Executive Summary

1.0 PREAMBLE :

M/s Bilagi Sugar Mill Limited (BSML), (the company henceforth) is having an area of 74.00 Acres (30 Hectares) in Survey Numbers 7, 92, 93, 195, 198, 199, 201, 202, 203 & 206 falling under the revenue limits of Badagandi Village, Girisagar Gram Panchayat, Bilagi Taluku, Bagalkote district of Karnataka State. **BSML** has obtained consent for establishment from Karnataka State Pollution Control Board (KSPCB) for Sugar Plant of sugar cane crushing capacity of 2500 TCD with cogeneration plant of 8 MW & operating the same with valid consents from KSPCB from 2005. Based on the feasibility reports & availability of sugar cane BSML has decided to upgrade the sugar cane crushing capacity to 5000 TCD, Cogeneration of power to 30MWhr at a project cost of Rs 207 Crores. Existing buildings are spread over an area of 2.875 Hectares (7.10 acres). Proposed expansion of sugar & cogeneration plants shall be located in an area of 1.74 Hectares (4.30 Acres). Around 6.22 Hectares (15.35 acres) has been developed as green belt. Around 4 hectares (9.88 acres) shall be developed as green belt in the proposed expansion. The balance area of 15.12 Hectares (37.37 acres) shall be vacant land. The land requirement for the proposed expansion is 4.30 acres & the land is already in possession of the company. The total water requirement shall be 3720m^3/d. The wastewater generation shall be in the form of process wastewater from sugar & non process wastewater from cogeneration plant.

1.1 NEED OF PUBLIC HEARING

The proposed expansion requires environmental clearance from State Environmental Impact Assessment Authority (SEIAA) Karnataka, Bengaluru duly constituted by Ministry of Environment & Forests (MOEF), New Delhi based on September 2006 notification on environment impact assessment (EIA) issued by MOEF. Hence, BSML submitted an application for environmental clearance to (SEIAA) Karnataka, Bengaluru for terms of reference (TOR) approval for the expansion of Sugarcane crushing capacity and increase in power generation from Cogeneration plant. TOR was approved during the State Level Expert appraisal committee (SEAC Karnataka duly constituted by MOEF) meeting held on 9th, 10thand11th February, 2015 held at M.S. buildings Bengaluru.

1.2 HIGHLIGHTS OF THE PROPOSED EXPANSION

Name of the Promoter / company **Factory Site**	M/s. Bilagi Sugar Mill Limited, Badagandi Village, Girisagar Gram Panchayat, Bilagi Taluku, Bagalkote district, Karnataka State
Constitution & Type :	Limited Company
Products & By Products	1. Sugar 2. Cogeneration power
Installed Capacity of the Project after Expansion	5000 TCD Sugar 30 MW cogen plant (New)
Working days per annum	Sugar plant : 180 to 240 days (Existing) Cogen Plant: 180 to 240 days (Existing) After expansion the same routine shall be followed.
Raw material requirement per annum	Sugar cane : 900000 MT Bagasse : 259200 to 294545 MT
Project Cost	Rs 207 Crores
Cost of Environment Protection	Rs. 10.25 Crores

Connectivity :

The proposed expansion shall be situated in the existing project site located at Badagandi Village, Girisagar Gram Panchayat, Bilagi Taluku, Bagalkote district of Karnataka State. The site is connected by broad gauge railway line of South Western railway on Hubballi - Vijayapur section. The nearest railway station is Bagalkote located at a distance of 18 Kms away in the SE direction. Bagalkote is the main town and market place which is located at about 18 kms from the plant in the SE direction. The area is well connected by road. National highway connecting Bagalkote to Bijapur (NH -218) is at a distance of 1.98 Kms in the western direction. The nearest airport is Belagavi and is at a distance of 126 kms in western direction.

1.3 RAW MATERIAL AND SUSTAINABILITY OF PROJECT

Sugar Plant

Raw material for the plant is sugarcane is available in ample quantity for the plant. The sugar factory requirement at 100% capacity is 9.0 lakh MT. Sugar factory is situated in the sugarcane growing area close to various sources of water in command area.

Cogen Power Plant

M/s BSML shall implement the cogeneration plant keeping in view of the availability of excess bagasse from the Sugar plant expansion. The cogeneration plant shall mainly comprise of the following configuration:

a. Bagasse fired Steam Boiler of 150 TPH
b. Turbine generator – 30 MW

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

1.4. WATER REQUIREMENT:

WATER BALANCE WITH CONSUMPTION & DISCHARGE DETAILS (m^3 / d)

Sl. No.	**Water Requirement: Particulars**	**Consumption**
	WATER IN TO SYSTEM	
1A	**Source :** Fresh water from river	**1364.00**
	Usage:	
a]	Sugar process	500.00
a)	Water Treatment Plant (DM Plant, R.O, & U.F) for boiler make up & laboratory**(Cogen Plant)**	784.00
3)	**Domestic:**	80.00
	Total	**1364.00**
1B	Excess condensate from sugar cane on cane	2356.00
	Total of 1A & 1B	**3720.00**
	Waste water generation:	**Discharge**

I	**From Process (including Laboratory)**	500.00
1)	Water Treatment Plant reject (Cogen)	60.00
2)	Boiler blow down (Cogen)	65.00
3)	Cooling tower blow down (Cogen)	240.00
II	**Total Effluent from sugar & cogen**	**865.00**
III	**Domestic Sewage**	**64.00**
IV	**Losses**	
	i) Vapour losses to Atmosphere	360.00
	ii) Vapour & drift loss at bearing (mill & turbine) cooling	90.00
	iii) Vapour & drift loss from cooling tower	575.00
	iv) Vapour & drift loss from T.G. set cooling tower	49.00
	v) Steam losses at traps & vent at 3% on cane	150.00
	vi) Domestic water loss	16.00
	vii) Vapour loss at crystallization & centrifugation	130.00
	viii) Flash vapour loss at clarifier	50.00
	ix) Vapour loss at mill	50.00
	x) Water going along with product & by products viz. Sugar, Bagasse, Molasses, press mud	960.00
	Total Losses	**2430.00**
V	**Excess condensate to recycling system**	**361.00**
	Total of II, III, IV & V	**3720.00**

1.5 BASELINE ENVIRONMENTAL STATUS

1.5.1 PHYSICAL ENVIRONMENT

Site Location and its Surroundings

Sr.no	Features	Details
1	Location	Badagandi Village, Girisagar Gram Panchayat, Bilagi Taluku, Bagalkote district, Karnataka
2	Altitude	557.13 m above MSL.
3	Longitude	$75^0$39'54.86" & $75^0$40'14.29" East
4	Latitude	16^0 21' 18.18" & 16^0 21' 30.12" North
5	Max. Temp.	45^oC
6	Min. Temp.	14^oC
7	Relative Humidity	38 to 69 %
8	Annual rainfall	600 mm
9	Land availability	74.00 Acres (30 Hectares)
10	Topography	Plain
11	Soil Type	Sandy Loam
12	Nearest River	Alamatti reservoir back water – 5.906 kms
13	Nearest National Highway (NH)	NH connecting Bagalkote to Bijapur (NH -218) - 1.98 Kms W
14	Nearest Railway station	Bagalkote - 18 Kms SE
15	Nearest Railway Junction	Bagalkote - 18 Kms SE
16	Nearest Industries	None within 10 kms radius

17	Nearest Village	Badagandi village - 2.37 Kms SW
18	Nearest City	Bagalkote - 18 Kms SE
19	Nearest Air port	Belagavi (Sambra) - 126 Kms W
20	Historical places, Monuments, Heritage sites, wild life sanctuaries, national parks, , Eco sensitive zones	None within 10 kms radius

The project site is located at Badagandi Village, Girisagar Gram Panchayat, Bilagi Taluku, Bagalkote district, Karnataka State. The site falls between $75^0$39'54.86" & $75^0$40'14.29" East longitude and 16^0 21' 18.18" & 16^0 21' 30.12" North latitude at an average elevation of 557.13 m above MSL. The site is connected by broad gauge railway line of South Western railway on Hubballi - Vijayapur section. The nearest railway station is Bagalkote located at a distance of 18 Kms away in the SE direction.

Alamatti reservoir back water is the major water body & is located at a distance of 5.906 kms in East direction.

The nearest village to the plant is Badagandi village, located at a distance of 2.37 Kms in the SW km direction. Bagalkote is the district place / main town and market place which is located at about 18 kms away from the plant site in the SE direction.

The area is well connected by road. The national highway (NH -218) connecting Bagalkote to Bijapur passes at a distance of 1.98 Kms in the western direction. The nearest airport is Belagavi at a distance of 126 Kms in West direction.

There are no reserved forests, wild life sanctuaries, national parks and elephant / tiger reserves within 10 kms radius of the project site.

1.5.2 TOPOGRAPHY

The project site area has plane topography with some part having slight undulation.

Salient Features of baseline Environmental Studies

Parameters	**Study**	**Inference**
Micrometeorological Study	Wind Profile, Temperature, Humidity, rainfall	To assess air pollution impacts on neighboring environment
Air Quality Data	Particulate Matter PM10 and PM 2.5 micron Sulphur Dioxide(SO2) Oxides of nitrogen (NOx) Carbon Monoxide (CO)	To assess air quality
Noise Quality	Noise	To identify Noise levels
Water and Soil Study	Physicochemical analysis	To assess quality of water and soil
Socio-Economic Study	Demography and occupation and Amenities in the area	To asses human index

1.5.3 Monitoring locations for Air, Noise, Soil, and Water with Direction

Sr. No.	Name of the Sampling Point	Direction w. r. t. the plant site	Distance w. r. t. the plant site	Geocodes
A1	Proposed site	-	--	
A2	Badgandi	WWS	2.38	$16^0$20'51.2"75^0 38' 49.97"
A3	Bilagi	SW	3.27	$16^0$19'45.5"75^0 38' 29.15"
A4	Mannikeri	S	3.5	$16^0$19'24.3"75^0 40' 3.9 "
A5	Takkalki	EEN	5.6	$16^0$23'58.7"75^0 41' 9.7"
A6	Girisagar	N	5.76	$16^0$21'10.9"75^0 42' 7.53"
A7	Sonna	NW	8.24	$16^0$24'5.65"75^0 36' 26.1"
A8	Siddhapur	W	8.8	$16^0$21'55.4"75^0 35' 22.95"

1.5.4 Air Environment

Sr. No	Location	24 Hour 98th percentile Concentration in µg/m³				CO mg/m³
		PM10	PM 2.5	SO_2	NOx	
A1	Proposed site	16.1	80.4	7.0	13.1	<4
A2	Badagandi	26.2	78.9	14.4	18.9	<4
A3	Bilagi	42.0	79.2	26.6	40.7	<4
A4	Mannikeri	11.4	58.7	9.9	15.0	<4
A5	Girisagar	12.6	42.6	9.1	14.8	<4
A6	Takkalaki	17.6	62.0	9.3	12.7	<4
A7	Sonna	9.8	42.0	8.3	12.6	<4
A8	Siddhapur	11.4	58.7	10.6	15.0	<4
	CPCB Standard	100	60	80	80	4

The ambient air quality observed during the study period is well within the prescribed National Ambient Air Quality Standards.

1.5.5 Noise Environment

The noise levels observed on all locations were in the range of 43.2 to 68.6 dBA during day time and 33.2 – 60.1 (at project site) dBA during night time.

Sr. No.	Monitoring Location/ Village	day Time Noise Level in dB(A)	Night Time Noise Level in dB(A)	CPCB Standards	
				Day Time Noise Level in dB(A)	Night Time Noise Level in dB(A)
1	Project Site	Leq 68.6	Leq 60.1	Leq 75.0	Leq 70.0
2	Badagandi	54.4	44.3	55.0	45.0
3	Bilagi Highway cross	65.2	48.5	55.0	45.0
4	Mannikeri	48.8	37.2	55.0	45.0
5	Girisagar	44.2	34.1	55.0	45.0
6	Sonna	43.2	33.2	55.0	45.0
7	Takkakli	51.2	40.2	55.0	45.0
8	Siddhapur	45.6	41.0	55.0	45.0

1.5.6 Water Quality

The ground water quality at eight locations was monitored. It was observed the hardness of water was in the range of 211 to 472 mg/l which is not on higher side. The surface water from water from Badagandi, Bilgi, Mannikeri villages was also analyzed and it was found that it is not potable.

1.5.7 Biological Environment

The study of Flora and Fauna in the 10 kms radius from the project site was carried out. The eco sensitive and wild life sanctuary was not found in 10 Km radius. In the study area trees like Neem, Tamrind, Karanj, Umber, Pipal, Babul and some common trees were observed. As regards fauna is concerned Mangoose, jackal, Squirrel were among the mammals, frog from amphibian, Naja-Naja, Viper from reptiles were noticed. Among the avifauna, Drango, Parrot, Crow, and Green bea eater were are found.

1.6. ENVIRONMENTAL IMPACT PREDICTION

Environmental impact in the study area reflects in any changes of environmental conditions, adverse or beneficial effects caused or induced by the impact of project if implemented. Superimposition of predicted impact over pre-project base line data shows final picture of environmental conditions. Step of quantitative impact prediction leads to decide suitable environment management plan needed to implement before initiation of project, commissioning stage to mitigate adverse effects on environmental quality. Plant involves activities to set up a plant, machinery, create infrastructure to transport raw material, finished products. It causes various impacts on air & water quality, noise levels, socio-economic environment etc. Next steps describe a brief description of the environmental impacts of proposed Cogen project in construction and operational phases and methodology and results of mathematical and simulation models used in their prediction.

1.6.1 IMPACT DURING CONSTRUCTION PAHSE

The construction phase is expected to be one and a half year. The activities will have impact on land environment, water, air, noise level, soil quality and socio economic However, the expansion doesn't involve much construction activity. Therefore its impact on Air Quality, Water Quality, Noise and soil will not be notable. As a matter of

fact this activity will have positive impact, as far as socio-economic culture of the people in the vicinity. The construction activity effect will be restricted to factory area.

1.6.2 IMPACT DURING OPERATIONAL PHASE

The operational activities of the plant after expansion will have little impact on physical environment (air & water quality, noise level, cropping pattern etc.) and on socio-economic environment. The solid waste generated shall be utilized in compost manufacture and brick makers which has positive impact.

The impact on Air, Noise & Cropping Pattern are the dimensions of Physical environment which are likely to be affected on account of power generation activities.

1.6.2.1 Impact on Air Environment

Prediction of impact on air environment is an important component in environmental impact assessment studies. Several techniques and methodologies are in vogue for predicting the impacts due to proposed industrial development on physico-ecological and socio-economic components of environment. Such predictions are superimposed over the baseline (pre-project) status of environmental quality to derive the ultimate (post-project) scenario of environmental conditions. The quantitative prediction of impacts lead to delineate suitable environmental management plan needed for implementation during the commissioning of proposed activities and in its operational phase in order to mitigate the adverse impacts on environmental quality.

Mathematical models are the best tools to quantitatively describe the cause effect relationship between source of pollution and different components of environment. In case, mathematical models are not available or it is not possible to identify/validate model for a particular situation, predictions are arrived through available scientific knowledge and judgment.

Air Quality Prediction

The impact on air quality due to emissions from single source or group of sources is evaluated by use of mathematical models. When air pollutants are emitted into the atmosphere, they are immediately diffused into surrounding atmosphere, transported and diluted due to winds. The air quality models are designed to simulate these processes mathematically and to relate emissions of primary pollutants to the resulting downwind air quality. The inputs include emissions, meteorology and surrounding topographic details to predict the impacts of conservative pollutants.

The BSML's proposed of expansion of cogen unit from 8 MW to 30MW, requires 1500 MT bagasse per as the fuel for boiler when operated on 100% bagasse mode. This cogen project meets the heat & power needs of BSML and balance power shall be exported to the grid.

Stack Details of Proposed Plant

Sr. No.	Stack	Fuel (T/Hr)	Emission Rate (g/s)	Stack Ht (m)	Diameter (m)	Exit Gas Temp. (K)	Velocity (m/s)
1	Boiler capacity	150	0.375(ESP will be use of 99%)	92m AGL	3.5	413	16

1.6.2.2 IMPACT ON WATER ENVIRONMENT

The construction activities will be associated with mechanical fabrication, assembly and erection. These activities associated do not consume large quantities of water. Make shift sanitation facility shall be provided by contractors for disposal of sanitary sewage generated by the work force. There shall be no disposal of construction waste outlet. The contractor will provide cooking fuel to the work force. This will check cutting and felling of shrubs and trees. The overall impact on water environment during construction phase due to the proposed power plant is considered short term and insignificant.

1.6.2.3 Impact On Noise Levels

Impact of machinery operations:

A) Considering all the machinery to be working at a time, which is the worst case from the point of view of noise level impact at BSML, the total noise level on account of all the equipment works out to be 108 dB(A). Major part of this noise gets attenuated due to wave divergence.

B) The noise attenuation due to wave divergence is calculated as follows:
Sound pressure level L_{p2} at a distance R_2 from the source neglecting attenuation due to atmospheric effects and interaction with objects is given by
$L_{p2} = L_{p1} - 20 \log R_2 / R_1$
Where,
$L_{p1}$is a sound pressure level at a distance of R_1 from the source and L_{p2} is a sound pressure level at a distance of R_2 from the source.

Minimum distance of the receptor location from BSML calculated by using above equation for achieving the noise level of 55 dB(A) during daytime is 135 m. This means, noise level at a distance of 135 m from BSML is 55 dB(A) or in other words the noise level impact of BSML operations is felt within a maximum area of 135m radius.

As the villages are located beyond 500 m from BSML increment in noise levels will not be detected at these locations on account of BSML activities.

C) Impact of Vehicular traffic

There will be an increase in the traffic to and fro from the site. Vehicles used for transportation of cane would be bullock carts, Tractors and Trucks whereas; utility vehicles used for various purposes would be buses, Jeeps, cars and ambulances. Assuming that no. of traffic on noise level at village calculated by using following equation is found to be 42 dB(A).

$L_{eq}(h)_i = L_{OE} + 10\log(N_i / S_i * T) + 10\log(15/d)^{(1+a)} + \triangle_S - 13$

Where,

$L_{eq}(h)1$ is the L_{eq} at hour h for the i^{th} vehicle type i.e. autos, medium trucks or heavy trucks.

L_{OE} is the reference mean energy level for the i^{th} vehicle type. This is the noise emission level for a given vehicle type and is found out by measurement.

N_i is the number of class I vehicles passing during the time T.

S_i is the average speed of the i^{th} vehicle class in km/hour.

D is the perpendicular distance in meters from the centerline of the traffic lane to the location where noise level is to be predicted.

a is a factor, which relates to the absorption characteristics of the ground cover between the roadway and the receptor location.

$\triangle_S$ is the shielding factor such as provided by the noise barrier.

Impact of traffic noise after superimposing on background noise level results in the noise level of 45 dB(A), which is less than Karnataka Pollution Control Board limits for rural and Residential area. Hence noise level impact of the traffic is negligible.

Impact on Topography

The proposed project site is a flat terrain with a gentle slope. The development of this land is not expected to change the topography of the study area . Adequate storm water drains will be provided to collect and carry the surface runoff during monsoon to the natural drainage system of the study area.

Impact on Soil

The activities involved in clearing the site for the various units of the production plant such as process units, buildings, raw materials & finished goods sheds, construction of roads, laying of the pipelines (water supply, effluent, telephone, power supply, etc.) would generate topsoil which needs proper management. As the existing ground level of the study area is more or less flat terrain without significant level differences it may not require any major excavation.

Mitigation Measures

The following measures will be adopted:

- After completion of the construction, the surplus earth will be utilized to fill up the low lying areas, the rubble will be cleared and all un-built surfaces will be reinstated;
- The top soil from the excavated areas will be preserved for re-use during plantation;
- Green belt development will be taken up during construction phase so that the plantations grow to adequate height by the time of commissioning of the plant.
- Species selected for plantation will be fast growing & adaptin to local conditions.

Socio-economic Environment

The socio-economic impacts during the construction phase of the proposed plant could result due to migrant workers, worker camps, induced development etc. Due to the migrant workers there would be impact on the existing infrastructure facilities in the surrounding villages. The impact of the proposed plant on socio economic conditions of the study area expected to be positive as follows:

- Increase in floating population.
- Increase in demand of services including hotels, lodges, public transport (including taxis), etc.
- Economic up-liftment of the area.
- Rising of infrastructure and financial aspects in the study area.
- Beneficiation of the civil construction and transportation companies as they are procured from the local area.
- Expanding of services like retail shops, banks, automobile workshops, school, healthcare, etc. The local population will have employment opportunities in related service activities like petty commercial establishments, small contracts/sub-contracts and supply of construction materials for buildings and ancillary infrastructures etc. Consequently, this will contribute to economic upliftment of the area.

1.7 ENVIRONMENT MANAGEMENT PLAN

1.7.1 Air Pollution control

The following measures shall be adopted for the control of emissions in the sugar and cogen unit

- Suitably designed electro static precipitator with efficiency of 98.36 % for bagasse based boiler shall be placed downstream of the stack which will separate out the incoming dust in flue gas and limit the dust concentration at its designed outlet concentration of 150 mg/Nm^3
- For the effective dispersion of the pollutants stack height has been fixed based on the CPCB requirements. The height of the stack shall be 92 m for bagasse based boiler.
- ESP is attached to collect and control fly ash emission.
- For DG sets, stacks of adequate height shall be provided.

- All vehicles and their exhausts shall be well maintained and regularly tested for emission concentration.
- Adequate thickness of insulating material with proper fastening shall be provided to control the thermal pollution.
- Regular preventive maintenance of pollution control equipment shall be carried out.
- Stack emission shall be regularly monitored external agencies on periodic basis.

1.7.2 Noise Pollution Control

All rotating equipments shall be lubricated and provided with enclosures as far as possible to reduce noise. Provision of silencer will be made wherever possible.

Water Pollution control

A network of planned storm water drainage is provided and maintained. Rain water harvesting will be carried out to reduce the load on fresh water uptake from river. It will also increase ground water table.

1.7.2.1. Effluent Treatment Plant for Sugar and Co-generation

Effluent treatment Plant for Sugar & Cogen operations shall have the following distinct advantage:-

The effluent shall be treated and the organic loading is polished to an extent that the treated water may be reused for

- Plant Floor washings,
- Make-up water for cooling tower,
- Development of Green Belt, Landscaping and
- Captive Irrigation, etc.

Fresh water drawl is avoided to that extent and conservation of water in a broader perspective is achieved. This is particularly of economic significance as fresh water is being sourced from about a distance of 5.906 km.

The treatment scheme incorporates both Anaerobic as well as Aerobic treatment methods for the wastewater with state of the art Bio-Tower and Diffused Aeration Technologies. Minor quantities of Biogas would emanate from the plant which may be used for meeting requirements partially for energy in Canteen / kitchens.

1.7.3 SOLID WASTE MANAGEMENT

Fly ash collected from the ESP hoppers and the air-heater hoppers and the ash collected from the furnace bottom hoppers can be used as fertilizer, during the seasonal operation of the plant, when bagasse will be the main and only fuel for the operation. The ash content in bagasse is less than one percent. In cane trash and the other biomass fuels proposed to be used the ash percentage will not exceed 10%. The total fly ash collected during off season could also be used as fertilizer / as filler material for making biocompost. The high potash content in the bagasse ash makes the ash, a good manure.

As the filter press mud from the sugar plant also has a good land nutrient value, it is possible to mix the ash and the press mud and sell the same to the farmers to be used in the cane fields. This ash generated will be given freely to entrepreneur to convert to Biocompost as well as it will be used with press mud to convert to compost.

Sl. No.	Description of By products / Solid Waste	Quantity Per Month in MT	Mode of Disposal
01	Molasses	6000	Shall be sold to other distilleries
02	Bagasse	48000	Shall be used as fuel for captive power generation
03	Press mud	6000	Shall be mixed with boiler ash & given as manure to member farmers.
04	Wet bottom ash	98	Shall be mixed with press mud & given as manure to member farmers.
05	Dry fly ash	392	--do--
06	ETP Sludge	60	Shall be used as manure within premises

1.7.4 GREEN BELT DEVELOPMENT

Tree plantation is one of the effective remedial measures to control the Air pollution and noise pollution. It improves aesthetics and climate of the area as well as sustains and supports the biosphere. It is an established fact that trees and vegetation act as vast natural sink for the gaseous as well as particulate air pollutants due to enormous surface area of leaves. It also helps to attenuate the ambient noise level. Plantation around the pollution sources control the air pollution by filtering the air particulate and interacting with gaseous pollutant before it reaches to the ground. Tree plantation also acts as buffer and absorber against accidental release of pollutants. The plantation work for green belt development will be carried out as per CPCB guidelines, local species would be preferred.

For effective control of air pollutants in and around the proposed industry, a suitable green belt is proposed by taking into consideration the following criteria. The green belt would;

- Mitigate gaseous emissions
- Have sufficient capability to arrest accidental release.
- Effective in wastewater reuse.
- Maintain the ecological balance.
- Control noise pollution to a considerable extent.
- Prevent soil erosion.
- Improve the Aesthetics.

Table for Species in Tree Plantation

No.	Tree species	Common Name
1	Plumeria pudica	Champak
2	Cassia siamea	Kashid
3	Pongamia pinnata	Karanj
4	Ficus glomerita	Umber
5	Azadirachta indica	Neem
6	Nerium indicum	Kaner
7	Delonix regia	Gulmohar
8	Bauhinia varie	Kanchan
9	Samanea saman	Rain tree
10	Sapindus emarginatue	Ritha
11	Tamarindus indica. Linn	Chinch
12	Anogeissus latifolia	Dhawda
13	Syzygium cimini, Skeels Myrataceae	Jambhul

1.7.5 BUDGET FOR ENVIRONMENTAL MANAGEMENT

Sr. No.	Capital Investment	All figures in Rs. lakhs
	Air Pollution Control Facilities	575
	ETP	150
	Green Belt	30
	Laboratory Facility for Monitoring	20
	Fire Fighting	70
	Rain water harvestint	50
	Green belt	30
	Health Facilities	50
	Drip irrigation for using treated effluent	50
	Total	**1025**
Recurring Cost of Operation and Maintenance		100

CSR provision by BSML

BSML is planning for develop nearby villages as per the identified requirement of the region under CSR activity. This will increase the social and economical sector of the region. BSML has decided to adopt three nearby villages to implement CSR. The identified villages are Badgandi. Sonna, & Girisagar . These villages were selected on the basis of shortfall of basic amenities.

Majorly these villages are depending on the agriculture. Following are the identified provision for the area:

- Capacity Building and Training for vocational Courses
- Village infrastructure
- Sustainable power development
- Drinking water facility
- Women Empowerment trough training and financial support
- Education Support through Extension of Building, Scholarship, Books
- Primary Health Centers through health camps, up gradation of Building, New Building etc
- Agriculture Development Program

1.8 MONITORING PLAN

1.8.1 MONITORING FACILITY

Monitoring schedule given by KSPCB will be strictly followed to ensure the success of environmental management activities.
In general, the monitoring schedule shall be as follows:

Particulars	location	Frequency
Ambient Air Quality	2 samples down wind direction at 500m and 1000m 1 sample at up wind direction at 500m	24 hr sample half yearly
Flue gas from Chimney for flow rate SPM, RSPM, SO_2, NOX	Sampling port of chimney	Monthly
Meteorological data	Site	Daily
Ground Water	1 Km from spent wash tank and compost yard 2 location on downward drainage pattern 1 on upward drainage 3 location in buffer zone	Half Yearly
River water	1 each down and upstream	Quarterly
Soil	Farm using Biocompost	Pre and post Monsoon
Waste Water	At site final discharge point	As per KSPCB consent conditions

1.9 RISK ASSESSMENT

Industrial accidents result in great personal and financial loss. Managing these accidental risks in today's environment is the concern of every industry including Cogen units, because either real or perceived incidents can quickly jeopardize the financial viability of a business. Many facilities involve various manufacturing processes that have the potential for accidents which may be catastrophic to the plant, work force, environment, or public.

The main objective of the risk assessment study is to propose a comprehensive but simple approach to carry out risk analysis and conducting feasibility studies for industries and planning and management of industrial prototype hazard analysis study in Indian context.

1.9.1 Risk Analysis Methodologies

Quantitative Risk Assessment (QRA)

QRA is a mathematical approach to engineers to predict the risks of accidents and give guidance on appropriate means of minimizing them. Nevertheless, while it uses scientific methods and verifiable data, QRA is a rather immature and highly judgmental technique, and its results have a large degree of uncertainty. Despite this, many branches of engineering have found that QRA can give useful guidance. However, QRA should not be the only input to decision-making about safety, as other techniques based on experience and judgment may be appropriate as well. Risk assessment does not have to be quantitative, and adequate guidance on minor hazards can often be obtained using a qualitative approach.

Qualitative Method

- Preliminary risk analysis
- Hazard and operability studies(HAZOP)
- Failure mode and effects analysis(FMEA/FMECA)
- Discussion and conclusion

1.9.2 Qualitative risk analysis methodologies

In the this section, we will deal with the qualitative methods used in risk analysis namely preliminary risk analysis(PHA), hazard and operability study(HAZOP), and failure mode and effects analysis (FMEA/FMECA).

Preliminary Risk Analysis

Preliminary Risk Analysis Preliminary risk analysis or hazard analysis a qualitative technique which involves a disciplined analysis of the event sequences which could transform a potential hazard into an accident. In this technique, the possible undesirable events are identified first and then analysed separately. For each undesirable events or hazards, possible improvements, or preventive measures are then formulated.

T

he result from this methodology provides a basis for determining which categories of hazard should be looked into more closely and which analysis methods are most suitable. Such an analysis also proved valuable in the working environment to which activities lacking safety measures can be readily identified. With the aid of a frequency/ consequence diagram, the identified hazards can then be ranked according to risk, allowing measures to be prioritized to prevent accidents.

Mitigation Measures

The purpose of mitigation is to identify measures that safeguard the environment and the community affected by the proposal. Mitigation is both a creative and practical phase of the EIA process. It seeks to find the best ways and means of avoiding,

minimizing and remedying impacts. Mitigation measures must be translated into action in the correct way and at the right time, if they are to be successful. This process is referred to as impact management and takes place during project implementation. A written plan should be prepared for this purpose, and includes a schedule of agreed actions. Opportunities for impact mitigation will occur throughout the project cycle.

Noise Exposure

High sound levels may be generated from the equipments used in the manufacturing and utilities (e.g.-compressed air, vacuum sources, unit operations system, etc). Irrespective of the enclosed design and anti vibration control measures in the work place modules, the workers are located close to the machines during manufacturing and exposed to noise.

Mitigation measures

- May good engineering practices.
- The rotation of employees in shift should be followed so as to reduce their exposure to noise sources for longer period.
- Hearing protective devices in the form of ear muff and plug should be used to reduce employee's exposure to high noise levels.
- Comprehensive hearing conservation programs should be carried out to identify noise sources for its prevention/control.
- Noise monitoring and medical surveillance should be carried out at regular intervals so as to assess the workers exposures to noise and corrective measures.

1.9.3 STORAGE OF FLAMMABLE LIQUIDS

The Dangerous Substances and Explosive Atmospheres create risks from the indoor storage of Dangerous Substances to be controlled by elimination or by reducing the quantities of such substances in the workplace to a minimum and providing mitigation to protect against foreseeable incidents.

These should be located in designated areas that are wherever possible away from the immediate processing area and do not jeopardise the means of escape from the workroom/working area. The flammable liquids should be stored separately from other dangerous substances that may enhance the risk of fire or compromise the integrity of

Handling: Wash thoroughly after handling. Use only in a well-ventilated area. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Avoid contact with heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

I. **Storage:** Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area. Do not store near perchlorates, peroxides, chromic acid or nitric acid.

1.9.4 EMISSION MECHANISMS AND CONTROL CONSIDERING STORAGE TANKS

Emissions from organic liquids in storage occur because of evaporative loss of the liquid during its storage and as a result of changes in the liquid level. The emission sources vary with tank design, as does the relative contribution of each type of emission source. Emissions from fixed roof tanks are a result of evaporative losses during storage (known as breathing losses or standing storage losses) and evaporative losses during filling and emptying operations (known as working losses). External and internal floating roof tanks are emission sources because of evaporative losses that occur during standing storage and withdrawal of liquid from the tank. Standing storage losses are a result of evaporative losses through rim seals, deck fittings, and/or deck seams. The loss mechanisms for fixed roof and external and internal floating roof tanks are described in more detail in this section. Variable vapor space tanks are also emission sources because of evaporative losses that result during filling operations.

i) Fixed Roof Tanks

A typical vertical fixed roof tank is type of tank consists of a cylindrical steel shell with a permanently affixed roof, which may vary in design from cone- or dome shaped to flat. Losses from fixed roof tanks are caused by changes in temperature, pressure, and liquid level.

Fixed roof tanks are either freely vented or equipped with a pressure/vacuum vent. The latter allows the tanks to operate at a slight internal pressure or vacuum to prevent the release of vapors during very small changes in temperature, pressure, or liquid level. Of current tank designs, the fixed roof tank is the least expensive to construct and is generally considered the minimum acceptable equipment for storing organic liquids.

ii) Floating Roof Tanks

There are two types of floating roof tanks External and Internal. A typical external floating roof tank (EFRT) consists of an open- topped cylindrical steel shell equipped with a roof that floats on the surface of the stored liquid. The floating roof consists of a deck, fittings, and rim seal system. Floating decks that are currently in use are constructed of welded steel plate and are of two general types: pontoon or double-deck.

An internal floating roof tank (IFRT) has both a permanent fixed roof and a floating roof inside.

There are two basic types of internal floating roof tanks: tanks in which the fixed roof is supported by vertical columns within the tank, and tanks with a self-supporting fixed roof and no internal support columns.

1.10 DISASTER OR EMERGENCY CONTROL PLAN

When the full fledge activity of sugar & co-generation will gear up it will have to follow Factories Act 1948 with all amendments till today and any directives from Director Safety, Health & Environment [SHE] will automatically be binding on BMSL. In such

condition to appoint a qualified Safety Officer is a must & will be an adequate, wise step in such direction. On site and off site disaster control plans and their perfect implementation will be part and parcel of the management & such safety officer. To lessen the probability of hazard to occur & avoid the consequent damage, a disaster management and control plan has to be worked out for whole complex in anticipation to the threat.

1.10.1 DISASTER PREVENTIVE MEASURES

The proposed plant will have following preventive measures to avoid occurrence of disasters:

i. Specification & marking of safe area to gather in emergency.
ii. Design, manufacture and construction of plant, machineries and buildings will be as per national and international codes as applicable in specific cases and laid down by statutory authorities.
iii. Provision of adequate access ways for movement of equipment and personnel shall be kept.
iv. Minimum two numbers of gates to escape during disaster shall be provided.
v. Fuel oil storage shall be in protected and fenced. The tank will be housed in a dyke wall. As per regulations of CCOE its testing & certification will be performed each 5 years regularly.
vi. Proper colour coding for all process water, air & steam lines will be done.
vii. Proper insulation for all steam & condensate, hot water lines will be done.
viii. Provision of circuit brakers, isolation switches, signals will be provided as per electricity act & rules.
ix. Proper & rigid bonding and earthing to all equipment will be arranged.

1.10.2 FIRE FIGHTING ARRANGEMENTS

BIS 2190 provides Indian standards for firefighting equipment. All firefighting equipment and extinguishers have to be planned according to this standard.
There are 4 classes of a fire to occur:

Class	Materials	Extinguisher
A	Cotton, Cloth, paper, wood	Water type
B	Oils, Hydrocarbons, Alcohol, Greases	CO_2 type
C	Gases, CNG, LPG, Acetylene,	Foam type
D	Electrical & metals	Foam

Recommendation

The fire tender, which will be part of project with following minimum fire fighting arrangements shall be procured:

- Water tank - 500 litres
- CO_2 - 2700 litres
- Foam tank - 45 litres
- CO_2 type fire extinguishers - 6 nos of 4.5 kg each

LOCATION TYPE OF FIRE EXTINGUISHERS

- Turbo-generator area CO_2 Type, Foam Type Dry chemical powder
- Cable galleries CO_2 Type, Foam Type Dry chemical powder
- High voltage panel CO_2 Type, Foam Type Dry chemical powder
- Control rooms CO_2 Type, Foam Type Dry chemical powder
- MCC rooms CO_2 Type, Foam Type Dry chemical powder
- Pump houses CO_2 Type, Foam type dry chemical powder
- Fuel tank Area CO_2 type, Foam Type Dry chemical powder Sand Basket
- Offices & Godowns Foam or Dry chemical powder Type
- Crushers house CO_2 Type, Foam Type dry chemical powder

1.10.3 ALARM SYSTEM TO BE FOLLOWED DURING DISASTER

On receiving the message of 'Disaster from Site Main Controller, fire station control room attendant will sound Siren '**WAVING TYPE**' for 5 minutes. Incident controller will arrange to broad cast disaster message through public address system. On receiving the message of "**Emergency Over**" from incident Controller the fire station control room attendant will give "All Clear Signal" by sounding alarm straight for two minutes. The features of alarm system will be explained to one and all to avoid panic or misunderstanding during disaster.

It is necessary to take one trial for perfect functioning of the siren at least once in one week with prior intimation to Bagalkot District Collector.

1.11 HEALTH AND SAFETY MEASURES

The safety considerations in the design of the proposed project would be provided to contain and control emergency.

Health and safety measures:

- Regular inspection and maintenance of pollution control systems.
- Statuary approvals, waste treatment and disposal including stack emissions etc.
- Full fledge fire protection system.
- Gloves and protective equipment to prevent health hazards.
- Use of splash proof safety goggles and shoes.
- To impart training at various levels including contractors and transport personnel's for observing safe work practices.
- Clearly define the procedures for inspection, operation, and emergency shutdown of the process operations.
- To device systematic accident prevention program to ensure safe and healthy working environment.
- The compliance of all statutory regulations.
- Environment monitoring and control of process parameters at various unit operations by providing control measures in the plant.
- Eliminate unreasonable, research and where appropriate, implement advance technology in the design, production services and to prevent pollution as well as conserve, recover and recycle raw materials.

1.12 Project Benefit

BSML. Proposes to expand sugar from 2500 to 5000 TCD, new 30MW Cogeneration power plant at Badagandi Village, Girisagar Gram Panchayat, Bilagi Taluku, Bagalkote district, Karnataka. This project will have long run benefits in the Bilagi taluka of Bagalkote district. The important advantages of the project are as under –

- This project is agro base project as Sugar cane is the main raw material
- Sugar cane growers i.e. Farmers will fetch good price for cane.

In India many sugar factories has proved beneficial for the Rural area as regards to development is concerned.

Basically BSML is proposing not only expansion of sugar manufacturing but also additional power generation. Hence byproduct of sugar industry viz. bagasse shall be raw material for Power generation. Hence waste is reduced which is great advantage. This use of byproduct will also provide BSML an opportunity to pay higher price to Sugarcane grower.

Power shortage has become major concern in the Country. Hence BSML decision to generate power using bagasse will provide power for self consumption and also other parts of villages which are presently in dark. This will also help to pay good price to farmers. This industry will provide revenue to State and Central Government.

Being the industry located at village of Bagalkot district, there is good scope to provide various facilities like road, power, health care centers and educational institutes in the area. For this BSML is committed as it will add to Socio economic development of the villages.

Employment is another important aspect of the development. Obviously due to proposed project BSML many youths will get placements hence there the migration from village to city will be reduced.

1.13 CONCLUSION

M/s. Bilagi Sugar Mill Limited (BSML) is proposing to expand its cane crushing capacity from 2500 TCD to 5000 TCD & power generation from 8 MW to 30 MW cogen at Badagandi Village, Girisagar Gram Panchayat, Bilagi Taluku, Bagalkote district, Karnataka. The sugar plant along with cogeneration will add more revenue to farmers. After the establishment of the factory, the standard of living of the entire area will improve. The land & other infrastructure is also available. BSML proposes to adopt Zero Liquid discharge, maximum recycle of water and complete utilization of waste. The impacts would be amenable to technological control and effective environmental management in both the phases (construction & Operation).

Based on the above, it is concluded that the adverse environmental impacts due to construction and operation phase can be mitigated to an acceptable level by implementation of various mitigatory measures envisaged.