Executive Summary

Executive Summary of draft EIA report for M/s. Shri Doodhaganga Krishna Sahakari Sakkare Karkhane Niyamit, Nanadi village, Chikodi Taluku, Belagavi district, Karnataka state

1.0 PREAMBLE:

M/s. Shri Doodhaganga Krishna Sahakari Sakkare Karkhane Niyamit (DKSSKN) is having an area of 72.06 Hectares (178 Acres) in Survey Numbers 184, 185, 186, 455, 456, 621, 626, 627 & 631 falling under the revenue limits of Nanadi Village, Chikodi Taluku, Belagavi district of Karnataka State. **DKSSKN** has obtained consent for establishment from Karnataka State Pollution Control Board (KSPCB) for Sugar Plant of sugar cane crushing capacity of 5500 TCD with cogeneration plant of 20.5 MWhr, Molasses based distillery of 30 KLD & operating the same with valid consents from KSPCB. Based on the feasibility reports & availability of sugar cane DKSSKN has decided to upgrade the sugar cane crushing capacity from 5500 TCD to 10000 TCD & cogeneration of power to 20.5 MWhr to 50MWhr at a project cost of Rs. 80 Crores.

Existing buildings are spread over an area of 14.55 Hectares (35.94acres). Proposed expansion of sugar & cogeneration plants shall be located in an area of 0.78 Hectares (1.93 Acres). Around 23.6 Hectares (58.292 acres) has been developed as green belt. The balance area of 33.13 Hectares (81.83 acres) shall be vacant land. The land requirement for the proposed expansion is already in possession of the company. The total water requirement shall be 6269 m^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 project of expansion of sugarcane crushing capacity & increase in cogeneration of power requires environmental clearance from Ministry of Environment and Forests, New Delhi (MOEF) based on the EIA notification no. SO 1533 dated 14th Sept 2006 published by Union Ministry of Environment and Forests. Hence DKSSKN submitted an application for environmental clearance to State Environment Impact Assessment Authority (SEIAA) Karnataka (duly constituted by MOEF) Bengaluru for the approval of terms of reference (TOR). TOR was approved during the State Level Expert Appraisal committee (SEAC) Karnataka (duly constituted by MOEF) in the meeting held in the month of February on 9 to 11, 2015 at Bengaluru. SEIAA Karnataka issued TOR, vide letter no. SEIAA IND 22, on March 03, 2015.

1.2 HIGHLIGHTS OF THE PROPOSED EXPANSION

Name of the Promoter / company Factory Site	M/s Shri Doodhaganga Krishna Sahakari Sakkare Karkhane Niyamit, Nanadi Village, Chikodi Taluku, Belagavi district of Karnataka State
Constitution & Type :	Co-operative Company
Products & By Products	1. Sugar 2. Cogeneration power
Installed Capacity of the Project after Expansion	10000 TCD Sugar 50 MWhr cogen plant
Working days per annum	Sugar plant : 180 to 270 days (Existing) Cogen Plant: 180 to 300 days (Existing) After expansion the same routine shall be followed.
Raw material requirement per annum	Sugar cane : 1800000 MT to 270000 MT Bagasse : 450000 MT to 675000 MT
Proposed Project Cost	Rs 80 Crores
Estimated cost of environment protection	Rs. 45 Crores

Connectivity:

The proposed expansion shall be situated in the existing project site located at Nanadi Village, Chikodi Taluku, Belagavi district of Karnataka State. The area is well connected by road. The national highway connecting Pune to Bengaluru (NH4) passes at a distance of 29.7 Kms in the western direction. The state highway connecting Examba to Chikodi (SH 78) passes at a distance of 1.8 Kms in the western direction. The nearest airport is Belagavi at a distance of 71.94 Kms in the SSW direction. The site is connected by broad gauge railway line of South Western railway on Hubballi - Miraj section. The nearest railway station is Raibag located at a distance of 20.7 Kms away in the East direction. The nearest village to the plant is Ullegaddiwadi village, located at a distance of 1.359 Kms in the North direction. Chikodi is the main town and market place which is located at about 8.98 Kms in SSW direction. Belagavi is the district place & is located at about 65.312 kms away from the plant site in the SSW direction.

1.3 RAW MATERIALS 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 18.0 lakhs MT to 27.0 lakhs MT. Sugar factory is situated in the sugarcane growing area close to various sources of water in command area.

Cogen Power Plant

DKSSKN is currently operating a boiler of capacity of 125 TPH with a steam pressure of 110 Kg/cm^2**. DKSSKN** is having a standby boiler of 40 TPH operating at a steam pressure of 87 Kg /cm^2 **(This shall be kept as a standby boiler even after the proposed expansion). DKSSKN** shall install a new boiler of 130 TPH in the proposed expansion. **DKSSKN** shall implement the expansion of cogeneration power plant keeping in view of availability of additional bagasse from the Sugar plant. During the non availability of bagasse imported coal shall be used. This shall be obtained from New Mangaluru Port.

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

a. New Bagasse fired Steam Boiler of 130 TPH
b. New 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)

Water Requirement:		Consumption
Sl. No.	Particulars	
	WATER INTO SYSTEM	
1A	**Source :** Fresh water from river	**722.00**
	Usage:	
a)	Process, Water Treatment Plant (DM Plant, R.O, & U.F), for boiler make up & laboratory	677.00
b)	**Domestic:**	45.00
	Total	**722.00**

1B	Excess condensate water from sugar cane	5547.00
	Total of 1A & 1B	**6269.00**
	Waste water generation:	**Discharge**
I	**From Process (including Laboratory)**	1000.00
1)	Water Treatment Plant reject (Cogen)	85.00
2)	Boiler blow down (Cogen)	115.00
3)	Cooling tower blow down (Sugar & Cogen)	480.00
II	**Total Effluent from sugar & cogen**	**1680.00**
III	**Domestic Sewage**	**36.00**
IV	**Losses**	
	i) Vapour losses to Atmosphere	560.00
	ii) Vapour & drift loss at bearing (mill & turbine) cooling water	200.00
	iii) Vapour & drift loss from cooling tower	700.00
	iv) Vapour & drift loss from T.G. set cooling tower	110.00
	v) Steam losses at traps & vent at 3% on cane	300.00
	vi) Domestic water loss	9.00
	vii) Vapour loss at crystallization & centrifugation	290.00
	viii) Flash vapour loss at clarifier	110.00
	ix) Vapour loss at mill	110.00
	x) Water going along with product & by products viz. Sugar, Bagasse, Molasses, press mud	1840.00
	Total Losses	**4229.00**
V	**Excess condensate to recycling system**	**324.00**
	Total of II, III, IV & V	**6269.00**

1.5 BASELINE ENVIRONMENTAL STATUS

1.5.1 PHYSICAL ENVIRONMENT

Site Location and its Surroundings

Features	**Details**
Altitude	575.60 m above MSL.
Longitude	$74^0$36’42.84” & $74^0$37’09.29” East
Latitude	16^0 30’04.60” & 16^0 30’35.43” North
Village, Taluk, District, State	Nanadi Village, Chikodi Taluku, Belagavi district of Karnataka State.
Max. Temp.	45^oC
Min. Temp.	14^oC
Relative Humidity	38 to 69 %
Annual rainfall	600 mm
Land availability	72.06 Hectares (178 Acres)
Topography	Plain
Soil Type	Black Cotton
Nearest Rivers	Doodhaganga river - 6.56 Kms NNW Krishna river - 8.17 kms NE
Nearest National Highway (NH) & state highway (SH)	NH 4 connecting Pune to Bengaluru - 29.7Kms W SH -78 connecting Examba to Chikodi -1.8Kms W
Nearest Railway station	Raibag - 20.7 Kms in East direction.

Nearest Industries	None within 10 kms radius
Nearest Village	Ullegaddiwadi village-1.359 Kms in N direction.
Nearest town	Chikodi is the main town & market place which is located at about 8.98 Kms in SSW direction.
Nearest district place & Air port	Belagavi (Sambra) – 65.312 Kms SSW
Historical places, Monuments, Heritage sites, wild life sanctuaries, national parks, elephant / tiger reserves, Eco sensitive zones	None within 10 kms radius

* Note: All distances mentioned in the above table are aerial distances.

The plant site is located at Nanadi Village, falling under the revenue limits of Chikodi Taluku, Belagavi district of Karnataka State with an average MSL of about 575.60 m. The site falls at 16^0 30'04.60" & 16^0 30'35.43" North Latitude and $74^0$36'42.84" & $74^0$37'09.29" East longitude. Parts of the study area fall within the Survey of India Toposheet Nos. 47 L/5, 47 L/6, 47 L/7, 47 L/10 (Scale: 1:50000).

The area is well connected by road. The national highway connecting Pune to Bengaluru (NH4) passes at a distance of 29.7 Kms in the western direction. The state highway connecting Examba to Chikodi (SH 78) passes at a distance of 1.8 Kms in the western direction. The nearest airport is Belagavi at a distance of 71.94 Kms in the SSW direction. The site is connected by broad gauge railway line of South Western railway on Hubballi - Miraj section. The nearest railway station is Raibag located at a distance of 20.7 Kms away in the East direction. Doodhaganga river is the nearest major water body & is located at a distance of 6.56 Kms in NNW direction. The nearest village to the plant is Ullegaddiwadi village, located at a distance of 1.359 Kms in the North direction.
Chikodi is the main town and market place which is located at about 8.98 Kms in SSW direction. Belagavi is the district place & is located at about 65.312 kms away from the plant site in the SSW 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 PM_{10} and $PM_{2.5}$ micron Sulphur Dioxide (SO_2) 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 & 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, & Water with Direction

Sl. No.	Stations	Distance from plant site Kms	Direction w.r.t plant site
A1	Plant Site	-	-
A2	Nanadi	2.402	NW
A3	Ullegaddiwadi	1.427	N
A4	Kerur Kadapur road	3.473	NE
A5	Roopnal	3.003	E
A6	Nagral	6.017	SW
A7	SH 78	2.552	NW
A8	Malikwad	5.347	NW
A9	Kadapur	4.90	EES

1.5.4 Air Environment

Sl. No./ Code	Names of locations	98TH PERCENTILE VALUES			
		PM_{10}	$PM_{2.5}$	SO_2	NOx
A1	Plant Site	50.68	15.07	11.71	18.60
A2	Nanadi	61.06	19.12	14.98	20.30
A3	Ullegaddiwadi	48.65	20.46	10.31	15.52
A4	Kerur Kadapur road	51.39	24.39	7.90	13.28
A5	Roopnal	41.85	21.38	7.90	13.28
A6	Nagral	50.01	16.26	9.52	19.47
A7	SH 78	56.45	26.47	7.90	13.28
A8	Malikwad	58.92	19.04	9.71	11.80
A9	Kadapur	58.92	19.04	9.71	11.80

Note: CO values are observed less than 1 ppm during study period.

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 recorded were found to be in the range of 49.2 to 61.0 dB (A) during daytime and in the range of 38.2 – 44.1 dB (A) during night time.

Sr. No.	Monitoring Location/ Village	Day time Noise Level in dB(A) Leq(D)	Night Time Noise Level in dB(A) Leq(N)	CPCB Standards in dB(A)	
				Day Time Noise Level	Night Time Noise Level
N1	Project Site	61.0	44.1	75.0	70.0
N2	Nanadi	54.0	43.8	55.0	45.0
N3	Ullegaddiwadi	52.2	40.2	55.0	45.0
N4	Kerur Kadapur road	52.8	38.2	55.0	45.0
N5	Roopanal	49.2	37.1	55.0	45.0
N6	Nagral	50.2	41.2	55.0	45.0
N7	Malikwad	51.7	40.1	55.0	45.0
N8	Kadapur	52.8	41.0	55.0	45.0

1.5.6 Water Quality

The ground water quality at six locations was monitored. It was observed the hardness of water was in the range of 175 to 505 mg/l which is not on higher side. All the samples were found within the limits specified by IS 10500 except surface water samples.

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, Tamarind, Karanj, Umber, Pipal, Babul and some common trees were observed. As regards fauna is concerned Mongoose, jackal, Squirrel were among the mammals, frog from amphibian, Naja-Naja, Viper from reptiles were noticed. Among the avifauna, Drango, Parrot, Crow, and Green bee eater were 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 will be of one and half year whose activities will surely show effects on land environment, water, air, noise level, soil quality, socio-economic trend etc. As the expansion shall take place within the existing area, its impact on air, water quality, noise and soil will not be notable. This activity will have a positive impact in case of Socio-economic culture for the people in the nearby villages. They will have a chance for local employment in foundation, fabrication, brick masonry, painting and machinery erection works. Along with that tree plantation will be one of the activities. As local workers are involved in the construction phase, impact at site will be negligible.

1.6.2 IMPACT DURING OPERATIONAL PHASE

The plant operational activities will have impact on physical environment (air & water quality, noise level, cropping pattern etc.) and on socio-economic environment. No land /topography alteration is envisaged in the operation phase of the sugar & cogeneration power plants.

1.6.2.1 Impact on Air Environment

Prediction of impacts 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.

DKSSKN's proposed increase in power generation from cogeneration unit from 20.5 MWhr to 50 MWhr requires 2500 MT per day bagasse as fuel for both the boilers when operated on 100% bagasse. Imported washed coal shall be used as an auxiliary fuel along with bagasse during non crushing season. This expansion of the cogen project meets the heat & power needs of DKSSKN after expansion and excess power shall be exported to the KPTCL grid.

Stack Details of Proposed Boiler

Sl. No.	Stack attached to	Fuel in TPH	Emission Rate (g/s)	Stack Height in m AGL	Diameter of stack in (m)	Exit Gas Temp. (K)	Velocity (m/s)
1	Boiler of capacity 130 TPH	Bagasse 55 to 60	0.651 (ESP shall be of 99% efficiency)	90	3.0 to 3.5	412	15

OVERALL SCENARIO

The maximum ground level concentration due to emissions boiler are superimposed on the maximum baseline concentrations obtained during the study period. The overall scenario with predicted concentrations over the baseline is shown below.

OVERALL SCENARIO («g/m^3)

	GROUND LEVEL CONCENTRATIONS		
24-Hourly Concentrations	**Particulate matter (PM10)**	**Sulphur dioxide (SO_2)**	**Oxides of Nitrogen (NOx)**
Baseline Scenario (max)	61.06	14.98	20.300
Predicted Ground level Concentration (Max)	0.092	2.96	9.757
Overall Scenario	61.152{100}*	17.94 {80}*	30.057{80}*

***NOTE:** The values in parentheses is the CPCB limit for Industrial, rural & residential areas.

1.6.2.2 IMPACT ON WATER ENVIRONMENT

The earth work includes cutting and filling. Excavation activities shall be done avoided during rainy season and shall be completed during the winter and summer seasons. Stone pitching on the slopes and

construction of concrete drains for storm water to minimize soil erosion in the area will be undertaken. Settling pond is existing for storage and recycling of surface water for use in the plant area. The development of green belt in and around plant is more than 33%. In plant roads are metalled. Toilets with septic tanks are available at site for construction workers. The overall impacts on water environment during construction phase due to proposed expansion activity shall be temporary and marginal.

1.6.2.3 Impact On Noise Levels

In the proposed expansion equipment in the sugar and cogeneration plants shall be designed for noise levels not exceeding 90 dB (A). Proper encasement of noise generating sources will be done to control the noise levels below 75 dB (A) at plant boundary.

The steam turbine generator shall be provided with acoustic enclosures and silencers in the exhaust. The steam turbine is housed in a closed building which is considerably reducing the noise. In case of maintenance, the persons working near the steam turbine generator building are provided with ear muffs.

A scientifically designed thick greenbelt over an area of 33% [23.6 Hectares (58.292 acres)] is already developed all around the plant which is acting as noise barrier.

In general the following methods shall be adopted to control the noise pollution from the proposed expansion.

- The use of concrete and masonry walls & barriers keeping in view the benefits of stiffness weight & cavity construction & the need to provide well sealed sound attenuating doors & windows.
- The use of complete or partial enclosures.
- Attenuation by use of sound absorbents on walls and fixed or suspended ceilings
- Introduction of control and monitoring rooms having good sound insulation properties.
- The reduction or elimination of noise leakage paths
- The use of vibration insulation techniques
- The use of ducts and plenum chambers

The use of mufflers, sound attenuation and acoustic louvers in air flow paths, taking particular care to direct inlet and discharge an opening away from critical areas wherever possible, so as to take advantage of direct effects.

Impact of Vehicular traffic

As a matter of fact of Power Plant does not invite heavy vehicular traffic at the site. There will be an increase in the traffic to and from the site. Vehicles used for transportation of coal would be a bullock cart, 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 centre line 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, increase in the noise level is less than CPCB limits for rural and Residential areas. Hence noise level impact of the traffic is negligible.

Impact on Topography

The area of the proposed plant is more or less flat terrain. It is predominantly covered with fine to medium grained clay loam as top soil with underlying compacted dense sand. During the construction phase levelling would be required. Apart from the localized construction impacts confined to the plant site, no significant long term adverse impact on topography is envisaged.

Impact on Soil

The solid waste generated from the proposed expansion of sugarcane crushing unit is mainly in the form of molasses, pressmud & bagasse. Boiler ash will be generated from cogen power plant. This solid waste in case dumped on land unscientifically may create soil degradation or underground water pollution.

Mitigation:

Molasses produced from the sugar unit is used as a raw material in the existing 30 KLD distillery for production of rectified spirit. Excess molasses from the proposed expansion of sugarcane crushing capacity shall be stored in molasses storage tanks/ sold to other distilleries. Press mud is sold / given to member farmers to use as compost after mixing it with boiler ash & spentwash. Bagasse is used / shall be used as fuel for power generation from cogeneration unit. Fly ash generated during combustion in boiler during non crushing season shall be sold as a raw material for brick manufacturing.

Socio-economic Environment

Like other sugar factories **DKSSKN** is also located in an isolated area. DKSSKN management thought that it would be advantageous to improve the living conditions of people in and around the plant site. It also proposes to employ local skilled and unskilled workers in the proposed expansion of sugar & cogeneration plants. It will therefore generate employment in the local area. **DKSSKN** has already initiated process to select & employ key persons for the proposed expansion. In the nearby future permanent employment & creation of additional residential facilities will give the surrounding people the space to reside & get settled in the area.

It will resolve power crisis and will enhance earnings for village people. In turn local people can avoid uncertainty of jobs, raise their living standards, do supplementary jobs of cane & other farming, cattle, poultry, brick making unit etc. thus to stabilize & prosper in life. This will surely make a positive impact.

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

- Air pollution control equipment like Electrostatic precipitator shall be implemented to reduce ground level gaseous emission concentrations.
- Maximum number of bullock carts will be used to transport sugarcane from the farms to the mill site as far as possible which is an environment friendly way out.
- It will be ensured that all vehicles used in transportation have PUC Certificate. It is proposed to have an auto exhaust emission monitoring equipment and trained manpower to carry out PUC checks at regular intervals.
- **DKSSKN** has laid all internal roads as tar roads and regular water sprinkling is carried out in sugarcane yard & for ash quenching.
- Tree plantation to the extent of 33% of area to lessen environmental impacts of the proposed activities is already implemented. Plantation program was well designed and a budget for maintenance of the greenbelt is allocated every year.
- Speed breakers on roads at regular intervals all over the plant area and / or attachment of speed locking system to the accelerators of all vehicles are used / will be used to restrict a speed limit of 20 Kms/hr.
- Existing vehicle parking area is sufficient for the proposed expansion.
- No overloading of bullock carts, Trucks, tippers, tractor trailers used in transporting sugar cane from the agriculture fields, pressmud, boiler ash, biocompost, tankers carrying molasses rectified spirit from the factory will be permitted.

1.7.2 Noise Pollution Control

Relevant noise emitters at DKSSKN are noise-making equipment such as Cutters, Crushers, Mixers, Compressors, Pumps, Centrifuges, Heat exchangers, Vacuum Filters, Boilers, and Turbines, D.G. Sets etc. All the equipment produce continuous noise. As deliberated in Chapter –IV, noise level impacts of DKSSKN operations are significant only on the operators of machinery and are negligible within buffer zone. This is because the noise produced by this machinery gets dissipated due to wave divergence, atmospheric absorption and absorption by noise barriers before being even felt in the buffer zone.
The continuous hammering of noise on the ears of the staff working in the factory premises may lead to some health problem, it can be circumvented by having small cabins with polycarbonate sheet or glass partition where in officers can carry out day-to-day work peacefully.
Following measures are already adopted / proposed for controlling noise level impacts on machinery operators and within core and buffer zone of DKSSKN.
Proper lubrication and regular maintenance of all the machinery used.
Developed greenery / barriers / landscaping of trees/ bushes and shrubs.
Reduced noise exposure to the operators of machinery by work scheduling and by providing ear protective equipment.
Rubber packing in the foundations of machineries to prevent noise transmission to the surrounding.

Water Pollution control

DKSSKN has taken due care for water management especially in the heavy soil region by providing a proper drainage system. The region has natural slope and the higher region is free from water logging.

The inputs like pesticide, insecticide, fungicide, micro – nutrient fertilizers, seeds of green manure, organic compost are easily available. There is no difficulty in procuring crop loans.

For implementing the above mentioned programs in the command area, training programs, Kisanmela [Ryatar Jatre] etc. are conducted in various parts of the operational area. Thus, the gap between potential yield & actual yield is considerably reduced.

It is to be noted that due to the developmental activities already introduced by DKSSKN, sugarcane cultivation has improved. Many new cane varieties have been introduced and hence it can be concluded that systematic as well as sustained efforts have helped to increase the yields of sugarcane.
Farmers are anxious about DKSSKN expanding the sugarcane crushing capacity at the existing factory site. Non-members of DKSSKN are attended properly better than the present SSKs. Farmers are of the view that the growing area of sugarcane has been increasing steadily for the last few years as more irrigation facilities have come up in the command area. However, following things shall be taken care of in the proposed expansion of DKSSKN.

1. Cane price is paid / shall be paid on par with the existing SSKs.
2. Good quality seed material of sugarcane is / shall be provided by DKSSKN.
3. At the time of plantation, crop loan and basal dose of fertilizer is linked / shall be linked so that farmers apply the basal dose of fertilizer
4. DKSSKN has made arrangement for soil testing and accordingly fertilizer doses are recommended. It shall be done not only for members of SSK but also for all the farmers who supply sugarcane to DKSSKN
5. DKSSKN is providing /shall provide the seeds with green manure. It is reported by a number of farmers that organic fertilizer coupled with chemical fertilizers if applied in balanced quantity, give a considerably higher yield of sugarcane particularly in medium and light soils.
6. Due to benefits accrued from the irrigation project, the number of electric pumps operating in the area as well as new pump connections would increase and there would be a long waiting list for electricity shortage and low voltage problems. DKSSKN would ensure constant and continuous electricity supply for agricultural operations.
7. Farmers are imparted / shall be imparted training in sugarcane cultivation.
8. Press mud and bio-compost are made available.
9. Interest rates are uniform in case of non-members as well as members.
10. Timely payment is made to farmers.

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 is / shall be treated and the organic loading shall be polished to such 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 6.0 to 8.0 Kms.

M/s DKSSKN is having two Effluent Treatment Plants [ETP's] having a capacity of 1000m^3/d each. The treatment scheme incorporated in the old ETP is two stage anaerobic treatment followed by single stage Activated Sludge Process [ASP] with surface aerators as per the directions of KSPCB.

The treatment scheme incorporated in the new ETP is two stage aerobic treatment method for the effluent with the state of the art of diffused Aeration Technology as per the directions of KSPCB.

1.7.3 SOLID WASTE MANAGEMENT

Fly ash collected from the ESP hoppers, the air-heater hoppers and the ash collected from the furnace bottom hoppers can be used as landfill, during the seasonal operation of the plant, when Bagasse will be the main and only fuel for burning. The ash content in Bagasse is less than 1 %. 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 be used in landfill. The high potash content in the Bagasse ash suits its use as good manure. As the filter press mud from the sugar plant also has a good land nutrient value, it is proposed to mix the ash and the press mud and sell the same to the farmers to be used in the cane fields. The maximum ash generated using Bagasse, biomass and cane trash as fuels will be about 6750 MTPA. This generated ash if extra (i.e. not lifted by the farmers), will be given to entrepreneurs to convert to bio compost, brick manufacturing.

Sl. No.	Description of by products / Solid Waste	Quantity per month in MT		Mode of Disposal
		Existing	After Expansion	
01	Molasses	6600	12000	Used as raw material for manufacturing of Rectified Spirit in the existing distillery & excess shall be sold to other distilleries.
02	Bagasse	52800	96000	Used as fuel for captive power generation
03	Press mud	6600	12000	Shall be mixed with boiler ash and given as manure to member farmers.
04	Boiler ash	540.0	720.0	Shall be mixed with press mud and given as manure to member farmers.
05	ETP Sludge	54.0	108.0	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 also causes aesthetics and climatologically improvement of area as well as sustains and supports the biosphere. It is an established fact that trees and vegetation acts as a 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 was carried out as per CPCB guidelines, & local species were preferred.

For effective control of air pollutants in and around the proposed industry, a suitable green belt was developed 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.

The species that have history of good survival and growth under similar site conditions were planted. Around 9000 trees are existing which are more than 30 years old.

1.7.5. BUDGET FOR ENVIRONMENTAL MANAGEMENT

The estimated operating cost for environmental management is Rs. 178 Lacs. DKSSKN has made a provision of Rs. 4500 Lacs for implementation of EMP.

CSR provision by DKSSKN:

DKSSKN is planning for develop nearby villages as per the identified requirement of the region under CSR activity. This will increase the social and economic sector of the region. DKSSKN has decided to adopt three nearby villages to implement CSR. The identified villages are Nanadi, Ulegaddiwadi, Roopanal. 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, upgradation 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 & 1000m 1 sample at up wind direction at 500m	24 hrs sample half yearly
Flue gas from Chimney for flow rate SPM, RSPM, SO_2, NO_X	Sampling port of chimney	Monthly
Meteorological data	Site	Daily
Ground Water	1 Km from ETP 2 locations on where the treated wastewater is used for land irrigation/gardening	Half Yearly
River water	1 each down and upstream	Quarterly
Soil	From the agriculture land utilizing the pressmud, boiler ash & treated effluent for agriculture.	Pre and post Monsoon
Waste Water	At site of final discharge point	Monthly
Water From Bore well	In the vicinity of the factory	twice a year

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 industrial unit, 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 & 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

1.9.1.1. 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.

1.9.1.2. 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

Qualitative methods used in risk analysis namely preliminary risk analysis (PRA), hazard and operability study (HAZOP), and failure mode and effects analysis (FMEA/FMECA) are dealt in this section.

1.9.2.1. Preliminary Risk Analysis (PRA)

Preliminary risk analysis or hazard analysis is 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.
The 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 helps in identifying activities lacking safety measures. 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.

1.9.2.2. 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.

1.9.3. Noise Exposure

High sound levels may be generated from the equipment 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 located close to the machines during manufacturing are exposed to noise.

1.9.3.1. Mitigation measures

- 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.

1.9.4. STORAGE OF FLAMMABLE LIQUIDS

Dangerous Substances and Explosive Atmospheres create risks from the indoor storage of dangerous Substances. This has 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 the container.

1.9.4.1. Handling: Wash thoroughly after handling. Use only in a well-ventilated area. Use ground and bound containers during transfer of the material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers, retained product residue, (liquid and/or vapour), and can be dangerous. Keep containers 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.

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

1.9.5. 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 vapour space tanks are also emission sources because of evaporative losses that result during filling operations.

1.9.5.1. 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. In the 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.

1.9.5.2. Floating Roof Tanks

There are two types of floating roof tanks viz. 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 fledged activity of sugar & co-generation will gear up after expansion it will have to follow Factories Act 1948 with all its amendments till date. Any directives from Director Safety, Health & Environment [SHE] will automatically be binding on **DKSSKN**. In such a 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 & safety officer. To lessen the probability of hazard that may occur & avoid the consequent damage, a disaster management and control plan has to be worked out for the whole complex in anticipation to the threat.

1.10.1 DISASTER PREVENTIVE MEASURES

The proposed expansion 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 area and fenced. The tank will be housed in a dyke wall. As per regulations of CCOE it's testing & certification will be performed every five 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.
x. Meagre value of earthing connections will be checked each 6 months and the records will be kept.
xi. System of fire hydrants comprising, of electrical motor driven fire pumps is planned. The fire hydrant system will have electrical motor and a generator driven jockey pump to keep the fire hydrant system properly pressurized.
xii. Automatic water sprinkling system is planned for all transformers.

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 four 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 a part of the 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 kgs 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 a week with prior intimation to **Belagavi Deputy Commissioner.**

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.
- Statutory approvals, waste treatment and disposal including stack emissions etc.
- Fully fledged 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 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.
- 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.
- The workers exposed to noisy sources will be provided with ear muffs/plugs.
- Preventive maintenance activities so as to have smooth operations.
- Audit programs must be carried out to review the management system for identifying, evaluating and controlling environmental, health and safety hazards.
- The health of the workers will be regularly checked by a well qualified doctor and proper records will be kept for each worker.

1.12 Project Benefits

M/s. DKSSKN proposes to expand the existing sugar cane crushing capacity from 5500 TCD to 10000 TCD sugar mill and 20.5 MW to 50 MWhr Cogeneration power plant at Nanadi village falling under the jurisdiction of **Chikodi taluku**, Belagavi district in Karnataka . The benefits of the project can be stated as follows:

- Nearby villages falling under the jurisdiction of **Chikodi taluku** the irrigation schemes and sugarcane growing area will be sufficient to fulfill the raw material requirement of **DKSSKN.**
- This project will have long run benefits **Chikodi taluku** of Belagavi district. Sugar mill is an agro based project using Sugar cane as sole raw material. Sugar cane cultivators i.e. Farmers will receive many benefits such as transport, education, community center etc.

- In the first stroke due to less distance from the farms they will get good price for cane. Next, farmers will get treated waste streams to be used as nutrients on farms. Thus they will achieve good returns for cane.
- Utilizing conservation plan they will get precious nutrients at merely throw away price. In this area crops like cotton, tur, jawar, bajra are cultivated, which will also fetch profits to the farmers.
- Solid waste of sugar mill i. e. Bagasse is useful for power generation
- There will be remarkable reduction in the waste from the complex. Thus such an attempt of use of waste material will also provide **DKSSKN** an opportunity to pay higher price to sugarcane grower.
- **DKSSKN** plans to sell excess molasses to other distilleries that produce anhydrous ethanol to provide precious fuel to automobiles and contribute to save Petrol, thereby foreign exchange. Indian Oil sector obtains fuel ethanol from sugar sector with good price.
- Power shortage is a crucial issue in the Country. A decision to opt for additional capacity of co-generation by **DKSSKN** using bagasse will provide power for self consumption and also other parts of villages under rural electrification plan.
- This will raise funds to pay good price to farmers. This industry will provide revenue to State and Central Government.
- In the nearby villages good scope exists to provide facilities like road, power, health care centers and educational institutes in the area. **DKSSKN** has already initiated socioeconomic development of the nearby villages.
- It will be a nucleus for forecasted accelerated growth in the region near Nanadi villages falling under the jurisdiction of **Chikodi taluku.** As liquid cash will be available to the farmers', supplementary units to farms like poultry, cattle growing and milk products and other food items, silkworm growing and silk weaving, Edible seeds crushing to yield oils, handmade paper units can be initiated. **DKSSKN** shall initiate this plan amongst the villagers and farmers jointly.
- Both direct and indirect employment is next important issue at the door step. **DKSSKN** has initiated recruitment of senior staff and persons needed in construction phase to minimize migration from village to city.
- At the national and the state levels the benefits include decentralized power generation, reduction in T&D loss, reduced emissions, reduction in the imports of petroleum products, increased tax revenues and reduction in the transportation cost. The project will have excellent multiplier effect and will become truly a win-win situation for all the stakeholders and for local people.

1.13. CONCLUSION

M/s. DKSSKN is proposing to expand its cane crushing capacity from 5500 TCD to 10000 TCD & power generation from 20.5 MW to 50 MW cogen at Nanadi Village, Chikodi Taluku, Belagavi district, Karnataka. This expansion will add more revenue to farmers. After the expansion of the factory, the standard of living of the entire area will improve. The land & other infrastructure are already available. **DKSSKN** 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.