. Belagavi is the district place & has a major railway station which is at a distance of 72 kms in SW direction to the project site.

River Ghataprabha is the major river, experiencing perennial flow is flowing from W to E with respect to the factory site and is at a distance of 3.45 kms in south direction to the project site. Hire Halla is at a distance of 5.5 kms in East direction to the project site. Gokak Canal is at a distance of 12.10 Kms in W direction to the project site. Other small distributory canals are existing within a distance of 500m to 5 Kms.

Nearest Settlements from the project site:

- Nagnur village – 7.65 kms N
- Vaderhatti village – 2 kms NE
- Phulgaddi village – 6 kms E
- Hunshyal village - 3.75 kms SE
- Beerangaddi village – 3.25 kms S
- Balobal village – 3.35 kms SW
- Sangankeri village – 4.5 kms W
- Kalloli village – 2.75 Kms NW
- Tigadi village - 4.75 kms NE
- Musguppi village – 4.95 kms NE
- Udagatti village – 5.25kms SE
- Durdundi village – 5.25 kms NW
- Nallanhatti village – 5.5 kms SW
- Dharmatti village – 6.75 kms NE
- Arabhavi village – 7.15 kms W
- Ghataprabha town panchayat – 13 kms W
- Gokak town – 10.25 kms SW

The area is well connected by road. State Highway (SH-44) connecting Sanganakeri to Yadwad is passing adjacent to the plant site. State Highway (SH-31) connecting Jamboti to Jath at a distance of 4.1 Kms in Western direction. National Highway (NH 4) connecting Bengaluru to Pune is at a distance of 40 Kms in Western direction.

Belagavi is the district head quarters located at a distance of about 72 kms in SW from the project site.

The nearest airport Belagavi (Sambra) is at a distance of 72 Kms in SW direction.

Gokak Reserve forest (RF) is at a distance of 12 kms in South Western direction to the project site.

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

CHAPTER – 4 SITE ANALYSIS

4.1 CONNECTIVITY

The factory site is located in Beerangaddi & Hunshyal P.G. villages, Sangankeri Yadwad Road, Gokak Taluk, Belagavi District, Karnataka State at an average elevation of 574.612 m to 574.994 above MSL**.**

The factory site is connected by broad gauge railway line of South Western railway on Hubli-Miraj section. Nearest railway line connecting Hubli to Miraj of South Western Railway line is located at a distance of 13 kms in W direction from the site. The nearest railway station is Ghataprabha which is at 13 kms in W direction from the factory site. Belagavi is the district place & has a major railway station which is at a distance of 72 kms in SW direction to the project site.

The area is well connected by road. State Highway (SH-44) connecting Sanganakeri to Yadwad is passing adjacent to the plant site. State Highway (SH-31) connecting Jamboti to Jath at a distance of 4.1 Kms in Western direction. National Highway (NH 4) connecting Bengaluru to Pune is at a distance of 40 Kms in Western direction.

Belagavi is the district head quarters located at a distance of about 72 kms in SW from the project site.

The nearest airport Belagavi (Sambra) is at a distance of 72 Kms in SW direction.

4.2 LAND FORM, LAND USE AND LAND OWNERSHIP

No additional land is required for the proposed expansion of sugar, cogeneration & distillery plants. **M/s Satish Sugars Limited (SSL, The company)** has an existing area of **159.30 Acres** (64.498 Hectares) in Survey Nos. 366, 367, 368, 369, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 385, 389, 390 & 391 & parts thereof, of Beerangaddi Village and 85, 86/1+3/A, 86/1+3/B, 86/1+3/K, 86/2+4/A, 86/2+4/B, 86/2+4/K, 86/2+4/D, 88/1/ABK/2AB, 90/1A, 90/1B, 90/1K, 90/2A, 90/2B, 90/3, 90/4A, 90/4B, 90/4K, 98/1A, 98/1B, 98/1K, 98/2+3A, 98/2+3B, 98/4, 99/1, 99/2, 99/3, 99/4, 100/2, 100/3, 100/4, 101/1+2+3A, 101/4A, 101/4B, 101/5, 102/3+4A, 102/4B, 102/4K+5,104,109,119,120/1 & parts thereof of Hunshyal PG Village falling under the revenue limits of Gokak Taluk, District Belagavi, Karnataka State. **SSL** is operating a Sugar Plant of sugar cane crushing capacity of 10000 TCD along with cogeneration plant of 45 MW power & 60KLD distillery. Based on the feasibility reports & availability of sugar cane in the area **SSL** has decided to upgrade the sugar cane crushing capacity from 10000 to 15000 TCD, Cogeneration of power from 45 MW to 80 MW. In view of the additional molasses availability in house after the expansion, **SSL** proposes to expand the manufacturing capacity of existing molasses based distillery from 60 KLD to 120 KLD to manufacture Rectified Spirit / Ethanol / Extra Neutral Alcohol in the existing premises.

The existing buildings of Sugar, Cogeneration & distillery units are spread over an area of **48.66 acres** (19.70 hectares). This includes the composting facilities of distillery, ETP for sugar & cogeneration units and utilities. Existing green belt area is being developed over an area of **49.90 acres** (20.22 hectares). An area of **9.97 acres** (4.036 hectares) is covered by roads & pavements. Vacant area available with the unit is **50.733 acres** (20.54 hectares).

Proposed up gradation of the sugar cane crushing capacity from 10000 to 15000 TCD, expansion of Cogeneration of power from 45 MW to 80 MW & expansion of molasses based

distillery from 60 KLD to 120 KLD shall be located in an area of **4.203 Acres** within the vacant area of the existing premises.

Additional area for green belt is not proposed. The balance area of **46.53 acres** shall be vacant land.

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

TABLE 4.1 LAND BREAK UP OF THE PROPOSED EXPANSION PROJECT

Sy. No.	Village	Area in Sqm	Description of Building	Proposed ground Coverage in Sq.m.	Existing coverage Area in (Sq.m.)	Greenbelt Area in (Sq.m.)	Vacant Area in (Sq.m.)
86	Hunshyal P.G.	**103295.97**	Molasses Tank	701.85			
			Total	**701.85**	**24742.23**	**29883.74**	**70236.15**
90	-do-	**91964.76**	Store	208.51			
			Cooling Tower	100.00			
			ETP Settling & Buffer Tank	1815.02			
			Digester	566.32			
			Total	**2689.83**	**53583.49**	**22643.33**	**13048.11**
99	-do-	**26507.38**	ETP section	3475.22			
			Total	**3475.22**	**2081.55**	**16770.00**	**4180.61**
101	-do-	**27720.95**	100 Ton Boilers	1217.49			
			Turbine House	415.45			
			Total	**1632.94**	**2719.51**	**2693.36**	**20675.14**
376	Beerangaddi	**10521.82**	Workshop	2085.13			
			Total	**2085.13**	**2154.63**	**4827.39**	**1454.67**
381	-do-	**6778.48**	Kirby Godown	2362.96			
			Total	**2362.96**		**3593.68**	**821.84**
382		**3338.65**	Kirby Godown	2573.05			
			Total	**2573.05**			**765.60**
384	-do-	**2751.94**	Kirby Godown	670.06			
			Total	**670.06**	**98.42**	**1391.65**	**591.81**
385		**13725.06**	Kirby Godown	828.24			
			Total	**828.24**	**666.45**	**11449.46**	**780.91**
		286605.01	**Gross Total**	**17019.28**	**86046.28**	**93252.61**	**90286.84**

4.3 TOPOGRAPHY (ALONG WITH MAP)

The plant layout is enclosed as Fig. 3.4.

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 & distillery plants. **M/s Satish Sugars Limited (SSL, The company)** has an existing area of **159.30 Acres** (64.498 Hectares) in Survey Nos. 366, 367, 368, 369, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 385, 389, 390 & 391 & parts thereof, of Beerangaddi Village

and 85, 86/1+3/A, 86/1+3/B, 86/1+3/K, 86/2+4/A, 86/2+4/B, 86/2+4/K, 86/2+4/D, 88/1/ABK/2AB, 90/1A, 90/1B, 90/1K, 90/2A, 90/2B, 90/3, 90/4A, 90/4B, 90/4K, 98/1A, 98/1B, 98/1K, 98/2+3A, 98/2+3B, 98/4, 99/1, 99/2, 99/3, 99/4, 100/2, 100/3, 100/4, 101/1+2+3A, 101/4A, 101/4B, 101/5, 102/3+4A, 102/4B, 102/4K+5,104,109,119,120/1 & parts thereof of Hunshyal PG Village falling under the revenue limits of Gokak Taluk, District Belagavi, Karnataka State. **SSL** is operating a Sugar Plant of sugar cane crushing capacity of 10000 TCD along with cogeneration plant of 45 MW power & 60KLD distillery. Based on the feasibility reports & availability of sugar cane in the area **SSL** has decided to upgrade the sugar cane crushing capacity from 10000 to 15000 TCD, Cogeneration of power from 45 MW to 80 MW. In view of the additional molasses availability in house after the expansion, **SSL** proposes to expand the manufacturing capacity of existing molasses based distillery from 60 KLD to 120 KLD to manufacture Rectified Spirit / Ethanol / Extra Neutral Alcohol in the existing premises.

The existing buildings of Sugar, Cogeneration & distillery units are spread over an area of **48.66 acres** (19.70 hectares). This includes the composting facilities of distillery, ETP for sugar & cogeneration units and utilities. Existing green belt area is being developed over an area of **49.90 acres** (20.22 hectares). An area of **9.97 acres** (4.036 hectares) is covered by roads & pavements. Vacant area available with the unit is **50.733 acres** (20.54 hectares).

Proposed up gradation of the sugar cane crushing capacity from 10000 to 15000 TCD, expansion of Cogeneration of power from 45 MW to 80 MW & expansion of molasses based distillery from 60 KLD to 120 KLD shall be located in an area of **4.203 Acres** within the vacant area of the existing premises.

Additional area for green belt is not proposed. The balance area of **46.53 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

Infrastructural facilities like roads & power supply are existing at the site.

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 Belgaum. 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 Gokak Taluk receives a rainfall of about 525 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 towns viz. Ghataprabha & Gokak towns & district headquarters i.e. at Belagavi.

Social Infrastructure provided by M/s Satish Sugars Limited is

1. Staff Quarters: The Company has provided bachelors quarters in the factory premises. These quarters are provided with free water, dish antenna for entertainment and electricity for their use. Telephone facilities are provided with a security facility.

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

3. The company has developed and is further developing greenery in the plant premises and lawns near the factory and residential premises. The lush greenery shall give a very pleasant look and soothing effect.

4. The company has financially contributed to various social organizations who conduct mass marriages, etc. Contributions are also made to various temples and special organizations for assisting the social activities of the public in nearby villages. The Company has also donated liberally for assisting the educational institutions, by contributing towards construction cost of school buildings. SSL is conducting every year a program called ‘Satish Sugar Awards’. This program is aimed at bringing out the talent of rural children. SSL conducts National Body Building Championship to promote awareness of health among the rural youth.

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 & distillery plants. **M/s Satish Sugars Limited (SSL, The company)** has an existing area of **159.30 Acres** (64.498 Hectares) in Survey Nos. 366, 367, 368, 369, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 385, 389, 390 & 391 & parts thereof, of Beerangaddi Village and 85, 86/1+3/A, 86/1+3/B, 86/1+3/K, 86/2+4/A, 86/2+4/B, 86/2+4/K, 86/2+4/D, 88/1/ABK/2AB, 90/1A, 90/1B, 90/1K, 90/2A, 90/2B, 90/3, 90/4A, 90/4B, 90/4K, 98/1A, 98/1B, 98/1K, 98/2+3A, 98/2+3B, 98/4, 99/1, 99/2, 99/3, 99/4, 100/2, 100/3, 100/4, 101/1+2+3A, 101/4A, 101/4B, 101/5, 102/3+4A, 102/4B, 102/4K+5,104,109,119,120/1 & parts thereof of Hunshyal PG Village falling under the revenue limits of Gokak Taluk, District Belagavi, Karnataka State. **SSL** is operating a Sugar Plant of sugar cane crushing capacity of 10000 TCD along with cogeneration plant of 45 MW power & 60 KLD distillery. Based on the feasibility reports & availability of sugar cane in the area **SSL** has decided to upgrade the sugar cane crushing capacity from 10000 to 15000 TCD, Cogeneration of power from 45 MW to 80 MW. In view of the additional molasses availability in house after the expansion, **SSL** proposes to expand the manufacturing capacity of existing molasses based distillery from 60 KLD to 120 KLD to manufacture Rectified Spirit / Ethanol / Extra Neutral Alcohol in the existing premises.

The existing buildings of Sugar, Cogeneration & distillery units are spread over an area of **48.66 acres** (19.70 hectares). This includes the composting facilities of distillery, ETP for sugar & cogeneration units and utilities. Existing green belt area is being developed over an area of **49.90 acres** (20.22 hectares). An area of **9.97 acres** (4.036 hectares) is covered by roads & pavements. Vacant area available with the unit is **50.733 acres** (20.54 hectares).

Proposed up gradation of the sugar cane crushing capacity from 10000 to 15000 TCD, expansion of Cogeneration of power from 45 MW to 80 MW & expansion of molasses based distillery from 60 KLD to 120 KLD shall be located in an area of **4.203 Acres** within the vacant area of the existing premises.

Additional area for green belt is not proposed. The balance area of **46.53 acres** shall be vacant land.

5.2 POPULATION PROJECTION

Around 300 people shall be employed during construction. **SSL** shall employ 235 persons during operational phase for the proposed expansion of sugar, cogeneration & distillery plants.

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

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

TABLE 5.1

Sy. No.	Village	Area in Sq.m.	Name of the building	Ground coverage Area Sq.m.	Greenbelt Area Sqm.	Vacant Area Sqm
85	Hunshyal P.G.	51091.56	Store	208.51		
			Molasses Tank	701.85		
			Chemical shed	73.03		
			Canteen	124.46		
			Treated Water Plant	223.40		
			DM Plant	133.32		
			Blending & Bottling section	2400.00		
			Hamal rest room 1 & 2	947.25		
			Kirby Godown	5995.35		
			Total	**10807.17**	**18005.26**	**22279.13**
86	Hunshyal P.G.	103295.97	Water stock pond	10871.59		
			Water clarifier	367.90		
			Service station (vehicle)	81.77		
			Rest house	532.48		
			Parking Main road	799.35		
			Car Parking	481.00		
			Fire Vehicle shed	527.89		
			Car Parking	306.29		
			Sugar Godown (Store)	6946.56		
			Water Reservior	1034.74		
			Blending & bottling section	914.24		
			Hamal rest rooms 1 & 2	841.33		
			Sugar Hopper crystalliser	396.29		
			Kirby Godown	640.80		
			Total	**24742.23**	**29883.74**	**48670.00**
88	Hunshyal P.G.	36786.11	Molasses Tank	1247.72		
			Service Water Tank	38.89		
			Inside Lime Plant	38.89		
			Vehicle shed	108.26		
			Water Tank(Guest House front side)	369.80		
			Old guest house	177.59		
			Directors room	118.18		
			Corporate office	119.71		
			Security office	64.93		
			Boiling MVC Dour old mill hopper	4179.09		
			Sugar Hopper crystallizer	1149.81		
			Old Spray pond	3691.51		
			Reservoir water tank	1048.13		
			Total	**12351.79**	**7796.23**	**16638.09**

Sy. No.	Village	Area in Sq.m.	Name of the building	Ground coverage Area Sq.m.	Greenbelt Area Sqm.	Vacant Area Sqm
90	Hunshyal P.G.	**91964.76**	Parking in front of security	322.69		
			Security office	17.87		
			Distillery office Excise & KSBL	122.11		
			Canteen	249.66		
			Weigh Bridge	17.87		
			Lagoon	7149.03		
			Cooling Tower	542.94		
			Storage ENA	1824.49		
			Molasses Tank (CAP. 1000 MT)	77.98		
			Fermentation House	750.64		
			Distillery Tower	366.38		
			Compost area	34261.07		
			ETP settling & Buffer tank	1815.02		
			Digester	566.32		
			Turbine & DG set	293.84		
			Boiler & Bagasse storage	3446.87		
			DM Plant	16.22		
			Water Reservoir	136.71		
			Total	**53583.49**	**22643.33**	**15737.94**
98	Hunshyal P.G.	**40467.71**	Laboratory Plan & Conference hall	226.92		
			New Guest House	190.49		
			Electric Workshop & Sulphur Godown	655.00		
			Store room	770.32		
			Bagasse Yard old	888.18		
			New TC House (RCC)	661.17		
			Earthing Pit	82.06		
			Old Turbine House (Power House)	180.58		
			Lime Plant	100.00		
			Lime Plant New	100.00		
			ETP section	2705.62		
			Old Spray Pond	1868.84		
			Reservoir Water Tank	1533.45		
			New Mill	647.16		
			Boiling MVC Door old mill hopper	2358.39		
			Toilets	66.12		
			Total	**13034.30**	**11447.34**	**15986.07**
99	Hunshyal P.G.	**26507.38**	Quarters of workers	475.42		
			Toilet of workers	44.19		
			D M Plant	792.35		
			ETP section	789.59		
			Total	**2081.55**	**16770.00**	**7945.72**

Sy. No.	Village	Area in Sq.m.	Name of the building	Ground coverage Area Sq.m.	Greenbelt Area Sqm.	Vacant Area Sqm
100	Hunshyal P.G.	**51392.33**	Cane section welfare account office	441.51		
			60 Ton Boiler	198.17		
			DG Set + Panel room	74.23		
			Old Mill	1751.76		
			Cable + Panel control + Steam	127.15		
			Turbine House	361.51		
			Air + Lab + AGM +Steam	170.91		
			Cooling Tower	556.08		
			New Mill	1310.00		
			Total	**4991.32**	**Nil**	**46401.01**
101	Hunshyal P.G.	**27720.95**	Weigh Bridge	193.86		
			130 Ton Boiler	1217.49		
			90 Ton Boiler	270.17		
			Cable + Panel control + Steam	121.55		
			Turbine House	357.42		
			Cooling Tower	492.90		
			Toilets	66.12		
			Total	**2719.51**	**2693.36**	**22308.08**
104	Hunshyal P.G.	**21347.16**	Bagasse & Coal Yard	12146.24		
			Weigh Bridges	313.45		
			Total	**12459.69**	**5255.83**	**3631.64**
109	Hunshyal P.G.	**41050.64**	Bagasse & Coal Yard	25259.75		
			Total	**25259.75**	**10091.33**	**5699.56**
119	Hunshyal P.G.	**33184.22**	Bagasse & Coal Yard	25010.64		
			Diesel Pump	496.46		
			Total	25507.10	7334.93	342.19
366	Beerangaddi	**2933.97**	Creche	209.81		
			Hamal Quarters	600.00		
			Total	**809.81**		**2124.16**
367	Beerangaddi	**1315.22**	Creche	41.75		
			Total	**41.75**	**436.13**	**837.34**
376	Beerangaddi	**10521.82**	Workshop	2154.63		
			Total	**2154.63**	**4857.39**	**3539.80**
379	Beerangaddi	**10501.06**	Bachelor Quarters	3030.61		
			Total	**3030.61**	**6858.02**	**612.43**
380	Beerangaddi	**9643.99**	Staff Quarters	2692.20		
			Bachelor Quarters	74.24		
			Total	**2766.44**	**5709.81**	**1167.74**
385	Beerangaddi	**13725.06**	Toilets	66.12		
			Kirby Godown	204.65		
			Staff Quarters	395.68		
			Total	**666.45**	**11449.46**	**1609.15**
102	Hunshyal P.G.	**10724.14**		Nil	**10415.21**	**308.93**
120	-do-	**15883.91**		Nil	**4286.53**	**11597.38**
368	Beerangaddi	**1214.05**		Nil	**986.70**	**227.35**
369	-do-	**2124.59**		Nil	**2020.48**	**104.11**
371	-do-	**1821.08**		Nil	**1650.87**	**170.21**
372	-do-	**1214.05**		Nil	**1146.92**	**67.13**
373	-do-	**1214.05**		Nil	**736.14**	**477.91**
374	-do-	**1517.57**		Nil	**728.29**	**789.28**
375	-do-	**1517.57**		Nil	**1203.41**	**314.16**
377	-do-	**2023.42**		Nil	**1379.32**	**644.10**

Sy. No.	Village	Area in Sq.m.	Name of the building	Ground coverage Area Sq.m.	Greenbelt Area Sqm.	Vacant Area Sqm
378	Beerangaddi	**6778.48**		Nil	**4934.95**	**1843.53**
381	-do-	**6778.48**		Nil	**3593.68**	**3184.80**
382	-do-	**3338.65**		Nil	Nil	**3338.65**
389	-do-	**4957.39**		Nil	Nil	**4957.39**
390	-do-	**8499.52**		Nil	**7907.33**	**592.19**
391	-do-	**1922.25**		Nil	**14.15**	**1908.10**
		644979.11		**197007.59**	**202206.14**	**245763.38**

5.4 ASSESSMENT OF INFRASTRUCTURE DEMAND (PHYSICAL & SOCIAL)

The factory site is well connected by road. State Highway (SH-44) connecting Sanganakeri to Yadwad is passing adjacent to the plant site. State Highway (SH-31) connecting Jamboti to Jath at a distance of 4.1 Kms in Western direction. National Highway (NH 4) connecting Bengaluru to Pune is at a distance of 40 Kms in Western direction.

The factory site is connected by broad gauge railway line of South Western railway on Hubli-Miraj section. Nearest railway line connecting Hubli to Miraj of South Western Railway line is located at a distance of 13 kms in W direction from the site. The nearest railway station is Ghataprabha which is at 13 kms in W direction from the factory site. Belagavi is the district place & has a major railway station which is at a distance of 72 kms in SW direction to the project site.

5.5 AMENITIES / FACILITIES

All infrastructure facilities such as education, health facilities and other social facilities are adequate at nearest towns viz. Gokak & Ghataprabha towns & district headquarters i.e. at Belagavi.

CHAPTER – 6 PROPOSED INFRASTRUCTURE

6.1 INDUSTRIAL AREA (PROCESSING AREA)

No additional land is required for the proposed expansion of sugar, cogeneration & distillery plants. **M/s Satish Sugars Limited (SSL, The company)** has an existing area of **159.30 Acres** (64.498 Hectares) in Survey Nos. 366, 367, 368, 369, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 385, 389, 390 & 391 & parts thereof, of Beerangaddi Village and 85, 86/1+3/A, 86/1+3/B, 86/1+3/K, 86/2+4/A, 86/2+4/B, 86/2+4/K, 86/2+4/D, 88/1/ABK/2AB, 90/1A, 90/1B, 90/1K, 90/2A, 90/2B, 90/3, 90/4A, 90/4B, 90/4K, 98/1A, 98/1B, 98/1K, 98/2+3A, 98/2+3B, 98/4, 99/1, 99/2, 99/3, 99/4, 100/2, 100/3, 100/4, 101/1+2+3A, 101/4A, 101/4B, 101/5, 102/3+4A, 102/4B, 102/4K+5,104,109,119,120/1 & parts thereof of Hunshyal PG Village falling under the revenue limits of Gokak Taluk, District Belagavi, Karnataka State. **SSL** is operating a Sugar Plant of sugar cane crushing capacity of 10000 TCD along with cogeneration plant of 45 MW power & 60 KLD distillery. Based on the feasibility reports & availability of sugar cane in the area **SSL** has decided to upgrade the sugar cane crushing capacity from 10000 to 15000 TCD, Cogeneration of power from 45 MW to 80 MW. In view of the additional molasses availability in house after the expansion, **SSL** proposes to expand the manufacturing capacity of existing molasses based distillery from 60 KLD to 120 KLD to manufacture Rectified Spirit / Ethanol / Extra Neutral Alcohol in the existing premises.

The existing buildings of Sugar, Cogeneration & distillery units are spread over an area of **48.66 acres** (19.70 hectares). This includes the composting facilities of distillery, ETP for sugar & cogeneration units and utilities. Existing green belt area is being developed over an area of **49.90 acres** (20.22 hectares). An area of **9.97 acres** (4.036 hectares) is covered by roads & pavements. Vacant area available with the unit is **50.733 acres** (20.54 hectares).

Proposed up gradation of the sugar cane crushing capacity from 10000 to 15000 TCD, expansion of Cogeneration of power from 45 MW to 80 MW & expansion of molasses based distillery from 60 KLD to 120 KLD shall be located in an area of **4.203 Acres** within the vacant area of the existing premises.

Additional area for green belt is not proposed. The balance area of **46.53 acres** shall be vacant land.

6.2 RESIDENTIAL AREA (NON PROCESSING AREA)

Additional quarters are not proposed in the expansion.

6.3 GREEN BELT.

Around 49.90 acres (20.22 hectares) is being developed as green belt. Additional area for green belt is not proposed.

6.4 SOCIAL INFRASTRUCTURE

All infrastructure facilities such as education, health facilities and other social facilities are adequate at nearest towns' viz. Gokak & Ghataprabha towns & district headquarters i.e. at Belagavi. Social infrastructure provided by M/s Satish Sugars Limited is as follows:

1. Staff Quarters: The Company has provided bachelors quarters in the factory premises. These quarters are provided with free water, dish antenna for entertainment and electricity for their use. Telephone facilities are provided with a security facility.

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

3. The company has developed and is further developing greenery in the plant premises and lawns near the factory and residential premises. The lush greenery shall give a very pleasant look and soothing effect.

4. The company has financially contributed to various social organizations who conduct mass marriages, etc. Contributions are also made to various temples and special organizations for assisting the social activities of the public in nearby villages. The Company has also donated liberally for assisting the educational institutions, by contributing towards construction cost of school buildings. SSL is conducting every year a program called 'Satish Sugar Awards'. This program is aimed at bringing out the talent of rural children. SSL conducts National Body Building Championship to promote awareness of health among the rural youth.

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

The factory site is well connected by road. State Highway (SH-44) connecting Sanganakeri to Yadwad is passing adjacent to the plant site. State Highway (SH-31) connecting Jamboti to Jath at a distance of 4.1 Kms in Western direction. National Highway (NH 4) connecting Bengaluru to Pune is at a distance of 40 Kms in Western direction.

The factory site is connected by broad gauge railway line of South Western railway on Hubli-Miraj section. Nearest railway line connecting Hubli to Miraj of South Western Railway line is located at a distance of 13 kms in W direction from the site. The nearest railway station is Ghataprabha which is at 13 kms in W direction from the factory site. Belagavi is the district place & has a major railway station which is at a distance of 72 kms in SW direction to the project site.

6.6 DRINKING WATER MANAGEMENT (SOURCE & SUPPLY OF WATER)

Domestic water consumption for the entire industrial complex after the proposed expansion shall be 68m^3/day and the requirement shall be met from Ghataprabha river.

6.7 SEWERAGE SYSTEM

Domestic sewage of 58m^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 15000 TCD & 80 MW plant are given in Table 6.1.

TABLE 6.1 COMPREHENSIVE WATER BALANCE FOR SUGAR & COGEN UNITS

Sl. No.	Particulars	Existing for 10000 TCD Cogen of 45 MW	Proposed Expansion For 15000 TCD Cogen of 80 MW
a)	**WATER INPUT (m^3 / d)**		
i)	Fresh water from river source	927*	1476
ii)	Water intake from cane juice as 70% moisture content in sugar cane	7000	10500
	TOTAL INPUT (m^3 / d)	**7927**	**11976**
b)	**WATER OUTPUT (m^3 / d)**		
i)	Domestic effluent (From Sugar, Co-gen & Distillery)	50	58
ii)	Sugar Factory effluent	1000	1500
iii)	Cooling tower Blow down **(Co-gen)**	208	282
iv)	Water treatment plant (DM Plant) drain water **(Co-gen)**	261	562
v)	Boiler Blow down @ 1% of 420 TPH	53	101
vi)	Evaporation losses from cooling tower **(Co-gen)**	1006	1385
vii)	Drift Losses from cooling tower **(Co-gen)**	280	421
viii)	Water loss in bagasse at 15% of cane Bagasse @ 32% of cane crushed & 50% moisture	1600	2250
ix)	Water loss with molasses Molasses @ 4% of cane crushed and 10% moisture	40	60
x)	Water loss with press mud, Filter cake @ 4% of cane crushed and 70% moisture	280	420
xi)	**Other Losses**		
	a) Flash losses	1000	1500
	b) Steam losses from boiler & TG	95	202
	c) Soot blowing, deaerator vent	80	120
	d) Losses Due to floor wiping, gland cooling & Ash quenching	150	225
	e) Domestic Losses	10	10
	f) Spray pond Evaporation & drift losses	1000	1523
xii)	Steam to sugar process	360	540
xiii)	Excess vapour condensate to condensate recycle system	454	817
	TOTAL OUTPUT (m^3 / d)	**7927**	**11976**

6.8.2 Distillery Unit:

The water consumption and wastewater generation after the proposed expansion of distillery plant from 60 KLD to 120 KLD are given in Table 6.2.

Table 6.2. COMPREHENSIVE WATER BALANCE FOR DISTILLERY AFTER EXPANSION

Sl. No	Particulars	Consumption m^3 / Day
	Water Requirement:	
1.	**INPUT**	
a	Fresh water for Industry	1890
b	Feed water content in Molasses	100
c	Steam from boiler	655
	Total Input	**2645**
	WASTEWATER SIDE (OUT PUT)	
a	Losses with Product	120
b	Loss from Industrial use	855
c	Effluent sober nature (cooling purging, blow down) sent to garden	66
d	Effluent moderately polluted	252
e	Effluent highly polluted spent wash	960
f	Recycled to boiler through reboiler	392
	Total accounted	**2645**

6.9 EFFLUENT TREATMENT SYSTEM FROM THE PROPOSED TREATMENT PLANT

6.9.1 Quantity of wastewater generation From Expansion of Sugar & Cogen Units

WASTEWATER GENERATION (m^3/day)

Sl. No.	UNIT	Quantity		Segregation
		Existing	After Expansion	
A	**SUGAR PLANT**			
1	Sugar Manufacturing Process & Washings	1000	1500	Process Wastewater
B	**COGENERATION PLANT**			
1	Cooling tower blow down	208	282	Non Process Wastewater
2	Boiler blow down	53	101	
3	DM Plant – drain	261	562	
E	**DOMESTIC WASTEWATER**	50	58	Septic Tank & Soak Pit
TOTAL WASTEWATER		**1572**	**2503**	

EFFLUENT FROM SUGAR & COGENERATION UNITS:

The wastewater from the existing plant (1000 m^3/d) is being treated in an elaborate ETP (Capacity 1000 m^3/d) consisting of the following treatment units.

a. Screen cum grit removal
b. Oil and Grease Removal
c. Neutralisation tank
d. Lime preparation tank
e. Monthly wash tank
f. Upflow Anaerobic Sludge Blanket Reactor
g. Extended Aeration tank followed by secondary clarifier
h. Sludge Pit
i. Sludge Drying Beds
j. Dilution with other wastewater streams in Polishing pond.

After expansion the quantity of process effluent from the sugar unit shall increase to 1500 m^3/d. The additional process effluent of 500 m^3/d shall be treated in an elaborate proposed ETP (Capacity 500 m^3/d) based on the activated sludge process.

Non process wastewater streams (522m^3/day) except for domestic wastewater are being neutralized & routed to polishing pond for dilution with each other. The final quality of the wastewater at the outlet of the polishing pond is meeting GSR 422 (E) on land discharge standards. This wastewater along with the treated sugar plant wastewater totalling to 1522 m^3/day is being utilized for on land irrigation & ash quenching within the premises.

After expansion, the quantity of non process wastewater streams shall increase to 945m^3/day. These streams shall be neutralized & routed to polishing pond for dilution with each other. The final quality of the wastewater at the outlet of the polishing pond shall meet GSR 422 (E) on land discharge standards.

After expansion, non process wastewater along with the treated sugar plant wastewater totalling to 2445m^3/day shall be utilized for on land irrigation & ash quenching within the premises. The project is based on zero discharge.

6.9.2 Quantity of wastewater generation From Proposed Expansion of Distillery

WASTEWATER GENERATION (m^3/day)

Sl. No.	UNIT	Quantity		DISPOSAL
		Existing for 60 KLD	Proposed for 120 KLD	
A	**DISTILLERY**			
1	Spentwash	480	960	Process Wastewater
2	Spentlees	126	252	Low strength Wastewater
B	**UTILITIES**			
1	Cooling tower blow down DM Plant regeneration	33	66	Non Process Wastewater
TOTAL WASTEWATER		**639**	**1278**	

6.9.2.1 EFFLUENT FROM DISTILLERY
PROCESS WASTEWATER - SPENT WASH

SSL has adopted the following method for treatment of spent wash:

The industry is currently subjecting the process effluents from distillery for bio composting along with press mud & boiler ash. The area of the compost yard is 18 acres including storage area. Compost yard provided is as per the MOEF / CPCB guidelines. **SSL** has provided necessary storage facilities for the storage of spent wash generated over a period of 30 days.

SSL shall create additional storage facilities for the storage of spent wash generated over a period of 05 days from the proposed expansion.

SSL shall adopt concentration followed by incineration for the treatment of spent wash (480m^3/d) generated from the proposed expansion.

6.9.2.2 PROCESS WASTEWATER - SPENT LEES

Around 126m^3/day of spent lees shall be generated in the proposed expansion 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 (94m^3/day). Reject from RO (32m^3/day) shall be sent to sugar ETP for further treatment. The project is based on zero discharge.

6.9.2.3 NON PROCESS WASTWATER FROM DISTILLERY

Quantity of effluent of sober nature from the distillery (cooling purging, blow down) is around 33m^3/d. These are neutralized and used for gardening within the premises.

After expansion, the quantity of non process wastewater streams from distillery is expected to increase to 66m^3/day. All the above streams will be routed to guard pond for mixing. These streams shall be neutralized. 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 wastewater 50m^3/day generated from the entire industrial complex is being subjected to treatment in Septic tank followed by soak pit.

After expansion, the quantity of domestic wastewater from the entire industrial complex is expected to increase to 58m^3/day. Additional Septic tank followed by soak pit shall be provided for the incremental quantity.

6.9.3 EFFLUENT STORAGE FACILITIES

The effluent storage facilities for the proposed expansion 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 from sugar & cogeneration units during the season & their disposal is shown below in the table

SOURCES	**NAME**	**QUANTITY IN TPD**		Mode of disposal
		Existing	**Proposed**	
Mill House	Bagasse	3200	4800	Used / Shall be used as boiler fuel
Process House	Press Mud	400	600	Subjected to bio composting along with spent wash. Excess press mud resulting from expansion shall be given to member farmers.
	Molasses	400	600	Shall be used as raw material for distillery
Boiler House Cogen Plant	Ash	24	45.8	Subjected to bio composting along with spent wash. Excess boiler ash resulting from expansion shall be given to member farmers.
Effluent treatment Plant	Sludge	2.0	3.0	Used as manure within premises & the same shall be continued

The hazardous waste generation shall be in the form of used oil from the DG sets. Used oil from DG sets shall be used as lubricant within premises / if in excess shall be sold to authorized recyclers.

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

Solid Wastes	Quantity Tons per day		Mode of disposal
	Existing	Proposed	
Yeast Sludge	6.00	12.00	Being dried / Shall be dried & sold as Cattle feed.
Bottom ash from existing boiler / proposed incineration boiler	0.33	5.60	Being sold / shall be sold to brick manufacturers / cement plants
Fly ash from existing boiler / proposed incineration boiler	1.21	57.10	Being given / Shall be given to farmers.

6.10 AIR POLLUTION CONTROL MEASURES

CONSTRUCTION PHASE

The construction activities in the proposed expansion of all the 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 boilers fired with Bagasse& coal. The proposed boilers of 100 TPH (02 Nos.) shall be provided with Electro Static Precipitators which shall be designed to meet an outlet concentration of less than 150 mg/Nm^3. Adequate stacks above ground level are proposed for the boilers as per the CPCB norms.

The standby DG sets shall be provided with adequate stack 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 boilers.

The proposed incineration boilers of 20 TPH (02 Nos.) shall be provided with adequate air pollution control measures which are designed to meet an outlet concentration of less than 150 mg/Nm^3. Adequate stack/s above ground level is/ are proposed for the incineration boilers as per the CPCB norms.

6.11 POWER REQUIREMENT & SUPPLY / SOURCE.

The proposed power requirement of the sugar & cogeneration plant after expansion shall be 20 MW. This requirement shall be met from the cogeneration plant and around 60 MW shall be exported to the grid during season.

The power requirement of the distillery plant after expansion shall be 2 MW. This requirement shall be met by generating 4 MW power from the incineration Boilers of 20 TPH capacity (02 Nos.).

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 & distillery plants. **M/s Satish Sugars Limited (SSL, The company)** has an existing area of **159.30 Acres** (64.498 Hectares) in Survey Nos. 366, 367, 368, 369, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 385, 389, 390 & 391 & parts thereof, of Beerangaddi Village and 85, 86/1+3/A, 86/1+3/B, 86/1+3/K, 86/2+4/A, 86/2+4/B, 86/2+4/K, 86/2+4/D, 88/1/ABK/2AB, 90/1A, 90/1B, 90/1K, 90/2A, 90/2B, 90/3, 90/4A, 90/4B, 90/4K, 98/1A, 98/1B, 98/1K, 98/2+3A, 98/2+3B, 98/4, 99/1, 99/2, 99/3, 99/4, 100/2, 100/3, 100/4, 101/1+2+3A, 101/4A, 101/4B, 101/5, 102/3+4A, 102/4B, 102/4K+5,104,109,119,120/1 & parts thereof of Hunshyal PG Village falling under the revenue limits of Gokak Taluk, District Belagavi, Karnataka State. **SSL** is operating a Sugar Plant of sugar cane crushing capacity of 10000 TCD along with cogeneration plant of 45 MW power & 60 KLD distillery. Based on the feasibility reports & availability of sugar cane in the area **SSL** has decided to upgrade the sugar cane crushing capacity from 10000 to 15000 TCD, Cogeneration of power from 45 MW to 80 MW. In view of the additional molasses availability in house after the expansion, **SSL** proposes to expand the manufacturing capacity of existing molasses based distillery from 60 KLD to 120 KLD to manufacture Rectified Spirit / Ethanol / Extra Neutral Alcohol in the existing premises.

The existing buildings of Sugar, Cogeneration & distillery units are spread over an area of **48.66 acres** (19.70 hectares). This includes the composting facilities of distillery, ETP for sugar & cogeneration units and utilities. Existing green belt area is being developed over an area of **49.90 acres** (20.22 hectares). An area of **9.97 acres** (4.036 hectares) is covered by roads & pavements. Vacant area available with the unit is **50.733 acres** (20.54 hectares).

Proposed up gradation of the sugar cane crushing capacity from 10000 to 15000 TCD, expansion of Cogeneration of power from 45 MW to 80 MW & expansion of molasses based distillery from 60 KLD to 120 KLD shall be located in an area of **4.203 Acres** within the vacant area of the existing premises.

Additional area for green belt is not proposed. The balance area of **46.53 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 project will be implemented within 12 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. 266.00 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 plant of cane crushing capacity from 10000TCD to 15000 TCD, cogeneration plant from 45 MW to 80 MW & molasses based distillery from 60 KLD to 120 KLD will be around Rs. 26600 Lacs.

Sl. No.	Particulars	Amount in Lacs of Rs.
1	Cost of civil work for expansion of sugar & cogeneration expansion & 120 KLD Distillery	2618.20
2	Plant and Machinery for sugar & cogeneration expansion	17722.14
3	Plant and Machinery for 120 KLD Distillery	2476.13
4	Miscellaneous Fixed Assets	1388.83
5	Preliminary Expenses & Preoperative Expenses	781.48
6	Contingencies	765.61
7	Working Capital Margin	847.61
	Total	**26600.00**

8.3 MEANS OF FINANCE:

For the proposed sugar & cogeneration plant the financing pattern is proposed to be 75:25 i.e. debt – equity ratio. 75% of the project cost of Rs. 266 Crores i.e. Rs. 199.50 Crores is to be financed by Financial Instructions / Bank, whereas, 25% of the project cost of Rs. 266 Crores i.e. Rs. 66.50 Crores will be contributed from internal accruals of the company viz. M/s Satish Sugars Limited.

The financial pattern of the proposed scheme for **M/s Satish Sugars Limited** at Survey Nos. 366, 367, 368, 369, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 385, 389, 390 & 391 & parts there of Beerangaddi Village and 85, 86/1+3/A, 86/1+3/B, 86/1+3/K, 86/2+4/A, 86/2+4/B, 86/2+4/K, 86/2+4/D, 88/1/ABK/2AB, 90/1A, 90/1B, 90/1K, 90/2A, 90/2B, 90/3, 90/4A, 90/4B, 90/4K, 98/1A, 98/1B, 98/1K, 98/2+3A, 98/2+3B, 98/4, 99/1, 99/2, 99/3, 99/4, 100/2, 100/3, 100/4, 101/1+2+3A, 101/4A, 101/4B, 101/5, 102/3+4A, 102/4B, 102/4K+5,104,109,119,120/1 & parts there of Hunshyal PG Village falling under the revenue limits of Gokak Taluk, District Belagavi, Karnataka State, is envisaged as under.

Sr. No	Particulars	Rs. In Lacs	%
1	EQUITY Own Contribution of M/s Satish Sugars Limited	6650	25
2	DEBT : Foreign Investors/ Term Loan Financial Institutions / Banks	19950	75
	Total	**26600**	**100%**

8.4 ASSUMPTIONS UNDERLYING THE PROFITABILITY PROJECTIONS

The proposed expansion of sugar & cogeneration plant & distillery is expected to be completed by end of March 2013 and production will start probably from October 2013.

The projected profitability has been computed on the basis of incremental production for the next ten years. However, summary of projections for the first five years are shown in the following table.

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.	180	180	180	180	180
1.3	Capacity Utilization in %	85	90	95	95	95
1.4	Estimated annual crushing in Lacs, MT	7.65	8.10	8.55	8.55	8.55
2	**Cogeneration Plant**					
2.1	Annual Exporting Capacity ('000 KWH)	90100	90100	90100	90100	90100
2.2	No. of days during season No. of days during off season	180 30	180 30	180 30	180 30	180 30
2.3	No. of hrs / day	22	22	22	22	22
2.4	Capacity Utilization in %	90	90	90	90	90
3	**Distillery Plant**					
3.1	**Capacity in KLD**	60	60	60	60	60
3.2	Capacity Utilization in %	90	90	90	90	90
3.3	Gross working Days	270	270	270	270	270
3.4	Installed Capacity in KL	14580	14580	14580	14580	14580

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 7 years in 14 equal half yearly Installments and there will be an initial moratorium of 18 months on the loan including Construction period. An Interest rate of 15.00% is assumed on Term Loans and it is assumed that the Interest payment and Principal Repayment will be half yearly.

• The selling prices for levy (10%) and non levy sugar (90%) have been considered respectively at prevailing market prices of Rs.1942.00 / Quintal and Rs.2900 / Quintal, without any escalation over the 10 years period of operation. The selling price of Spirit is considered at Rs. 30 per liter.

• The price for exportable power to Third party under open access has been taken at Rs.4.50/ kWh.

• 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.2425 / MT, over the entire 7 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 11976 KL / day & 2154 KL / day respectively has been taken at Rs. 10/ KL.

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

• Power at Rs.35, Fuel at Rs.20, Consumables/Chemicals at Rs.110, Direct Labour/Wages/Salaries at Rs.350, Repairs and maintenance at Rs.180, Gunny/PP bags at Rs.300, Insurance at Rs.15 and loading & Miscellaneous at Rs.10 are considered on the basis of per tonne sugarcane crushed.

• Other manufacturing overheads at Rs.60, administrative staff salaries at Rs.80, Labour welfare at Rs.10, selling overheads at Rs.25 and Preliminary Exp written off at Rs.20 of per are considered on the basis of per tonne sugarcane crushed.

• 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 14.50% interest rate.

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

8.6 FINANCIAL PARAMETERS AND BENEFIT

The financial viability indicators of average DSCR of 1.59 (min 1.18), payback period of 6 to 7 years and IRR of 27.40% 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 assumptions / basis indicated in the above section. Average increase in export power selling price, utilization levels, recovery, etc. will improve the project financial viability further.

8.7 CONCLUSION

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

THE RESULTS OF THE DSCR, PAYBACK PERIOD AND IRR 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 AND SOCIAL BENEFITS WITH SPECIAL EMPHASIS ON THE BENEFIT TO THE LOCAL PEOPLE INCLUDING TRIBAL POPULATION, IF ANY, IN THE AREA.

SSL shall undertake the following social welfare measures

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