Best Vision Towards Environment

GADAG ENVIRO TECH PRIVATE LIMITED.

(Bio-Medical Waste Management Systems)

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Mobile : +91 9986042986, +91 9880088750, E-Mail:gadagenviro@gmail.com

Project Office : Plot No 48-P, Narsapura Growth Center, KIADB,Gadag-582102, Karnataka, India
Mobile : +91 9620978080, +91 9620878080.

Date: 22.8.2018

To,
Member Secretary : Infra-2,
Ministry of Environment Forest and Climate Change,
Room No – 232, Agni Block,
Indira Paryavaran Bhavan, Jor Bagh Road,
New Delhi – 110 003

Sir,

Sub: Environmental Clearance for the Proposed Hazardous Waste Incineration Facility at Plot No.125, Gadag Industrial Area of KIADB, Narasapura, Gadag District, Karnataka.

Ref: 1. 32nd Expert Appraisal Committee meeting (Infra -2) held on 2nd to 4th July 2018.
2. Minutes of meeting of the 32nd Expert Appraisal Committee meeting

We refer to the above subject and hereby wish to bring to your kind notice that we are coming up with Hazardous Waste Incineration Facility at the above said location.

We hereby wish to communicate that our project proposal was presented before EAC in its meeting cited at reference (1) above. Minutes of meeting for the proposal is cited in reference (2) above.

The proposal was appraised and additional information was sought. We are now, hereby submitting the following information / documents as per the Minutes of meeting document:

1. Revised Form 1 is appended as Annexure – 1.
2. A write up on how the proposal conform to the stipulations made in the "Protocol for Performance Evolution and Monitoring of the Common Hazardous Waste Treatment Storage and Disposal facilities including common Hazardous Waste Incinerators", published by the CPCB on May 24, 2010. Form 2, Environment Impact Assessment Study Report along with other documents (Appended as Annexure – 2)
3. Status of Ambient Air quality monitoring stations established and operated in consultation with the State Pollution Control Board is appended as Annexure – 3.
4. Details of Corporate environmental responsibility is appended as Annexure – 4.
5. Form 2 as per MoEFCC's OM No. 22-8/2018-IA-III dated 20th April, 2018 is appended as Annexure – 5.

We trust that the same is in order and request you to kindly process our proposal for issue of Environmental Clearance at the earliest and oblige.

Thanking you,
Yours faithfully,
for GADAG ENVIROTECH PVT. LTD.,

D. K. NAGARAJ
Director

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APPENDIX I

(See paragraph – 6)

FORM 1

(I) Basic Information

1	Name of the Project	M/s. Gadag Envirotech Pvt. Ltd.,
2	Sl. No. in the schedule	Serial No. 7(d) – "A" Category in the schedule under EIA notification – 2006.
3	Proposed capacity/area/ length/tonnage to be handles/command area/lease area/number of wells to be drilled	Plot area: 4,047 sq m (1 Acres) Cost: Rs. 2.5 Crores Incinerator capacity: 250 Kg/hr
4	New / Expansion / Modernization	New project
5	Existing capacity / Area etc.,	-
6	Category of project i.e., `A` or `B`	A
7	Does it attract the general condition? If yes, please specify.	No
8	Does it attract the specific condition? If yes, please specify.	No
9	Plot/Survey/Khasra No.	Plot No.125, KIADB Narasapura Industrial Area, Gadag- 582102.
	Village	Betageri
	Thesil	Gadag
	District	Gadag
	State	Karnataka
10	Nearest railway station/airport along with distance in Kms.	Gadag Railway Junction- 4.2 Kms towards NE Hubli Airport - 70 Kms towards SW
11	Nearest Town, City, District Headquarters along with distance in Kms.	Nearest town – Betageri City & District – Gadag
12	Village Panchayats, Zilla Parishad, Municipal Corporation, Local body (Complete postal addresses with telephone nos. to be given)	Zilla Panchayat, Mini Vidhana Souda , Hubli Road - Gadag 582101. Phone : 08372 - 234375 E-Mail : ceozp.gdg@gmail.com
13	Name of the applicant	Mr. Nagaraj

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14	Registered address	M/s. Gadag Envirotech Pvt Ltd. Plot No.125, KIADB Narasapura Industrial Area, Gadag.
15	Address for correspondence:	As above
	Name	Mr. Nagaraj D K
	Designation (Owner/Partner/CEO)	Director
	Address	Head Office 377, Kurugunteshwar Nilaya, Chikkasandar Nagar, Hesargatta Main Road, T. Dasarhalli, Bengaluru.
	Pin Code	560057
	E – mail	gadagenviro@gmail.com
	Telephone No.	9845449405
16	Details of alternative Sites examined, if any. Location of these sites would be shown on a topo sheet.	No alternative sites are examined. The proposed location is in notified industrial area.
17	Interlinked Projects	Not interlinked.
18	Whether separate application of interlinked project has been submitted?	NA
19	If yes, date of submission	NA
20	If no, reason	Proposed project is Hazardous Waste Incineration Facility.
21	Whether the proposal involves approval/clearance under: if yes, details of the same and their status to be given a) The Forest (Conservation) Act 1980? b) The wildlife (Protection) Act, 1972? c) The C R Z Notification, 1991?	 No No No
22	Whether there is any Government Order/Policy relevant/relating to the site?	The project site is KIADB allotted land. Land allotment letter is appended in the EIA report.
23	Forest land involved (Hectares)	None
24	Whether there is any litigation pending against the project and/or land in which the project is propose to be set up? a) Name of the court b) Case No. c) Orders/directions of the court, if any and its relevance with the proposed project.	 None

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(ii)Activity:

1. Construction, operation or decommissioning of the Project involving actions, which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.,)

Sl. No	Information/Checklist confirmation	Yes /No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
1.1	Permanent or temporary change in land use, land cover or topography including increase in intensity of land use (with respect to local land use plan)	Yes	The project site is located within Gadag Industrial area, developed by KIADB. The extent of land is One Acre only. There will be construction of factory building and erection of Incinerator.
1.2	Clearance of existing land, vegetation and buildings?	No	Vacant plain land. There is no tree in the plot. Before construction the shrubs and other rank vegetation will be cleared.
1.3	Creation of new land uses?	No	In the industrial land the factory building will be constructed.
1.4	Pre-construction investigations e.g. bore houses, soil testing?	Yes	Geotechnical investigations is required to be carried out for the construction of factory building.
1.5	Construction works?	Yes	The proposed project involves construction of factory building and erection of Incinerator.
1.6	Demolition works?	No	There is no demolition work involved in the proposed project site.
1.7	Temporary sites used for construction works or housing of construction workers?	No	No such facility will be provided within the premises as the workers will be from nearby places surrounding the industry.
1.8	Above ground buildings, structures or earthworks including linear structures, cut and fill or excavations (Calculation for earth work estimation)	Yes	All the structures will be located above the ground and the construction activity will involve providing foundation for the buildings and erection of plant and machinery required for the activity. All the excess excavated soil if any will be used for refilling the plinth

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			and landscaping.
1.9	Underground works including mining or tunneling?	No	NA
1.10	Reclamation works?	No	NA
1.11	Dredging?	No	NA
1.12	Offshore structures?	No	NA
1.13	Production and manufacturing processes?	Yes	The proposed project is Hazardous Waste Incineration Facility. Incineration system contains basic elements such as: 1. Waste Receiving and Storing Area 2. Feeding Section 3. Incineration Section /Combustion chamber- primary and secondary and 4. Pollution Control devices
1.14	Facilities for storage of goods or materials?	Yes	Temporary sheds will be constructed for storage of construction materials.
1.15	Facilities for treatment or disposal of solid waste or liquid effluents?	Yes	2000 LPD Scrubber Bleed will be generated in the process. It will be treated in ETP and treated effluent will be used for scrubbing flue gas in venturi scrubber and reused. Around 700 LPD of domestic wastewater will be generated from the project and will be treated in septic tank and disposed into soak pit. Solid Waste: Solid Waste Generation during the Operation Phase is Incinerated ash, ash from furnace and emission collected in bag filter. The approximate quantity of above solid waste is about 20 MT/Year. This ash is collected and disposed to TSDF.

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			disposed to TSDF. The Domestic Solid Wastes generated during operation phase will be collected, composted in compost pits and the product will be used as manure for landscape development.
1.16	Facilities for long term housing of operational workers?	No	No long term housing plan for the operational worker is not planned in the proposed project as the local population residing in the surrounding areas of the project site will find employed.
1.17	New road, rail or sea traffic during construction or operation?	No	NA
1.18	New road, rail, air waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc.	No	NA
1.19	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?	No	NA
1.20	New or diverted transmission lines or pipelines?	No	NA
1.21	Impoundment, damming, culver ting, realignment or other changes to the hydrology of watercourses or aquifers?	No	NA
1.22	Stream crossings?	No	NA
1.23	Abstraction or transfers of water form ground or surface waters?	Yes	The water supply is from KIADB sources.
1.24	Changes in water bodies or the land surface affecting drainage or run-off?	No	Not expected.
1.25	Transport of personnel or materials for construction, operation or decommissioning?	Yes	There will be minor increase in traffic due to the movement of vehicles carrying construction materials during the construction

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			phase and due to movement of employees to and fro to the industry during the operation phase. During both the construction and operation phase the local transport facility will be availed. This will not have a major impact on the existing traffic in the region.
1.26	Long-term dismantling or decommissioning or restoration works?	No	NA
1.27	Ongoing activity during decommissioning which could have an impact on the environment?	No	NA
1.28	Influx of people to an area in either temporarily or permanently?	Yes	Construction phase – 35 Nos Occupancy phase – 18 Nos
1.29	Introduction of alien species?	No	Not expected.
1.30	Loss of native species or genetic diversity?	No	Not expected.
1.31	Any other actions?	No	NA

2. Use of Natural resources for construction or operation of the Project (such as land, water, materials or energy, especially any resources which are non-renewable or in short supply):

Sl.No	Information/checklist confirmation	Yes/ No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
2.1	Land especially undeveloped or agricultural land (ha)	Yes	The project site is located in Gadag Industrial area developed by KIADB.

2.2	Water (expected source & competing users) unit: KLD	Yes	• The water supply is from KIADB.
			• Total water requirement is about 4 KLD.
			  • Domestic purpose – 800 LPD
			  • Gardening – 1200 LPD
			  • Scrubbing floor and vehicle washing – 2000 LPD

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2.3	Minerals (MT)	No	NA
2.4	Construction material – stone, aggregates, sand / soil (expected source – MT)	Yes	Construction materials will be sourced from the locally available resources as per requirement.
2.5	Forests and timber (source– MT)	No	The timber requirement is very meager.
2.6	Energy including electricity and fuels (source, competing users) Unit: fuel (MT), energy (MW)	Yes	Power Requirement: Power source for the industry is KPTCL. The total power requirement of the project is 50 HP. One DG Set of 63 kVA capacity is proposed to serve as backup power supply during power failure. Fuel requirement Low Sulphur content Diesel is used as fuel and consumption is 12.6 L/hr.
2.7	Any other natural resources (use appropriate standard units)	No	NA

3. Use, storage, transport, handling or production of substances or materials, which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health.

Sl No	Information/Checklist confirmation	Yes /No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
3.1	Use of substances or materials, which are hazardous (as per MSIHC rules) to human health or the environment (flora, fauna, and water supplies)	Yes	Used DG oil– 0.05 KL/A shall be collected in leak proof containers and disposed only to CPCB registered reprocessors /common collection Centre provided the oil meets the standards as per schedule- 5 of the rules. Incinerator ash and bag filter

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			particulates – 20 MT/year. Collected Stored in Secured manner and sent to TSDF. Discarded containers: 5 MT/year containers will be used for collecting hazardous wastes.
3.2	Changes in occurrence of disease or affect disease vectors (e.g. insect or water borne diseases)	No	NA
3.3	Affect the welfare of people e.g. by changing living conditions?	No	NA
3.4	Vulnerable groups of people who could be affected by the project e.g. hospital patients, children, the elderly etc.,	No	NA
3.5	Any other causes	No	NA

4. Production of solid wastes during construction or operation or Decommissioning (MT/Month)

Sl No	Information/Checklist confirmation	Yes /No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
4.1	Spoil, overburden or mine wastes	No	NA
4.2	Municipal waste (domestic and or commercial wastes)	Yes	Only 18 employees will be employed. The solid waste is insignificant. The wet waste will be used for manure and inert will be disposed to waste collectors.
4.3	Hazardous wastes (as per Hazardous Waste Management Rules)	Yes	Used oil/ Lubricant oil – 0.05 KL/A shall be collected in leak proof containers and disposed only to CPCB registered reprocessors /common collection Centre provided the oil meets the standards as per schedule- 5 of the rules. Incinerator ash and bag filer particulates – 20 MT/year.

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			Collected Stored in Secured manner and send to TSDF. Discarded containers & bags : 5 MT/year
4.4	Other industrial process wastes	No	NA
4.5	Surplus product	No	NA
4.6	Sewage sludge or other sludge from effluent treatment	Yes	The secondary dewatered STP and ETP sludge is approximately 10 kg/month and used as manure.
4.7	Construction or demolition wastes	Yes	There is no demolition work involved in the proposed project. Construction debris generated will be used for preparation of roads and pavements.
4.8	Redundant machinery or equipment	No	NA
4.9	Contaminated soils or other materials	No	NA
4.10	Agricultural wastes	No	NA
4.11	Other solid wastes	No	NA

5. Release of pollutants or any hazardous, toxic or noxious substances to air (Kg/hr)

Sl No	Information/Checklist confirmation	Yes /No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources	Yes	Flue gas emission: Particulate matters, Sulphur oxides Process emission: Particulate matters, sulphur oxides, nitrous oxides, HCl, CO, Dioxins, Furans, NH3, TOC, Cl2, HC, H2S,Hg (Sb+As+Pb+Cr+CO+Cu+Mn+Ni+V+Cd+Th+Hg) etc. DG Set – 63 KVA capacity with 3 m chimney height.
5.2	Emissions from production processes	No	NA

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5.3	Emissions from materials handling including storage or transport	Yes	Fugitive dust generation is due to movement of vehicles carrying construction materials.
5.4	Emissions from construction activities including plant and equipment	Yes	Fugitive dust during earthwork, concreting, and construction material handling is expected. Fugitive dust is controlled by sprinkling of water. Closed construction operations will be followed to ensure that surrounding is not affected.
5.5	Dust or odors from handling of materials including construction materials, sewage and waste	Yes	Fugitive dust arises due to handling of construction materials. Emission of fugitive dust will be controlled by sprinkling of water and barricading will be provided all around the project site. No obnoxious odor is expected during incineration. If there is odor during storage it will be temporary and localized.
5.6	Emissions from incineration of waste	No	NA
5.7	Emissions from burning of waste in open air (e.g. slash materials, construction debris)	No	NA
5.8	Emissions from any other sources	No	NA

6.Generation of Noise and Vibration, and Emissions of Light and Heat:

Sl No	Information/Checklist confirmation	Yes/ No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data with source of information data
6.1	From operation of equipment e.g., engines, ventilation plant, crushers	Yes	Noise and vibration during the construction phase is confined to project site. However, there is certain increase in ambient noise level during construction activities which will be reduced by under

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			taking periodic preventive maintenance of construction vehicles/equipment. The DG set will be provided with acoustic enclosure. The heat from incinerator flue gas is controlled in the scrubbing system. Planting peripheral trees will further reduce the noise and also give aesthetic look.
6.2	From industrial or similar processes	Yes	As above.
6.3	From construction or demolition	Yes	Noise generation due to construction activities will be negligible and confined within the site. However, there is certain increase in ambient noise level during construction activities which will be reduced by under taking periodic preventive maintenance of construction vehicles and restricting and reducing the speed of vehicle operated for the movements of construction materials.
6.4	From blasting or piling	No	NA
6.5	From construction or operational traffic	Yes	Construction phase: Vehicles carrying construction materials Occupancy phase: Vehicular movement by the occupants.
6.6	From lighting or cooling systems	No	NA
6.7	From any other sources	No	NA

7. Risks of contamination of land or water from releases of pollutants into the ground or into sewers, surface waters, groundwater, coastal waters or the sea:

Sl No	Information/Checklist confirmation	Yes /No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data

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7.1	From handling, storage, use or spillage of hazardous materials	Yes	Adequate precaution will be taken for any spillages during handling. If there are any spillages same will be moped and taken to storage.
7.2	From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)	Yes	The total quantity of sewage generated from the proposed project is about 700 LPD. The same will be treated and disposed in septic tank and soak pit. 2000 LPD Scrubber Bleed will be generated. It will be treated in ETP and treated effluent will be used for scrubbing flue gas in venturi scrubber and excess will be used
7.3	By deposition of pollutants emitted to air into the land or into water	No	NA
7.4	From any other sources	No	NA
7.5	Is there a risk of long term buildup of pollutants in the environment from these sources?	No	NA

8. Risk of accidents during construction or operation of the Project, which could affect human health or the environment

Sl No	Information/Checklist confirmation	Yes /No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
8.1	From explosions, spillages, fires etc., from storage, handling, use or production of hazardous substances	Yes	Proposed project is incineration of hazardous waste generating from the industries. The storage and handling of Hazardous waste will be as per the guidelines published by CPCB. Risk assessment is prepared for the proposed activity. Fire protection will be as per the standard guidelines and the

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			report prepared for on-site emergency plan.
8.2	From any other causes	No	-
8.3	Could the project be affected by natural disasters causing environmental damage (e.g. Floods, earthquakes, landslides, cloudburst etc.,)?	No	Natural calamities cannot be ruled out, However, all precautions will be taken to meet the eventualities to reduce the damage/impact.

9. Factors which should be considered (such as consequential development) which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality.

Sl No	Information/Checklist confirmation	Yes /No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
9.1	Lead to development of supporting. Utilities ancillary development or development stimulated by the project which could have impact on the environment e.g.: • Supporting infrastructure (roads, power supply, waste or wastewater treatment, etc.) • housing development • extractive industries • supply industries • other	Yes	Marginal development is anticipated.
9.2	Lead to after-use of the site, which could have an impact on the environment	No	-
9.3	Set a precedent for later developments	Yes	Net industrial development.
9.4	Have cumulative effects due to proximity to other existing or planned projects with similar effects	No	

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Environmental Sensitivity:

Sl No	Areas	Name/ Identity	Aerial distance (within 15 km.) Proposed project location boundary
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value	No	-
2	Areas which are important or sensitive for ecological reasons - Wetlands, watercourses other water bodies, coastal zone, biospheres, mountains, and forests.	No	There are no important or sensitive areas.
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration	No	There are no notified areas protected, important or sensitive species of flora or fauna for breeding/resting / migration.
4	Inland, coastal, marine or underground waters	No	-
5	State, National boundaries	No	-
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas	No	-
7	Defense installations	No	-
8	Densely populated or built-up area	Yes	Gadag- Betageri Town 4.2 Km.
9	Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, community facilities)	Yes	Gadag- Betageri Town 4.2 Km.
10	Areas containing important, high quality or scarce resources (ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)	No	NA
11	Areas already subjected to pollution or environmental damage. (those where existing legal environmental standards are exceeded)	No	NA

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12	Areas susceptible to natural hazard which could cause the project to present environmental problem (earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions)	No	NA

"I hereby give undertaking that the data and information given in the application and enclosures are true to the best of my knowledge and belief and I am aware that if any part of the data and information submitted is found to be false or misleading at any stage, the Project will be rejected and clearance given, if any to the project will be revoked at our risk and cost".

Date: 22/8/2018
Place: Bangalore

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Mr. D. K. Nagaraj,
Director
Head Office 377, Kurugunteshwar
Nilaya, Chikkasandar Nagar,
Hesargatta Main Road,
T. Dasarhalli, Bengaluru-582102.

ANNEXURE - 3

STATUS OF AMBIENT AIR QUALITY MONITORING STATIONS ESTABLISHED AND OPERATED IN CONSULTATION WITH THE STATE POLLUTION CONTROL BOARD

Gadag Envirotech Pvt. Ltd., is a Green field project. The ambient air quality monitoring stations will be established in consultation with State Pollution Control Board. The Karnataka State Pollution Control Board has established continuous air quality monitoring station at Gadag town in Tontadarya College of Engineering in the South Western direction of the industrial area at a distance of about 7.8 Kms.

ANNEXURE - 2

PROTOCOL FOR PERFORMANCE EVALUATION AND MONITORING OF THE COMMON HAZARDOUS WASTE TREATMENT STORAGE AND DISPOSAL FACILITIES INCLUDING COMMON HAZARDOUS WASTE INCINERATORS PUBLISHED BY CPCB,2010.

Rules and the guidelines applicable for development and operation of the common hazardous waste treatment, storage and disposal facilities:

Environmental Impact Assessment Notification S.O.1533 (E) dated 14 September 2006:

According to the Environmental Impact Assessment (EIA) Notification dated 14 September 2006, establishment of an integrated facility having incineration & landfill or incineration alone requires Environmental Clearance from the Ministry of Environment & Forests (MoEF). Since the proposed facility is standalone Hazardous waste Incineration project it requires Environmental Clearance from MoEF.

The Hazardous and Other Wastes (Management, Handling & Transboundary Movement) Rules, 2016:

In the ToR it is mentioned to address on the conformity of site to the stipulation as made in the Hazardous and Other Wastes (Management, Handling & Transboundary Movement) Rules, 2016 (HWM Rules) and will have a complete chapter indicating conformity to the said rules.

In the HWM Rules, there is no specific stipulation with respect to siting guidelines for establishing Incinerator facility. However, in the chapter IV rule 16 of the said rules mentions about the common facility for TSDF. In conformity with the said Rule the following are the compliances.

1. The site for the facility is allotted by a Single window agency of Government of Karnataka in the designated industrial area at Gadag. The relevant records are in Annexure III.
2. The guidelines for Common Hazardous Waste Incineration published by CPCB during 2005 is followed for conceptualizing the layout, technology, transportation of

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hazardous waste, storage of hazardous waste, basic laboratory facilities, pollution control systems etc.,

3. The facility will be operated scientifically in an environmentally sound system following the standard operating procedures issued by CPCB.
4. The statutory records and returns to be filed in prescribed forms to the SPCB shall be submitted within the prescribed time limits.
5. The facility will transport the hazardous waste in accordance with the provisions of the HW Rules, Motor Vehicles act, 1988, Guidelines issued by CPCB and circulars issued by KSPCB. During transportation, manifestation prescribed will be followed for movement of waste.
6. Before commissioning the plant, authorisation under HW Rules will be obtained from KSPCB.
7. If any accidents occur during transportation or during incineration the same will be reported immediately to KSPCB and necessary ameliorative actions will be taken.
8. The company will be responsible for any environmental damage and will be liable to pay financial penalties as levied for any violations of the provisions under the rule.
9. The facility will accept only incinerable waste as categorised under the schedule to the HW Rules.

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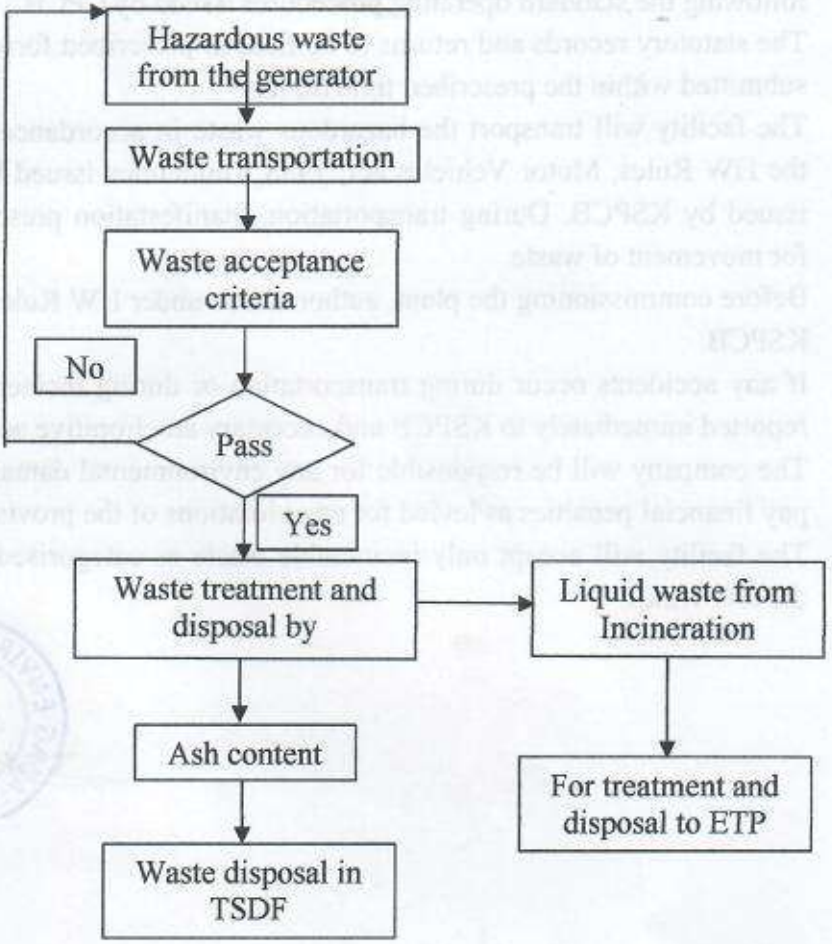
Procedure followed for Waste Acceptance and Disposal by the Common Hazardous Waste Treatment, Storage and Disposal Facility Operator



Protocol for Performance Evaluation of Common Hazardous Waste TSDF and Common Hazardous Waste Incinerator will be followed and information will be submitted to KSPCB before commissioning and whenever there is any change in the information provided earlier.

Gaseous Emission Norms for Common Hazardous Waste Incinerators notified under Environment (Protection) Act, 1986 as Environment (Protection) Fifth Amendment Rules, 2008 dated 26 June 2008 as under will be followed.

Air emission			
Common Hazardous Waste Incinerator	Parameters	Limiting concentration in mg/Nm^3 unless stated	Sampling duration in minutes unless stated
	Particulate matter	50	30
	Hcl	50	30
	SO_2	200	30
	CO	100	30

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		50	24 hours
	Total organic carbon	20	30
	HF	4	30
	NO_X (NO and NO_2 expressed as NO_2)	400	30
	Total dioxins and furans	0.1 ng TEQ/Nm^3	30
	Cd + Th + their compounds	0.05	8 hours
	Hg and its compounds	0.05	2 Hours
	Sb+ As+ Pb+ Co+ Cr+Cu+ Mn+ Ni+ V+ their compounds	0.50	2 hours

Notes:

- All monitored values shall be corrected to 11 % oxygen on dry basis.
- The CO2 concentration in tail gas shall not be less than 7 %.
- In case, halogenated organic waste is less than 1 % by weight in input waste, all the facilities in twin chamber incinerators shall be designed to achieve a minimum temperature of 950 °C in secondary combustion chamber and with a gas residence time in secondary combustion chamber not less than 2 (two) seconds.
- In case, halogenated organic waste is more than 1 % by weight in input waste, waste shall be incinerated only in twin chamber incinerators and all the facilities shall be designed to achieve a minimum temperature of 1100° C in secondary combustion chamber with a gas residence time in secondary combustion chamber not less than 2 (two) seconds.
- Incineration plant shall be operated (combustion chambers) with such temperatures, retention time and turbulence, as to achieve Total Organic Carbon (TOC) content in the slag and bottom ashes less than 3 %, or their loss on ignition is less than 5 % of the dry weight.

Guidelines for storage of incinerable hazardous waste

The revised guidelines for storage and handling of incinerable hazardous waste are suggested as follows:

A) Storage area (Storage shed)

- Flammable, ignitable, reactive and non-compatible wastes will be stored separately and will not be stored in the same storage shed
- Storage area may consist of different sheds for storing different kinds of incinerable hazardous wastes and sheds will be provided with suitable openings
- Adequate storage capacity will be provided in the premises

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- Storage area will be designed to withstand the load of material stocked and any damage from the material spillage
- Storage area will be provided with the flameproof electrical fittings
- Heat detection system will be provided in the sheds. Adequate firefighting systems will be provided for the storage area, along with the areas in the facility
- At least 15 meter distance between the storage sheds will be provided.
- Loading and unloading of wastes in storage sheds will be done under the supervision of the well trained and experienced staff.
- Fire break of at least 4 meter between two blocks of stacked drums will be provided in the storage shed. One block of drum will not exceed 300 MT of waste.
- Minimum of 1 meter clear space will be left between two adjacent rows of pallets in pair for inspection
- The storage and handling will have at least two routes to escape in the event of any fire in the area.
- Doors and approaches of the storage area will be of suitable sizes for entry of fork lift and firefighting equipment
- The exhaust of the vehicles used for the purpose of handling, lifting and transportation within the facility such as forklifts or trucks will be fitted with the approved type of spark arrester.
- In order to have appropriate measures to prevent percolation of spills, leaks etc. to the soil and ground water, the storage area will be provided with concrete floor or steel sheet depending on the characteristics of waste handled and the floor must be structurally sound and chemically compatible with wastes
- Measures will be taken to prevent entry of runoff into the storage area. The Storage area will be designed in such a way that the floor level is at least 150 mm above the maximum flood level.
- The storage area floor will be provided with secondary containment such as proper slopes as well as collection pit so as to collect wash water and the leakages/spills etc
- Storage yards will be provided with proper peripheral drainage system connected with the sump so as to collect any accidental spills in roads or within the storage yards as well as accidental flow due to firefighting

B) Storage drums/containers

- The container will be made or lined with the suitable material, which will not react with, or in other words compatible with the hazardous wastes proposed to be stored.
- The stacking of drums in the storage area will be restricted to three high on pallets (wooden frames). Necessary precautionary measures will be taken so as to avoid stack collapse.
- No drums will be opened in the storage sheds for sampling etc. and such activity will be done in designated places outside the storage areas;
- Drums containing wastes stored in the storage area will be labelled properly indicating mainly type, quantity, characteristics, source and date of storing etc.

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C) Spillage/ leakage control measures

- The storage areas will be inspected daily for detecting any signs of leaks or deterioration if any. Leaking or deteriorated containers will be removed and ensured that such contents are transferred to a sound container.
- In case of spills / leaks/dry adsorbents/cotton will be used for cleaning instead of water.
- Proper slope with collection pits will be provided in the storage area so as to collect the spills/leakages.
- Storage areas will be provided with adequate number of spill kits at suitable locations. The spill kits should be provided with compatible sorbent material in adequate quantity.

D) Record keeping and maintenance

- Proper records with regard to the industry –wise type of waste received, characteristics as well as the location of the wastes that have been stored in the facility will be properly maintained.

E) Miscellaneous

- Smoking will be strictly prohibited in and around storage areas.
- Good housekeeping will be maintained in the storage areas.
- Sign boards with precautionary measures will be displayed at suitable locations.
- Necessary precautions will be taken during loading and unloading of liquid hazardous wastes.
- Storage area will be inspected regularly for spills and leaks, proper records will be maintained.
- Storage areas will be provided with proper ventilation to prevent volatile solvents or other low vapour pressure chemicals from direct exposure to sunlight.
- Liquid storage tanks will be properly dyked.
- Necessary emergency equipments and systems will be provided in the storage site.
- Hazardous waste received will be analysed and stored accordingly.
- Trained personnel will be provided with access to the storage site.
- Mock drill will be carried out and records of the same will be maintained.

Recommended storage time and the quantity of the incinerable hazardous waste:

Normal storage of incinerable hazardous waste at the incinerator site should be restricted to maximum of six months subject to obtaining of approvals as per Hazardous and Other Wastes (Management and Transboundary Movement) Amendment Rules, 2016and further amendments made thereof.

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Hazard analysis and safety audit:

For every incinerator facility, a preliminary hazard analysis should be conducted. Safety Audit internally by the Operator every year & externally once in two years by a reputed expert agency should be carried out and same should be submitted to the SPCB/PCC. Such conditions should be stipulated by SPCBs while granting authorization under Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2008 to the incinerator operators.

Rules/Standards and the Guidelines Applicable for Common Hazardous Waste Treatment, Storage and Disposal Facilities & Common Hazardous Waste Incinerators

Rules/Standards applicable for TSDFs/hazardous waste incinerators:

1. Environmental Impact Assessment Notification S.O.1533 (E) dated 14 September 2006
2. Hazardous Waste (Management, Handling & Transboundary Movement) Rules 2008 notified on 24 September 2008;
3. Gaseous Emission Norms for Common Hazardous Waste Incinerators notified as Environment (Protection) Fifth Amendment Rules, 2008 dated 26 June 2008;
4. Norms for DG set, The Noise Pollution (Regulation and Control) Rules, 2000, Effluent Discharge norms, surface/ground water norms and Ambient Air Quality norms.
5. General standards for discharge of environmental pollutants Part –A: Effluents notified vide G.S.R. 422 (E) dated 19 May 1993 and published in the Gazette No. 174, dated 19 May 1993 under the Environment (Protection) Act, 1986 and rules made there under, shall also be applicable for disposal of leachate into sewage treatment plant, common effluent treatment plant, inland surface water bodies or coastal areas.

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ANNEXURE - 4

CORPORATE ENVIRONMENTAL RESPONSIBILITY

As per the MoEF & CC Office memorandum F No. 22-65/2017-IA.III dated 1st May 2018, if the capital investment is less than 100 crores, for Greenfield projects, 2 % of the capital investment is to be earmarked for CER. The total capital cost of the project is Rs. 2.5 Crore, hence Rs. 5 Lakhs is earmarked for activities mentioned below.

Sl No	Activity	Fund allocated in Rs.
1	Avenue plantation in industrial area and community areas	1.0 Lakhs
2	Sanitation and rain water harvesting in Government school at Betageri Rural village	2.0 Lakhs
3	To participate with Karnataka State Pollution Control Board, regional office in "Parisara Mitra Shala" program in Gadag District.	2.0 Lakhs

Date: 22.8.2018
Place: Bangalore

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Mr. D.K. Nagaraj,
Director
Head Office 377,
Kurugunteshwar Nilaya,
Chikkasandar Nagar,
Hesargatta Main Road,
T. Dasarhalli, Bengaluru-582102.

ANNEXURE - 5

FORM 2

APPLICATION FOR PRIOR ENVIRONMENTAL CLEARANCE

1	Details of the project		
	a	Name of the project	Common Hazardous Waste Incineration Facility
	b	Name of the company / organisation	M/s. Gadag Envirotech Pvt. Ltd.,
	c	Registered address	Plot No.125, KIADB Narasapura Industrial Area, Gadag- 582102.
	d	Legal status of the company	Private
	e	Joint venture	No
2	Address for correspondence		
	a	Name of the applicant	D K Nagaraj
	b	Designation	Director
	c	Address	Head Office 377, Kurugunteshwar Nilaya, Chikkasandar Nagar, Hesargatta Main Road, T.Dasarhalli, Bengaluru.
	d	Pin code	560057
	e	E mail	gadagenviro@gmail.com
	f	Telephone no	9845449405
	g	Fax no	-
3	Category of the project as per schedule of EIA Notification, 2006		
	a	Project/activity 1(a)i, 1(a)ii, 1(b), 1(c), 1(d), 1(e),2(a), 2(b), 3(a) 3(b) 4(a) 4(b) 4(c) 4(d) 4(e) 4(f), 5(a), 5(b), 5(c), 5(d), 5(e), 5(f), 5(g), 5(h), 5(i), 6(a), 6(b), 7(a), 7(b), 7(c), 7(d), 7(da), 8(a), 8(b),	7 (d) –Common Hazardous Waste Treatment, Storage and Disposal facilities - ***Standalone Incinerator***
	b	Category (A/B1/B2)	A
		If B1 or B2	-
		Reason for application at Central level /state level (in case of B2 projects)	***Standalone Incinerator***
		If others	-
	c	Please specify	-
	d	EAC Concerned (for category A projects only) (Coal mining/ non coal mining/ thermal / river valley and hyro/ industry –I/industry II/infrastructure I/ infrastructure II/ nuclear defence/ CRZ	Infrastructure - II
	e	New/ expansion/ modernization/one time capacity expansion (only for coal mining)/expansion under para 7 (ii)/ modernization under para 7 (ii)/change of product mix under	New

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CHAPTER 1

INTRODUCTION

1.1 Purpose of the Report

M/s. Gadag Envirotech Pvt. Ltd., proposes to establish a Common Hazardous Waste Incineration Facility at Plot No.125 Narasapura Industrial Area, Gadag – 582102, Karnataka.

The proposed activity falls under Category A of Project Activity 7 (D) "Common Hazardous Waste Treatment, Storage and Disposal Facilities (TSDFs)" in the schedule of EIA Notification dated 14th September 2006, the project requires Environmental Clearance from MoEF, Govt. of India.

The report has been prepared as per the recommendation in the Terms of References (TOR) from minutes of the 26th Meeting of the Expert Appraisal Committee (EAC) for projects related to all ship breaking yard including ship breaking unit, airports, common hazardous waste treatment, storage and disposal facilities, ports and harbours, aerial ropeways, CETPs, Common Municipal Solid Waste Management Facility, Building/Construction Projects, Townships and Area Development Projects held on 14th and 15th December, 2017.

The EIA report besides being a statutory requirement is also a planning tool to confirm Environmental Acceptability of Proposed design, Construction and Operation. This EIA report will include mitigation measures to be adopted under Environmental Management Plan (EMP) for all the identified significant environmental impacts likely to result out of activities taken up during pre-construction (including design), during construction and operation phases. The EMP will also include environmental monitoring plan with institutional responsibilities and cost for implementation of suggested measures (including environmental enhancement measures).

1.2 Identification of the project & project proponent

1.2.1 Identification of the project

M/s. Gadag Envirotech Pvt. Ltd., has proposed to set up a Common Hazardous Waste Incineration Facility for thermal destruction of hazardous waste having characteristics of non-easily biodegradable/toxic/incinerable/combustible in nature. The incinerable waste may be in solid/ semi solid or liquid form.

The facility will be set up in industrial area Narasapura, Gadag District in Karnataka. The total land area of the site is One acre. The Industrial Area is established in the year 2000. In this industrial area all civic amenities and infrastructure facilities required for industrial developments are available. The industrial area is well connected by railways and by road.

The proposed Incinerator facility will have a capacity of 250 kg/hr. The prime objective of Gadag Envirotech Pvt Ltd. is to facilitate disposal of incinerable Hazardous waste generated from industries in the Northern part of Karnataka.

1.2.2 About the Project Proponent

Mrs. Aruna D, is the Director for M/s. Gadag Envirotech Pvt Ltd, and they intend to set up a Common Hazardous waste incineration facility at Plot No.125 Gadag Industrial Area, Narasapura, Gadag – 582102, Karnataka State, India. The proponent has established Common Bio- medical waste disposal facility at Gadag and is in operation. Mr. Nagaraj D K was a group head/ Director of Ramky group of Companies, Karnataka, he has good amount of experience in handling industrial waste and worked as General Manager at Karnataka Waste Management Facility of Ramky Enviro Engineers, Bangalore.

1.2.3 Project at Glance

Sl No	Description	Project Details
1	Name of project proponent & Address	"Gadag Envirotech Pvt. Ltd." Common Hazardous Waste Incineration Facility **Registered Office:** Head office 377, Kurugunteshwar Nilaya, Chikkasandar Nagar, Hesaraghatta Main Road, T. Dasarahalli, Bangalore **Project Site:** M/s. Gadag Envirotech Pvt Ltd, Plot No.125, KIADB Narasapura Industrial Area, Gadag – 582102, Karnataka State, India.
2	Project Category and Size of the industry	Serial No. 7(d) – "A" Category in the schedule in EIA notification – 2006 Small Scale Unit
3	Project Capital Cost	Rs. 2.5 Crores
4	Constitution of the Organization	Private
5	Product	Transportation, Storage, Stabilization and incineration of Incinerable Hazardous Waste.
6	Raw Materials	Hazardous Waste from Industries.
7	Coordinates	Latitude 15^0 27' 53.16'' N and Longitude 75^0 40' 08.67'' E
8	Plot/Survey/Khata No	Plot No.125
9	Contact details	Mrs. Aruna D, Phone No - 9845449405.
10	E mail id	gadagenviro@gmail.com

11	State	Karnataka
16	**Resource requirement**	
i	Land	Plot area: 4,047 sq m (1 Acres)
ii	Water	Source: KIADB **Operation phase :** • Domestic purpose – 800 LPD • Gardening – 1200 LPD • Scrubbing floor and vehicle washing – 2000 LPD
iii	Electricity	Source: KIADB • 50 HP • Backup power : 63 KVA D.G. set during operation phase in case of power failure
iv	Fuel	**Operation phase :** • For Incinerator: LDO/HSD • For D.G. set, HSD : 12.6 litre/Hr
v	Man power	18 Nos
17	**Sources of pollution**	
i	Waste water generation	a) Sewage of about 700 LPD Industrial effluent: The expected quantity of generation is about 2000 LPD. It will be treated in ETP and treated effluent will be used for scrubbing flue gas in venturi scrubber and excess will be reused.
ii	Air emission	Flue gas emission: Particulate matters, Sulphur oxides Process emission: Particulate matters, sulphur oxides, nitrous oxides, HCl, CO, Dioxins, Furans, NH3, TOC, Cl2, HC, H2S, Hg (Sb+As+Pb+Cr+CO+Cu+Mn+Ni+V+Cd+Th+Hg) etc.
iii	Solid / hazardous waste generation	**Construction phase :** Construction waste i.e. Broken brick, Waste concrete Operation phase : • Incineration ash : 20 MT/year • Used oil : 0.05 KL/A • Discarded containers & bags : 5 MT/year
18	**Mode of treatment**	
i	Waste water	Sewage to be generated during construction as well as operation phase shall be treated in septic tank/soak pit.
ii	Air	Adequate Air pollution control devices (Venturi scrubber) shall be provided to achieve the

		stipulated norms.
iii	Solid/ hazardous waste	Solid/hazardous wastes will be disposed-off to authorized TSDF.

1.3 Brief description of nature, size, location of the project & its importance to the country, region

1.3.1 Nature, size & location of the project

The proposed project is to establish a Hazardous Waste incinerator of 250 kg/hr Capacity. This facility will be highly useful option for waste generators who individually cannot afford the high cost infrastructure and other treatment facility required for managing their hazardous waste. Presently, there are no Hazardous Waste incinerator facilities available in Northern Karnataka. The project would help Industries located in the Northern districts of Karnataka to safely handle, manage and dispose Hazardous wastes.

The proposed project site is located at Plot No.125 of KIADB industrial area, Narasapura, Gadag, Karnataka – 582102. This industrial area is established on 5th January 2000.

Fig 1.0 Location of Project Site

The project is well connected by Road and Railways. Nearest railway station is Gadag Railway Junction and is located at a distance of 4.2 Kms towards North East and Gadag – Bagalkot State Highway SH-6 is 300 m towards East of the Site.

1.3.2 Need for the Project and Its Importance to the Country and/Region

The industrial growth in India is particularly accelerating in Karnataka. There are many large and medium scale industries both in the public and private sectors. During the operation of the facility, in addition to wastewater and air emissions, solid, semi-solid waste and sludge are generated.

As per Karnataka State Pollution Control Board inventory dated 31-03-2017 different types of hazardous waste generated in Karnataka is as under.

Type of Hazardous Waste	Quantity in MT *	Quantity in Nos.**
Land fillable waste	46596.67	Nil
Incinerable waste	*79542.72*	*74068.00*
Recyclable/re-processable waste	65851.23	878131.00
Total	**1,91,990.62**	**9,52,199.00**

(* Assuming that the Units are Operating at 100% Capacity)

Sl No	Regional Office	Total No. of Industries	Land fillable HW (MT/A)	Recyclable HW (MT/A)	Incinerable HW (MT/A)	Total Qty HW Generation (MT/A)
1	Bagalkot	41	0.00	73.23	0.0	73.23
2	Belgaum-1	87	3.45	2018.83	9.58	2031.86
3	Belgaum-2	43	19.91	135.92	272.69	428.52
4	Bellary	66	560	3707.00	1689.00	5956.00
5	Bidar	19	668	0.20	650.03	1318.23
6	Bijapur	30	0.0	0.0	8.31	147.53
7	Dharwad	84	614.76	405.77	918.26	1938.78
8	Gadag	14	0.0	91.52	11.55	103.07
9	Gulbarga	12	0.0	127.50	52004.1	52131.67
10	Haveri	18	0.0	3626.97	442.00	4068.97
11	Karwar	41	0.0	2050.00	0.0	2050.00
12	Koppal	40	1295.04	179.02	255.97	1730.03
13	Raichur	19	2020.29	34	85.27	2139.56
14	Yadgir	9	0.0	2.50	0.0	2.50
	NORTHERN KARNATAKA	**523**	**5,181.45**	**12,452.46**	**56,346.76**	**74,119.95**

Out of 74,119.95 MT/A incinerable wastes generated in Karnataka, the quantity of incinerable waste generation in Northern Karnataka is 56,346.76 MTPA.

As a matter of consequence, a need is arising to develop a common infrastructure to treat and dispose the hazardous waste to cater to the industries in the Northern Districts of Karnataka. At present, there is no facility in the Northern Karnataka for disposal of Hazardous wastes generated from various industries. The proposed facility is planned in Narasapura Industrial area, Gadag. Hence, the proposed project is well justified in meeting the current and increasing waste management demand.

1.4 Scope of Study – Details of Regulatory Scoping Carried out (As Per Terms Of Reference)

This EIA report covers all the terms of reference set by EAC of MoEF & CC details are as under:

Table 1.1: Terms of Reference (ToR)

Sl No	Description	Details provided in the chapter
1	Reasons for selecting the site with details of alternate sites examined/ rejected /selected on merit with comparative statement and reason/basis for selection. The examination should justify site suitability in terms of environmental damages, resources sustainability associated with selected site as compared to rejected sites. The analysis should include parameters considered along with weightage criteria for short-listing selected site.	A need is arising to develop a common infrastructure to treat and dispose the hazardous waste to cater to the industries in the Northern Districts of Karnataka. At present, there is no facility in the Northern Karnataka for disposal of Hazardous wastes generated from various industries. Gadag is industrially backward district. The Govt. of Karnataka has developed the industrial area at Gadag. The industrial area is established on 5th January 2000.The promoters are already having a common bio medical disposal facility in the same industrial area. Keeping these aspects in view the location is selected for establishing common hazardous waste incineration facility.
2	Submit the details of the road/rail connectivity along with the likely impacts and mitigative measures	Connectivity details are provided in Chapter 3, Section – 3.15
3	Submit the present land use and permission required for any conversion such as forest, agriculture etc.,	Details are provided in the Chapter – 2, Section – 2.5.
4	Examine the details of transportation of Hazardous wastes, and its safety in handling.	Details are provided in the Chapter – 1, Section – 1.3.2
5	Examine and submit the details of on	Online monitoring details are enclosed

	line pollutant monitoring.	in Chapter – 3.
6	Examine the details of monitoring of Dioxin and Furan.	The monitoring of dioxin and furan will be conducted once the plant is commissioned.
7	MoU for disposal of ash through the TSDF.	Before commissioning of the plant MoU will be entered with TSDF.
8	MoU for disposal of scrubbing waste water through CETP.	The trade effluent will be treated in house.
9	Examine and submit details of monitoring of water quality around the landfill site	Water quality monitoring details are enclosed in Chapter – 3.
10	Examine and submit details of the odour control measures.	Detailed in the Chapter – 9, Environmental Management Plan.
11	Examine and submit details of impact on water body and mitigative measures during rainy season.	Details are provided in Chapter – 4, Section – 4.3.4.
12	Environmental Management Plan should be accompanied with Environmental Monitoring Plan and environmental cost and benefit assessment. Regular monitoring shall be carried out for odour control.	Environmental management plan is detailed in the Chapter - 9.
13	Water quality around the landfill site shall be monitored regularly to examine the impact on the ground water.	There is no landfill facility in the project. However the ground water quality will be monitored regularly. Details are provided in Chapter – 9, Section – 9.3
14	The storage and handling of hazardous wastes shall be as per the Hazardous Waste Management Rules.	The storage and handling of hazardous waste will be as per the HWM Rules issued by CPCB and Protocol for "Performance Evaluation and Monitoring of Common Hazardous Waste Treatment Storage Disposal Facility Including Common Hazardous Waste Incinerator".
15	Submit details of a comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disaster	Details are provided in Chapter - 7, Section - 7.11.
16	Public hearing to be conducted for the project in accordance with provisions of Environmental Impact Assessment Notification, 2006 and the issues raised	The proposed unit site is in designated industrial area formed by Karnataka Industrial Area Development Board. The industrial area is established on 5th

	by the public should be addressed in the Environmental Management Plan. The Public Hearing should be conducted based on the ToR letter issued by the Ministry and not on the basis of Minutes of the Meeting available on the website.	January 2000. Therefore, public hearing is exempted as per Notification no J-11011/321/2016-IA-II(I) dated 27th April, 2018.
17	A detailed draft EIA/EMP report should be prepared in accordance with the above additional TOR and should be submitted to the Ministry in accordance with the Notification.	Detailed EIA report shall be submitted to the MoEF & CC.
18	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	Not applicable.
19	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly	Project cost details are detailed in Chapter – 2, Section – 2.4.

1.4.1 Specific Guidelines issued by EAC along with Terms of Reference

Sl No	Description	Details provided in the chapter
1	Importance and benefits of the project	The project benefits are detailed in chapter – 8.
2	The EIA would address to the conformity of site to the stipulations as made in the Hazardous and other wastes (Management, handling and trans boundary movement) Rules 2016 and will have a complete chapter indicating conformity to the said rules.	The applicability of stipulations as made in Hazardous and other wastes (Management, handling and trans boundary movement) Rules 2016 are detailed in Chapter – 10.
3	The project proponents will submit a certificate from the competent authority that the Industrial areas are approved and Hazardous waste incinerators are not disallowed in such clearances. Subject to the competent authority certifying as above, the project could be exempt from public hearing.	Government of Karnataka's Single window clearance meeting proceedings held on 21st November 2016 is provided as Annexure III where in the Deputy Commissioner and Chairman of Single Window Committee agency, Gadag has cleared the proposal to establish Hazardous Waste management facility at Narsapura Industrial area. To this effect KIADB has issued the Land allotment letter for setting up the industry for

		hazardous waste management facility. (copy enclosed)
4	Project proponents would also submit a write up on how their project proposals conform to the stipulations made in the "Protocol for Performance evolution and monitoring of the Common Hazardous Waste Treatment Storage and Disposal facilities including common Hazardous Waste incinerators", published by the CPCB on May 24, 2010.	The details of the write up are provided in Chapter – 10.
5	Status of compliance to the provisions of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.	The details of the compliance are provided in Chapter – 10.
6	Compliance to the conditions of the consent to operate and authorization for the existing facilities.	The proposed Hazardous waste incineration facility is a green field project.
7	Details of various waste management units with capacities for the proposed project.	The proposed project will cater to industries located in Northern Karnataka generating incinerable hazardous waste. The quantity of incinerable waste generation in the Northern Karnataka is detailed in Chapter – 1, Section – 1.3.2.
8	List of waste to be handled and their source along with mode of transportation.	Details are provided in Chapter – 2, Section – 2.6 and 2.7.
9	Other chemicals and materials required with quantities and storage capacities.	Lime is used in case the incinerable waste is acidic. The quantity of usage is estimated as 250 kgs/month. This will be stored in the secured manner at pretreatment area.
10	Details of temporary storage facility for storage of hazardous waste at project site.	As per the guidelines of Common Hazardous Waste Incineration published by CPCB, Two dedicated sheds are proposed, One shed will be utilised for storing Flammable and Ignitive waste, another shed will be used for storing reactive and non-compatible. Also the Incinerated ash will be collected and stored separately till disposal to TSDF.
11	Details of pre-treatment facility of	The wastes received will be analysed for

	hazardous waste at TSDF.	its calorific value. The high calorific waste and low calorific waste will be mixed to get a compatible waste for incineration. This treatment is used to facilitate complete breakdown of hazardous wastes and more usually to modify the chemical properties of the wastes, e.g., to reduce water solubility or to neutralise acidity or alkalinity. The techniques involve oxidation, chemical reduction, neutralisation, heavy metal precipitation, oil/water separation and solvents/fuels recovery.
12	Details of air emissions, effluents, hazardous/solid waste generation and their management.	Details are provided in Chapter – 2, Section 2.11 and 2.12.
13	Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract).	Details are provided in Chapter – 2, Section 2.11.
14	Process description along with major equipments and machineries, process flow sheet (quantitative) from waste material to disposal to be provided.	Details are provided in Chapter – 2, Section 2.8 and 2.9.
15	Hazard identification and details of proposed safety systems.	Details of hazard identification and safety systems are provided in Chapter – 7.
16	Layout maps of proposed Solid Waste Management Facilities indicating storage area, plant area, greenbelt area, utilities etc.	Site layout map is enclosed as Annexure – IV.
17	Details of Drainage of the project up to 5 km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 3 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be provided.	There are two nalas/canals flowing on eastern and western side of the project site both at a distance of 1.5 km. The proposed site is at an elevation of 645 m. The elevations at the two nalas are 626 m and 633 m. There are natural small drains which connects the nalas on either side. No flow in the nala is observed during the site visit. It is informed by the locals that some flow is observed during monsoon, during rest of the year it is dry. Since there is no steep slope towards nala and as the activity/project is not water

		intensive and whatever the waste water generated from scrubber is treated and reused. Therefore, the drainage pattern in this area do not have any impact on the proposed project.
18	Ground water quality monitoring in and around the project site.	Ground water quality monitoring details are provided in Chapter – 3, Section – 3.9.1.
19	The Air Quality Index shall be calculated for base level air quality.	Details are provided in the Chapter – 3, Section – 3.7.4, 3.7.5 and 3.7.6.
20	Status of the land purchases in terms of land acquisition Act and study the impact.	The project site is KIADB allotted land. Land allotment letter and possession certificate is enclosed in Annexure – III.
21	Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land	The project site is KIADB allotted land. Land allotment letter and possession certificate is enclosed in Annexure – III
22	R & R details in respect of land in line with state Government policy.	Not Applicable, the proposed project site is in notified industrial area.
23	Details of effluent treatment and recycling process.	Details are provided in Chapter – 2, Section - 2.12.2
24	Leachate study report and detailed leachate management plan to be incorporated.	Details of leachate management are provided in Chapter – 9, Table – 9.2.
25	Action plan for measures to be taken for excessive leachate generation during monsoon period.	Details of leachate management are provided in Chapter – 9, Table – 9.2.
26	Action plan for any pollution of ground water is noticed during operation period or post closure monitoring period.	Possibility of pollution of ground water is due to leaching of Hazardous waste from storage area. The storage area is made impervious with required lining of HDPE sheets and the storage shed is secured from rain. This system will be periodically checked for intactness. Therefore, no ground water pollution is anticipated.
27	Detailed Environmental Monitoring Plan as well as Post Closure Monitoring Plan.	Details of Environmental monitoring are provided in Chapter – 6.
28	Any litigation pending against the project and/or any direction/order	Not applicable.

	passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, detail thereof and compliance/ATR to the notice(s) and present status of the case	

1.5 Generic Structure of EIA Document:

This EIA report presents the existing baseline scenario and the assessment and evaluation of the environmental impacts that may arise during the construction and operational phases of the project. This report also highlights the Environmental Monitoring Program during the construction and operation phases of the project and the post project monitoring program. In terms of the EIA Notification of the MoEF dated 14thSeptember 2006, the generic structure of the EIA document is as under:

Table 1.2: Generic structure of EIA Document

Chapter No.	Chapters name	Description
1	Introduction	Introductory information is presented in this Chapter. The introduction provides a background of the project and describes the objective of this document. This chapter also includes the outline of the project and its proponent.
2	Project Description	This Chapter includes Project Description and Infrastructure Facilities delineating all industrial and environmental aspect of the industry and also in this chapter gives information about storage and handling of raw materials, water and wastewater quantitative details, water pollution and control system, air pollution and control system, sludge storage facility, utilities, greenbelt and safety measures for proposed plant etc.,
3	Description of the Environment	This Chapter provides Baseline Environmental Status of Environmental components (Primary data) delineating meteorological details of the project site and surrounding area.
4	Anticipated Environmental	This Chapter presents the analysis of impacts

	Impacts &Mitigation Measures	on the environmental and social aspects of the project as a result of establishment of plan and thereby suggesting the mitigation measures.
5	Analysis of Alternatives	This chapter includes the justification for the selection of the project site from Environmental point of view as well as from economic point of view.
6	Environmental Monitoring Plan	This chapter includes the technical aspects of monitoring, the effectiveness of mitigation measures which will include the measurement methodologies, frequency, location, data analysis, reporting schedules etc.,
7	Additional Studies	Risk assessment and Disaster Management Plan.
8 & 9	Project Benefits & Environmental Cost Benefit Analysis.	The realization of the project activity is envisaged to impart benefits to the areas in concern. This Chapter will identify the benefits from the project
10	Specific ToR's issued by EAC	This chapter presents the description of specific ToR points issued by EAC.
11	Environmental Management Plan	This chapter of the report presents the mitigation plan, covers the institutional and monitoring requirements to implement environmental mitigation measures.
12	Summary and Conclusion	This chapter summarizes the information given in Chapters in this EIA/EMP report and the conclusion based on the environmental study, impact identification, mitigation measures and the environmental management plan.
13	Disclosure of the Consultant	Names of consultants engaged in the preparation of the EIA/EMP report along with their brief resume and nature of Consultancy rendered are included in this Chapter.

CHAPTER 2

PROJECT DESCRIPTION

2.0 Type of Project

The proposed project is a common Hazardous Waste Incineration Facility to cater to industries in the Northern part of Karnataka.

2.1 Need for the Project

The need for the project is detailed in Section 1.3.2, Chapter 1.

2.2 Objectives of the project:

The objective of this project provides Common Hazardous Incinerable Waste disposal facility.

Objectives of the Project include:

- To ensure that the environmental impacts are minimized.
- To ensure that resource conservation is maximized.
- To ensure techno-economic feasibility of the Project.
- To enable the Incinerator facility to handle the hazardous wastes in a lawful manner.
- To prevent accumulation of the hazardous wastes at the industries.
- To ensure proper collection of the hazardous wastes, transport, transit, storage, treatment and disposal by incineration.
- To minimize the health effects associated with hazardous waste handling and management activities.
- To ensure the technical reliability of the technology in terms of safety, flexibility and sustainability under local conditions.
- To ensure compliance with regulatory requirements at every stage of hazardous waste handling and disposal.

2.3 Location of the Proposed Industry

Table 2.1: Salient features of the project site:

Location	M/s. Gadag Envirotech Pvt Ltd., Plot No. 125, Gadag Industrial Area, Narasapura, Gadag, Pin – 582102.
Present land use	The plot is located in Narasapura Industrial Area. Presently the land is barren with shrubs & bushes.
Latitude and longitude	Latitude 15^0 27’ 53.16” N and Longitude 75^0 40’ 08.67” E at 645 m MSL
Topography	Plain land
Nearest highway	Gadag – Bagalkot State Highway, SH-6 – 300 M towards E
Nearest railway station	Gadag Railway Junction- 4.2 Kms towards NE

Nearest airport	Hubli Airport- 70 Kms towards SW
Nearest town	Betageri
Sensitive locations	No ecologically sensitive locations within 10 Km from the site
Nearby industries	**Direction** / **Description** North – Vacant KIADB plot South – KIADB Road East – Brick manufacturing unit West – Vacant KIADB plot

Fig 2.0: Maps showing project boundary & project site location

Centre of the Plot: Latitude 15^0 27’ 53.16” N and Longitude 75^0 40’ 08.67” E at 645 m MSL

Table 2.2: Co-ordinates (lat-long) of all four corners of the site

Sl No	Directions	Co- ordinates
1	North East	Latitude: 15^0 27’ 54.05” N; Longitude: 75^0 40’ 10.70” E
2	North West	Latitude: 15^0 27’ 54.19” N; Longitude: 75^0 40’ 07.02” E
3	South East	Latitude: 15^0 27’ 52.15” N; Longitude: 75^0 40’ 10.59” E
4	South West	Latitude: 15^0 27’ 52.24” N; Longitude: 75^0 40’ 06.97” E

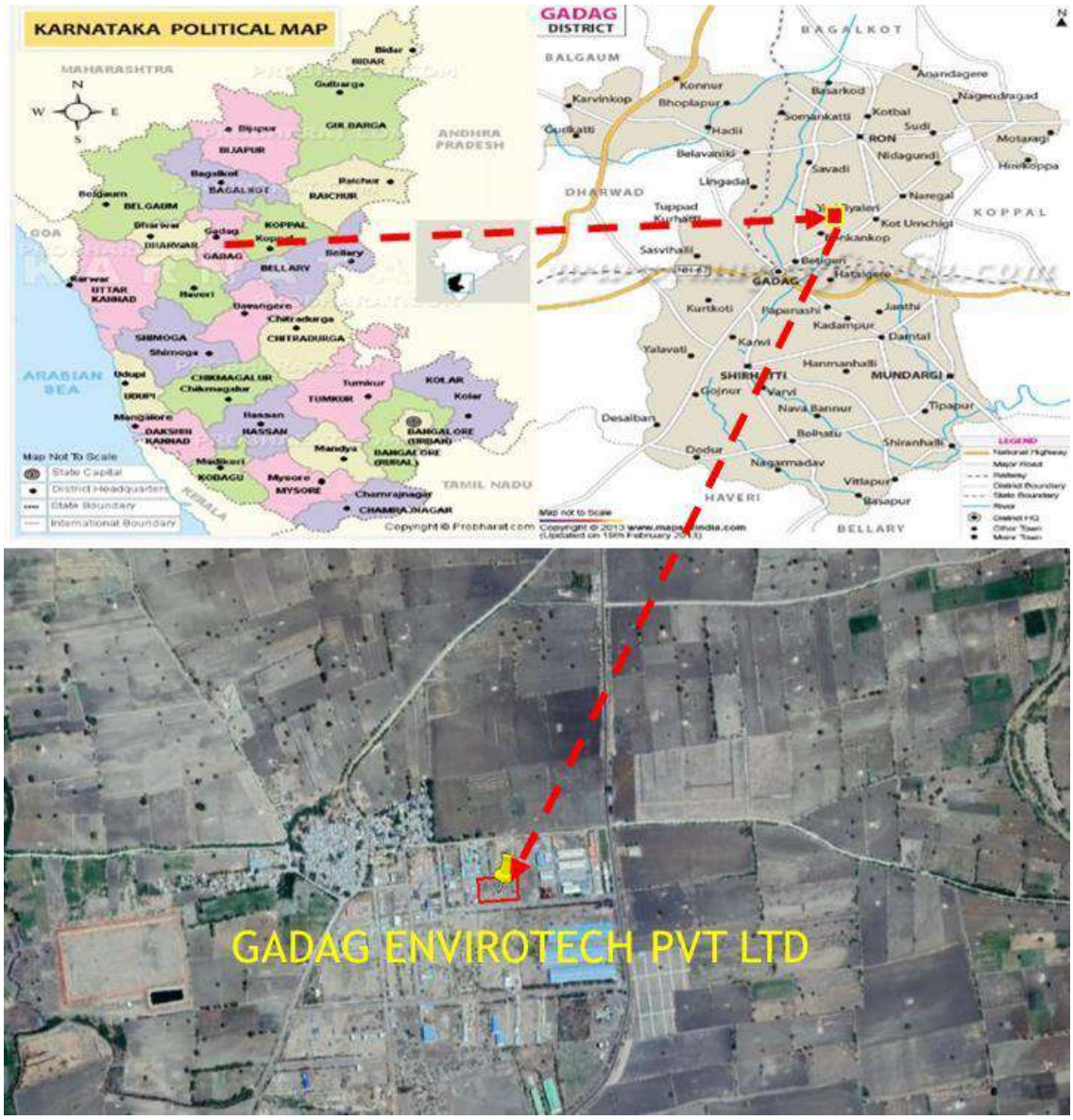


Fig. 2.1 Google map showing the general location and project site boundary.

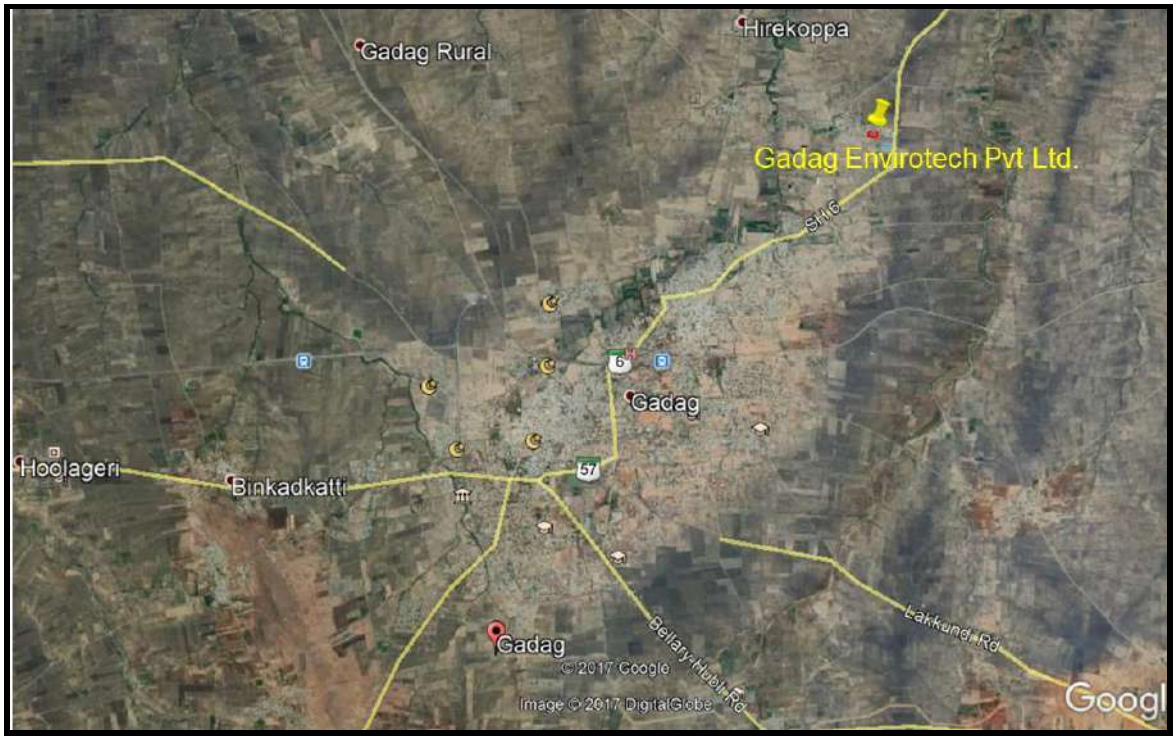


Fig. 2.2 Road Connectivity to the project site

Note: The project site layout plan is enclosed as Annexure-IV.

2.4 Size or Magnitude of Operation

Common Hazardous Waste Incineration Facility of capacity 250 Kg/hr. This is a small scale unit. The cost of the project is Rs. 2.5 crores.

The details of capital investment on the project which are given in the following table 2.3

Table 2.3: Cost of the project

Sl No.	Description	Amount (Lakhs) In Rs.
1	Land	15
2	Construction	40
3	Plant and Machinery	195
TOTAL		**250**

2.5 Land Use Pattern

The land use pattern is provided in table 2.4.

Table 2.4: Land use pattern

Sl No	Particulars	Area (m^2)	In %
1	Total Plot Area	4,047	100
2	Ground coverage area (total built up area)	2,023.5	50
3	Green belt	1,214.1	33
4	Hard paved area	809.4	17

Fig 2.3 Site Photographs

2.6 Source, Collection & Transportation of Hazardous Wastes

The details of type of hazardous waste, quality and quantity of hazardous waste generated as per the inventory of Karnataka State Pollution Control Board (KSPCB) as on 31-03-2017 are provided in the section 1.3.2 of the report**.**

The proposed project, Common Hazardous Waste Incineration facility, is planned to cater to the industries located in the Northern part of Karnataka. The hazardous wastes generated from the industries will be collected from individual industries and transported by road using 3 Nos of 2.2 MT capacity Tata 407 vehicle.

2.6.1 Operating Authorized Incinerators in Karnataka

Six common incineration facilities have the authorization in the state and they are listed in the table below:

Sl No	Incinerators
1	Haat Incinerator India Private Limited, Anekal Taluk, Bangalore.
2	Gomti Incinco, Kumbalagodu, Bangalore.
3	Century Refineries Pvt. Ltd. Hoskote, Bangalore.
4	Bangalore Incinerator Pvt. Ltd., Kunigal Taluk, Tumkur.
5	E Nano Incintech, Plot No.342-B, of Harohalli Industrial Area, 2nd Phase, 2nd Sector, Ramanagar District.
6	Bangalore Eco Park Pvt. Ltd, No.298 B, KIADB Industrial Area, Sompura 1st Stage, Nidavanda, Nelamangala, Bengaluru Rural District

2.7 Technology and process description

Common Hazardous Waste Incineration Facility (CHWIF) is where hazardous incinerable waste is collected, transported & scientifically disposed of from industries. Collected wastes are stored in a secured manner as per the guidelines of CPCB. The wastes are sometimes mixed to attain the required calorific value and then incinerated as per the approved specifications. The incinerator will be operated scientifically and the emissions are controlled with air pollution control equipment viz., Bag filter and scrubber. The emission will be vented out through 30 m height chimney. The incinerated ash is collected separately and disposed to TSDF. The liquid waste from scrubber will be treated and reused.

Types of Hazardous Wastes as specified in the hazardous and other waste (Management & Transboundary Movement) Rules, 2016.

Sl. No. as per schedule -1	Waste process/waste streams	Disposal options
5.2	Waste/residue containing oil	Shall be collected in secured manner and transported in approved vehicles without causing adverse effect on the environment. After receipt at site, the same is stored in a secured manner. The compatible wastes are mixed, analyzed and incinerated.
20.1	Contaminated aromatic, aliphatic waste/ residue containing naphthenic solvents not fit for originally intended use	
20.3	Distillation residues	
21.1	Process wastes, residues, and sludges	
28.1, 29.1	Process residue and wastes	
28.4	off specification products	
28.5	Date-expired products	
29.3	Date expired and off specification pesticides	

2.8 Incineration Plant

The incineration plant is designed for thermal treatment for disposal of hazardous wastes. The plant consists of primary chamber, secondary chamber followed by a flue gas treatment system (scrubbing system). Hazardous solid wastes are burnt completely in the primary & secondary chambers of the incinerator. The flue gases generated are treated in scrubbing system.

2.8.1 Concept of Incineration

Incineration is an ultimate treatment process, applied to certain wastes that cannot be recycled, reused or safely deposited into a landfill. It is a high temperature, thermal destruction oxidation process in which hazardous wastes are converted in the presence of oxygen in air into gases and incombustible solid residue. The gases are vented into the atmosphere with cleaning as deemed necessary while the solid residue is sent to landfill for disposal.

The design parameters employed to burn all these wastes, have been standardized by Incineration Institute of America in the initial stages and then US Environment protection agency, a body recognized throughout the developed world. Criteria used for design are:

1. Primary chamber. Loading rate (kg/hr/cum)
2. Heat release rate in primary chamber.
3. Excess air required.
4. Residence time for flue gas in the secondary chamber at specific temperature.

Incineration is a waste treatment process that involves the combustion of organic substances

contained in waste materials. Incineration and other high-temperature waste treatment systems are described as "Thermal Treatment". Incineration of waste materials converts the waste into ash, flue gas and heat.

- Thermal Treatment Process
- Combustion at High Temperature
- Controlled for High Combustion Efficiency Defined as,
- With Minimum Undesirable Products
- Treatment of Combustion Products for Safe Disposal

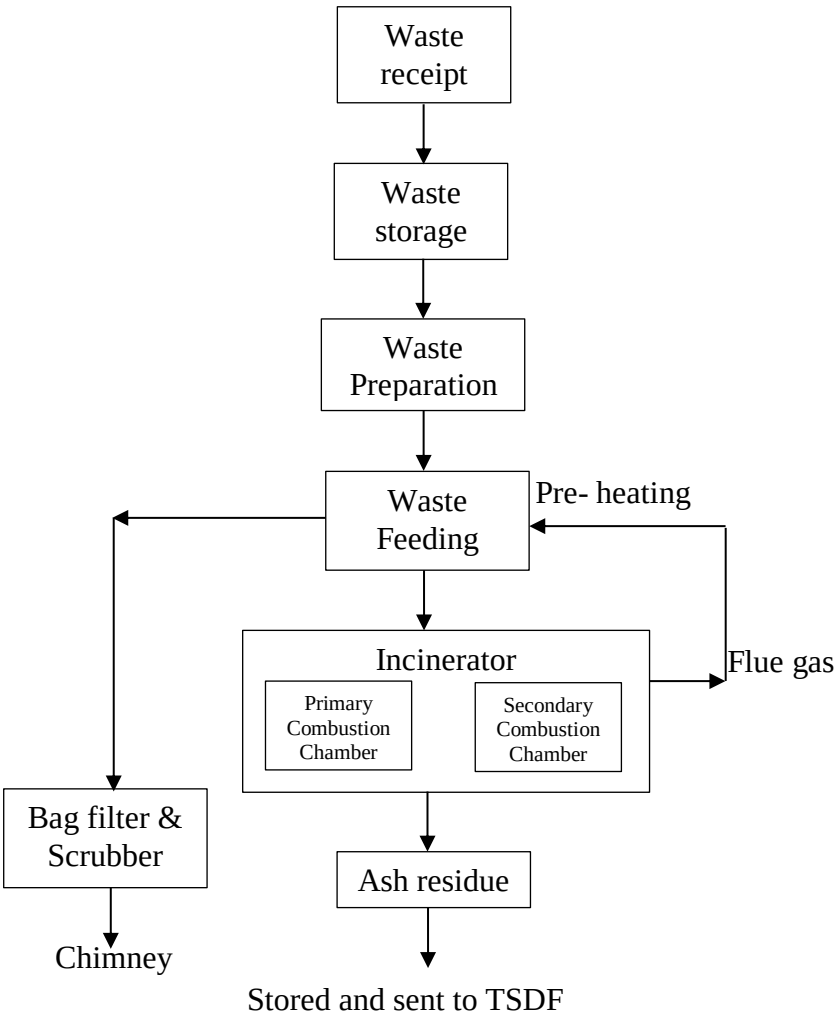


Fig 2.4: Flow diagram of incinerator

The proposed incinerator would cater for the disposal/ destruction of the following wastes:

- Waste/residue containing oil
- Contaminated aromatic, aliphatic waste/ residue containing naphthenic solvents not fit for originally intended use

- Distillation residues
- Process wastes, residues, and sludges
- Process residue and wastes
- off specification products
- Date-expired products
- Date expired and off specification pesticides

Advantages of Incineration

The following advantages of incineration of hazardous wastes

- Ability to handle heterogeneous waste
- High efficiency due to
    - Vigorous mixing
    - High retention time
- Low NO_X formation due to
    - Lower operating temperature &
    - Low excess air
- Quick restart due to heat stored in the bed
- Absence of moving parts hence low maintenance
- Flexibility to handle diverse fuels
- Residence time can be adjusted by varying speed
- Waste feeding without much preparation
- Waste heat recovery is possible
- Gas cooling systems can be fixed
- Well Scrubbing systems can be added
- Temperature control for constant efficiently
- Air control for adequate excess air
- Interlocks for safe operational shut down

2.8.2 Process description

Incineration system contains basic elements such as feed system, combustion chamber, exhaust system and residue disposal system. The incinerator equipment includes material storage and sorting system at front end and air pollution control devices at the back end of the incinerator. The incineration plant is divided into following sections:

1. Waste Receiving and Storing Area
2. Feeding Section
3. Incineration Section/Combustion chamber – Primary and Secondary
4. Pollution Control devices

2.8.2.1 Waste Receiving and Storing Area

Hazardous Incinerable wastes are collected from industries having authorization under the Hazardous and Other Waste (Management & Transboundary Movement) Rules, 2016**.** The waste is transported in the vehicles and brought to the project site. The waste so collected is stored in the facility in a secured manner under the roof.

The general/industrial waste will be stocked on a perforated base to enable its liquid contents if any, to partially seep out. This liquid will be disposed in the incinerator in a controlled manner. Adequate precautions will be taken in storage to avoid any spillage, emission etc. The wastes are labelled with date of receipt, quantity and type. The wastes are randomly analyzed for its composition, especially for calorific value. The inventory is maintained. A separate mixing area is maintained to mix the waste if required for compatibility for incineration.
An Incinerable waste storage shed with adequate capacity as per CPCB guidelines will also be established as a necessary infrastructure. The design of storage shed will be considered as per following requirements.

- Minimum of 15 m distance between storage sheds
- Fire break of at least 4m between two blocks of stacked drums
- At least 1m clear space between two adjacent rows of drums in a pair for routine inspection purpose
- Spillage or leakage control measures to be adopted in the event of any leakage or spillages record keeping and maintenance of shed
- Fire detection, protection and safety measures as well as performing safety audits every year by the operator of a facility and externally once in two years by a reputed expert agency.
- Storage area shall be designed in such a way that the floor level is at least 150 mm above the maximum flood level.
- Signboards showing precautionary measures to be taken, in case of normal and emergency situations shall be displayed at appropriate locations.

2.8.2.2 Waste feeding

Waste-feeding plays an important role to achieve desired combustion efficiencies. Continuous feeding of homogeneous waste having same / similar calorific value to the combustion chambers is the desired option. However, often maintaining homogeneous feed of waste is not feasible due to incompatibility of different wastes for mixing. Conventionally, hazardous wastes in solid form are fed through a hydraulic system to the primary chamber, which will have automatic two gates i.e. once the outside plate is closed, inner side plate is opened and solid waste mass is hydraulically pushed inside and once the inner side plate is closed, outer plate is opened for next batch of solid waste. This system, besides negative pressure in the combustion chambers is required to ensure safety and to prevent workmen exposure to thermal radiation.

2.8.2.3 Combustion chambers

Incineration plant shall be designed, equipped, built and operated in such a way that the gas resulting from the process is raised, after the last injection of combustion air, in a controlled and homogenous fashion.

Incineration plant will be equipped with one auxiliary burner which would be switched on automatically with the temperature of the combustion gases after the last injection of combustion air falls below specified temperature. It will also be used during plant start up and shut-down operations in order to maintain the minimum specified temperature at all times during operations and as long as unburnt waste is in the combustion chamber.

Primary and secondary combustion chamber of the incinerator will be made of mild steel and of suitable thickness lined with high-grade refractory and insulation, so as not to buckle in or bulge out.

Combustion chambers (Primary combustion chamber & secondary combustion chamber) will be designed to supply with excessive air to ensure complete burning of wastes. The blower will be provided with appropriate capability to supply of combustion air. Incinerator facility will have a window fitted with safety view glass to view the Combustion chamber and flame in secondary combustion chambers.

As the common incineration systems will be handling wastes having varying heat value, and while ensuring Total Organic Carbon (TOC) and Loss on Ignition (LOI) requirements in the ash/slag, there are possibilities for sudden rise of temperatures in the combustion chambers. Therefore, the facilities will be designed with thermal refractory bricks and insulation capable of withstanding a maximum temperature of 1,300°C (typically, corundum / chromium bricks). Interlocking arrangements for CO and temperature controls (in primary and secondary chamber) with feeding devices will also be provided. All the burners will be equipped with automatic flame control system. Exit doors will be provided at suitable place, one each on the primary chamber and the secondary chamber of the incinerator for ease in inspection and maintenance.

2.8.2.4 Primary Combustion Chamber

To maintain designed heat capacity of the Primary chamber, quantity of the solid waste injection will be adjusted w.r.t. calorific value of the waste feed. When a high calorific value possessing solid waste is injected in packets, the size of each injection will be reduced, such that the peak CO concentration in the primary chamber does not exceed too high in the initial stage, creating shooting of emissions to the secondary chamber, thereby crisis in ensuring the required retention time.

In the primary chamber waste residence time (30-90 mins) will be adjusted in order to achieve total organic carbon (TOC) and loss on ignition (LOI) requirements in the form of

ash/slag. Silica and glass are fed in appropriate ratios to the chambers to form a cover over the refractory lining, as and when the thickness of the layer reduces. This will improve the life of refractory and insulation bricks.

In the primary chamber, the temperature will be maintained at 800+°C in order to ensure complete burning of waste. Controlled flow of air will be maintained for complete volatilization of waste.

2.8.2.5 Secondary combustion chamber

Minimum temperature requirement in the secondary combustion chamber is 1050°C. The design and operating conditions will be a minimum of 2 seconds residence time in the secondary combustion chambers, under critical feed conditions, so as to bring complete combustion of volatile matter evolved from the primary combustion chamber.

2.9 Pollution Control devices

There are many combinations of treatment units installed for gas cleaning and removal of air pollutants, to comply with the standards. Designed treatment scheme will comprise of following equipment, in combination, with adequate efficiencies to meet the emission standards:

Dioxins: Steps must be taken to prevent reformation of dioxins by rapidly lowering the flue gas temperatures, particularly from 500°C to less than 200°C by adopting rapid quench / catalyst / adsorption by activated carbon etc.

Particulate matter: Fine particulates in the flue gases require specific dust separation technologies such as bag filters, electro static precipitator etc. in order to meet flue gas standard. In case of electro static precipitators, special care is required to avoid electric sparks due to the dust to avoid reformation of dioxins and adsorption to the fine dust.

Mercury: If the feeding waste contains mercury and its compounds, there is an every chance of these emissions to get air borne. Therefore, requires specific treatment for control of these emissions. (Ex. activated carbon, conversion into mercuric chloride and then to mercuric sulphide etc.)

SO_2: Sulphur in the feeding waste upon thermal oxidation forms Sulphur dioxide, which requires control measures to meet the standard. Conventional method followed is scrubbing by alkali (alkali dry / wet scrubber with hydrated lime or sodium hydroxide injection).

HCl & HF: In order to control halogen emissions to the desired level, in particular chlorides and fluorides, conventionally water/alkali scrubbers are in use.

Mist: Often there is a need to eliminate the mist in the stack emissions, therefore, where necessary de-mister may be provided.

2.9.1 Technical Specifications of the Incinerator used

1) Burn capacity: Min 250 kg/hr of hazardous waste
2) Mode of waste handling: Auto loading with ram feeder
3) Type of fuel: LDO/HSD
4) Type of burner operation: Automatic diesel fired

A. INCINERATOR

Incinerator should comprise of 2 static chambers – Primary and Secondary combustion chamber. The plant should have structurally stiffened incineration chambers duly lined with environment compatible high alumina hot face and insulation refractory with openings for flue gases, instruments and burners. Incinerator shell thickness should be 6 mm thick and ASTM A36 MOC.

1	Incinerator	Controlled air, pyrolytic design
2	Fuel	LDO / HSD
3	Model	PDR with air pollution control device
4	Duration of use	Suitable for continuous operation - minimum 8 hr/day
5	Capacity	250 kg/hr
6	Residence time of gas	2 seconds

i) PRIMARY COMBUSTION CHAMBER

1	Type	Static, horizontal
2	No. of chambers	1
3	MOC	ASTM A 36
4	Type of fuel	LDO / HSD
5	Burners	1 no.
6	Burner heating range	Suitable / as required
7	Design temperature	1400°C
8	Operating temperature of primary chamber	850 – 950°C
9	Refractory	Castable type
10	(i) Thickness	Min 220 mm
	(ii) Insulation	Medium / high purity light weight insulating castable having temperature resistance of 1400°C.
	(iii) Hot face	High strength low cement high alumina castable refractory having temperature resistance of 1500°C.

	(iv) Hearth	Low cement high alumina castable refractory having very high strength at high temperature of 1600°C.
11	Ash door	1 no.
12	Residence time	30 – 90 mins

ii) SECONDARY COMBUSTION CHAMBER

1	Type	Static, horizontal
2	MOC	MS – ASTM A 36
3	Type of fuel	LDO / HSD
4	Burner	1 no.
5	Design temperature	1400°C
6	Temperature of secondary chamber	1000 – 1100°C
7	Residence time of secondary chamber	2 seconds
8	Refractory	Castable type
9	(i) Thickness	Min.220 mm
10	(ii) Insulation	Medium / high purity light weight insulating castable having temperature resistance of 1400°C.
	(iii) Hot face	High strength low cement high alumina castable refractory having temperature resistance of 1500°C.
11	Ash door	1 no.

iii) REFRACTORY

1	Type	Castable
2	Anchors	SS-316
3	Coating on anchors	Paraffin
4	CCS at 1000°C	725 kg/cm²
5	Grain size	5 mm
6	Al_2O_3	40 – 60%
7	Bulk density	2.10 g/cm³
8	Service temperature	1500°C

iv) INSULATING CASTABLE

1	Type	Castable
2	CCS at 110°C	35 – 45 kg/cm²
3	Grain size	5mm
4	Bulk density	1.1 gm/cc
5	Service temperature (maximum)	1350°C
6	Anchor keys	SS 310/309

V) COMBUSTION AIR FAN

1	Quantity	1 no.
2	MOC	IS:2062
3	Type	Forced draught, centrifugal, direct drive
4	Motor rating	5.5 kW

vi) DIESEL BURNER

1	Type	Baltur equivalent make oil burners consisting of burner head with photocell for selective flame supervision, nozzle and electrodes, connection hoses, ignition and photocell cable, oil pump, fan and controller
2	Quantity	2 nos.
3	Make	Baltur / Bentone / Ecoflam
4	Power	415/230V, 50Hz
5	Electrical cabling and earthing	Within battery limits
6	Burner output	350-900 kW

vii) AUTOMATIC WASTE FEEDING (RAM LOADER) SYSTEM

1	Quantity	1 no.
2	MOC	MS plate conforming to (IS: 2062).
3	Support	MS angle and channel section (IS: 2062).
4	Ram head	MS plate (IS: 2062).
5	Support leg	MS plate (IS: 2062).
6	Hydraulic rams	
	[a] Ram head loading	Two way operation type with suitable Inner

	and retracting ram	ram
	[b] Incinerator door ram	Two way operation types with suitable inner ram mounted on top of ram loader and incinerator boss.
7	Power pack	Electrically operated power pack consisting of hydraulic oil reservoir, hydraulic pump and limit switches Mounted on ram loader support frame.
8	Hydraulic hoses	High pressure armored hoses as specified by power pack Manufacturer.

viii) EMERGENCY STACK

In the event of power failure, hot gases should be directly exhausted to the emergency stack, by-passing the scrubber, preventing damage. Simultaneously, water from the emergency water tank should flow into the scrubber to bring down the temperature.

1	Quantity	1 no.
2	MOC	IS:2062, refractory lined
3	Operation	By electromagnetic damper

B. SCRUBBING SYSTEM COMPRISING OF GAS COOLER, BAG FILTER, ACID GAS SCRUBBER AND DEMISTER

i) GAS COOLER

Flue gas at a temperature 1100^0C from the secondary combustion chamber should passed into a gas cooler. The gas cooler should have two sections. The first section should be made of steel with refractory lining. The second section should be made of unlined steel. Fresh water is pumped into the gas cooler to cool gas from 1100^0C to 180^0C. The water should evaporate completely in the gas cooler and there should be no water outlet.

1	Type	Horizontal cylindrical	
2	MOC	ASTM A 36 with refractory lining	
3	Re-circulation pump	Type	Centrifugal
		Make	Johnson / KSB
		Material Motor rating	SS-316 / PP 9.3 kW

ii) BAG FILTER

Bag house filter should be reverse pulse-jet cleaning type with filter bags. Filter bags should be made of PTFE fabric installed on metal filter cages. Conical bottom sections should be for the collection of ash and coating material.

1	Bags filter type	Online cleaning
2	Bags material	Fiber glass with Teflon membrane
3	No. of bags	Approx. 200
4	Pulsing valve type	Solenoid operated diaphragm valve
5	Compressed air type	Oil and moisture free (in client's scope)
6	Air to cloth ratio	1:3

iii) ACID GAS SCRUBBER

Flue gas should be fed into an acid gas scrubber to remove gaseous pollutants like SO2 and HCl. The scrubbing medium should be water / caustic.

1	Type	Tower
2	MOC	SS 316
3	Quantity	1 no.
4	Design inlet temperature	180°C
5	Design outlet temperature	80°C
6	Flow direction - flue gas	Vertical / downwards
7	Flow direction - water	Vertical / downwards
8	Recirculation water tank	1 No.

iv) DE-MISTER

The Scrubbed gases from the venturi scrubber should pass into the demister. This system should ensure that moisture or mist is not carried to the ID fan.

1	MOC	ASTM A 36 with rubber lining and PP fills
2	Details of bottom seal pot	Re-circulation tank
3	Temperature of flue gas at outlet	70 – 80°C
4	Piping and valves	Complete with requisite return pipes, overflow pipes, drains, etc.

v) ID FAN

The ID fan should maintain the balance draft and should draw out the clean gases into the atmosphere through 30 m high stack.

1	Type	Centrifugal, complete with inlet chamber, inlet/outlet, motor, base plate and other accessories.
2	Quantity	1 no.
3	Motor rating, kW	55 kW

vi) CHIMNEY

A chimney should be provided to ensure release of flue gases 30 m from ground level.

1	Type	Self-supported designed as per IS 6533
2	Lining	Rubber lining
3	Height	30 mtrs
4	Accessories	Platform, sampling port, ladder, protection rings, lightning arrestor and foundation bolts

2.9.2 Fuel

Wastes fed into the incinerator forms the fuel for startup and for maintaining the set temperature. In case of low waste burning, diesel is used as a fuel. For this purpose, diesel tank with 1000 L capacity and a pump is also provided with the incinerator.

2.9.3 Stack

A self-support MS stack with rubber lining is provided for releasing the gases after incinerator from the secondary combustion chamber. Stack height 30 m above ground level. Stack dia 0.80 m

2.9.4 Safety and Controls

The electrical system is interlocked with the eductor fan. Unless and until the eductor fan is on, no electrical system comes on line. When this fan trips the system goes into Lockout. The eductor mechanism creates negative draft in the system which ensures safety of the operator by preventing flame/hot gases coming out of the charging door. The limit switch on the charging door trips the primary burner when the door opens there by preventing the operator from facing the flames. Thermocouples provide in the primary and secondary chambers bring the burner on and off the line with the help of temperature indicators cum controllers thereby ensuring optimum fuel consumption.

2.10 Emission Effluent Standard for Incinerator as Per Ep Rules Serial No 68 'B' of Schedule I of EP Rules

Emissions	**Limiting concentration in mg/Nm^3**	**Sampling duration in minutes**
Particulate matter	50	30 or more
Hcl	50	30
SO_2	200	30
CO	100	Daily average
Total Organic Carbon	20	30
Dioxins and Furans	0.1 ng TEQ/Nm^3	8 Hours
Sb+As+Pb+Cr+Co+Cu+Mn+Ni+V+Cd+Th+Hg and their compounds	1.5	2 Hours

The existing plant shall comply with norms for Dioxins and Furans as 0.1 ng TEQ/Nm^3

Note:

i) All monitored values shall be corrected to 11% oxygen on dry basis

ii) The CO_2 concentration in tail gas shall not be less than 7 %.

iii) In case, halogenated organic waste is less than 1% by weight in input waste, all the facilities in twin chamber incinerator shall be designed so as to achieve a minimum temperature of 850 ± 25 ^{0} c in primary chamber and 950^0 c in secondary combustion chamber and with a gas residence time in secondary chamber not less than two seconds.

iv) In case of halogenated organic waste is more than 1% by weight in input waste, waste shall be incinerated only in twin chamber incinerators and all the facilities shall be designed to achieve a minimum temperature of 850±25^0 C in primary chamber and 1100^0 C in secondary combustion chamber with a gas residence time in secondary combustion chamber not less than two seconds.

v) Scrubber meant for scrubbing emissions shall not be used as quencher.

vi) Incineration plants shall be operated with such temperature, retention time and turbulence, as to achieve TOC content in the incineration ash and residue less than 3% and their loss on ignition is less than 5% of the dry weight. In case of non-conformity, ash and residue, as the case may be, shall be re-incinerated.

Note: i) Effluent from scrubber and floor washing shall flow through closed conduit or pipe network and be treated to comply with the effluent standards.

ii) The built up in TDS in waste water of floor washings shall not exceed 1000 mg/l over and above the TDS of raw water used.

Storm Water

i) Storm water shall not be allowed to mix with scrubber water and/or floor washings.

ii) Storm water shall be channeled through separate drains passing through a HDPE lined pit having holding capacity of 10 minutes (hourly average) of rainfall.

2.11 Resource requirement:

Capital investment, land, water, fuel, man power, power, other utilities etc. are main requirement of proposed project.

2.11.1 Water Requirement

The water requirement for the project during operation is augmented from KIADB water supply sources. Total water requirement is 4 KLD.

2.11.2 Manpower Requirement

The proposed project shall generate employment during the construction for local skilled and semi-skilled workers. Approximately 18 nos. of peoples will get direct employment during operation phase. During construction phase approximately 35 nos of peoples will get employed.

2.11.3 Energy Requirement

The power requirement of about 50 HP for the project is augmented from KPTCL. Further one diesel generator of 63 kVA capacity is proposed to be installed to serve as an alternative source of power supply to the project site.

2.12 Quantity of wastes to be generated (liquid and solid) and scheme for their management/ disposal

2.12.1 Water Environment & Management:

The water requirement for the project during operation is augmented from KIADB water supply sources.

The total quantity of water requirement for the plant is about 4 KLD. The break-up of the consumption of water and waste water generation details is as presented in table 2.5 & 2.6 below.

Table 2.5: Water Consumption

Water consumed for	Consumption (LPD)
(a) Domestic	800
(b)Scrubbing, vehicle wash and cleaning	2000
(c)Gardening/Landscape development	1200
Total	**4,000**

Table 2.6: Waste Water Generation Details

Water consumed for	Discharge (LPD)
(a) Domestic	700
(b) Scrubber bleed, vehicle wash and cleaning	2000
Total	**2700**

2.12.2 Waste Water Treatment Scheme

Sewage generated from Domestic purposes will be treated in Septic Tank and Soak pit. Scrubber effluent and floor wash will be treated in ETP and treated effluent will be used for scrubbing flue gas in venturi scrubber and excess will be reused.

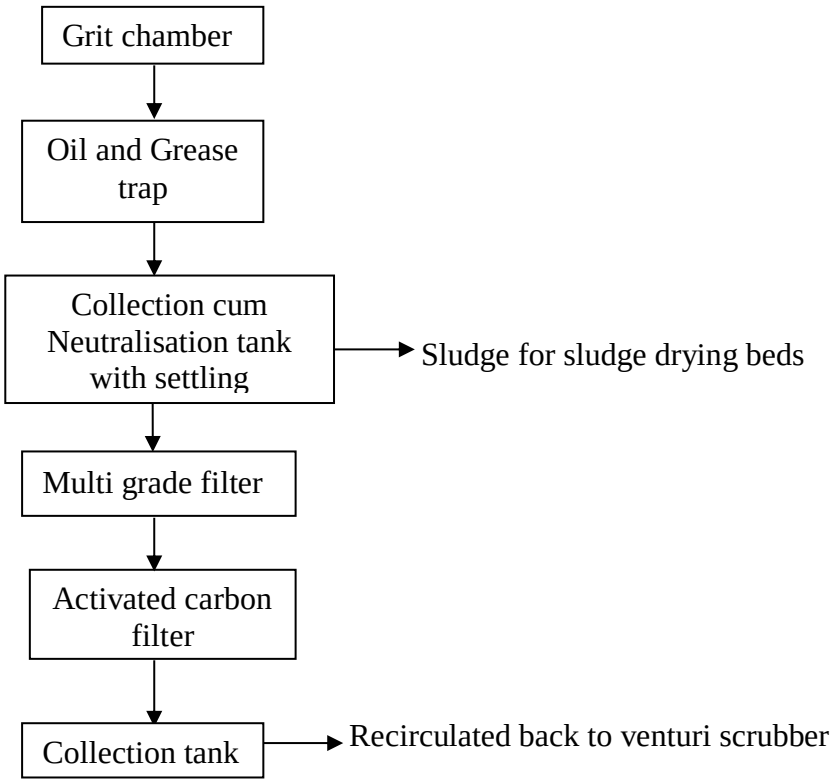


Fig 2.5: ETP flow chart

The effluent generated from Scrubber, floor and vehicle washings will be treated in ETP. The ETP comprises of grit chamber, oil and grease trap followed by collection, neutralization tank and settling. The sludge from the collection tank will be dried on sludge drying beds. The water from the collection tank will be passed through Multi grade and activated carbon filters for removal of turbidity and suspended particles present in the water. The treated water from the filters will be used for scrubber and excess will be reused.

2.12.3 Air Environment & Management

The major air pollution sources from the project are Incinerator and DG set. These sources are provided with stacks of adequate height so as to disperse the emanating flue gases.

Table 2.7: Air pollution sources and control measures:

a) Incinerator

Sl No	Stack Details	Stack attached to
1	Incinerator furnace	Chimney of 30 m height and Scrubber
2	Fuel used	Ultra-Pure Low Sulfur Content Diesel

b) D G Set

Sl No	**Stack Details**	**Stack Attached to**
Physical Details		DG Set
1	Capacity	63 kVA
2	Fuel quantity	12.6 L/hr
3	Fuel used	Ultra-Pure Low Sulfur Content Diesel
4	Stack height	Chimney of 3 m (Above roof level)
5	Stack diameter	80 mm

2.12.4 Noise Generation and Its Management

The main sources of noise from the proposed project is movement of vehicles on the roads during transportation of waste from Industries and the DG set for which acoustic enclosure is proposed. The ambient noise levels will be ensured within the ambient standards by inbuilt design of mechanical equipment apart from vegetation (tree plantations) along the periphery and at various locations within the plant premises.

2.12.5 Solid Waste Generation and Management

Solid Waste Generation during the Operation Phase is Incinerated ash. One is from the furnace and the other from the emission collected in the bag filter. The ash is collected and disposed to TSDF. The approximate quantity of ash generation is about 20 MT/Year.

2.12.6 Hazardous waste Management

Hazardous waste generation quantity is given in the following table:

Table 2.8: Hazardous waste generation quantity:

Sl No	Waste Category	Type of Hazardous waste generated	Generation Qty	Handling & mode of disposal
1	5.1	Used Oil/Lubricant oil	0.05 KL/A	Shall be collected in leak proof containers and disposed only to CPCB reprocessors /common collection Centre provided the oil meets the standards as per schedule- 5 of the rules.
2	37.2	Incinerator ash	20 MT/Year	Collected, Stored in Secured manner and send to TSDF.
3	33.1	Discarded containers and bags	5 MT/year	Hazardous waste containers is reused for collecting hazardous waste

2.13 Green belt development

Greenbelt will be developed around the site boundary. The total greenbelt including green cover and landscape area in the premises is 1,214 sq m which works out to about 33 % of total project area. The treated water from the ETP will be used for green belt development.

Species for Plantation

The species proposed will have broad leaves. Trees will be selected such that they are easily available and suitable to the local climate. They have different morphological, physiological and bio-chemical mechanism/ characters like branching habits, leaf arrangement, size, shape, surface (smooth/hairy), ascorbic acid content, cationic peroxides and sulphite oxidize activities etc. to trap or reduce the pollutants.

Table 2.9: Trees proposed in the project site.

Sl No	**Scientific name**	**Common name**	**Numbers**
1	*Azadirachta indica*	Neem	12
2	*Plumeria alba*	Temple tree	10
3	*Pongamia pinnata*	Honge	11
4	*Syzygium jambos*	Jambu	6
5	*Tectona grandis*	Teak	11
		Total	50

All the above-mentioned species are ideally suited for the ecological habitat of Gadag Industrial Area, Gadag.

CHAPTER 3

DESCRIPTION OF THE ENVIRONMENT

3.0 Introduction

Baseline environmental status in and around proposed project depicts the existing environmental conditions of air, noise, water, soil, biological and socio-economic environment. Baseline data was collected for environmental attributes viz., Ambient air quality, Surface and ground water quality, soil quality and noise so as to compute the impacts that are likely to arise due to establishment of Proposed Common Hazardous Waste Incineration Facility.

3.1 Baseline environmental studies

The main aim of the impact assessment study is to find out the impact of the project on the environment. This study is to be carried out during the project planning stage itself, so that the proponent can implement the project in a technically, financially and environmentally viable way.

With proposed project as the centre, a radial distance of 5 - 7 Km is considered as 'study area' for baseline data collection and environmental monitoring. The estimated impact due to the proposal can be superimposed over the existing conditions to arrive at the post project scenario. The scope of the baseline studies includes detailed characterization of following environmental components, which are most likely to be influenced by setting up the industry:

- Ambient Air Quality
- Noise Levels
- Water Quality (Surface + Ground water).
- Soil Quality and
- Socio Economic studies

3.2 Monitoring Period

The baseline data generation for the EIA has been carried out during the post monsoon season (February 2018 to April 2018).

3.3 Establishment of Baseline

3.3.1 Meteorological data

Climate has an important role in the build-up of pollution levels. The climatic condition of the area may be classified as moderately or seasonally dry, tropical or temperate savanna climate with four seasons in a year. Winter is critical for air pollution build-up because of

frequent calm conditions with temperature inversions resulting in poor atmospheric mixing, natural ventilation and high emission loads.

The classification of months according to the seasons is given in the following table.

Season	*Period*
Summer	March to May
Monsoon	June to September
Post monsoon	October to November
Winter	December to February

The metrological data reflecting minimum, maximum temperature in ^{0}C, relative humidity in %, rainfall in mm/hr, wind speed in m/s, mixing height in m, cloud cover in tenths and atmospheric pressure in mb for the year 2017 is secondary data.
Source: https://www.worldweatheronline.com/gadag-weather

3.3.1.1 Temperature

Months	**Max. Temperature(°C)**	**Min. Temperature (°C)**	**Humidity %**	**Precipitation /Rainfall (mm)**	**Wind Speed Km/hr**
January	32	19	43	1.3	13.3
February	35	21	32	0	13.03
March	38	23	33	6.6	11.5
April	40	25	40	9.4	13.3
May	36	25	58	25.3	15.7
June	28	23	79	149.6	23.8
July	30	23	70	66.6	29.12
August	30	22	75	234.2	24.4
September	30	23	73	395.5	16.57
October	30	22	68	283.1	13.67
November	30	21	50	8	14.00
December	31	20	46	6.8	14.00

Fig 3.0: Temperature Graph of Gadag during JAN 2017 – DEC 2017

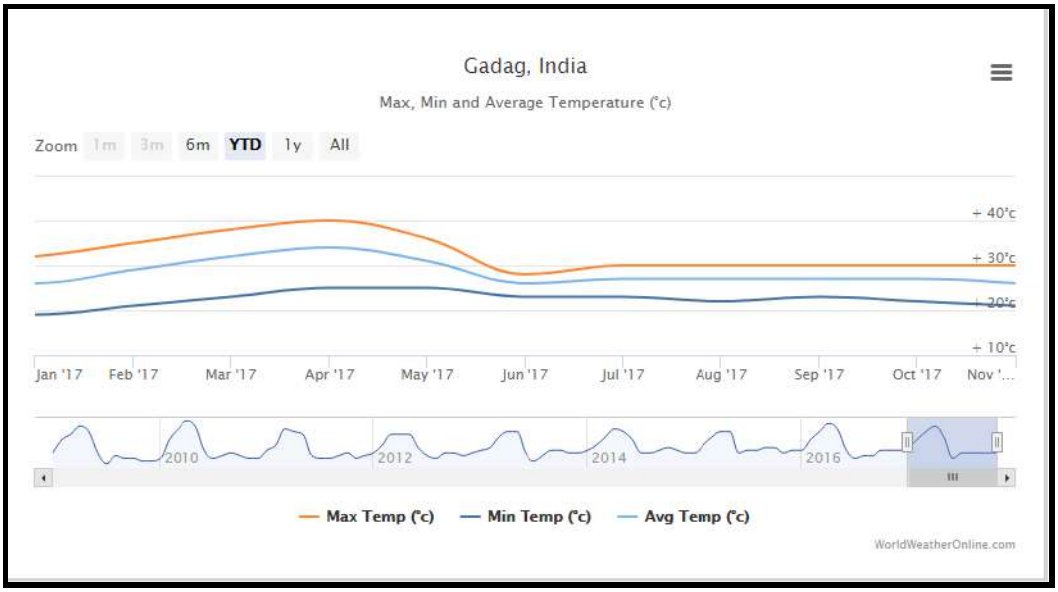


Fig 3.1: Precipitation Graph of Gadag during JAN 2017 – DEC 2017

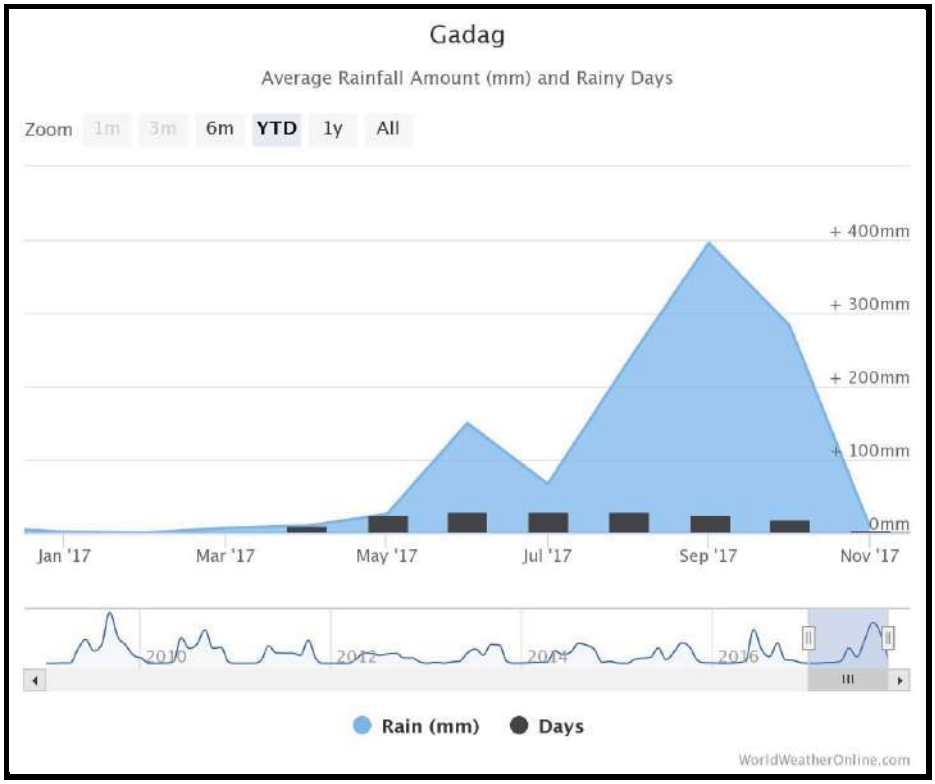
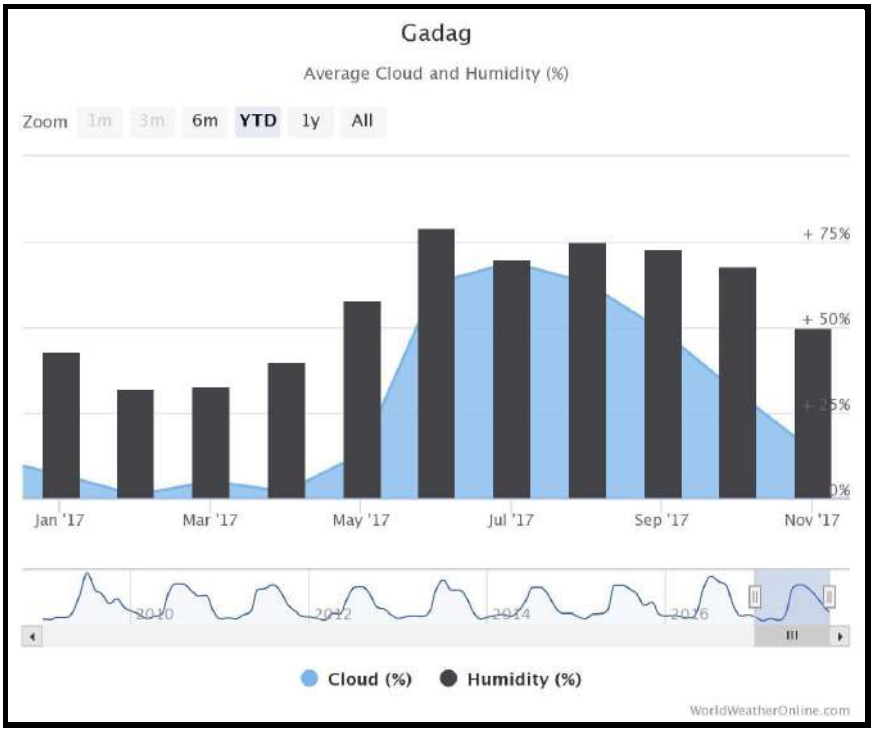


Fig 3.2: Humidity Graph of Gadag during JAN 2017 – DEC 2017



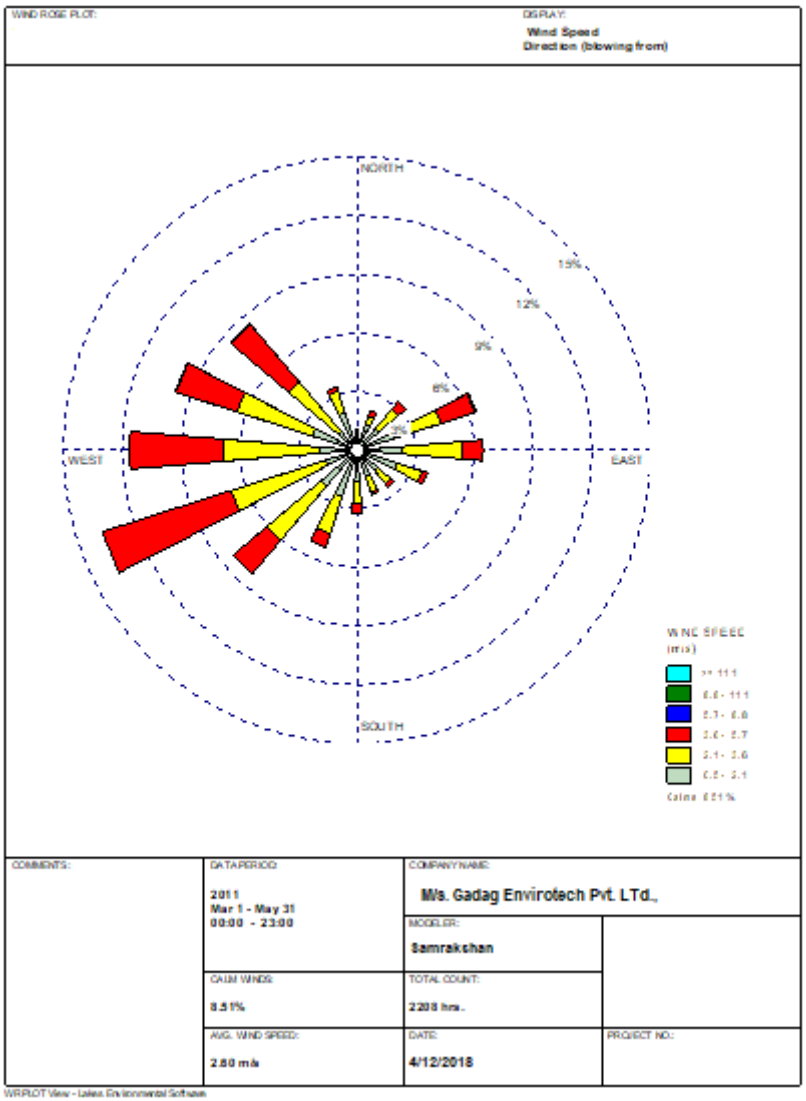
3.3.1.2 Wind

The data on wind patterns are pictorially represented by means of wind rose diagrams for the entire year in Fig 3.3 and for different seasons.

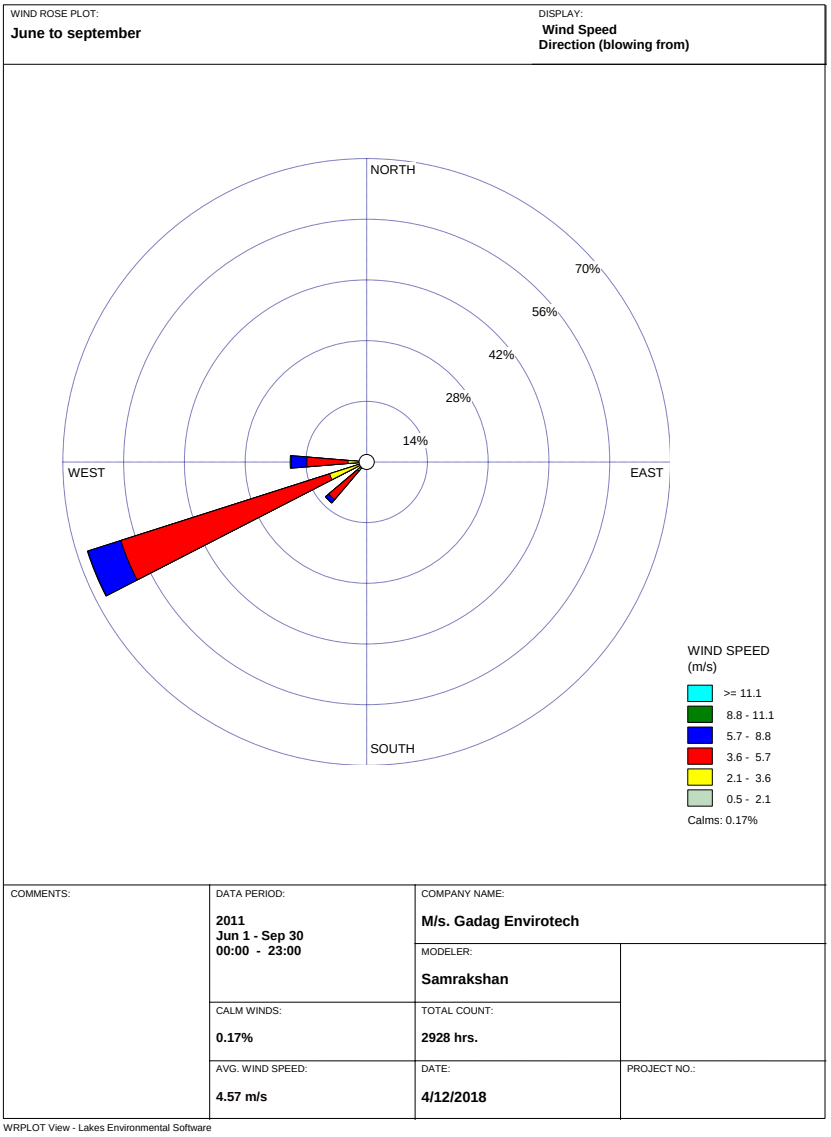
Season	Period	Wind direction
Summer	March to May	North West
Monsoon	June to September	South West
Post monsoon	October to November	North East
Winter	December to February	North East

Fig 3.3: WINDROSE DIAGRAMS:

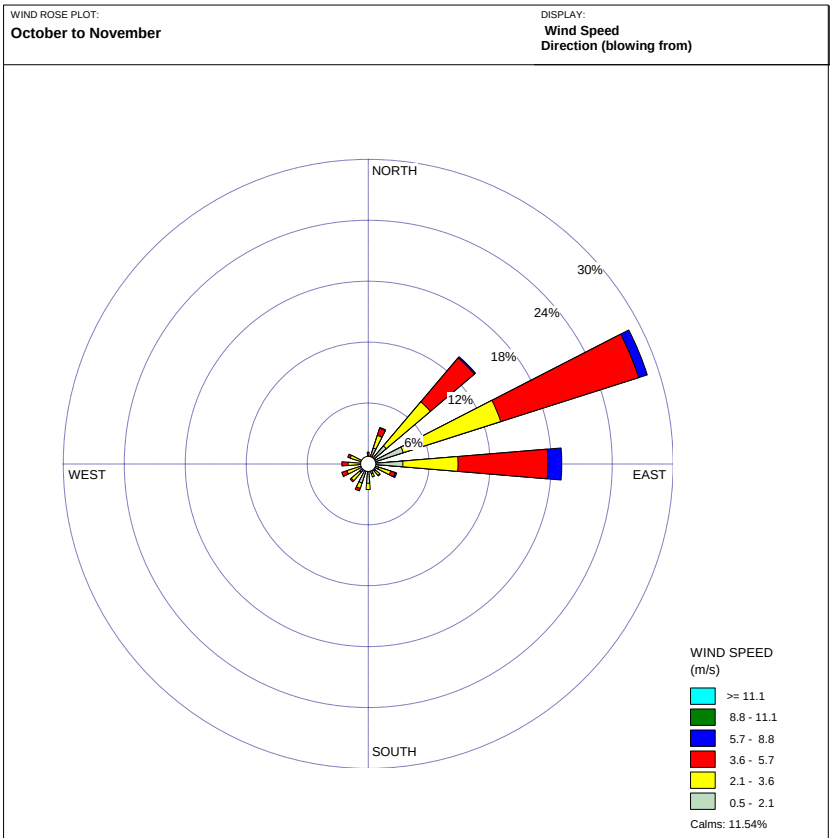
1) March to May



2) June to september

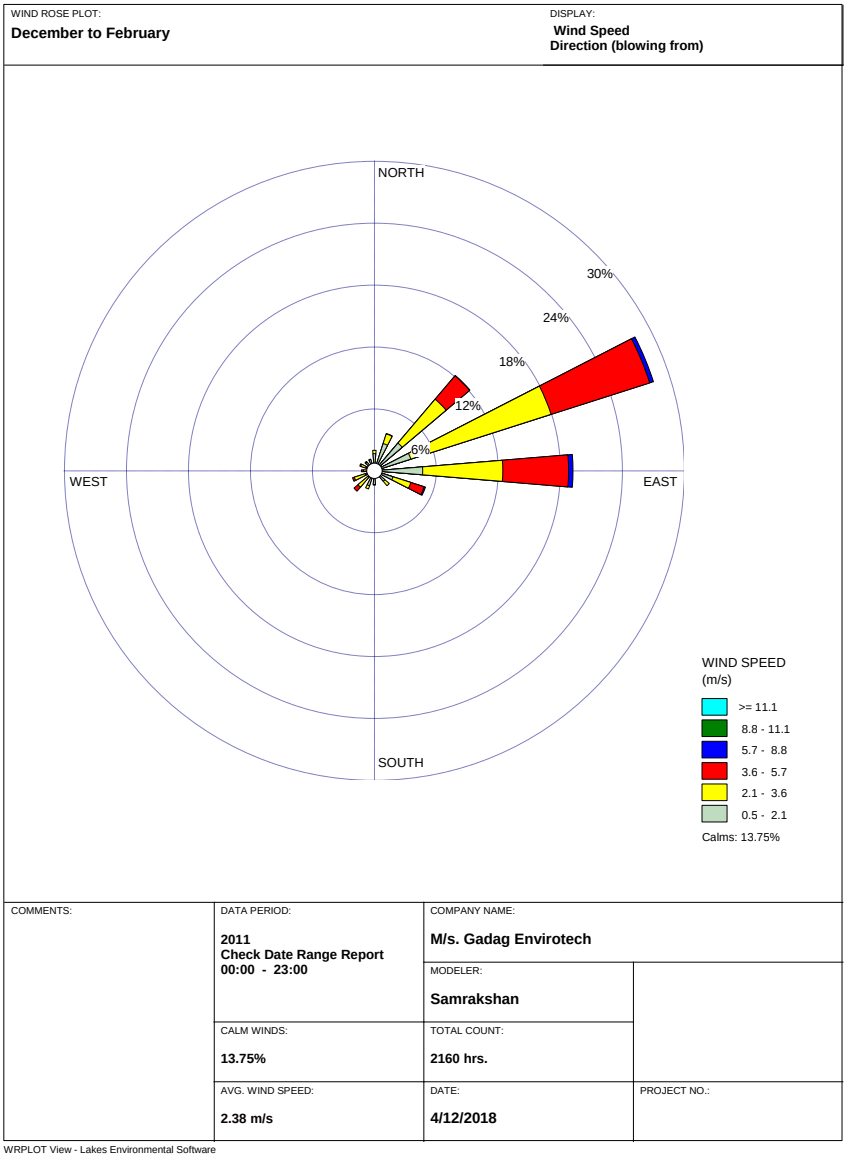


3) October to November



WRPLOT View - Lakes Environmental Software

4)December to February



3.4 Geology of the district

Gadag district is located in northern parts of Karnataka and situated in between north latitudes of 15° 15’ and 15°45’ and east longitudes of 75°20’ and 75°47’. The district falls in the semi-arid tracts of Karnataka. The annual rainfall is generally less than 750 mm. The depth and colour varies from place to place according to topographic and climatic conditions. The soil of the study area is mainly medium black soil.

Gadag district at a glance

Sl No	Items	Statistics
1	**General Information**	
	i) Geographical area (Sq.km)	4656

<table>
<tr><td></td><td>ii) Administrative Divisions</td><td></td></tr>
<tr><td></td><td>a) Number of Taluk</td><td>5</td></tr>
<tr><td></td><td>b) Number of panchayat/S</td><td>106</td></tr>
<tr><td></td><td>iii)Population (As on 2011Census)</td><td>1,72,612</td></tr>
<tr><td></td><td>iv)Average Annual Rainfall (mm)</td><td>612.3</td></tr>
<tr><td>2</td><td>Geomorphology</td><td></td></tr>
<tr><td></td><td>Major physiographic units</td><td>02</td></tr>
<tr><td>3</td><td>Land Use (Ha)</td><td></td></tr>
<tr><td></td><td>a) Forest area</td><td>32614</td></tr>
<tr><td></td><td>b) Net area sown hectare</td><td>3866</td></tr>
<tr><td>4</td><td>Area Under Principal Crops (Ha)</td><td><table>
<tr><td>Jowar</td><td>93659</td></tr>
<tr><td>Tur dal and other pulses</td><td>2874</td></tr>
<tr><td>Ground nut</td><td>57846</td></tr>
<tr><td>Cotton</td><td>59813</td></tr>
<tr><td>Paddy</td><td>1543</td></tr>
<tr><td>Wheat</td><td>36348</td></tr>
<tr><td>maize</td><td>22621</td></tr>
</table></td></tr>
<tr><td>5</td><td>Irrigation By Different Sources (Ha)</td><td></td></tr>
<tr><td></td><td>Dug wells</td><td>2008</td></tr>
<tr><td></td><td>Bore wells</td><td>26856</td></tr>
<tr><td></td><td>Tanks</td><td>1246</td></tr>
<tr><td></td><td>Canals</td><td>20016</td></tr>
<tr><td></td><td>Other sources</td><td>5246</td></tr>
<tr><td></td><td>Lifts</td><td>1309</td></tr>
<tr><td></td><td>Gross irrigation area</td><td>62766</td></tr>
<tr><td>6</td><td>Effect of industries in Narsapura industrial area Gadag on Gadag town</td><td>Gadag town is in the south west direction of the Narasapura Industrial area at a distance of 5 km and in the downwind direction therefore the impact on Gadag town’s air quality may not be affected due to industries.</td></tr>
</table>

3.5 Drainage pattern in 5 km radius of study area

There are two nalas/canals flowing on eastern and western side of the project site both at a distance of 1.5 km. The proposed site is at an elevation of 645 m. The elevation at the two nalas are 626 m and 633 m. There are natural small drains which connects the nalas on either side. No flow in the nala is observed during the site visit. It is informed by the locals that some flow is observed during monsoon, during rest of the year it is dry. Since there is no steep slope towards nala and as the activity/project is not water intensive and whatever the waste water generated from scrubber is treated and reused.

Therefore, the drainage pattern in this area do not have any impact on the proposed project.

3.6 Basis for Selection of the Monitoring Locations

The selection of the monitoring site criteria is based on the

- Wind flow direction
- Topography /Terrain of the study area
- Density of population within region
- Residential and Sensitive areas
- Magnitude of surrounding industries if any
- Proximity of industrial activity if any

3.7 Ambient Air Quality

The Ambient Air quality was monitored in the study area which represents mostly rural environment. The prime objective of the baseline Air quality study was to assess the existing Ambient Air quality of the study area.

3.7.1 Parameters for Sampling & Sampling Frequency

Ambient Air Quality Monitoring (AAQM) stations were set up at 5 locations. AAQ locations were selected in downwind, cross wind and upwind direction of the proposed Project location.

The details of the monitoring stations are given in **Table 3.1**; air monitoring locations are shown in **Fig 3.4.**

At each sampling station monitoring was carried out for a frequency of 2 days per week for 4 weeks in a month during study period. The Common Air pollutants namely Particulate Matter (PM<2.5µ, PM<10µ), Sulphur dioxide (SO_2), Oxides of Nitrogen (NO_x), carbon monoxide (CO) and Ozone (O_3), were sampled on 8/24 hourly and results were averaged to 24 hours to meet the requirements of the MoEF and compared with the National Ambient Air Quality Standards stipulated by CPCB. Monitoring of other parameters viz., Ammonia, Benzene,

Benzo (a) pyrene, Arsenic, Nickel is not carried out because there are no major industries in the Gadag Industrial Area, which contribute to these pollutants.

Table 3.1: Air quality monitoring locations

Sl No	Station No.	Name of the station	Distance from site (km)	Direction from the site	Latitude	Longitude
1	A 1	Adjacent brick unit	0.005	East	15^0 27' 53.16" N	75^0 40' 08.67" E
2	A 2	Betageri rural	1.8	West	15^0 28' 10.35" N	75^0 38' 28.11" E
3	A 3	Benakanakoppa	5	North east	15^0 30' 16.67" N	75^0 41' 26.05" E
4	A 4	Kanaginahal	6.4	East	15^0 27' 24.82" N	75^0 43' 40.16" E
5	A 5	Hamalara colony	3.1	South	15^0 26' 09.88" N	75^0 43' 40.16" E

Fig 3.4: Ambient Air monitoring locations

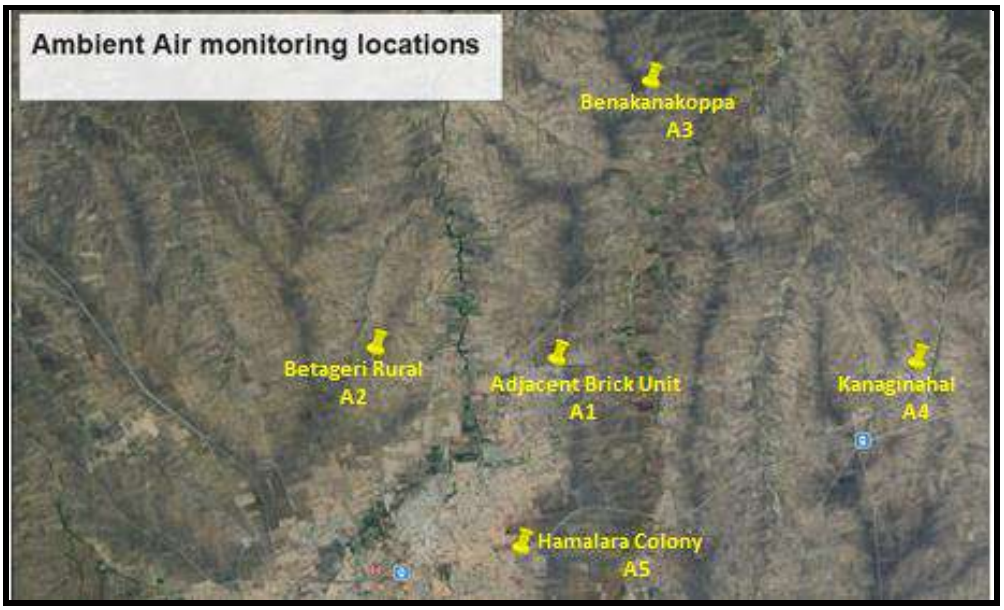
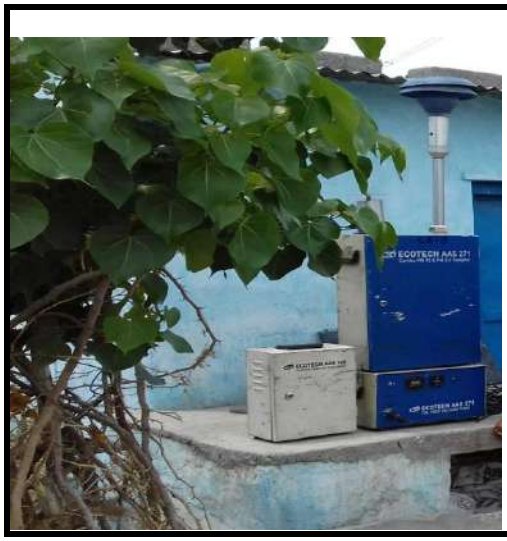


Fig 3.5: Photographs of Ambient Air Sampling

Project site – Adjacent brick unit

Betageri rural – Near Harsha Kirani Store



Benakanakoppa – Near Anganawadi

Kanaginahal – Near bus stop

Hamalara colony – Near Renuka Clinic

Table 3.1 (a): Ambient Air Quality Analysis Report for February – 2018

Parameter	Unit	Project site	Betageri rural	Benakanakoppa	Kanaginahal	Hamalara colony
		(A1)	(A2)	(A3)	(A4)	(A5)
Sulphur Dioxide (as SO_2),	$\mu g/m^3$	8.1	5.1	7.8	8.1	7.4
Oxides of Nitrogen (as NO_2),	$\mu g/m^3$	14.9	11.3	12.6	13.6	11.6
Particulate Matter PM_{10}	$\mu g/m^3$	65.7	73.6	65.4	69.3	71.4
Particulate Matter $PM_{2.5}$	$\mu g/m^3$	30.1	34.8	32.3	31.8	29.6
Ozone (O_3),	$\mu g/m^3$	BDL	BDL	BDL	BDL	BDL
Lead (Pb),	$\mu g/m^3$	0.02	0.02	0.01	0.01	0.02
Carbon Monoxide (CO),	mg/m^3	ND	ND	ND	ND	ND

Table 3.1 (b): Ambient Air Quality Analysis Report for March - 2018

Parameter	Unit	Project site	Betageri rural	Benakanakoppa	Kanaginahal	Hamalara colony
		(A1)	(A2)	(A3)	(A4)	(A5)
Sulphur Dioxide (as SO_2),	$\mu g/m^3$	6.2	7.8	6.4	5.8	5.3
Oxides of Nitrogen (as NO_2),	$\mu g/m^3$	13.3	14.1	13.3	11.8	10.1
Particulate Matter PM_{10}	$\mu g/m^3$	63.2	63.5	59.8	68.9	67.3
Particulate Matter $PM_{2.5}$	$\mu g/m^3$	30.1	31.3	34.6	33.4	29.8
Ozone (O_3),	$\mu g/m^3$	BDL	BDL	BDL	BDL	BDL
Lead (Pb),	$\mu g/m^3$	0.02	0.01	0.02	0.02	0.01
Carbon Monoxide (CO),	mg/m^3	ND	ND	ND	ND	ND

Table 3.1 (c): Ambient Air Quality Analysis Report for April– 2018

Parameter	Unit	Project site	Betageri rural	Benakanakoppa	Kanaginahal	Hamalara colony
		(A1)	(A2)	(A3)	(A4)	(A5)
Sulphur Dioxide	$\mu g/m^3$	10.5	6.3	7.3	6.3	8.1

(as SO_2),						
Oxides of Nitrogen (as NO_2),	µg/m^3	15.6	13.9	12.5	11.4	12.4
Particulate Matter PM_{10}	µg/m^3	72.8	78.8	68.3	56.8	58.3
Particulate Matter $PM_{2.5}$	µg/m^3	33.4	38.3	29.3	25.4	28.8
Ozone (O_3),	µg/m^3	BDL	BDL	BDL	BDL	BDL
Lead (Pb),	µg/m^3	0.02	0.02	0.02	0.02	0.01
Carbon Monoxide (CO),	mg/m^3	ND	ND	ND	ND	ND

3.7.2 Observations of Ambient Air Quality Data

- The minimum and maximum concentrations for PM_{10} were recorded as 63.5 µg/m^3 and 78.8 µg/m^3 respectively. The minimum and maximum concentrations were recorded at Betageri rural Village (A2).
- The minimum and maximum concentrations for $PM_{2.5}$ were recorded as 25.4 µg/m^3 and 38.3 µg/m^3 respectively. The minimum and maximum concentrations were recorded at Kanginahal (A4) and at Betageri rural (A2) respectively.
- The minimum SO_2 concentration was recorded as 5.1 µg/m^3 at Betageri Rural (A2)and the maximum concentration of 10.5µg/m^3 was recorded at adjacent brick unit to the project Site (A1) respectively.
- The minimum and maximum NOx concentrations were recorded as 10.1 µg/m^3at Hamalara Colony (A5) and 15.6µg/m^3 at adjacent brick unit to the project site(A1) respectively.
- The ozone concentration was BDL at all the monitoring locations.
- The concentrations of $PM_{2.5}$, PM_{10}, SO_2 and NO_2 are observed to be well within the NAAQ standards prescribed by Central Pollution Control Board (CPCB) for industrial and rural /residential zone.

3.7.3 National ambient air quality standards

Sl No	Pollutant	Time Weighted Average in hours	Industrial, Residential, Rural and Other Area
1	Sulphur Dioxide (as SO_2), µg/m^3	24 *	80
2	Oxides of Nitrogen (as NO_2), µg/m^3	24 *	80
3	Particulate Matter / PM_{10}, µg/m^3	24 *	100
4	Particulate Matter/ $PM_{2.5}$,		

	$\mu g/m^3$	24 *	60
5	Ozone (O_3), $\mu g/m^3$	1 *	180
6	Lead (Pb), $\mu g/m^3$	24 *	1.0
7	Carbon Monoxide (CO), mg/m^3	1 *	04

3.7.4 AIR QUALITY INDEX FOR THE MONTH OF FEBRUARY - 2018

Station	Pollutant	Concentration	AQI	AQI Category	Remarks	
					Heath effects	Sensitive groups
Adjacent brick unit	Sulphur dioxide	8.1 µg/m^3	11	Good	None	People with asthma are the group most at risk.
	Oxides of nitrogen	14.9 µg/m^3	13	Good	None	People with asthma or other respiratory diseases, the elderly, and children are the groups most at risk.
	PM_{10}	65.7 µg/m^3	56	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory disease are the group most at risk.
	$PM_{2.5}$	30.1 µg/m^3	89	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory or heart disease, the elderly and children are the groups most at risk.
	Ozone	BDL	0	Good	None	Children and people with asthma are the groups most at risk.
	Carbon Monoxide	ND	0	Good	None	People with heart disease are the group most at risk.

Station	Pollutant	Concentration	AQI	AQI Category	Remarks	
					Heath effects	Sensitive groups
Betageri rural	Sulphur dioxide	5.1 µg/m^3	7	Good	None	People with asthma are the group most at risk.
	Oxides of nitrogen	11.3 µg/m^3	10	Good	None	People with asthma or other respiratory diseases, the elderly, and children are the groups most at risk.
	PM_{10}	73.6 µg/m^3	60	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory disease are the group most at risk.
	$PM_{2.5}$	34.8 µg/m^3	99	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory or heart disease, the elderly and children are the groups most at risk.
	Ozone	BDL	0	Good	None	Children and people with asthma are the groups most at risk.
	Carbon Monoxide	ND	0	Good	None	People with heart disease are the group most at risk.

Station	Pollutant	Concentration	AQI	AQI Category	Remarks	
					Heath effects	Sensitive groups
Benakanakoppa	Sulphur dioxide	7.8 µg/m^3	10	Good	None	People with asthma are the group most at risk.
	Oxides of nitrogen	12.6 µg/m^3	11	Good	None	People with asthma or other respiratory diseases, the elderly, and children are the groups most at risk.
	PM_{10}	65.4 µg/m^3	56	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory disease are the group most at risk.
	$PM_{2.5}$	32.3 µg/m^3	99	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory or heart disease, the elderly and children are the groups most at risk.
	Ozone	BDL	0	Good	None	Children and people with asthma are the groups most at risk.
	Carbon Monoxide	ND	0	Good	None	People with heart disease are the group most at risk.

Station	Pollutant	Concentration	AQI	AQI Category	Remarks	
					Heath effects	Sensitive groups
Kanaginahal	Sulphur dioxide	8.1 µg/m^3	11	Good	None	People with asthma are the group most at risk.
	Oxides of nitrogen	13.6 µg/m^3	12	Good	None	People with asthma or other respiratory diseases, the elderly, and children are the groups most at risk.
	PM_{10}	69.3 µg/m^3	58	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory disease are the group most at risk.
	$PM_{2.5}$	31.8 µg/m^3	92	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory or heart disease, the elderly and children are the groups most at risk.
	Ozone	BDL	0	Good	None	Children and people with asthma are the groups most at risk.
	Carbon Monoxide	ND	0	Good	None	People with heart disease are the group most at risk.

Station	Pollutant	Concentration	AQI	AQI Category	Remarks	
					Heath effects	Sensitive groups
Hamalara colony	Sulphur dioxide	7.4 µg/m^3	10	Good	None	People with asthma are the group most at risk.
	Oxides of nitrogen	11.6 µg/m^3	10	Good	None	People with asthma or other respiratory diseases, the elderly, and children are the groups most at risk.
	PM_{10}	71.4 µg/m^3	59	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory disease are the group most at risk.
	$PM_{2.5}$	29.6 µg/m^3	88	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory or heart disease, the elderly and children are the groups most at risk.
	Ozone	BDL	0	Good	None	Children and people with asthma are the groups most at risk.
	Carbon Monoxide	ND	0	Good	None	People with heart disease are the group most at risk.

3.7.5 AIR QUALITY INDEX FOR THE MONTH OF MARCH - 2018

Station	Pollutant	Concentration	AQI	AQI Category	Remarks	
					Heath effects	Sensitive groups
Adjacent brick unit	Sulphur dioxide	6.2 µg/m^3	9	Good	None	People with asthma are the group most at risk.
	Oxides of nitrogen	13.3 µg/m^3	12	Good	None	People with asthma or other respiratory diseases, the elderly, and children are the groups most at risk.
	PM_{10}	63.2 µg/m^3	55	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory disease are the group most at risk.
	$PM_{2.5}$	30.1 µg/m^3	89	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory or heart disease, the elderly and children are the groups most at risk.
	Ozone	BDL	0	Good	None	Children and people with asthma are the groups most at risk.
	Carbon Monoxide	ND	0	Good	None	People with heart disease are the group most at risk.

Station	Pollutant	Concentration	AQI	AQI Category	Remarks	
					Heath effects	Sensitive groups
Betageri rural	Sulphur dioxide	7.8 µg/m^3	10	Good	None	People with asthma are the group most at risk.
	Oxides of nitrogen	14.1 µg/m^3	13	Good	None	People with asthma or other respiratory diseases, the elderly, and children are the groups most at risk.
	PM_{10}	63.5 µg/m^3	55	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory disease are the group most at risk.
	$PM_{2.5}$	31.3 µg/m^3	91	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory or heart disease, the elderly and children are the groups most at risk.
	Ozone	BDL	0	Good	None	Children and people with asthma are the groups most at risk.
	Carbon Monoxide	ND	0	Good	None	People with heart disease are the group most at risk.

Station	Pollutant	Concentration	AQI	AQI Category	Remarks	
					Heath effects	Sensitive groups
Benakanakoppa	Sulphur dioxide	6.4 µg/m^3	9	Good	None	People with asthma are the group most at risk.
	Oxides of nitrogen	13.3 µg/m^3	12	Good	None	People with asthma or other respiratory diseases, the elderly, and children are the groups most at risk.
	PM_{10}	59.8 µg/m^3	53	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory disease are the group most at risk.
	$PM_{2.5}$	34.6 µg/m^3	98	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory or heart disease, the elderly and children are the groups most at risk.
	Ozone	BDL	0	Good	None	Children and people with asthma are the groups most at risk.
	Carbon Monoxide	ND	0	Good	None	People with heart disease are the group most at risk.

Station	Pollutant	Concentration	AQI	AQI Category	Remarks	
					Heath effects	Sensitive groups
Kanaginahal	Sulphur dioxide	5.8 µg/m^3	7	Good	None	People with asthma are the group most at risk.
	Oxides of nitrogen	11.8 µg/m^3	10	Good	None	People with asthma or other respiratory diseases, the elderly, and children are the groups most at risk.
	PM_{10}	68.9 µg/m^3	57	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory disease are the group most at risk.
	$PM_{2.5}$	33.4 µg/m^3	96	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory or heart disease, the elderly and children are the groups most at risk.
	Ozone	BDL	0	Good	None	Children and people with asthma are the groups most at risk.
	Carbon Monoxide	ND	0	Good	None	People with heart disease are the group most at risk.

Station	Pollutant	Concentration	AQI	AQI Category	Remarks	
					Heath effects	Sensitive groups
Hamalara colony	Sulphur dioxide	5.3 µg/m^3	7	Good	None	People with asthma are the group most at risk.
	Oxides of nitrogen	10.1 µg/m^3	9	Good	None	People with asthma or other respiratory diseases, the elderly, and children are the groups most at risk.
	PM_{10}	67.3 µg/m^3	57	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory disease are the group most at risk.
	$PM_{2.5}$	29.8 µg/m^3	88	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory or heart disease, the elderly and children are the groups most at risk.
	Ozone	BDL	0	Good	None	Children and people with asthma are the groups most at risk.
	Carbon Monoxide	ND	0	Good	None	People with heart disease are the group most at risk.

3.7.6 AIR QUALITY INDEX FOR THE MONTH OF APRIL - 2018

Station	Pollutant	Concentration	AQI	AQI Category	Remarks	
					Heath effects	Sensitive groups
Adjacent brick unit	Sulphur dioxide	10.5 µg/m^3	14	Good	None	People with asthma are the group most at risk.
	Oxides of nitrogen	15.6 µg/m^3	14	Good	None	People with asthma or other respiratory diseases, the elderly, and children are the groups most at risk.
	PM_{10}	72.8 µg/m^3	59	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory disease are the group most at risk.
	$PM_{2.5}$	33.4 µg/m^3	96	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory or heart disease, the elderly and children are the groups most at risk.
	Ozone	BDL	0	Good	None	Children and people with asthma are the groups most at risk.
	Carbon Monoxide	ND	0	Good	None	People with heart disease are the group most at risk.

Station	Pollutant	Concentration	AQI	AQI Category	Remarks	
					Heath effects	Sensitive groups
Betageri rural	Sulphur dioxide	6.3 µg/m^3	9	Good	None	People with asthma are the group most at risk.
	Oxides of nitrogen	13.9 µg/m^3	12	Good	None	People with asthma or other respiratory diseases, the elderly, and children are the groups most at risk.
	PM_{10}	78.8 µg/m^3	62	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory disease are the group most at risk.
	$PM_{2.5}$	38.3 µg/m^3	108	Unhealthy for sensitive groups	Increasing likelihood of respiratory symptoms in sensitive individuals, aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly	People with respiratory or heart disease, the elderly and children are the groups most at risk
	Ozone	BDL	0	Good	None	Children and people with asthma are the groups most at risk.
	Carbon Monoxide	ND	0	Good	None	People with heart disease are the group most at risk.

Station	Pollutant	Concentration	AQI	AQI Category	Remarks	
					Heath effects	Sensitive groups
Benakanakoppa	Sulphur dioxide	7.3µg/m^3	10	Good	None	People with asthma are the group most at risk.
	Oxides of nitrogen	12.5 µg/m^3	11	Good	None	People with asthma or other respiratory diseases, the elderly, and children are the groups most at risk.
	PM_{10}	68.3 µg/m^3	57	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory disease are the group most at risk.
	$PM_{2.5}$	29.3 µg/m^3	87	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory or heart disease, the elderly and children are the groups most at risk.
	Ozone	BDL	0	Good	None	Children and people with asthma are the groups most at risk.
	Carbon Monoxide	ND	0	Good	None	People with heart disease are the group most at risk.

Station	Pollutant	Concentration	AQI	AQI Category	Remarks	
					Heath effects	Sensitive groups
Kanaginahal	Sulphur dioxide	6.3 µg/m^3	9	Good	None	People with asthma are the group most at risk.
	Oxides of nitrogen	11.4 µg/m^3	10	Good	None	People with asthma or other respiratory diseases, the elderly, and children are the groups most at risk.
	PM_{10}	56.8 µg/m^3	51	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory disease are the group most at risk.
	$PM_{2.5}$	25.4 µg/m^3	79	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory or heart disease, the elderly and children are the groups most at risk.
	Ozone	BDL	0	Good	None	Children and people with asthma are the groups most at risk.
	Carbon Monoxide	ND	0	Good	None	People with heart disease are the group most at risk.

Station	Pollutant	Concentration	AQI	AQI Category	Remarks	
					Heath effects	Sensitive groups
Hamalara colony	Sulphur dioxide	8.1 µg/m^3	11	Good	None	People with asthma are the group most at risk.
	Oxides of nitrogen	12.4 µg/m^3	11	Good	None	People with asthma or other respiratory diseases, the elderly, and children are the groups most at risk.
	PM_{10}	58.3 µg/m^3	52	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory disease are the group most at risk.
	$PM_{2.5}$	28.8 µg/m^3	86	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion	People with respiratory or heart disease, the elderly and children are the groups most at risk.
	Ozone	BDL	0	Good	None	Children and people with asthma are the groups most at risk.
	Carbon Monoxide	ND	0	Good	None	People with heart disease are the group most at risk.

3.8 Water Quality

Surface water and ground water samples were collected from different sources within the study area and some important physical and chemical parameters including heavy metals were considered for the baseline status in the study area.

3.8.1 Water Quality Assessment

About 5 ground water samples were collected from the study area to assess the water quality during the study period. The ground water samples were drawn from the hand pumps and open wells being used by the villagers for their domestic needs. The details of the locations are given in **Table 3.2,** ground water sampling locations shown in **Fig 3.6**

Table 3.2: Water quality monitoring stations

Sl. No.	Code no	Name of the station	Distance from site (km)	Direction from the site	Latitude	Longitude
1	GW1	Project site	-	-	15^0 27' 53.16" N	75^0 40' 08.67" E
2	GW2	Betageri rural	1.8	West	15^0 28' 10.35" N	75^0 38' 28.11" E
3	GW3	Benakanakoppa	5	North east	15^0 30' 16.67" N	75^0 41'26.05" E
4	GW4	Kanaginahal	6.4	East	15^0 27' 24.82" N	75^0 43' 40.16" E
5	GW5	Hamalara colony	3.1	South	15^0 26' 09.88" N	75^0 43' 40.16" E

Fig 3.6: Ground water monitoring locations

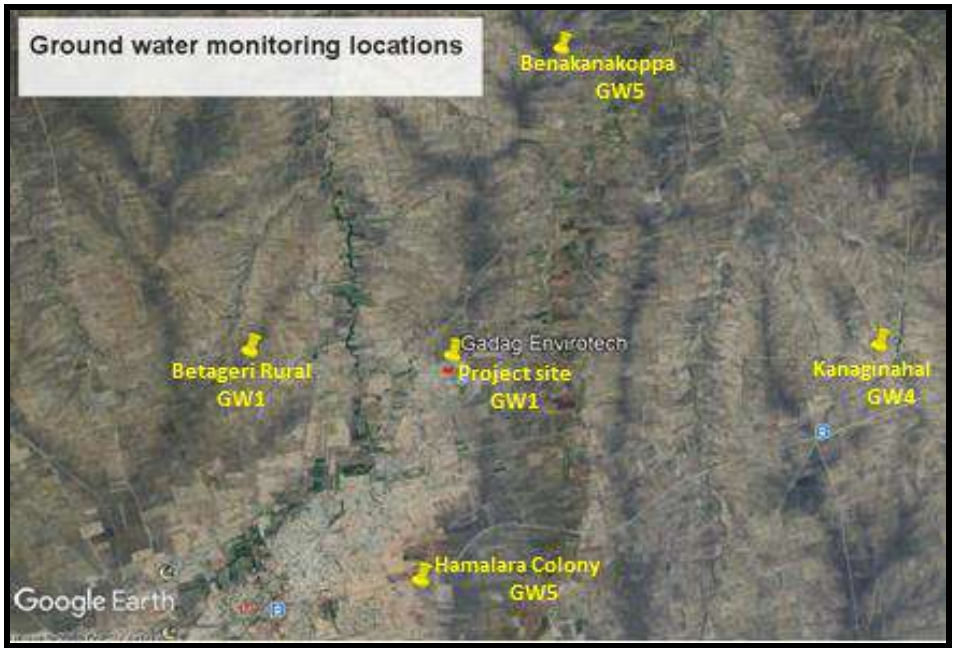


Fig 3.7: Photographs of Ground Water Sampling

Project Site (GW1) **Betageri Rural (GW2)**

Benakanakoppa (GW3) **Kanaginahal (GW4)**

Hamalara Colony (GW5)

Table 3.2 (a): Ground Water Quality Analysis Report for February - 2018

Sl no	Parameter	GW1	GW2	GW3	GW4	GW5	Standard IS:10500-2012	
							Acceptable	Permissible
1	Total Alkalinity as $CaCO_3$	216	220	180	152	310	200 max	600 max
2	Aluminum ,as Al,	ND	ND	ND	ND	ND	0.03	0.2
3	Calcium as Ca	75.2	36.8	34.4	40.8	96.8	75 max	200 max
4	Chloride as Cl	132.1	98.2	83.88	67.49	126.22	250 max	1000 max
5	Cadmium (as Cd)	ND	ND	ND	ND	ND	0.003 max	No relaxation
6	Color	6	5	5	5	5	5 max	15 max
7	Iron (as Fe)	0.018	0.024	0.031	0.026	BDL	0.3 max	No relaxation
8	Fluoride as F	0.416	0.316	0.298	0.416	0.246	1.0 max	1.5 max
9	Magnesium as Mg	24.78	22.84	22.84	22.84	34.99	30 max	100 max
10	Nitrate Nitrogen as NO_3-N	1.32	1.03	1.26	1.84	0.894	45 max	No relaxation
11	Lead (as Pb)	ND	ND	ND	ND	ND	0.01 max	No relaxation
12	pH @ 25^0C	7.23	7.48	7.36	7.91	7.63	6.5 – 8.5	No relaxation
13	Sulphate as SO_4	28.9	47.4	22.4	32.6	24.6	200 max	400 max
14	Sulphide ,H2S,	12.4	21.3	21.7	15.6	10.2	0.05	No relaxation
15	Residual free Chorine	Nil	Nil	Nil	Nil	Nil	0.2 min	1 min
16	Total Dissolved Solids (TDS)	610	780	620	630	690	500 max	2000 max
17	Total Hardness as $CaCO_3$	290	186	180	196	386	200 max	600 max
18	Turbidity	0.01	0.1	0.1	0.1	0.1	1 max	5 max
19	Zinc (as Zn)	ND	ND	ND	ND	ND	5 max	15 max

Table 3.2 (b): Ground Water Quality Analysis Report for March - 2018

Sl no	Parameter	GW1	GW2	GW3	GW4	GW5	Standard IS:10500-2012	
							Acceptable	Permissible
1	Total Alkalinity as $CaCO_3$	184	268	176	382	182	200 max	600 max
2	Aluminum ,as Al,	ND	ND	ND	ND	ND	0.03	0.2
3	Calcium as Ca	73.6	43.24	52	83.2	58	75 max	200 max
4	Chloride as Cl	128.9	74.89	173.56	177.42	167.74	250 max	1000 max
5	Cadmium (as Cd)	ND	ND	ND	ND	ND	0.003 max	No relaxation
6	Color	5	5	5	5	5	5 max	15 max
7	Iron (as Fe)	0.011	0.032	0.037	0.034	BDL	0.3 max	No

								relaxation
8	Fluoride as F	0.341	0.298	0.314	0.334	0.278	1.0 max	1.5 max
9	Magnesium as Mg	15.55	20.38	18.95	39.36	15.79	30 max	100 max
10	Nitrate Nitrogen as NO_3-N	1.11	1.21	1.34	2.01	1.02	45 max	No relaxation
11	Lead (as Pb)	ND	ND	ND	ND	ND	0.01 max	No relaxation
12	pH @ 25^0C	7.46	7.52	7.21	7.82	7.41	6.5 – 8.5	No relaxation
13	Sulphate as SO_4	23.4	52.6	37.6	67.8	21.6	200 max	400 max
14	Sulphide ,H2S,	15.2	21.8	14.9	32.4	11.7	0.05	No relaxation
15	Residual free Chorine	Nil	Nil	Nil	Nil	Nil	0.2 min	1 min
16	Total Dissolved Solids (TDS)	586	760	580	710	750	500 max	2000 max
17	Total Hardness as $CaCO_3$	248	192	208	370	210	200 max	600 max
18	Turbidity	0.01	0.1	0.1	0.05	0.05	1 max	5 max
19	Zinc (as Zn)	ND	ND	ND	ND	ND	5 max	15 max

Table 3.2 (c): Ground Water Quality Analysis Report for April – 2018

Sl no	Parameter	GW1	GW2	GW3	GW4	GW5	Standard IS:10500-2012	
							Acceptable	Permissible
1	Total Alkalinity as $CaCO_3$	620	286	256	126	330	200 max	600 max
2	Aluminum ,as Al,	ND	ND	ND	ND	ND	0.03	0.2
3	Calcium as Ca	55.2	46.4	84	5.6	16.8	75 max	200 max
4	Chloride as Cl	584.11	423.65	440.28	240.46	104.69	250 max	1000 max
5	Cadmium (as Cd)	ND	ND	ND	ND	ND	0.003 max	No relaxation
6	Color	<5	<5	<5	8	<5	5 max	15 max
7	Iron (as Fe)	0.028	0.018	0.011	BDL	BDL	0.3 max	No relaxation
8	Fluoride as F	0.516	0.728	0.42	0.076	0.376	1.0 max	1.5 max
9	Magnesium as Mg	49.08	33.04	41.79	3.402	3.88	30 max	100 max
10	Nitrate Nitrogen as NO_3-N	1.78	1.94	1.07	0.178	1.79	45 max	No relaxation
11	Lead (as Pb)	ND	ND	ND	ND	ND	0.01 max	No relaxation
12	pH @ 25^0C	7.73	7.36	7.45	8.54	7.68	6.5 – 8.5	No relaxation

13	Sulphate as SO_4	41.9	52.3	26.4	7.56	18.2	200 max	400 max
14	Sulphide ,H2S,	22.6	24.8	14.3	3.1	7.1	0.05	No relaxation
15	Residual free Chorine	Nil	Nil	Nil	Nil	Nil	0.2 min	1 min
16	Total Dissolved Solids (TDS)	1930	1280	1260	211	710	500 max	2000 max
17	Total Hardness as $CaCO_3$	340	252	382	28	58	200 max	600 max
18	Turbidity	0.05	0.05	0.05	5	0.05	1 max	5 max
19	Zinc (as Zn)	ND	ND	ND	ND	ND	5 max	15 max

3.9 Surface water monitoring locations:

Sl. No.	Code no	Name of the station	Distance from site (km)	Direction from the site	Latitude	Longitude
1	SW1	Bhishma lake	6.0	South west	15^0 25' 19.84" N	75^0 37' 51.75" E
2	SW2	Betageri pond	1.8	West	15^0 28' 10.35" N	75^0 38' 28.11" E

Fig 3.8: Surface water monitoring locations

Fig 3.9: Photographs of Surface Water Sampling

Bhishma lake **Betageri Pond**

Table 3.3 (a): SURFACE WATER QUALITY ANALYSIS REPORT FOR FEBRUARY – 2018

Sl. No.	Parameters	Unit	Result		IS-2296-1982 ,the Tolerance limits surface water, Class D
			SW1	**SW2**	
1	Color	Hazen	7	6	300
2	Odour	---	Agreeable	Agreeable	Not specified
3	Dissolved Iron ,as Fe,	mg/L	0.028	0.041	Not specified
4	Iron (as Fe)	mg/L	0.017	0.034	0.5
5	Dissolved Oxygen	mg/L	4.2	4.6	4
6	Dissolved Manganese	mg/L	ND	ND	Not specified
7	Manganese (as Mn)	mg/L	ND	ND	Not specified
8	pH @ 25^0C	----	7.55	7.51	6.5 to 8.5
9	Turbidity	NTU	0.1	0.1	Not specified
10	Fecal Coli from/100 ml	MPN	63	46	Not specified
11	BOD_3 3 days @ 27^0C	mg/L	6	7.5	Not specified
12	COD	mg/L	11.5	12	Not specified

Table 3.3 (b): Surface Water Quality Analysis Report for March – 2018

Sl. No.	Parameters	Unit	Result		IS-2296-1982 ,the Tolerance limits surface water, Class D
			SW1	SW2	
1	Color	Hazen	8	7	300
2	Odour	---	Agreeable	Agreeable	Not specified
3	Dissolved Iron ,as Fe,	mg/L	0.15	0.13	Not specified
4	Iron (as Fe)	mg/L	0.013	0.019	0.5
5	Dissolved Oxygen	mg/L	4.6	4.4	4
6	Dissolved Manganese	mg/L	ND	ND	Not specified
7	Manganese (as Mn)	mg/L	ND	ND	Not specified
8	pH @ 25^0C	----	7.42	7.11	6.5 to 8.5
9	Turbidity	NTU	0.1	0.01	Not specified
10	Fecal Coli from/100 ml	MPN	47	38	Not specified
11	BOD_3 3 days @ 27^0C	mg/L	3	4.5	Not specified
12	COD	mg/L	13.5	13.5	Not specified

Table 3.3 (c): Surface Water Quality Analysis Report for April – 2018

Sl. No.	Parameters	Unit	Result		IS-2296-1982 ,the Tolerance limits surface water, Class D
			SW1	SW2	
1	Color	Hazen	7	7	300
2	Odour	---	Agreeable	Agreeable	Not specified
3	Dissolved Iron ,as Fe,	mg/L	0.024	0.072	Not specified
4	Iron (as Fe)	mg/L	0.011	0.041	0.5
5	Dissolved Oxygen	mg/L	6	5.5	4
6	Dissolved Manganese	mg/L	ND	ND	Not specified
7	Manganese (as Mn)	mg/L	ND	ND	Not specified
8	pH @ 25^0C	----	8.41	8.52	6.5 to 8.5
9	Turbidity	NTU	0.1	0.1	Not specified
10	Fecal Coli from/100 ml	MPN	48	63	Not specified
11	BOD_3	mg/L	12	17.5	Not specified

	3 days @ 27^0C				
12	COD	mg/L	52.8	73.90	Not specified

3.9.1 Observations of Ground and Surface water quality

➢ **Surface Water**

- There are only two surface water bodies within the study area viz., Bhishma Lake and Betageri Pond.
- The pH of the surface water samples collected ranges in between 7.11 to 8.52. The iron concentrations varied between 0.011 mg/l and 0.034 mg/l. Manganese values are in the not detectable range at both the sampling locations.
- Both the sampling location waters fall into 'D' category as per the Primary Water Quality Criteria for various used laid down by Central Pollution Control Board that is the water source is good for "propagation of wildlife".
- BOD ranges between 3 and 12 mg/l indicating that the values are well below the limits. DO ranges between 4.2 and 6 mg/l and the lowest and highest concentrations are observed in the same location (Bhishma Lake)

➢ **Ground Water**

The results for the parameters analysed for ground water samples are presented and are compared with standards for drinking water as per IS:10500-2012 "Specifications for Drinking Water"

- Total 5 water samples were collected from different sources around the project site within the periphery of 7 km.
- The pH of the water samples collected ranges in between 6.49 to 7.91.
- Chlorides concentrations ranged from 67.49 mg/l to 440.28 mg/l indicating that the concentrations are well within the permissible limits.
- Sulphates concentrations ranged from 7.56 mg/l to 67.8 mg/l indicating that the concentrations are within the permissible limits.
- Total hardness expressed as $CaCO_3$ ranges from 126 mg/l to 382 mg/l, which shows that total hardness is within the permissible, limits at all the locations.
- The concentration of Nitrate fluctuates between 0.178 mg/l and 2.01 mg/l indicating that the values are within the permissible limits.

3.10 Noise Environment

Noise can be defined as any sound that is unacceptable because it interferes with speech and hearing, is intense enough to damage hearing or is otherwise annoying. The definition noise as unwanted sound implies that it has an adverse effect on human beings and their environment, including land, structures, and domestic animals. Noise can also disturb natural wildlife and ecological systems. The Environment/health impacts of noise can vary from

noise induced hearing loss (NIHL) to annoyance depending on loudness of noise levels and tolerance levels of individual.

3.10.1 Sources of Noise

The main sources of noise in the study area are industrial activities and vehicular traffic.

3.10.2 Noise Levels in the Study Area

Baseline noise levels have been monitored at 5 locations within the study zone. Noise level measurement locations were identified for assessment of existing noise level status, keeping in view the residential areas in villages, schools, bus stands, etc., the day levels of noise have been monitored during6 AM to 10 PM and the night levels during 10.0 PM to 6 AM. The noise monitoring stations are shown in **Table 3.4.**

Table 3.4 Noise monitoring locations

Sl. No.	Code no	Name of the station	Distance from site (km)	Direction from the site	Latitude	Longitude
1	N1	Project site	-	-	15^0 27’ 53.16” N	75^0 40’ 08.67” E
2	N2	Betageri rural	1.8	West	15^0 28’ 10.35” N	75^0 38’ 28.11” E
3	N3	Benakanakoppa	5	North east	15^0 30’ 16.67” N	75^0 41’ 26.05” E
4	N4	Kanaginahal	6.4	East	15^0 27’ 24.82” N	75^0 43’ 40.16” E
5	N5	Hamalara colony	3.1	South	15^0 26’ 09.88” N	75^0 43’ 40.16” E

Fig 3.10: Noise monitoring locations

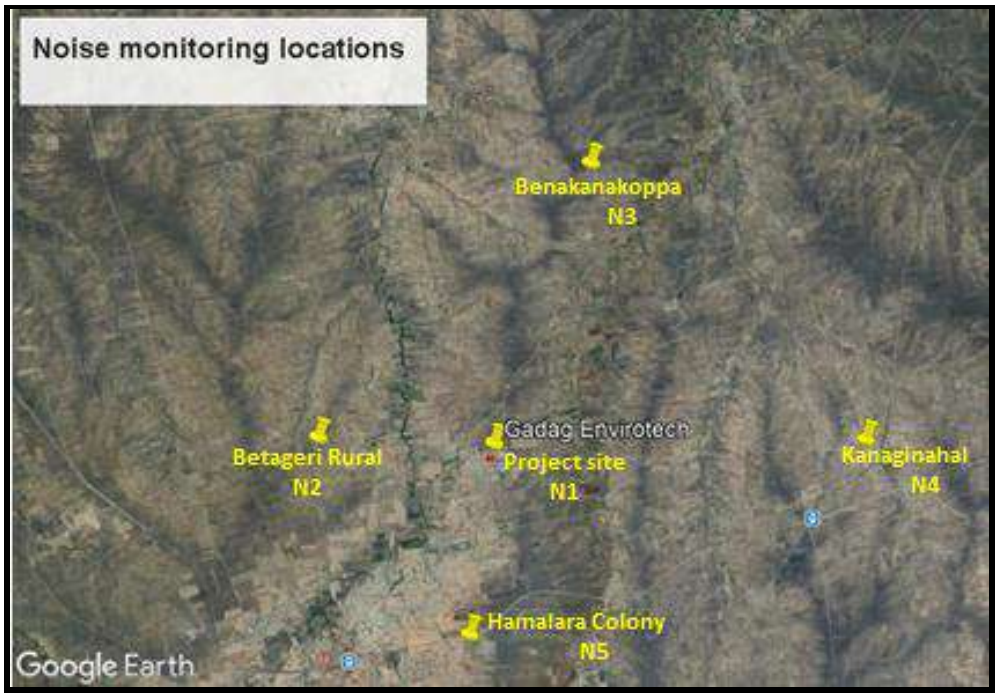


Table 3.4 (a): Ambient Noise Level Monitoring Report for February - 2018

Sl No	**Time Frequency**	**N1**		**N2**		**N3**	
	Every one hr in dB (A)	Day (6:00 AM - 10:00 PM)	Night (10:00 PM - 6:00 AM)	Day (6:00 AM - 10:00 PM)	Night (10:00 PM - 6:00 AM)	Day (6:00 AM - 10:00 PM)	Night (10:00 PM - 6:00 AM)
1	dB (A)	61.2	55.2	5.56	50.2	7.12	48.9
2	dB (A)	63.2	53.6	6.92	48.7	7.23	50.6
3	dB (A)	69.5	54.5	6.35	49.5	6.63	51.4
4	dB (A)	68.2	58.2	6.12	47.6	6.52	52.4
5	dB (A)	66.5	59.2	6.52	50.2	6.23	50.4
6	dB (A)	60.3	51.5	6.63	59.2	5.31	53.4
7	dB (A)	62.1	57.2	7.03	55.4	5.61	52.4
8	dB (A)	63.2	53.6	6.93	50.6	6.63	52.3
9	dB (A)	69.8	-	6.64	-	6.23	-
10	dB (A)	59.2		6.52		6.92	
11	dB (A)	60.6		6.02		6.62	
12	dB (A)	66.2		6.32		6.25	
13	dB (A)	53.4		6.05		6.92	
14	dB (A)	55.4		6.42		6.78	
15	dB (A)	65.2		5.82		6.52	
16	dB (A)	60.2		6.63		6.02	
	L_{EQ}	**57.83**	**47.31**	**58.99**	**44.58**	**58.70**	**42.92**
	Min	**53.4**	**51.5**	**55.6**	**47.6**	**53.1**	**48.9**
	Max	**69.8**	**59.2**	**70.3**	**59.2**	**72.3**	**53.4**

Sl No	**Time Frequency**	**N4**		**N5**	
	Every one hr in dB (A)	Day (6:00 AM - 10:00 PM)	Night (10:00 PM - 6:00 AM)	Day (6:00 AM - 10:00 PM)	Night (10:00 PM - 6:00 AM)
1	dB (A)	53.2	51.4	66.5	52.2
2	dB (A)	56.1	48.7	60.3	50.6
3	dB (A)	65.2	56.2	66.2	53.6
4	dB (A)	63.2	50.2	65.2	54.2
5	dB (A)	66.2	51.6	69.2	53.2
6	dB (A)	62.3	49.7	65.1	56.2
7	dB (A)	68.2	58.2	62.1	59.2
8	dB (A)	65.4	50.4	59.2	54.2
9	dB (A)	64.2	-	58.7	-

10	dB (A)	69.2		62.4	
11	dB (A)	68.2		60.4	
12	dB (A)	63.1		58.1	
13	dB (A)	56.4		65.2	
14	dB (A)	53.8		60.1	
15	dB (A)	55.4		63.2	
16	dB (A)	57.3		68.2	
	L_{EQ}	**58.14**	**44.62**	**57.60**	**46.18**
	Min	**53.2**	**48.7**	**58.1**	**50.6**
	Max	**69.2**	**58.2**	**69.2**	**59.2**

Table 3.4 (b): Ambient Noise Level Monitoring Report for March – 2018

Sl No	**Time Frequency**	**N1**		**N2**		**N3**	
	Every one hr in dB (A)	Day (6:00 AM - 10:00 PM)	Night (10:00 PM - 6:00 AM)	Day (6:00 AM - 10:00 PM)	Night (10:00 PM - 6:00 AM)	Day (6:00 AM - 10:00 PM)	Night (10:00 PM - 6:00 AM)
1	dB (A)	53.7	54.2	50.4	53.5	66.5	48.3
2	dB (A)	56.4	56.3	61.4	56.5	63.1	56.2
3	dB (A)	68.2	58.2	66.3	58.3	66.3	50.2
4	dB (A)	60.4	56.8	69.5	53.2	69.4	49.7
5	dB (A)	68.5	48.5	63.2	59.2	70.1	54.2
6	dB (A)	70.5	49.5	65.1	55.1	72.4	52.1
7	dB (A)	63.1	52.6	66.5	52.1	69.2	55.1
8	dB (A)	61.2	53.2	65.4	55.7	63.5	55.2
9	dB (A)	64.8		65.8		66.3	
10	dB (A)	66.3		66.4		65.1	
11	dB (A)	60.2		69.2		68.2	
12	dB (A)	69.2	-	63.1	-	62.4	
13	dB (A)	60.2		56.2		52.3	
14	dB (A)	68.2		60.4		66.2	
15	dB (A)	66.2		69.2		65.1	-
16	dB (A)	68.1		63.4		70.1	
	L_{EQ}	**59.82**	**45.98**	**59.43**	**47.33**	**61.27**	**44.67**
	Min	**53.7**	**48.5**	**50.4**	**52.1**	**52.3**	**48.3**
	Max	**70.5**	**58.2**	**69.5**	**59.2**	**72.4**	**56.2**

Sl No	**Time Frequency**	**N4**		**N5**	
	Every one hr in dB (A)	Day (6:00 AM - 10:00 PM)	Night (10:00 PM - 6:00 AM)	Day (6:00 AM - 10:00 PM)	Night (10:00 PM - 6:00 AM)
1	dB (A)	60.2	5.68	56.4	53.6
2	dB (A)	65.2	5.01	58.4	54.8
3	dB (A)	63.2	5.68	69.2	56.3
4	dB (A)	72.5	4.72	60.1	50.4
5	dB (A)	61.4	4.84	65.1	56.4
6	dB (A)	62.1	4.92	73.4	58.2
7	dB (A)	60.8	5.01	65.4	52.4
8	dB (A)	69.2	5.62	68.2	54.2
9	dB (A)	63.1	-	63.4	-
10	dB (A)	63.4		62.1	
11	dB (A)	68.1		63.5	
12	dB (A)	60.4		54.8	
13	dB (A)	66.5		59.2	
14	dB (A)	55.4		55.4	
15	dB (A)	61.4		60.8	
16	dB (A)	67.4		68.2	
	L_{EQ}	**59.52**	**44.73**	**59.34**	**46.37**
	Min	**55.4**	**47.2**	**54.8**	**50.4**
	Max	**72.5**	**56.8**	**73.4**	**58.2**

Table 3.4 (c): Ambient Noise Level Monitoring Report for April – 2018

Sl No	**Time Frequency**	**N1**		**N2**		**N3**	
	Every one hr in dB (A)	Day (6:00 AM - 10:00 PM)	Night (10:00 PM - 6:00 AM)	Day (6:00 AM - 10:00 PM)	Night (10:00 PM - 6:00 AM)	Day (6:00 AM - 10:00 PM)	Night (10:00 PM - 6:00 AM)
1	dB (A)	53.6	48.2	63.2	58.2	65.2	53.2
2	dB (A)	65.2	55.1	72.1	56.2	68.2	55.4
3	dB (A)	63.2	59.6	65.1	56.7	63.2	56.2
4	dB (A)	59.6	56.2	68.2	52.1	68.2	52.4
5	dB (A)	60.2	55.2	64.2	56.2	69.7	52.1
6	dB (A)	65.2	53.2	65.2	51.4	56.2	57.2
7	dB (A)	70.2	55.7	61.2	58.2	66.2	54.1
8	dB (A)	63.5	58.2	66.3	56.2	58.2	53.2
9	dB (A)	65.2	-	62.3	-	60.2	
10	dB (A)	68.2		69.2		70.4	

11	dB (A)	68.2		63.2		66.3	
12	dB (A)	55.6		60.4		72.4	
13	dB (A)	63.8		72.5		63.2	
14	dB (A)	58.4		69.2		66.4	
15	dB (A)	63.4		70.1		68.2	
16	dB (A)	69.2		62.5		66.3	-
	L_{EQ}	**59.07**	**47.39**	**60.63**	**47.455**	**60.80**	**45.83**
	Min	**53.6**	**48.2**	**60.4**	**51.4**	**56.2**	**52.1**
	Max	**70.2**	**59.6**	**72.5**	**58.2**	**72.4**	**57.2**

Sl No	**Time Frequency**	**N4**		**N5**	
	Every one hr in dB (A)	Day (6:00 AM - 10:00 PM)	Night (10:00 PM - 6:00 AM)	Day (6:00 AM - 10:00 PM)	Night (10:00 PM - 6:00 AM)
1	dB (A)	66.5	56.7	70.5	53.2
2	dB (A)	59.2	50.4	63.2	55.6
3	dB (A)	66.3	59.6	60.4	59.1
4	dB (A)	65.2	52.3	72.5	58.2
5	dB (A)	63.2	55.4	66.4	51.2
6	dB (A)	69.2	56.8	65.2	56.2
7	dB (A)	70.2	53.2	68.2	54.7
8	dB (A)	62.5	50.2	63.5	53.2
9	dB (A)	63.2		55.6	
10	dB (A)	66.1		63.2	
11	dB (A)	65.2		59.6	
12	dB (A)	63.2	-	63.5	-
13	dB (A)	50.2		65.2	
14	dB (A)	60.4		71.5	
15	dB (A)	65.2		70.6	
16	dB (A)	63.9		65.2	
	L_{EQ}	**58.70**	**46.68**	**60.80**	**47.12**
	Min	**50.2**	**50.2**	**55.6**	**51.2**
	Max	**70.2**	**59.6**	**72.5**	**59.1**

3.10.3 Ambient noise standards by Central Pollution Control Board

Area code	Category of area	Noise levels (dB (A))	
		Day time	Night time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silence zone	50	40

3.10.4 Observations of Noise quality:

- The maximum noise level observed is 69.2 dB (N5) at Hamalara Colony and minimum noise level 42.92 dB (N3) observed is at Benakanakoppa location during the month of February.
- The maximum noise level observed is 73.4 dB (N5) at Hamalara Colony and minimum noise level 44.67 dB (N3) observed is at Benakanakoppa location during the month of March.
- The maximum noise level observed is 72.5 dB (N5) at Hamalara Colony and minimum noise level 45.83 dB (N3) observed is at Benakanakoppa location during the month of April.

3.11 Soil Quality Studies

The present study on soil quality establishes the baseline characteristics in the study area surrounding the project site. The study has been addressed with the following objectives.

- To determine the base line characteristics
- To determine the soil characteristics of proposed project site.
- To determine the impact of industrialization/urbanization on soil characteristics
- To determine the impacts on soils from agricultural productivity point of view

The predominant activity around the Industrial area is agriculture.

3.11.1 Criteria Adopted for Selection of Sampling Locations

For studying the soil types and soil characteristics, 5 sampling locations were selected to assess the existing soil conditions representing various land use conditions and geological features.

The homogenized soil samples collected at different locations were analysed for obtaining results. Details of the soil sampling locations are given in **Table 3.5,** soil sampling locations shown in **Fig 3.11**

Table 3.5: Soil sampling locations

Sl No	Code no	Name of the station	Distance from site (km)	Direction from the site	Latitude	Longitude
1	S1	Project site	-	-	15^0 27' 53.16" N	75^0 40' 08.67" E
2	S2	Betageri rural	1.8	West	15^0 28' 10.35" N	75^0 38' 28.11" E
3	S3	Benakanakoppa	5	North east	15^0 30' 16.67" N	75^0 41' 26.05" E
4	S4	Kanaginahal	6.4	East	15^0 27' 24.82" N	75^0 43' 40.16" E
5	S5	Hamalara colony	3.1	South	15^0 26' 09.88" N	75^0 43' 40.16" E

Fig 3.11: Soil monitoring locations

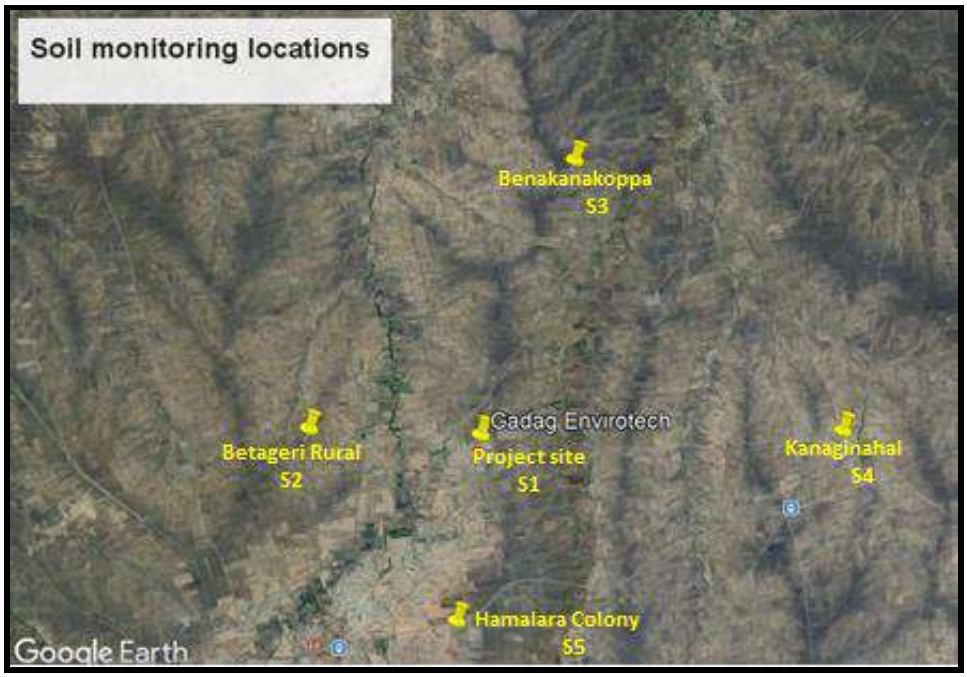


Fig 3.12: Photographs of soil sampling stations

Project Site **Betageri Rural**

Benakanakoppa

Kanaginahal

Hamalara colony

Table 3.5 (a): Soil Quality Monitoring Report for February – 2018

Sl no	Parameters	Results				
Sampling station		S1	S2	S3	S4	S5
1	pH @ 25ºC	7.92	8.16	7.49	7.51	7.11
2	Conductivity, micromhos/ cm	412	620	476	219	340
3	Organic Matter, %	3.65	4.05	2.37	5.5	2.06
4	Moisture content, %	1.10	1.23	0.98	1.02	1.1
5	Nitrogen, as N, Kg/ha	125.3	142.01	162.62	157.02	170
6	Phosphorous, as P, Kg/ha	35.6	39.2	28.7	25.7	21.6
7	Sulphates, as SO_4, %	0.034	0.0121	0.0117	0.0102	0.0187

8	Potassium, as K, Kg/ha	5.1	8.3	5.16	3.8	2.9
9	Lead, mg/Kg	Nil	Nil	Nil	Nil	Nil
10	Calcium, as Ca, %	0.037	0.024	0.0213	0.192	0.0208
11	Magnesium, as Mg, %	0.04	0.0874	0.0747	0.099	0.077
12	Iron, as Fe, %	0.034	0.0217	0.015	0.0172	0.0131
13	Sodium, mg/Kg	0.016	0.0287	0.0221	0.012	0.032
14	Organic carbon, %	1.46	2.36	1.38	3.2	1.2

Table 3.5 (b): Soil Quality Monitoring Report for March – 2018

Sl no	Parameters	Results				
Sampling station		S1	S2	S3	S4	S5
1	pH @ 25ºC	8.16	7.13	7.16	7.13	7.18
2	Conductivity, micromhos/ cm	246	516	402	201	340
3	Organic Matter, %	2.72	2.23	1.70	2.92	1.89
4	Moisture content, %	2.1	1.31	1.02	1.9	1.37
5	Nitrogen, as N, Kg/ha	123.3	136.7	171.1	143.1	184
6	Phosphorous, as P, Kg/ha	31.2	26.7	28.7	20.17	18.7
7	Sulphates, as SO_4, %	0.042	0.036	0.031	0.019	0.022
8	Potassium, as K, Kg/ha	29.31	17.16	34.70	22.46	15.15
9	Lead, mg/Kg	Nil	Nil	Nil	Nil	Nil
10	Calcium, as Ca, %	0.051	0.044	0.091	0.017	0.021
11	Magnesium, as Mg, %	0.032	0.017	0.024	0.071	0.018
12	Iron, as Fe, %	0.091	0.089	0.0416	0.026	0.0716
13	Sodium, mg/Kg	0.086	0.096	0.076	0.0718	0.0516
14	Organic carbon, %	1.6	1.3	0.99	0.17	1.1

Table 3.5 (c): Soil Quality Monitoring Report for April – 2018

Sl no	Parameters	Results				
Sampling station		S1	S2	S3	S4	S5
1	pH @ 25ºC	7.46	7.54	7.24	7.19	7.36
2	Conductivity, micromhos/ cm	406	221	315	286	275
3	Organic Matter, %	2.99	1.82	1.68	2.13	3.73
4	Moisture content, %	0.72	0.81	0.57	0.64	0.77
5	Nitrogen, as N, Kg/ha	86.24	120.1	82.4	73.2	68.9
6	Phosphorous, as P, Kg/ha	36.7	41.2	28.7	52.6	21.7
7	Sulphates, as SO_4, %	0.0767	0.081	0.048	0.036	0.071
8	Potassium, as K, Kg/ha	4.48	7.71	5.7	11.6	18.6

9	Lead, mg/Kg	Nil	Nil	Nil	Nil	Nil
10	Calcium, as Ca, %	0.034	0.086	0.073	0.051	0.022
11	Magnesium, as Mg, %	0.016	0.024	0.025	0.018	0.013
12	Iron, as Fe, %	0.0136	0.0076	0.031	0.042	0.011
13	Sodium, mg/Kg	81.7	73.2	58.7	65.3	71.4
14	Organic carbon, %	1.74	0.106	1.24	21.7	1.34

3.11.2 Standard soil classification:

Sl No	**Soil test**	**Classification**
1	pH	<4.5 Extremely acidic 4.51- 5.50 Very strongly acidic 5.51-6.00 moderately acidic 6.01-6.50 slightly acidic 6.51-7.30 Neutral 7.31-7.80 slightly alkaline 7.81-8.50 moderately alkaline 8.51-9.0 strongly alkaline >9.00 very strongly alkaline
2	Salinity Electrical Conductivity (ppm) (1 ppm =640µmho/cm)	Upto 1.00 Average 1.01-2.00 harmful to germination 2.01-3.00 harmful to crops (sensitive to salts)
3	Organic Carbon	Upto 0.2: very less 0.21-0.4: less 0.41-0.5 medium, 0.51-0.8: on an average sufficient 0.81-1.00: sufficient >1.0 more than sufficient
4	Nitrogen (Kg/ha)	Upto 50 very less 51-100 less 101-150 good 151-300 Better >300 sufficient
5	Phosphorus (Kg/ha)	Upto 15 very less 16-30 less 31-50 medium 51-65 on an average sufficient 66-80 sufficient >80 more than sufficient
6	Potassium (Kg/ha)	0 -120 very less 120-180 less 181-240 medium

		241-300 average 301-360 better >360 more than sufficient

3.11.3 Observations of soil quality:

- It has been observed that the pH of the soil quality ranged from 7.11 to 8.16 indicating that the soil is usually slightly alkaline to moderately alkaline in nature.
- The Electrical Conductivity was observed to be in the range of 201 micro mhos/ cm to476 micro mhos/ cm, with the maximum observed at S3 (Benakanakoppa) in the month of February.
- The Nitrogen values ranged between 68.9 kg/ha and 184 kg/ha.
- The Phosphorus values range between 26.7 kg/ha and 52.6 kg/ha. It shows that the soil falls under 'average sufficient' category.
- The Potassium values range between 3.8 kg/ha and 34.7 kg/ha. The potassium levels recorded indicates that the Potassium concentration is 'very less'.

3.12 Biological environment

Ecological studies are one of the important aspects of Environmental Impact Assessment with a view to conserve environmental quality and biodiversity. Studies on biological aspects of ecosystems are important in Environmental Impact Assessment for safety of natural flora and fauna. The biological environment includes terrestrial and aquatic ecosystems. The animal and plant communities co-exist in a well-organized manner. Their natural settings can get disturbed by any externally induced anthropological activities or by naturally occurring calamities or disaster.

The present study was under taken as a part of the study to understand the present status of ecosystem prevailing in the study area, to compare it with past condition with the help of available data, to predict changes that may occur as a result of proposed activity and to suggest measures, if there is impact for maintaining its health. A buffer zone of 10 km radius around the project site has been considered to study the ecosystem.

Following methods are being adopted for this survey.

- Generation of data through observation
- Secondary data collected from publications of various Government agencies like forest department, agriculture department and rural development department etc.
- Consulting local people for gathering information on local plants and animals.

3.12.1 Flora:

Primary faunal studies were conducted in the 5 km radius of the study area and details are presented in Table-3.6.
The list of the flora of study area is given in below Table 3.6

Sl No	Scientific name	Common name	Vernacular name
1	*Anacardium occidentale*	Cashew tree	Kaju
2	*Mangifera indica*	Mango	Mavina mara
3	*Annona squamosal*	Sugar apple	Sitaphala
4	*Semecarpus anacardium*	Marking nut	
5	*Plumeria alba*	Pagoda tree	
6	*Cocos nucifera*	Coconut tree	Tenginamara
7	*Phoenix sylvestris*	Sugar date palm	Ichalamara
8	*Roystonea regia*	Royal palm	
9	*Millingtonia hortensis*	Indian cork tree	Akash mallige
10	*Tabebuia argentea*	Trumpet tree	
11	*Terminalia catapa*	Indian almond	
12	*Cassia fistula*	Golden shower	Kakke mara
13	*Delonix regia*	Gulmohar	Kempu
14	*Cassia javanica*	Apple blossom tree	
15	*Butea monosperma*	Flame of the forest	Muttuga
16	*Bauhinia racemosa*	Bidi leaf tree	Bangaramara
17	*Pongamiapinnata*	Indian beech	Honne
18	*Prosopis cineraria*	Banni tree	Banni
19	*Pterocarpus marsupium*	Indian kino tree	
20	*Courouptiaguianensis*	Cannonball tree	
21	*Micheliachampaca*	Sampige tree	
22	*Azadirachtaindica*	Neem tree	Bevinamara
23	*Ficusbenghalensis*	Banyan tree	Aladamara
24	*Ficus racemose*	Indian fig tree	Atthimara
25	*Moringaoleiferu*	Drumstick tree	Nuggemara
26	*Syzygiumjambos*	Plum tree	Neralemara
27	*Thespesiapopulnea*	Malabar plum	
28	*Spathodeacompanulata*	Tulip tree	
29	*Manikarazapota*	Chickoo tree	Chikugida
30	*Muntingiacalabura*	Ornamental tree	

Source: Diversity of Tree Species in Gadag District, Karnataka, India by Sidanand V. Kambhar & K. Kotresha

3.12.2 Fauna:

The area under consideration is not suitable for any rare or endangered or endemic or threatened wildlife as there are no forests or other protected areas. Fauna observed in the region include domestic animals, retiles and birds. The composition of fauna in the study area is presented in the table 3.7 below.

Table 3.7: List of fauna of the study area

MAMMALS		
Sl No	**Scientific name**	**Common name**
1	*Bandicotabengalensis*	Lesser Bandicoot
2	*Bandicotaindica*	Greater bandicoot
3	*Lupus nibricollis*	Indian hare
4	*Macaca mulatto*	Rhesus macaque
5	*Mus booduga*	Indian field rat
6	*Oryctolaguscuniculus*	Rabbit
7	*Varanusindicus*	Common mongoose
8	*Funambuluspalmarum*	Three striped palm squirrel
REPTILES		
9	*Bungaruscaeruleus*	Common Indian krait
10	*Calotes versicolor*	Garden lizard
11	*Chameleon zeylanicus*	Chameleon
12	*Dryphis sp.*	Tree snake
13	*Hemidactylusflaviviridis*	Indian wall lizard
14	*Hemidactylustriedrus*	Termite hill gecko
15	*Najanaja*	Cobra
16	*Ptyasmucosus*	Rat snake
AMPHIBIANS		
17	*Rana hexadactyla*	Ordinary frog
18	*Bufomelonosticatus*	South Indian Toad
BIRDS		
19	*Acridotherstrists*	Myna
20	*Athene brama*	Owl, spotted
21	*Bubulcus ibis*	Cattle egret
22	*Centrpussinesis*	Crow pheasant
23	*Columbia livaia*	Pigeon, blue rock
24	*Corvusmacrohyuchos*	Jungle crow
25	*Corvussplendens*	Crow
26	*Cuculusvarus*	Cuckoo
27	*Egrettagaretta*	Egret, little
28	*Eudynamisscolopaceus*	Koel
29	*Francolinuspondicerianus*	Partridge, grey
30	*Hirandorustica*	Swallow, common
31	*Lonchurastriata*	Munia, spotted
32	*Pavocristatus*	Common peafowl
33	*Ploceusphilippinus*	Weaver bird, common
34	*Psittaculaeupatria*	Parakeet Large Indian
35	*Psittaculakrameri*	Parakeet, rose-ringed
36	*Saxicoloidesfulicata*	Indian robin

Source: Literature survey

3.13 Socio Economic Baseline

The baseline data referring to the socio-economic environment is collected by way of secondary sources such as census records, statistical hand book and relevant official records with the government agencies. Also, the data was collected by field visits.

The growth of industrial sectors and infrastructure development in and around the agricultural area i.e. villages and semi-urban settings and towns is bound to create certain socio-economic impacts on the local populace. The impacts may be either positive or negative depending on the nature of development. To assess such impact, it is necessary to know the existing socio-economic order of the study area.

3.13.1 Demography structure

Demographic parameters	**Nos**
No. of Districts	1
No of Taluks	5
No. of Villages	60
No. of City Municipal Council-(CMC)	1
Actual population	10,64,570
Male	5,37,147
Female	5,27,423
Population growth	9.54 %
Area Sq.m	4657
Density, Km^2	229
Sex ratio	1.74 %
Child sex ratio	947
Average literacy	75.12 %
Male literacy	84.66 %
Female literacy	65.44 %
Total child population (0-6 age)	1,32,442
Male population (0-6 age)	68,025
Female population (0-6 age)	64,417
Literates	7,00,177
Male Literates	3,97,178
Female literates	302999
Child proportion (0-6 age)	12.44 %
Boys proportion (0-6 age)	12.66 %
Girls proportion (0-6 age)	12.21 %

Source: https://www.census2011.co.in/data/district/255-gadag-karnataka.html

3.14 Social Infrastructure available

Agriculture is the basic sector of employment for the local people in this area. Infrastructure is the basic physical and organizational structures needed for the operation of a society or enterprise or the services and facilities necessary for an economy to function.

The list of hospitals and schools available in the vicinity of the proposed industry is tabulated in below table 3.8 and 3.9 respectively.

Table 3.8: List of hospitals near the project site

Sl. No.	Hospital	Distance from the industry (km)	Direction w.r.t. the industry
1	CBI Basel Mission hospital	3.79	SW
2	Sankanur hospital	4.5	SW
3	ESI dispensary, Gadag		
4	Vaatsalya hospital	4.43	SW
5	Dr. N. B. Patil hospital	6.8	SW
6	Adamya hospital and ortho care center	8.3	SW

Table 3.9: Schools near the project site

Sl. No.	Hospital	Distance from the industry (km)	Direction w.r.t. the industry
1	Gadag Public School	SW	5.33
2	Loyola High School	SW	4.20
3	KLE high School	SW	4.7
4	Bachpan play school	SW	7.45
5	Jaycee school	South	7.40
6	VDSTC high school	South	5.0

3.15 Connectivity to the project site

The project site is located at Plot No.125, Gadag Industrial Area, Narasapura, Gadag District, Karnataka State. The unit is well connected by all modes of transportation. The Google map showing connectivity is as shown in below figure.

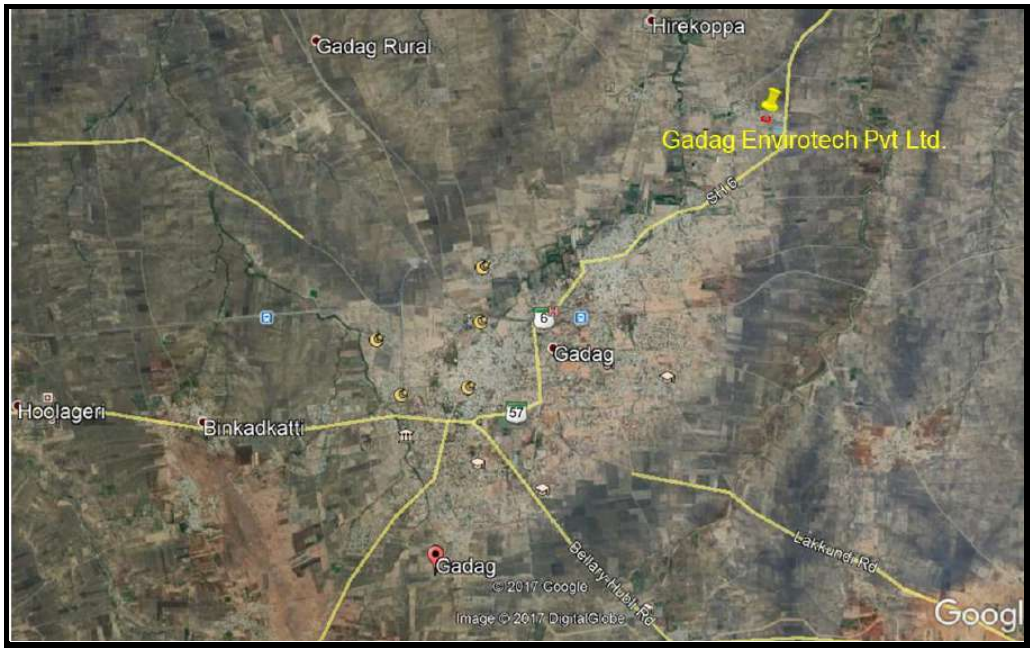


Fig 3.13: Connectivity to the project site

Connectivity to the project site is detailed in the following table 3.10. Google map showing the same is appended subsequently in fig 3.13.

Table 3.10: Connectivity to the project site

Sl No	Road	Distance from the project site	Direction w.r.t. project site
1	Gadag – Bagalkot State Highway	300 m	East
2	Gadag Railway Junction	4.2 km	South West
3	Hubli Airport	70 km	South West

Note: All distances mentioned are aerial

The details of 1 km, 5 km & 10 km distance google map is showing in below Fig 3.14, 3.15, 3.16

Fig 3.14: Google Map Covering 1 Km Aerial Distance From the Project Site

Fig 3.15: Google Map Covering 5 Km Aerial Distance from the Project Site

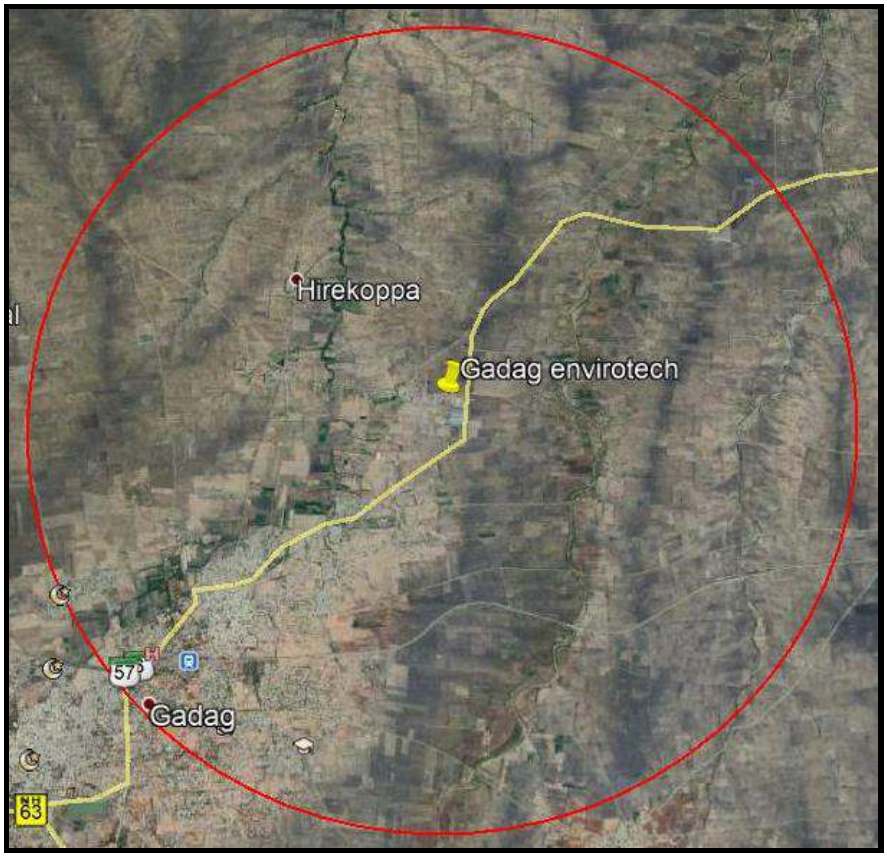
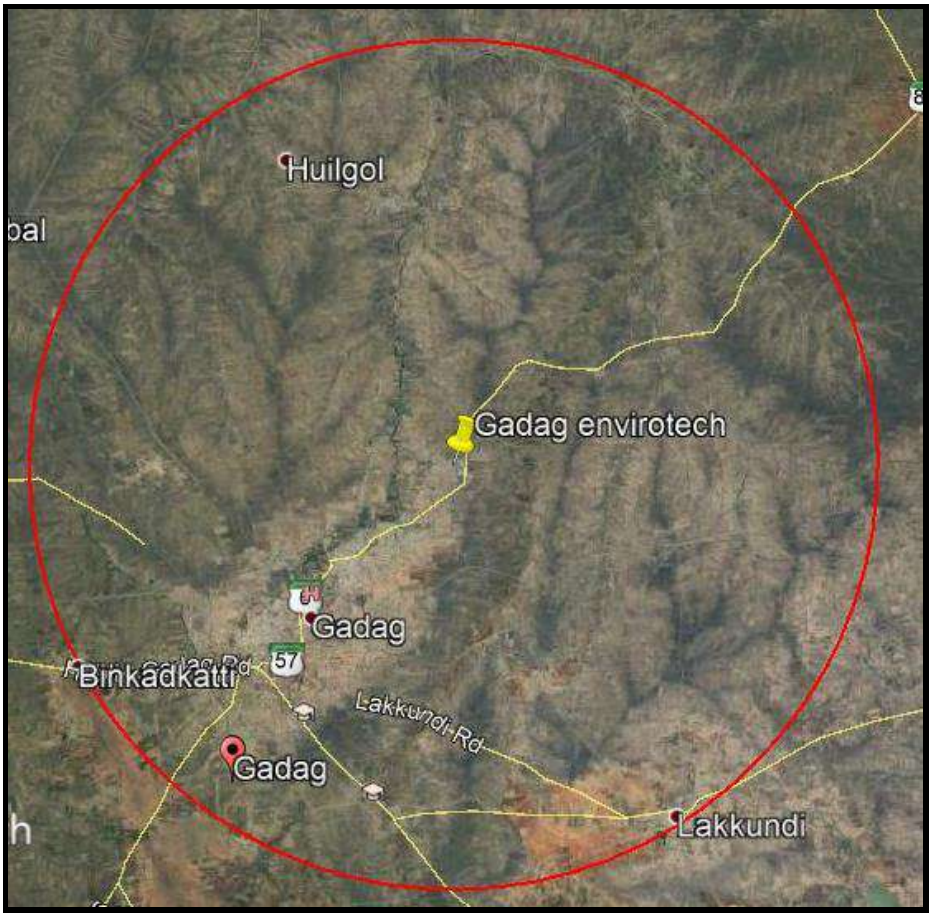


Fig 3.16: Google Map Covering 10 Km Aerial Distance from the Project Site



CHAPTER 4

ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4.1 Details Of Investigated Environmental Impacts Due to Project Location, Possible Accidents, Project Design, Project Construction, Regular Operations, Final Decommissioning Or Rehabilitation Of Completed Project

This chapter discusses potential environmental and social impacts which are likely to appear due to various project-related activities. These include positive and negative, direct and indirect, local and regional and also reversible and irreversible impacts due to project construction and operation. The impact assessment forms the basis for development of mitigation measures.

4.1.1 Environmental Impacts Due to Project Location, Possible Accidents and Mitigation Measures

Prediction of impacts is the most important component in the Environmental Impact Assessment studies. The prediction of impacts helps to identify possible mitigation measures for the proposed project activity and to arrive at a most appropriate mitigation measures to overcome the adverse impact.

The environmental impacts identified due to this project activity during construction and operation phases would include the following:

- Topography and Land use
- Hydrology and Surface Water Quality
- Ambient Air Quality
- Ambient Noise Quality
- Traffic Volume
- Ecology – Flora and Fauna
- Land use
- Socio-economic – Employment generation & induced impacts due to increased developmental activities in the area
- Health and Sanitation and Aesthetics
- Natural Disasters – Earthquakes, Floods and Landfill Stability Failure; and
- Other Risks Associated – Road Accidents, Fire Safety, Road Safety and Entry/Exit System

The environmental impacts identified above due to various activities pertaining to project components during construction and operation phase of the project are elaborated and in the following sections.

4.2 Impact on Topography and Land use

There will not be any adverse impact on the land use as the allotted land falls under industrial area approved by Govt. of Karnataka State. The extent of land is also very small, that is One Acre. Furthermore, the impact on surrounding land, during the constructional activity, is negligible as all the raw materials required will be stored within the boundary of the industrial plot.

4.3 Impact on Water Environment

Impact on Water Environment can be predicted in two ways i.e

- Impact on water resources
- Impact on water quality

4.3.1 Impact on water resources – Surface water resources:

As the nearest surface water resources prevailing in the study area is at about 1.8 Km distance from the project site, there will not be impact on surface water resource and quality due to the proposed project.

4.3.2 Impact on water resources - Ground Water Resources:

The proposed project is not significant from water pollution point of view. It is not a water intensive project. No impact on Ground water resources is anticipated during both construction as well as operational phase of the project as there is no withdrawal of water. However, Water demand shall be met through KIADB Sources.

4.3.3 Impact on water quality:

4.3.3.1 Construction phase:

During construction phase of the project, water requirement will be met from KIADB water sources. The waste water generated during construction phase is mainly from the use of water for domestic activities. The domestic sewage from construction workers will be treated in septic tank and disposed in soak pit. The rain water collected during the construction period will be channelized to a sump and reused for construction.

4.3.3.2 Operation phase impact and mitigation:

Total waste water requirement of the plant operation is as under:

Water consumed for	Consumption (LPD)
(a) Domestic	800
(b)Scrubbing, vehicle wash and cleaning	2000
(c)Gardening/Landscape development	1200
Total	**4,000**

Waste Water Generation Details;

Water consumed for	Discharge (LPD)
(a) Domestic	700
(b) Scrubber bleed and cleaning	2000
Total	**2700**

The waste water can contaminate sources of water and soil, if discharged untreated. Therefore, the domestic effluent is treated in septic tank and disposed into soak pit. The scrubber bleed and other washing effluents will be collected and treated in on-site treatment plant.

4.3.4 Mitigation measures during rainy season

The surface run off generated during rain may affect the recipient environment if not properly collected and discharged. The HW storage area and waste preparation area are properly secured from rain water so that rain water will not get contaminated. The storm water drain and effluent drains will be kept separate and no rain water will be allowed to mix with the effluent. The rain water before discharge will be made to pass through an impervious tank so that if any pollutant escaping will be contained. The rain water from paved area and roof top will be collected and harvested.

4.4 Impact on Air Environment and mitigation measures

4.4.1Construction phase:

The sources of air emission during construction phase will include site clearing, vehicles movement, materials storage and handling and operation of construction equipment. Emissions from these sources are expected to result in temporary degradation of air quality, primarily in the working environment affecting construction employees. However, dust generation and SPM rise in the ambient air will be coarse and will settle within a short distance close to the construction sites. Hence, dust and other emissions are unlikely to spread sufficiently to affect the surroundings of the construction site.

Traffic to the site during construction will be slightly more but not significant. The present road conditions are good for the proposed additional movement of vehicular traffic. Hence the impacts on the ambient air quality during construction phase will be temporarily for short duration and restricted to small area.

Fugitive dust sources associated with construction phase include vehicular movement generating fugitive dust on paved and unpaved roads, aggregate material handling, and other aggregate processing operations.

Mitigation measures are:

- Water spraying on inactive disturbed surface areas to suppress the dust.
- Haul trucks and dumpers will be covered with suitable covering material like tarpaulin sheets to prevent fugitive emissions during transportation of construction materials
- Proper housekeeping of the area to be maintained to remove dirt/debris from the site on daily basis

4.4.2 Operation phase impact and mitigation measures:

The main sources of air pollution are from Incinerator and DG Set emission. The capacity of the incinerator is very small that is 250 kg/hr. The capacity of DG set is 63 KVA. The impacts from the proposed project are only the incinerator emission. The possible emissions of pollutants are HCl, SO_2, CO, heavy metals, total organic carbon, total dioxins and total furans.

Mitigation measures are:

The incinerator will have a double combustion chamber. In the primary chamber temperature of 250 ± 25^0 C and in the secondary chamber 1100^0 C will be maintained with the gas residence time of 2 secs. The incinerator will be operated at such temperature to achieve total organic carbon content in the incineration ash and residue is less than 3 % and their loss on ignition is less than 5% of dry weight. Incinerator will be provided with demister to arrest the emission of moisture. Dioxin and furans are controlled by reducing the flue gas temperature from 1000° C to < 200° C by cooling. The effluent is treated and reused for cooling the flue gas, scrubber and bag filter to control the emission to the standards prescribed in the EP Rules. The stack of 30 m height will be provided for dispersion of emissions. For DG set, 3 m height chimney with acoustics will be provided.

4.5 Impact on Noise Quality and mitigation measures

4.5.1 Construction Phase

The activities such as operation of construction equipment like concrete mixers, cranes, generators, pumps, compressors, vibrators etc., and vehicular movement are potential to cause noise pollution.

The construction activities generally lead to higher noise levels if not properly controlled. It is expected that construction activities will involve noise generation above 95 dB (A). The major work will be carried out during the day time. The construction equipment may have high noise levels, which can affect the personnel, operating the machines. Use of proper personal protective equipment will mitigate any significant impact of the noise generated by such equipment.

Mitigation measures are:

- The construction areas to be provided with sheet barriers or temporary enclosures.
- Rubber padding to be provided in the construction machinery for vibration control.
- Provide acoustic enclosures and noise barriers in areas of high noise generating sources.
- High noise generating activity will be permitted during day time only
- Regular maintenance of its vehicles and repair of its equipment/ machinery
- Mobile noise sources such as cranes, earth moving equipment and heavy goods vehicles to be routed in manner that there is minimum disturbance to nearby habitation
- Diesel generators should be provided with acoustic enclosures
- Construction machinery and vehicles will be well maintained and idling of equipment or vehicles when not in use to be avoided
- Construction workers working near high noise generation will be provided with ear plugs/ ear muffs to limit exposure to occupational hazards.

4.5.2 Operation Phase

Impacts to noise quality post construction will be mainly due to project related vehicular traffic movement connecting access to various project components and machinery including emergency DG set, incinerator, fans, compressors, blowers, etc. The observed noise level of these machineries in the proposed plant is given below.

- Diesel Generator 95-105 dB(A)
- Fans, compressors and blowers 90-95 dB(A)
- Incinerator 78-80 dB(A)

Mitigation measures are:

- The DG set will be provided with acoustic enclosures
- The incinerator will be housed in a enclosed shed
- Vehicular movement will be regulated as per the Motor Vehicle Act.

4.6 The details of the Road/Rail Connectivity along with the likely impacts and mitigative measures

In order to have safe and minimized risks due to transportation of hazardous wastes the following alternatives need to be considered to select viable route for the transportation to:

- Use of specially designed vehicles to minimize risks of spills of hazardous wastes;
- Avoid routes having sensitive receptors like forests, water bodies, recreational areas;
- Avoid routes having narrow and unpaved roads;
- Avoid routes having human settlements and congested areas;
- Follow up best practices for and applicable legislation in force for safe transportation of hazardous wastes.

The proposed hazardous waste transportation route is selected carefully to minimize impacts on receptors in the North Karnataka region. National and State Highways will be preferably considered for the transportation route.

The project site is well connected by State highway No - 6. The nearest railway connectivity is Gadag railway Junction and it is 4.2 Kms towards NE of the project site.

As indicated in the aforesaid chapters this Common Hazardous Waste Incineration facility is planned to cater to the industries located in the Northern part of Karnataka. The hazardous wastes generated from the industries will be collected and transported by road using 3 Nos of 2.2 MT capacity Tata 407 vehicle.

Hazardous wastes will be collected from various industries and transported. The vehicles will move mainly through State and National highways. The additional traffic due to the proposed activity is not likely to affect the regular vehicular movements. The transport vehicles will follow the guidelines issued by CPCB.

The transport survey conducted by Karnataka PWD in Gadag is given in below table:

Table 4.1: Transport survey of Gadag

Slow moving vehicles	Two wheelers	Auto	Cars	Vans	Mini bus	Bus	LCV	2 axle	3 axle	Multi axle	Tractors
	1980	365	706	210	13	349	191	185	44	39	98
Fast moving vehicles	2100	1285	1711	975	627	1299	877	939	673	485	426

The transportation of Hazardous waste by road will have very minimal impact on the existing traffic.

4.6.1 Generator responsibilities as per Guidelines for Common Hazardous Waste Incineration

- Generator of the hazardous waste shall ensure that wastes are packaged in a manner suitable for safe handling, storage and transportation. Labelling on packaging is readily visible and material used for packaging shall withstand physical and climatic conditions
- Generator shall ensure that information regarding characteristics of wastes particularly in terms of being corrosive, reactive, ignitable or toxic is provided on the label
- All hazardous waste containers shall be provided with a general label as given in Form 8 in Hazardous Waste (Management & Handling) Rules, 1989, as amended.

- Transporter shall not accept hazardous wastes from an occupier (generator) unless six - copy (with colour codes) of the manifest (Form 9) is provided by the generator. The

transporter shall give a copy of the manifest signed and dated to the generator and retain the remaining four copies to be used for further necessary action prescribed in the Hazardous Wastes (Management and Handling) Rules, 1989, as under:

Copy 1	White	Forwarded to the pollution control board by the occupier
Copy 2	Light yellow	Signed by the transporter and retained by the occupier
Copy 3	Pink	Retained by the operator of the facility
Copy 4	Orange	Returned to the transporter by the operator of the facility after accepting waste
Copy 5	Green	Forward to pollution control board by the operator of the facility after disposal
Copy 6	Blue	Returned to the occupier by the operator of the facility after disposal

- Generator shall provide the transporter with relevant information in Form 10 i.e. Transport Emergency card regarding the hazardous nature of the waste and measures to be taken in case of an emergency.

Transporter responsibilities as per Guidelines for Common Hazardous Waste Incineration

- Transport of hazardous wastes shall be in accordance with the provisions of the rules made by the Central Government under the Motor Vehicles Act, 1988 and other guidelines issued from time to time.
- The Hazardous wastes should be transported in closed containers at all times and delivered at designated points only.
- Wastes in terms of being Corrosive, Reactive, Ignitable or Toxic should be provided with proper labelling.
- Transporter shall possess requisite copies of the certificate (valid authorization obtained from the concerned SPCB/PCC for transportation of wastes by the waste generator and operator of a facility) for transportation of hazardous waste.
- Maintaining the manifest system as required.
- Transporting the wastes in closed containers at all times
- Delivering the wastes at designated points
- Informing SPCB and other regulatory authorities immediately in case of spillage, leakage or other accidents during transportation
- The design of the trucks shall be such that there is no spillage during transportation.
- The transport vehicles shall be designed suitably to handle and transport the hazardous wastes of various characteristics.
- Transporter should have valid “Pollution under Control Certificate” (PUCC) during the transportation of hazardous waste and shall be properly displayed.

- The driver should be trained with regard to emergency response measures to be taken during transportation of hazardous wastes.

Source: Guidelines for transportation of hazardous wastes, CPCB, September, 2005
Guidelines for Common Hazardous Waste Incineration, CPCB, June, 2005

The total quantity of incinerable waste generation in the Northern districts of Karnataka is estimated as 56,346 T/A (Karnataka State Pollution Control Board – Hand book). The hazardous wastes generated from the industries will be collected and transported by road using 3 Nos of 2.2 MT capacity (Tata 407 vehicle). Considering if all the waste is collected by the Gadag Incineration facility, the number of trips the transport vehicles make is estimated about as 90 trips in a month. This will not have any tangible impact on the traffic.

4.7 Impact on neighbourhood

The impacts shall be of short-term duration and limited to the construction phase.

- Noise generation from construction equipments, machinery and construction vehicles may lead to increase in noise levels that will lead to disturbance in the immediate vicinity.
- The accumulation of water in the dugout areas of the site might result in building up mosquito breeding areas and spread of vector borne diseases
- During the construction activities, problem of traffic may increase in the area because of movement of heavy vehicles to and from the site
- Engagement of local workers and increase in business at local shops by workers will have marginal positive impact
- The avenues for local shops, small eateries, tea stalls for construction labour may increase in the industrial area and around.
- There could be exposure of local inhabitants, children and cattle workers engaged in construction activities to the construction waste, sharp objects which may lead to injury and minor accidents.

4.7.1 Mitigation measures

The following mitigation measures can be implemented to counter the probable impacts that might emerge

- Adequate drainage facility inside the project site will be provided so that water does not become stagnant or collect.
- All high noise generating activity will be permitted during daytime only to ensure minimal disturbance to the nearby residents.
- Workers from nearby villages will be engaged in construction activities as per their skill set, this will supplement their income.
- Workers will be briefed about general conduct and behavior while interacting with local community.

- Adequate security arrangement will be provided to ensure that the local inhabitants and the cattle are not exposed to the potential hazards of construction activities.
- Proper fencing and proper signage will be provided around construction site.
- Security Personnel will be appointed to restrict entry of unwanted people to the site round the clock.

4.8 Impact on biological environment

No endangered, rare and threatened species are observed in this area. There is no ecologically sensitive area like National park or Sanctuaries or Biosphere Reserves within 10 km radius of the study area. In the present project, adequate stack heights will be provided for dispersion of pollutants after adequate pollution control measures to reduce impact due to emissions.

Therefore, the impact of SO_2 and NO_x emissions on the surrounding agro-eco-system will be insignificant. Total emission of SO_2, NO_x is expected to be 10.5 µg/m^3, particulate (PM_{10} is expected to be 72.8 µg/m^3, plantation comprising of pollutant resistant species will be undertaken in and around the project site, which will serve as not only pollution sink but also as noise barrier. It is expected that with adoption of these mitigation measures, the impact due to operation of the proposed project will be minimal on the terrestrial ecosystem.

CHAPTER 5

ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

5.1 Technological aspects

Thermal oxidation through incinerator is one of the proven technologies for destruction of hazardous waste in all the forms i.e. solid / semi solid / liquid. The incinerable waste is proposed for Incineration using controlled flame combustion to thermally degrade waste.

Incineration of waste materials converts the waste into ash, flue gas, and heat. The Incinerator is constructed of heavy, well-insulated materials, so that it does not give off extreme amounts of external heat.

The Gadag Envirotech Private Limited has chosen the best available technology for incineration. It is a facility with two chambers and meets the specification in the Guidelines issued by the CPCB. The details are provided in the Chapter - 2.

5.2 Criteria of selection

- Long Residence Time (30-90 mins)
- Ability to burn wastes of 60% of water
- Ability to burn wastes of different shapes and sizes
- Incinerators are quite suitable and are more versatile than all other systems because these units can handle both liquid and solid type wastes.
- A large interfacial area and good mixing of the solid and gaseous reactants are achieved in these furnaces due to the drum rotation since the solid waste is continuously dropped down through the axially moving gas stream. Solid wastes are usually fed by a conveyor system and the liquid type waste is introduced through nozzles.
- Can handle wastes in liquid, sludge and solid form.

5.3 Details of Pre-treatment

The wastes received will be analysed for its calorific value. The high calorific waste and low calorific waste will be mixed to get a compatible waste for incineration. The waste is also tested for pH. If the pH is acidic lime will be mixed to make it neutral during burning of the waste as per the requirement. This treatment is used to facilitate complete breakdown of hazardous wastes and more usually to modify the chemical properties of the wastes, e.g., to reduce water solubility or to neutralise acidity or alkalinity. The techniques involve oxidation, chemical reduction, neutralisation, heavy metal precipitation, oil/water separation and solvents/fuels recovery.

5.4 Site

The site as already indicated is in Narasapura industrial area and is the best suited for the incineration plant. It meets the siting guidelines as per Common Hazardous Waste Incineration, June 2005.

CHAPTER 6

ENVIRONMENTAL MONITORING PROGRAM

6.0 Introduction

Environmental monitoring program is planned to ensure that the regulatory compliances are met as well as to assess the performance of the operation of the plant and the pollution control systems. It will also keep a check on the trends in environmental parameters. In all cases the results of monitoring will be reviewed, analyzed statistically and submitted to concerned authorities.

6.1 Frequency, Location, Data Analysis, Reporting Schedules

A comprehensive monitoring program is suggested in table below.

Table 6.1: Monitoring schedule for environmental parameters

Sl No	Parameter	Frequency
1	Ambient Air quality, Particulate matter less than 2.5 µm, PM <10 µm, SO_2, NO_2, lead, ozone, carbon monoxide, ammonia, Benzene, Benzpyrene, Arsenic and nickel.	Twice in a month
2	Groundwater at site and location around	Twice in a year Once before the monsoon and after the monsoon
3	Treated water quality	Once in 15 days
4	Project premises noise monitoring	Once in a year
5	Hazardous waste characterization of Incineration ash	Once in a month.
6	Temperature	Continuous monitoring
7	Carbon monoxide	Continuous monitoring
8	Oxygen	Continuous monitoring
9	Total particulate matter	Continuous monitoring

Stack emissions		
Sl No	Parameters	Frequency
1	SO_x	Twice a year
2	NO_X	Twice a year
3	Total organic carbon	Twice a year
4	Mercury	Twice a year
5	Heavy metals	Twice a year
6	Dioxins and furans	Twice a year

6.2 Environmental Management Cell

The environmental cell will be a nodal agency to co-ordinate and provides necessary services on environmental issues during operation of the project. This environmental group will be responsible for implementation of environmental management plan, interaction with the environmental regulatory agencies, reviewing draft policy and planning. This department will interact with State Pollution Control Board (SPCB), other environment regulatory agencies and all member industries.

6.3 Pollution Monitoring Facilities

Incinerator stack should have provision of platform and port hole for stack sampling, it shall meet the standards prescribed by CPCB with necessary power connection. The monitoring shall be out sourced to NABL accredited / MOEF recognized laboratory.

6.4 Health Monitoring

- Monitor the health of workers within the project site to keep track on the health status of the workers.
- Periodically obtain feedback from local doctors regarding any potential indicators of adverse health effects due to environmental cause in the communities surrounding.
- By organizing health camps on a regular basis.

6.5 Budgetary provisions for EMP

In order to comply with the environmental protection measures, the project management has made budgetary provision for environmental protection and safety measures. Cost towards environmental mitigation measures are given in below Table 6.2.

Table 6.2: Budgetary provisions for EMP

Sl No	Item	Amount Rs. Lakhs/annum	Procurement schedule
1	Capital investment on pollution control systems	35.00	During project implementation phase
	Laboratory facilities	10.00	During project implementation phase
2	Maintenance cost	2.00	During plant operation phase
	Monitoring of water, wastewater, soil, solid waste	2.00	During plant operation phase
	Ambient air and stack emission monitoring	25.00	During plant operation phase

The monitoring results will be submitted to State Pollution control board, Regional Office and to the Head office once in Six months.

CHAPTER 7

ADDITIONAL STUDIES

7.0 Public Consultation.

The project is proposed is in Narasapura Industrial Area of KIADB, Gadag. Therefore, as per Notification no J-11011/321/2016-IA-II dated 27th April, 2018 public hearing is exempted.

7.1 Risk Assessment

The main objective of the risk assessment study is to identify and quantify the major hazards and the risk associated with various operations of the proposed project, which may lead to emergency consequences (disasters) affecting the public safety and health. Based on this information, an emergency preparedness plan is prepared to mitigate the consequences. The approach involves hazards identification, hazards assessment and evaluation, developing Disaster Management Plan (DMP).

7.2 Risk analysis

Risk analysis includes an estimate of the probability or likelihood that an event will occur. Risk can be characterized in qualitative terms as high medium or low, or in quantitative terms using numerical estimates and statistical calculations. Both probability and consequences are extremely important in evaluating risk. A high risk situation can be the result of a high probability with severe consequences (e.g. irreversible health effects or death due to an airborne toxic dust, a fire or explosion with injuries or fatalities), whereas moderate risk situations can be a result of either high probability with mild consequences or low probability with more severe consequences. Diminishing the likelihood of an accident or minimizing the consequences will reduce risk overall.

Application of readily available information when combined with site-specific evaluations such as the vulnerability analysis will complete much of the risk analysis process.

7.3 Hazard identification

Identification of hazards at the proposed site is of primary significance of the analysis, and quantification of risk. Hazard indicates the characteristics of hazardous wastes that pose potential for an emergency situation. All the components of proposed site need to be thoroughly examined to assess their potential for any unplanned event/sequence of events, which can be termed as an emergency.

Following type of hazard wastes may be involved during operation of facility, which can create potential emergency situation in the event of spillage and accidental release of hazardous wastes from the site:

- Flammable wastes
- Corrosive Wastes
- Reactive wastes
- Toxic wastes

Flammable wastes can form explosive mixture with air and heating may cause pressure rise with risk of bursting and explosion. Sometimes vapour may be heavier than air and spreads along the ground, narcotic in high concentrations, gives off toxic or irritant fumes in a fire.

7.4 Identification of Toxic and Flammable

7.4.1 Toxic Chemicals: Chemicals having the following values of acute toxicity and which owing to their physical and chemical properties are capable of producing major accidents:

Sl No	Toxicity	Oral toxicity LD50 (mg/kg)	Dermal toxicity LD50 (mg/kg)	Inhalation toxicity LC50 (mg/l)
1	Extremely toxic	1-50	1-200	0.1-0.5
2	Highly toxic	51-500	201-2000	0.5-2.0

7.4.2 Flammable Chemicals:

Flammable gases: Gases which are at 200° C and at standard pressure of 101.3 KPa are:-

- Ignitable when in a mixture of 13 % or less by volume with air
- Have a flammable range with air of at least 12 percentage points regardless of the lower flammable limits.
- Extremely flammable liquids: chemicals which have flash point lower than or equal to 230° C and boiling point less than 350° C
- Very highly flammable liquids: chemicals which have a flash point lower than or equal to 230°C and initial boiling point higher than 350° C.
- Highly flammable liquids: chemicals which have a flash point lower than or equal to 600C but higher than 230° C.
- Flammable liquids: chemicals which have a flash point higher than 60^{o}C but lower than 900° C.

7.5 Hazardous activities at site

During the operation phase of the facility, the following activities can pose hazards and risks to surrounding environment.

- Storage of diesel in drums of 1000 L capacity tank
- Manoeuvring of Wastes and Manual Handling
- Unloading hazardous wastes on vehicle – mechanical movements
- Removal of bungs from drums, cuts & abrasions

- Contact with hazardous chemicals.
- Chemical reaction – fire, gas

7.6 Evaluating Hazards

Following are considered for evaluation of hazards:

- Hazard and Operability Study (HAZOP)
- Accident Consequence Analysis
- Event Tree Analysis
- Fault Tree Analysis
- Failure Modes, Effects and Criticality Analysis

In order to be in a state of readiness to face the adverse effects of accidents, an Emergency Preparedness Plan **(EPP)** has to be prepared. Such a plan mush cover the possible hazardous situations in the locality and the causes, areas most likely to be affected, on-site and off-site plans, establishment of Emergency Control Canters **(ECC)**, location of emergency services and duties of officers/staff during emergency. The necessary preventive and protective steps required to be taken before, during and after an accident need to be worked out in operational terms and detailed in the document.

7.7 Nature of Possible Hazards

There can be two kinds of major hazards

- Spontaneous ignition– Explosion and Fire hazard
- Electrical Hazards like flashover and short circuits

7.8 Hazardous Conditions

A. Hazards due to loss of containment

Hazardous waste handled, stored and disposed will be flammable and toxic in nature. In the event of spillage, leakage or accidental release of hazardous wastes, it will create localized effects within the short distances inside the site in the form of thermal radiations or toxic fume release. Safety measures including firefighting facilities will be provided to attend any emergency due to handling and storage and disposal of such hazardous wastes.

B. Release of flammable wastes

Hazardous wastes containing fraction of organic waste and residue, paint wastes, will be stored in drums of various sizes for incineration. At the time of leakage, spreading or fixed pool will be formed and in an unlikely event of fire, thermal radiation may cause damage to life and property within short distance.

C. Fire in Stored Hazardous Wastes

Hazardous waste will be stored in containers and drums either in solid and semisolid state.
In normal condition, hazardous wastes cannot initiate fire. However, in the event of fire, hazardous wastes can burn and sustain fire resulting generation of toxic fumes and smoke. Such toxic fumes will result in suspended particulate matter, shoots carbon monoxide, carbon dioxide, oxides of nitrogen, and other toxic constituents, etc. In the event of fire, hazardous waste will act as area source of toxic gas emissions and disperse in to the atmosphere and is responsible for deterioration of ambient air quality. Subsequently, there can be adverse impacts on the heath due to inhalation of toxic gases.

D. Delayed Ignition and Explosion

Flammable liquid hazardous waste when released is not ignited immediately; the vapours will spread in the surrounding area toward wind direction. The drifting vapour cloud will mix with air. As long as the vapour concentration is between the lower and upper explosion limits, the toxic impact will be less dangerous or the vapour cloud may be set on fire by an ignition source.

In case of delayed ignition of a flammable vapour cloud, two physical effects may occur:

- Flash fire over the whole length of the explosive vapour cloud;
- Vapour cloud explosion that results in blast wave, with typical peak overpressures circular around the ignition source.

For generation of overpressure effects, some degree of confinement of the flammable vapour cloud is required. The extent of injury to people & damage to property or environment depends on the vapour cloud size, explosive mass in the vapour cloud and the degree of confinement at the time of ignition.

Table 7.1 below gives an illustrative listing of damage effects caused by peak overpressure.

Table 7.1: Damage effects caused by peak overpressure

Peak overpressure (bar)	**Failure**
0.005	5 % window shattering
0.02	50 % window shattering
0.07	Collapse of a roof tank
0.07-0.14	Connection failure of panelling
0.08-0.1	Minor damage to steel framework
0.15-0.2	Concrete block wall shattered
0.2	Collapse of steel framework
0.2-0.3	Collapse of self-framing steel panel building

0.2-0.3	Ripping of empty oil tanks
0.2-0.3	Deformation of a pipe bridge
0.2-0.4	Big trees topple over
0.3	Panelling torn off
0.35-0.4	Piping failure
0.35-0.8	Damage to distillation column
0.4-0.85	Collapse of pipe bridge
0.5	Loaded train wagon overturned
0.5	Brick walls shattered
0.5-1.0	Failure of connecting piping

7.9 Nature of Hazard from Oil Storage:

Diesel is a petroleum product. It is a highly flammable liquid having flash point between 32–96° C. However its auto ignition temperature is 256°C. Its boiling point ranges between 150-400°C. Furnace Oil is of similar characteristics having flash point above 66°C. Major Hazards from oil storage can be fire. Maximum credible accidents from oil storage tank can be:
a) Tank fire
b) Pool/Dyke fire

A. Tank Fire - Diesel Oil is stored in 1000 L capacity tank. Leak in rim seal leading to accumulation of vapour is a source of fire. Lighting can be a source of ignition and can cause tank fire

B. Pool / Dyke fire - If there is outflow from the tank due to any leakage from tank oil will flow outside and form a pool. After sometime, the vapour from the pool can catch fire and can cause pool or dyke fire.

7.10 Risk mitigation measures

- Flammable, ignitable, reactive and non-compatible wastes will be stored separately and never will be stored in the same storage shed.
- Storage area consists of 2 different sheds. One shed will be utilised for storing Flammable and ignitive waste, another shed will be used for storing reactive and non-compatible.
- Adequate storage capacity will be provided in the premises.
- Storage area will be designed to withstand the load of waste stocked and ensures that there will not be any damage from the hazardous waste spillage.
- Hazardous waste storage area will be provided with the flameproof electrical fittings and it should be strictly adhered to.
- Heat detection system will be provided in the sheds. Adequate firefighting systems will be provided for the storage area.

- Loading and unloading of wastes in storage sheds will only be done under the supervision of the well trained and experienced staff.
- "Fire break" of at least 04 meter between two blocks of stacked drums will be provided in the storage shed. One block of drum will not exceed 300 MT of waste.
- Minimum of 1.5/>2.5 meter clear space should be left between two adjacent rows of pallets in pair for movement of personnel and or fork lift and inspection.
- The storage and handling will have at two openings/ routes to escape in the event of any fire in the area.
- Doors and approaches of the storage area will be of suitable sizes for entry of fork lift and firefighting equipment;
- Measures will be taken to prevent entry of runoff into the storage area. The Storage area shall be designed in such a way that the floor level is at least 150 mm above the maximum flood level.
- The storage area floor should be provided with secondary containment such as proper slopes as well as collection pit so as to collect wash water and the leakages/spills etc.
- No drums will be opened in the storage sheds for sampling etc. and such activity will be done in designated places outside the storage areas;
- Drums containing wastes stored in the storage area should be labelled properly indicating mainly type, quantity, characteristics, source and date of storing etc.
- The container shall be made or lined with the suitable material, which will not react with the hazardous waste to be stored
- In case of spills / leaks/dry adsorbents/cotton will be used for cleaning instead of water.
- Proper slope with collection pits be provided in the storage area so as to collect the spills/leakages.
- Smoking shall be prohibited in and around the storage areas;
- Good housekeeping will be maintained around the storage areas.
- Signboards showing precautionary measures will be taken, in case of normal and emergency situations will be displayed at appropriate locations.
- In case of manual operation, proper precautions will be taken, particularly during loading / unloading of liquid hazardous waste in drums.
- Only persons authorized to enter and trained in hazardous waste handling procedures will have access to the hazardous waste storage areas.

7.11 Disaster Management Plan

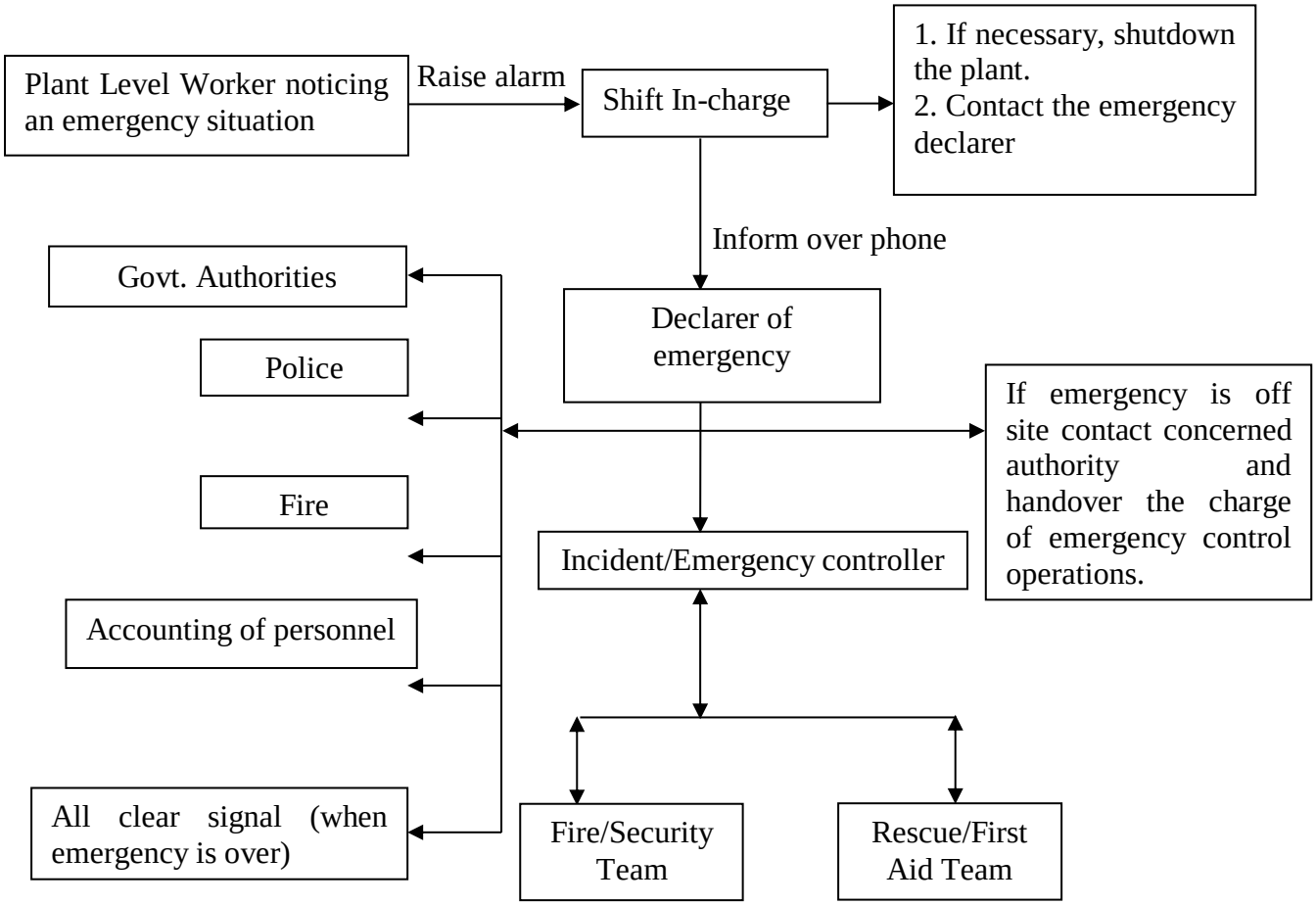
7.11.1 Emergency Plan

An Emergency is a situation, which may lead to or cause large-scale damage or destruction of life, property or environment within or outside the Factory. Such an unexpected situation may be too difficult to handle for the normal work force within the plant.

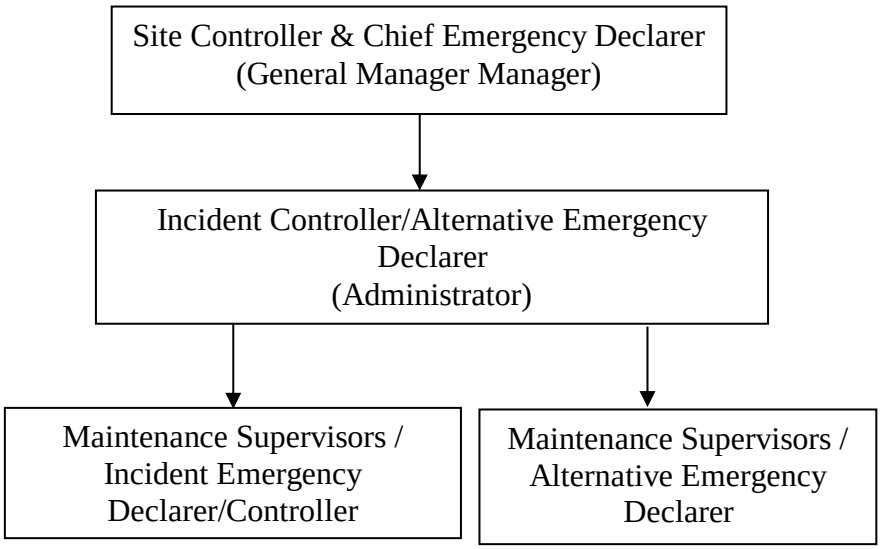
Emergency is a general term implying hazards both inside and outside the installations. Thus, emergency are termed "On-Site" when it confines itself within the plant even though it may require external help and "Off-Site" when emergency extends beyond its premises.
Onsite emergency plan contain the following key elements:

- Basis of the plan
- Accident prevention procedure/measures
- Emergency response procedure/measures
- Recovery procedure

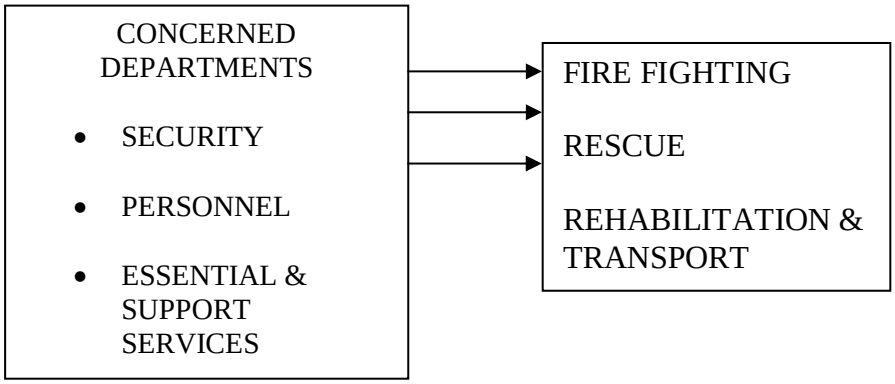
7.11.2 Structure of Onsite Emergency Preparedness and Response



7.11.3 Emergency Organization Structure



7.11.4 Emergency Coordinates



7.12 Emergency Personnel's Responsibility

7.12.1 Site Controller: The General Manager or his nominated deputy will assume overall responsibility for the plant / storage site and its personnel. His duties will be to:

- Assess the magnitude of the situation and decide if staff needs to be evacuated from their assembly points to identify safer places;
- Exercise direct operational control over areas other than those affected;
- Undertake a continuous review of possible developments and assess in consultation with key personnel as to whether shutting down of the plant or any section of the plant and evacuation of personnel are required;
- Liaise with senior officials of Police, Fire Bridge, Medical and Factories Inspectorate and provide advice on possible effects on areas outside the factory premises.
- Look after rehabilitation of affected persons on discontinuation of emergency;
- Issue authorized statements to news media, and ensure that evidence is preserved for enquiries to be conducted by the statutory authorities.

7.12.2 Fire & Security Officer

The Chief Officer and Security Officer will be responsible for firefighting. On hearing the fire alarm he shall reach the fire station immediately and advise fire and security staff in the factory of the incident zone and cancel the alarm. He will also convey through telephones or messengers to the Communication Officer, Incident Controller and Site Controller about the incident zone. He will open the gates nearest to the incident and stand by to direct the emergency services.

7.12.3 Telephone Operator:

On hearing the emergency alarm, he will immediately contact Site Controller and on his advice call the local fire-bridge or mutual-aid scheme members. In case the PAS internal/external telephone system becomes inoperative, he shall inform the Communication Officer through a messenger. In case fire has been detected and the alarm is not in operation, he shall receive information about location from the person who detected the fire and thereafter immediately consult the Incident Controller and make announcement on telephone telling the staff about location of the incident and to evacuate to their assembly points.

7.13 Infrastructure: Emergency control room

This is the main center from where the operations to handle the emergency are directed and coordinated. Emergency Control Centre shall be alert round the clock. The Control Room will be the focal point case of an emergency from where the operations to handle the emergency are directed and coordinated. It will control site activities and should be furnished with external and internal telephone connections, list of essential telephone numbers, list of key persons and their addresses.

7.13.1 Assembly Points

An Assembly Point is a predetermined safe location that all occupants of the building must report to upon evacuating the building in case of an alarm of fire or any other emergency. It is at the assembly points that the occupants of the building will be accounted for and given information concerning the emergency.

7.14 Operational systems during emergency

7.14.1 Communication system

There are different types of alarms to differentiate one type of an emergency from other as described below:

Fire or Gas	Normal Fire Siren
Emergency/Evacuation	High-pitched wailing Siren

Alarms should be followed by an announcement over Public Address System (PAS). In case of failure of alarm system, communication should be by telephone operator who will make announcement in industrial complex through Public Address System which should be installed. If everything fails, a messenger could be used for sending the information.

7.14.2 Emergency services

The Control Centres should be located at an area of the minimum risk or vulnerability in the premises concerned, taking into account the wind direction, areas which might be affected by fire/explosion, toxic releases, etc.

Emergency control centre should include the following facilities:

- Internal and External communication
- Computer and other essential records
- Telephone set for quick communication with telephone directory
- Process flow-chart
- Factory layout
- First aid medicines
- Copy of on-Site Emergency plan
- Employees address and contact numbers
- Note book, pen and pencil
- List of key personnel with addresses, telephone numbers Etc.

7.14.3 Mutual Aid

It is essential to have mutual aid arrangements as it is useful in cases of major fire and other emergencies. Mutual aid arrangements are to be worked out in the plan to facilitate additional help in say, fire-fighting or medical attention which might be beyond the capacity of an individual factory/unit. To make the mutual aid plan a success, the following are considered essential:
Written procedure which spells out how call for help will be made and how it will be responded.

- The type of equipment which would be used and procedure for making replacement.
- A quick hot-line method of communication.
- A brief mention of the type of hazard in each plant and fire-fighting measures. Orientation and joint training program for staff.
- Joint inspections and drills.

7.15 Disaster Management

In spite of various hazard control procedures practiced at the plant, there still is possibility for certain hazards to blow up into disasters. Plant management will be equipped to handle such disasters or emergencies. A comprehensive disaster or emergency management plan with an

objective to minimize exposure of people and maximize the speed of corrective action is required for any industry. Potential for hazards due to fire, explosion is significant in the proposed project.

7.15.1 Objectives:

- Assessing the dangers, this could arise on and off site as a result of foreseen emergencies & the effects that could be on the environment.
- Training of individual personnel, with duties under the plans will familiarize the onsite personnel with their roles, their equipment and details of the plans.
- Emergency plans should be based on the specific needs of each particular site for dealing with those emergencies, which may arise. These plans should be tested when first devised and thereafter to be rehearsed at suitable intervals.
- Assessing the causes, which lead to disaster E.g., fires, spillages, release of toxic and corrosive materials etc. consequences of which should be assessed.
- Safeguarding employees & minimizing damage to property & environment.
- Mitigation of the risks involved by pre-planned remedial & rescue measures using when necessary, the combined resources of the organization concerned and the public emergency services.

Following are the precautions to avoid the risk involved and the emergency control measures to be taken for handling any incident, which can take place in spite of taking all precautions.

- Adequate ventilation systems for fumes, smokes and dust will be provided.
- Exit signs will be clearly displayed to facilitate easy and quick evacuation of personnel during emergencies.
- Danger signs will be prominently displayed near electrical installations and other potential hazards.

7.15.2 Safety Measures during Power Failure

- In case supply fails due to internal problem or due to fault in supply line then:
- At first the MOCB is tripped and the fault is detected.
- The electrician is provided with hand gloves, goggles, safety apron etc.
- The General Manager (Works) is informed about the rectification & the line is switched on.

Following are the safety equipments provided in the control room for any emergency:
i. First Aid Box.
ii. Artificial respiration chart
iii. Discharge rod.
iv. Hand gloves
v. Asbestos apron
vi. Goggles
vii. Fire extinguishers and sand buckets

7.15.3 Risk and Disaster Handling Procedures

- Plant start-ups and emergency shut downs – Every operating person will be properly Trained and proper instructions written down on strategic locations to ensure that plant start up/ shut down is as per procedures.
- As a policy, the management will entrust definite assignment of responsibility on specific functions to various departmental heads and co-ordination by one individual as chain of command who will be available round the clock either in the industry on duty or available on phone, with proper communication facility to reach the site in minimum time.
- Medical services – details of names of Doctors and hospitals with first aid services & other medical facilities with telephone numbers will be provided.
- Fire protection facility – full-fledged firefighting facilities in the factory and the crew will be readily available handy at all times.
- In order to keep employees abreast with firefighting in the event of actual fire, the employees will be trained by mock fire exercises periodically.
- All control instruments will be maintained in up to date conditions. Safety values and rupture discs, alarms and level indicators will be checked by dummy trails.
- Arrangement for emergency power and water supply will be kept ready at all times.
- Before supervisors and workers are designed to work, they will be trained in operations and provided with literature about correct handling, possible hazards and protective equipment.
- They shall be trained in safety procedures and be examined that they have absorbed this knowledge. Persons with a habit of adopting shortcuts or who are complacent must be disqualified.
- Emergency procedures shall be written down and made known to each person concerned. Escape routes shall be properly marked. Information will be provided through alarms, siren with proper coding, and public address systems.
- Monitoring of accidents, their causes and other relevant data will be recorded as per MoEF guidelines. The management will take necessary steps, which include details of the accidents reporting to State Pollution Control Board and Inspector of Factories.
- Information on offsite emergency plan will be furnished to the Chief Inspector of Factories for possible emergency.

7.16 First aid measures

Following are the first aid measures which would be taken before the personnel taken to the hospital.

- In case of contact with skin, remove the contaminated clothes; wash with plenty of water and report for medical treatment.
- In case of exposure to eyes flush thoroughly with large quantities of water from the tap, spray or by inserting the head in a water container and repeatedly opening and closing of the eyes for at least 10 minutes.

- In case of inhalation, move the affected person immediately to uncontaminated place, loosen his clothing and make him to lie down in face down position and observe breathing. If breathing stops, apply artificial respiration and do not attempt to give anything orally to patient if he is unconscious.

7.17 Fire Prevention Facilities

The unit will be provided with appropriate firefighting equipment including pumps for emergency requirement. Any one or combination of the following system will protect all yards and plant.

- Hydrant system
- High velocity and Medium velocity sprinkler system.
- Water spray (Mulsifier System)
- Foam system

CHAPTER 8

PROJECT BENEFITS

8.0 Introduction

For systematic & scientific disposal of solid wastes, a facility has to be developed where care is to be taken to avoid any negative effects on the environment.

The main benefits of the proposed project are:

- The proposed project facilitates better management of the industrial wastes.
- It will be the showcase for others for management of hazardous waste with additional benefit of green and clean Environment.
- It minimizes the pollution load on environment from industrial hazardous waste
- Compliance with prescribed regulatory norms which in turn avert the risk of closure on account of violation of rules
- It reduces the illegal disposal of hazardous waste
- Possibility for recovery of material can be researched at common site.
- The management of wastes is relatively easier & economically viable at common facility.
- Cost of environmental monitoring is less at common facility
- Reduced environmental liability due to captive storage of hazardous waste in the premises of industries
- Better occupational health and safety at individual industry level
- Prevention of natural resource contamination thereby improving overall environmental status of the region
- Helps in scientific secured disposal of the Hazardous waste in Karnataka supplementing already operating facilities in the Southern Karnataka.
- Helps industries for timely disposal of the Hazardous waste in a common facility.
- Improvement of social health and sanitation level.
- Generation of organized employment

8.1 Improvement in the Physical Infrastructure

The proposed project is expected to yield a positive impact on the socio economic environment. It helps sustain the development of industrial area and other physical infrastructural facilities.

The main advantage of the proposed project is direct employment generation

(i) Absorbs rural labour and unskilled workers (in addition to semi-skilled and some skilled)
(ii) Provides opportunity for seasonal employment thereby supplementing workers' income from farming
(iii) Permits participation of women workers both during construction and operation phase.

Additionally it is estimated that good number of jobs will be created as an indirect employment opportunities at local/regional level due to contractual, marketing and associated jobs directly with the project. The other related employment due to transportation requirement, supply of essential items and services to the project site and other community services will be plenty. Involvement of unskilled labour requirement will be on continuous basis depending on the requirement of contractor at site. A major part of this labour force will be hired from nearby places.

8.2 Other Tangible Benefits

- Cultural, recreation and aesthetic facilities will also improve
- Improvement in communication, transport, education, community development and medical facilities
- Change in employment and income opportunity
- The State Government will also benefit from the proposed project, through increased revenue

CHAPTER 9

ENVIRONMENTAL MANAGEMENT PLAN

9.0 Introduction

Mitigation measures at the source level and an overall Management Plan at the site level are proposed so as to minimize the impact of pollution and related effects on the surrounding environment.

The construction phase impacts are mostly short term, restricted to the plot area and not envisaged on the larger scale. In the operational phase the environmental impacts are due to continuous operation of the Incinerator. Hence, the emphasis in the Environment Management Plan (EMP) is to minimize such impacts.

The emphasis on the EMP development is on the following:

- Mitigation measures for each of the activities causing the environmental impact;
- Monitoring plans for checking activities and environmental parameters and Monitoring responsibilities;
- Role responsibilities and resource allocation for monitoring.

Table 9.1: Environmental Management Plan during Construction phase			
Sl No	**Components**	**Potential impacts identified**	**Suggested management plan**
1	Land use	No significant change in the topography of the site	• Excavated soil to be preserved in stockpiles • Movement and parking of heavy machinery and other vehicles will be restricted to identified routes and areas in order to limit soil compaction • In order to channel surface runoff, proper drainage system will be provided • Construction footprint will be well defined and restricted to within the site boundary
2	Soil quality	• Run off during monsoons and soil erosion	Soil Erosion control • Avoid Excavation works during monsoons. • bunds to be provided around the storage areas for excavated soil and other construction material; • Excavated materials will be used for backfilling • Segregate construction waste and facilitate their reuse to the extent possible; • Empty containers of paints, solvents, adhesives and sealants to be sold to authorized vendors.
3	Ambient air quality	• Fugitive emissions from excavated soil during site levelling operations • Dust generation during movement of construction vehicles on unpaved roads • Emissions from construction	• Limited vehicular movement will be permitted • Vehicle speeds on unpaved roads will be restricted to 25 kmph • Haul trucks will be covered with suitable covering material like tarpaulin sheets to prevent fugitive emissions during transportation of construction materials. • Periodic maintenance of construction equipment will be undertaken to minimize exhaust emissions;

		equipments, vehicles • Improper handling and storage of construction material	• Proper housekeeping of the area to be maintained to remove dirt/debris from the site
4	Ambient noise quality	• Noise due to Construction activities (such as excavation, grading, erecting equipment, piling, etc.) • Movement of vehicles • Occupational noise hazard	• The construction areas to be provided with sheet barriers or temporary walls along the boundary close to any habitations; • Provide acoustic enclosures and noise barriers in areas of high noise generating sources; • High noise generating activity will be permitted during day time only; • Regular maintenance of vehicles and repair of its equipment/ machinery to be undertaken; • Mobile noise sources such as cranes, earth moving equipment and heavy goods vehicles (HGVs) to be routed in manner that there is minimum disturbance to nearby habitation. • Diesel generators should be provided with acoustic enclosures • Construction machinery and vehicles should be well maintained and idling of equipment or vehicles when not in use should be avoided; • Construction workers working near high noise generation will be provided with ear plugs/ ear muffs to limit exposure to occupational hazards.
5	Water quality	• Potential run-off from site and percolation of used oil and grease generated from the vehicles • Potential water wastage during	• Excavation will be avoided during monsoon season; • Vehicle Maintenance and related activities will not be undertaken at site to avoid any oil spill/leaks; • Arrangements for septic tank-soak pits will be provided for disposal of sewage

		construction • Disposal of sewage from labour toilets during construction phase • Contamination of surface and groundwater resources	• An impervious cover will be provided over storm water drain to prevent the surface runoff carrying the construction waste materials/ other pollutants to enter the drain.
6	Socio economics	• Noise generation from construction equipments, machinery and construction vehicles • Potential accumulation of water leading to mosquito breeding areas and other vector-borne diseases • Marginal positive impact in terms of avenues for local shops, small eateries, etc.	• Adequate drainage inside the project facility will be provided so that water does not become stagnant or get collected in adjoining areas; • All high noise generating activity will be permitted during daytime only to ensure minimal disturbance to the nearby residents • Workers from nearby villages will be engaged in construction activities as per their skill set. • Workers will be briefed about general conduct and behavior while interacting with local community; • Proper fencing will be provided around construction site; • Security Personnel will be appointed to restrict entry of unwanted people to the site
7	Occupational Health and Safety	• Injury due to improper handling, operation and execution • Trip and fall, inadequate fall safe arrangements • Exposure to hazardous substances	• The construction staff and contractors involved in the construction activities will be trained on the necessary precaution and safety practices prior to commencement of construction activity; • The necessary safety measures will be taken up before and during the construction activities for all electrical driven machinery; • All required Personal Protection Equipment will be used by the workers at site and their use to be supervised; • Safety harness will be ensured for workers while working at

			heights; • All works related to working at heights will be undertaken only during the daytime when sufficient sunlight is available; • Use of temporary fall protection measures in scaffolds and out edges of elevated work surfaces, such as hand rails and toe boards to prevent materials from being dislodged will be done; • Workers will be provided with required PPEs to be used at site; • Proper signage will be provided in places of construction areas;
8	Ecology	• Removal of flora at site due to clearing of vegetation • Small mammals might be affected	• No vegetation will be removed from area outside the project site boundary • Minimum levels of noise during construction activities shall be maintained as well as illumination and night operations will be restricted to avoid adverse impacts on habitat of fauna.

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Table 9.2: Environmental Management Plan during Operation phase

Sl No	Components	Potential impacts identified	Suggested mitigation measures
1	Ambient air quality	• Vehicular emissions • Particulates and other emissions from incinerator • Emissions from DG set • Odour nuisance	• Adequate stack height for DG sets will be maintained at as per norms prescribed by CPCB • Internal roads will be concreted / asphalted to reduce dust emissions; • The waste carrying vehicle will have permanent enclosure to ensure that there is no spillages • Speed restriction will be followed • Thick green belt will be provided along the internal roads and plant boundary which will limit the spread of dust and odour;
2	Odour management	Number of sources of odour	• Maintaining proper air and moisture in the storage sheds • Quick disposal by incineration of odourous hazardous waste

	plan	generation which exist in site	without storing the same for a longer duration. • The emission from incinerator is scrubbed to ensure that odourous compounds if any are controlled • Dilution of odorant by odour counteraction or neutralize by spraying Ecosorb (organic and biodegradable chemical) around odour generation areas at regular intervals
3	Leachate management	• Contamination of soil due to leachate percolation	• The hazardous waste received at site will be stored in the storage sheds over rakes with proper impervious flooring and lining. • The spillages if any will be collected in an impervious pit inside the shed and taken for incineration along with the solid hazardous waste • Ensure that the surface runoff will not enter the hazardous waste storage area. The storage area floor level will be 150 mm above the normal ground level at site. • Spillages if any during loading and unloading of hazardous waste will be immediately collected by mopping using mop or cotton waste and this mopped material will be collected separately and incinerated.
4	Ambient noise quality	• Potential increase in noise levels in adjoining areas due operating equipments such as shredders, DG sets, any rotating equipment • Increased noise levels on due to movement of vehicles	• Acoustic enclosures, rubber paddings and linings will be provided for all noise producing equipments such as Incinerator, DG sets etc. • Proper maintenance of machineries • Working hours of the workers employed in high noise areas will be rotated; • Earplugs/muffs, or other hearing protective wear will be provided to those working very close to the noise generating machinery; • Periodic monitoring of noise levels on site and at nearby receptors

			will be carried out to ensure compliance with Noise Pollution (Regulation & Control) Rules 2000.
5	Water quality	• Fresh water demand of the project • Unplanned disposal of domestic sewage • Inadequate management of storm water • Leachate generation	• The process effluent from Scrubber bleed will be generated. It will be recycled when the scrubbed liquid requires disposal it will be taken for treatment in the ETP. • Domestic Effluent will be treated in septic tank and disposed in soak pit. • The effluent from floor washings, workshop etc. will be collected, treated in ETP and used for greenbelt within the premises. • Provisions will be made for rainwater harvesting. • Storm water drainage will be fitted with screens and filters to avoid contaminated runoff water getting mixed with the rainwater • Quality of groundwater should be monitored and analyzed for parameters prescribed in IS 10500 standards.
6	Socio economics	• Disturbance to community due to increased noise levels, odour, air emissions and traffic • More employment opportunities • Improve aesthetics of area	• Good Waste Handling practices will be implemented which will greatly reduce foul smell and reduce impact from odours. • Vehicles/ trucks operations will be restricted to day time • Job opportunities to local residents during construction and operation phase. • Green belt development and avenue plantations to improve aesthetics
7	Ecology	• Disturbance to local birds and small mammals in the adjoining areas	• A green belt will be developed along the periphery of the proposed project which will limit noise reaching outside the project boundary • Native species and healthy seedlings will be planted • No activities shall be planned in the green buffer other than approach/ service road

			• Attempts will be made to ensure that all open spaces, where tree plantation may not be possible, will be covered with shrubs and grass to prevent erosion of topsoil

9.3 Environmental Monitoring Plan

Details of Environmental Monitoring Plan are dealt in detail in the Chapter – 6.

9.4 Environmental management cell

For day to day management at the Incinerator Facility, operation and maintenance of pollution control systems will be overseen by the Project Manager. He will co-ordinate with the outsourced monitoring agency for monitoring the environmental aspects. The Project Manager will be supported by a qualified and competent EHS Officer.

9.5 Responsibilities of the Project manager and EHS officer

- Implementation of EMP;
- Public relations and information dissemination;
- Monitoring and Evaluation of pollution control systems;
- Insure funding requirement for operation and maintenance of Pollution control systems and monitoring.

9.6 Environmental Management System & OSHAS

The Gadag Envirotech Private Limited will adopt an environmental management system (EMS) in line with ISO 14001 (2015) and OSHAS ISO 18001 (2007) requirement. It will also get accredited under the system. Thereby it will strive for continual improvement in complying with statutory requirement and beyond.
Following components are to be taken up to establish an EMS:

- Organizational Commitment;
- Environmental Policy;
- Environmental Management Plan;
- Objectives and Targets;
- Public Consultation and grievances redress of people in the vicinity;
- Documentation;
- Responsibilities and Reporting Structure;
- Training; and
- Environmental Review Audits.

CHAPTER 10

SPECIFIC ToRs ISSUED BY EAC

10.0 PROTOCOL FOR PERFORMANCE EVALUATION AND MONITORING OF THE COMMON HAZARDOUS WASTE TREATMENT STORAGE AND DISPOSAL FACILITIES INCLUDING COMMON HAZARDOUS WASTE INCINERATORS PUBLISHED BY CPCB,2010.

Rules and the guidelines applicable for development and operation of the common hazardous waste treatment, storage and disposal facilities:

Environmental Impact Assessment Notification S.O.1533 (E) dated 14 September 2006:

According to the Environmental Impact Assessment **(**EIA) Notification dated 14 September 2006, establishment of an integrated facility having incineration & landfill or incineration alone requires Environmental Clearance from the Ministry of Environment & Forests (MoEF). Since the proposed facility is standalone Hazardous waste Incineration project it requires Environmental Clearance from MoEF.

10.1 The Hazardous and Other Wastes (Management, Handling & Transboundary Movement) Rules, 2016:

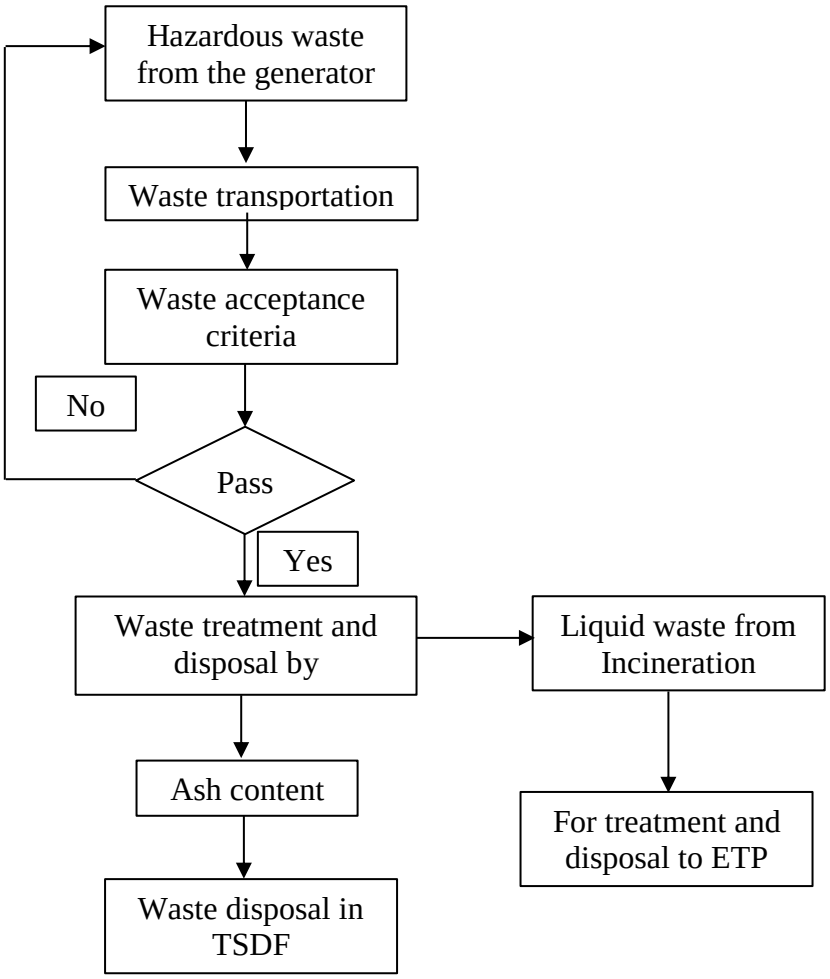
In the ToR it is mentioned to address on the conformity of site to the stipulation as made in the Hazardous and Other Wastes (Management, Handling & Transboundary Movement) Rules, 2016 (HWM Rules) and will have a complete chapter indicating conformity to the said rules.

In the HWM Rules, there is no specific stipulation with respect to siting guidelines for establishing Incinerator facility. However, in the chapter IV rule 16 of the said rules mentions about the common facility for TSDF. In conformity with the said Rule the following are the compliances.

1. The site for the facility is allotted by a Single window agency of Government of Karnataka in the designated industrial area at Gadag. The relevant records are in Annexure III.
2. The guidelines for Common Hazardous Waste Incineration published by CPCB during 2005 is followed for conceptualizing the layout, technology, transportation of hazardous waste, storage of hazardous waste, basic laboratory facilities, pollution control systems etc.,

3. The facility will be operated scientifically in an environmentally sound system following the standard operating procedures issued by CPCB.
4. The statutory records and returns to be filed in prescribed forms to the SPCB shall be submitted within the prescribed time limits.
5. The facility will transport the hazardous waste in accordance with the provisions of the HW Rules, Motor Vehicles act, 1988, Guidelines issued by CPCB and circulars issued by KSPCB. During transportation, manifestation prescribed will be followed for movement of waste.
6. Before commissioning the plant, authorisation under HW Rules will be obtained from KSPCB.
7. If any accidents occur during transportation or during incineration the same will be reported immediately to KSPCB and necessary ameliorative actions will be taken.
8. The company will be responsible for any environmental damage and will be liable to pay financial penalties as levied for any violations of the provisions under the rule.
9. The facility will accept only incinerable waste as categorised under the schedule to the HW Rules.

10.2 Procedure followed for Waste Acceptance and Disposal by the Common Hazardous Waste Treatment, Storage and Disposal Facility Operator



Protocol for Performance Evaluation of Common Hazardous Waste TSDF and Common Hazardous Waste Incinerator will be followed and information will be submitted to KSPCB before commissioning and whenever there is any change in the information provided earlier.

Gaseous Emission Norms for Common Hazardous Waste Incinerators notified under Environment (Protection) Act, 1986 as Environment (Protection) Fifth Amendment Rules, 2008 dated 26 June 2008 as under will be followed.

Air emission			
Common Hazardous Waste Incinerator	Parameters	Limiting concentration in mg/Nm^3 unless stated	Sampling duration in minutes unless stated
	Particulate matter	50	30
	Hcl	50	30

	SO_2	200	30
	CO	100	30
		50	24 hours
	Total organic carbon	20	30
	HF	4	30
	NO_X (NO and NO_2 expressed as NO_2)	400	30
	Total dioxins and furans	0.1 ng TEQ/Nm^3	30
	Cd + Th + their compounds	0.05	8 hours
	Hg and its compounds	0.05	2 Hours
	Sb+ As+ Pb+ Co+ Cr+Cu+ Mn+ Ni+ V+ their compounds	0.50	2 hours

Notes:

- All monitored values shall be corrected to 11 % oxygen on dry basis.
- The CO2 concentration in tail gas shall not be less than 7 %.
- In case, halogenated organic waste is less than 1 % by weight in input waste, all the facilities in twin chamber incinerators shall be designed to achieve a minimum temperature of 950 °C in secondary combustion chamber and with a gas residence time in secondary combustion chamber not less than 2 (two) seconds.
- In case, halogenated organic waste is more than 1 % by weight in input waste, waste shall be incinerated only in twin chamber incinerators and all the facilities shall be designed to achieve a minimum temperature of 1100° C in secondary combustion chamber with a gas residence time in secondary combustion chamber not less than 2 (two) seconds.
- Incineration plant shall be operated (combustion chambers) with such temperatures, retention time and turbulence, as to achieve Total Organic Carbon (TOC) content in the slag and bottom ashes less than 3 %, or their loss on ignition is less than 5 % of the dry weight.

10.3 Guidelines for storage of incinerable hazardous waste

The revised guidelines for storage and handling of incinerable hazardous waste are suggested as follows:

A) Storage area (Storage shed)

- Flammable, ignitable, reactive and non-compatible wastes will be stored separately and will not be stored in the same storage shed
- Storage area may consist of different sheds for storing different kinds of incinerable hazardous wastes and sheds will be provided with suitable openings
- Adequate storage capacity will be provided in the premises
- Storage area will be designed to withstand the load of material stocked and any damage from the material spillage
- Storage area will be provided with the flameproof electrical fittings
- Heat detection system will be provided in the sheds. Adequate firefighting systems will be provided for the storage area, along with the areas in the facility
- At least 15 meter distance between the storage sheds will be provided.
- Loading and unloading of wastes in storage sheds will be done under the supervision of the well trained and experienced staff.
- Fire break of at least 4 meter between two blocks of stacked drums will be provided in the storage shed. One block of drum will not exceed 300 MT of waste.
- Minimum of 1 meter clear space will be left between two adjacent rows of pallets in pair for inspection
- The storage and handling will have at least two routes to escape in the event of any fire in the area.
- Doors and approaches of the storage area will be of suitable sizes for entry of fork lift and firefighting equipment
- The exhaust of the vehicles used for the purpose of handling, lifting and transportation within the facility such as forklifts or trucks will be fitted with the approved type of spark arrester.
- In order to have appropriate measures to prevent percolation of spills, leaks etc. to the soil and ground water, the storage area will be provided with concrete floor or steel sheet depending on the characteristics of waste handled and the floor must be structurally sound and chemically compatible with wastes
- Measures will be taken to prevent entry of runoff into the storage area. The Storage area will be designed in such a way that the floor level is at least 150 mm above the maximum flood level.
- The storage area floor will be provided with secondary containment such as proper slopes as well as collection pit so as to collect wash water and the leakages/spills etc

- Storage yards will be provided with proper peripheral drainage system connected with the sump so as to collect any accidental spills in roads or within the storage yards as well as accidental flow due to firefighting

B) Storage drums/containers

- The container will be made or lined with the suitable material, which will not react with, or in other words compatible with the hazardous wastes proposed to be stored.
- The stacking of drums in the storage area will be restricted to three high on pallets (wooden frames). Necessary precautionary measures will be taken so as to avoid stack collapse.
- No drums will be opened in the storage sheds for sampling etc. and such activity will be done in designated places outside the storage areas;
- Drums containing wastes stored in the storage area will be labelled properly indicating mainly type, quantity, characteristics, source and date of storing etc.

C) Spillage/ leakage control measures

- The storage areas will be inspected daily for detecting any signs of leaks or deterioration if any. Leaking or deteriorated containers will be removed and ensured that such contents are transferred to a sound container.
- In case of spills / leaks/dry adsorbents/cotton will be used for cleaning instead of water.
- Proper slope with collection pits will be provided in the storage area so as to collect the spills/leakages.
- Storage areas will be provided with adequate number of spill kits at suitable locations. The spill kits should be provided with compatible sorbent material in adequate quantity.

D) Record keeping and maintenance

- Proper records with regard to the industry –wise type of waste received, characteristics as well as the location of the wastes that have been stored in the facility will be properly maintained.

E) Miscellaneous

- Smoking will be strictly prohibited in and around storage areas.
- Good housekeeping will be maintained in the storage areas.
- Sign boards with precautionary measures will be displayed at suitable locations.

- Necessary precautions will be taken during loading and unloading of liquid hazardous wastes.
- Storage area will be inspected regularly for spills and leaks, proper records will be maintained.
- Storage areas will be provided with proper ventilation to prevent volatile solvents or other low vapour pressure chemicals from direct exposure to sunlight.
- Liquid storage tanks will be properly dyked.
- Necessary emergency equipments and systems will be provided in the storage site.
- Hazardous waste received will be analysed and stored accordingly.
- Trained personnel will be provided with access to the storage site.
- Mock drill will be carried out and records of the same will be maintained.

Recommended storage time and the quantity of the incinerable hazardous waste:

Normal storage of incinerable hazardous waste at the incinerator site should be restricted to maximum of six months subject to obtaining of approvals as per Hazardous and Other Wastes (Management and Transboundary Movement) Amendment Rules, 2016and further amendments made thereof.

10.4 Hazard analysis and safety audit:

For every incinerator facility, a preliminary hazard analysis should be conducted. Safety Audit internally by the Operator every year & externally once in two years by a reputed expert agency should be carried out and same should be submitted to the SPCB/PCC. Such conditions should be stipulated by SPCBs while granting authorization under Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2008 to the incinerator operators.

10.5 Rules/Standards and the Guidelines Applicable for Common Hazardous Waste Treatment, Storage and Disposal Facilities & Common Hazardous Waste Incinerators

Rules/Standards applicable for TSDFs/hazardous waste incinerators:

1. Environmental Impact Assessment Notification S.O.1533 (E) dated 14 September 2006
2. Hazardous Waste (Management, Handling & Transboundary Movement) Rules 2008 notified on 24 September 2008;
3. Gaseous Emission Norms for Common Hazardous Waste Incinerators notified as Environment (Protection) Fifth Amendment Rules, 2008 dated 26 June 2008;

4. Norms for DG set, The Noise Pollution (Regulation and Control) Rules, 2000, Effluent Discharge norms, surface/ground water norms and Ambient Air Quality norms.
5. General standards for discharge of environmental pollutants Part –A: Effluents notified vide G.S.R. 422 (E) dated 19 May 1993 and published in the Gazette No. 174, dated 19 May 1993 under the Environment (Protection) Act, 1986 and rules made there under, shall also be applicable for disposal of leachate into sewage treatment plant, common effluent treatment plant, inland surface water bodies or coastal areas.

CHAPTER 11

SUMMARY AND CONCLUSIONS

11.0 Introduction

M/s. Gadag Envirotech Pvt. Ltd., intend to set up a Common Hazardous waste incineration facility of capacity 250 kg/hr at Plot No.125 of Karnataka Industrial Area Development Board's Gadag Industrial Area, Narasapura, Gadag – 582102, Karnataka State, India.The cost of the project is about Rs.2.5 crores. It is a small-scale unit. The industrial area is established on 5th January 2000.

11.1 Environmental Setting

The environmental setting of the proposed expansion is as follows:

- The proposed plant is located at about 5 km (aerial) from Gadag in South West direction
- There are no ecological sensitive locations and defence installations within 10 km radius
- The nearest village is Betageri rural at a distance of about 1.8 km in west direction from the site
- The nearest railway station is Gadag Railway Junction- 4.2 Kms towards North East and the nearest highway is Gadag – Bagalkot State Highway, SH-6 – 300 M towards East.
- Proposed plant site does not fall in any critically polluted areas as per the CPCB Notification

11.2 Proposed Project Details

The area of plant is about 1 acre. The incinerator capacity is 250 kg/hr. Incinerator is proposed with two chambers complying with the specifications prescribed by CPCB. The project activities will commence after obtaining Environment Clearance.

11.3 Resource requirement

1	Land	Plot area: 4,047 sq m (1 Acres)
2	Water	Source: KIADB, quantity 4 KLD **Operation phase:** • Domestic purpose – 800 LPD

		• Gardening – 1200 LPD • Scrubbing, floor and vehicle washing – 2000 LPD
3	Electricity	Source: KIADB • 50 HP • Backup power : 63 KVA D.G. set
4	Fuel	**Operation phase :** • For Incinerator: LDO/HSD- • For D.G. set, HSD : 12.6 litre/Hr
5	Man-power	18 Nos

11.4 Baseline Environmental Status

Primary baseline environmental monitoring studies were conducted during February to April - 2018.

Meteorological data

The summary of meteorological data of Gadag during the monitoring months is given in below table:

Months	Max. Temperature(°C)	Min. Temperature (°C)	Humidity %	Rainfall (mm)	Wind Speed Km/hr
February 2017	35	21	32	0	13.03
March 2017	38	23	33	6.6	11.5
April 2017	40	25	40	9.4	13.3

11.4.1 Ambient air quality

The concentrations of $PM_{2.5}$, PM_{10}, SO_2 and NO_2 are observed to be well within the NAAQ standards prescribed by Central Pollution Control Board (CPCB) for industrial and rural /residential zone**.**

Parameters	Units	February		March		April	
		Max	Min	Max	Min	Max	Min
SO_2	$\mu g/m^3$	8.1	5.1	7.8	5.3	10.5	6.3
NO_2	$\mu g/m^3$	14.9	11.3	14.1	10.1	15.6	11.4
PM_{10}	$\mu g/m^3$	73.6	65.4	68.9	63.2	78.8	56.8
$PM_{2.5}$	$\mu g/m^3$	34.8	30.1	34.6	30.1	38.3	25.4
O_3	$\mu g/m^3$	BDL	BDL	BDL	BDL	BDL	BDL

Lead (Pb),	$\mu g/m^3$	0.02	0.01	0.02	0.01	0.02	0.01
Carbon Monoxide (CO)	mg/m^3	ND	ND	ND	ND	ND	ND

11.4.2 Water Quality

Surface water

- Two surface water samples have been collected from Bhishma Lake and Betageri Pond. The physical, chemical and biological characterization is given in **Table-3.3 (a, b and c)**
- Both the sampling location waters fall into 'D' category as per the Primary Water Quality Criteria for various used laid down by Central Pollution Control Board.

Ground Water

The results for the parameters analysed for ground water samples are presented in **Table-3.2 (a, b and c)** and are compared with standards for drinking water as per IS: 10500-2012 "Specifications for Drinking Water"

- In total 5 water samples were collected from different sources around the project site within the periphery of 7 km.
- The water quality is within the permissible limits.

11.4.3 Soil Environment

- It has been observed that the pH of the soil quality ranged from 7.11 to 8.16 indicating that the soil is usually slightly alkaline to moderately alkaline in nature.
- The Electrical Conductivity was observed to be in the range of 201 micro mhos/ cm to476 micro mhos/ cm, with the maximum observed at S3 (Benakanakoppa) in the month of February.
- The Nitrogen values ranged between 68.9 kg/ha and 184 kg/ha.

11.4.4 Noise Level Survey

The noise level in the project area and at the monitored stations by and large are within the National noise standards prescribed for Industrial and Residential areas.

11.4.5 Flora and fauna studies

The area is rich with cultivated fields. Apparently, there are no rare and endangered plants, reptiles, mammals and insects listed in the study areas there are no forests or other protected areas. Flora and Fauna observed in the region include native tree species, domestic animals, retiles and birds.

11.4.6 Land Use Studies

The major portion of the study area falls under agricultural land use.

11.4.7 Socio-Economic Environment

Infrastructure facilities such as basic social services such as schools and hospitals, roads are all available at Gadag and other major talukas.

11.5 Anticipated Environmental Impacts and Mitigation Measures

The environmental impacts during construction and operation phases of the proposed project have been assessed and adequate management plan has been evolved to mitigate the impacts.
There are no major constructional activities involved in the proposed project.

The environmental impacts during the construction stage will be short term, temporary in nature and will be confined very close to project sites. The manpower required for these activities will be sourced from nearby villages.

11.5.1 Land Environment

Land is already categorized under industrial use and there will not be any change in land use. Land is located in Gadag Industrial Area, Narasapura, Gadag District. As there are no additional land acquisitions, using earmarked industrial area for the proposed project no proposal of land degradation activities, impact on land use are insignificant.

11.5.2 Air Environment

The AAQ levels for the monitored parameters are within the NAAQ limits. Hence, the AAQ levels after implementation of the proposed project will remain within the permissible limits.

All continuous sources of emissions such as DG sets and incinerator will be installed with adequate stack heights as per KSPCB/CPCB norms to ensure wider dispersion.
The emissions from the incinerator are scrubbed and the scrubbed waste is routed through the Effluent Treatment Plant. The treated water will be used for cooling tower water make up.

11.5.3 Water Environment

Water required for the project is sourced from KIADB.

The entire effluent generated from the project will be suitably treated in ETP and treated effluent will be used for cooling tower water make up. No impacts on the surface water quality of river or other streams are envisaged. Also, groundwater is not disturbed.

11.5.4 Effluent Management

The effluent (Scrubber effluent and floor wash) will be treated in ETP and excess will be reused. The domestic sewage shall be treated in be treated in Septic Tank and Soak pit.

11.5.5 Hazardous waste Management:

Hazardous waste generation is mainly used oil from the DG set and the incinerator ash it will be disposed to authorized preprocessor and to TSDF respectively.

11.5.6 Noise Environment

The major noise generating sources at the project site are DG sets and Incinerator. The predicted noise levels at the project premises are ranging in between 45.98 to 59.82 dB(A). It is seen from the monitoring results that the noise levels are well within the CPCB standards.

The equipments and machinery will be such that the sound pressure level in the work area will not exceed 85 dB(A). Personal Protective Equipment will be provided to workmen and their proper usage will be ensured for eardrum protection of the workers. The DG sets will be provided with acoustic control enclosures and the exhausts are provided with silencers. The nearest human habitations are located at about 1.8 km from the boundary in west direction and the cumulative noise impacts would be insignificant.

11.5.7 Biological Environment

No endangered, rare and threatened species are observed in the study areas. There is no ecologically sensitive area like National park or Sanctuaries or Biosphere Reserves within 10 km radius of the study area. Therefore, the impact of SO_2 and NO_x emissions on the surrounding agro-eco-system will be insignificant. It is expected that with adoption of these mitigatory measures, the impact due to operation of the proposed project will be minimal on the terrestrial ecosystem.

11.6 Environmental Monitoring Program

A detailed project monitoring in respect of air, water, soil, process emissions, occupational noise, etc. to assess the changes has been covered during various phases of project. Details of Environmental Monitoring Program are provided in Table 6.1:

11.7 Risk Analysis

The principal objective of the risk assessment study is to identify and quantify the major hazards and the risk associated with various operations of the proposed project, which may lead to emergency consequences (disasters) affecting the public safety and health.

All necessary measures to minimize the risk due to the proposed project will be taken during design stage and also during operation period viz, Fire & safety control measures, Emergency preparedness plan, Disaster Management plan, etc.

11.8 Project Benefits

The project benefits are detailed in chapter – 8.

11.9 Environmental Management Plan

The Environmental Management Plan (EMP) is required to ensure sustainable development in the area of the proposed project site. Hence, it needs proper Environmental Management
Plan (EMP) to meet these objectives. The purpose of the Environmental Management Plan is to minimize the potential environmental impacts from the project and to mitigate the adverse impacts. Details of Environment Management Plan are given in chapter 9.

11.10 Project cost estimate

The costing for the plant has been done based on land cost with respective civil, building and plant and machineries.

Table 11.1: Cost of the project

Sl No	Description	Amount in Rs. Lakhs
1	Land	15
2	Construction	40
3	Plant and Machinery	195
	TOTAL	**250**

CHAPTER 12

DISCLOSURE OF CONSULTANTS ENGAGED

Address: M/s. SAMRAKSHAN
F- 4, I Floor, Swastik Manandi Arcade,
S C Road, Sheshadripuram,
Bangalore - 560 020.
Ph.: 080-41466009
E mail id – info@samrakshan.co.in, samrakshanblr@gmail.com

12.0 Introductory Profile

SAMRAKSHAN is a Bangalore; Karnataka based Environmental Engineering Consultancy Company. SAMRAKSHAN is an off shoot of AQUATECH ENVIRO ENGINEERS, Bangalore. We are leading solutions providers of B2B solutions in the field of Environment since two decades. SAMRAKSHAN is a specialized solution provider, we serve varied industries like Distillery, Sugar, Fertilizers, Pharmaceuticals, Power generation, Service industries, Common waste disposal facilities etc.,

12.1 Professional Services Offered:

We under take works related to Pollution Control

- Environmental Impact Assessment studies
- Preparation of Environmental Management plan
- Design and execution of Effluent / wastewater and water treatment plants
- Air pollution control and management
- Solid and hazardous waste management
- Due-diligence studies
- Assists clients for implementation of conditions stipulated in the Environmental Clearances, Consent to Establish and consent to operate issued by the Regulatory agencies
- Assist clients in Environment related Project Management Consultancy
- Imparting training to the industries for Environment regulatory compliances
- Compliance report preparation
- We also undertake assisting clients in techno-legal issues before the Hon’ble High Court NGT and Supreme Court etc.,

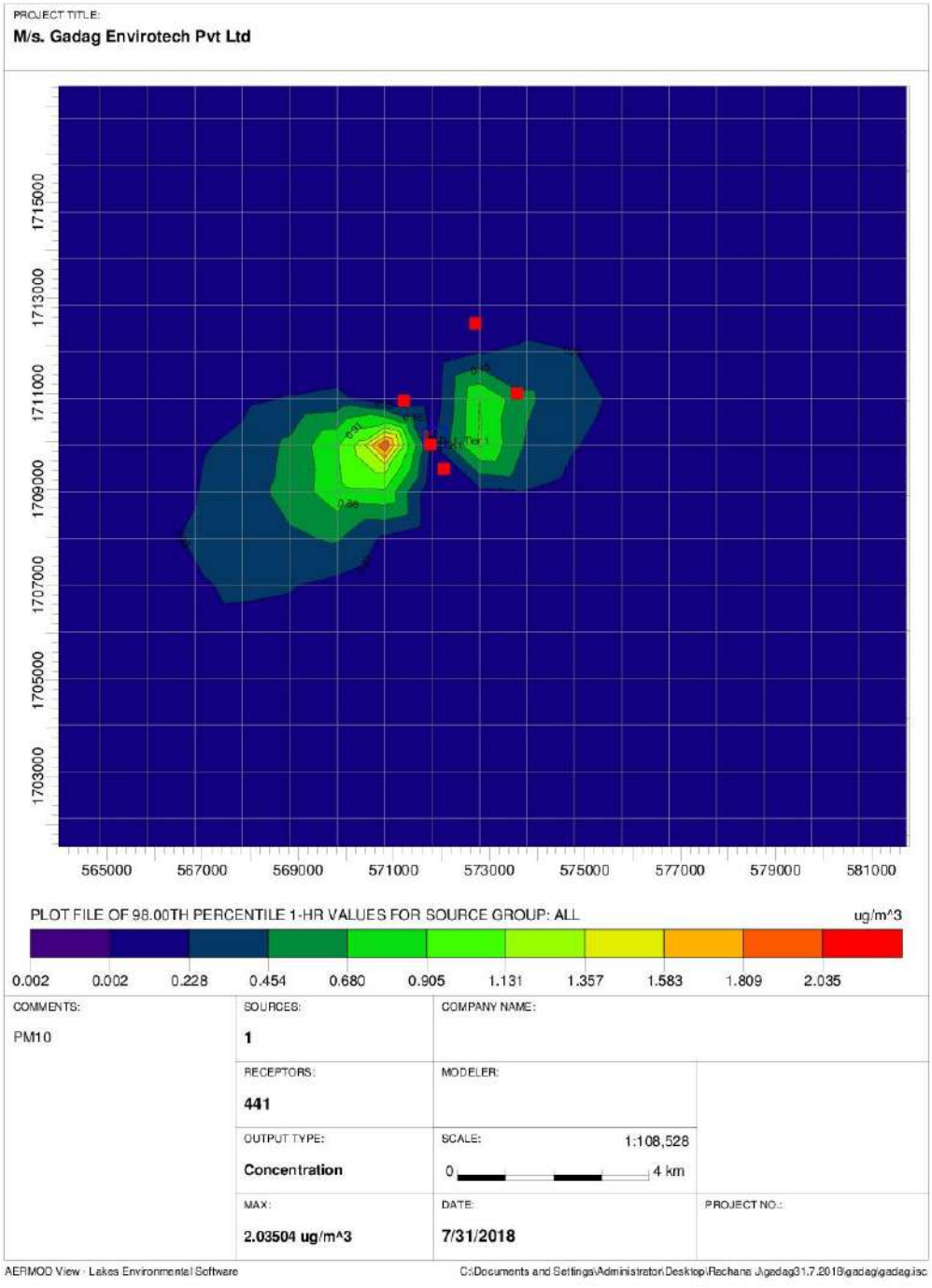
12.2 Key personnel of the organization:

Name	Qualifications	Designation	Experience
Mr. Nanda Kumar S	B E (Civil), PG Diploma in Ecology and Environment, FIE	Chief Executive Officer	37 Years at Karnataka State Pollution Control Board (Retired as CEO, KSPCB)
Dr. C T Puttaswamy	B E (Chem.,), M Tech (Env.,) Ph.D.,	Technical Advisor	20 Years' experience in industry, research and development, environmental consultancy and Teaching for graduate and postgraduate engineering courses.
Mr. Vasudevaiah		Technical Advisor	30 year experience in chemical, water and Waste Water, air samples analysis, as senior Chemist in KSPCB laboratory and retired from Public Health Institute.
Mr. B Ramaiah	B E (Civil)	Technical Advisor	35 Years of service at Karnataka State Pollution Control Board (Retired as MS, KSPCB)
Mr. G R Manjunath	B E (Mech.), M Tech (Env.,)	Technical Advisor	16 years industrial and environmental consultancy
Mr. Nandakishore	B E (Chem)	Technical Advisor	30 Years' experience in Pharmaceutical and related industries.
Mr. Channakesava	B E (Env.,)	Sr. Manager - Projects	15 Years in implementation of Water, Wastewater treatment plant from concept to commissioning
Mr. Hanumantha Raj Urs	M Sc (Env. Sce), PGDIS	Sr. Manager - Environment	12 Years' experience in environmental consultancy.
Mrs. Lakshmi L S	B E (Chem.,)	Chemical Engineer	8 Years' experience in environmental consultancy.
Mrs. Rohini S	B E (Env.)	Environmental Engineer	9 Years' experience in environmental consultancy.
Mr. Shreeshailacharya Badiger	B E (Chem.,)	Chemical Engineer	7 Years' experience in Pharmaceutical production and

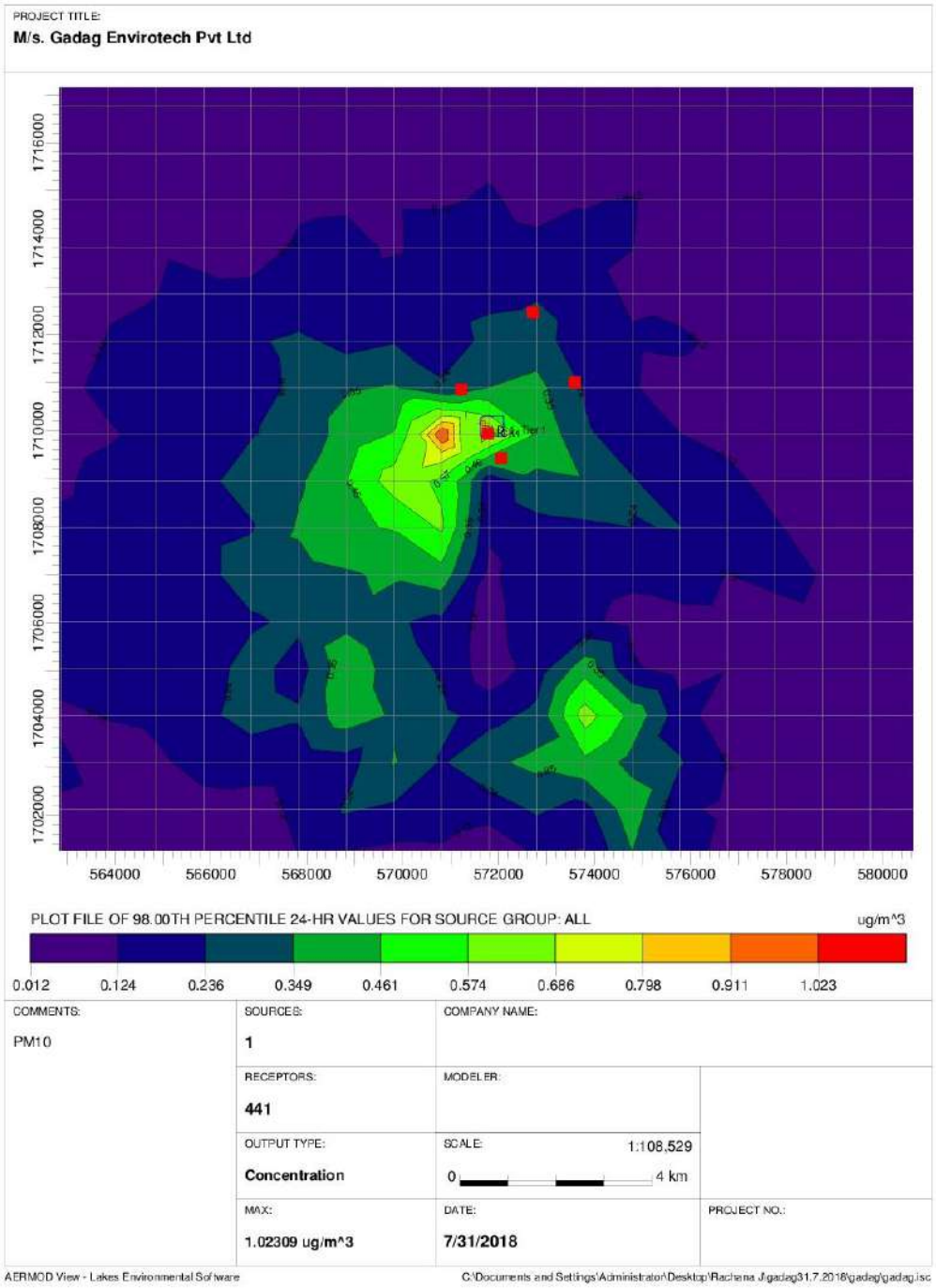
			consultancy.
Ms. Pooja M D	B E (Env.)	Environmental Engineer	3 Years' experience in environmental consultancy
Mrs. Rachana J	B E (Env.)	Environmental Engineer	1 Year experience in environmental consultancy
Mr. Santhosh	M A (Economic)	Admin and Logistic Manager	10 Years' experience in administration and logistics
Mr. Suresh	PUC	Project Assistant	4 years' experience.

Air modelling studies:

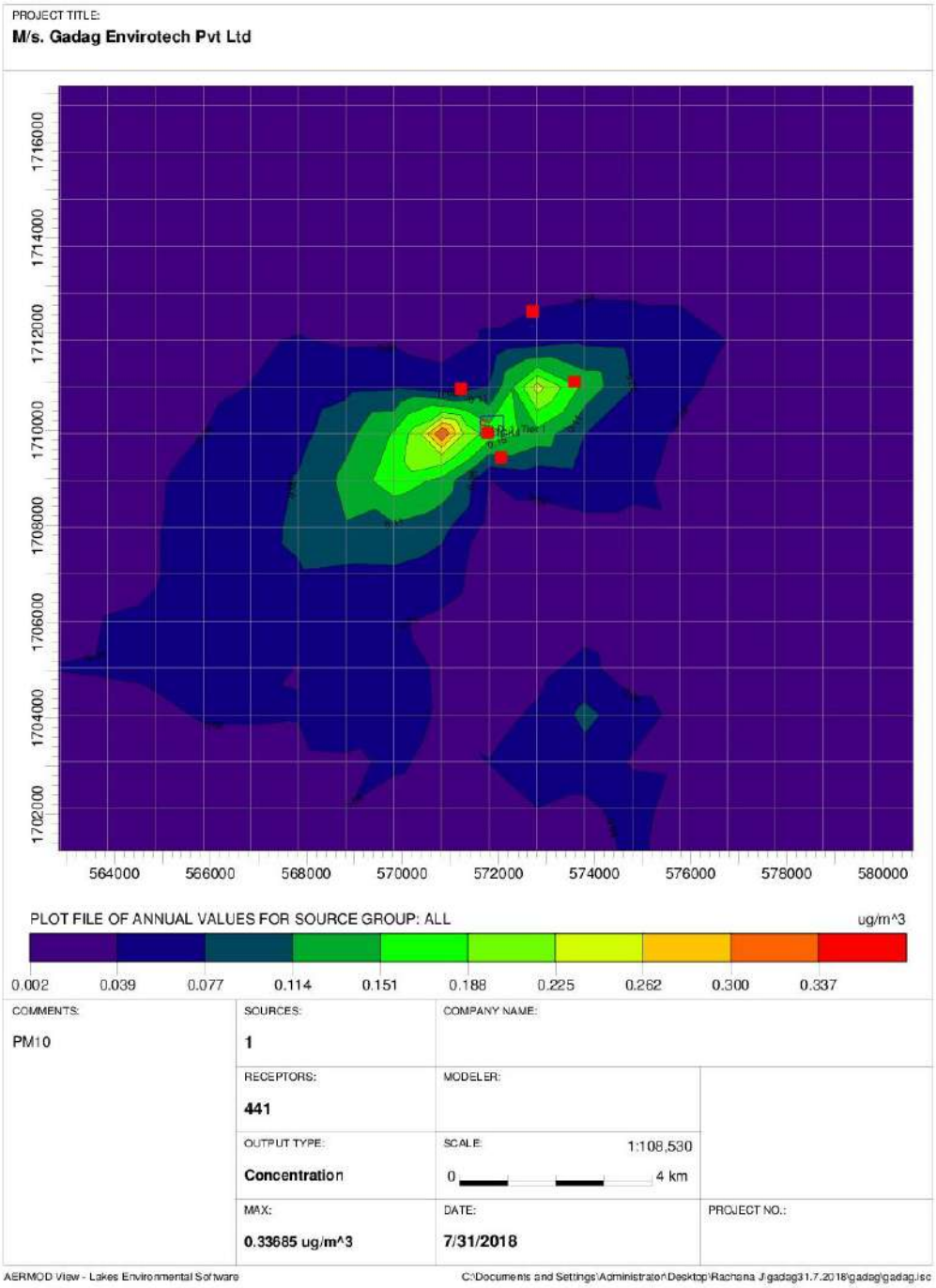
i) PM_{10} - 1st hour



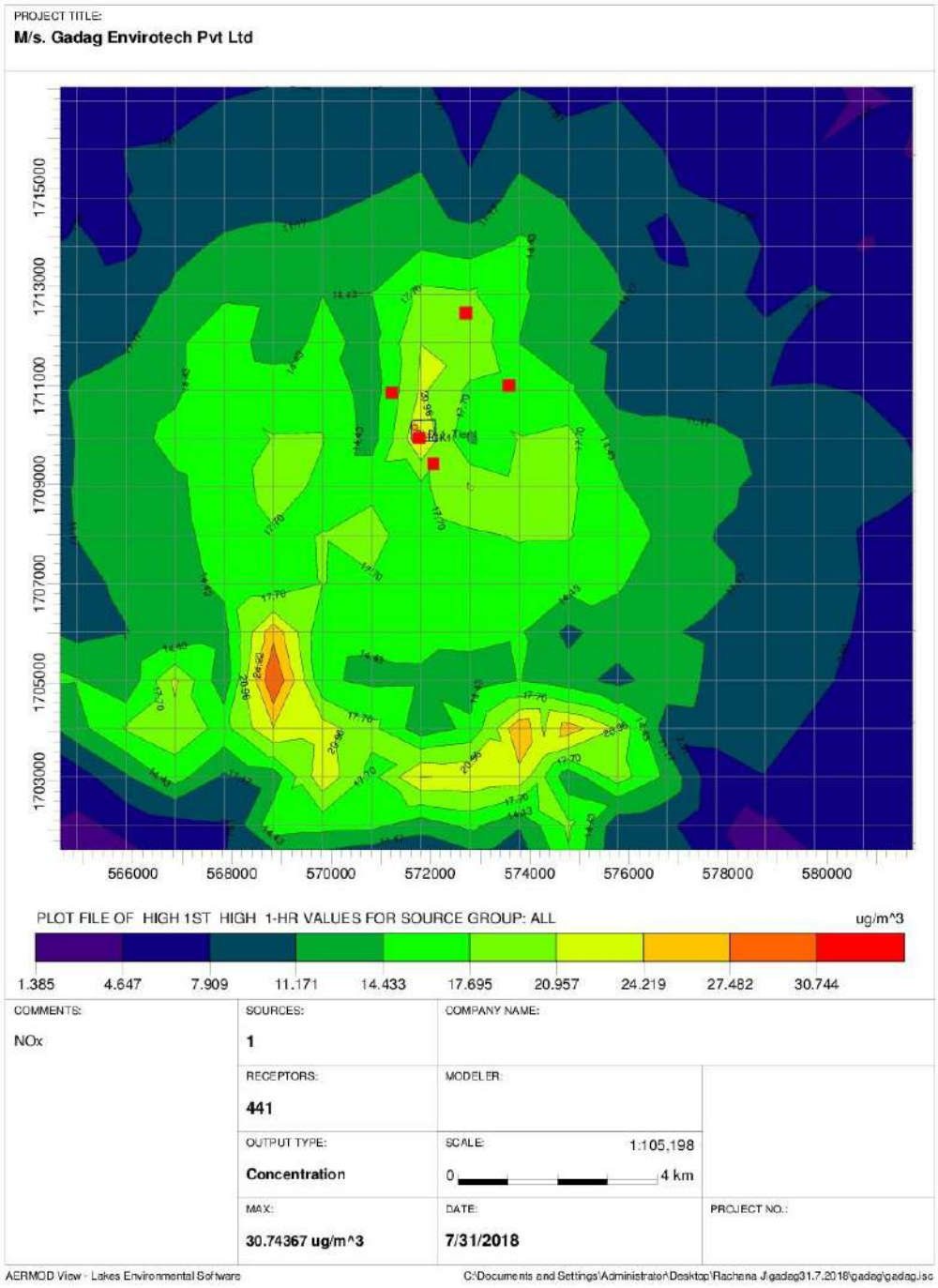
ii) PM_{10} - 24 hour



iii) PM_{10} – annual



i) NO_2 _ 1st hour



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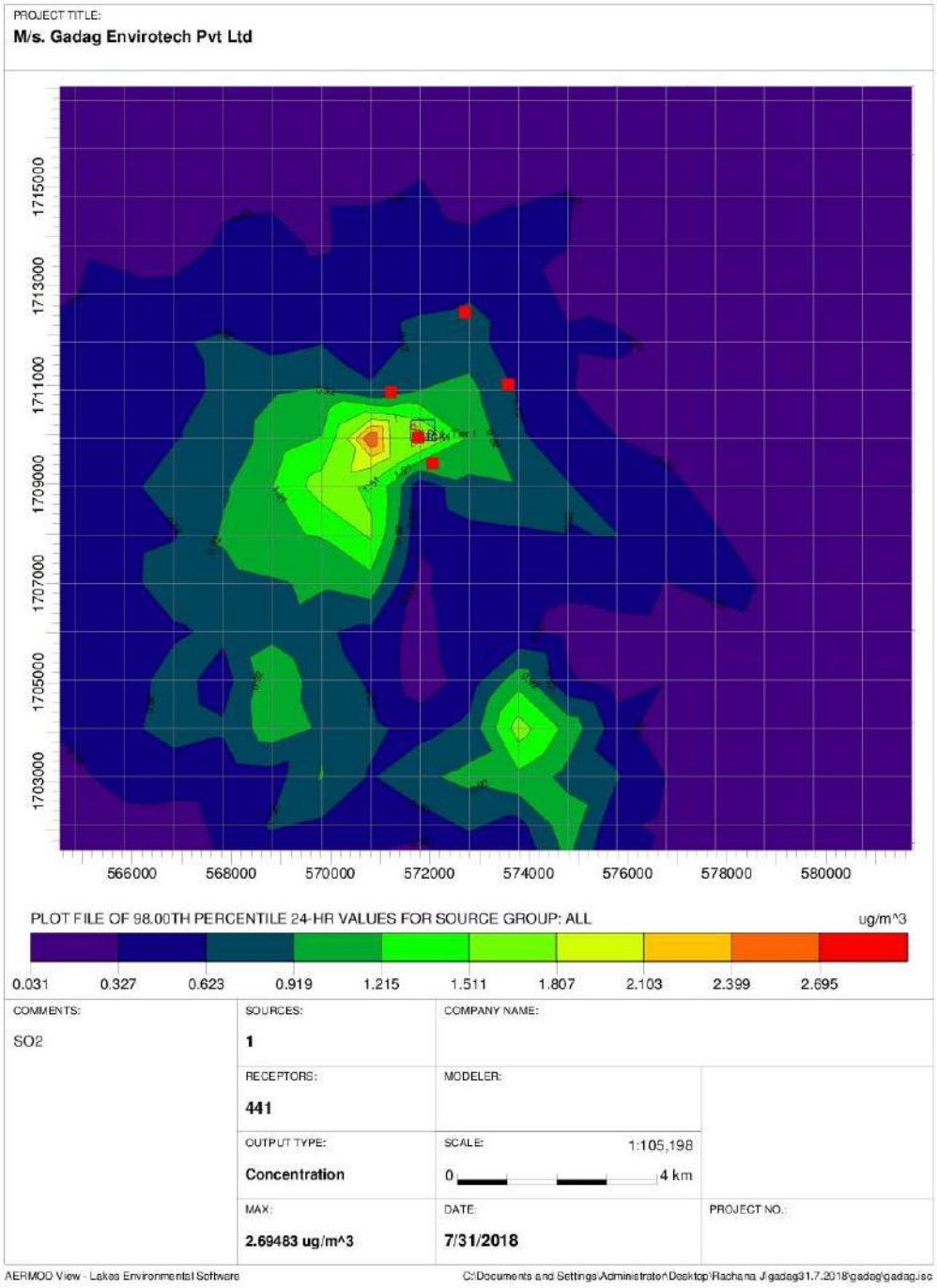
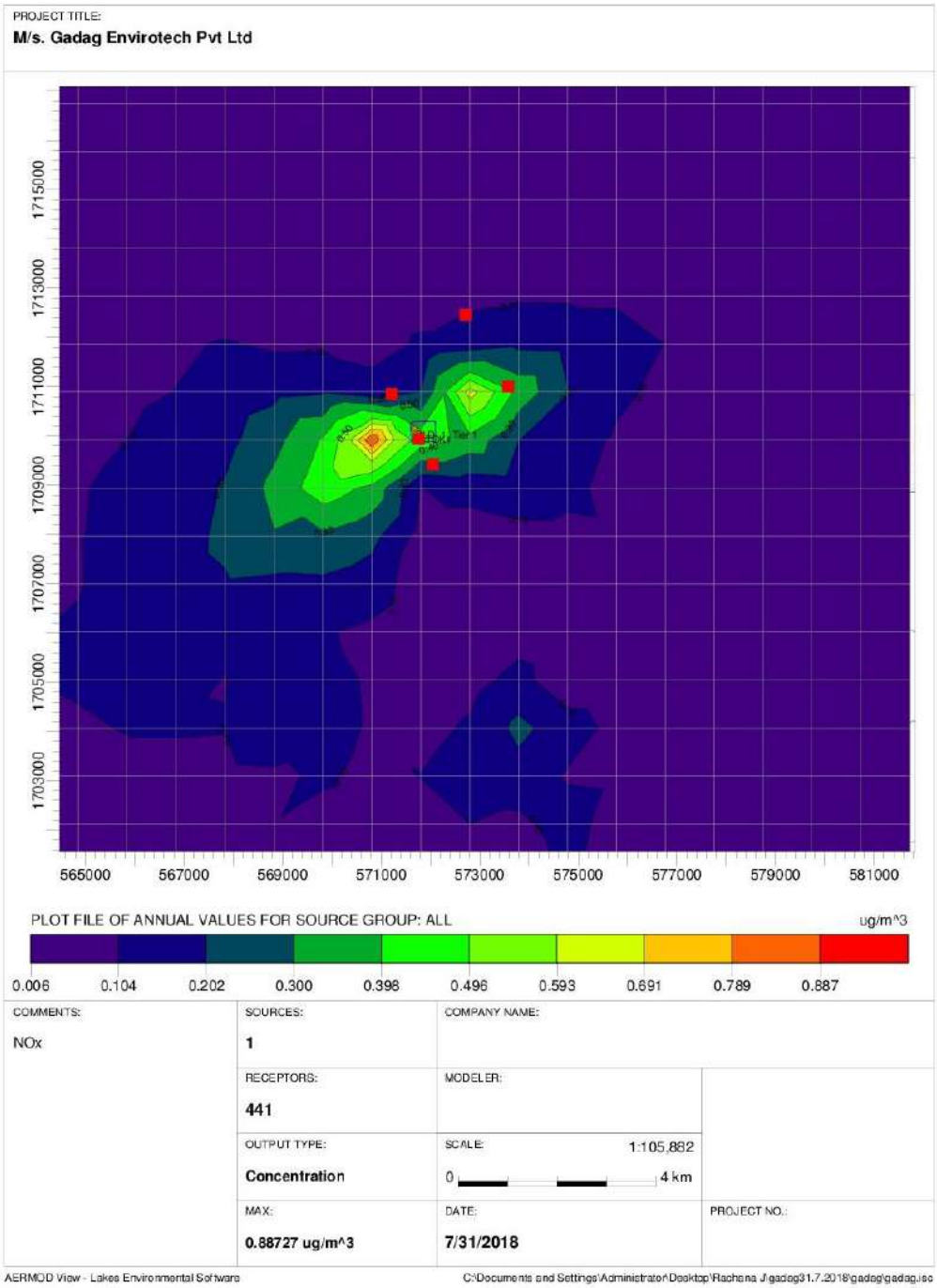
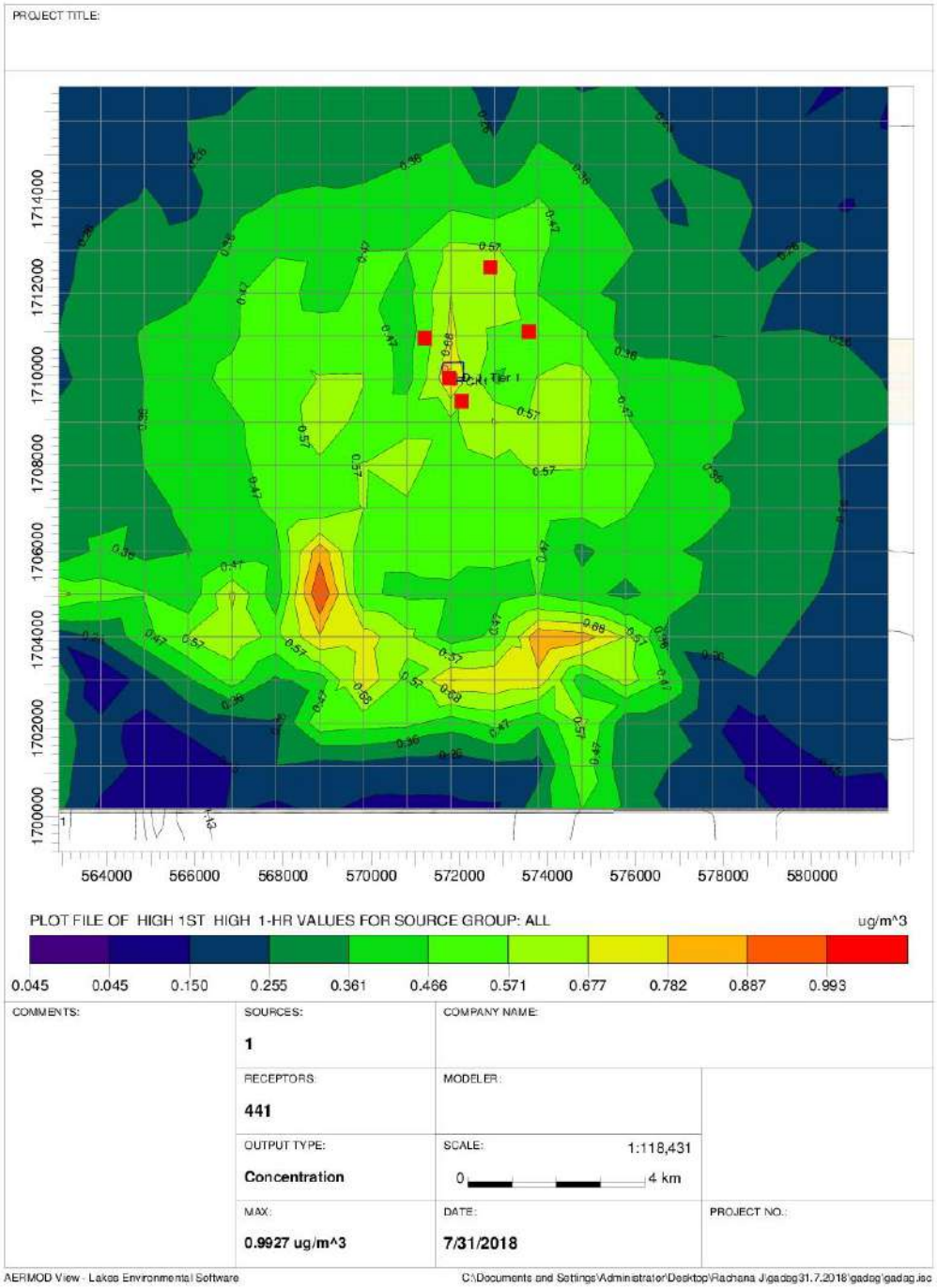


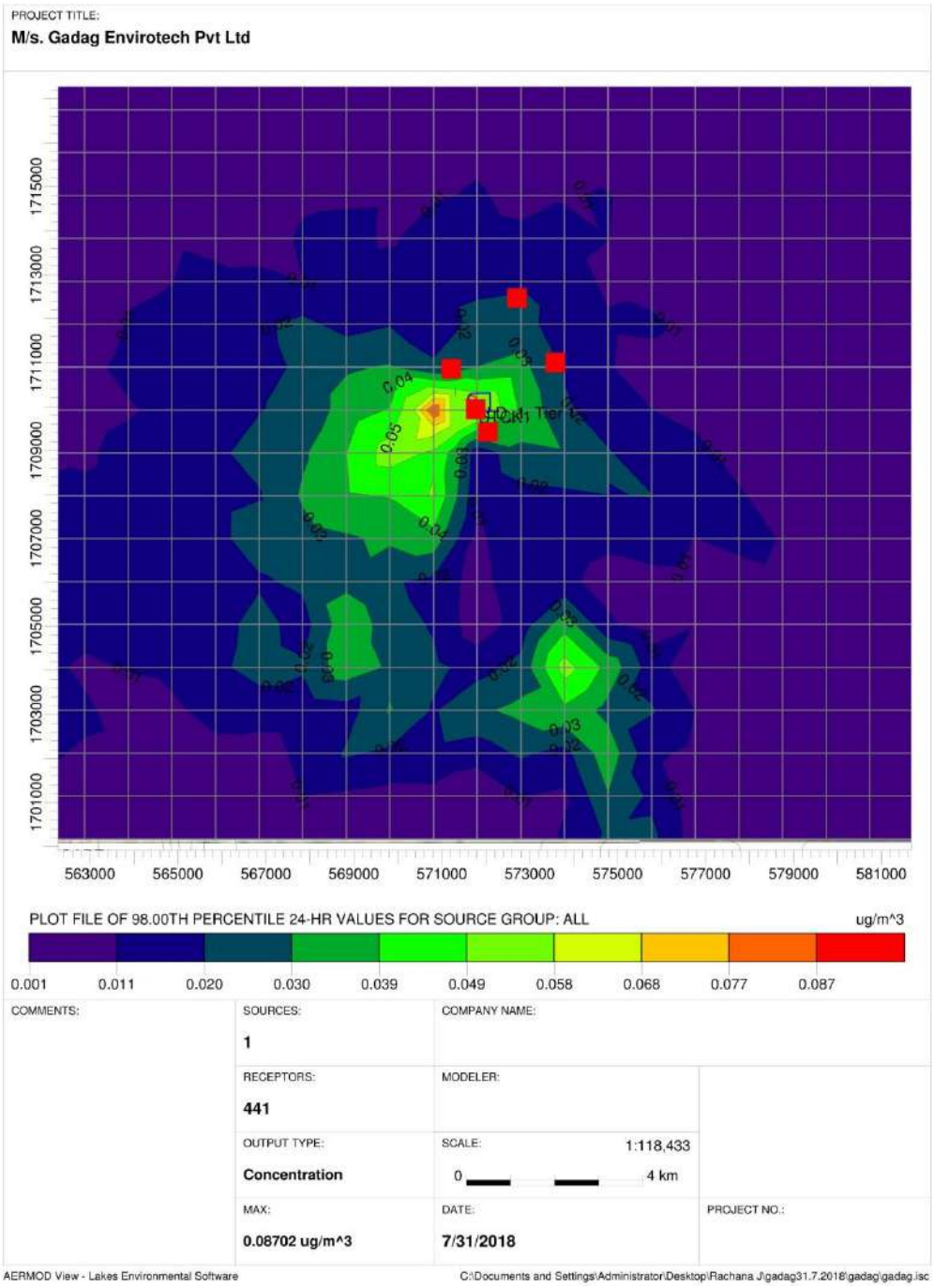
iii) NO_2 _ Annual



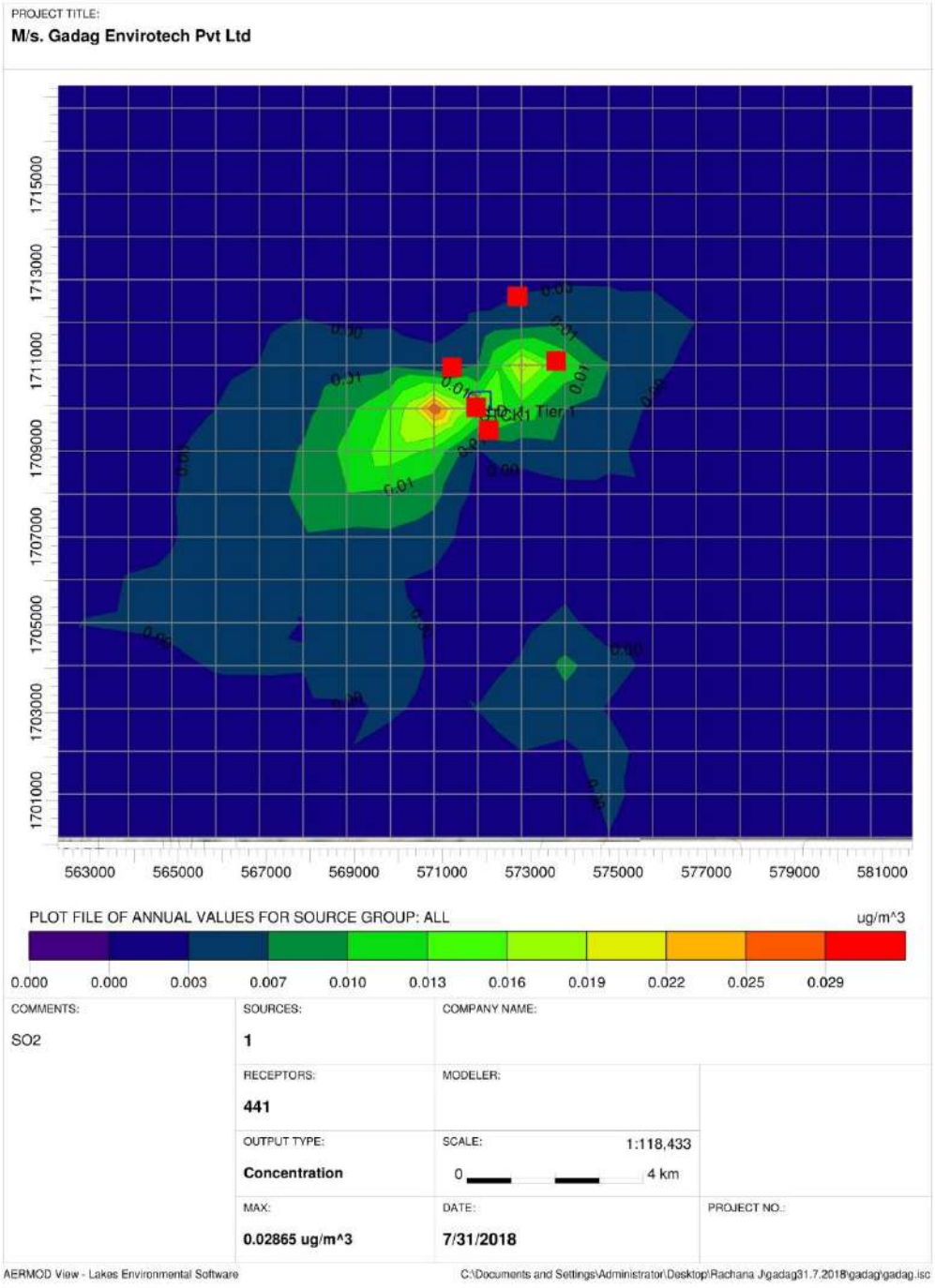
i) SO_2 1st hour



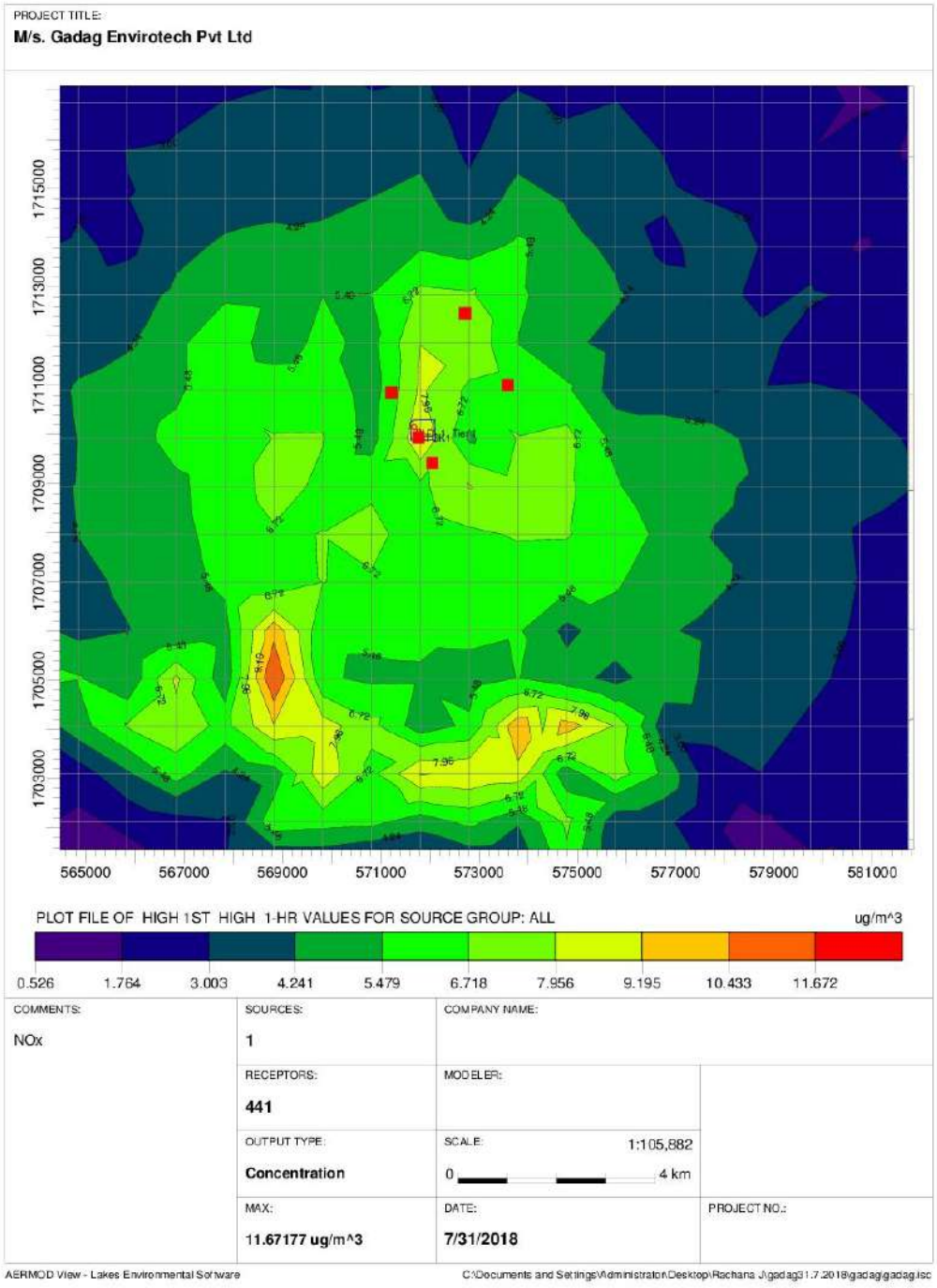
ii) SO_2 – 24 hour



iii) SO_2 – Annual



i) CO 1st hour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7/31/2018
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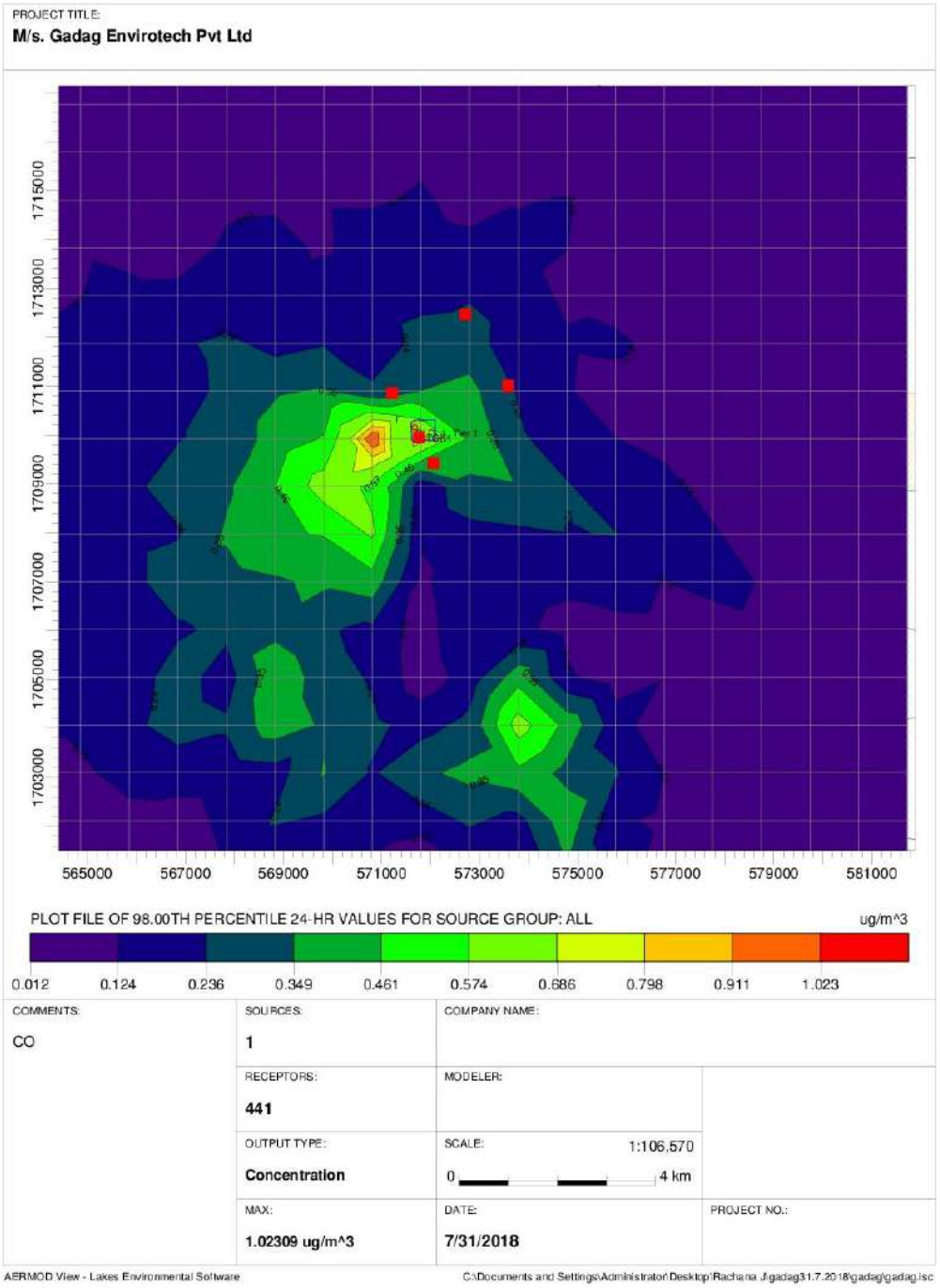
ii) CO – 24 hour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M/s. Gadag Envirotech Pvt Ltd
1715000
1713000
1711000
1709000
1707000
1705000
1703000
565000
567000
569000
571000
573000
575000
577000
579000
581000
PLOT FILE OF 98.00TH PERCENTILE 24-HR VALUES FOR SOURCE GROUP: ALL
ug/m^3
0.012
0.124
0.236
0.349
0.461
0.574
0.686
0.798
0.911
1.023
COMMENTS:
CO
SOURCES:
1
COMPANY NAME:
RECEPTORS:
441
MODELER:
OUTPUT TYPE:
Concentration
SCALE:
1:106,570
0
4 km
MAX:
1.02309 ug/m^3
DATE:
7/31/2018
PROJECT NO.:
AERMOD View - Lakes Environmental Software
C:\Documents and Settings\Administrator\Desktop\Rachana J\gadag31.7.2018\gadag\gadag.isc

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