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MOTHER EARTH ENVIRON TECH PRIVATE LIMITED

CIN : U93000KA2011PTC059184 :+91 80 26712303, Fax : 080-26712305

CHAITRA GROUPS # 2542, 28th Cross, 17th Main, Banashankari 2nd Stage, Bengaluru - 560 070

Date: 30/04/2019

ADS Letter Reply

To,

The Member Secretary

Shri Kushal Vashist, Director,

Ministry of Environment, Forest and Climate Change,

Indira Paryavaran Bhavan,

Aliganj, Jor Bagh Road,

New Delhi – 110003.

Sub: Integrated Common Hazardous Waste, Treatment, Storage and Disposal Facility at KIADB Kadechur Industrial Estate - Submission of additional details/ information as sought by EAC committee.

Ref: MOM of 39th Meeting of Expert Appraisal Committee (Infra-2) Wednesday, 27th March, 2019, Item No. 39.4.6

Respected Sir,

With reference to above, we are submitting herewith the Additional Details Sought by Honorable EAC committee for re-consideration for prior Environmental Clearance for our proposed Integrated Common Hazardous Waste, Treatment, Storage and Disposal Facility at approved Kadechur Industrial Estate of KIADB.

Sr. No.	ADS Points	Compliance
1	Submit revised Form-1 and EIA/EMP report for the project.	Annexure-1
2	Submit Justification for non submission of the certified compliance report.	Annexure-2
3	Submit the Cost of the project Along with the Justification.	Annexure-3
4	Submit revised water balance.	Annexure-4

We request your good self to kindly consider our proposal for grant of Environmental Clearance at the earliest.

Thanking You.

For Mother Earth Environ Tech Private Limited,

Managing director

Mother Earth Environ Tech Pvt. Ltd. BENGALURU

info@motherearthenviron.com, motherearthenvirontech@gmail.com

http : www.motherearthenviron.com

SITE : Plot No. 217, 2nd Phase, KIADB Industrial Area
Harohalli, Kanakapura (Tq.) Ramanagara District
Karnataka - 562 112

Integrated Treatment Storage and Disposal Facility for Hazardous Waste at Plot no. 158 to 164, KIADB Kadechur Industrial Estate Village Kadechur, Tehsil and District Yadgir, Karnataka by M/s Mother Earth Environ Tech Private Limited –Environmental Clearance.
(IA/KA/MIS/73814/2018: F.No. 10-37/2018-IA-III)

The committee after deliberation on the proposal, sought following documents as Complied given below:

Annexure -1

(i) Submit revised Form-1 and EIA/EMP report for the project.

Revised Form -1 and EIA/ EMP report is enclosed with this letter

Note: Revised EIA Report attached after the Annexure-4 of ADS points

Revised - FORM-1

I. Basic Information

Sr. No.	Item	Details
1	Name of the project/s	Integrated Common Hazardous Waste Treatment, Storage and Disposal Facility (CHWTSDF) at KIADB Kadechur Industrial Estate, Village- Kadechur, Teshil- Yadgir, Karnataka 585221
2	Sr. No. in the schedule	7(d) Common Hazardous Waste Treatment, Storage and Disposal Facilities (CHWTSDFs)
3	Proposed capacity/area/length/tonnage to be handled/command area/lease area/number of wells to be drilled	Land Area- 16.2 Ha, allotted in the approved Kadechur Industrial Estate **(Annex I- KIADB Land allotment letter)** of KIADB, will consists of 1. Secured Landfill of 1.21 MT capacity (to be developed in cellular fashion) 2. Incineration of 12T/day (Phase I, Stationary hearth type) Incinerator of 12 T/day (Phase II, Rotary kiln primary chamber type) (Together 24T/day) 3. Associated utilities and amenities. The premise will also have a 5 MLD CETP (to be developed in phases) for which EC has been accorded by the MoEF & CC along with the EC of the KIADB Kadechur Industrial Estate. **(Annex II – EC Letter of MoEF&CC, No. 218/2014-IA-III, dated 14th October, 2016)** Mandate of operation of the Integrated TSDF will include transportation of Hazardous Waste from the site of generation/storage to the TSDF site in KSPCB approved vehicles in accordance with Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016. Rooftop area, top surface and faces of the landfill facing the sun incidence path are intended to be used for installation of grid connected solar PV power generation system during/in the post-closure phase with suitable panel de-dusting plan. Gross generation potential of the site based on present generation PV technology is 5 MW.
4	New/Expansion/Modernization	New
5	Existing Capacity/Area etc.	16.2 Ha.
6	Category of Project i.e. 'A' or 'B'	A
7	Does it attract the general condition? If yes, please specify	Yes Inter-State boundaries
8	Does it attract the specific condition? If yes, please specify	No

9	Location	Yadgir
	Plot/Survey/Kharsa No.	Plot No. 158 to 164
	Village	Kadechur
	Tehsil	Yadgir
	District	Yadgir
	State	Karnataka
10	Nearest railway station/airport along with distance in kms	Railway Station-Chegunta, 3.8 km Airport-Rajiv Gandhi International Airport, Hydrabad, 140km
11	Nearest Town, city, District Headquarters along with distance in km	District-Yadgir 30km
12	Village Panchayats, Zilla Parishad, Municipal Corporation, Local body (complete postal Addresses with telephone nos. to be given)	Grampanchayat: Kadechur Taluk: Yadgir Dist, Yadgir, Karnataka-585221
13	Name of applicant	Thigalanahalli N Parmesh
14	Registered Address	No. 2542, 17th Main, 28th cross, Banashankari, 2nd stage, Near BDA complex, Bengaluru, Karnataka
15	Address for correspondence :	
	Name	Thigalanahalli N Parmesh
	Designation (owner/partner/CEO)	MD
	Address	No. 2542, 17th Main, 28th cross, Banashankari, 2nd stage, Near BDA complex, Bengaluru, Karnataka
	Pin Code	560070
	E-Mail	Kadechur1@gmail.com
	Telephone No	080-26712303
	Fax No	
16	Details of Alternative Sites examined, if any. Location of these sites should be shown on a topo sheet	Not applicable as the facility is being developed as anxillaiary unit within the notified Industrial area.
17	Interlinked Projects	Not Applicable
18	Whether separate application of interlinked project has been submitted?	NA
19	If yes, date of submission	NA
20	If no, reason	NA
21	Whether the proposal involves approval/ clearance under : (a) The Forest (Conservation) Act, 1980? (b) The Wildlife (Protection) Act, 1972? (c) The CRZ Notification, 1991? If yes, details of the same and their status to be given	 No No No
22	Whether there is any Government Order/Policy relevant/relating to the site?	No
23	Forest land involved (hectares)	No
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	No NA NA NA

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.)**

Sr. 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)	No	Industrial area 16.2 ha has been allotted by the KIADB in the notified KIADB Kadechur Industrial Estate (Plot nos. 158 to 164). The land use is 'Industrial' and the proposed activity is in accordance with the planned/approved land use. The industrial plot is devoid of any vegetation. (**Annex I – KIADB Land allotment letter)** **(Annex III – KIADB Kadechur Industrial Estate map with the allotted plot shown).** The proposed activity will not change the land use as the area falls within the notified industrial area of KIADB. However, this activity may increase the land use.
1.2	Clearance of existing land, vegetation and buildings?	No	Not envisaged
1.3	Creation of new land uses?	No	Not envisaged
1.4	Pre-construction investigations e.g. bore houses, soil testing?	Yes	Site-specific, pre-construction soil investigation inside the plot entailing soil auguring (about 10 – 15 nos.) in and around the plot (for bearing capacity, examination of soil strata, foundation analysis, deciding location of ground water monitoring well, etc.) will be carried out.
1.5	Construction works?	Yes	General civil construction, inter alia, comprising construction of boundary wall, gate complex including weighbridge, tire wash facility, covered shed for storage and pre-disposal processing of hazardous waste, phase-I Incinerator, Phase-II incinerator, MEE, administrative office, laboratory, workshop, MCC room, storm water drains, soft landscapes, roads, etc.
1.6	Demolition works?	No	Not envisaged
1.7	Temporary sites used for construction works or housing of construction workers?	No	Not envisaged
1.8	Above ground buildings, structures or earthworks including linear structures, cut and fill or excavations	Yes	Landfill will be partially below-ground and partially aboveground construction. In all civil building construction for installation of incinerator, MEE and associated utilities excavation for foundation will be necessary.
1.9	Underground works including mining or tunneling?	No	Not envisaged
1.10	Reclamation works?	No	Not envisaged
1.11	Dredging?	No	Not envisaged
1.12	Offshore structures?	No	Not envisaged
1.13	Production and manufacturing processes?	No	The scope of the Integrated CHWTSDF will be to collection, transportation, receipt, short-term storage of hazardous waste, pre-landfill processing (waste stabilization) of hazardous waste, landfilling of assorted wastes, incineration of hazardous waste and treatment of leachate in the CETP to be set up within the premises.

1.14	Facilities for storage of goods or materials?	Yes	A high-head storage shed of 600 sq. m. with impervious flooring, leachate collection drains, suitable soft partition, circulation area, loading/unloading bays will be constructed. The shed will be naturally aspirated and will be provided with flame proof electrical fittings. All material handling operations will be carried out by mechanized means.
1.15	Facilities for treatment or disposal of solid waste or liquid effluents?	Yes	An Integrated CHWTSDF with a scientifically designed landfill to be developed in phases in cellular fashion, hazardous waste incineration, and associated utilities and amenities. The premise will also have a 5 MLD CETP (to be developed in phases) for which EC has been accorded by the MoEF&CC along with the EC of the KIADB Kadechur Industrial Estate (vide' Letter No. 21-8/2014-IA-III,dated 14th October, 2016)
1.16	Facilities for long term housing of operational workers?	No	Not envisaged
1.17	New road, rail or sea traffic during construction or operation?	Yes	Approx. 30 - 45 truck trips carrying construction earth during peak construction period. Hazardous waste will be brought to the proposed Integrated CHWTSDF by 10-18 T trucks by road route in operation phase. An estimated 7 to 8 trucks load of wastes will arrive at the facility at its peak operation per day.
1.18	New road, rail, air waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc?	No	Not envisaged
1.19	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?	No	Not envisaged
1.20	New or diverted transmission lines or pipelines?	No	Not envisaged
1.21	Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers?	No	Not envisaged
1.22	Stream crossings?	No	Not envisaged
1.23	Abstraction or transfers of water form ground or surface waters?	No	Not envisaged
1.24	Changes in water bodies or the land surface affecting drainage or run-off?	No	Not envisaged
1.25	Transport of personnel or materials for construction, operation or decommissioning?	Yes	Approx. 70-100 labourers will be transported by the Civil Contractor in tractor trolley in the construction phase. Approx. 30 persons will enter and leave the facility every day, by own car or two-wheelers in the operation phase.
1.26	Long-term dismantling or decommissioning or restoration works?	No	Not envisaged

1.27	Ongoing activity during decommissioning which could have an impact on the environment?	No	Not envisaged
1.28	Influx of people to an area in either temporarily or permanently?	No	Not envisaged
1.29	Introduction of alien species?	No	Not envisaged
1.30	Loss of native species or genetic diversity?	No	Not envisaged
1.31	Any other actions?	No	Nil

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):

Sr 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)	No	Industrial area 16.2 ha has been allotted by the KIADB in the notified KIADB Kadechur Industrial Estate (Plot nos. 158 to 164). The land use of the area is Industrial use.
2.2	Water (expected source & competing users) unit: KLD	Yes	The Integrated CHWTSDF will require about 100 KLD raw water for Domestic, Industrial And Horticulture purpose. Raw water will be supplied by the KIADB. **(Annex IV- Water Balance)**
2.3	Minerals (MT)	No	Nil
2.4	Construction material – stone, aggregates, sand / soil (expected source – MT)	Yes	About 9100 m^3 of yellow soil will be required for construction of the landfill bund/embankment and compacted base, and backfilling in the foundation excavation in the buildings. Soil will be sourced through building materials suppliers/contractors from nearby borrow pits. Soil from a Project that had a positive soil balance (e.g. Ongoing road embankment/grading projects or dig-out projects) will be preferred.
2.5	Forests and timber (source – MT)	No	Not envisaged
2.6	Energy including electricity and fuels (source, competing users) Unit: fuel (MT), energy (MW)	Yes	About 450 KVA power will be required for construction & operation. Power supply from Gulberga Electricity Supply Company (GESCOM) will be made available at the site by overhead power cables. One DG of 150 KVA will be installed as Standby power source.
2.7	Any other natural resources (use appropriate standard units)	No	About 24 T/month of Lime, cement, fly ash and other waste conditioning/binding agents will be used for waste pre-treatment before landfilling.

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.

Sr. 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)	No	Fuels used in the incineration system (SKO (as LDO thinner and flowing agent), HSD (start up and flame stabilization fuel) and LDO) intended to be stored and used at the Integrated TSDF fall under MSIHC Rules,1980 (amended 2000), Schedule I, Part I, (iv) highly flammable liquids, and (vi) flammable liquids. However, the proposed facility is aimed at handling/ disposing solid and hazardous industrial waste.
3.2	Changes in occurrence of disease or affect disease vectors (e.g. insect or water borne diseases)	No	Not envisaged
3.3	Affect the welfare of people e.g. by changing living conditions?	No	Not envisaged
3.4	Vulnerable groups of people who could be affected by the project e.g. hospital patients, children, the elderly etc	No	Not envisaged
3.5	Any other causes	No	Not envisaged

4. Production of solid wastes during construction or operation or decommissioning (MT/month)

Sr. 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	Not envisaged
4.2	Municipal waste (domestic and or commercial wastes)	Yes	Domestic/ municipal waste (about 50 kg/day) comprising food and office waste shall be generated in the construction phase. This waste will be hand–shredded and co-composted using windrows/ vermin composting method on-site. About 150 kg/day municipal waste comprising food and office waste will be generated from the operation phase of the Project, which will be composted continuing the construction phase system.
4.3	Hazardous wastes (as per Hazardous Waste Management Rules)	Yes	Some hazardous wastes will be generated from the operation of the Integrated TSDF; waste categories per Schedule–I & II of the Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016, inter alia, Used or spent oil, Chemical-containing residue arising from decontamination, Empty barrels/ containers/ liners contaminated with hazardous chemicals/ wastes, Exhaust Air or Gas cleaning residue, etc.
4.4	Other industrial process wastes	No	Not envisaged
4.5	Surplus product	No	Not envisaged

4.6	Sewage sludge or other sludge from effluent treatment	No	Minor quantity of sewage arising from the Integrated CHWTSDF's administrative functions will be treated in a Septic Tank-Soak Pit till such time the first phase CETP is operational. After the CETP coming on stream, sewage from the collection sump of the Septic Tank will be pumped directly to the secondary treatment of the CETP. Sludge from the Soak Pit will be decanted using suction machines and disposed along with the secondary sludge of the CETP.
4.7	Construction or demolition wastes	No	Not envisaged
4.8	Redundant machinery or equipment	No	Not envisaged
4.9	Contaminated soils or other materials	No	Not envisaged
4.10	Agricultural wastes	No	Not envisaged
4.11	Other solid wastes	No	Not envisaged

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

Sr. 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 gases from the Incinerator(s) after a two-stage scrubbing process will be let out using a 30 m stack. DG 150 KVA will be provided with supported mufflers releasing at 12 m height. Vehicles used at the facility (backhoe loaders, gravity rollers, tractors and administration vehicles) will also generate tailpipe emissions. Engines and vehicles will be maintained in good running order to conserve fuel and reduce pollution.
5.2	Emissions from production processes	No	Not envisaged
5.3	Emissions from materials handling including storage or transport	Yes	Fugitive dust may be generated from the material handling activities (handling of Lime, cement, fly ash and other waste conditioning/binding agents, as well as chemical coagulants in the CETP). Dust suppression measures (e.g. enclosures, screens) and operational discipline will be implemented to minimize fugitive emissions.
5.4	Emissions from construction activities including plant and equipment	Yes	Fugitive dust may be generated from construction activities after implementation of dust suppression measures. Storage and handling of loose construction material as well as vehicle plying on construction roads/pathways will be carried out under sprinkling of water.
5.5	Dust or odours from handling of materials including construction materials, sewage and waste	Yes	Handling of material with propensity of dusting/odor such as Lime, cement, fly ash and other waste conditioning/binding agents, as well as chemical coagulants in the CETP will be carried out diligently following dust suppression measures (e.g. enclosures, screens) and operational discipline will be implemented to minimize fugitive emissions.

5.6	Emissions from incineration of waste	Yes	Flue gases from the Incinerator(s) after a two-stage scrubbing process will be let out using a 30 m stack.
5.7	Emissions from burning of waste in open air (e.g. slash materials, construction debris)	No	Not envisaged
5.8	Emissions from any other sources	No	Not envisaged

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

Sr. No	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
6.1	From operation of equipment e.g. engines, ventilation plant, crushers	Yes	During operational phase noise may be generated from transportation, material handling, incineration and landfilling activities, operation of vehicles and DGs. Operation of CETP (mainly aerators) will also be a source of low amplitude, continuous noise. Mitigation measures will be implemented to minimize vehicular noise and by carrying out acoustic treatment of noisy operational machinery. A three-row greenbelt in the inner margin of the premises will also help in amelioration.
6.2	From industrial or similar processes	Yes	During operational phase noise may be generated from transportation, material handling, incineration and landfilling activities, operation of vehicles and DGs. Operation of CETP (mainly aerators) will also be a source of low amplitude, continuous noise. Mitigation measures will be implemented to minimize vehicular noise and by carrying out acoustic treatment of noisy operational machinery. A three-row greenbelt in the inner margin of the premises will also help in amelioration.
6.3	From construction or demolition	Yes	Noise will be generated from the construction activities and operation of construction equipment. Construction equipment will be maintained regularly which will help in reducing noise levels.
6.4	From blasting or piling	No	Not envisaged
6.5	From construction or operational traffic	Yes	Noise from the operational traffic inside the Integrated TSDF premises will be ameliorated by greenbelt to be developed all along the periphery of the premises.
6.6	From lighting or cooling systems	No	Not envisaged
6.7	From any other sources	No	Not envisaged

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:

Sr. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
7.1	From handling, storage, use or spillage of hazardous materials	Yes	All handling of hazardous waste will be carried out on impervious flooring with peripheral drainage and leachate collection system as applicable. No activities leading to inadvertent spill will be carried out on bare ground.

7.2	From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)	No	Not envisaged
7.3	By deposition of pollutants emitted to air into the land or into water	No	Not envisaged
7.4	From any other sources	No	Not envisaged
7.5	Is there a risk of long term build up of pollutants in the environment from these sources?	No	Not envisaged

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

Sr. 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	Incidences due to likely improper handling of hazardous substances or accidental spills, which will be minimized by strict operational discipline and implementation of an onsite DMP. The Incinerator which operates at a higher temperature will be provided with safety interlocks and emergency venting devices.
8.2	From any other causes	No	Not envisaged
8.3	Could the project be affected by natural disasters causing environmental damage (e.g. floods, earthquakes, landslides, cloudburst etc)	No	There are no record of occurrence of floods, earthquakes, landslides, cloud bursts, etc. in the area. The proposed Project site falls in Zone-II as per IS-1893 (Part-I):2002 which is seismically less activity zone.

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

Sr. 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 waste water treatment, etc.) • Housing Development • Extractive Industries • Supply Industries • Other	Yes	The proposed project will lead to ancillary development and also lead to a positive impact on extractive and supply industries.
9.2	Lead to after-use of the site, which could have an impact on the environment	No	Not envisaged
9.3	Set a precedent for later developments	No	Not envisaged

9.4	Have cumulative effects due to proximity to other existing or planned projects with similar effects	No	Not envisaged

(iii) Environmental Sensitivity

Sr. 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	None
2	Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests	No	None
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration	No	None
4	Inland, coastal, marine or underground waters	Yes	River Bhima, tributary of perennial River Krishna is about 8.2 km south west of the site. River Krishna is about 12.3 km south of the site. Bada talab (village irrigation tank) is about 1.45 km east of the site.
5	State, National boundaries	Yes	The site is 2.15 km away from the state boundary of Telangana (District Mahbubnagar, Maganur Mandal)
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas	No	--
7	Defense installations	No	None
8	Densely populated or built-up area	No	None
9	Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, community facilities)	No	--
10	Areas containing important, high quality or scarce resources (ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)	Yes	Ground water River Bhima, tributary of perennial River Krishna is about 8.2 km south west of the site. River Krishna is about 12.3 km south of the site. Bada talab (village irrigation tank) is about 1.45 km east of the site.
11	Areas already subjected to pollution or environmental damage. (those where existing legal environmental standards are exceeded)	No	None

12	Areas susceptible to natural hazard which could cause the project to present environmental problems (earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions)	No	The proposed Project site falls in Zone–II as per IS-1893 (Part-I):2002. Hence, seismically less active zone.

I hereby given 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 give, if any to the project will be revoked at our risk and cost.

For Mother Earth Environ Tech Pvt. Ltd.

Managing Director

Date : 30/04/2019

Place : Bengaluru

Mother Earth Environ Tech Pvt. Ltd. BENGALURU

Signature of the applicant
With Name and Full Address
(Project Proponent/ Authorized Signatory)

NOTE:

1. The projects involving clearance under Coastal Regulation Zone Notification, 1991 shall submit with the application a CRZ map duly demarcated by one of the authorized agencies, showing the project activities, with CRZ (at the stage of TOR) and the recommendations of the State Coastal Zone Management Authority (at the stage of EC). Simultaneous action shall also be taken to obtain the requisite clearance under the provisions of the CRZ Notification, 1991 for the activities to be located in the CRZ

2. The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden thereon (at the stage of EC)

3. All correspondence with the Ministry of Environment & Forests including submission of application for TOR/Environmental Clearance, subsequent clarifications, as may be required from time to time, participation in the EAC meeting on behalf of the project proponent shall be made by the authorized signatory only. The authorized signatory should also submit a document in support of his claim of being an authorized signatory for the specific project.

Annexure-I

KARNATAKA INDUSTRIAL AREAS DEVELOPMENT BOAR

(A Government of Karnataka Undertaking)
49, 4th & 5th Floors, 'East Wing', Khanija Bhavan, Race Course Road, Bengaluru - 560 0
Phone : 080-22265383 Fax : 080-22267901
Website : www.kiadb.in email: ceoemkiadb@gmail.com

No. KIADB/HO/Allot/Secy-3/ 18032 /2017-18 Date: 21.02.2018

M/s. Mother Earth Environ,
Tech Private Limited,
No. 2542, 28th Cross,
17th Main, Banashankari 2nd Stage,
Bengaluru -560 070.

RPAD

Sir/Madam/Sirs,

ALLOTMENT LETTER

Sub: Allotment of 40.01 acres of land in Plot Nos. 158 to 164 at Yadgeer District, Kadechur -Badiyala Indl., Area.

Ref: 1. Approval of 90th SLSWCC Meeting dtd: 01.02.2016.
2. Approval of 350th Board Meeting dtd: 22.08.2017.
3. Your application dt: 09.02.2018.
4. G.O.No.CI261 SPI 2010, Bengaluru, dtd: 06.09.2016.

-oOo-

In pursuance of the approval given by the **90th SLSWCC held on 01.02.2016**, you have been allotted **40.01 acres** of land in **Plot Nos. 158 to 164** at **Yadgeer District, Kadechur -Badiyala Indl., Area.** for Setting up " **Hazardous Waste & Other Waste management facilities & CETP** " subject to the terms and conditions indicated in the 350th Board Meeting dtd: 22.08.2017 and also the terms and conditions mentioned hereafter.

1. The allotment of land is on lease basis for a period of **99 years**. The lease is liable to be cancelled automatically in case the land is not utilized within a period of three years in case of MSME, large projects or five years in cases of mega, ultra mega, super mega projects as defined in the industrial policy or the land is not utilized within a specified period approved in **350th Board Meeting held on 22.08.2017.**

2.The premium payable for allotment of the said land has been tentatively fixed at **Rs.19.50 lakhs per acre** and as per the 350th Board Meeting dated: 22.08.2017, 50% rebate @ of Rs. 9,75,000=00 per acre.

3. (a) The premium of the land shall be paid as follows:

i) A sum of **Rs.78,01,950/-** being the balance 20% of the tentative premium of land paid vide receipt No.0040660 dt:17.02.2018.

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KARNATAKA INDUSTRIAL AREAS DEVELOPMENT BOARD
(A Government of Karnataka Undertaking)
49, 4th & 5th Floors, 'East Wing', Khanija Bhavan, Race Course Road, Bangalore - 560 001
Phone : 080-22205383 Fax : 080-22267901
Website : www.kiadb.in email: ceoomkiadb@gmail.com

ii) A sum of Rs.7,31,250-00 15% Corner Charges for 5.00 acres @ the rate Rs. 9,75,000-00 per acre being the balance land cost within shall be paid within 30 days from the date of issue of this letter on before 22.03.2018.

iii) A Sum of Rs.3,12,12,800-00 being the balance 80% tentative premium of land shall be paid within 90 days from the date of issue of this letter ie on or before 20-05-2018.

(b) In the event of your furnishing letter of commitment from KSFC/KSIIDC/Reserve Bank of India approved Financial Institutions/Corporations/Companies agreeing to pay the premium indicated at 3(a)(2) directly to the Board (applicable only to Medium, Small and Micro Enterprises) the allotment will be confirmed and documentation will be permitted subject to payment of interest @ 9% per annum on amount due from the date of handing over possession of land to the date of payment which should be made within 180 days from the date of execution of lease agreement.

(c) You should pay lease rent of Rs.1000/- per acre/per annum.

(d) You should pay maintenance charges as may be fixed by the Board from time to time.

(e) Interest at 9% per annum shall be levied in case the lease rents are not paid within one month from the date on which the lease rents fall due every year.

4(a) In case of your failure to pay the amount mentioned at Para 3(a)(2) before the expiry of the time stipulated therein, this offer of allotment stands automatically cancelled and the Earnest Money Deposit and 10% of the amount paid by you towards premium stands automatically forfeited.

4(b) If the balance premium is not paid within 90 days from the date of execution of lease agreement in respect of cases mentioned at Para3(b), the plot would be resumed on expiry of the time stipulated without issuing any fresh notice.

5. Soon after receipt of 100% premium and on your acceptance of all the terms and conditions indicated herein before and also those mentioned hereinafter, the possession of land will be handed over within 30 days from the date of payment. At the time of taking over possession, you should produce the original receipts, issued for the payments made, to the Engineer in charge of the area.

6. On taking possession of land, you shall adhere to the time schedule indicated in the Annexe-A.

KARNATAKA INDUSTRIAL AREAS DEVELOPMENT BOARD
(A Government of Karnataka Undertaking)
49, 4th & 5th Floors, 'East Wing', Khanija Bhavan, Race Course Road, Bengaluru - 560 001
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7. Your failure to take possession of land within 30 days from the date of payment of the premium shall result in cancellation of allotment and 10% of the amount paid towards premium and E.M.D shall stand forfeited.

8. The Board may accept voluntary surrender of plot subject to levy of penalty at 15% of the allotment cost paid by you.

9. All taxes in respect of the lease including service tax shall be payable by you to the Board.

10. Any deposits made by the allottee towards allotment will not carry any interest.

11. It shall be mandatory for you to obtain all statutory clearances from the Karnataka State Pollution Control Board and other statutory competent authorities before commencement of the approved project.

12. You are also requested to remit **Rs.NIL** towards Slum Improvement Cess as **per G.O.No.HUD/180/MIB/94/dt.29.3.1984 together with balance premium.**

13. Only courts situated in the city of Bangalore/ Gulbarga/ Dharwad shall have jurisdiction.

14. You are required to inform any change in address of the Registered Office or Administrative Office, to the Board immediately.

15. This allotment is subject to other terms and conditions of the lease deed.

16. This allotment letter is issued with the approval of Chief Executive Officer & Executive Member.

Yours faithfully,

AUTHORISED SIGNATORY 21.02.18

KARNATAKA INDUSTRIAL AREAS DEVELOPMENT BOARD
(A Government of Karnataka Undertaking)
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Annexe-A

CONDITIONS OF ALLOTMENT

The time schedule prescribed for various activities subsequent to payment of premium.

1.(a) For taking over possession of land.	30 days from the date of payment of entire premium.
(b) For execution of Lease Agreement	30 days from the date of receipt of Possession Certificate.
(c) For commencement of construction and completion of project by commencing production.	Construction should be commenced within nine months from the date of taking over possession and production should be commenced :- i) within a period of three years after taking over possession in case of MSME and large industries ii) within a period of five years after taking over possession in cases of mega, ultra mega and super mega projects. iii) Promoters to seek extension of time in writing by giving valid reasons to be concerned investment approving committees viz., DLSWCC / SLSWCC/ SHLCC/**Allotment Committee** prior to the above mentioned periods.

2. On being satisfied that the land is not put to use for the purpose for which it was allotted, the Board will be free to re-enter upon and take possession of the whole or any part of the land which has not been put to proper use.

. . . . 2 . . .

KARNATAKA INDUSTRIAL AREAS DEVELOPMENT BOARD
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3. If necessary, the interest in this plot of land may be offered as security in order to obtain financial assistance from the Govt., or Corporate bodies like Life Insurance Corporation of India, Karnataka State Financial Corporation, Karnataka State Industrial Investment & Development Corporation, Trustees for Debenture Stock or Banks. However, prior permission of the Board shall be obtained for creating second and subsequent charges on the land.

AUTHORISED SIGNATORY 21.02.18

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AUTHORISED SIGNATORY 21.02.18

F.No.21-8/2014-IA-III
Government of India
Ministry of Environment, Forest and Climate Change
(IA.III Section)

Indira Paryavaran Bhawan
Jor Bagh Road, New Delhi - 3

Dated: 14th October, 2016

To

The Development Officer,
Karnataka Industrial Areas Devl. Board (KIADB),
KIADB Zonal Office, Kapanoor Industrial Area,
Humnabad Road,
Gulbarga – 585104 (Karnataka)

Sub: 'Kadechuru Industrial Area' at Kadechuru Village, Taluka & Distric Yadgir (Karnataka) by Karnataka Industrial Areas Development Board Environmental Clearance - reg.

Sir,

This has reference to your application No.KIADB/DO/KLB/1068/2015-16 dated 4th January, 2016 and subsequent letters dated 2nd May, 2016 and 23rd May 2016, submitting the above proposal to this Ministry for grant of Environmenta Clearance (EC) in terms of the provisions of the Environment Impact Assessmen (EIA) Notification, 2006 under the Environment (Protection) Act, 1986.

2. The proposal for **'Kadechuru Industrial Area'** at Kadechuru Village, Taluka & District Yadgir (Karnataka) by Karnataka Industrial Areas Development Board was considered by the Expert Appraisal Committee (EAC) in the Ministry for Infrastructure Development, Coastal Regulation Zone, Building/ Construction and Miscellaneous projects, in its meetings held on 28-29 March, 2016, 30-31 May 2016 and 26th July, 2016.

3. The details of the project, as per the documents submitted by the project proponent, and also as informed during the above said EAC meetings, are reported to be as under:-

(i) The project involves development of Kadechuru Industrial Area at Kadechuru Village, Taluka & District Yadgir (Karnataka) by Karnataka Industrial Area Development Board (KIADB).

(ii) The proposed area to be developed is 1311.18 ha (3240 acres). The details of the areas demarcated as follows:

S.No	Description	Acres	Percentage%
1	Industrial	1426.92	44.04
2	KSSIDC	67.9	2.10
3	Commercial	74.2	2.29
4	Amenities	62.7	1.94
5	Utility	53.4	1.65
6	Greenbelt	413.58	12.76
7	Truck Parking	133.95	4.13
8	Road	172.4	5.32
9	Bulk Land (Coca cola, Railway Bogie, Pet Bottle Plant)	834.95	25.77
Total		**3240**	**100**

(iii) Total water requirement is estimated to be 3.24 MLD proposed to be drawn through Sangam River. The Industries to be proposed are "B" Category industries utilizing minimum water.

(iv) Waste water generated from the industrial units/different zones will be collected and treated at the proposed STP/CETP. The treated water will be recycled and reused for green belt development as well as fire water.

(v) During construction phase, no hazardous waste will be generated. During operation phase hazardous waste management would be the responsibility of individual industries. Prior to the commencement of production, each unit will take authorization for storage, handling and transport of hazardous waste, as per the Hazardous Waste (Management, Handling and Trans-boundary Movement) Rules, 2008 and amendments thereof.

(vi) The ETP is of 5 MLD capacity in an area of 27.60 acres of land allocated at plot No.162. Based on extended aeration, RO will be provided as tertiary treatment for reutilisation of treated effluent and resource conservation.

(vii) The nearest abadi would be at a distance of about 1 km from the waste disposal site and 2 km from the ETP. The waste water shall be treated to the discharge standards which would be recycled to use after reverse osmosis process.

(viii) **Water bodies**: Kedechuru tank is 0.5 km, E and Bhima river is 5.8 km, WSW from the project site.

(ix) Storm water drains will be planned along the sides of the roads to collect the surface run-off water from the roads.

(x) **RWH**: Based on the runoff calculations, 300 rainwater harvesting pits are proposed.

(xi) **Wildlife issues**: There are no Eco-sensitive areas in 10 km radius of the project site.

(xii) **Greenbelt facilities**: 12.76% of the total project area is allocated for greenbelt development and individual industries will also contribute from the land allotted to them. Green belt (50 m wide) is also proposed along either sides of river tributaries. The treated water will be recycled and reused for greenbelt development as well as fire water.

(xiii) **Investment/Cost:** Estimated cost of the project is Rs.1134 Crores.

(xiv) **ToR details**: Terms of Reference granted by the Ministry vide letter No.21-8/2014-IA-III dated 18th September, 2014.

(xv) **Public Hearing:** Public Hearing was conducted on 14th September, 2015 in Kadechur village, Taluka, District Yadgir (Karnataka).

(xvi) **Employment potential**: About 300 to 500 number of people for direct and another 4500 to 5000 number of people for indirect.

(xvii) **Benefits of the project**:

- Improvement on standard of leaving
- Education system will improve by having Schools, Colleges, Vocational training institutes etc.,
- Existing approach roads will be strengthened with Black Top Roads
- Economic growth of nearby surrounding area
- Community halls will be constructed to nearby villages.
- Medical Assistance with Ambulance facility to nearby Hospitals.
- Potable drinking water facilities will improve

4. The EAC, in its 161st meeting held on 26th July, 2016, has recommended the project for grant of Environmental Clearance. As per recommendations of the EAC, the Ministry of Environment, Forest and Climate Change hereby accords Environmental Clearance to the above project **'Kadechuru Industrial Area'** at Kadechuru Village, Taluka & District Yadgir (Karnataka) promoted by Karnataka Industrial Areas Development Board, under the provisions of the EIA Notification,

2006 and amendments/circulars issued thereon, and subject to the specific and general conditions as under:-

PART A - SPECIFIC CONDITIONS

I. Construction Phase

(i) 'Consent to Establish' shall be obtained from State Pollution Control Boarc under the Air (Prevention and Control of Pollution) Act, 1981 and the Wate (Prevention and Control of Pollution) Act, 1974.

(ii) As per the undertaking submitted by project proponent vide letter No KIADB/CDO&CE/7192/201-17 dated 5th August, 2016, the flood plair streams as demarcated in the layout plan of Kadechuru Industrial Area by the Irrigation Department, shall be maintained as it is and shall not be allotted to any individual henceforth. The flood plain areas as demarcated by the Irrigation Department shall be reserved and maintained as buffer zone No civil constructions other than bridges and culverts shall be constructed or the flood plain in the industrial area.

(iii) There shall be a continuous green belt along the plant premises, except at the designated entry and exit points.

(iv) The quantity of fresh water usage, water recycling and rainwater harvestin shall be measured and recorded to monitor the water balance as projected by the project proponent. The record shall be submitted to the Regional Office MoEF&CC along with six Monthly Monitoring reports.

(v) Special purpose vehicle shall be established for implementation, monitorin and compliance of the environmental safeguards.

(vi) All the recommendation of the EMP shall be complied with letter and spirit All the mitigation measures submitted in the EIA report shall be prepared ir a matrix format and the compliance for each mitigation plan shall be submitted to RO, MoEF&CC along with half yearly compliance report.

(vii) The member units shall provide storage tanks for storage of effluent fo monitoring the characteristics of effluent before taking into the CETP fo further treatment.

(viii) Proper meters with recording facilities shall be provided to monitor th effluent quality and quantity sent from member industries to CETP and fron CETP to the final disposal/re-use on a continuous basis.

(ix) Member industries shall treat the effluent to meet the prescribed CETP inle norms.

(x) The project proponent shall establish an environmental monitoring cell witl all the potential polluting units as members to review the environmenta monitoring data and suggest for improvements.

(xi) Internal Road widths within the industrial area shall be minimum 24 r ROW.

(xii) Common facilities such as repair shops, rest rooms for drivers an attendants shall be provided.

(xiii) All required sanitary and hygienic measures should be in place before startin construction activities and to be maintained throughout the constructio phase.

(xiv) Soil and ground water samples will be tested to ascertain that there is no threat to ground water quality by leaching of heavy metals and other toxic contaminants.

(xv) Construction spoils, including bituminous material and other hazardous materials, must not be allowed to contaminate watercourses and the dump sites for such material must be secured so that they should not leach into the ground water.

(xvi) Parking space to accommodate trucks, cars, two wheelers and bicycles shall be provided as per the norms.

(xvii) Any hazardous waste generated during development/ construction phase, should be disposed off as per applicable rules and norms with necessary approvals of the State Pollution Control Board.

(xviii) The diesel generator sets to be used during development/ construction phase should be low sulphur diesel type and should conform to Environment (Protection) Rules prescribed for air and noise emission standards.

(xix) The diesel required for operating DG sets shall be stored in underground tanks and if required, clearance from Chief Controller of Explosives shall be taken.

(xx) Vehicles hired for bringing construction material to the site should be in good condition and should have a pollution check certificate and should conform to applicable air and noise emission standards and should be operated only during non-peak hours.

(xxi) Ambient noise levels should conform to residential standards both during day and night. Incremental pollution loads on the ambient air and noise quality should be closely monitored during development/ construction phase. Adequate measures should be made to reduce ambient air and noise level during construction phase, so as to conform to the stipulated standards by CPCB/SPCB.

(xxii) Fly ash should be used as building material in the construction as per the provisions of Fly Ash Notification of September, 1999 and amended as on 27th August, 2003.

(xxiii) Ready mixed concrete must be used in site development and building construction.

(xxiv) Storm water control and its re-use as per CGWB and BIS standards for various applications.

(xxv) Water demand during development/construction should be reduced by use of pre-mixed concrete, curing agents and other best practices referred.

(xxvi) Permission to draw ground water shall be obtained from the competent Authority prior to construction/operation of the project.

(xxvii) Separation of grey and black water should be done by the use of dual plumbing line for separation of grey and black water.

(xxviii) Fixtures for showers, toilet flushing and drinking should be of low flow either by use of aerators or pressure reducing devices or sensor based control.

(xxix) Use of glass may be reduced by upto 40% to reduce the electricit consumption and load on airconditioning. If necessary, use high quality low value glass.

(xxx) Roof should meet prescriptive requirement as per Energy Conservatio Building Code by using appropriate thermal insulation material to fulfi requirement.

(xxxi) Opaque wall should meet prescriptive requirement as per Energy Conservatio Building Code which is proposed to be mandatory for all airconditioned space while it is aspirational for non-airconditioned spaces by use of appropriat thermal insulation material to fulfill requirement.

(xxxii) The approval of the competent authority shall be obtained for structural safet of the buildings due to earthquake, adequacy of fire fighting equipments, etc as per National Building Code including protection measures from lightenin etc.

(xxxiii) Regular supervision of the above and other measures for monitoring should b in place all through the development/ construction phase, so as to avoi disturbance to the surroundings.

(xxxiv) Under the provisions of Environment (Protection) Act, 1986, legal action shal be initiated against the project proponent if it was found that construction o the project has been started without obtaining environmental clearance.

(xxxv) The responses/commitments made to the issues raised during public hearin shall be complied with in letter and spirit. A hard copy of the action take shall be submitted to the Ministry.

(xxxvi) 2% of the project cost shall be earmarked for Corporate Environmen Responsibility activities.

(xxxvii) Necessary provision to develop facilities for disabled people shall be mad under Corporate Environment Responsibility.

(xxxviii) Corporate Environment Responsibility:

a) The Company shall have a well laid down Environment Policy approved b the Board of Directors.
b) The Environment Policy shall prescribe for standard operating process procedures to bring into focus any infringements/deviation/ violation o the environmental or forest norms/ conditions.
c) The hierarchical system or Administrative Order of the company to dea with environmental issues and for ensuring compliance with th environmental clearance conditions shall be furnished.
d) To have proper checks and balances, the company shall have a well lai down system of reporting of non-compliances/ violations of environmenta norms to the Board of Directors of the company and/or shareholders o stakeholders at large.

II. Operation Phase

(i) All the topsoil excavated during development/construction activities should b stored for use in horticulture/landscape development within the project site.

(ii) Disposal of muck during development/construction phase should not creae any adverse effect on the neighbouring communities and be disposed takin

the necessary precautions for general safety and health aspects of people, only in approved sites with the approval of competent authority.

(iii) The solid waste generated should be properly collected and segregated. Wet garbage should be composted and dry/inert solid waste should be disposed off to the approved sites for land filling after recovering recyclable material.

(iv) Diesel power generating sets proposed as source of back up power for elevators and common area illumination during operation phase should be of enclosed type and conform to rules made under the Environment (Protection) Act, 1986. The height of stack of DG sets should be equal to the height needed for the combined capacity of all proposed DG sets. The location of the DG sets may be decided with in consultation with State Pollution Control Board.

(v) Noise should be controlled to ensure that it does not exceed the prescribed standards. During night time the noise levels measured at the boundary of the building shall be restricted to the permissible levels to comply with the prevalent regulations.

(vi) The green belt of the adequate width and density preferably with local species along the periphery of the plot shall be raised so as to provide protection against particulates and noise.

(vii) Weep holes in the compound walls shall be provided to ensure natural drainage of rain water in the catchment area during the monsoon period.

(viii) Rain water harvesting for roof run- off and surface run- off, as plan submitted should be implemented. Before recharging the surface run off, pre-treatment must be done to remove suspended matter, oil and grease. The borewell for rainwater recharging should be kept at least 4 mts. above the highest ground water table.

(ix) The ground water level and its quality should be monitored regularly in consultation with Central Ground Water Authority.

(x) Traffic congestion near the entry and exit points from the roads adjoining the proposed project site must be avoided. Parking, loading and unloading should be fully internalized and no public space should be utilized.

(xi) A Report on the energy conservation measures confirming to energy conservation norms finalise by Bureau of Energy Efficiency should be prepared incorporating details about building materials & technology, R & U Factors etc and submit to the Ministry in three months time.

(xii) Energy conservation measures like installation of CFLs/TFLs for the lighting the areas outside the building should be integral part of the project design and should be in place before project commissioning. Use CFLs and TFLs should be properly collected and disposed off/sent for recycling as per the prevailing guidelines/rules of the regulatory authority to avoid mercury contamination. Use of solar panels may be done to the extent possible.

(xiii) The building should have adequate distance between them to allow movement of fresh air and passage of natural light, air and ventilation.

PART – B: GENERAL CONDITIONS

i) The environmental safeguards contained in the EIA Report should be implemented in letter and spirit.

ii) Provision should be made for supply of kerosene or cooking gas and pressur cooker to the labourers during construction phase.

iii) Six monthly monitoring reports should be submitted to the Ministry and it Regional Office, Bangalore.

iv) A copy of the environmental clearance letter shall also be displayed on th website of the concerned State Pollution Control Board. The EC letter shal also be displayed at the Regional Office, District Industries centre anl Collector's Office/ Tehsildar's office for 30 days.

v) The project proponent shall set up a separate environmental management cel for effective implementation of the stipulated environmental safeguards unde the supervision of a Senior Executive.

vi) The funds earmarked for environment management plan shall be included i the budget and this shall not be diverted for any other purpose.

5. The above stipulations would be enforced among others under the provisions of Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention anl control of Pollution) act 1981, the Environment (Protection) Act, 1986, the Publi Liability (Insurance) Act, 1991 and the EIA Notification, 2006.

6. Officials from the Regional Office of MoEF&CC at Bangalore who would b monitoring the implementation of environmental safeguards should be given ful cooperation, facilities and documents/data by the project proponents during the inspection. A complete set of all the documents submitted to MoEF&CC should b forwarded to the CCF, Regional Office of MoEF&CC at Bangalore.

7. In the case of any change(s) in the scope of the project, the project woull require a fresh appraisal by this Ministry.

8. The Ministry reserves the right to add additional safeguard measure subsequently, if found necessary, and to take action including revoking of th environment clearance under the provisions of the Environmental (Protection) Ac, 1986, to ensure effective implementation of the suggested safeguard measures in time bound and satisfactory manner.

9. All other statutory clearances such as the approvals for storage of diesel fron Chief Controller of Explosives, Fire Department, Civil Aviation Department, Fore Conservation Act, 1980 and Wildlife (Protection) Act, 1972 etc. shall be obtained, a applicable by project proponents from the respective competent authorities.

10. The project proponent should advertise in at least two local Newspapers wide circulated in the region, one of which shall be in the vernacular language informin that the project has been accorded Environmental Clearance and copies of clearanc letters are available with the State Pollution Control Board and may also be seen o the website of the Ministry of Environment, Forest and Climate Change a http://www.envfor.nic.in. The advertisement should be made within Seven days from the date of receipt of the Clearance letter and a copy of the same should b forwarded to the Regional office of this Ministry at Bangalore.

11. This clearance is subject to final order of the Hon'ble Supreme Court of Indi in the matter of Goa Foundation Vs Union of India in Writ Petition (Civil) No.460 o 2004 as may be applicable to this project.

12. Any appeal against this clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.

13. A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parishad/Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions/ representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent.

14. The proponent shall upload the status of compliance of the stipulated EC conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; SPM, RSPM, SO2, NOx (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the project shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.

15. The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of EC conditions and shall also be sent to the respective Regional Offices of MoEF&CC by e-mail.

SKS 14/10/2016

(S.K. Srivastava)
Scientist E

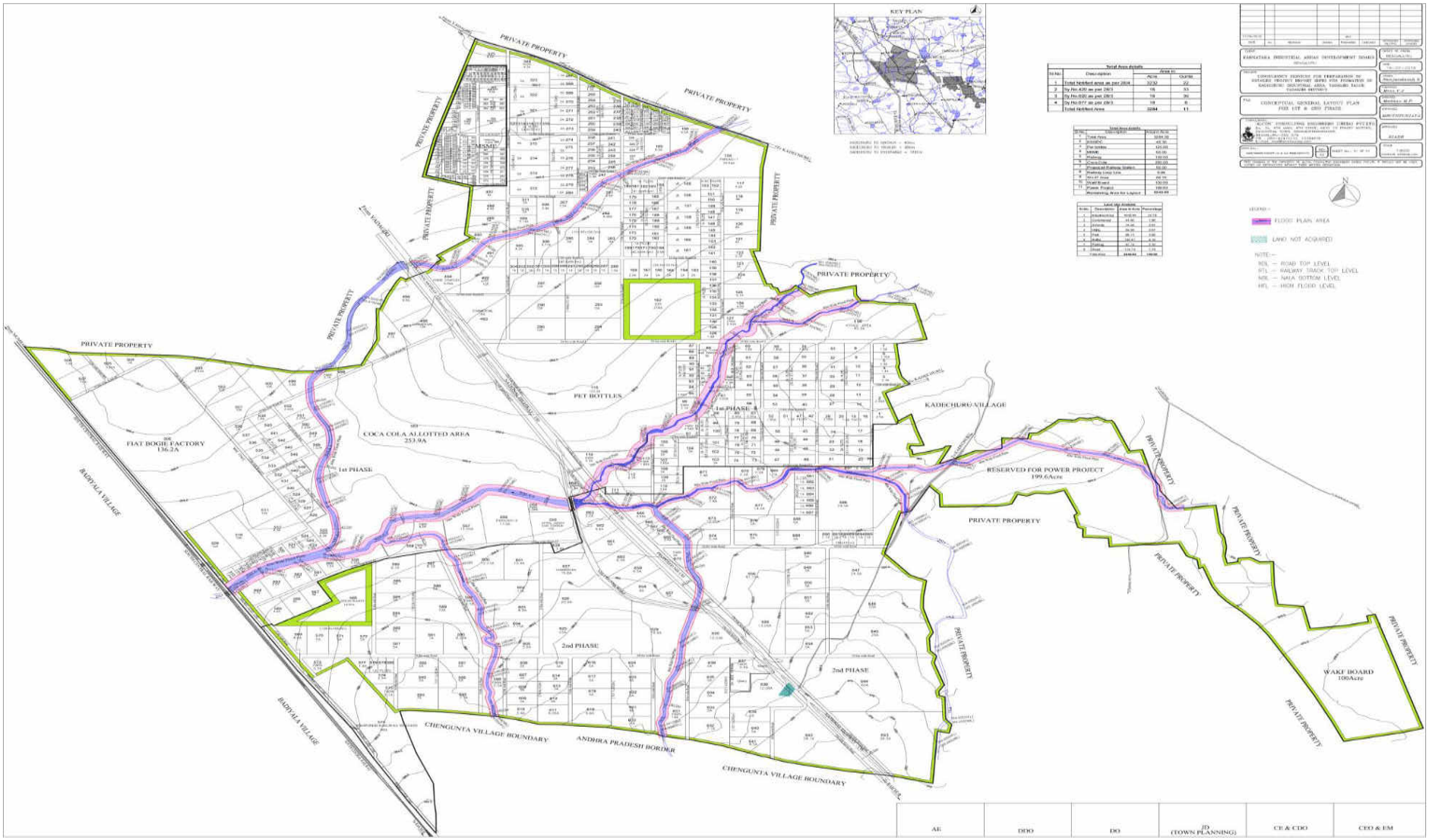
Copy to: -

(1) The Secretary, Department of Environment, Govt. of Karnataka, Bangalore.
(2) The Chairman, Central Pollution Control Board, Parivesh Bhawan, CBD-cum-Office Complex, East Arjun Nagar, Delhi – 32.
(3) The Member Secretary, Karnataka State Pollution Control Board, "Parisara Bhavan, 4th & 5th Floor, # 49, Church Street, Bangalore-01.
(4) The APCCF (C), MoEF&CC, Regional Office (SZ), Kendriya Sadan, 4th Floor, E&F Wing, 17th Main Road, Koramangala II Block, Bangalore - 34.
(5) IA Division, Monitoring Cell, MOEF, New Delhi - 3.
(6) Guard file.

SKS 14/10/2016

(S.K. Srivastava)
Scientist E

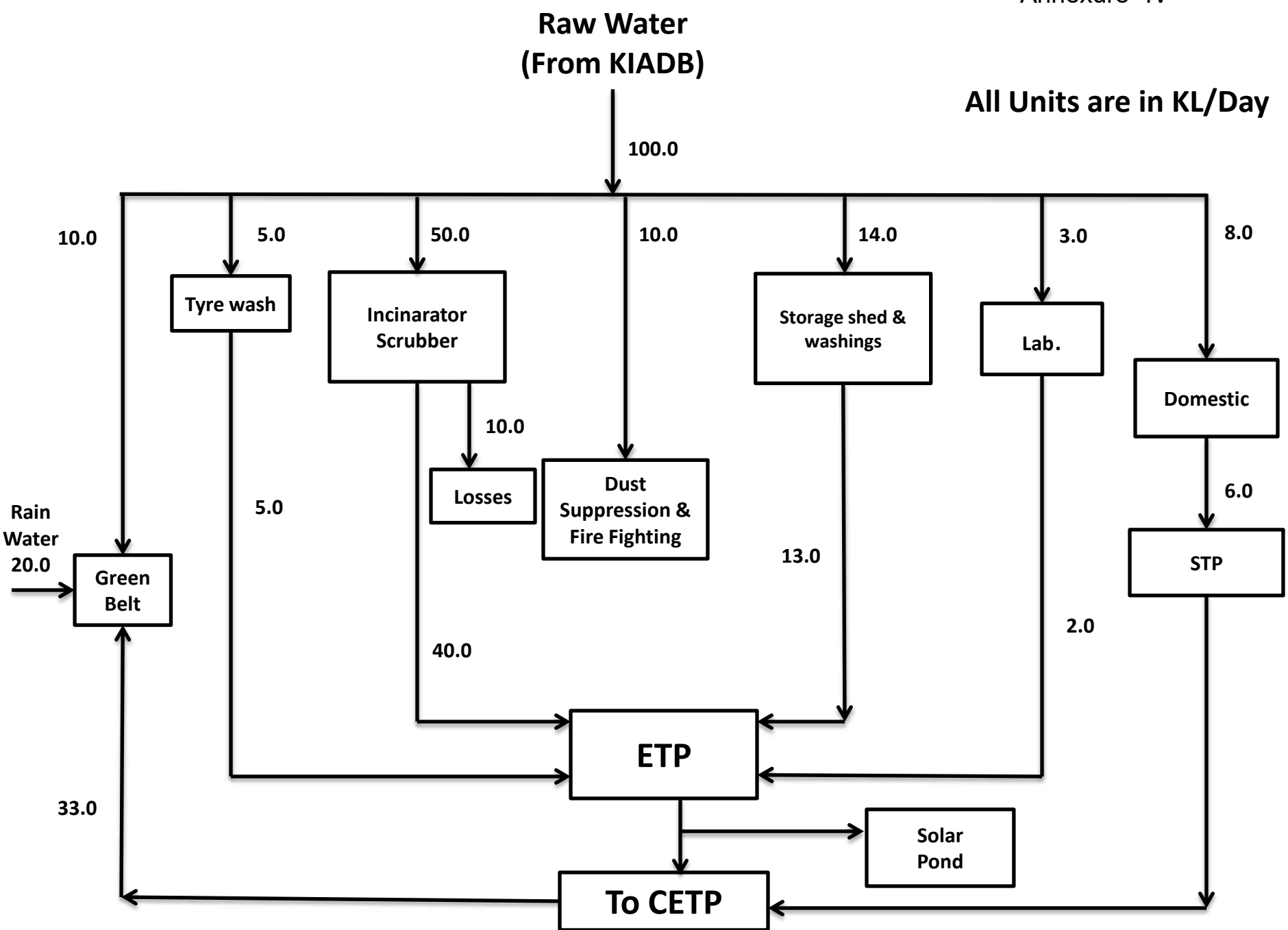
Annexure- III



Location of the site in the IE map of the Kadechur KIADB IE

Annexure- IV

WATER BALANCE



Annexure -2

(ii) Submit Justification for non submission of the certified compliance report.

Compliance status: Proposed integrated TSDF is a green field project being set up within the approved Industrial Area of KIADB. The compliance report for Kadechur Industrial Area is under scope of Karnataka Industrial Area Development Board (KIADB) and we have requested KIADB for the same vide the attached letter. KIADB informed that the Compliance Certification is under process and we assure that we will submit the certified compliance report as soon as we received it from KIADB, Which includes the individual industrial units having separate consents that are monitored by KSPCB.

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(A Government of Karnataka Undertaking)
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Phone : 080-22265383 Fax : 080-22267901
Website : www.kiadb.in email: ceoemkiadb@gmail.com

No:KIADB/CDO&CE/FCN-43/809/2018-19 Date:11-09-2018

RPAD

M/S. Mother Earth Environ Tech Pvt Ltd.,
#2542, 17th Main, 28th Cross,
Banashankari 2nd stage,
Near BDA Complex,
Bengaluru – 560070.

Sir,

Sub: Half Yearly EC Compliace Report for KIADB Kadechuru Industrial Estate, Yadgir Taluk & District, Karnataka.
Ref: 1 Your letter No. MEEPL/HO/YADGIR/006/2018-19 Dtd. 07-08-2018

******

With reference to the above, MoEF has issued Environmental Clearance (EC) for the Kadechuru Industrial Area (1311.18 Ha) vide letter No. F.No.21-8/2014-IA-III, on 14th October, 2016.

The KIADB has taken all effective steps as per the terms & condition of the EC approval, accordingly tendering process for appointing consultant for monitoring of conditions stipulated in the EC would be finalized shortly.

Thanking You,

Yours faithfully,

Chief Development Officer &
Chief Engineer

Annexure -3

(iii) Submit the Cost of the project Along with the Justification.

Compliance status:

We would like to inform that M/s Mother Earth Environ Tech Private Limited (MEEPL) has conceived both integrated TSDF and CETP as a single project and land allocation has been done by KIADB accordingly. Hence, initially when the Form-1 was submitted, a combined cost of the project was mentioned as Rs.135 crores which include cost of TSDF and cost of CETP.

However, since CETP was already approved by MoEF&CC and issued EC as part of the Kadechure Industrial Area, MEEPL is now requesting the stand alone EC for TSDF.

Hence, after separating the cost of CETP, the cost of integrated TSDFwill be Rs. 59.48 crores.

The **breakup of project cost as given in table below. Serial No. 2 (**Building, Storage Shed and other Civil Works) **& 3 (**Machinery, vehicles and Laboratory Equipments) **are varying and other cost remain unchanged.**

Breakup of Project Cost

Sr. No.	Item	Cost (INR) of Integrated TSDF only	Previous Cost (INR) of the project including integrated TSDF and CETP
1	Land Cost	3,90,00,000.00	3,90,00,000.00
2	Building, Storage Shed and other Civil Works	38,30,25,965.00	55,08,16,465.00
3	Machinery, vehicles and Laboratory Equipments	12,21,75,160.00	69,44,12,264.00
4	Pollution Control Measures	1,60,00,000.00	1,60,00,000.00
5	Office Equipment and Power Supply & other development works	1,58,69,792.00	1,58,69,792.00
6	Miscellaneous	69,01,479.00	69,01,479.00
7	CSR Activities	1,18,97,396.00	2,70,00,000.00
Total Cost		**59,48,69,792.00**	**1,35,00,00,00,000.00**

Annexure -4

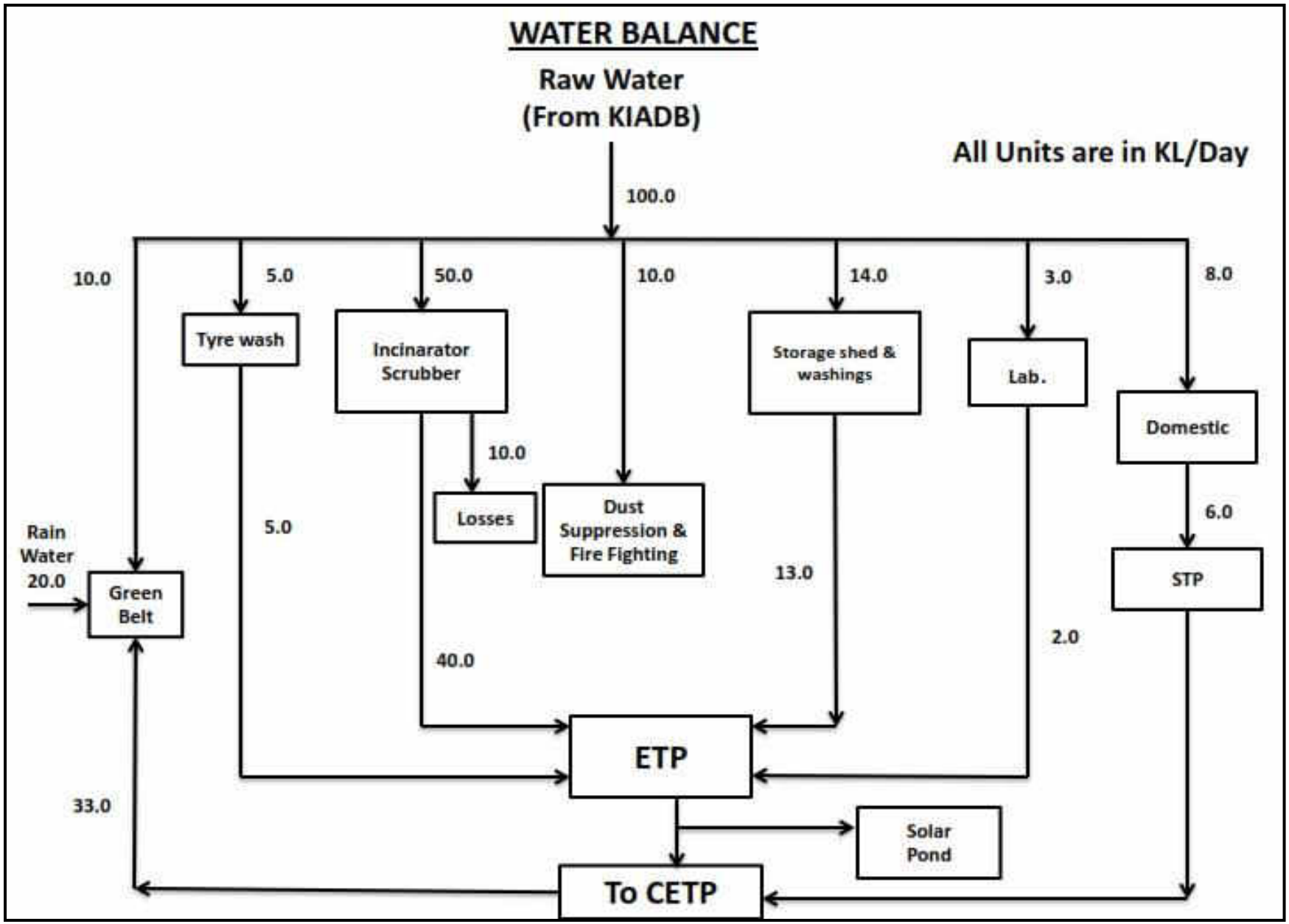
(iv) Submit revised water balance.

The total water required for operation of CHWTSDF will be 100.0 KLD which will be supplied by KIADB.

The water consumption in Incinerator will be 50.0 KLD during regular operation. About 10.0 KLD will be evaporation loss and remaining 40.0 KLD used for scrubbed water which will be sent to ETP for preliminary treatment.

In storage shed, 14.0 KLD water will be required for washings and spraying (as per requirement) which will be discharged to ETP (about 13.0 KLD). Similarly, tyre washings (5.0 KLD) and laboratory use (3.0 KLD) together (5.0 +2.0 = 7.0 KLD) waste water will be sent to ETP for treatment. There will be treated waste water consumption of 33.0 KLD for green belt along with 10.0 KLD fresh water, 10.0 KLD for dust suppression and 8.0 KLD domestic consumption.

Depending on the quality of waste water, the provision has been made to treat in ETP or send to Solar Pond for evaporation. During rainy season, the treated water from ETP along with surface run off water around TSDF site will be sent to CETP for treatment. The details of the water balance are given in Figure below:


WATER BALANCE
Raw Water
(From KIADB)
All Units are in KL/Day
100.0
10.0
5.0
50.0
10.0
14.0
3.0
8.0
Tyre wash
Incinarator Scrubber
Storage shed & washings
Lab.
Domestic
10.0
Losses
Dust Suppression & Fire Fighting
6.0
Rain Water 20.0
Green Belt
5.0
13.0
STP
2.0
40.0
ETP
33.0
Solar Pond
To CETP

Environmental Impact Assessment & Environment Management Plan Report

For

Integrated Common Hazardous Waste Treatment, Storage and Disposal Facility (CHWTSDF) at Village- Kadechur District- Yadgir, Karnataka

M/s Mother Earth Environ Tech Pvt. Ltd. KIADB Industrial Estate, at Village- Kadechur District- Yadgir, Karnataka

Prepared by

VISIONTEK CONSULTANCY SERVICES PVT. LTD

(An Enviro Engineering Consulting Cell)

Plot No.-M 22 & 23, Chandaka Industrial Estate Patia, Bhubaneswar-24

Phone No. : 91-674-6451781

E-mail- visiontekin@gmail.com

Visit us at -www.vcspl.org

ISO 14001:2004
ISO 9001: 2008
OHSAS 18001:2007

April - 2019

DECLARATION BY PROJECT PROPONENT

We, M/s Mother Earth Environ Tech Private Limited proposed to install **Integrated Common Hazardous Treatment Storage and Disposal Facility (CHWTSDF) at KIADB Kadechur Industrial Estate, Taluka and district Yadgir, Karnataka.**

As per EIA Notification dated 14th Sep 2006, this project falls under Category "A" (EIA Notification dated 14th Sep 2006 as amended on 2009). Accordingly proposal for Term of Reference (TOR) for undertaking EIA/EMP study for proposed project was issued by MoEF & CC for Integrated Treatment Storage and Disposal Facility for Hazardous Waste vide File No. 10-37/2018-IA-III, Dated 27.07.2018 and online proposal no. IA/KA/MIS/73814/2018 Dated 06.04.2018.

We have entrusted for conducting EIA / EMP Study to M/s Visiontek Consultancy Services Pvt. Ltd., Bhubaneswar, who has been accredited by the National Accreditation Board for Education & Training (NABET), Quality Council of India Vide Accreditation No: NABET / EIA /1720/RA0090, Dated 30.04.2018. The Environmental Impact Assessment (EIA) & Environmental Management Plan (EMP) Report has been prepared based on the approved ToR and as per the generic structure of the EIA Notification 2006.

The data contained in EIA Report are sourced from primary & secondary data and assessment is based on Environmental Impact Assessment methodologies. We hereby undertake to mention that the information / data given in the EIA report are factual and scientific to the best of our knowledge & belief. All data contained in this report is owned by M/s Mother Earth Environ Tech Private Limited.

For M/s Mother Earth Environ Tech Private Limited

Authorized Signatory

Date: 03/01/2019

Place: Bangalore

DECLARATION BY CONSULTANT

[as per MoEF Office Memorandum No. J-11013/41/2006-IA.II (I) dated 04.08.2009 & NABET Annexure – VII]

DECLARATION BY EXPERTS CONTRIBUTING TO THE EIA/EMP OF

M/s Mother Earth Environ Tech Pvt. Ltd.

Integrated Common Hazardous Waste Treatment, Storage and Disposal Facility (CHWTSDF) at at Village- Kadecheru, District- Yadgir, Karnataka

Declaration by Experts contributing to the EIA/EMP:

I, hereby, certify that I was part of the EIA team in the following capacity that developed the above EIA/EMP.

EIA Co-ordinator:

Name : M. C. Dash

Signature : MC Dash

Period of involvement : March, 2017 – Till date

Contact information : Visiontek Consultancy Services Pvt. Ltd.
M 22 & M23, Chandaka Industrial Area, Patia, Bhubaneswar-24
Phone No. : 91-674-6451781
E-mail-visiontekin@gmail.com, www.vcspl.org

Functional Area Experts (FAEs):

Sr. No.	Functional Areas	Name of the expert/s	Involvement during March, 2017– Till date	Signature
1.	AP	Manoj Kumar	a) Identifying the sources of emissions and mitigation measures. b) Inventory of point Source Stacks emissions details. c) Ambient Air Quality -Impact predictions and mitigations.	Manoj kumar

DECLARATION BY CONSULTANT

2.	**WP**	**Manoj Kumar** **C. R. Panda**	a) Surface water and ground water quality monitoring and assessment, impacts on Water environment and mitigations. b) Identification, characterisation of effluent streams and treatments thereof c) Water balance and conservation measures	Manoj Kumar CR Panda
3.	**SHW**	**B. K. Mishra**	a) Non-hazardous solid wastes generation, recycling and disposal b) Storage and management of hazardous solid wastes	B.K. Mishra
4.	**SE**	**Dr. Arati Nanda**	a) Determination of demographic profile including socio economy & livelihood b) Assessing the changes in socio economic pattern	Arati Nanda
5.	**EB**	**Dr. B. C. Nagaraja**	a) Biological environment status in respect of terrestrial fauna and aquatic eco system b) Impact on ecological environment	BC Nagaraj
6.	**HG & Geo**	**P. K. Panda** **Arin Bandyopadhyay**	a) Ground water resource assessment b) Impact on ground water potential and mitigation measures for avoiding Ground water contamination.	PK Panda Arin
7.	**AQ**	**Manoj Kumar** **C. R. Panda**	a) Processing of site- specific micro-meteorological data b) Air dispersion modelling for prediction of GLCS due to PM10, SO2 and NOx	Manoj Kumar CR Panda
9.	**LU**	**P K Ranjan** **B. C. Nagaraj**	a) Analysis of data related to land use b) Land use map development. c) Impact on land environment in respect to land form change	PK Ranjan BC Nagaraj

DECLARATION BY CONSULTANT

10.	**RH**	**Manoj Kumar** **S. C. Mishra**	a) Identification of hazardous prone areas b) Environment risk analysis c) On-site and Off-site emergency planning	Manoj Kumar Semisha

Declaration by the Head of the accredited consultant organization/ authorized person

I, **P. Kumar Ranjan**, Managing Director, Visiontek Consultancy Services Pvt. Ltd., hereby,confirm that the above mentioned experts were involved in the preparation of the EIA/EMP for M/s Mother Earth Environ Tech Pvt. Ltd. KIADB Industrial Estate, at Village-Kadecheru District- Yadgir, Karnataka

The Awarded TORs are complied with and incorporated in the EIA/EMP Report. The data submitted in the EIA Report are factually correct to best our knowledge. I also confirm that I shall be fully accountable for any miss-leading information mentioned in this statement.

Name: **Mr. P. Kumar Ranjan**

Signature

Designation: **Managing Director**

Name of the EIA Consultant Organization: **Visiontek Consultancy Services Pvt. Ltd.**
QCI/NABET Accredited Environment Consultancy

NABET Certificate No. & Issue Date: NABET/EIA/1720/RA0090 & dated- 30.04.2018

F. No. 10-37/2018-IA-III
Government of India
Ministry of Environment, Forest and Climate Change
(IA.III Section)

Indira Paryavaran Bhawan,
Jor Bagh Road,
New Delhi - 110003

Date: 27th July, 2018

To,

Shri T.N. Paramesh, Managing Director,
M/s Mother Environ Tech Private Limited,
2542, 17th Main, 28th Cross,
Banashankari 2nd stage, Near BDA Complex,
Benaluru, Karnataka - 560070.

Phone no.: 080-26712303/26712305
Email: kadechur1@gmail.com, pramed.av@motherearthenviron.com

Subject: Integrated Treatment Storage and Disposal Facility for Hazardous Waste at Plot No. 158 to 164, KIADB Kadechur Industrial Estate Village Kadechur, Tehsil and District Yadgir, Karnataka by M/s Mother Earth Environ Tech Private Limited - Terms of Reference - reg.

Sir,

This has reference to your online proposal No. IA/KA/MIS/73814/2018 dated 06th April, 2018, submitted to this Ministry for seeking Terms of Reference (ToR) in terms of the provisions of the Environment Impact Assessment (EIA) Notification, 2006 under the Environment (Protection) Act, 1986. The proposal is for grant of Terms of Reference to the project 'Integrated Treatment Storage and Disposal Facility for Hazardous Waste at Plot No. 158 to 164, KIADB Kadechur Industrial Estate Village Kadechur, Tehsil and District Yadgir, Karnataka' by M/s Mother Earth Environ Tech Private Limited.

2. The project/activity is covered under category 'A' of item 7(d) 'Common Hazardous Waste Treatment, Storage and Disposal Facilities (TSDFs)' of the Schedule to the EIA Notification, 2006 and its subsequent amendments, and requires appraisal at Central Level.

3. The proposal for grant of Terms of Reference (ToR) to the project was considered by the Expert Appraisal Committee (Infra-2) in its 32nd meeting held on 2 - 4 July, 2018.

4. The details of the project, as per the documents submitted by the project proponent, and also as informed during the above said meeting, are as under:

(i) M/s Mother Earth Environ Tech Pvt Ltd Bangalore (MEETPL) is proposing an Integrated Treatment, Storage and Disposal Facility (TSDF) for hazardous waste (HW) under the setting-up and operational compliance framework of the Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016 (Hazardous Waste Rules) over a 16.2 ha industrial plot within Notified Industrial Estate (IE) of Karnataka Industrial Area Development Board (KIADB), Kadechur, Taluka and District Yadgir, Karnataka. The proposed integrated TSDF will comprise a secured landfill of 1.21 MT and an incinerator of 12 T/day (Phase I - Stationary hearth type), expandable to 24 T/day, Phase II -

Rotary kiln primary chamber type) treatment and terminal disposal of hazardous waste, along with essential utilities and amenities.

(ii) The site will also feature a 5 MLD CETP based on conventional technology, to be developed in phases of 1.2, 1.2 and 2.6 MLD. The 3 MLD CETP is part of the Environmental Clearance (Refer Sr. 3, (vi), page 02 of the Kadechur KIDB Industrial Estate Environmental Clearance letter).

(iii) Environmental clearance for the 1311.18 ha KIADB IE has been accorded by the Ministry of Environment, Forest and Climate Change (MoEE&CC), New Delhi vide Letter No. 21-8/2014-IA-III, dated 14th October, 2016).

(iv) According to Karnataka State Pollution Control Board (KSPCB) Inventory of Hazardous Waste as on 20th December, 2017, the state of Karnataka generates about 1,91,990 MT/annum (plus 9,52,199 nos. of contaminated units - containers, filters, etc. which are not measured in weight units) of hazardous waste from 3134 industrial/other units, 46,596 MT/annum (24.2%) of which is land-fillable waste and 79,542 MT/annum (plus 74,068 nos.) (41.4%) is incinerable waste.

(v) The Integrated TSDF will require about 260 KLD raw water for domestic, industrial and horticulture purpose. Raw water will be supplied by the KIADB. Water use for horticulture will be supplemented by treated effluent from the CETP after it is commissioned.

(vi) **Investment/Cost:** Approx. Rs.135 Crores.

(vii) **Employment potential:** About 30 persons (8 skilled, 22 semi-skilled) will work in the integrated TSDF in its fully operational state. In addition, 35 - 40 contract labourer and 12 security personnel will be needed for operation of the facility.

(viii) **Benefits of the project:** The land of 16.2 ha land will serve the industries in North and North East Karnataka for essential hazardous waste disposal service for more than five decades.

5. As per the recommendation of the EAC, the Ministry of Environment, Forest and Climate Change hereby accords ToR to the above project for preparation of the Environmental Impact Assessment (EIA) Report and Environmental Management Plan (EMP) with the following specific and general conditions in addition to Standard ToR provided at Annexure -1:

Specific Guidelines

(i) Importance and benefits of the project.

(ii) The E.I.A. would address to the conformity of site to the stipulations as made in the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 and will have a complete chapter indicating conformity to the said rules.

(iii) The application should be made only for those phases which are likely to be completed within the maximum permissible validity, (10 years in this case)

(iv) Project proponents would also submit a write up on how their project 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.

(v) A certified compliance report on the compliance and functioning of the CETP, from the State Pollution Control Board and the Zonal office of the MoEF&CC as applicable, shall be submitted.

(vi) Certified Compliance Report issued by the MoEF&CC, Regional Office or concerned Regional Office of Central Pollution Control Board or the Member Secretary of the

respective State Pollution Control Board for the conditions stipulated in the environmental clearance issued to KIADB Industrial Estate by MoEE&CC vide Letter No. 21-8/2014-IA-III, dated 14th October, 2016 along with an action taken report on issues which have been stated to be partially complied or non/not complied.

(vii) Status of compliance to the provisions of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 and Bio-Medical Waste Management Rules, 2016.

(viii) Details of various waste management units with capacities for the proposed project.

(ix) List of waste to be handled and their source along with mode of transportation.

(x) Other chemicals and materials required with quantities and storage capacities.

(xi) Details of temporary storage facility for storage of hazardous waste at project site.

(xii) Details of pre-treatment facility of hazardous waste at TSDF.

(xiii) Details of air emissions, effluents, hazardous/solid waste generation and their management.

(xiv) Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract).

(xv) Process description along with major equipments and machineries, process flow sheet (quantitative) from waste material to disposal to be provided.

(xvi) Hazard identification and details of proposed safety systems.

(xvii) 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 30 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be provided.

(xviii) Ground water quality monitoring in and around the project site.

(xix) The Air Quality Index shall be calculated for base level air quality.

(xx) Status of the land purchases in terms of land acquisition Act and study the impact.

(xxi) Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land.

(xxii) R&R details in respect of land in line with state Government policy.

(xxiii) Details of effluent treatment and recycling process.

(xxiv) Leachate study report and detailed leachate management plan to be incorporated.

(xxv) Action plan for measures to be taken for excessive leachate generation during monsoon period.

(xxvi) Action plan for any pollution of ground water is noticed during operation period or post closure monitoring period.

(xxvii) Detailed Environmental Monitoring Plan as well as Post Closure Monitoring Plan.

(xxviii) A certificate of adequacy of available power from the agency supplying power to the project along with the load allowed for the project.

(xxix) The EMP would also include proposals for creating a solar Power generation farm.

(xxx) A pond is situated at 1.45 Km from site. The EIA would examine the impact of this activity on the pond and also describe as to how it conforms to the siting criteria.

(xxxi) A detailed Plan for green belt development.

(xxxii) A certificate from the local body supplying water, specifying the total annual water availability with the local authority, the quantity of water already committed, the quantity of water allotted to the project under consideration and the balance water available. This should be specified separately for ground water and surface water sources, ensuring that there is no impact on other users.

(xxxiii) Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included.

(xxxiv) The project proponents shall satisfactorily address to all the complaints/suggestions that have been received against the project till the date of submission of proposals for Appraisal.

(xxxv) Plan for Corporate Environment Responsibility (CER) as specified under Ministry's Office Memorandum vide F.No. 22-65/2017-IA.III dated 1st May 2018 shall be prepared and submitted along with EIA Report.

(xxxvi) A tabular chart with index for point wise compliance of above ToRs.

General Guidelines

(i) The EIA document shall be printed on both sides, as far as possible.

(ii) All documents should be properly indexed, page numbered.

(iii) Period/date of data collection should be clearly indicated.

(iv) Authenticated English translation of all material provided in Regional languages.

(v) The letter/application for EC should quote the MoEF&CC File No. and also attach a copy of the letter prescribing the ToR.

(vi) The copy of the letter received from the Ministry on the ToR prescribed for the project should be attached as an annexure to the final EIA-EMP Report.

(vii) The final EIA-EMP report submitted to the Ministry must incorporate the issues mentioned in ToR. The index of the final EIA-EMP report, must indicate the specific chapter and page no. of the EIA-EMP Report where the specific ToR prescribed by the Ministry. Questionnaire related to the project (posted on MoEF&CC website) with all sections duly filled in shall also be submitted at the time of applying for EC.

(viii) Grant of ToR does not mean grant of EC.

(ix) The status of accreditation of the EIA consultant with NABET/QCI shall be specifically mentioned. The consultant shall certify that his accreditation is for the sector for which this EIA is prepared.

(x) On the front page of EIA/EMP reports, the name of the consultant/consultancy firm along with their complete details including their accreditation, if any shall be indicated. The consultant while submitting the EIA/EMP report shall give an undertaking to the effect that the prescribed ToRs (ToR proposed by the project proponent and additional ToR given by the MoEF&CC) have been complied with and the data submitted is factually correct (Refer MoEF&CC Office memorandum dated 4th August, 2009).

(xi) While submitting the EIA/EMP reports, the name of the experts associated with/involved in the preparation of these reports and the laboratories through which the samples have been got analysed should be stated in the report. It shall clearly be indicated whether these laboratories are approved under the Environment (Protection) Act, 1986 and the rules made there under (Please refer MoEF&CC Office Memorandum dated 4th August, 2009). The project leader of the EIA study shall also be mentioned.

(xii) All the ToR points as presented before the Expert Appraisal Committee (EAC) shall be covered.

6. The above ToR should be considered for the project 'Integrated Treatment Storage and Disposal Facility for Hazardous Waste at Plot No. 158 to 164, KIADB

Kadechur Industrial Estate Village Kadechur, Tehsil and District Yadgir, Karnataka by M/s Mother Earth Environ Tech Private Limited', in addition to all the relevant information as per the 'Generic Structure of EIA' given in Appendix III and IIIA in the EIA Notification, 2006.

7. Public hearing is exempted for the project as per para 7(i) III Stage (3)(i)(b) of EIA Notification, 2006 for preparation of EIA/EMP Report.

8. The project proponent shall submit the detailed final EIA/EMP prepared as per ToRs to the Ministry for considering the proposal for environmental clearance within 3 years as per the MoEF&CC O.M. No.J-11013/41/2006-IA-II(I) (P) dated 08.10.2014.

9. The consultants involved in preparation of EIA/EMP report after accreditation with Quality Council of India/National Accreditation Board of Education and Training (QCI/NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other Organization(s)/ Laboratories including their status of approvals etc. vide Notification of the MoEF&CC dated 19.07.2013.

10. The prescribed ToR would be valid for a period of three years for submission of the EIA/EMP Reports.

11. This issues with the approval of the Competent Authority.

Bhawna Singh

(Dr. Bhawna Singh)
Scientist D

Copy to:

1. The Member Secretary, Karnataka State Pollution Control Board, No. 25, 6th - 9th Floor, Public Utility Building, M.G. Road, Bangalore - 560 001.

Annexure-I

7(d): STANDARD TERMS OF REFERENCE FOR CONDUCTING ENVIRONMENT IMPACT ASSESSMENT STUDY FOR COMMON HAZARDOUS WASTE TREATMENT, STORAGE AND DISPOSAL FACILITIES (TSDFS) AND INFORMATION TO BE INCLUDED IN EIA/EMP REPORT

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.

2) Submit the details of the road/rail connectivity along with the likely impacts and mitigative measures

3) Submit the present land use and permission required for any conversion such as forest, agriculture etc

4) Examine the details of transportation of Hazardous wastes, and its safety in handling.

5) Examine and submit the details of on line pollutant monitoring.

6) Examine the details of monitoring of Dioxin and Furon.

7) MoU for disposal of ash through the TSDF.

8) MoU for disposal of scrubbing waste water through CETP.

9) Examine and submit details of monitoring of water quality around the landfill site.

10) Examine and submit details of the odour control measures.

11) Examine and submit details of impact on water body and mitigative measures during rainy season.

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.

13) Water quality around the landfill site shall be monitored regularly to examine the impact on the ground water.

14) The storage and handling of hazardous wastes shall be as per the Hazardous Waste Management Rules.

15) Submit details of a comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disaster.

16) Public hearing to be conducted for the project in accordance with provisions of Environmental Impact Assessment Notification, 2006 and the issues raised 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 web-site.

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.

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.

19) The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.

20) Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website http://moef.nic.in/Manual/Incinerator

****

Specific ToR Compliance

Sr. No.	Specific Points	Compliance
1.	Importance and benefits of the project.	There are no integrated TSDFs (featuring both secured landfill and HW incinerator at the same site) in Karnataka. Only two operational TSDFs (with secured landfills alone) are near Bangalore. There is a need for TSDF in Karnataka to cater the need for the industries. Pls refer to Section-1.2, Chapter -1
2.	The E.I.A. would address to the conformity of site to the stipulations as made in the Hazardous and Other Wastes (management and Transboudary Movement) Rules, 2016 and will have a complete chapter indicating conformity to the said rules.	Site Criteria selection has been made as per Hazardous and Other Wastes (management and Transboudary Movement) Rules, 2016 and is complying to CPCB's "Guideline for conducting EIA and Site Selection for Common Hazardous Waste Management Facility, New Delhi, 2003. Pls. refer to Table – 5.2, Chapter -5
3.	The application should be made only for those phases which are likely to be completed within the maximum permissible validity. (10years in this case).	Proposed TSDF will consist of 1.21 MT secured land fill and incinerator to be established in 2 phases of 12 TPD each with ultimate capacity of 24 TPD and will be established within the maximum validity period.
4.	Project proponents would also submit a write up on how their project proposal confirm to the stipulations made in the 'Protocol for Performance evolution and monitoring of the Common	Noted. Project Proponent will submit the Performance evolution with respect to basic information, quarterly report, criteria for storage and functioning of Landfill as per the protocol.

	Hazardous Waste Treatment Storage and Disposal Facilities including common Hazardous Waste incinerators', published By the CPCB on May24,2010.	
5.	A certified compliance report on the compliance and functioning of the CETP, from the State Pollution Control Board and the Zonal office of the MoEF & CC as applicable, shall be submitted.	Certification of compliance report is under process is attached as Annexure -2 in EIA report.
6.	Certified Compliance Report issued by the MoEF & CC, Regional Office or concerned Regional Office of Central Pollution Board or the Member Secretary of the respective State Pollution Control Board for the conditions stipulated in the environmental clearance issued to KIADB Industrial Estate by MoEF & CC vide letter No. 21-8/2014-IA-III, dated 14th October, 2016 along with an action taken report on issues which have been stated to be partially complied or non/not complied.	Certification of compliance report is under process. Letter is attached as Annexure - 2 in EIA report. KIADB (Govt of Karnataka) has provided letter for this.
7.	Status of compliance to the provisions of the Hazardous and other Wastes (Management and Transboundary Movement) Rules, 2016 and Bio-Medical Waste Management Rules, 2016.	Project Proponent will follow procedure for - • Management of Hazardous and other wastes • Treatment Storage and disposal facility • Packing, levelling and transportation of Hazardous waste According to Hazardous and other Wastes

		(Management and Transboundary Movement) Rules, 2016
8.	Details of various waste management units with capacities for the proposed project.	The proposed integrated TSDF will comprise a secured landfill capacity of 1.21 MT and an incinerator of 12 T/day (Phase I – Stationary hearth type), expandable to 24 T/day, Phase II-Rotary kiln primary chamber type) treatment and terminal disposal of hazardous waste, along with essential utilities and amenities.
9.	List of waste to be handled and their source along with mode of transportation.	CPCB's Guidelines for Transportation of Hazardous waste (HAZWAMS-33) Central Government Rules under the Motor Vehicle Act, 1988 Details Chapter-2 Table-2.4 and sec-2.16.1.2
10.	Other chemicals and materials required with quantities and storage capacities.	Caustic Lye having storage capacity of 10 Tonnes. Details Chapter-2 Section-2.12.2 Table-2.13
11.	Details of temporary Storage facility for storage of hazardous waste at project site.	Stabilization Area - Steel Post Truss with CGI covered roof, concrete floor and side wall brick masonry. Temporary Waste Storage Area- Concrete Platform for manual sorting and inspection Pls refer to Table – 2.10, Chapter -2.
12.	Details of pre-treatment facility of hazardous waste at TSDF.	Pre-treatment shall be provided based on Comprehensive /fingerprint analysis of waste

		sample. Pls refer to Section 2.16.1, Chapter -2.
13.	Details of air emissions, effluents, hazardous/solid waste generation and their management.	Pls refer to Page 10.2 - 10.6 of Section-10.2, Chapter-10.
14.	Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract).	Water- 100 KLD Source-KIADB will provide Power- 450 KW Source-Guberga Electricity Supply Company (GESC) Water & Power Permission Letter- Annexue-5 Manpower-30 (regular). Pls refer to Section 2.10 – 2.10.4, Chapter - 2.
15.	Process description along with major equipment and machineries, process flow sheet (quantitative) from waste material to disposal to be provided.	Details in Chapter-2 Section-2.11.2 Chapter-2 Figure-2.8 Chapter-2 Section-2.12 Figure-2.10
16.	Hazard identification and details of proposed safety systems.	Chapter-7 Section-7.1.4
17.	Details of Drainage of the project up to 5km 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 level of the project site and maximum Flood Level of the river shall also be provided.	Project is within the notified Industrial Estate. There is no river within 1.0 km Pls refer to Figure 3.15, Page 3.40, Chapter 3.
18.	Ground Water quality monitoring in and	Ground Water quality monitoring will be done

	around the project site.	as per the monitoring programme detailed in Table-6.2, Page -6.7-6.8 Chapter-6
19.	The Air Quality Index shall be calculated for base level air quality.	Results- From the baseline data it has been computed, so the AQI are in the range of 51-100 in Satisfactory Class. So, Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution. Pls refer to Page 3.9 of Chapter 3.
20.	Status of the land purchases in items of land acquisition Act and study the impact.	Land has been allotted by KIADB in the Industrial Estate. Copy of land allotment letter is attached **Annexure-4.**
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.	Land has been allotted by KIADB in the Industrial Estate. Copy of land allotment letter is attached **Annexure-4.**
22.	R & R details in respect of land in line with state Government policy.	Land is within the Industrial Estate. Hence there is no R & R Plan is envisaged.
23.	Details of effluent treatment and recycling process.	In the proposed system, the leachate from segregation pit, Temporary Waste Storage area, bottom of the land fill cells are collected and sent to ETP & will be pumped to solar pond or CETP as per requirement.
24.	Leachate study report and detailed leachate management plan to be incorporated.	Pls refer to Section-2.12.8, Chapter -2
25.	Action plan for measures to be taken	Details Chapter-2 Section-2.13

	for excessive leachate generation during monsoon period.	
26.	Action plan for any pollution of ground water is noticed during operation period or post closure monitoring period.	Details Chapter-6 Section-6.3 & 6.4 Table-6.2 & 6.3 Page-6.6-6.10
27.	Detailed Environmental Monitoring Plan as well as Post Closure Monitoring Plan.	Details Chapter-6 Section-6.3 & 6.4 Table-6.2 & 6.3 Page-6.6-6.10
28.	A certificate of adequacy of available power from the agency supplying power to the project along with the load allowed for the project.	Approval Copy for Power Connection from KIADB has been attached **Annexure-5.**
29.	The EMP would also include proposals for creating a solar Power generation farm.	There has been provision for solar power generation to the extent of 5 % of total power requirement.
30.	A pond is situated at 1.45Km from site. The EIA would examine the impact of this activity on the pond and also describe as to how it conforms to the siting criteria.	As per the CPCB site selection criteria, Lake pond shall be more than 200 meters There shall not be any impact to the pond which is more than 200 m.
31.	A detailed Plan for green belt development.	Considering the total project area of 16.2 Ha (162000 Sq m), 5.4 Ha (53460Sq m – 33%) will be developed into Green belt. Trees to be planted as per the Horticulture Department. Pls refer to Page 8.5 & 8.6, of Section 8.2.4, Chapter 8.

32.	A certificate from the local body supplying water, specifying the total annual water availability with the local authority, the quantity of water already committed the quantity of water allotted to the project under consideration and the balance water available. This should be specified separately for ground water and surface water sources, ensuring that there is no impact on other users.	Total water requirement shall be supplied by KIADB. There is no proposal for drawl of ground water and surface water.
33.	Any litigation pending against the project and / or any direction / order passed by any Court of Law against the project, if so, details thereof shall also be included.	No litigation is pending.
34.	The project proponents shall satisfactory address to all the complaints / suggestions that have been received against the project till the date of submission of proposals for Appraisal.	Shall be complied as per the requirement.

<table>
<tr>
<td>35.</td>
<td>Plan for corporate Environment Responsibility (CER) as specified under Ministry's Office Memorandum vide F.No.22-65/2017-IA.III dated 1st May 2018 shall be prepared and submitted along with EIA report.</td>
<td>Corporate Environment Responsibility (CER) – 118 lakhs
<table>
<tr><th>Activities</th><th>Expenditure proposed (Rs.) Lakhs</th></tr>
<tr><td>General development in the area</td><td></td></tr>
<tr><td>a) Housing</td><td>25</td></tr>
<tr><td>b) Water supply</td><td>15</td></tr>
<tr><td>c) Education</td><td>21</td></tr>
<tr><td>d) Health, safety and medical facilities.</td><td>26</td></tr>
<tr><td>Infrastructure-public transport, roads, communication and electricity</td><td>2</td></tr>
<tr><td>Recreation and other sports activities</td><td>11</td></tr>
<tr><td>Total</td><td>118</td></tr>
</table>
</td>
</tr>
<tr>
<td>36.</td>
<td>A tabular chart with index for point wise compliance of above ToRs.</td>
<td>Noted.</td>
</tr>
</table>

Standard ToR COMPLIANCE

Sr. No.	ToR Points	Compliance
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 reject sites. The analysis should include parameters considered along with weightage criteria for short –listing selected site.	Alternative site compared and selected on basis of environmental sustainability weightage. Details in Chapter 5 – Section 5.2 The proposed site was preferred as it is located within the approved Industrial Area.
2.	Submit the details of the road/rail connectivity along with the likely impacts and mitigate measures	SH-51 at 0.7 Km is well connected with industrial area road. Nearest railway station Chegunta located at 3.8 km from site is also well connected by road. Road carry capacity is adequate. Only marginal impact.Details in Chapter 2 – Section 2.4
3.	Submit the present land use and permission required for any conversion such as forest, agriculture etc	The land is part of the approved KIADB Industrial Estate for which due Environmental Clearance has been accorded by MoEF&CC vide letter no. 21-8/2014-IA-III,dated 14th October, 2016 and the present land use is also

		industrial. Details in Chapter 2 – Section 2.2
4.	Examine the details of transportation of Hazardous wastes, and its safety in handling.	All transportation will be in compliance to Rule 17,18 & 19 of Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016, Details in Chapter 2 – Sec. 2.16.1.2
5.	Examine and submit the details of online pollutant monitoring.	Online monitoring system will be provided. Details in Chapter 6 – Table 6.2
6.	Examine the details of monitoring of Dioxin and Furon.	Dioxin and Furan in stack emission will l be monitored regularly as per CPCB guidelines and CTO from KSPCB Details in Chapter 6 – Table 6.2
7.	MoU for disposal of ash through the TSDF.	Ash shall be disposed in in-house TSDF for covering and in landfill.
8.	MoU for disposal of scrubbing waste water through CETP.	Waste water shall be treated in in-house in the 5 KLD CETP to be constructed at site
9.	Examine and submit details of monitoring of water quality around the landfill site.	Will be taken up all around in 50 m & 100 m and at least one in core zone. Details in Chapter – 3, Section - 3.7 and Chapter – 6, Table 6.2 and 6.3

10.	Examine and submit details of odour control measures.	Daily covering of landfill with soil/ash to mitigate the odour. During rains HDPE covers will also be provided. Details in Chapter – 4, Section 4.5.2
11.	Examine and submit of impact on water body and mitigative measures during rainy season.	No withdrawal of water from surface or ground water. Water supplied by KIADB Industrial Estate. Wastewater treated in CETP. Separate storm water drain network will be established. Collected rain water will be used for various purposes leading to conservation of water resources. TSDF & CETP will operate on Zero Discharge concept and no on-land or surface water discharge is envisaged and hence no impact on the water body. Details in Chapter – 4, Section 4.12
12.	Environmental Management plan should be accompanied with Environmental Monitoring Plan and environmental cost and benefit assessment. Regular monitoring shall be carried out of odour control.	Rs. 1.60 crores envisaged for the environment management plan and monitoring. Details in Chapter – 6, Section-6.5.2, Table 6.5
13.	Water quality around the landfill site shall be monitored regularly to examine the impact on the	Water quantity shall be monitored regularly. Will be taken up all around in 50 m & 100 m and at least one in

	ground water.	vadose zone. Details in Chapter – 6, Table 6.2 and 6.3
14.	The storage and handling of hazardous wastes shall be as per the Hazardous Waste Management Rules.	It will be as per Hazardous and other Waste (Management, Handling Rules 2016. A high- head storage shed of 600 sq. m. with impervious flooring, leachate collection drains, suitable soft partition, circulation area, loading/ unloading bays will be constructed. The shed will be naturally aspirated and will be provided with flame proof electrical fittings. All material handling operations will be carried out by mechanized means. Facility for Waste Inspection and Sampling, Stabilization and Temporary shed will be provided. Details in Chapter 2 – Sec. 2.11.3
15.	Submit details of a comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disaster.	DMP details mentioned in Chapter – 7
16.	Public hearing to be conducted for the project in accordance with provisions of Environmental Impact Assessment Notification, 2006 and the issues raised by the public should be addressed in the	Public hearing is not required as proposed TSDF will be set up within declared industrial Estate vide EC letter F.No.21-8/2014-IA-III on dated

	Environmental Management Plan. The Public Hearing should be conducted based on the ToR letter issed by the Ministry and not on the basis of minutes of the Meeting available on the web-site.	14th October 2016.
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.	EIA/EMP REPORT has been prepared with additional TOR.
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.	There is no litigation.
19.	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Revised Cost for proposed project is Rs. 5948.69 Lakhs. While Captial budget for EMP is envisaged as Rs. 160 Lakhs. Details in Chapter 9 – Table 9.1 Recurring cost of EMP is envisaged as Rs. 33.52 Lakhs/annum approx. Details in Chapter 6 – Table No. 6.5
20.	Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website http://moef.nic.in/Manual/Incinerator.	Noted and complied

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Chapter 1

Introduction

1.1 Project Intent

M/s Mother Earth Environ Tech Pvt. Ltd. Bangalore (MEEPL) is proposing an integrated Treatment, Storage and Disposal Facility (TSDF) for hazardous waste (HW) under the setting-up and operational compliance framework of the Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016 over a 16.2 ha Industrial Plot within Notified Industrial Estate (IE) of Karnataka Industrial Area Development Board (KIADB), Kadechur, Taluka and District Yadgir, Karnataka. The proposed integrated TSDF will comprise a secured landfill of 1.21 MT and an incinerator of 12 T/day (Phase I – Stationary hearth type), expandable to 24 T/day, Phase II - Rotary kiln primary chamber type) treatment and terminal disposal of hazardous waste, along with essential utilities and amenities.

The site will also feature a 5 MLD CETP based on conventional technology, to be developed in phases of 1.2, 1.2 and 2.6 MLD.

Environmental clearance for the 1311.18 ha KIADB IE has been accorded by the Ministry of Environment, Forest and Climate Change (MoEE&CC), New Delhi vide' Letter No. 21-8/2014-IA-III, dated 14th October, 2016), as given in **Annexure I.**

1.2 Need for the Project

With the ever-increasing population, industrial growth and urbanisation, waste management has emerged as a huge challenge in the country. Not only the waste has increased in quantity, but the characteristics of waste have also changed tremendously over a period due to change in industrial process integration, consumption pattern, lifestyle and use of civic consumables and durables. It is estimated that about 62 million tonnes of waste is generated annually in the country, out of which 5. 6 million is plastic waste, 0.17 million is biomedical waste. In addition, hazardous waste generation is 7.90 million TPA and 15 lakh tonne is e-waste. The per capita waste generation in Indian cities range from 200 gm to 600 gm/day (2011). 43 million TPA is collected, 11.9 million is treated and 31 million is dumped in landfill sites.

According to Karnataka State Pollution Control Board (KSPCB) Inventory of Hazardous Waste as on 20th December, 2017, given in **Annexure II,** the state of Karnataka generates about 1,91,990 MT/annum (plus 9,52,199 nos of contaminated units – containers, filters, etc. which are not measured in weight units) of hazardous waste from 3134 industrial/ other units, 46,596 MT/annum (24.2%) of which is land-fill able waste and 79,542 MT/annum (plus 74,068 nos.) (41.4%) is incinerable waste.

The generation of hazardous waste, both landfill and incinerable is heavily skewed towards Bangalore (Urban and Rural), contributing a dominant portion of the wastes in both incineration and landfill categories. There are no integrated TSDFs (featuring both secured landfill and HW incinerator at the same site) in Karnataka.

TSDFs operational in Karnataka with secured landfills alone are as follows:

- M/s Karnataka Waste Management Project, Doddaballapur Road, KIADB, Industrial Area, Dobbaspet, Nelamangal Tq, Bangalore Rural – 562 111
- Mother Earth Environ Tech Pvt. Ltd. Plot No 217, 2nd phase KIADB Industrial Area, Harohalli, Kanakapura Taluk, Ramanagara District – 562 112

TSDFs operational in Karnataka with standalone incineration facility are as follows:

- M/s Haat Incinerators India Pvt Ltd, #35 B & C, Jigani Industrial Area, Bangalore – 560 105
- M/s Gomti Incinco, # 3 – B-2, 1st Phase, KIADB Indl Area, Kumbalgodu, Mysore Road, Bangalore – 560 074
- M/s Century Refineries (P) Ltd, # 17 A & B, KIADB Indl. Area, Hoskote Taluk, Bengaluru – 562 114
- M/s. Bangalore Incinerator Pvt. Ltd., No. 28, KIADB Industrial Area, Kallanayakana Village, Huthridurga Hobli, Kunigal Taluk, Tumkur
- M/s. E Nano Incintech, Plot No., 342-B, Harohalli Industrial Area, 2nd Phase, 2nd Sector, Kanakapura Taluk, Ramanagara District – 562 112

In addition, six stand-alone HW incinerators are in operation in the state. Apart from increase in HW generation due to increase in industrial production, and including of wastes streams into hazardous wastes in the newly notified Hazardous

and Other Waste (Management and Transboundary Movement) Rules, 2016. It is a common observation that declaration of hazardous waste by the generators increase if a TSDF in the vicinity provides affordable facility and cost of disposal. The increase in landfill and incinerable waste has been observed to increase by 356 % and 1770 % based on KSPCB data of 2008 and 2015.

About 43.18 % HW generating units fall in 19 KSPCB ROs within 100 km of Bangalore, which is the major hazardous waste generation hub of the state.

About 800 MT/annum of waste presently being received by MEETPL is from the northern districts, which will be diverted to the Kadechur integrated TSDF upon commissioning, thus increasing the usable life of the secured landfill at Harohalli.

1.3 Project Proponent

M/s Mother Earth Environ Tech Pvt. Ltd., promoted by Chaitra Group, Bangalore is a company in the business of providing secured landfill services of hazardous waste. It operates a secured landfill site of 95,000 MT waste capacity over 1.44 ha site at KIADB Harohalli Industrial Area, Ta. Kanakapura, dist. Ramanagara, about 40 km from Bangalore under valid Environmental Clearance (details) and Consent and Authorization of KSPCB (details). Managing Director of Chitra Group, Sh. T N Paramesh was the member of KSPCB from 2007 to 2010, member of consent committee for EIA and Non EIA category and Library and Laboratory Committee, and has in-depth knowledge and hands-on experience in the domain of hazardous waste generation and treatment. Sh. Paramesh has been involved in greening of Adichunchanagiri (plantation of five lakhs trees), and also been conferred upon National Award for Small Scale Entrepreneurs, 2006 from the august hands of Dr. Manmohan Singh, the then Prime Minister of India for his work in pilot project on drip irrigation based on an Israeli technology.

1.4 Proposed Project Site

The proposed integrated TSDF is proposed over a 16.2 ha land inside the KIADB Kadechur IE (Plot Numbers 158 to 164). The plot is 770 m east of the Raichur to Yadgiri highway SH-51, Kadechur village is 1.6 km away from the site's eastern boundary. A 24 m, four lane, un-mediated tarred road passes from in front (south) of the site which will act the prime easement for the site.

The Kadechur IE is about 40 km south (by road) from Yadgir, the District Headquarter. River Bhima, tributary of perennial River Krishna is about 8.2 km south west of the site. River Krishna is about 12.3 km south of the site. Bada talab (village irrigation tank) is about 1.45 km east of the site.

Chegunta is the nearest railway station, about 3.8 km (aerial distance) south of the site on the South Central Railway line (double track, electrified, 374 m MSL). Saidapur is the second nearest railway station, about 8.2 km (aerial distance) north west of the site on the South Central Railway line (double track, electrified, 379 m MSL). Railway track is about 2.5 km south west of the Project site. The nearest airport is Rajiv Gandhi International Airport, Hyderabad, located about 140 km in the north east direction (aerial distance) from the proposed Project site.

The site is 2.15 km away from the inter-state boundary of Telengana in the east. Maganur Mandal taluka, Mahbubnagar District is the adjoining administrative unit of Telengana from the site.

1.5 Application for Environmental Clearance

The project attracts proviso of the EIA Notification, 2006 (amended) under Schedule, Sr. 7(d) Common hazardous waste treatment, storage and disposal facilities (TSDFs), Category 'A', all integrated facilities having incineration and landfill or incineration alone.

As the Kadechur KIADB IE has obtained Environmental Clearance in 14th October, 2016 (refer Annexure I), under 7, 7(i), III, (i), (b) Public Consultation, including Public Hearing will not be applicable to the project. Being within 10 km of the interstate boundary (Karnataka and Telangana), General Condition, as mentioned in the Schedule of the Notification is applicable to the project.

EIA Notification, 2006 (Amended), Schedule, Note:- General Condition (GC): Any project or activity specified in Category 'B' will be treated as Category 'A', if located in whole or in part within 10 km from the boundary of (iv) inter-State boundaries and international boundaries.

Provided that the requirement regarding distance of 10 km of the inter-State boundaries can be reduced or completely done away with by an agreement between the respective States or U.Ts sharing the common boundary in case the activity does not fall within 10 kilometres of the areas.

1.6 Importance of the Project to the Country, Region

There is a growing concern all over the country for the disposal of hazardous wastes generated from anthropogenic sources. The waste generators find it difficult to dispose their hazardous wastes without causing environmental disturbance; very few scientific disposal facilities are available.

The Hazardous Waste (Management and Handling) Rules 1989 subsequently revised in 2000, 2003, 2008 and 2016, promulgated under the Environment Protection Act 1986 govern the generation, handling, storage, treatment and disposal of Hazardous Wastes. Schedule I and II of the 2016 Rules clearly identify hazardous waste from processes, their characteristics and concentration levels beyond which a waste will be termed as hazardous. As per the Rules, the hazardous wastes need to be disposed off in a secured manner

without causing environmental damage. CPCB has published several Guidelines for waste characterization and criteria to choose disposal pathways.

The primary objective of this project is to provide scientific treatment/ disposal of Hazardous Wastes through common landfill facility to cater to the hazardous wastes generation in Karnataka state.

The detailed chronology for conducting EIA studies and obtaining Environmental clearance is as under:

- Registered on MoEF & CC web portal
- Submitted Online Application & received acknowledgement slip with file number and proposal number
- TOR was deliberated at Expert Appraisal Committee held on 02/07/2018 at MoEF & CC Delhi
- Baseline studies were conducted from December 2017 to February 2018

1.7 Objectives and Description of Activities in EIA

Objectives of EIA

The objectives of EIA for the proposed project are listed below:

- Characterization and bench marking of existing environmental status
- To identify and quantify significant impact on the environmental parameters during Construction, Commissioning, Operation and Decommissioning phases of the proposed project.
- To recommend appropriate mitigation measures to avoid/ minimize pollution and health hazards, environmental disturbance, property damage and nuisance.
- Preparation of an environmental management plan to minimize adverse impacts of proposed project, a budget, monitoring plan, Program to implement the same.

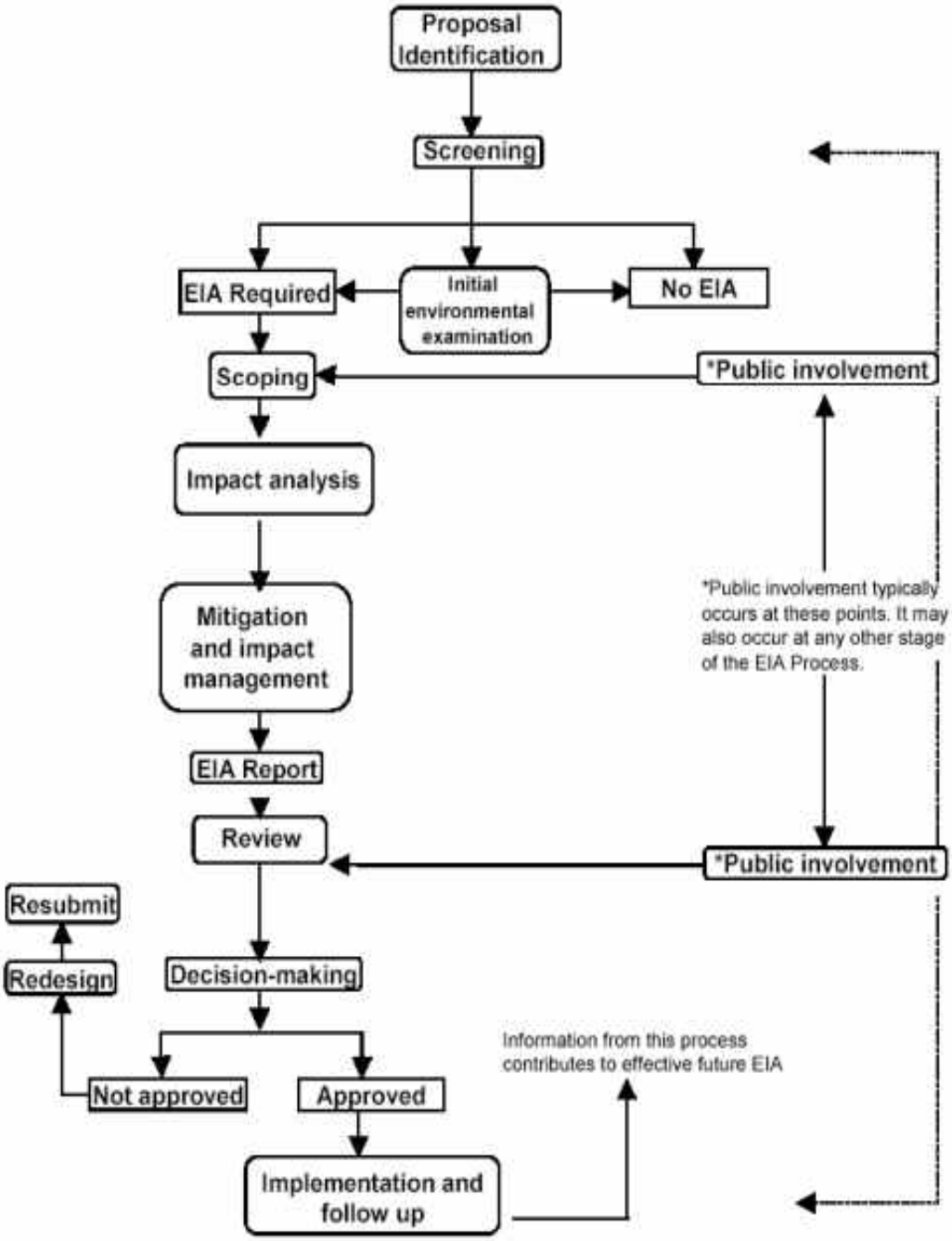
Activities involved in EIA study

EIA is a management tool to identify, frame and prioritize the environmental issues in such a way as to work out the mitigation measures to allow the negative impacts to be minimized or to be avoided during different phases of the proposed project.

EIA process passes through the following phases:

- Screening, Scoping by Preliminary scanning of project and study area
- Regulatory approval of ToR
- Desktop study of the project details and study area to understand environmental issues and identify Secondary data sources and identify Environmental indicators
- Field studies (Primary survey) collection of baseline environmental data for study area
- Impact identification, prediction and evaluation
- Assessment of alternatives and delineation of Environment Management Plan
- Risk Assessment (RA) and Disaster Management Plan (DMP)
- Review and finalization of EIA report
- Final EIA report and EC Application.

Flow chart of various activities carried out for EIA report preparation is depicted below.



These activities are described in detail below:

1. Screening and scoping

Screening stage is not necessary for this project since it is listed in category 7 (d) of the EIA Notification, 2006 and thus requires EIA. Scoping is carried out by Environmental Consultant by studying the project activity and its location and site specific Terms of Reference was proposed for the EIA.

2. Desktop Study and Secondary Data

Desk top study includes study of the project proposal/ process details, its air/water pollution aspects, wastes generation, hazardous chemicals used. Desk study also includes study of available maps, Google Earth images to understand the study area and helps identify available data on environmental monitoring from other reliable sources, if any. Secondary/published data has been accessed for the EIA study, to supplement and/or confirm observations in the primary study (field surveys). Reference materials such as Census 2011, SOI/OSM map published articles from authentic sources; Data from Forest Department, Health Department have been used for the preparation of EIA report.

3. Field studies

Field studies have been carried out in winter season (December 2017 to February 2018) to verify and complement information gathered from desktop study. Baseline data describes the existing environmental status of the identified study area and covers all the relevant components of ambient air monitoring; noise, water quality, soil monitoring, ecological, and socio- economic and health components of the environment as below:

- **Air environment:** Monitoring of the existing status of ambient air quality and analysis have been carried out for PM_{10}, $PM_{2.5}$, SO_2, NOx, CO results compared with National Ambient Air Quality Standard, 2009. Eight sampling stations have been selected considering the pre-dominant downward wind direction, population zone and sensitive receptor of the region. Micro-meteorological data like hourly wind speed

and direction, temperature, relative humidity, rain fall etc. have been collected by using wind monitor.

- **Noise environment:** Noise level monitoring has been carried out for day and night times by Sound Level Meter to assess the present scenario of the noise environment. Results have been compared to Standards as given in EP Act.

- **Land Environment:** Geo hydrological studies and Soil investigations were conducted by engaging a QCI NABET accredited Geo-hydrology expert and Soil Conservation. Soil samples have been collected from selected locations within the impact zone and analyzed for relevant parameters. Studies on soil characteristics were carried out. Existing land use and topography, landscape and drainage patterns within the study area were analyzed.

- **Water environment:** Ground & Surface Water samples have been collected from various locations within 10 km radius from the project. Analysis was carried out for physico-chemical, heavy metal, microbiological and biological parameters. Results have been compared with IS 10500:2012 (Drinking Water Quality Standards) to assess the water quality.

- **Ecology & Socio-Economic Environment**

Primary data of flora and fauna in 10 km study area in various habitats identified have been collected from site surveys by QCI- NABET accredited Functional Area Experts. Similarly, surveys were conducted through socioeconomic experts to assess the quality of life and status of socioeconomic conditions in study area.

- **Laboratory Analysis:** Samples collected during the field sampling are analyzed in MOEF&CC accredited laboratory.

4. Impact Prediction and Evaluation

Four phases of the project have been identified viz Construction, Erection and Commissioning, Operation and Decommissioning. Impact prediction is a way of 'mapping' the environmental consequences of the significant aspects of the project and its alternatives in each of these phases. Wherever possible impacts are

quantified using available regulatory models (for example ISCST 3 model of the USEPA has been used for predicting Air quality impacts). Impact evaluation was carried out using the matrix method.

5. Risk and Hazard Assessment

Risk assessment report contains hazard identification, consequence analysis of failures and predicts consequences due to accidents resulting in fire, explosion, hazardous releases etc. The report gives pointers for effective Onsite /off site Emergency Plan and ways for reducing the hazards and accident occurrences.

6. Mitigation Measures and Environmental Management Plan

Mitigation plan has been drawn up for each of the identified project phases depending upon severity of impacts estimated to avoid/ minimize pollution and health hazards, environmental disturbance, property damage and nuisance. An environmental management plan to minimize adverse impacts of proposed project, a budget and monitoring plan to implement the same.

7. EIA Report

Based on the field survey visit primary & secondary data collection, compilation of data and technical details were done by the project team and review will be done by the EC. Draft EIA report will be prepared after incorporation of all the technical data, maps, drawings, FAEs comments and inputs from EC. Quality check would be conducted by a QA/QC team and their comments to be incorporated in the report. After final confirmation from the project proponent EIA report shall be submitted.

Structure of EIA Report

1	**Introduction**	• Purpose of the report • Identification of project & project proponent • Brief description of nature, size, location of the project and its importance to the country, region • Scope of the study – details of regulatory scoping carried out.

2	**Project Description**	• Condensed description of those aspects of the project (based on project feasibility study), likely to cause environmental effects.
		• Description contains the details of the following:
		  - Type of project
		  - Need for the project
		  - Location details showing general location, specific location, project boundary & project site layout
		  - Technology and process description including drawings showing project layout, components of project etc.
		• Description of mitigation measures incorporated into the project to meet environmental standards.

3	**Description of the Environment**	• Study area, period, components & methodology. • Establishment of baseline for valued environmental components, as identified in the scope. • Study Period • Base maps of all environmental components. • Frequency of monitoring

4	**Anticipated Environmental Impact And Mitigation Measures**	• Details of Investigated Environmental impacts due to project location, possible accidents, project design, project • Construction, regular operations. Measures for minimizing and / or offsetting adverse impacts identified. • Irreversible and Irretrievable commitments of environmental components • Assessment of significance of impacts (Criteria for determining significance, Assigning significance) • Mitigation measures.
5	**Analysis of Alternatives (Site and Technology)**	• Analysis of alternative site considered for the proposed project. • Analysis of alternatives technologies considered for the project
6	**Environmental Monitoring Programme**	• Technical aspects of environmental monitoring for the effectiveness of mitigation measures (incl. Measurement methodologies, frequency, location data analysis, reporting • schedules, emergency procedures, budget & procurement schedules)
7	**Additional Studies (Risk Assessment and Public Hearing)**	• Hazard Identification • Risk Assessment & control/prevention Measures • Disaster Management
8	**Project Benefits**	• Details of the Socio-economic & other tangible / intangible benefits of the project.
9	**Environmental Cost Benefit Analysis**	• Details of the environmental benefits of the project.

10	**Environmental Management Plan**	• Description of the administrative aspects of ensuring that mitigation measures are implemented and their effectiveness monitored, after approval of the Clearance. The Chapter consist of: • Mitigation measures for impacts • Pollution Prevention Plan • Greenbelt Development Plan • Waste management plan • Environment Management Cell • Budgetary Provisions for EMP
11	**Summary and Conclusions**	• Brief description of EIA content, summary and conclusion
12	**Disclosure of Consultant Engaged**	• Details of EIA Consultant

Chapter 2

Project Description

2.1 Type of Project

M/s Mother Earth Environ Tech Pvt. Ltd. Bangalore (MEEPL) is proposing an integrated Treatment, Storage and Disposal Facility (TSDF) for hazardous waste (HW) under the setting-up and operational compliance framework of the Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016 over a 16.2 ha industrial plot within Notified Industrial Estate (IE) of Karnataka Industrial Area Development Board (KIADB), Kadechur, Taluka and District Yadgir, Karnataka.

The proposed integrated TSDF will comprise a secured landfill of 1.21 MT and an incinerator of 12 T/day (Phase I - Stationary hearth type), expandable to 24 T/day, Phase II - Rotary kiln primary chamber type) treatment and terminal disposal of hazardous waste, along with essential utilities and amenities.

2.2 Proposed Project Site

The proposed integrated TSDF is proposed over a 16.2 ha land inside the KIADB Kadechur IE (Plot Numbers 158 to 164). The plot is 770 m east of the Raichur to Yadgiri highway SH-51, Kadechur village is 1.6 km away from the site's eastern boundary. A 24 m, four lane, un-mediated tarred road passes from in front (south) of the site which will act the prime easement for the site.

The Kadechur IE is about 40 km south (by road) from Yadgir, the District Headquarter. River Bhima, tributary of perennial River Krishna is about 8.2 km south west of the site. River Krishna is about 12.3 km south of the site. Bada talab (village irrigation tank) is about 1.45 km east of the site. Location of the site in the IE map of the Kadechur KIADB IE is given in **Figure No. 2.3**.

Present Land use of Site

The land is part of the notified KIADB Industrial Estate for which due Environmental Clearance has been obtained from concerned authority and no conversion of land is required, as the present land use is also industrial. The EC of the KIADB Industrial Estate and land allotment letter by its authority is annexed to the report.

2.3 Site Accessibility

Chegunta is the nearest railway station, about 3.8 km (aerial distance) south of the site on the South Central Railway line (double track, electrified, 374 m MSL). Saidapur is the second nearest railway station, about 8.2 km (aerial distance) north west of the site on the South Central Railway line (double track, electrified, 379 m MSL). Railway track is about 2.5 km south west of the Project site. The nearest airport is Rajiv Gandhi International Airport, Hyderabad, located about 140 km in the north east direction (aerial distance) from the proposed Project site. The site is 2.15 km away from the inter-state boundary of Telengana in the east. Mangalur Mandal taluka, Mahabubnagar District is the adjoining administrative unit of Telangana from the site.

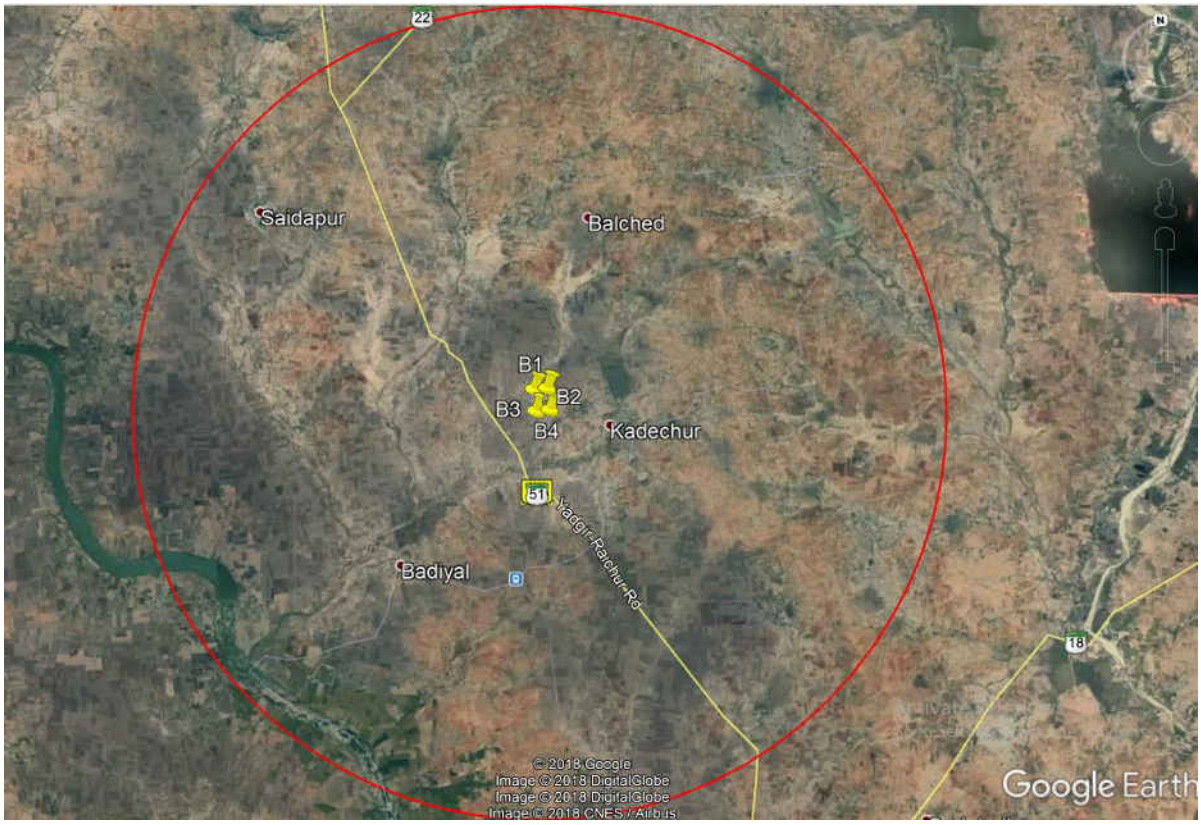


Figure No. 2.1: Google Image of the Area Showing 10 Km raidus of Study Area

Boundary Co-Ordinates

B1	**16^0 31' 8.0436" N** **77.18' 31.2588" E**
B2	**16^0 31' 25.4244" N** **77.18' 31.5288" E**
B3	**16^0 31' 25.284" N** **77.18' 42.6456" E**
B4	**16^0 31' 7.9032" N** **77.18' 42.8364" E**

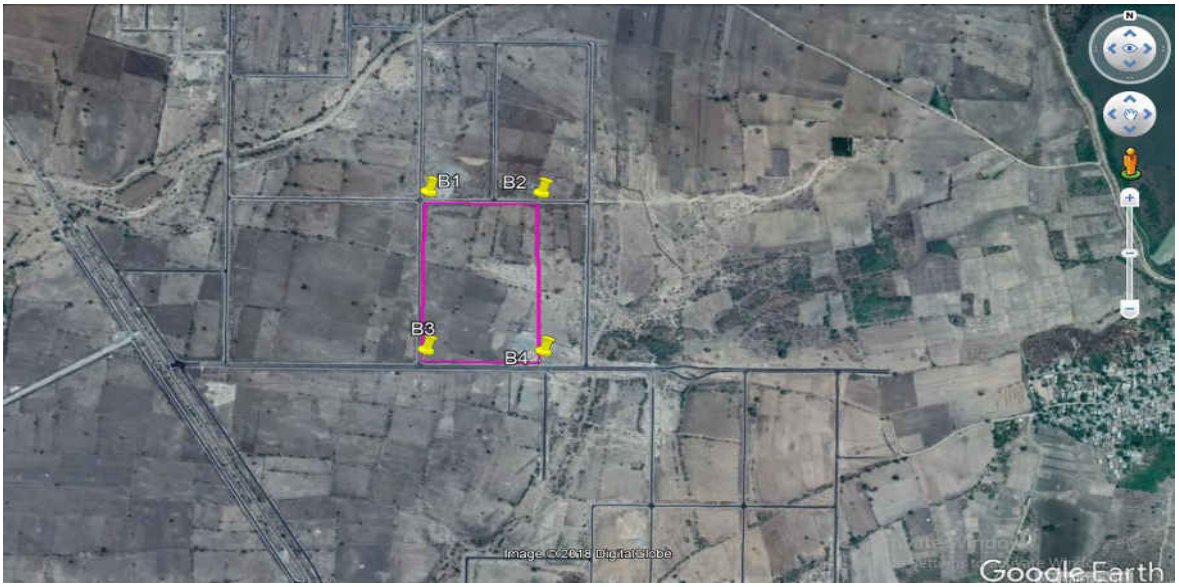


Figure No. 2.2: Site Accessibility Map

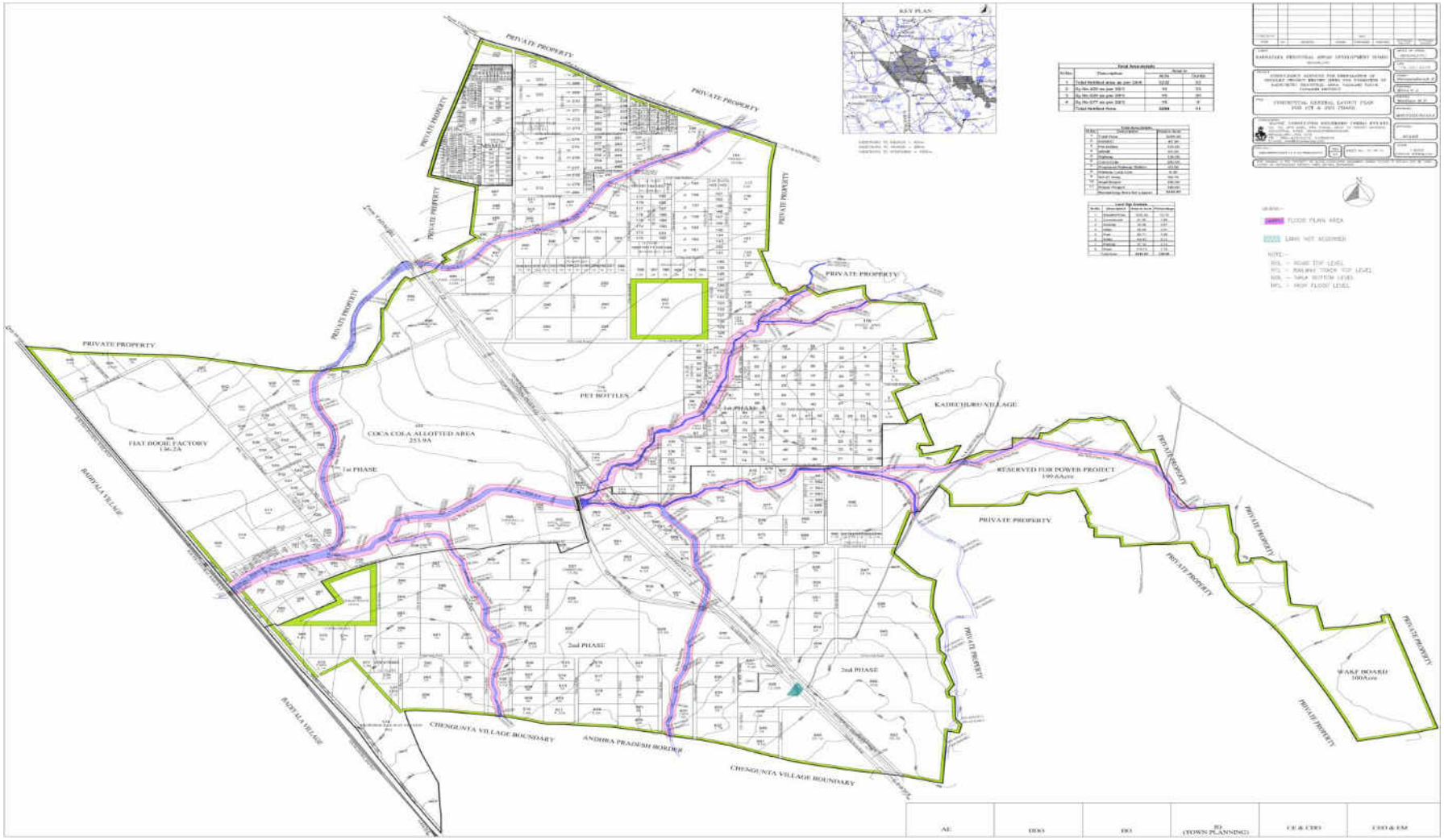


Figure No. 2.3: Location of the site in the IE map of the Kadechur KIADB IE

2.4 Project Location and Its Advantage

The proposed Kadechur Industrial Area is located near village Kadechur, around 45 Kms from Yadgir. The project site gradually slopes towards South-East direction with rolling terrain. The soil is predominantly Blackish to Grey clayey sand. The project area is approachable on National Highway towards Raichur- Mumbai National Highway. Thus the project location is strategically located and in fact this National Highway bifurcates the entire industrial area and has potential for attracting more industries. Further, this industrial area is also located adjoining main railway line connecting Raichur, Ananthpur, Bengaluru on southern direction and Gulbarga, Solapur, Miraj, Pune and Mumbai on North- West direction. Yadgiri is also the connecting point to the Indian Capital, i.e. Delhi & other major metros viz. Bangalore, Chennai, Hyderabad, Bhopal, etc.

2.4.1 Connectivity

The state is well connected to 6 neighboring states, and other parts of India through14 national highways as the state accounts for six percent of the total national highway network in the country. The district headquarters in the State are linked through 114 state highways and the total road network national highways, state highways and district roads is about 2.22 lakh kms out of which 1.30 lakh kms is surfaced.

Karnataka has good rail connectivity with total rail length of 3,244 kms. The Rail projects are proposed on a PPP basis with the State well connected to other parts of the country and Karnataka being the first State to share cost of railways on an ongoing PPP basis.

The state has five domestic international airports at Bangalore, Mangalore, Hubil, Mysore and Belgaum and new minor airports are proposed at Hassan, Bellary, Gulbarga, Bijapur and Bidar. The state has one major port at Mangalore and ten minor ports situated in three coastal districts of Karnataka.

2.4.2 Description of Connectivity of the Area

Road: State Highway 51, connecting Yadgir – Raichur passes at a distance of 0.7 Km and is well connected by Industrial area road. The SH is further connected to other major roads of the district. SH – 51 and the connecting road have adequate

carrying capacity and only marginal impact is envisaged due to additional traffic due to this project. To mitigate the impact transportation of material will be regulated and time difference maintained. All material carrying vehicles will be covered and PUC certificate made mandatory.

National and State Highways passes through the District providing good connectivity to the Capital City Bangalore and other important Districts and also parts of Maharashtra, Kerala, Tamilnadu and Andhra Pradesh.

Rail: The District is connected well to the important cities like Mangalore and Bangalore through south central railway network. Nearest railway station of the proposed project site is Chegunta railway station located at 3.8 km. No transportation of material for the project during operation is envisaged by rail, hence negligible impact.

Air: The International Airports located in Karnataka are at Bangalore and Mangalore and nearest Hyderabad Airport is 140 km away from the project site. However, there is helipad facility available in the district.

Port: The sea port of Karnataka is at Mangalore.

The Village Kadechur situated besides the project site. However the habitation of the village is scattered in nature.

2.5 Topography

Karnataka State has geographical area of 1,92,000 sq.kms. The population of Karnataka as per 2011 Census is 6.11 crores comprising 61% rural population and 39% urban. The density of the population is 319 per sq. km., and literacy rate with 68.13%.

The state has 10 agro climatic zones and has climate and soil most suitable for cultivating almost all type of crops. It is the largest area under horticulture and third largest area for production of horticulture crops in the country, apart from being the third largest producer of fruits and vegetables. It produces nearly 12% fruits and

8% vegetables grown in the country, being the leader in floriculture, coffee, spices, aromatic and medicinal crops.

A detailed survey has been conducted by the implementing agencies to ascertain the topography and ground profile of the project area.

2.6 Area of Coverage for a Combined TSDF Facility

There would be various types of industries likely to be established in this new industrial area. However, there would be mainly units in the pharma and chemical sector who are the likely occupants in this industrial area.

Overall there would be the industrial units which comprise Engineering, Pharmaceutical/ Biotechnology, Food Products, Chemical, Packaging Industries, Plastic & Rubber, Textile and Garments, Ceramics & Tiles, Granite & Marble Processing, Electrical & Electronics, Automobile, Building Materials & Wood Works etc.

Table No. 2.1: List of Upcoming Industries in Kadechur Industerial Area

Sr. No.	Name of Firm Address and Contacts Details	Extent of Land Allotted	Product
1.	Sharanappa S/o Amaresh Post: VibhuthiHalli, Shahapur, Tq. Shahapur, Dist: Yadgir	0.5	Fly Ash Bricks & Cement Precast Product
2.	Prabhukumar, Post P. No: 197/1, Raichur Growth Centre, Wadaloor Road, Raichur	0.5	Pharmaceuticals
3.	M.v. Rakesh S/o Vasanth M. No. 275, T-V, RTPS Colony, Shakthi Nagar, Raichur	0.5	Fly Ash Bricks & Pipes & Poles
4.	Ravikumar S/o Mariyappa H. No. 3/121, BadiyalYadgir	0.5	Bricks Industries
5.	M.A. Mubin S/o WahedMiya, H.No. 3-2-109, KumbarWadi, Yadgir	1	Dall Industries
6.	Md. Ansaruddin S/o Md. Allauddin H. No. 5-5-377/36, S.B. Road, Near Sana MajjinYadgir	1	TyreProlysis
7.	Shoukath Ali Mohd Ali No. 5-1-1, 145/1, Madanpur, Yadgir	1	TyreProlysis
8.	Khalilulla Khan S/o Gujjarulla Khan, Near	0.5	Tycon Fly Ash

	SalahinMajjidKalaburgi		Bricks
9.	Irfan Ahmed Shahan S/o NazzamudinShahan, AsarMohalal, Yadgir	1	Rice Mill
10	Smt. Vijaylaxmi W/o Chi. Krishnarao, P. No. Q-4 & Q-10 ShahapurTq. ShahapurDist: Yadgir	1	Agri Implements
11.	Sharavankumar S/o: Shanthappa, Laxmi Nagar, Yadgir	1	Rice Mill
12.	Naveen S/o Narasappa H. No. 1-11-1128/159, Road, Raichur	1	ModerniseMachanic Fabrication Workshop
13.	Shaik Ibrahim S/o- Shaik Ahmed, H. No. 11-5-57, Besthwarpet, Raichur	1	Cotton Ginning
14.	NaseerHussain S/o Haji Hussain H. No. 2-5-199/3, Court ThalarRaichur	2	Cotton Ginning
15.	PhavadAns Ahmed S/o Abdul Saleemans, Shahapurpet, Yadgir	0.5	Plastic
16.	KahekshaArin S/o JanisarKousar, Sab Manjil, Gandhi Chowk, Yadgir	1	Paver Blocks
17.	MirjaAsifBaig S/o AjimBaig Ward No-07,JKLS Manjil, Ismalnagar, Manvi, Tq. ManviDistYadgir	1	Agri Implements
18.	Lingappa S/o Mahadevappa Bali, Post: Hunasagi, Tq. ShorapurDist: Yadgir	1	Rice Mill
19.	HariprasadDadich (HUF) H. No. 03-10-36, Berun Kill, Raichur, Pin- 585101	2	Cotton Ginning
20.	T. Ahmed Sarif S/o T. Abdul Ganisab, Karibasappa Building, Congress Office	0.5	Fabrication Work
21.	K. Jyothi W/o Chandrashekhar H. no. 3/ 121 & 5/43 BadiyalYadgir	0.25	Water Plant
22.	Asif Sameer Badal S/o A.s. Badal, Millath Nagar, Opp. Govt. Hospital Yadgir	1	Fly Ash Bricks
23.	Kishore Kumar S/o Bheemanna H. No. 10-54/8, Near High School Ground, Jeveshwar Nagar, Shahapur	1	Surgical Units
24.	Smt. Manjula W/o SidannaWaggar, H.No. 5-4-41, & 42, Lades Galli , Station Area Yadgir	1	Oil Industry
25.	Amar M. Meli S/o Mallikarajun S. Meti, H. No. 1-11-55/9A, Venkatesh Nagar Raichur	2	Cotton Ginning
26.	Ameresh P. Nandikol H. no. 9-51, Basaveshwar Nagar, Shahapur	1	Edible Oil

27.	M/s ArsalanFlyash& Cement Bricks Industry Prop: Ayesha Fatima W/o Adam Baig Near Karnataka Function hall, Chiragali Colony Aslam Nagar, Manvi	0.5	Fly Ash Bricks
28.	M/s Raje Cold Storage Prop: RafeeqRaje S/o Md. IqubalRaje, H. No. 19-20 MohallaKhwajapur, Post: Shahapur, Dist: Yadgir	2	Cold Storage

2.6.1 Industrial Growth

Table No. 2.2: Sampling Estimation of HW Quantity

Sr. No.	District	No of Population	Industries	Total HW(MT/Y)	Total HW(TPD)
1	Gulbarga	3659928	12	5213.1	14
2	Yadgir	956180	9	2.5	0
3	Bellary	4145421	66	1325.6	4
4	Bidar	2659871	19	1318	4
5	Raichur	2918687	19	214	1
6	Belgavi	8346178	24	204.3	1
7	Bagalkote	3182882	41	73	0
8	Chitradurga	2992390	26	155	0
9	Gadag	1750685	14	103	0
10	Haveri	2840948	18	706.8	2
11	Koppal	1917621	40	173	0
12	Davangere	3264721	41	408	1
Total		**38635512**	**329**	**9896.3**	**27**

To note that this estimation of HW is been done based on the KSPCB's data inclusive of Incinerables, Land Fillables, Bio-Medical and Recyclables. Further this estimate indicates that with the existing industries around the per capita generation of HW is estimated at 0.00070 kg/person/day, which is much less than any international figures (0.00241 kg/person/day)

2.6.2 Existing Industrial Scenario

There are around 856 industries within 300 km radius of the proposed site. However considering the transportation logistics and accessibility of the existing industries, around 329 industries are likely to contribute their HW to this facility for processing with 9896 MT/year of total waste. Major industrial categories are Sugar Industry, Cement Plants, Iron & Steel Plants, Auto Industry, textile Industry and Power Plants. With the upcoming new industrial areas and state promotion for Pharmaceutical Industries, there will be a great growth of the HW contribution to this facility.

Karnataka is contributing to 8% of the India's industrial income and 9.8% of India's product exports. The State contributes to 6.5% of India's cement production and is the seventh largest producer of cement and has large deposits of high value minerals.

Karnataka State has been a pioneer in developing Industry in the country. Over the last 100 years, the State has the distinction of building a strong and vibrant industrial base, which combines the intrinsic strengths of large industrial public sector undertakings, large & medium privately owned industrial units across industries and a very wide & dispersed small scale sector. The state has demonstrated strength over a wide spectrum of sectors in industry and has outstanding examples of success in the old economy. The Government has been consistently pursuing progressive industrial policies to meet the changing needs of the State's economy and industry. The industrial policy 2009-2014 was formulated keeping in view the changed industrial scenario and to further tempo of industrialization has validity upto 31.03.2014.

Yadgir District is the newly formed District carved out from erstwhile Gulbarga District. The newly formed Yadgir District comprises three Taluka viz., Shahapur, Shorapur and Yadgir itself. Since it is a newly formed district and hence there are not too many industrial developments in the region. The main industrial development was concentrated in and around Gulbarga city which was the capital of Yadgir before formation of new district. The main industries in these three Taluka

comprise dall processing, rice mills, general engineering, building materials, plastic & rubber, etc.

As Yadgir established as a new district Karnataka State, Karnataka Industrial Areas Development Board (KIADB) has proposed to develop Kadechur Industrial Area at Yadgir Taluk& District to give main focus on industrial development and provide momentum for industrial growth in this region. For this purpose, KIADB has acquired and developed a total extent of 3232.55 acres of land. The proposed project area is located adjacent to Kadechur Village in Yadgir Taluk & Yadgir district. It is located at a distance of 3 Km from Kadechur village adjoining Raichur-Mumbai Highway.

Figure No. 2.4: Site Visit Photographs

2.7 Assessment of Existing Treatment Storage & Disposal facilities

2.7.1 Overview of TSDF in Karnataka

Common TSDFs (with secured landfills) are operational at 27 different places in 14 states- Gujarat (8 Nos.), Maharashtra (4 nos.), Uttar Pradesh (3 Nos.), Andhra Pradesh (2 Nos.), Karnataka (2 Nos.), Himachal Pradesh, Madhya Pradesh, Punjab, Rajasthan, Tamil Nadu, West Bengal, Karnataka, Kerala, Uttarakhand, Daman Diu, Dadar & Nagar Haveli each state have 1 No. Common TSDF projects (secured landfills and Incineration) that have obtained Environmental Clearance.

Out of the two secured landfills in Karnataka, only one, M/s Mother Earth Environ Tech Pvt. Ltd., at KIADB Industrial Area, Harohalli, Ramanagara district is operational at the time of issuing this report; the landfill of M/s Karnataka Waste Management Project: KIADB, Industrial Area, Dobbaspet, Bengaluru Rural is in-operative due to denial consent to operate by KSPCB on account of non-availability of Environmental Clearance of the facility under EIA Notification, 2006.

2.7.2 Existing TSDF Details

There are, however, few, large- volume generators of hazardous waste in the northern Karnataka (Bellary-Hospeth industrial cluster), in addition to several basic chemical and pharmaceutical manufacturers in the northern districts, which generate considerable amount of hazardous waste.

Compared to the 17 ROs within 100km of Bangalore (the Bangalore conglomerate), and leaving aside the 02 ROs which are south of Bangalore(but out of 100km distance), however closer to Bangalore, about 25 ROs west and north of Bangalore conglomerate are the prime catchment and target for the purposed TSDF at Kadechur.

These 17 ROs generate about 25% of total hazardous waste, about 41% of total land fillable, about 25% of total recyclable and about 17% of total incinerable waste of the state. The present TSDF of MEEPL at Harohalli received about 800

T/month of land fillable waste from northern districts/ROs, which is about 29% of its infill load (2017-18).

Load security of the proposed TSDF can be further looked at by analyzing the transportation economics of wastes from the centers of origin to the TSDFs. Location of the two existing secured landfills and the one is proposed at Kadechur.

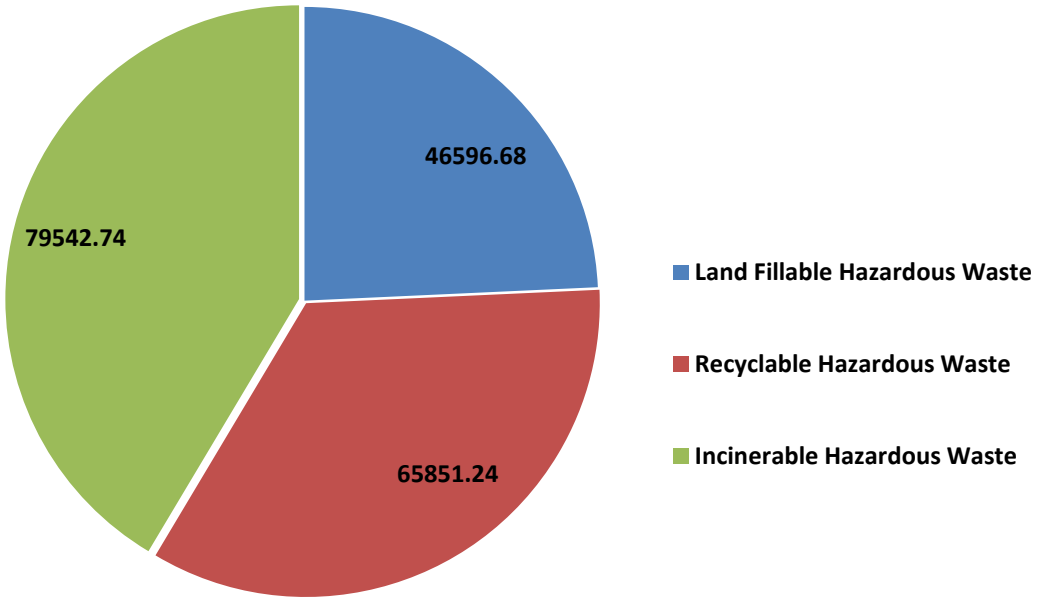
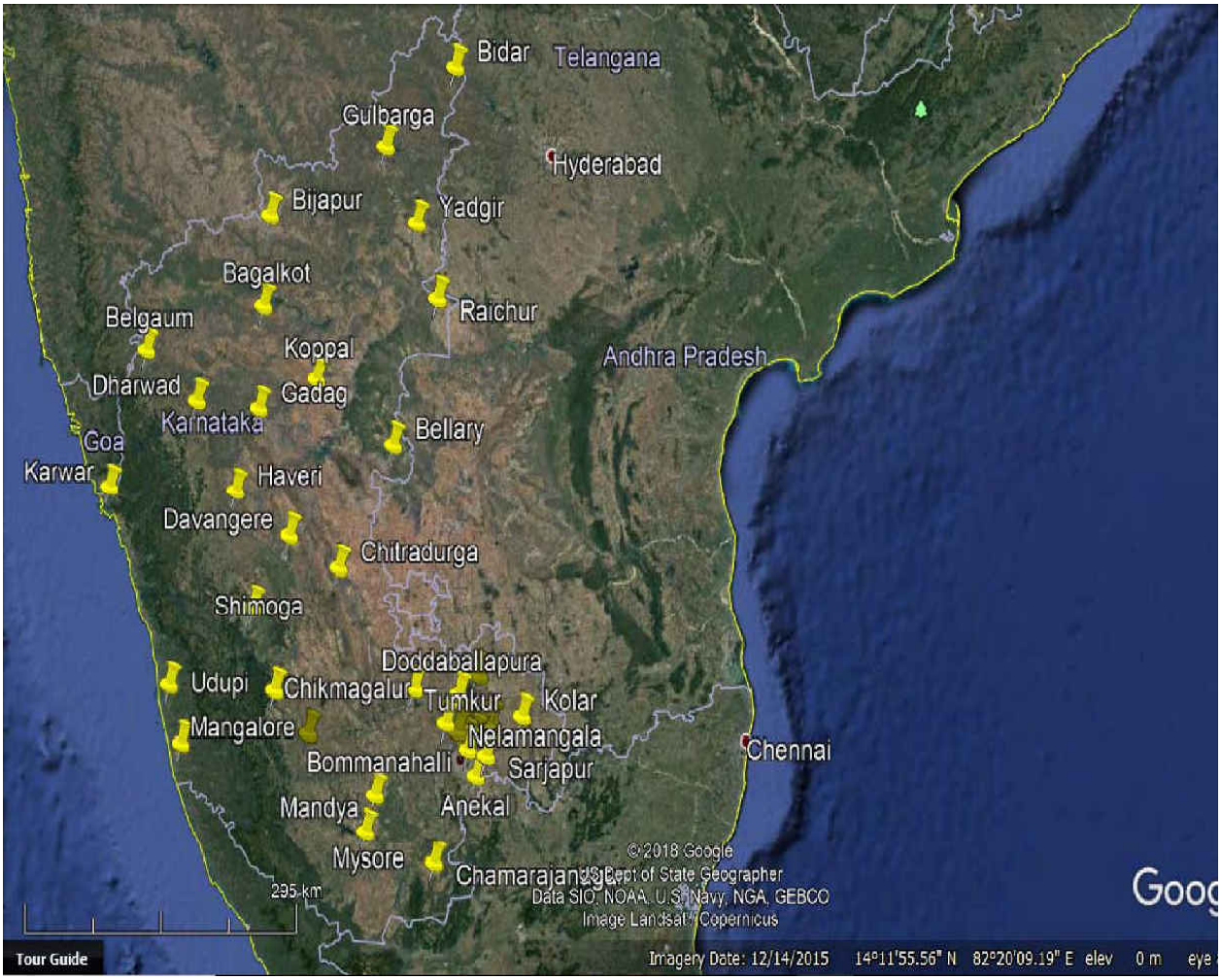
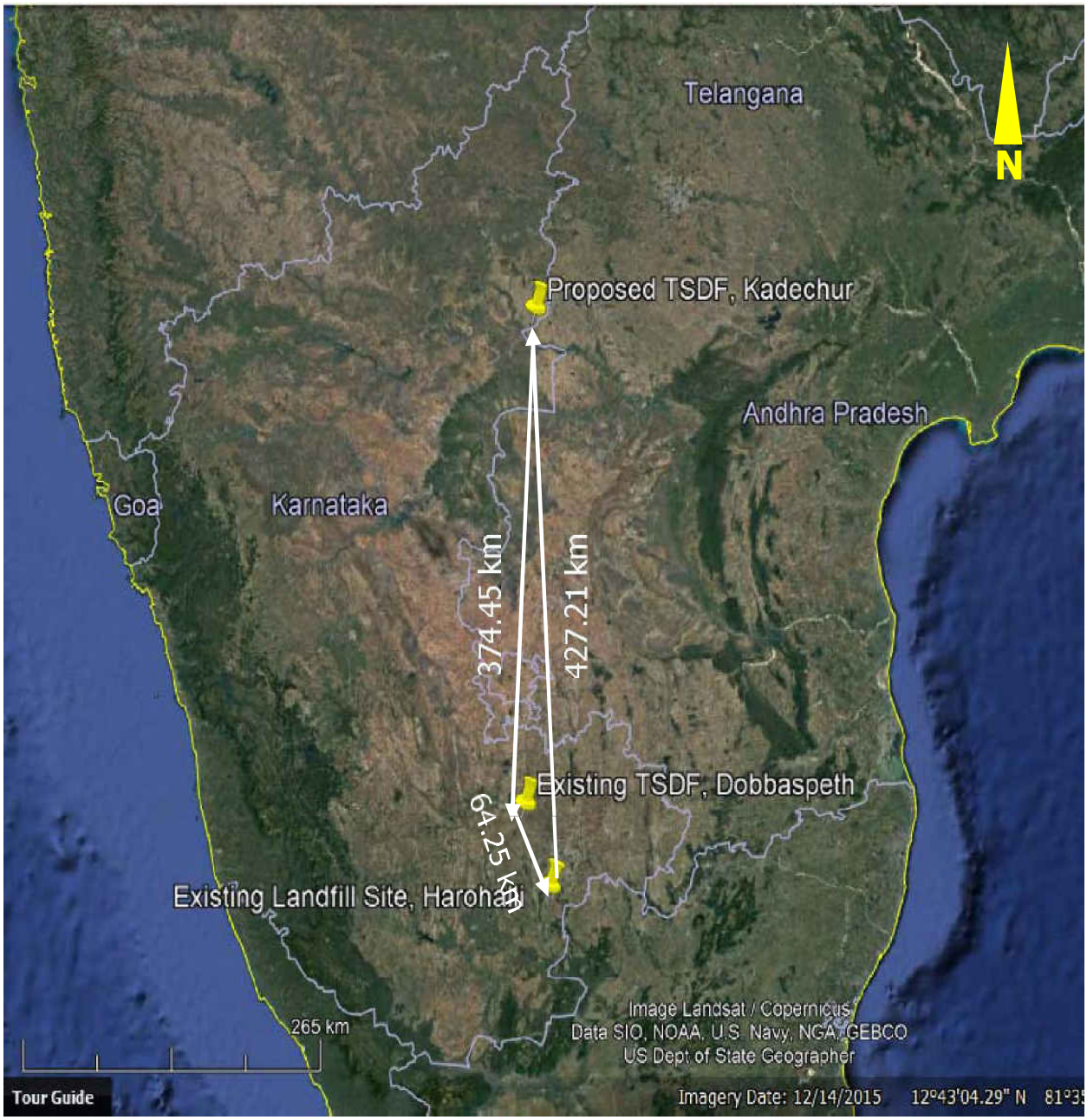


Figure 2.5: Proportion of Landfillable, Recyclable and Incinerable waste in Karnataka

Locations of KSPCB Regional Office s as centres of Hazardous Waste Generation



Location of Existing Secured Landfills at Dobbaspeth, Harohalli and Proposed Secured Landfills at Kadechur.



2.7.3 Sources of Hazardous Waste Generation

There is a great skewing of hazardous waste generation across Karnataka State. Therefore considering the list of industries of nearby District and existing Industrial clusters, the present Hazardous Waste generation is estimated as below.

Table 2.3: Zone wise Hazardous Waste generation

Sr. No.	Zone Name	Total No. of Industries	Land Fillable HW (MT/Yr)	Recyclable HW (MT/Yr)	Incinerable HW (MT/Yr)	Total HW (MT/Yr)
1	Bangalkote	41	0	73.23	0	73.23
2	Belgam-1	87	3.45	2018.83	9.58	2031.85
3	Belgam 2	43	19.91	135.92	272.69	428.52
4	Bellari	66	560	3707	1589	5956
5	Bidar	19	668	0.2	650.03	1318.23
6	Bijapur	30	0	139.22	8.31	147.53
7	Chikkamangalur	3	0	1.5	0	1.5
8	Chitradurga	26	0	93.8	61.34	155.14
9	Davengere	41	291.08	103.66	12.96	407.7
10	Dharwar	84	614.76	405.77	918.26	1938.78
11	Gadag	14	0	91.52	11.55	103.07
12	Gulbarga	12	0	127.5	52004.17	52131.67
13	Haveri	18	0	3626.97	442	4058.97
14	Karwar	41	0	2050	0	2050
15	Kopal	40	1295.04	179.02	255.97	1730.03
16	Mangalore	134	4000	6978	1100	12078
17	Raichur	19	2020.29	34	85.27	2139.56
18	Shivamoga	80	3753	145.67	53.73	3952.4
19	Udupi	49	1486.6	33	18.54	1538.14
20	Yadgiri	9	0	2.5	0	2.5
Total		**856**	**14712.13**	**19947.31**	**57493.4**	**92242.82**

The TSDF Facility Intends to Cater the Industries Generating HW for Treatment & Disposal at the given facility.

2.7.4 Hazardous Waste Characterization

Various hazardous wastes are generated from different industries. Therefore in lieu of the industries around the proposed facility, the type of hazardous waste from the category of industries is listed as below.

Table No. 2.4: Hazardous waste Characterization

Category of Industry	Hazardous Waste
Power Plant	Oil & Grease, Spent Resins from DM Plant, Used Transformer Oil
Iron & Steel Plant	Used Transformer Oil, Hydraulic Oil, Gear Oil, Empty Drum & Barrels, Used Smeared Cotton
Solvent Oil	Spent Solvent, Discarded Container, Bag/ Liners, Used Oil, Incineration Ash, Process Sludge
Fertilizer	Spent Catalysts, spent oil, oil soaked cotton waste, oil filters, batteries, chemical or oil drums & electrical waste, Carbon Residue, ETP Chromium Sludge, Arsenic Sludge
Auto Industry	Used Diesel oil, Engine Oil, Diesel Smeared Cottons, Dry Batteries, Chemical, Paint etc.
Textile Industry	Chemical Residue Containing Lead, Chromium, Arsenic etc. Used oil, PP bags/liner and Discarded drums.
Color & Pigment Manufacture	Spent Catalyst, Spent Oil/Used Oil, Discarded Containers (Bag, Barrel, Drum),Spent Acid Sludge, Process Waste Residue.
Organic Chemical Industry	Resin Residue, Copper Based Catalyst, Titanium Based Catalyst, Contaminated filter cloth, Discarded Container
Petro Chemical	Spent Catalysts, Tarry Residue, Sludge / solid polymerization material, Oil contaminated materials and oily sludge

Pharmaceutical Industry	Process Residue, Spent Catalyst, Spent Carbon etc.

2.7.5 Estimated Waste for TSDF

In the following estimation, the quantity of Bio-medical waste is not been considered due to the fact that it requires specific pre-treatment and decontamination process. Following table indicates zone wise generation of direct Land fill waste from various industries this waste quantification does not include coast processed land fillable material, which includes incineration waste.

Table No. 2.5: District wise Hazardous Waste generation

Sr. No.	District	No of Population	Industries	Total HW (MT/Y)	Total HW (TPD)
1	Gulbarga	3659928	12	5213.1	14
2	Yadgir	956180	9	2.5	0
3	Bellary	4145421	66	1325.6	4
4	Bidar	2659871	19	1318	4
5	Raichur	2918687	19	214	1
6	Belgavi	8346178	24	204.3	1
7	Bagalkote	3182882	41	73	0
8	Chitradurga	2992390	26	155	0
9	Gadag	1750685	14	103	0
10	Haveri	2840948	18	706.8	2
11	Koppal	1917621	40	173	0
12	Davangere	3264721	41	408	1
Total		**38635512**	**329**	**9896.3**	**27**

Unlike MSW, the growth of Hazardous waste is not directly related to the demographic growth of the region. Rather, it is very much dependent on the industrial growth, need based industries, and more so a state or national policy framework for such development.

2.8 Proposed Waste Treatment & Disposal System

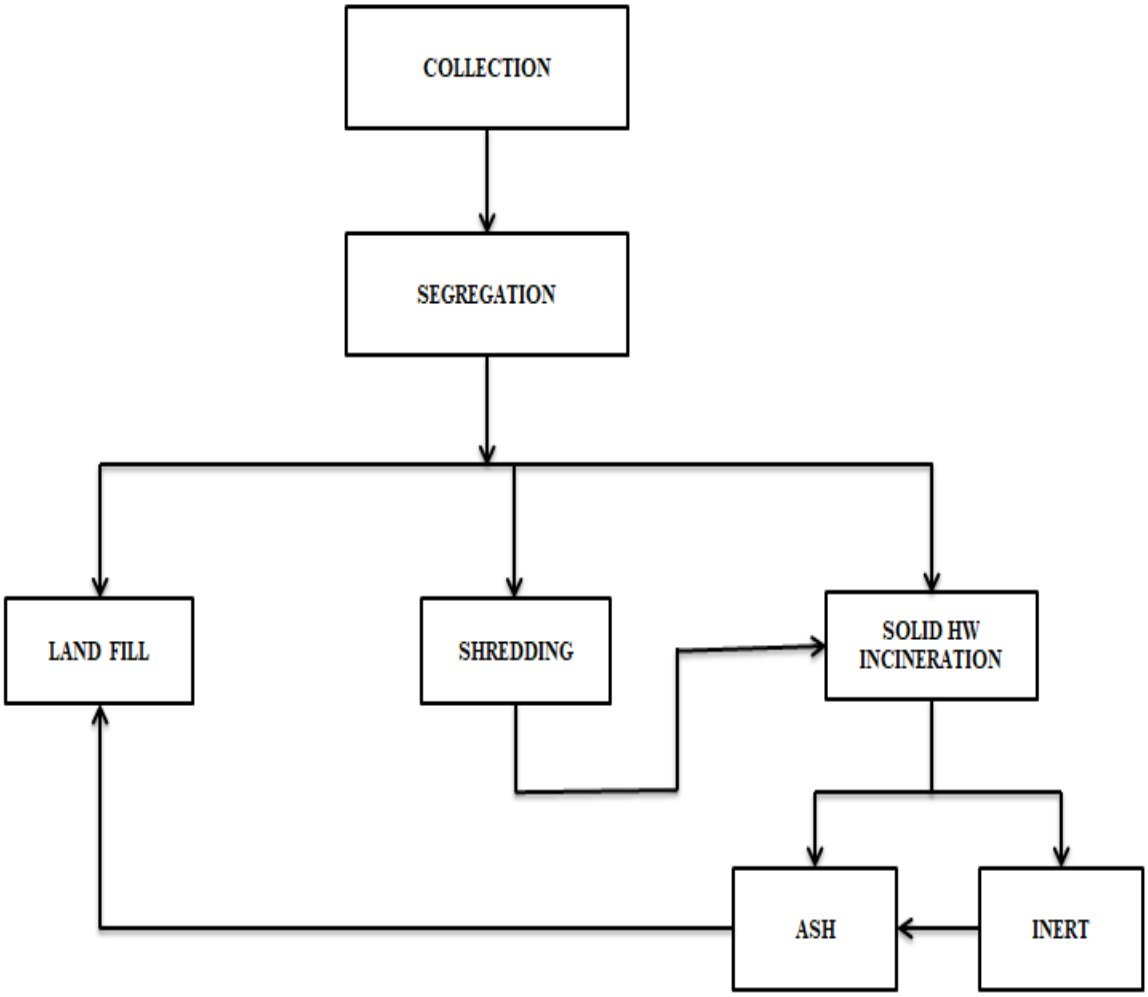


Figure No. 2.6: Proposed work flow

2.9 Design of the TSDF Facility

In the phased operation, during first phase only TSDF and incinerator 12T/ Day are proposed with all ancillary facilities. In the second phase, incinerator (Rotary Kiln Type) 12 T/Day is proposed. All these facilities will share the common facilities which will be created during the first phase.

2.9.1 Design Criteria for TSDF

Landfills have to be designed and constructed as a secured facility to contain the waste material and any leachate generated during the process. To meet these requirements, the base, slope, etc., of the landfill shall be constructed as per the guidelines given by MoEF & CC and CPCB (CPCB documents: Guidelines for Setting up of Operating Facility - Criteria for Hazardous Waste Landfills, HAZWAMS/17/2000-01) and conditions stipulated by SPCB in the authorization to operate TSDF. Prior to the placement of waste, an engineered capping over the surface shall be placed after completion of work daily so as to minimize the infiltration of rainfall. The baseliner and capping shall be a composite system comprising compacted clay layer and synthetic membrane as may be approved by the SPCB. A leachate collection drainage system shall be constructed in the base of the landfill, immediately above the liner to ensure that the head of leachate will not exceed 300 mm during any season of the year.

The following objectives have to be considered in the design of an engineered landfill: ·

1. Minimization of the possibility of contamination of surface and/or groundwater
2. Control over gaseous emissions ·
3. Prevention and control of any other possible adverse impact(s) on the environment ·
4. Utilization of excavated soil as cover material ·
5. Harvest of upstream rainwater flowing into the fill ·
6. Preferred use of clay with plasticity index between 10 and 30, which is well-graded having at least 30% passing through 75 micron.
7. Clay fraction shall be kept at greater than 15% or more whereas gravel fraction shall be less than 50% of clay lining. ·

8. Clay having clod size less than 50 mm may be compacted to optimum moisture content using a sheep foot roller.

Waste received at landfill site can be handled in different ways i.e., ˙

1. Direct disposal into landfill
2. Treatment/stabilization of wastes and then disposal into landfill ˙
3. Direct incineration/pre-treatment and incineration/pre-treatment,
4. Incineration and disposal of incineration ash in landfill ˙

Waste treatment/stabilization is a process designed to convert hazardous wastes in the form of non-aqueous liquids, semi-solids or reactive solids into less leachable solids that can then be deposited directly into the secured landfill in compliance with the concentration limits/criteria stipulated by SPCB. The treatment/stabilization operations will be carried out for all wastes identified for the purpose, so as to minimize their contaminant leaching potential. This will ch*ange the nature of these wastes to a less hazardous category. Treatment/stabilization involves immobilization of leachable materials by fixation as non-reactive solids, reduction of volume, reducing contaminant level of organic/inorganic components.

2.9.2 Criteria of the Proposed Plan

The following are the design specifications which may be considered before designing a landfill:

- appropriate sizing of the landfill and related facilities based on the projected waste quantities
- visual barrier and enhanced environmental acceptability of the facilities, and contamination attenuation zone as required for a natural attenuation site
- soil and material balance towards daily, intermediate and final cover of the fill, and other operation and maintenance (O&M) related issues
- Selection of appropriate earth moving equipment, compactors, and waste transportation trucks, etc.

- Grade plan and phased development plan of the landfill (cell by cell) which identifies the earth works and other works related to daily operations, interim cover over the completed cells, etc.
- design of storm water (drainage) management systems to divert rainwater away from the wastes and collect, treat and discharge into natural systems
- Leachate collection and management plans, leachate recirculation.
- Design of a liner system depending on the type of engineering systems required at the site and the anticipated change in waste characteristics and waste quantities.
- design waste placement and cover systems to ensure stability and safety
- selecting construction techniques and materials
- designing & monitoring wells and establishing surface water and groundwater monitoring programs design of a monitoring plan for monitoring the post-project quality of air, soil and water
- Design of receiving area, inspection area and temporary storage area etc.
- designing site access roads and transportation systems
- provision of appropriate analytical methods and providing specifications for monitoring instruments
- to minimize the possibility of contaminating surface and groundwater
- to have control over gaseous emissions
- to maximize resource productivity

2.9.3 Proposed Concept for CHWTSDF

Common Hazardous Waste Treatment, Storage and Disposal (CHWTSDF) system typically involves activities associated with waste collection, transportation, processing and scientific disposal. An effective TSDF system is based on the specific local conditions, and is developed with due considerations to protection of human health, environment & aesthetics. In addition to the requirements of an adequate infrastructure, active community participation and a robust monitoring & evaluation system are also very essential for a successful and sustainable IHWM system.

Present daily waste loads for this facility is around 27 TPD, and with adjacent industrial belt contributing to this facility is estimated to be nearly 137 MT/day. To

improve the economies of scale, the command area is targeted for 150-300 km radius area with a regional approach for development of a waste treatment & disposal (TSD) facility at Kadechur. Further there are no integrated TSDF Facility within 400 km radius area constituting 8-10 districts of Karnataka.

Overall benefits of regional facility are:

- Cost effective: Reduction in the fixed costs per unit of waste for its treatment and land filling are achieved by scaling up the incoming waste quantity;
- Land saving: The requirement of land for handling the same quantity of waste in a single facility is much lesser than putting up multiple facilities of smaller size at different locations.
- Optimized transaction cost: Single facility minimizes the costs of project preparation, approvals, etc.
- Technical viability: Scaling up the project enables the possibility of adopting robust technologies that are more effective in achieving higher volume reduction of waste and minimizing area for landfill.
- Social acceptance: A single large regional facility enables cost effect safeguards against environment and social impacts as well as offer incentive to affected communities.
- Attractive PPP option: Scaled up projects interest large competent operators of national and international repute.

Table No. 2.6: Waste Volume Projections for the Command Area

Year	Total HW in TPY	Recyclable in TPY	Incinerable in TPY	Land Fillables in TPY	Incinerated ash for Land fill in TPA	Total land Fillable Waste in TPA
2018-19	13870	4757	5746	3366	862	4228
2019-20	13870	4757	5746	3366	862	4228
2020-21	15330	5258	6351	3721	953	4673
2021-22	15330	5258	6351	3721	953	4673
2022-23	20075	6886	8317	4872	1248	6120
2023-24	20075	6886	8317	4872	1248	6120
2024-25	22630	7762	9376	5492	1406	6899
2025-26	22630	7762	9376	5492	1406	6899
2026-27	24455	8388	10132	5935	1520	7455
2027-28	24455	8388	10132	5935	1520	7455
2028-29	24455	8388	10132	5935	1520	7455
2029-30	28105	9640	11644	6821	1747	8568
2030-31	28105	9640	11644	6821	1747	8568
2031-32	29930	10266	12400	7264	1860	9124
2032-33	29930	10266	12400	7264	1860	9124
2033-34	29930	10266	12400	7264	1860	9124
2034-35	31755	10892	13156	7707	1973	9680
2035-36	31755	10892	13156	7707	1973	9680
2036-37	34675	11894	14366	8416	2155	10571
2037-38	34675	11894	14366	8416	2155	10571
2038-39	37595	12895	15576	9124	2336	11461
2039-40	37595	12895	15576	9124	2336	11461
2040-41	40880	14022	16937	9922	2540	12462
2041-42	46720	16025	19356	11339	2903	14242
2042-43	46720	16025	19356	11339	2903	14242
Total	**705545**	**242002**	**292307**	**171236**	**43846**	**215082**

2.10 Required Utilities and Amenities

2.10.1 Water Requirement

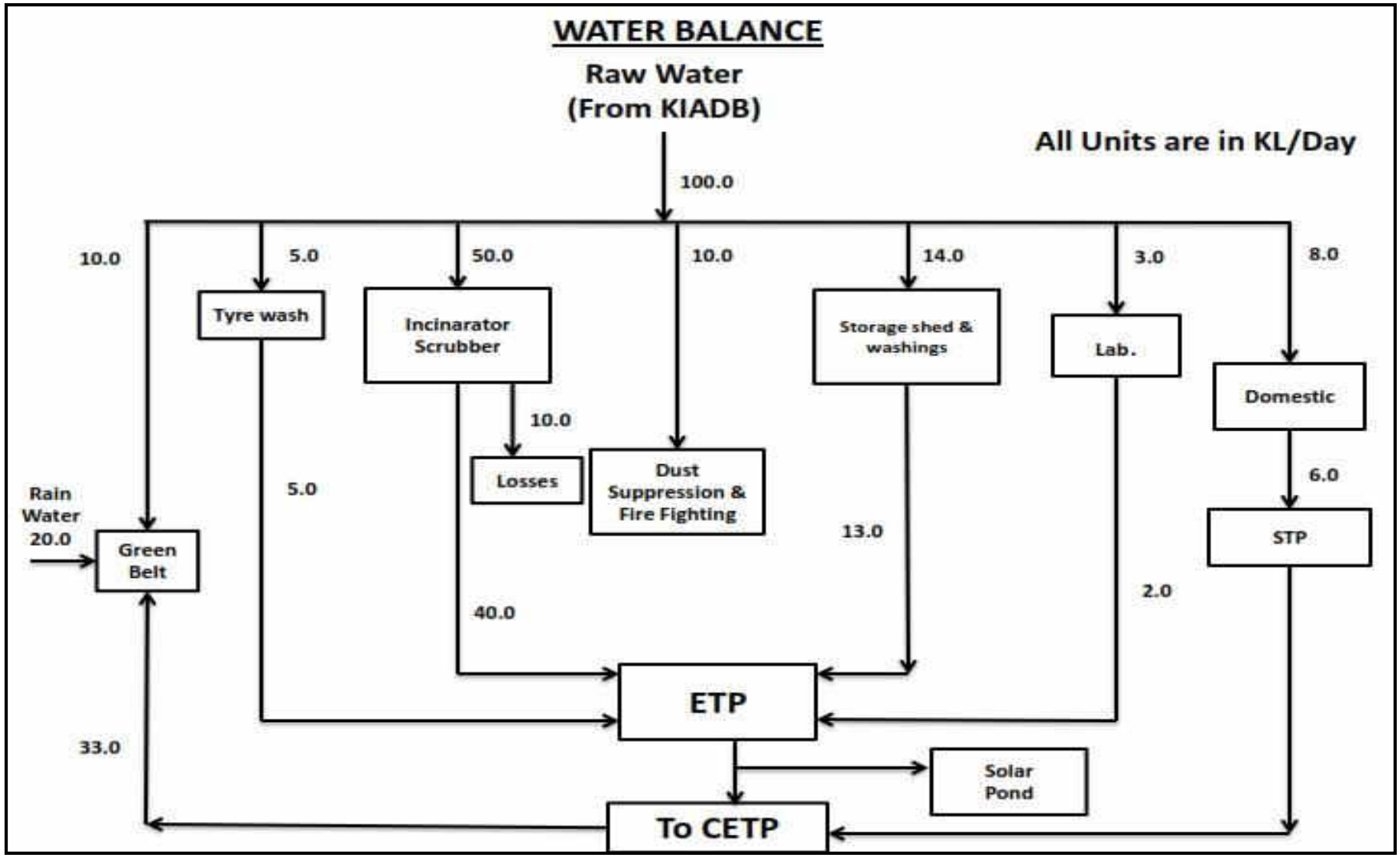
The total water required for operation of CHWTSDF will be 100.0 KLD which will be supplied by KIADB.

The water consumption in Incinerator will be 50.0 KLD during regular operation. About 10.0 KLD will be evaporation loss and remaining 40.0 KLD used for scrubbed water which will be sent to ETP for preliminary treatment.

In storage shed, 14.0 KLD water will be required for washings and spraying (as per requirement) which will be discharged to ETP (about 13.0 KLD). Similarly, tyre washings (5.0 KLD) and laboratory use (3.0 KLD) together (5.0 +2.0 = 7.0 KLD) waste water will be sent to ETP for treatment. There will be treated waste water consumption of 33.0 KLD for green belt along with 10.0 KLD fresh water, 10.0 KLD for dust suppression and 8.0 KLD domestic consumption.

Depending on the quality of waste water, the provision has been made to treat in ETP or send to Solar Pond for evaporation. During rainy season, the treated water from ETP along with surface run off water around TSDF site will be sent to CETP for treatment. The details of the water balance are given in Figure below **2.7.**

Figure No. 2.7: Water Balance Chart



2.10.2 Power Requirement

The project will require about 450 kW of electrical power. Landfill component will not be power Intensive; electrical power of about 130 kW will be required for operation of Weigh Bridge, leachate pumps and area illumination.

Incineration will consume about 75 Kw power. A 150 kVA DG has been provisioned for backup Power to keep the critical incineration and safety/instrumentation system operational in the event of any power failure.

Construction power from Guberga Electricity Supply Company (GESC) will be made available at the site by overhead power cables. Construction contractors will bring their own DGs to the site as per requirement and loads.

There has been provision for solar power generation to the extent of 5 % of total power requirement.

Table No. 2.7: Unit wise Power Requirement

Sr. No.	Particulars	Nos.	Usage Load (KW)	Total Connection Load (KW)
PART A.	**PUMPS & MOTORS**			
	Shredder	1	17.5	17.5
	ID Fan	4	5.5	22
	FD Fan	2	1.5	3
	Incinerator Motors	3	25	75
	Scrubber	1	0.75	0.75
	Ventury	1	7.5	7.5
	ETP Motor	3	35	105
	Conveyor Belt Motor	4	7.5	30
	Diesel Transfer Motor	1	1.5	1.5
	Submersible Pump	2	1.5	3
Sub Total of A			**133.25**	**265.25**
PART	**Ancillary Instruments & Units**			

B.				
	Weigh Bridge	1	75	75
	Leachate Pump	2	9	18
Sub Total of B			**84**	**93**
PART C.	**Domestic Gadgets**			
	FAN	10	0.45	4.5
	Exhaust Fan	6	1.5	9
	Heater	2	1	2
	Led Light	35	0.04	1.4
	Street Light	60	0.2	12
	Computer	8	0.15	1.2
	Office A.C	4	1.5	6
Sub Total of C			**4.84**	**36.1**
Total of A + B +C		**90**	**192.09**	**394.35**
PART D.	Standby DG Set	1	150	150
	Fuel for DG Set	LDO		25 lit/hr
PART E.	Fuel for Incineration	LDO / HSD		1.6 KLD

2.10.3 Fuel Requirement

About 1.6 KLD auxiliary fuel (LDO, SKO and HSD) will be sourced from the nearest bulk depots of Oil PSUs. Vehicles used at the facility (backhoe loaders, gravity rollers, tractors and administration vehicles) will consume about 350 Lt/day at peak activity.

2.10.4 Manpower

About 40 persons will work in the integrated TSDF in its fully operational state. Including labourers and security personnel.

Table No. 2.8: Manpower Requirement for Proposed Plan

Sr. No.	Item	Nos Rqrd.
A	Primary Operation	
1	Land Fill operator	22
2	Machine Operator	4
3	Heavy Vehicle driver	4
B	Secondary Operation	
4	Security	12
5	Contract Labourer	35-40

2.11 Waste Processing & Technology Assessment

2.11.1 Scope of Technological Solution

There are various technologies available for processing of waste in an environmentally sound manner. Waste treatment techniques seek to transform the waste into a form that is more manageable, reduce the volume or reduce the toxicity of the waste thus making the waste easier to dispose of. Treatment methods are selected based on the composition, quantity, and form of the waste material. There are various technologies available for processing of waste in an environmentally sound manner.

Table No. 2.9: List of Identified HW Processing Technologies

Waste Processing Technology	Processes
Thermal Processing Technologies	Incineration (Mass burn)
	Pyrolysis
	Plasma Arc Gasification
Physical Processing Technologies	Refuse-Derived Fuel (RDF)
	Densification / Palletisation

Incineration (Mass burn): It can be defined as a combustion process which uses an excess of oxygen and/or air to burn the hazardous waste at high temperature (>850°C). It is the most common thermal technology for waste processing with minimal pre-processing of waste at the facility. Though, this method involves high cost of investment (~INR 16cr for processing 100 tons of mixed HW), it is very effective in significant volume reduction (<10% ash production).

Pyrolysis: Pyrolysis uses heat to break down combustible polymeric materials in the absence of oxygen, producing a mixture of combustible gases (primarily methane, complex hydrocarbons, hydrogen, and carbon monoxide), liquids and solid residues. The products of pyrolysis process are: (i) a gas mixture; (ii) a liquid (bio-oil/tar); (iii) a solid residue (carbon black). Relatively low temperatures (400-900°C, but usually about 650°C) are employed compared to gasification. Similar to gasification, this technology is also yet to be proven for the mixed municipal hazardous waste.

Plasma gasification: A high-temperature pyrolysis process whereby the organics of waste solids (carbon-based materials) are converted to a synthesis gas while inorganic materials and minerals produce a rock-like glassy by-product, called vitrified slag. The high temperature of this process is created by an electric arc in a torch whereby a gas is converted into plasma. The process containing a reactor with a plasma torch processing organics of waste solids (carbon-based materials) is called plasma arc gasification. The reactor for such a process typically operates at 4000°C - 7000°C. The plasma pyrolysis method can be used efficiently for municipal hazardous waste and plastic waste also. However, this technology is extremely expensive and requires very high degree of sophistication and process control and rarely used for mixed HW.

RDF: The HW is subjected to various physical processes that reduce the quantity of total feedstock, increase its heating value, and provide a feedstock. It may be

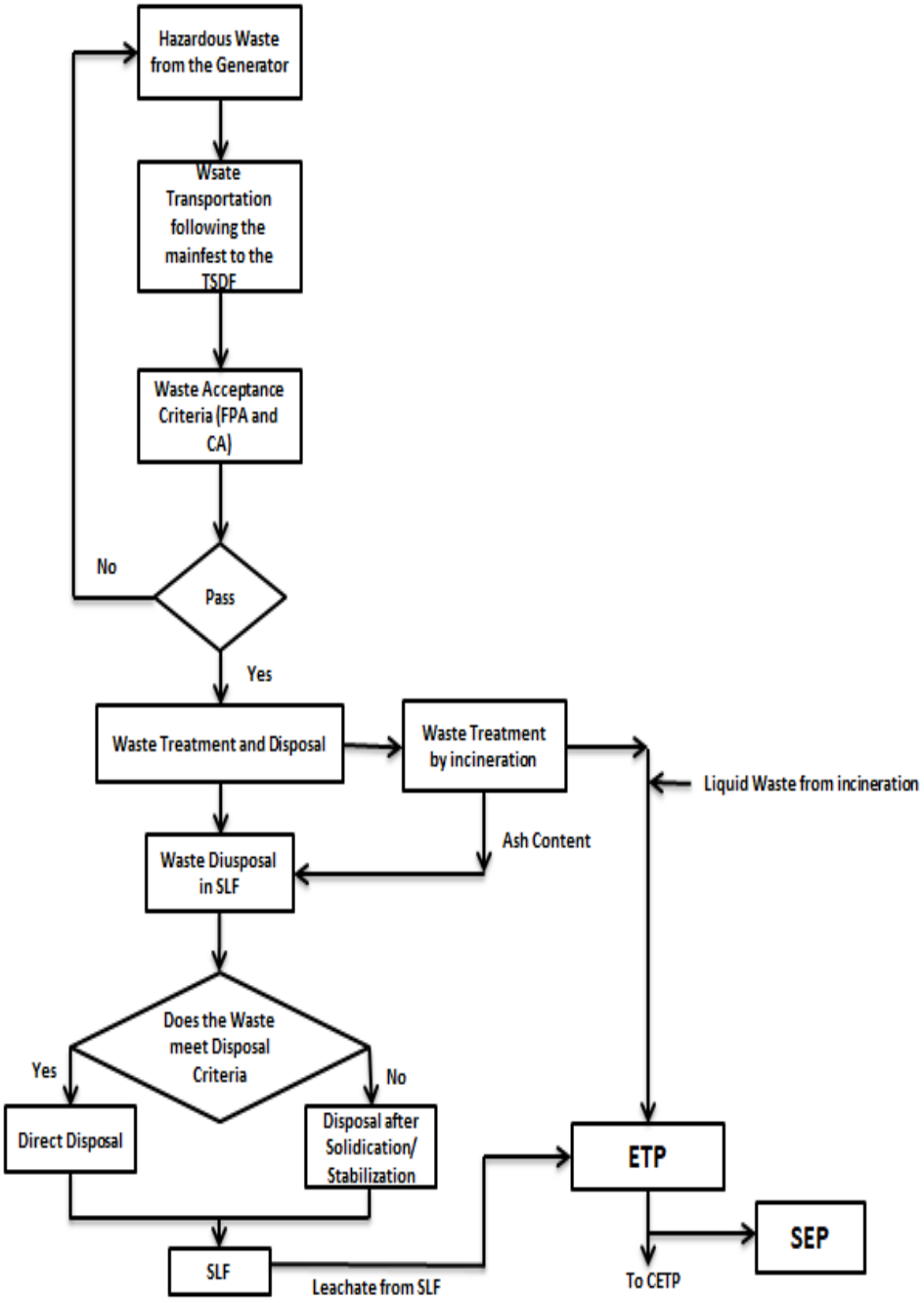
densities or palletized into homogeneous fuel pellets and transported and combusted as a supplementary fuel in utility boilers.

Decision about adapting a particular technology for processing of waste for a city is mainly governed by the following criteria:

- ***Technology Reliability***: Reliable technologies that could be considered without reservations for processing of waste generated in the city and which have been used successfully in the past for similar kind of waste and is also in compliance with the HW handling and management rules, 2000.
- ***Waste Suitability***: Technologies that are suitable for the given waste characteristics and composition that require value addition of the HW chain for sustainability.
- ***Economic Viability****:* Technologies which are affordable to the local municipality and sustainable economically with respect to the scale of capital investment and operational costs considering the prevailing local conditions.
- **Environment & social impacts**: Technologies that have minimum environmental and social impacts, and conforms to the regulatory requirements (HW Rules, 2000).

2.11.2 Processing of Hazardous Waste

The general procedure which could be followed by the TSDFs starting from receipt of wastes from generators to the final disposal is shown in following Figure.



LEGEND:

FPA: Finger Print Analysis
CA: Comprehensive Analysis
SEP: Solar Evaporation Pond
CETP: Common Effluent Treatment Plant

Figure 2.8: Processing Steps for HW

2.11.3 Detailed Design of Facility

TSDF Design

The Integrated Processing and Scientific Landfill Facility is proposed as per the minimum design requirements set out in Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016. Due to the emerging Industrial estate and very thin industrial clusters in the near vicinity of Yadgir district, it is planned to start the Integrated TSDF operation with a landfill and incineration with all common facilities as per the Hazardous waste guidelines. Then based on the need growth, the other components of an integrated TSDF facility shall be coming within this premises. With a vision of Mother Earth, this will be a first of its kind integrated TSDF within the state of Karnataka.

This kind of system would help in reducing the content of landfill able waste to less than 65%, as the Inert rejects from the waste can also be minimized by resale. The Incineration technology is a well-established technology in India for medium & large projects. Also, with the subsidy of 70% on all instruments utilized in the facility, the option of Hazardous Waste handling becomes a viable project. It is estimated that for the 25 years average waste quantity of 137 MT/day to be achieved after 25th year of operation enhances the life span of the facility, which also shall optimize the phased cost in creation, maintenance and operability of Landfill Cells.

Table No. 2.10 : The overall design parameters include the following components at the facility.

Sr. No.	Particulars	Description
A	**Common Facilities**	
1.	Site Fencing	Fencing with concrete post and barbed wire all-around the ISWM site
2.	Entrance gate	One Main gate and one side gate for pedestrian movement.
3.	Weighbridge	One weighbridges of 60MT capacity

		(computerized)(entry and exit) at Entrance gate
4.	Guard room	One guard room at entrance gate and one small room for installation of computerized system of weighing facility.
5.	Administrative building	One Administrative building comprises administrative and Laboratory facilities for the site.
6.	Mechanical Cum Generator Building	This building comprises three room, generator room, Control room cum store and Office room. Load bearing single story building with special floor arrangement in generator room.
7.	Workshop	Workshop is provided with basic facilities for general maintenance of operational equipment and Vehicle. The Major maintenance equipment is not provided in workshop. Proposed structure is Steel Post Truss with CGI covered roof, concrete floor and side wall brick masonry
8.	Public Toilet	A common Toilet block with washing and bathing facilities is provided in midway for worker to maintain the hygienic environment. The proposed structure is single story with slope CGI roofing.
9.	Parking	Transportation and Operational Vehicle Parking Lot and Vehicle Parking Lot. Concrete floor open parking facilities
10.	Roads	Two category of road required for operation of TSDF at proposed location. Access road for transportation of waste and Internal service road for operation of ISWM site. To minimize the investment and meet the functional requirements proposed roads have divided into Blacktop Road and Gravel Road. Further the carriages way width of road varies as per requirements on various sections of road. In general Main Road is provided 7m width, service road and

		Arterial road at SLF is provided 3.5m.
11.	Water Supply	Water will be supplied by KIADB.
12.	Electricity	To facilitate the power for operation of the TSDF site, Electricity main supply with generator backup is proposed at site. To connect with main supply of the region, it is required to provide Transformer at site. The Transformer is proposed at Main gate of site Near Mechanical cum Generator Building. Main control panel and Power control system is proposed in this building.
13.	Storm water Management and Protection Structure	Road side drain, Peripheral drain for Landfill Cells for the internal drainage management system, independent from the leachate system, to ensure that the run-off, rain water from the hinterland does not enter the Hazardous waste storage and processing area and there is no stagnation of rain water in the Site
14.	Vehicle Washing Platform	Near workshop a Vehicle Washing platform is proposed for regular cleaning
15.	Leachate management system	Network of HDPE pipes, sump and solar evaporation pond (for Rainy Season Collection only) for Leachate collection and treatment.
B	**Additional ancillary Facilities**	
1.	Stabilization Area	Steel Post Truss with CGI covered roof, concrete floor and side wall brick masonry
2.	Recycle Shed	Steel Post Truss with CGI covered roof, concrete floor and side wall brick masonry
3.	Temporary Waste Storage Area	Concrete Platform for manual sorting and inspection
4.	Peripheral Drain	Concrete covered drain
5.	Waste Inspection	Platform with shed

	and Sampling Facility	
6.	Plant & Machinery	P&M for Incinerable and landfillable

In addition to the above, the landfill facility is proposed to have the following additional features:

1. Liner system as per CPCB standards.
2. Good access roads for two way vehicular movement within the Secured Engineered Secured Landfill.
3. Minimum 5 m top width of Landfill bund all around for easy disposal of Inerts to landfill cell.
4. Landfill gas venting system.

Proposed layout plan and area requirements for various components of TSDF facility along with landfill are presented below. Around 6.57 ha (16.23 Ac) would be adequate for development of TSD facility and in the remaining area the ancillary facilities for 25 years can be developed. It may be noted that the SLF is to be developed in four phases with each phase comprising of one SLF cell adequate for five years with the first cell for first 10 years.

Table No. 2.11: Area requirement for the Regional Waste Processing facility and SLF

Sl. No.	Description	Area in Sq. mt.
1	Hazardous Waste Land Fill	65,660.00 Sq.mt
2	Incineration	3,000.00 Sq.mt
3	Incineration Waste Storage Shed	1,000.00 Sq.mt
4	Haz. Waste Temporary Storage Shed	900.00 Sq.mt
5	Vehicle Parking Area	600.00 Sq.mt
6	Stabilization Bin	225.00 Sq.mt
7	Stock Piling	900.00 Sq.mt
8	Material Storage Shed	400.00 Sq.mt
9	Vehicle washing with Sump	50.00 Sq.mt
10	Office Building with Laboratory	100.00 Sq.mt

11	Storm Water bin for plant Layout	150.00 Sq.mt
12	Storm Water bin for Land Fill	36.00 Sq.mt
13	Solar Evaporation Pond	200.00 Sq.mt
14	Primary Treatment Plant	50.00 Sq.mt
15	Leachat Storage	100.00 Sq.mt
16	Roads along with Drains	8628.50 Sq.mt
17	Security Cabin	15.00 Sq.mt
18	Weigh Bridge	48.00 Sq.mt
19	Green Belt	53,419.00 Sq.mt
20	Work Shop	600.00 Sq.mt
21	Transformer Yard	100.00 Sq.mt
22	Fire Hydrant Extension	60.00 Sq.mt
23	Utility Purposes	6310.50 Sq.mt

The plant would have the following facilities, some of which shall be common to the secured landfill, also. Layout plan for the same has been provided in proceeding figure.

The open space initially identified will be utilized for Green Belt Development as exhibited in the layout map. The proponent will develop Green belt all around the boundary wall as well in open spaces with plant species of local in nature. This also includes the avenue plantation and plantation adjacent to the boundary area as provided by the industrial estate.

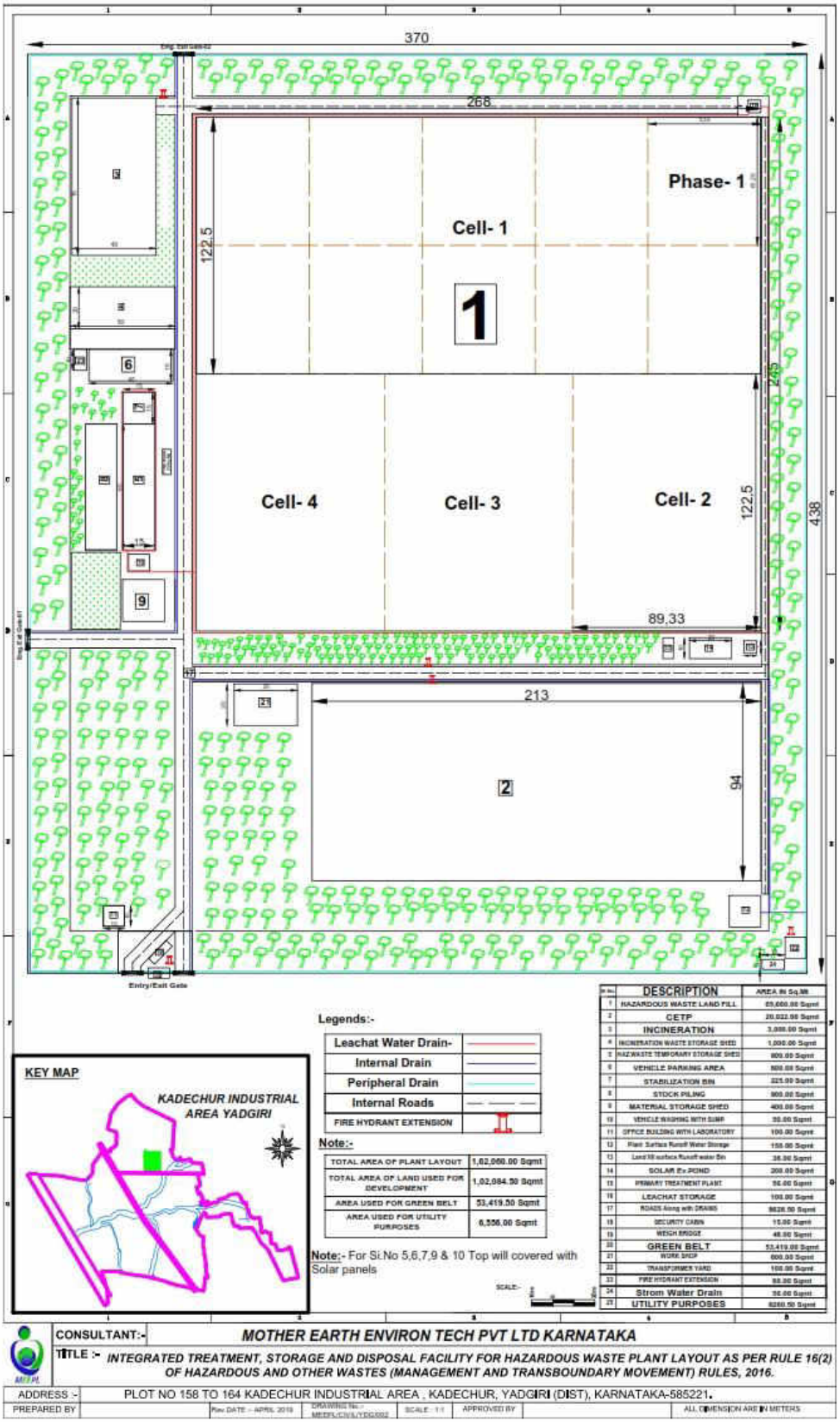


Figure No. 2.9 : HW Processing Facility Layout

2.12 Incineration

Incineration of hazardous wastes with high calorific waste (over 2500 Kcal/kg) (exceptextremely/very highly flammable/oxidising/incendiary material without proper blending/pretreatment) will be carried out in the proposed incineration system in following phases:

Phase I – 12 T/day incineration based on Single Drum Pyrolysis as primary combustion chamberfollowed by baffled Secondary Chamber, and downstream gas cleaning system.

Phase II – 12 T/day incineration based on rotary kiln as primary combustion chamber (withadditional liquid waste feeding system) followed by baffled Secondary Chamber, and downstreamgas cleaning system.

The Phase I and II will have separate systems, and may be run concurrently or independently incampaign basis based on incineration load and PM schedule.

The general incineration system process flow proposed to be followed in the TSDF is given in **Figure No. 2.10**

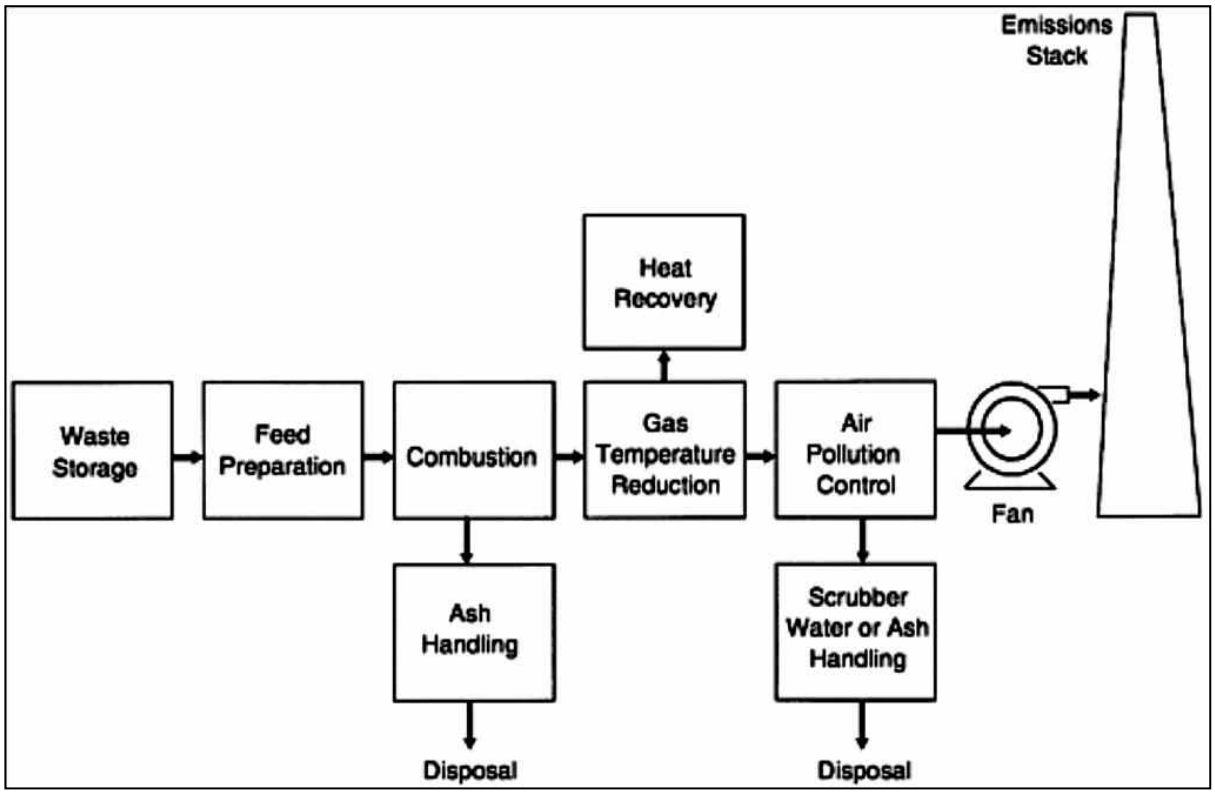


Figure No. 2.10: Proposed Incineration System Process Flow

The incineration facility shall be designed to achieve a minimum temperature of 1100°C in secondarycombustion chamber and with a gas residence time in secondary combustion chamber not less thantwo seconds. Incineration system will be operated 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 weightof the material.

Guidelines published by the Central Pollution Control Board from time-to-time for commonincineration facilities shall be referred for implementation.

Waste Feeding

The incineration system will operate in negative pressure at all the times. Continuous feeding of homogeneous waste having same/similar calorific value to the combustion chambers will be ensured.

Hazardous wastes in solid form will be fed through a hydraulic system, which will have automatic gates i.e. once the outside plate is closed, inner side plate is opened and hazardous waste mass is hydraulically pushed inside the primary chamber. This system, besides negative pressure in the combustion chambers is required to ensure safety and to prevent workmen exposure to thermal radiation.

Primary Combustion

Incinerator's combustion chambers will be made of mild steel conforming to IS: 2062 and of suitable thickness lined with high-grade refractory and insulation, so as not to buckle in or bulge out.

Incineration system will be equipped with an auxiliary fuel fired burner. The burner may be pressure atomizedtype with approved certification from the Bureau of Indian Standards or equivalent.

Temperature will be maintained at 850±50°C in the primary chamber order to ensure complete burningof hazardous waste. Controlled flow of air will be maintained for complete volatilization of hazardous waste.

Combustion chambers will be supplied with excessive air to ensure complete burning of wastes. The blower will have the capability to provide appropriate supply

of combustion air. An inventory of fuel oil for 5 days continuous operation of the incineration facility may be kept in reserve.

As the common incineration systems will be handling wastes having varying heat value, and whileensuring TOC and LOI requirements in the ash/slag, there are possibilities for sudden rise oftemperatures in the primary chamber. Therefore, the facilities may like to have thermal refractorybricks and insulation capable of withstanding a minimum temperature of 1,300°C (typically,corundum/chromium bricks).

To maintain designed heat capacity, quantity of the hazardous waste injection package (kg/singleinjection) will be adjusted w.r.t. calorific value of the waste feed. When a high calorific value possessing hazardous waste is injected in packets, the size of each injection may 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.

Appropriate slope (in general, 3 degrees), rotation rates (around 10/hr) and hazardous waste residencetime (1-10 hrs) may be adjusted for the kiln type primary chamber, in order to achieve total organiccarbon (TOC) and loss on ignition (LOI) requirements in the ash/slag. To ensure life of refractory and insulation bricks, it is a practice to feed silica and glass in appropriate ratios to the kilns to form a cover over the refractory lining, as and when the thickness of the layer reduces.

Secondary Combustion

Minimum temperature requirement in the secondary combustion chamber is 1100±50 ^{o}C. This will be ensured by averaging the temperature measurement of three detectors (not exactly positioned in the burner flame) at the same time with in the combustion chamber. The design and operating conditions will demonstrate 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.

Safety and Process Control

Incinerator will have windows fitted with safety view glass to view flame in the combustion chambers.

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 flame control system(if no flame is detected, fuel injection has to be stopped, automatically – use of fast-stop-valve).

Whenever the pressure in the combustion chambers becomes positive, immediately the feeding ofwaste will be stopped and needful measures be taken to restore negative pressure. Exit doors will be provided at suitable place, one each on the primary kiln and the secondary chamber of theincinerator for ease in inspection and maintenance.

Access for the online monitoring of prescribed parameters in the form of continuous monitoring data will be provided to the servers of KSPCB/CPCB following protocols provided by them.

Pollution Control System

Pollution control devices will be installed to scrub the flue gases to comply with prescribed standardsfor particulate matter, HCl, SO2, CO, Total Organic Carbon, HF, NOx (NO and NO2 expressed asNO2), Hydrocarbons, Dioxins/Furans, Cd +Th (and its compounds), Hg (and its compounds), Sb +As + Pb + Cr + Co + Cu + Mn + Ni + V (and their compounds).

The scrubbing system will have a rapid gas quencher (preferably with rotary liquid automizer),ventury scrubber, followed by counter current packed bed column type scrubber, ID fan and 30 m MS self-supported stack. Quenching will be carried out with reclaimed water. Scrubbing shall becarried out by alkaline scrubbing medium (caustic lye solution). The scrubbing medium will be passed through a plate-and-frame type filter press (HDPE plates and HDPE woven/Teflon woven filter fabric)for removal of solids.

Sampling platform shall be provided as per CPCB norms to collect stack samples from the stack formonitoring the air pollutants, as and when required. Holes will be provided on stack as per standardCPCB norms, following diametric calculations.

Interlocking arrangement shall be provided for removal of ash/slag from the combustion chambers.Ash will be disposed in the landfill.

2.12.1 Incineration Process (Incineration Standard)

Operating Standards

1). Combustion Efficiency (CE) shall be at least 99.00%.

2). The Combustion efficiency is computed as follows:

$$C.E. = \frac{\%CO2}{\%CO2 + \%\ CO} \times 100$$

3). The temperature of the primary chamber shall be a minimum of 800 ^{O}C and the secondary chamber shall be minimum of $1100^{0}C \pm 50^{0}C$.

Incineration incorporates the right technology featuring for a complete destruction of the waste into completely safe end products. A process combination of pyrolysis and controlled air combustion, where heat and air for combustion is regulated in such a way as to first volatilize/ gasify the waste in conditions of inadequate air, i.e., below stoichiometric air conditions and heat, and then totally destroy it in adequate heat and excess air, thereby making the end products environmentally safe. The process is not only safe but is also today's answer to the rampant problem of hospital waste management and pollution. The primary purpose of incineration is to burn the waste to ashes through a combustion process. MMS intends to set up incinerators of optimum capacity at each of the locations. The unit shall be a dual chambered incinerator. The primary chamber's main purpose would be combustion of the waste materials into safe end products (ash). The temperature of the primary chamber would be 850^{O}C and above wherein wastes are completely destroyed. The primary chamber would have an attached burner with auxiliary fuel supply to augment the fuel requirements and ensure maintenance of temperatures. The purpose of the secondary chamber would be to burn the off-gases and ensure safe end products (gaseous). The secondary chamber would operate at a temperature of 1100^{O}C and above. The gases would be completely burnt and safe gases then shall be let out of the incinerator unit. The incinerator is completely automated with control panel and continuous recording of temperatures. The entire system is very simple and is easy to operate.

2.12.2 Design Details of proposed Incinerator

The design details of the proposed incinerator system are given in Table below;

Table No. 2.12: Design Details of proposed Incinerator

1	Name of equipment	Incineration (Double Stage Combustion)
2	Application	Incineration of Hazardous Waste
3	Capacity	12 T/Day
4	Method of feeding the waste	Through a Belt Conveyor/Hydraulic Power Pack
5	Principle of Operation	Incinerator offered is designed to operate on controlled Air Principle of Combustion.
6	Fuel	LDO/HSD/diesel
7	Heating Media	Through Oil fired fully automatic Burner assembly
8	Design temperature	1400 Degree C.
9	Operating temperature	
	Primary Chamber	850 +/- 50 Degree C
	Secondary Chamber	1100 +/- 50 Degree C.
10	Fuel consumption	145 lt/hr +/- 5
On Primary Chamber, One feed Hopper shall be provided. An electrically operated top cover suitable for to and fro movements shall be provided at top of the hopper.		

Table No. 2.13: Details of various components involved in the system

a) COMBUSTION CHAMBER	
(Dual Primary with secondary Chamber)	
Type	Vertical
Material of construction	Mild steel.
Size	1600 mm dia x 8000 mm Ht with top conical
PRIMARY CHAMBER	Body made form 5 mm thick. IS 2062 MS Plate
	Materials supported with structural section materials. It shall be sturdy to with stand any stress or strain formed during the operation inside portion of the chamber shall be lined with high alumina fire bricks and backed up by insulations bricks confirming to IS 2042 grades.
Combustion Burner	Fully automatic operated burner assembly Oil fired type comprising diffuser plate, photo state Housing electrode with holding brackets, solenoid Valve, Electrodes, flexible hose pipes, spray Nozzle, Oil filter, fuel injection Pump, blower etc. connected With 25.00 HP electric Motor, Air regulator etc.
Fire Grate Bars	Fire grate bars shall be provided at bottom portion of the inside of Primary Chamber. This fire bars are made from High alumina fire bricks
SECONDARY CHAMBER	
Material of construction	As per Primary Chamber.
Inside Lining	As per Primary Chamber.
Combustion Burner	One unit, fully automatic operated burner
	Assembly oil fired type (LDO/HSD)
Retention time	20 to 25 seconds.
Doors	All doors are made from 5 mm thick. MS Plate Duly lined with g\high grade cast iron refractory materials and fitted with gaskets to seal the doors when closed.

BELT CONVEYOR 500 mm Width x 30 m. Long complete with carrying idlers, return idlers, supporting structure, idler brackets, take up arrangement, drive and tail pulley, drive units comprising 2 HP electric motor, gear box belts and Pulleys, base frame, side skirts etc.	
b). ELECTRICAL PANEL	Control panel made from MS Sheet material
BOARD	Powder coated provided with temperature Controller cum indicator for Primary Chamber and Secondary Chamber, indicator for ventury, scrubber, stack overload relay, contactor, Fuses and switches & fitted. PLC Based panel shall be Supplied with stabilizer with printing arrangement
c). BLOWER.	
Type	Centrifugal
HP	5.00 HP
Capacity	600 cfm
Static pressure	22" WC
Material of construction	Mild Steel
d). WATER QUENCHING SYSTEM (comprising the following)	
QUENCHER	
Type	Vertical, Cylindrical.
Size	1800 mm dia x 5400 mm Ht.
Material of construction	Made from IS 2062 MS Plate 5 mm thk. Inside portion duly lined with special Grade Refractory material with a thickness of 50 mm.
SPRAY NOZZLE	
Application	For spraying raw water for quenching the temperature coming from the secondary chamber to ventury.
Material of construction	Graded Cast Iron.
QUENCHING TANK.	
Type	Rectangular

Size	4.500 m L x 2.5 m x 2 m H
Material of construction	Made from 4 mm thick. IS 2062 MS plate along with structural section materials. Inside portion duly lined with ebonite Rubber lining with a thickness of 5 mm inside MSRL perforated plate shall be provided.
QUENCHING PUMP.	
Size	140 mm x 140 mm
Type	Semi open Impeller type Slurry Pump.
HP	7 HP
Material of construction	Body made from Graded Cast Iron.
Impeller	Non Metallic
e). **WET SCRUBBING SYSTEM COMPRISES THE FOLLOWINGS**	
Scrubbing media - Caustic Lye mixed with water Storage Capacity -10.0 T (Maxm.) Day Tank with Agitator -500lit. Capacity	
Type	Vertical, Cylindrical, top and bottom conical Inside portion lined with high grade heat Resistance cast able refractory of 40 mm thick. Provided with jig jag passing baffles Top and bottom conical with flange welded With shell for bolting.
Size	1700 mm dia x 4500 mm Ht
Material construction	Made from 5 mm thick, IS 2062 MS Plate.
Maintenance door	Shall be provided made from 5 mm thick. IS 2062 MS Plate materials duly lined with Refractory materials and fitted with High quality gaskets to seal the door when closed.
Supporting structure	Made from heavy structural section materials.
Filtration cum Circulation Tank. (COMMON TANK FOR SCRUBBER & VENTURY)	
Size	3500mm L x 3750 mm W x 1250 mm H
Material construction	Made form 5 mm thick. MS Plate. Inside portion

	Duly rubber lined with 5 mm coating of ebonite rubber. Inside MSRL perforated plate along with filter cloth with required connections and nozzles.
Shower	For spraying the caustic lye mixed water.
Material construction	Made from SS Materials.
Installation	At top of Scrubber.
Circulation Pump (For circulation of Caustic Lye Mixed water)	
COMMON PUMP FOR VENTURI & SCRUBBER	
Type	Semi open Impeller type Mud Pump
Size	40 x 40 mm
HP	3 HP
Material of construction	Non Metallic
Pipe lines and valve fittings, operation and maintenance plat form Made from IS structural section materials and plate materials.	
f). VENTURI	
Type	Pressurized nozzle
Tower Height	5000 mm
Throat dia	200 mm
Material of construction	5 mm thick
Shower	For spraying the water inside the venturi.
Material of construction	SS 304
g). DUCT LINE.	
From combustion Chamber to Ventury Made from 5 mm thick. MS Plate material and the inside portion duly lined with high grade heat resistance Refractory materials with in a thickness of 50 mm. From Secondary Chamber to quencher, quencher to Ventury, Ventury to Gas Scrubber, Gas scrubber to Moisture separator, Moisture separator to ID Fan and ID Fan to Chimney Made form 5 mm MS Plate materials.	
h). ID FAN.	
Capacity	6000 c.f.m
Static pressure	750 mm WC
HP	15 HP

Attachment	Base frame, damper, V- Belts and Pulleys, Guards etc.
Material of Construction	SS 304
j). MOISTURE SEPARATOR	
Type	Rectangular Zigzag passing
Size	1200 mm H x 1000 mm 1000mm
Material of construction	5 mm thick. IS 2062 MS Plate materials
k). PAINTING.	
All the components shall be painted with (Two Coats) Heat resistance Paints.	

Table No. 2.14: Operating Pollution Standard for Incinerator

Sr. No.	Parameter	Standards	
		Limiting concentration in mg/l	Sampling Duration in minutes, unless stated
1	Particulate matter	50	30 or 1NM^3 of sample volume, whichever is more
2	Nitrogen Oxides NO and NO2 expressed asNO2	400	30 for online sampling or grab sample
3	HCl	50	30 or 1NM^3 of sample volume, whichever is more
4	Total Dioxins and Furans	0.1ngTEQ/Nm^3 (at 11%O_2)	8 hours or 5NM^3 of sample volume, whichever is more
5	Hg and its compounds	0.05	2 hours or 1NM^3 of sample volume, whichever is more

Estimated Bulk Pricing for Incinerator

Sr. No.	Description	Quantity	Price (Rs. In Lakh)
MACHINARY			

1	770 KG/HOUR DUAL STAGE INCINERATOR	1	1875.00

The design drawing for Incinerator area is provided in the Figure below.

Table No. 2.15: TSDF Vehicles & Accessories

Sr. No.	Description of Unit	Estimated Unit Cost INR	No. / Unit	Estimated Unit Cost in INR
1	Hydraulic Excavator	5250000	2	12076160
2	Compactor	2200000	2	4610000
3	Dozer	5400000	1	5400000
4	Truck	2474500	2	6868000
5	Generator	4956000	1	4956000
6	Tractor with Trolly	1120000	1	1120000
7	Weigh Bridge	1545000	1	1545000
8	Incinarator	85000000	Set	85000000
9	Lab	600000	Set	600000
	Total			**12,21,75,160**

2.12.3 Disposal of the HW: Secured Scientific Land filling

According to the HWM Rules, Secured Landfill (SLF) is required for the ultimate disposal of waste which cannot be further processed. The HWM system for the cluster has been conceptualised and designed on this basis so that minimum amount of rejects/inerts go the landfill. The final HW rejects/inert waste shall be disposed in the secured landfill, to be developed scientifically according to Hazardous Waste Rule, 2016. With the assumption of 24% of incoming waste to be landfilled, the total waste quantity to be landfilled in 25 years of time (2018-43) is estimated to be around 1130250 MT . Total area requirement for the landfillcells would be around 6.57ha. This area requirement has been worked out based on the assumption of 1.5 m depth below ground level and 6 m above ground with 1:3 side slope and 10% daily liner and 10% for final cover and 10% for construction of bunds.

The base of the landfill will follow the average slope of the landfill to minimize the earthwork and take advantage of the sloped topography for leachate collection and drainage. The landfill will be so planned that the average slope of the bottom of the landfill is same as that of average slope of the site. Average slope of the even portion of site varies from 2% to 5% based on the topography of the site.

A preliminary assessment of the site including location criteria for site selection for setting up waste processing and disposal facility has been carried out in Chapter 4. However, detailed assessment shall be carried out as part of Environment Impact Assessment (EIA) as per Guidelines developed for the Management of Hazardous Waste. Based on the EIA assessment, necessary statutory approvals shall be obtained.

As per the Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016, the secured landfill for Hazrdous Waste shall comply with the following:

- The secured landfill shall be provided with fence, security gate, approach and internal roads, waste inspection facility, weigh bridge, equipment and machinery, infrastructure like water supply, lighting, etc. and health inspection facilities.
- Waste shall be compacted adequately and provided with daily cover of minimum 10cm of soil inert debris.
- Prior to commencement of monsoon intermediate cover of thickness 45cm has to be provided with proper compaction and grading to prevent infiltration during monsoon. Proper drainage berms shall be provided to divert runoff from the active cell of the landfill.
- The bottom layer specifications shall be a composite barrier having 2.0 mm High Density Polyethylene (HDPE) liner, geo-textile liner,300mm drainage layer ,450 mm compact clay layer. The highest level of water table shall be 2.0 m below the clay/amended soil layer.
- The final cover shall have a regulatory layer of 30 cm, barrier layer comprising of 60cm of clay/amended soil with permeability coefficient not greater than $1X10^{-7}$cm/sec., a drainage layer of 30 cm and on top a vegetation layer of 60 cm thickness.

- In order to prevent the pollution problems storm water diversion drains, leachate collection and treatment system and preventive measures for run – off from landfill area entering any stream, lake, river or pond shall be provided.
- Buffer zone around the landfill site and a vegetative cover over the completed site shall be provided.
- The post closure care of landfill site shall be conducted for at least thirty years and long-term monitoring plan shall be prepared

Accordingly, main components of the secured landfill are presented below:

- Bottom liner
- Leachate management system
- Landfill gas management system
- Final cover for landfill cells
- Site Infrastructure including storm water drains, roads, boundary wall, office, green belt etc.

2.12.4 Design Specifications for Landfill

The following are the design specifications which may be considered before designing a landfill:

- appropriate sizing of the landfill and related facilities based on the projected waste quantities
- visual barrier and enhanced environmental acceptability of the facilities, and contamination attenuation zone as required for a natural attenuation site
- soil and material balance towards daily, intermediate and final cover of the fill, and other operation and maintenance (O&M) related issues
- selection of appropriate earth moving equipment, compactors, and waste transportation trucks, etc.
- grade plan and phased development plan of the landfill (cell by cell) which identifies the earth works and other works related to daily operations, interim cover over the completed cells, etc.

- design of stormwater (drainage) management systems to divert rainwater away from the wastes and collect, treat and discharge into natural systems
- leachate collection and management plans, leachate recirculation.
- design of a liner system depending on the type of engineering systems required at the site and the anticipated change in waste characteristics and waste quantities.
- design waste placement and cover systems to ensure stability and safety
- selecting construction techniques and materials
- designing & monitoring wells and establishing surface water and groundwater monitoring programs
- design of a monitoring plan for monitoring the post-project quality of air, soil and water
- design of receiving area, inspection area and temporary storage area etc.
- designing site access roads and transportation systems
- provision of appropriate analytical methods and providing specifications for monitoring instruments
- to minimise the possibility of contaminating surface and groundwater
- to have control over gaseous emissions
- to maximise resource productivity

Slopes in the cells and collection pipes:

The slopes of base of cells and leachate collection pipes shall meet the following basic requirements:

- The base of each cell shall slope towards the leachate collection sump
- The lateral collection pipes shall slope towards the main collection pipe and the main pipe shall slope towards the sump
- The slope of the excavations which are not sealed with the landfill liner shall be away from the waste. Separate sumps for collecting and removing uncontaminated storm water shall be provided.b

Based on the volume of Waste generation and inerts generated after choosing for land fill or incineration, the following design criteria is been considered as for 25 years' TSDF.

Table No. 2.16: Design Parameters of SLF

Parameter	Value
Average waste quantity to the landfill	*22% of the incoming waste*
Project life	*25 years*
Density of waste after compaction in landfill	*1.8 t/cum*
Total waste volume (cell 1+cell 2+ cell 3 + cell 4)	*6,70,140 cum*
Additional volume of daily cover, bund & bottom liner	*15%*
Bund details (width, height)	*5m (W), 3m(H)*
Side slope	*1:3 (Vertical: Hoz)*
Landfill Height (above G.L.)	*9-12m (as per site condition)*
Landfill depth (below G.L.)	*3.0 m*
Total waste confined area (area of landfill cells)	*6.57 ha (approx)*

It is proposed to consturct the landfill in four phases with 10 years for first cell and three cells of 5 years each .Details of each cell for the proposed SLF are in the cluster are provided below:

Table No. 2.17: Sizing and Area calculations for landfill cells at site

Sr. No.	Component	Unit	Landfill Cell 1	Landfill Cell 2	Landfill Cell 3	Landfill Cell 4
	Life of landfill cell	***years***	***10***	***5***	***5***	***5***
1	Total Projected Waste during the period	tons	452100	226050	226050	226050
2	Achievable Waste Density in Landfill	tons/ cum	1.8	1.8	1.8	1.8

3	Volume of Waste (V1)	cum	251167	125583	125583	125583
4	Average height of Landfill (H)	m	12	12	12	12
5	Depth of Landfill (D)	m	1.5	1.5	1.5	1.5
6	Slope above G.L (as 1: n)		3.5	3.5	3.5	3.5
7	Addition 27% for Bottom Liner, Bund formation & daily cover –V2	cum	67815	33908	33908	33908
8	Total Volume Required (V=V1+V2)	cum	318982	159491	159491	159491
9	Area at the ground level for each cell	sqm	26582	13291	13291	13291
	TOTAL Area for landfill cells	**sqm**	**66455**			

Based on the design estimation, the given site is adequate for the time period of 25years and beyond. The Land Fill is been designed for 6 times the existing estimation of waste based on the probable growth of the Industry around this area.

2.12.5 Liner System

Several precautionary measures must be taken in order to ensure environmentally safe landfill disposal of hazardous waste. To minimize the potential impacts on the ground water, surface water, percolation of the leachate into the ground water must be avoided. Therefore it is imperative to have a proper sealing system for the landfill facility.

As per the guidelines on Engineered Secured Landfill Facility, an acceptable physical separation shall exist between the proposed waste body and the wet season high elevation of the ground water. This applies whether the cover excavation takes place on site or not. The minimum permissible separation is 1.5 meter. However here in the proposed site area where the maximum ground Water

table is 3.0 below the Ground level, the proposed separation is just adequate as per the national regulation.

2.12.6 Bottom Liner System

The liner system is a combination of drainage layer and barrier layers to prevent liquids and waste from escaping into underlying soils. A competent liner system shall have low permeability, shall be robust and durable and shall be resistantto chemical attack, puncture and rupture. A liner system comprises of combination of barrier materials such as natural clay, amended soils and flexible geo-membrane.

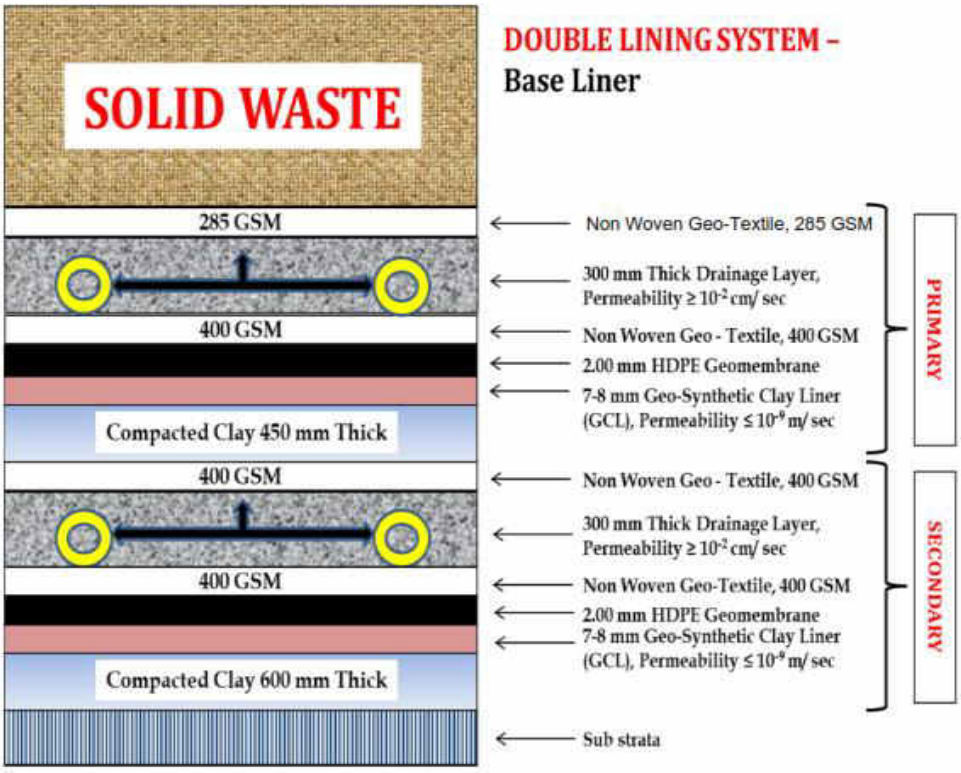


Figure No. 2.11: Double Lining System (Base Liner)

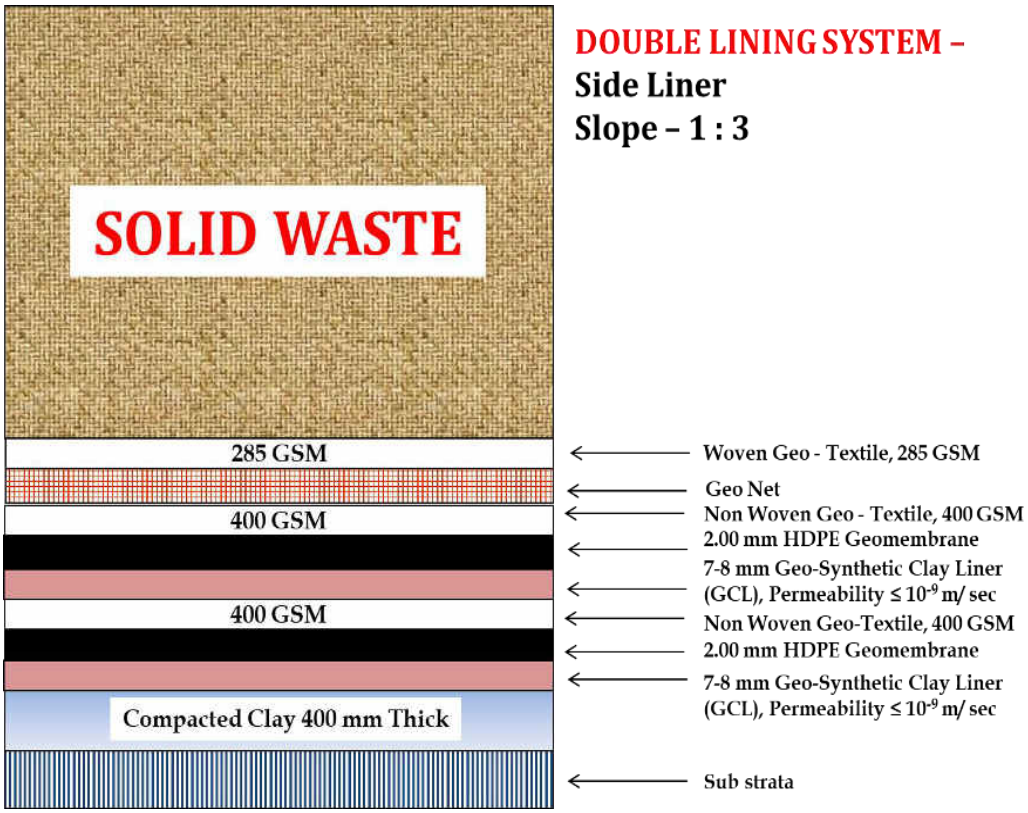


Figure No. 2.12: Double Lining System (Side Liner)

A single composite liner of two barriers made of different materials, placed in immediate contact with each other provides a beneficial combined effect of both the barriers. The liner system of a geo-membrane layer over clay barrier is proposed. A drainage layer and leachate collection system is placed over the composite liner system.

The liner system will comprise of the following layers below the waste:

i. 285 gsm thick geo-textile layer

ii. HDPE lateral pipe

iii. 300 mm thick drainage layer thick protective layer of sandy silt

iv. 400gsm geo-textile layer

v. 2.0 mm thick HDPE geo membrane

vi. 7.8 mm thick Geo-Synthetic clay layer

2.12.7 Side Soil Bund

Side soil bund has to be constructed for resisting the sliding of the waste along the slopes. The height of the soil bund has been restricted to 6 m.

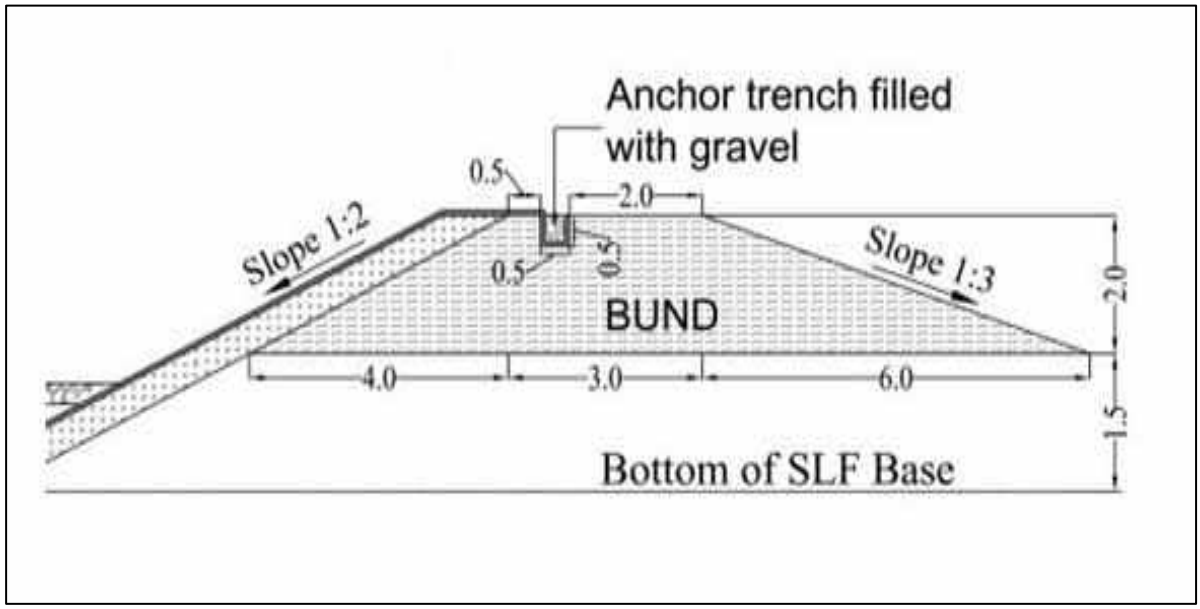


Figure No. 2.13: Side Soil Bund

Slope Stability Aspects

The stability of the slopes has been checked for the following cases:

- Stability of the above ground portion of the completed landfill (Slope 1:3)
- Stability of the liner system along the embankment

As liner will be laid along the slope which is a natural profile of the site, the stability is ensured (Considering the site factors).

2.12.8 Leachate Drainage, Collection & Removal

Leachate Collection

The primary function of the leachate collection system is to collect and convey the leachate out of the landfill unit and to control the depth of the leachate on the liner. As per manual, the leachate collection system shall be designed to maintain the leachate a maximum head of 30 cm. The design of leachate head is very important as flow of leachate through imperfections in the liner system increases with an increase in leachate head on the liner.

Maintaining a low leachate level on the liner helps to improve performance of the composite liner system. In order to collect and convey the leachate generated to the collection sump, a Leachate collection System has been designed. It comprises of the following:

- Drainage Layer
- A perforated Pipe Collector System
- Sump Collection Area
- Removal of the leachate

The leachate drainage is usually achieved using graded under-liner and drains which lead to a collection system or a sump. The technical details of the leachate drainage are as under:

- Thickness of the Drainage Layer: 30 cm
- Material: Granulated Material/Sand
- Permeability: 0.01 cm/sec

The generated leachate will be collected in the channel due to bottom transverse slope of the site and conveyed to the sump via collector pipe due to the longitudinal slope of 1% (max) by gravity.

Leachate Collection Sump

A leachate collection sump has to be designed to collect the leachate from the facility and transfer the same to the solar evaporation pond after preliminary treatment in ETP.

The purpose of leachate collection sump is to collect the leachate from the header pipes and active landfill area. The leachate collection sump would be supported by pumps.

Leachate Pipe

Leachate Pipe design covers two factors, viz., the length and diameter of the pipe.

2.13 Leachate Management

The leachate that will be collected from the landfill facility contains lots of pollutants and hence required to be treated in ETP and shall be sent to Solar Evaporation Pond. In the rainy season when the generation of the leachate is very high and the treatment plant also looks inadequate, the leachate Shall be sent to CETP.

In the proposed system, the leachate from segregation pit, Temporary Waste Storage area, Incinerator scrubber, bottom of the land fill cells are collected at leachate sump shall be pumped to ETP from where it will be pumped to Solar evaporation pond.

In the proposed design of leachate network, the pipe diameter has been assumed and subsequently, the spacing of pipes has been worked out, using Mound Model.

Spacing of Pipes

As suggested by USEPA Manual, the pipe spacing may be determined by the Mound Model. In the Mound Model, the maximum height of fluid between two parallel drainage pipes is equal to,

$$h_{\max} = \frac{L\sqrt{c}}{2}\left[\frac{\tan^2\alpha}{c} + 1 - \frac{\tan\alpha}{c}\sqrt{\tan^2\alpha + c}\right]$$

Where, C = Q/k

h_{max} = Maximum Hydraulic Depth (30 cm)

L = Distance between the Pipes

k = Permeability of Drainage Layer (0.01)

Q = Inflow Rate (generally unit area)

α = Slope (proposed slope of the pipes, generally kept at a gradient to allow the flow of leachate under gravity)

The leachate generation is primarily a function of precipitation and it is directly proportional to rainfall intensity and surface area. Using the rational formula for calculation of the inflow rate of leachate, with the average of 24 hours maximum rainfall intensity of around 30mm and circulation of around 50%, maximum of 81.6cum/day of leachate would be generated. This can be treated in the solar evaporation pond of 200sqm area and 1.2m depth with 3 day storage facility.

- For collection of leachate, it is proposed to provide HDPE perforated pipes with sufficient strength (minimum 6 kg/sq.m) and safe from particulate and biological clogging and deflections. Perforated drainage pipes can provide long-term performance and these pipes transmit fluids rapidly and maintain good service lives. The depth of the drainage layer around the pipe shall be deeper than the diameter of the pipe. The pipes can be placed in trenches to provide the extra depth. In addition, the trench serves as a sump (low point) for leachate collection.
- It is proposed to provide a network of pipe comprising of 100mm diameter feeder pipe connected through 160mm header pipe and finally into the leachate pond through 315mm main header pipe. The leachate collection pipe shall be provided with cut/perforations
- **Leachate collection system**

The leachate collection system comprises a network of drainage pipes, which is located directly over the liner system and is covered with a sand/gravel drainage layer. Leachate shall be collected by a network of lateral and header pipes embedded in a drainage layer, all of which shall eventually drain into a leachate collection sump. The collected leachate shall be transferred to a leachate treatment system. Leachate, thus collected shall be transferred to the effluent treatment plant. The leachate collection system in an engineered landfill takes the

form of an under-drain beneath the waste material. It is required to ensure that there is no more than a limited head of pressure above the base liner to cause leakage of liquid from the base of the landfill. The maximum pressure head in the proposed landfill shall be limited to 300 mm. Drainage is affected by a highly permeable layer of about 300 mm thickness made of graded sand/gravel. Within this layer a network of HDPE pipes are placed to collect leachate and conduct it quickly to the collection sump for removal from landfill. The pipes are typically perforated only over the upper half to allow the leachate to enter the pipe and thereafter to be contained within the pipe network system. The layout of pipe network generally includes sufficient redundancy to ensure that if a blockage occurs somewhere in the network the leachate simply backs-up a little then flows into the system a little further up-gradient. Two layers of the leachate collection system shall be provided one over the other. Slotting area of the pipe shall be done only on the top 120^0 portion of the pipe and to an extent of 100 square centimeters (cm^2) per running meter of the pipe.

Key design features of a typical leachate collection system comprise the following:

- A network of semi perforated HDPE pipes laid out directly over the primary and secondary liners and graded towards the collection sump at no less that of 2% slope, with a slotting area of 100 cm2 per running meter of the pipe.
- A drainage layer 300 mm thick of graded sand/gravel placed over the entire base of the landfill, covering the pipe network (16-32 mm grade 4 material).
- A geo-textile placed over the primary liner serving the purpose of filter/barrier between the waste and the drainage media.

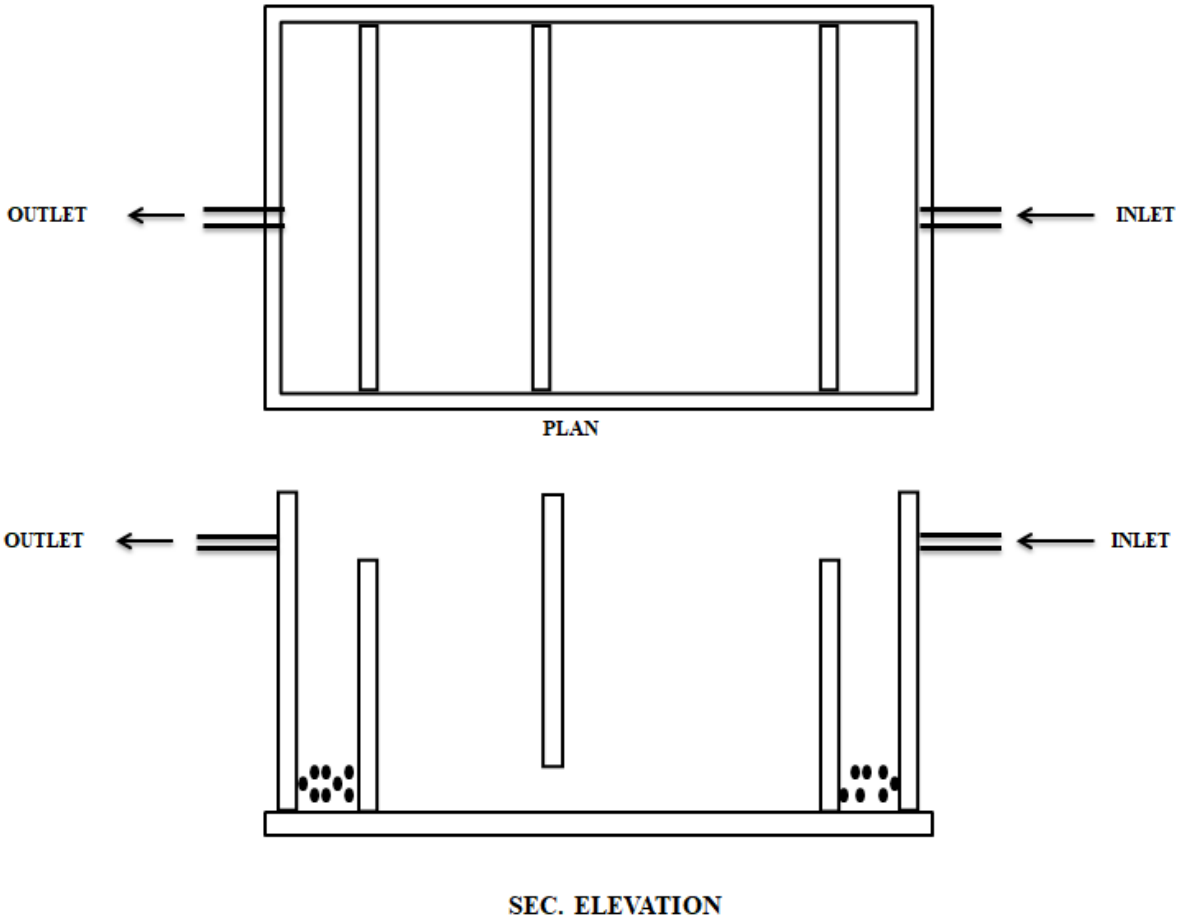


Figure No. 2.15: LEACHATE COLLECTION SYSTEM

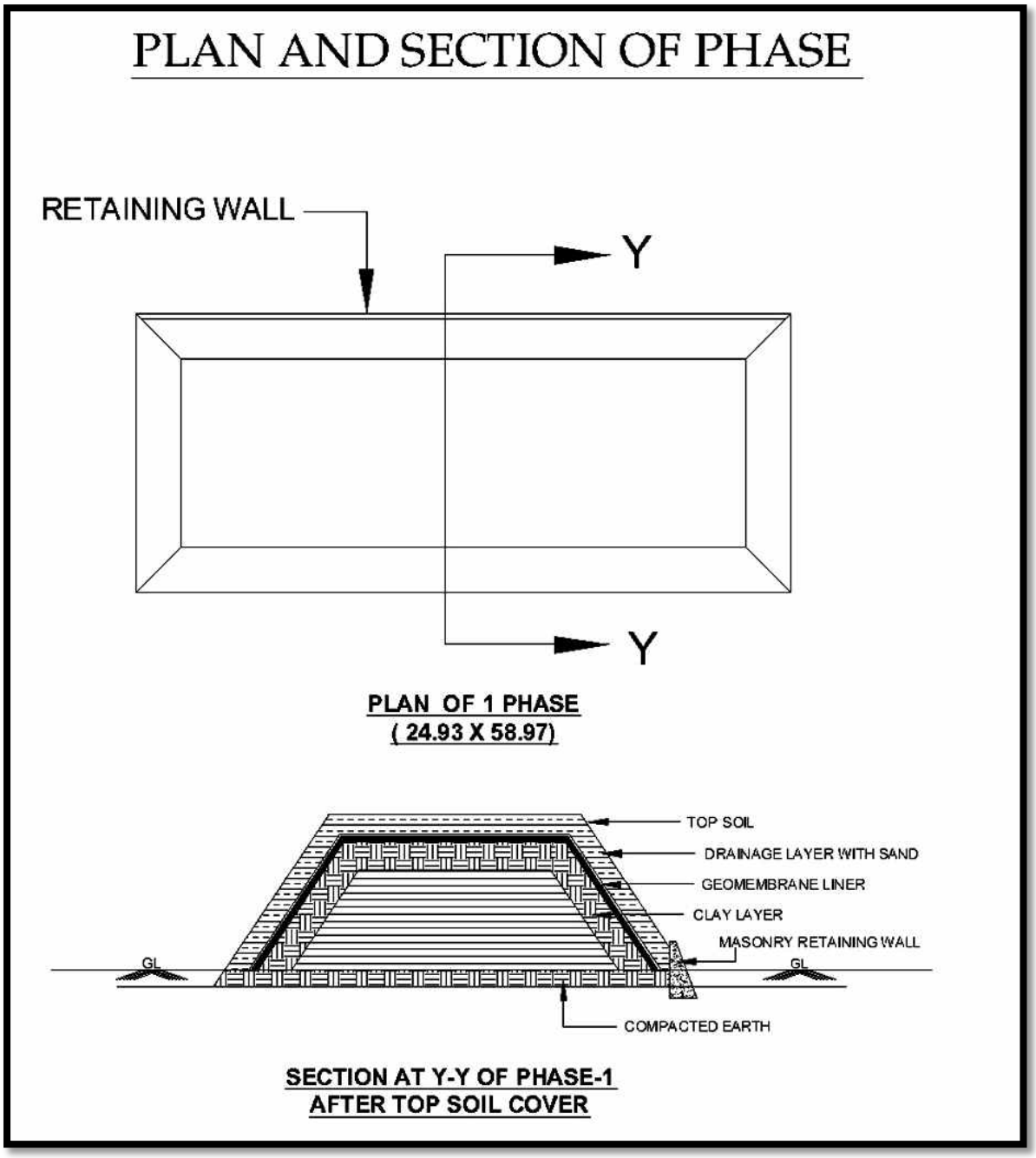


Figure No. 2.16: Proposed Section of Closure Plan of Secured Landfill Site

Pipe Diameter (mm)	Length (m)
200 mm – Main Header pipe	161
160 mm – Header pipe	540
100 mm – Feeder pipe	340

A simple solar evaporation pond is proposed with no treatment system. The leachate generated in each cell shall be collected in a sump from where it shall be diverted to the solar evaporation pond.

Top Cover

The cover system will comprise of the following layers above the waste:

i. 300 mm thick gas collection layer of granular soil (permeability 10^{-2} cm/s)
ii. 600 mm thick compacted amended soil
iii. 1.5 mm thick Geo-membrane sheet.
iv. 300 mm thick drainage layer of granular soil (permeability 10^{-2} cm/s)
v. 600mm thick vegetative cover with good clay soil

2.14 Design of Landfill Gas Management

Landfill gas is generated as a product of biodegradation of organic content of the waste under anaerobic conditions. Methane and carbon dioxide are the principle gases produced.In this project, Only inert and rejects having very low organic content is been sent to the landfill for final disposal, thereby minimizing the potential of landfill gas generation. Hence, a passive venting of gas is recommended for the proposed landfill.

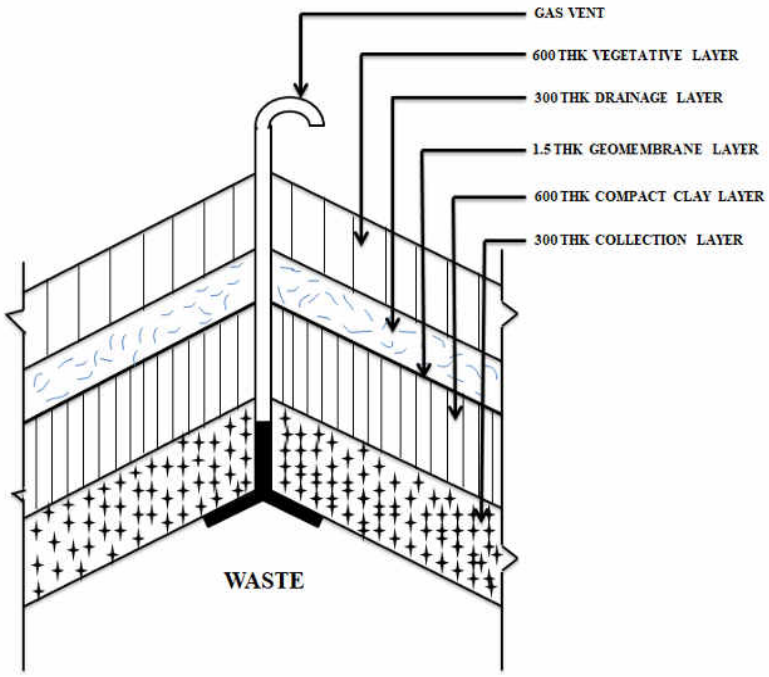


Figure No. 2.17: GAS VENT FOR LANDFILL GAS MANAGEMENT

A controlled passive venting system for landfill gas management is proposed. The gas pipes comprising of perforated HDPE pipes of 63mm diameter shall be installed in the waste cell up to top surface of the waste layer below the top final cover system. The pipes shall be placed on the top surface with the pipe network of interconnections above the waste pile, to collect the gas which shall be vented to the atmosphere, as it will be released in a very small amount.

2.15 Surface Water Drainage System

The surface water drainage system is designed for two purposes:

- Runoff from the surrounding areas does not drain into the active filling area.
- There is no water logging/pounding over the final cover of the landfill facility.

CASE-I

Storm water drain is very essential component of landfill facility. The first and important factor for a landfill is to prevent the entry of water streams into the landfill facilities, thus reducing the generation of leachate from the waste body, which ultimately reduces the migration of pollutants from landfill facility. The drainage along the sides of the active filling area is intercepted and channelled to water courses without entering the operational area.

CASE-II

After the final cover is laid on the landfill facility, it has to be ensured that the topography allows the smooth drainage of the precipitation / rainfall and no poundings take place thereby enhancing the leachate problem.

It is proposed that the final cover would be provided a slope of 3 to 5% for proper surface water drainage. Drainage chutes shall be provided at adequate spacing on the final surface along the side slopes. The water would be collected in the peripheral drains and channeled to the nearest existing storm water drain.

2.16 Operation and Maintenance

1. The proponent shall endeavor to ensure
   i. That the waste processing facility and secured landfill are maintained to the standards and specifications as set out in the O&M requirements.
   ii. the safety of personnel deployed on and users of the Waste Processing Facilities or part thereof
   iii. adverse effects on the environment and to the owners and occupiers of property and/or land in the vicinity of the Waste Processing Facility and secured landfill, due to any of its actions, is minimized
   iv. any situation which has arisen or likely to arise on account of any accident or other emergency is responded to as quickly as possible and its adverse effects controlled/minimized
   v. The personnel assigned by the contractor shall have the requisite qualifications and experience and are given the training necessary to enable meeting the O&M requirements
   vi. Data relating to the operation and maintenance of the waste processing facilities is collected, recorded and available for inspection by respective agencies

2. The following minimum data would be recorded at the HW receipt point:
   i. Date of operation
   ii. Registration number of the truck supplying Municipal Hazardous waste/ Lorry number
   iii. Total weight of the truck
   iv. Time of entry of the truck
   v. Zone/circle/ward from which Municipal Hazardous waste has been collected
   vi. Empty weight of the truck
   vii. Net weight of Municipal Hazardous waste
   viii. Time of exit of the truck

3. During the Operations Period and until the handover of the Waste Processing Facilities, the Contractor shall, duly document the O&M plan and/or O&M Manual, covering the various operational aspects which could be exhaustive but including the following:
    - Green Belt
    - Fencing
    - Quality Control Laboratory
    - Internal Roads
    - Lighting and other electrical works
    - Weigh Bridge
    - Waste Receipt
    - Waste Inspection
    - Waste Weighing
    - Waste Acceptance Criteria
    - Waste Unloading
    - HW Processing Machinery
    - Window platform
    - Storm Water Drainage System
    - Leachate Collection
    - Water Supply System

4. Routine Maintenance Standards

In order to ensure smooth and uninterrupted operations, routine maintenance of the project facilities shall include the following:

i. Prompt repairs of the weigh-bridge, windrow platforms, leachate collection drainage and treatment system, electrical items, drains, internal roads, sieving machinery, lighting and fencing;

ii. Repair of equipment/consumables, horticultural maintenance and repairs to equipment, structures and other civil works which are part of the Project Facilities;

iii. Keeping the Project Facilities in a clean, tidy and orderly condition and taking all practical measures to prevent damage to the Project Facilities or any other properly on or near the Site;

iv. Taking all reasonable measures for the safety of all the workmen, material, supplies and equipment brought to the site.

5. The following standards in order of preference shall be adopted for O&M, unless otherwise specified:
   i. HW Rules, 2016
   ii. Any other standards specified by statute and Applicable Laws
   iii. Bureau of Indian Standards (BIS)
   iv. Any other standard acceptable international / national guidelines

6. The Emergency Response Protocol ("ERP") shall be developed in line with Factories Act, which shall be a part of the O&M Manual.

7. Sufficient staff, plant, equipment and materials, including medical assistance shall be ensured to respond to Emergency within reasonable period at all times during the Operations Period

8. Landfill Operation
   i. On each day during the Operation Period, the residual inert waste shall be compacted and covered ("Daily Cell Cover") in the manner as specified in HW Rules, 2000-01.
   ii. The Contractor shall maintain a leachate collection and removal system to ensure that there is no run-on / run-off to and from the facility
   iii. based on the level of segregation achieved and characteristics of waste disposed off into landfill, the requirement of gas recovery / venting system may be designed
   iv. The Contractor may also consider the requirements for getting CDM benefits, while planning for the above

9. Sampling and Testing

The Residual inert matter shall be sampled and tested in the manner as set out in the O&M requirements

10. Environment Monitoring System

Environmental Monitoring shall be carried out as stipulated in the HW Rules, 2016, Manual on HW Management prepared by MoUD and other applicable regulations. The monitoring schedule, parameters and locations shall be detailed in the O&M manual.

The instruments / equipment required for carrying out the environmental monitoring tests as per above requirements shall be provided. Global Expert shall deploy qualified personnel with hands on experience in Environment lab to monitor and test the required parameters

11. Sale / distribution of recyclable products from segregation

Note: The information furnished above is indicative only and can be altered / amended at the stage of design and detailed engineering of the project.

2.16.1 Operational Methodology of TSDF: Land Fill Site

2.16.1.1 Waste Acceptance Criteria

- The generator shall have Authorization for disposal as per Hazardous Wastes (Management, and Trans-boundary Movement) Rules, 2016.
- At the time of taking membership, the company shall carry out comprehensive analysis of waste and the same sample will be preserved for further physical verification.
- As the dumper/truck/vehicle arrive to MEETPL, it will be weighed and samples will be taken from 3 different locations and composite sample will be made and analyzed for main parameters of quick test. These parameters and analysis method are listed out below

List of Quick Test Parameters and Its Analysis Method

Sr. No.	Parameters	Method
1	Color	APHA (2120 B &2120 C)
2	Odour	APHA (2150 B)
3	pH	APHA (4500-H^+ B)
4	PFLT (Paint Filter Liquid Test) for moisture content	USEPA Method 9095 B

If the sample passes finger print analysis, then only, the truck is allowed to go to the landfill area and dispose the wastes. In case the sample fails in finger print analysis, then investigation is done and the waste is given required treatment before disposal to the landfill. Fingerprint Analysis Requirement for Hazardous Waste Treatment, Storage and Disposal Facilities is Listed out below

Fingerprint Analysis Requirement for Hazardous Waste Treatment, Storage and Disposal Facilities

Sl. No.	Parameters for fingerprint Analysis by the Operators of TSD Facilities
1	Physical Analysis
2	Physical State of the waste (liquid/slurry/ semi-solid/ solid: inorganic/organic /metallic)
3	Identification of different phases of the wastes in cases of solid wastes contained in aqueous/non-aqueous liquids/solutions for slurries and sludge)
4	Color & Textures
5	Specific Gravity
6	Viscosity in case of liquid waste
7	Flash Point
8	Loss on drying at 105o C in case of solids
9	Loss on ignition at 550o C
10	Calorific values in case loss on ignition>_ 20%

11	Paint filter Liquid Test (PFLT) for liquids
12	Liquid Release Test (LRT) for liquids
13	Chemical Analysis
14	pH
15	Reactive Cyanide (ppm)
16	Reactive Sulfide (ppm)

2.16.1.2 Collection & Transportation of Hazardous Solid Waste from Generation Site to TSDF

The hazardous waste for disposal will be collected mainly from the industries within the KIADB Industrial Estate; however some waste will also be received/ collected from other areas. Safe transportation of hazardous waste to the TSDF is a collective responsibility of the waste generator, operator of a facility for treatment and disposal of hazardous waste and the transporter. Apart from the guidelines mentioned in packaging and labeling, the following guidelines will be followed before handing over the waste to the transporter.

- Transport of hazardous wastes will 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.
- All hazardous waste containers will be provided with a general label as given in Form - 8 in Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016, as amended.
- Transporter will not accept hazardous waste from an occupier (generator) unless six– copies (with color codes) of the manifest (Form – 10) as per rule 19 of the Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016 and as amended are provided by the generator. The transporter will 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 and Other Waste (Management and Transboundary Movement) Rules, 2016, as under.
  - Copy 1 (white): To be forwarded to the SPCB/PCC by the occupier.

- Copy 2 (Yellow): To be signed by the transporter and retained by the occupier.
- Copy 3 (Pink): To be retained by the operator of a facility.
- Copy 4 (Orange): To be returned to the transporter by the operator of facility after accepting waste.
- Copy 5 (Green): To be forwarded to the SPCB/PCC by the operator of facility after disposal.
- Copy 6 (Blue): To be returned to the occupier by the operator of the facility after disposal.
- Copy 7 (Grey): To be sent by the receiver to the State Pollution Control Board of the sender in case the sender is in another state.

- The generator will provide the transporter with relevant information in Form 9, i.e. Transport Emergency (TREM) Card regarding the hazardous nature of the wastes and measures to be taken in case of an emergency.
- The operator of a facility (registered recyclers or re – processors of hazardous waste) while collecting the wastes from the waste collections points or ports or ICDs shall also follow the manifest system as per rule 7 of the Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016.

Transportation of hazardous waste will be done as per guidelines of CPCB. The TSDF will be having authorized transporters with dedicated dumpers / trucks / vehicles (Hydraulic) on contract basis for transportation of waste. All the vehicles will have the nameplate with details of company's name, address, phone no., etc. During transportation, containers are closed from all sides and covered from top. The frequency of trucks / dumpers / vehicles movement within premises of TSDF Site will be maximum 5 nos./day.

The outsourced agencies designated to transport hazardous waste from source of generation up to TSDF facility will have a road map reported to both the generator of hazardous waste and TSDF facility keeping in mind the nature of hazardous waste being transported in the trucks and also the vulnerability and sensitivity of the

route that is being taken. All efforts will be made to avoid transport routes that are sensitive and vulnerable.

Hazardous Waste Transportation & Safety

In order to optimize and facilitate proper operations at TSDF, the generator of hazardous waste shall be responsible for managing hazardous waste before being sent to the TSDF for further treatment and disposal. Responsibilities of the generator are listed as under:

- Waste minimization, reuse of waste to the maximum extent before sending to TSDF
- Comprehensive waste characterization
- Segregation of hazardous and non-hazardous waste to reduce the quantity of waste for disposal at TSDF, appropriate labeling of all containers and storage aspects
- Proper handling of waste at source
- Other requirements as discussed in subsequent sub-sections

Requirements for transportation of hazardous wastes for disposal

Transportation is one of the most important areas of concern associated with the handling of hazardous waste. Considering the toxic, flammable, explosive or corrosive characteristics of hazardous waste, its transport has to be planned in such a way that this waste does not cause danger to health or environment, when handled individually or when in contact with other wastes or substances during transportation. Hence, its transportation is expected to:

- Satisfy the needs of occupier and handlers/transporters
- Meet national and, if necessary, international requirements, e.g., United Nation's, safety labeling requirements

The packaging and method of transport determines the safety of hazardous wastes during the transit without any accident or spillage. In addition, proper and rapid identification of a spilled substance determines how effectively and safely the situation can be controlled. Spill risk is high during loading, transportation and

unloading. This is the reason why the transportation of hazardous waste is required to be regulated. Hazardous waste transportation regulations cover the transportation of hazardous waste outside an installation, e.g. on the pathway from the waste generator's premises to the TSDF. The off-site transportation requirements involve proper awareness about the following:

- Container: Specially designed container considering the fact that the hazardous wastes are corrosive/abrasive in nature, the container shall be made of appropriate leak-proof material with mechanical stability for 3 (three) years
- Labeling of the container: to identify the waste, describe the possible hazard, and the remedial measures/first-aid required in case of any accidental spills
- Transportation vehicle: to identify the waste displaying the possible hazard, the remedial measures/first-aid required in case of accidental spills, telephone number of the contact person/controlling agency in case of emergency, etc. through labeling
- Collector/transporter selection: to have technical competence and relevant skills and other requirement
- License/manifest: to carry application and 'No objection certificate (NOC)' documents
- Emergency procedures: to have knowledge about actions to be taken in case of spills or accidents
- Fees and fines: to be paid for not having license, or not abiding to the regulations

On-site transportation typically involves carrying of small amounts of materials over short distances. On-site transportation does; however, pose a significant risk from the frequency of activity and the lack of observance of prescribed regulations.

Regulatory requirements for packaging, labeling of individual containers and transportation of hazardous wastes are provided under Rule 7 of the Hazardous

Wastes (Management & Handling) Rules, 1989 as amended, and notified under the Environment (Protection) Act, 1986. It is the responsibility of the generator or operator of a facility to ensure that the hazardous wastes are packaged, based on the composition in a manner suitable for handling, storage and transport. Labeling and packaging is required to be easily visible and to withstand physical conditions and climatic factors. CPCB has also enunciated guidelines for Transportation of Hazardous Wastes, HAZWAM/33/2005-2006

These guidelines are issued to facilitate safe transportation (on-site & off-site) of the hazardous wastes in compliance with the regulations.

Packaging:

The containers must be able to withstand normal handling and retain integrity for at least six months. In general, packaging for hazardous waste must meet the following requirements:

- All packaging material including containers shall be of such strength, construction and type that they would not break open or become defective during transportation
- All packaging material including containers shall be packaged and sealed in such a way that those spillages of hazardous wastes/substances are prevented during transportation due to jerks and vibrations caused by uneven road surface
- Re-packaging materials including that used for fastening must not be affected by the contents or form a dangerous combination with them
- Packaging material shall be such that there will be no significant chemical or galvanic action among any of the material in the package

The containers when used for packaging of hazardous wastes shall meet the following requirements:

- Container shall be of mild steel with suitable corrosion-resistant coating and roll-on roll-off cover, which may either be handled by articulated crane or by a hook lift system comfortably for a large variety of wastes. Other modes of packaging, like collection in 200-litre plastic drums,

cardboard cartons, PP and HDPE/LDPE containers, etc., may also be used for a variety of wastes. However, all such containers shall hold up mechanical handling.

- They shall be leak proof
- In general, the containers for liquid hazardous waste shall be completely closed, in fact sealed. There shall be no gas generation due to any chemical reaction within the container, and hence, there shall not be any need for air vents; expansion due to increase/decrease in temperature normally does not need air vents.
- Container shall be covered with a solid lid or a canvas to avoid emissions of any sort including spillage, dust, etc., and to minimize odour generation both at the point of loading as well as during transportation.
- Container used for transportation of waste shall be able to withstand the shock loads due to vibration effect/undulations of pavements, etc.,
- Container shall be easy to handle during transportation and also emptying.
- Manual handling of containers shall be minimized to the extent possible. Appropriate material handling equipment is to be used to load, transport and unload containers. This equipment includes drum, dollies, forklifts, drum handling equipment, lift gates and pallets. Drums shall not be rolled on off vehicles.
- Where two-tier or three-tier storage is envisaged, the frame shall have adequate strength to hold the containers.
- One-way containers (especially 160-litre drums) are also allowed. The multi-use containers shall be reusable provided it shall be cleaned and free from deterioration or defects.
- Loads are to be properly placed on vehicles. Hazardous waste containers are not to overhang, perch, lean or be placed on any unstable base. Load shall be secured with straps, clamps, braces or other measures to

prevent movement and loss. Design of the container shall be such that it can be safely accommodated on the transport vehicle.

- Dissimilar wastes shall not be collected in the same container. Wastes shall be segregated and packed separately. This is necessary to ensure that each waste finds its way to the right disposal point.
- Generator of hazardous waste shall not resort to the dilution of wastes (predominantly organic wastes).

Labeling:

There are two types of labeling requirements:

- Labeling of individual transport containers (ranging from a pint-size to a tank), and
- Labeling of transport vehicles

All hazardous waste containers must be clearly labeled showing all its contents. The labels must be waterproof and firmly stuck to the containers, so that they cannot be removed. Previous content labels shall be obliterated when the contents are changed. Proper marking of containers is essential.

Containers storing hazardous waste shall be labeled with the words "HAZARDOUS WASTE" in vernacular language, Hindi/English. The information on the label must include the code number of waste, waste type, origin (name, address, telephone number of generator), hazardous property (e.g. flammable), and the symbol for the hazardous property (e.g. the red square with flame symbol).

The label must withstand the effects of rain and sun. Labeling of containers is important for tracking the wastes from the point of generation up to the final point of disposal. The following are the requirements for labeling:

- The label shall contain the name and address of the generator and operator of the facility where it is being sent for treatment and final disposal i.e., labeling of container shall be provided with a general label as per Form 8 of HW (M&H) Rules,1989 and as amended).

- Emergency contact phone numbers shall be prominently displayed viz. the phone number of concerned Regional Officer of the SPCB/PCC, Fire Station, Police Station and other agencies concerned.

Explanation: As a general rule, the label has to state the origin/generator of the waste. The HW generator alone is responsible and shall know, in case of any accident/spillage, etc., the kind of wastes it contained, the kind of hazard that may occur and the measures to be taken. The second in the line is the collector/transporter, who needs to know the risk and what to do to minimize risks and hazards.

Transportation requirement:

Following are the requirements pertaining to the transportation of hazardous wastes:

- Vehicle used for transportation shall be in accordance with the provisions under the Motor Vehicles Act, 1988, and rules made there under.
- 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.
- Transporter shall have valid “Pollution under Control Certificate” (PUCC) during the transportation of HW and shall be properly displayed.
- Vehicles shall be painted preferably in blue colour with white strip of 15 to 30 cm width running centrally all over the body to facilitate easy identification.
- Vehicle shall be fitted with mechanical handling equipment for safe handling and transportation of wastes.
- The words "HAZARDOUS WASTE" shall be displayed on all sides of the vehicle in vernacular language, Hindi, and English.
- Name of the generator or the transporter, as the case may be, shall be displayed.

- Emergency phone numbers and TREM Card in Form 9 of HW (M&H) Rules, 1989 and as amended shall be displayed properly.
- Vehicle shall be fitted with roll-on/roll-off covers if the individual containers do not possess the same.
- Carrying of passengers is strictly prohibited except for the waste haulers. Access to these waste haulers shall be restricted to the cabins only.
- Transporter shall carry documents of manifest for the wastes during transportation as required under Rule 7 of the Hazardous Waste (M&H) Rules, as amended.
- The trucks shall be dedicated for transportation of hazardous wastes and they shall not be used for any other purpose.
- Each vehicle shall carry first-aid kit, spill control equipment and fire extinguisher.
- HW transport vehicle shall run only at a speed specified under Motor Vehicles Act in order to avoid any eventuality during the transportation of HW.
- The driver of the transport vehicle shall at least have cleared the SSC exam (10th standard) and shall have valid driving license for heavy vehicles from the State Road Transport Authority and shall have experience in transporting the chemicals.
- Driver(s) shall be properly trained for handling the emergency situations and safety aspects involved in the transportation of hazardous wastes.
- The design of the trucks shall be such that there is no spillage during transportation.

2.16.1.3 Waste Treatments/Stabilization

Waste treatment / stabilization is a process to convert hazardous wastes in the form of non- aqueous liquids, semi-solids or reactive solids into less leachable solids that can then be deposited directly into the secured landfill in compliance with the concentration limits/criteria stipulated by SPCB. The treatment/stabilization operations will be carried out for all wastes identified for the purpose, so as to

minimize their contaminant leaching potential. This will change the nature of these wastes to a less hazardous category. Treatment/stabilization involves immobilization of leachable materials by fixation as non-reactive solids, reduction of volume reducing contaminant level of organic/inorganic components. Selection of technology applications, cost, etc. Suggested flow chart for screening the wastes going to treatment/stabilization for developing treatment plant is given in the CPCB document Hazwams/17/2000-01. The treated wastes before disposal in the landfill shall be assessed for compatibility with other wastes as well as with liner system.

The term treatment/stabilization intends to cover a number of mechanisms including:

- Immobilization/chemical fixation – the chemical binding of contaminants within a cementing structure to reduce the mobility or leachability of the waste constituents.
- Encapsulation – the occlusion or entrapment of contaminant particles within a solid matrix.
- Solidification – the conversion of slurries that do not readily de-water into solids by addition of solidification and adsorption agents.
- Typical reagents that would be used for the stabilization process may include lime, fly ash, bentonite (clay), cement, saw dust, etc., in combination with sodium silicate solution, if required to create additional binding properties of the wastes.

General operations for waste treatment/stabilization shall include.

- Receiving waste for its storage in appropriate/designated place
- Adding of reagents as per the pre-estimated quantities
- Mixing and curing
- Thermal treatment to remove moisture, organics, etc.
- Analysis of the stabilized sample (TCLP)
- Transfer of stabilized material to landfill

The above process operation generally has the potential to create gaseous and particulate emissions into the air. This can be controlled by various management

practices as stipulated by SPCB including masking (and would have to be properly managed)

Also ambient odor near facility coming from industrial estates has to be neutralized in the following manner by the operator.

Placing bulk, containerized, or non-containerized liquid hazardous wastes containing free liquids (whether or not absorbents have been added, liquids that have been absorbed in biodegradable materials and liquids that have been stabilized by sorbents but will release liquids when compressed under normal pressure that might occur during and after land filling) in any landfill is prohibited regardless of the length of time, presence of liners or leachate collection system.

Hence, TSDF shall use the paint filter liquid test (PFLT) to comply with this requirement. This test determines whether the waste can be accepted to landfill subject to its passing the PFLT. The waste is not subject to a ban if it passes the PFLT. However, it if does not, it must be treated before it can be placed in the landfill.

Waste treatment/stabilization would have to be performed on all wastes that find their final disposal into a landfill but do not med the landfill disposal criteria. Typical analysis protocol for waste treatment/stabilization would be as indicated in table – 2.7 (comprehensive analysis). Finger printing analysis for the same would be as indicated in table – 2.6.

2.16.1.4 Weighing and Sampling Of Waste

- As the dumper / truck / vehicle enter MEETPL, weighing will be done and samples will be drawn from three different locations and a composite sample will be made.
- Once the quick tests are over, vehicle will be allowed to enter the premises and will be sent to dumping site or temporary hazardous waste storage area.
- If any waste consignment is not meeting the acceptance criteria, it will be either returned to the waste generator or taken for appropriate treatment (like neutralization / stabilization etc).

The frequency of weighing machine calibration shall be as per rules and regulations

2.17 Closure and Post-Closure Maintenance Plan

Determination of the end-use of a landfill site is an essential part of the plan for landfill closure and post-closure maintenance. Some possible uses of closed landfill sites near urban centres include parks, recreational areas, golf courses, vehicle parking areas and sometimes even commercial development.

A closure and post-closure plan for landfills involves the following components:

i. Plan for vegetative stabilization of the final landfill cover.
ii. Plan for management of surface water run-off with an effective drainage system.
iii. Plan for periodical inspection and maintenance of landfill cover and facilities.

2.17.1 Landfill Closure

As each phase is completed and as the final cover level is reached in successive phases, the following interconnectivities are established:

(a) The leachate collection system of each phase is sequentially connected (if so designed)
(b) The surface water drainage system at the cover of each phase is sequentially connected (if so designed)
(c) The temporary surface water drainage system constructed at the base of each completed phase is dismantled.
(d) The gas collection system (if provided) of each phase is sequentially connected.

Upon completion of all phases a final check is made of the proper functioning of all inter connected systems. An access road is provided on the landfill cover to enable easy approach for routine inspection of the landfill cover.

2.17.2 Post-Closure Stabilization, Operation & Care

Long-Term Vegetative Stabilization

If a landfill cover is intended to be used for a specific purpose e.g. park or golf course or vehicle parking area, then the cover will be stabilized in such a manner that the end-use is achieved. However, if no specific end-use is envisaged, then long-term vegetative stabilization will be undertaken to return the land to its original and natural vegetative landform.

Vegetation is by far the most common and usually the preferred stabilization option after closure of landfills. If a self-perpetuating vegetative cover can be established, not only can wind and water erosion be minimized, but also the landfill can be returned to some semblance of its original appearance and land use. In favourable climates, re-vegetation may require only modest effort or may occur by natural process during a reasonably short period of time. However, in arid climates or a harsh environment, establishment of vegetation may be a lengthy, difficult and costly process. Typically, vegetation efforts follow a series of steps. While the specific procedures are unique to each landfill and climatic regime, the following are usually representative elements of the process:

(a) Seedbed Preparation: Seedbed preparation is necessary to set the stage for establishment of the short-term community. Initial operations may include grading, furrowing, or grouping to enhance microclimate and addition of nutrients and soil amendments, if required.

(b) Short-Term Vegetation: It is common practice, in both humid and dry environments, to rely largely on grasses for the primary initial source of short-term land cover. Usually several species are included in the initial seeding mixture to increase diversity and reduce the chance of total community failure. Short-term vegetation is usually assisted by irrigation.

(c) Long-Term Vegetation: To achieve the ultimate goal of attaining a self-sustaining and stable community, a transition between short-term and long term vegetation must occur. In some cases, this may be left to invasion by native species after short-term vegetation is assured and soil development is well under way. In other cases – for example, when irrigation has been used temporarily to establish the short-term community – it may be necessary or desirable to enhance the natural

succession process by replanting with a more diverse mix of species suited to the next stage of community succession, such as shrubs. The need for artificial enhancement of the succession process will depend on the success of previous short-term efforts and on the ultimate intended land use of the reclaimed area. All vegetation efforts, however, shall work toward self-generation and minimum management in the long term. Several factors limit the growth of plants on landfills. These include toxicity of landfill generated gases (methane and carbon dioxide) to root systems, low soil oxygen due to heavy compaction, thin cover layer inhibiting root penetration, low nutrient status of cover soil, high soil temperatures and poor soil structure. Some of these factors can be eliminated or their effect on plant growth reduced. Active gas extraction or proper uses of gas barriers with venting system prevent gas migration to the root zone. Waste may be removed from certain areas to enable planting of islands of trees. By separating biodegradable waste from on-biodegradable, it may be possible to create zones free of toxic gases.

2.17.3 Operation after Closure

The following facilities will be operated routinely after closure:

(a) Leachate management system;
(b) Surface water management system
(c) Environmental monitoring system;
(d) Cover rehabilitation and repair system.

The operating methodology will depend on the type of system adopted at the landfill.

The total landfill dimension is of 268.5 M x 245 M. During Closure considering road width for moment of vehicles as 8 M on each side the closure plan was prepared. As per the closure plan for it was assumed that for each 50 M ascent of vehicle the slope increased by 2 M. So maximum of 4 numbers of ascent can be made thus making the total height to 32 Meters for the landfill closure considering the slope of the terrain.

At the capping area for closure the total area available in **Table No 2.19** is 52 M long X 14 Meters Wide. Thus the total area for closure amounts to 728 sqm.

After the closure of the landfill, the post closure operation maintenance for the SLF along with the landscaping and the vegetation and health of the SLF cost has been considered.

2.18 Landfill Monitoring

The landfill monitoring program will be designed and developed as indicated below Quantitative parameter to be monitored will be:

a) Leachate quantity
b) Gas quantity
c) Surface water run-off quantity and (d) cover system settlement quantities.

Qualitative parameters to be monitored will be:

a) Leachate quality within the landfill (at the base)
b) Leachate quality after treatment
c) Ground water quality (up gradient and down gradient)
d) Surface water quality at the exit of landfill
e) Gas quality within the landfill
f) Air quality above the landfill and at gas vents
g) Air quality at gas control facilities.

The regulatory limits for various parameters of quality will be prescribed by the regulatory authorities.

2.18.1 Periodic Inspection and Maintenance

Periodic inspection and routine maintenance at a closed landfill site shall be carried out for a period of 25 years after closure. The following components of a closed landfill are inspected visually after landfill closure to confirm that all functional elements are working satisfactorily. A maintenance schedule with specified reporting formats is drawn up after each inspection.

Cover System: The final cover is inspected 2 to 4 times a year (a) to check that vegetation growth is occurring satisfactorily and that plants are not showing stunted growth, (b) to detect if any erosion gullies have been formed there by exposing the

barrier layers, (c) to earmark depressions that may have developed with time and (d) to identify ponding of water on the landfill cover. At least one inspection shall be carried out during or immediately after the peak of the monsoon season.

Closed landfills show significant settlement. Rectification measures must not only re- establish the initial slope of the cover (for proper surface water runoff)but must also ensure that all the components of the landfill cover system continue to perform as originally envisaged. Site managers must have sufficient equipment and funds to periodically carry out maintenance work in the form of soil filling, re-grading the cover and re-vegetating the landfill cap.

In areas where extensive erosion gully formation is observed, filling of cover material, regarding of cover slopes and re-vegetation must be routinely undertaken.

Surface Water Drainage System: The surface water drainage system is also inspected 2 to 4 times a year (a) to identify cracks in drains due to settlements, (b)to delineate clogged drains requiring immediate clean-up and (c) to study the level of deposited soil in the storm water basin and initiate excavation measures. Broken pipes and extensively cracked drains may require replacement after filling soil beneath them to establish slopes for gravity flow. In extreme cases where long term settlement may be excessive, it may become necessary to make sumps and operate storm water pumps for removal of accumulated water in the drainage system.

Gas and Leachate Management Systems: Periodic inspection of the gas and leachate collection systems is undertaken to check vent gas (if any) coming out from the closed cell. The monitoring of vent gas to be carried out for any remedial action by suitable expert agencies operating the gas treatment. One may, if required may have to install new gas extraction wells. The possibility of leachate generation after capping is remote.

Environmental Monitoring Systems: Ground water monitoring wells, air quality monitoring systems and vadose zone monitoring instruments are periodically inspected to check that all systems are functioning satisfactorily and that well

cap sand sampling ports are not subjected to damage due to excessive settlement or vandalism.

Environmental monitoring systems have to be maintained during the entire post-closure period as per the requirements of the local environmental regulatory agencies. Wherever possible, monitoring instruments must be periodically recalibrated. Sampling devices must be routinely detoxified and also regularly checked for proper functioning of the opening and closing of valves or spring loaded mechanisms.

Chapter 3

Description of the Environment

3.1 Preamble

Baseline environmental status in and around the proposed project depicts the existing environmental conditions of air, water, noise, soil, biological and socio-economic environment. With proposed project as the center, a radial distance of 10 km is considered as 'study area' for baseline data collection. Baseline data was collected for various environmental attributes so as to compute the impacts that are likely to arise due to proposed developmental activity.

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

The success of any impact assessment study depends mainly on two factors. First is estimation of impact from proposed project on the environment and the second is assessment of the environmental condition. Both are key factors to arrive at the post project scenario. The estimated impact due to the proposal can be superimposed over the existing conditions to arrive at the post project scenario. The baseline data generation has been carried out in **Dec 2017 to Feb 2018.**

3.2 Meteorological Conditions

The study of meteorological conditions forms an intrinsic part of the environment impact assessment study. The meteorological conditions of an area and the industrial process are both intertwined and each has a definite influence over the other. Favorable weather conditions and the surroundings help the successful operation of plant, while the plant activity influences the weather in both positive as well as negative ways.

Dispersion of different air pollutants released in to the atmosphere has significant impacts on neighborhood air environment. The dispersion/ dilution of the released pollutant over a large area will result in considerable reduction of the concentration of a pollutant. The dispersion in turn depends on the weather conditions like the wind speed, direction, temperature, relative humidity, mixing height, cloud cover

and also the rainfall in the area. Normally the impacts surrounding the project site are studied in detail.

3.2.1 Meteorological Scenario of the Study Area

The critical weather elements that influence air pollution are wind speed, wind direction, temperature which together determines atmosphere stability. Hence it is indispensable part of any air pollution studies and requires interpretation of baseline information. Wind speed and direction data recorded during the study period is useful in identifying the influence of meteorology on the air quality of the area. The meteorological data recorded at the site for the study period is used for the preparation of the wind rose on sixteen- sector basis (N, NNE, NE, ENE, E, ESE, SE, SSE, S, SSW, SW, WSW, W, WNW, NW and NNW). The maximum and minimum temperatures, relative humidity, rainfall recorded, wind speed and predominant wind direction observed are given in **Table No. 3.1**

Table No. 3.1: **Observed Meteorological Data**

Sr. No.	Parameters		Dec-17	Jan-18	Feb-18
1	**Temperature (^{0}C)**	Maximum	41.35	27.6	33.8
		Minimum	16	4.7	8.5
		Average	**24.4**	**16.0**	**19.4**
2	**Relative Humidity (%)**	Maximum	95.0	98	93
		Minimum	23.0	27	13
		Average	**70.0**	**73.2**	**59.4**
3	**Wind Speed (m/s)**	Maximum	10.3	8.5	10.3
		Minimum	0.0	0	0.4
		Average	**2.0**	**2.3**	**2.5**
4	**Wind Direction (degree)**	N	0.12	0.14	0.16
		NE	16	18.8	18
		E	26	25	26
		SE	45.2	42.8	41.9
		S	8.8	8.9	8.2
		SW	1.8	2.1	2.6

		W	1	1.8	2.4
		NW	0.8	0.76	0.8
		CALM	0.22	0.23	0.2
5	**Cloud Cover**	OKTAS	0-8	0-8	0-8
6	**Rainfall (mm)**	Maximum	1.2	1.0	1.2
		Minimum	0.0	0.0	0.0
		Total	**6.2**	**2.4**	**4.2**
		Average of 31 days	0.2	0.07	0.13
		No. of rainy days	1.8	0.2	0.4
7	**Ambient Pressure (mm Hg)**	Minimum	1004.1	1003.7	998.3
		Maximum	1015.0	1016.8	10.2
		Average	**1009.5**	**1010.4**	**1008.6**

3.3 Wind Pattern

The detailed analysis of wind pattern for the study period is given in the Table No.3.2, and the windroses are given in the Figure 3.1- 3.4 respectively. The predominant wind direction in the month of Dec 2017 to Feb 2018 is E followed by SE with wind speeds recording up to 2.5 m/s.

The predominant wind direction in the month of Dec 2017 is E followed by SE with average wind speeds recording up to 2.0 m/s.

The predominant wind direction in the month of Jan 2018 was E followed by SE with average wind speeds recorded up to 2.3 m/s.

The predominant wind direction in the season Feb 2018 was SE followed by E with average wind speed up to 2.5 m/s

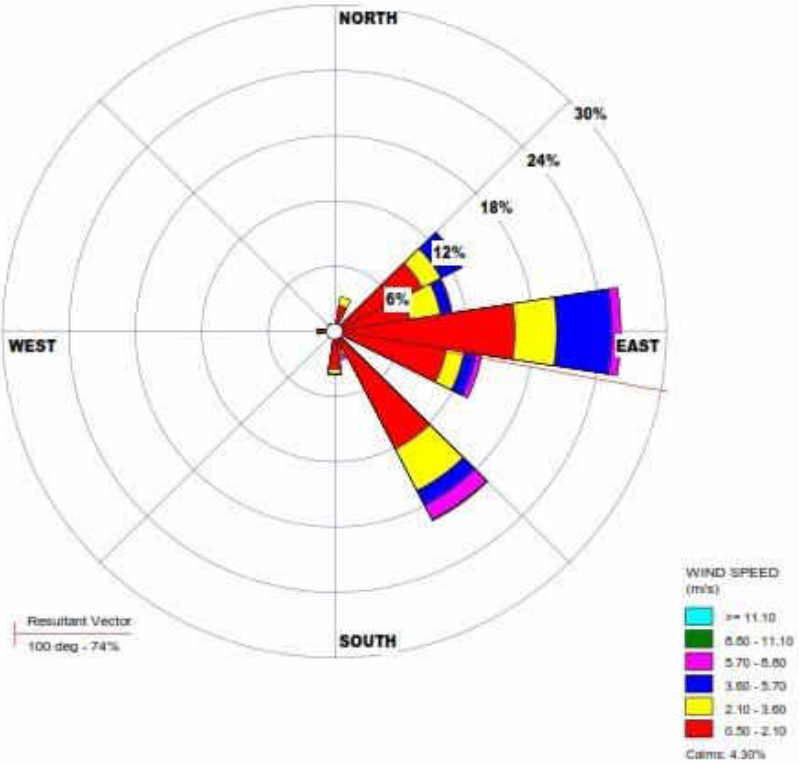


Figure No. 3.1: Windrose for December 2017

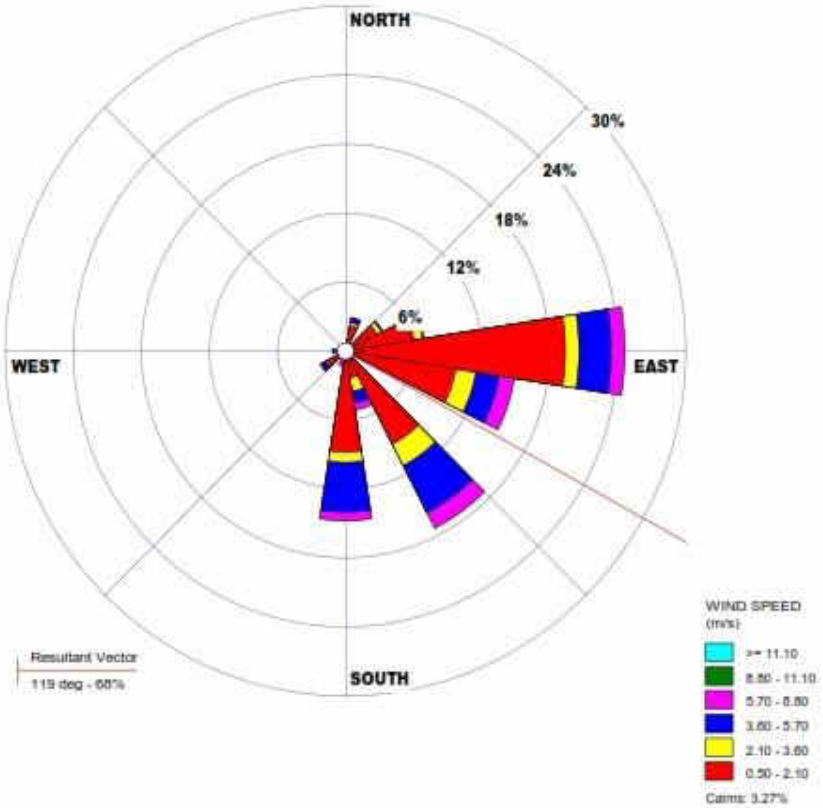


Figure No. 3.2: Windrose for January 2018

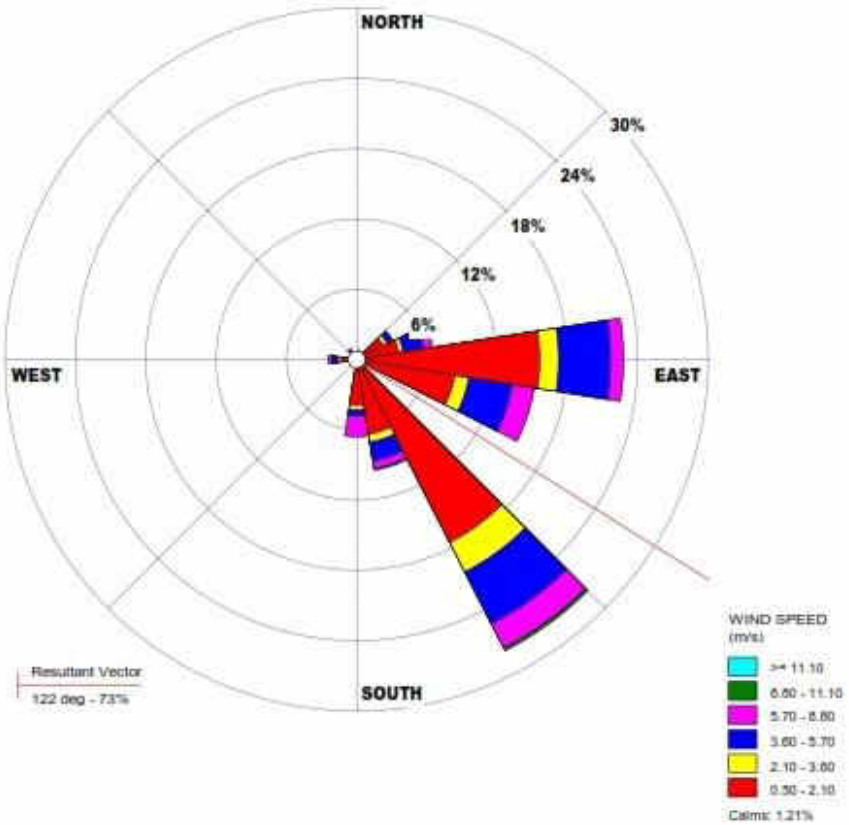


Figure No. 3.3: Windrose for February 2018

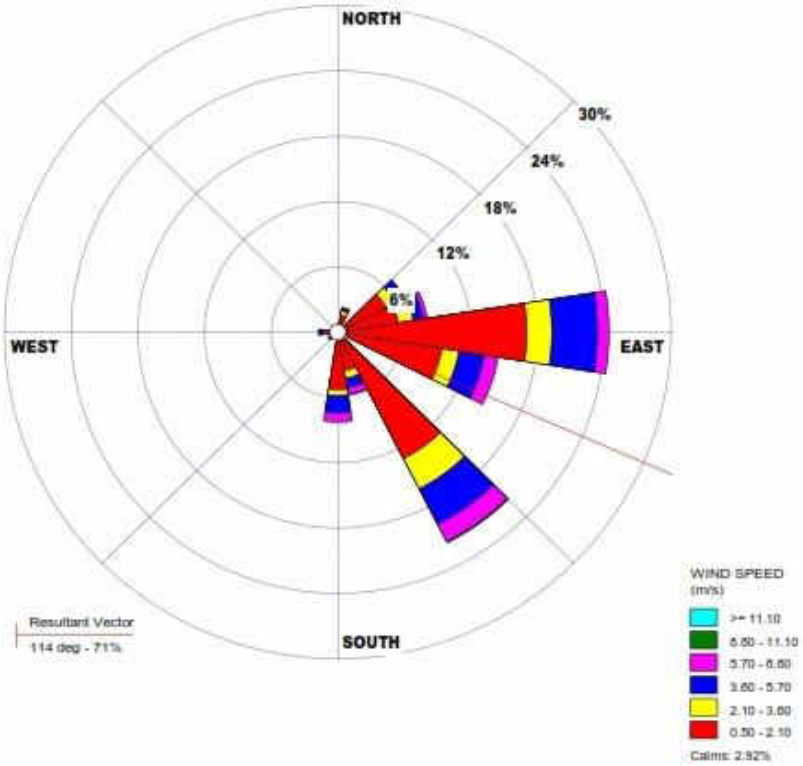


Figure No. 3.4: Windrose for December 2017 to February 2018

3.4 Ambient air quality

The study area represents mostly rural, semi urban environment and Kadechuru Industrial Area. The baseline status of the ambient air quality has been assessed through a scientifically designed ambient air quality network. The design of monitoring network in the air quality surveillance program has been based on the following considerations:

- Meteorological conditions on a synoptic scale
- Topography of the study area
- Representation of the regional background levels
- Representation of the plant site
- Influence of the existing sources
- Major settlements in the study area

Ambient air quality monitoring stations were setup for 8 different locations with consideration in the above mentioned points. The locations were selected in downwind, cross wind and up wind of the proposed project. The detail monitoring stations is given **Table 3.2** and air quality monitoring location on base map is represented in **Figure 3.5.** The common air pollutants namely Particulate matter (PM_{10} & $PM_{2.5}$), Sulphur dioxide (SO_2), and the oxides of nitrogen (NO_X) were sampled on 8/24 hourly and results were averaged to 24 hours to meet the requirements of the MoEF and compared with the standards stipulated by CPCB. The detailed ambient air quality levels given in

The monitoring was carried out for the period from Dec 2017 to Feb 2018 to represent winter season for the parameters such as PM_{10}, $PM_{2.5}$, SO_2, NO_X and CO

Sampling Locations

Ambient Air Quality Monitoring (AAQM) stations were set up at 8 locations within the study area as depicted in **Figure 3.5** for assessment of the baseline concentrations. The location of the selected stations with reference to the plant area boundary is given in the **Table No. 3.2**.

Table No. 3.2: Details of Ambient Air Quality (AAQ) Monitoring Stations

Location Code	Name of the Location	Geographical Co-Ordinates		Direction& Distance from Proposed Plant
		Latitude	Longitude	
AAQ1	Project Site	16°31'16.32"N	77°18'13.63"E	Core Zone
AAQ2	Kadechur	16°31'5.64"N	77°20'12.65"E	E , 3.5 KM
AAQ3	Balched	16°33'52.99"N	77°18'35.23"E	N , 4.8 KM
AAQ4	Kottapalle	16°29'23.61"N	77°23'7.31"E	EES , 9.3 KM
AAQ5	Baddepalli	16°34'21.53"N	77°21'59.53"E	NE , 8.8 KM
AAQ6	Kunsi	16°26'52.10"N	77°21'8.01"E	SSE , 9.6 KM
AAQ7	Badiyal	16°29'33.48"N	77°16'15.20"E	SW , 4.7 KM
AAQ8	Saidapur	16°34'22.70"N	77°15'24.19"E	NW , 7.6 KM

Sampling and Analytical Techniques

Ambient air quality monitoring has been carried out with a frequency of two days per week during study period. The duration of sampling for PM_{10}, $PM_{2.5}$, SO_2, and NO_x CO was sampled for 8 hours continuous thrice in 24 hour duration monitoring.

AAQ Samples (Filter Paper) were collected in air-tight locked polythenes and cassettes. Gaseous samples were collected in sample bottles preserved in ice box and transported to central laboratory as per the guidelines of BIS (Bureau of Indian Standard).

The sampling and analysis of ambient air are carried out as per the procedures detailed in IS-5182 (Indian Standards for Ambient Air Quality Parameters) for specific parameters. Brief of the sampling and testing procedures used are given in **Table 3.3.**

Table No. 3.3: Testing and Monitoring Procedures

Sr. No.	Parameter	Technical Protocol	Sampler	Instrument for Analysis	Methodology Adopted
1	Particulate Matter (as $PM_{2.5}$)	--	Fine Particulate Sampler (APM 550)	Balance, Oven, Desiccators	Gravimetric Method
2	Particulate Matter (as PM_{10})	IS: 5182 (Part 23)	RDS with cyclone separator (APM 460)	Balance, Oven, Desiccators	Gravimetric Method
3	Sulphur dioxide (as SO_2)	IS: 5182 (Part 2)	Gaseous Sampler of RDS	Spectro-photometer	Improved West & Geake Method
4	Oxides of Nitrogen (as $NO_{2)}$	IS: 5182 (Part 6)	Gaseous Sampler of RDS	Spectro-photometer	Modified Jacob & Hochhecisere (Na- Asencte)
5	Carbon Monoxide (as CO)	IS: 5182 (Part 10)	Tedlar Bag	NDIR CO Analyzer	Non Dispersive Infrared Spectroscopy

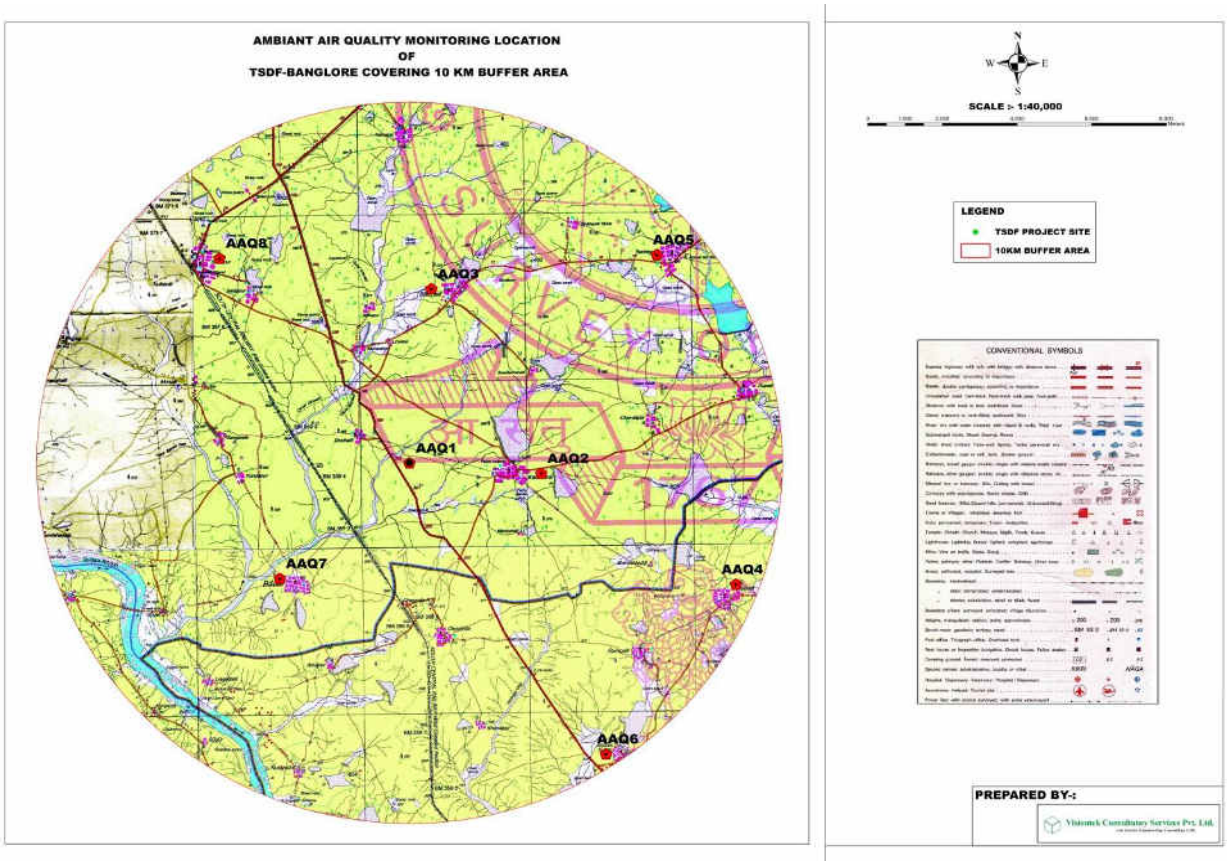


Figure No. 3.5: Ambient Air Quality Monitoring Locations

Air Quality Index

An air quality index (AQI) is used by government agencies to communicate to the public how polluted the air currently is or how polluted it is forecast to become. As the AQI increases, an increasingly large percentage of the population is likely to experience increasingly severe adverse health effects.

Location Code	Name of the Location	Air Quality	Index Value	Prominent Pollutant
AAQ1	Project Site	**Satisfactory**	68	PM_{10}
AAQ2	Kadechur	**Satisfactory**	64	PM_{10}
AAQ3	Balched	**Satisfactory**	67	PM_{10}
AAQ4	Kottapalle	**Satisfactory**	60	PM_{10}
AAQ5	Baddepalli	**Satisfactory**	64	PM_{10}
AAQ6	Kunsi	**Satisfactory**	68	PM_{10}
AAQ7	Badiyal	**Satisfactory**	67	PM_{10}
AAQ8	Saidapur	**Satisfactory**	69	PM_{10}

Good (0–50)	Minimal Impact	**Poor (201–300)**	Breathing discomfort to people on prolonged exposure
Satisfactory (51–100)	Minor breathing discomfort to sensitive people	**Very Poor (301–400)**	Respiratory illness to the people on prolonged exposure
Moderate (101–200)	Breathing discomfort to the people with lung, heart disease, children and older adults	**Severe (>401)**	Respiratory effects even on healthy people

Results- From the baseline data it has been computed, so the AQI are in the range of 51-100 in Satisfactory Class. So, Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.

Table No. 3.4: Summary of Ambient Air Quality Results Dec 2017 to Feb 2018

(Unit- µg/m^3)

Sampling Stations	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO*
AAQ-1: Project Site					
Max	72.4	15.1	27.7	33.9	0.87
Min	62.5	12.1	20.2	24.3	0.65
Average	67.5	13.6	24.0	29.1	0.76
98%tile	72.2	15.0	27.6	33.7	0.86
AAQ-2: Kadechur					
Max	70.1	25.1	17.5	21.5	0.83
Min	56.7	17.9	14.3	16.4	0.24
Average	63.4	21.5	15.9	19.0	0.54
98%tile	69.9	25.0	17.4	21.4	0.82
AAQ-3: Balched					
Max	71.2	30.3	17.5	35.5	0.87
Min	62.2	20.1	14.3	28.6	0.29
Average	66.7	25.2	15.9	32.0	0.58
98%tile	71.0	30.0	17.4	35.3	0.86
AAQ-4: Kothapalle					
Max	63.8	26.3	15.7	19.1	0.59
Min	55.9	18.4	11.7	12.5	0.21
Average	59.9	22.4	13.7	15.8	0.40
98%tile	63.7	26.2	15.6	19.0	0.58
AAQ-5: Baddepalli					
Max	68.3	24.6	15.2	37.2	0.36
Min	59.3	16.5	11.7	30.2	0.13
Average	63.8	20.6	13.7	33.7	0.25
98%tile	**68.1**	24.4	15.6	37.1	0.35
AAQ-6: Kunsi					
Max	72.7	31.3	18.2	21.3	0.88
Min	63.5	23.3	14.4	16.7	0.71
Average	68.1	68.1	16.3	19.0	0.80

98%tile	72.5	72.5	18.1	21.2	0.87
AAQ-7: Badiyal					
Max	70.7	26.8	17.0	17.0	0.51
Min	62.4	17.7	11.3	11.3	0.11
Average	66.5	22.3	14.1	14.1	0.31
98%tile	70.5	26.6	16.8	16.8	0.50
AAQ-8: Saidapur					
Max	73.6	32.6	32.6	25.3	0.88
Min	64.6	25.2	25.2	18.1	0.75
Average	69.1	28.9	28.9	21.7	0.82
98%tile	73.4	32.4	32.4	25.2	0.86

* mg/m^3

The observations based on a perusal of the results for Winter Season are summarized below:

Respirable Particulate Matter (PM_{10}):

A maximum value of 73.4 $\mu g/m^3$ was observed at Saidapur (AAQ-8) and minimum value of 56.7 $\mu g/m^3$ was observed at Village at Kadechur (AAQ-2). The average values were observed to be in the range of 59.9 to 69.10 $\mu g/m^3$ and the 98% tile was observed by in the range of 63.7 to 73.4 $\mu g/m^{3.}$

Particulate Matter ($PM_{2.5}$):

A maximum value of 32.6 $\mu g/m^3$ was observed at Saidapur (AAQ-8) and minimum value of 12.1 $\mu g/m^3$ was observed at Project Site (AAQ-1). The average values were observed to be in the range of 13.6 to 28.9 $\mu g/m^3$ and the 98% tile was observed by in the range of 15.0 to 32.4 $\mu g/m^3$.

Oxides of Nitrogen (NO_x):

Maximum concentration of NO_2 is observed to be 37.2 $\mu g/m^3$ at Baddepalli (AAQ-5) and minimum value of 11.3 $\mu g/m^3$ observed at AAQ-7 Badiyal. The average

values were observed to be in the range of 14.1 to 33.7 μg/m^3 and the 98% tile was observed by in the range of 16.8 to 37.1 μg/m^3.

Sulphur Dioxide (SO_2):

Maximum concentration of SO_2 is observed to be 32.6 μg/m^3 at AAQ-8 Saidapur and minimum value of 11.3 μg/m^3 observed at AAQ-7 Badiyal. The average values were observed to be in the range of 13.4 to 28.9 μg/m^3 and the 98% tile was observed by in the range of 15.1 to 32.7 μg/m^3.

Carbon Monoxide (CO):

Maximum concentration of CO is observed to be 0.88 mg/m^3 at Saidapur (AAQ-8) and minimum value of 0.11 mg/m^3 observed at AAQ-7 Badiyal. The average values were observed to be in the range of 0.10 to 0.16 mg/m^3 and the 98% tile was observed by in the range of 0.35 to 0.87 mg/m^3.

3.5 Noise Environment

The environmental assessment of noise from the plant activity and vehicular traffic has been undertaken by taking into consideration various factors like potential damage to hearing, physiological responses, and annoyance and general community responses.

- Characteristics of noise sources (instantaneous, intermittent or continuous in nature). It can be observed that steady noise is not as annoying as one which is continuously varying in loudness;
- The time of day at which noise occurs, for example high noise levels at night in residential areas are not acceptable because of sleep disturbance; and
- The location of the noise source, with respect to noise sensitive land use, which determines the loudness and period of exposure.

The main objective of noise monitoring in the study area is to establish the baseline noise levels, and assess the impact of the total noise expected to be generated by the construction and operation of the plant facilities around it. Measured noise levels,

displayed as a function of time, is useful for describing the acoustical climate of the community.

Ambient Noise Level

Digital Sound Level Meter was used and all readings were taken on the 'A-Weighting' frequency network, at a height of 1.5 meters from ground level and on the 'Fast' Range Time Weighting. The sound level meter does not give a steady and consistent reading and it is quite difficult to assess the actual sound level over the entire monitoring period. To mitigate this shortcoming, the Continuous Equivalent Sound level, indicated by Leq is used. Equivalent sound level, 'Leq', can be obtained from variable sound pressure level, 'L', over a time period by using following equation.

Measured noise levels, displayed as a function of time, is useful for describing the acoustical climate of the community. Noise levels recorded at each station with a time interval of about 60 minutes are computed for equivalent noise levels. Equivalent noise level is a single number descriptor for describing time varying noise levels. The equivalent noise level is defined mathematically as

$L_{eq} = 10 \text{ Log } L / T \sum (10^{Ln/10})$

Where L = Sound pressure level at function of time dB (A)

T = Time interval of observation

Noise levels during the night time generally drop, therefore to compute Equivalent noise levels for the night time, noise levels are increased by 10 dB (A) as the night time high noise levels are more annoying compared to the day time.

Noise levels at a particular station are represented as Day Night equivalents (Ldn). Day Night equivalent is the single number index designed to rate environmental noise on daily/ 24 hourly basis.

Mathematically Ldn is given by

$Ldn = 10 \text{ Log } \{ 1/24 (16x\ 10^{(Ld/10)} + 8 \times 10^{[(Ln+10/10)]})\}$

Where Ld = A weighed equivalent for day time period (6am-10 pm)

Ln = A weighed equivalent for night time period (10 pm to 6 a

In order to assess the noise levels within the study area, noise monitoring was carried out at Eight (8) locations once during Summer (Dec 2017 to Feb 2018) as per details given in **Table No. 3.5** and depicted in **Figure No. 3.6**.

Table No. 3.5: Ambient Noise Level Monitoring Locations

Location Code	Name of the Location	Geographical Co-Ordinates		Direction& Distance from Proposed Plant
		Latitude	Longitude	
N1	Project Site	16°31'16.32"N	77°18'13.63"E	Core Zone
N2	Kadechur	16°31'5.64"N	77°20'12.65"E	E , 3.5 KM
N3	Balched	16°33'52.99"N	77°18'35.23"E	N , 4.8 KM
N4	Kottapalle	16°29'23.61"N	77°23'7.31"E	EES , 9.3 KM
N5	Baddepalli	16°34'21.53"N	77°21'59.53"E	NE , 8.8 KM
N6	Kunsi	16°26'52.10"N	77°21'8.01"E	SSE , 9.6 KM
N7	Badiyal	16°29'33.48"N	77°16'15.20"E	SW , 4.7 KM
N8	Saidapur	16°34'22.70"N	77°15'24.19"E	NW , 7.6 KM

Noise levels were measured using integrated sound level meter manufactured by Quest Technologies, USA which is an integrating/ logging type with Octave filter attachment (model OB-100) and has frequency range from 31.5 to 16000 Hz.

At each noise monitoring station, noise level as Leq was recorded on an hourly basis for 24 hours continuously. The summarized results of noise levels as Leq day (Ld) and Leq night (Ln) are given in **Table No. 3.6**.

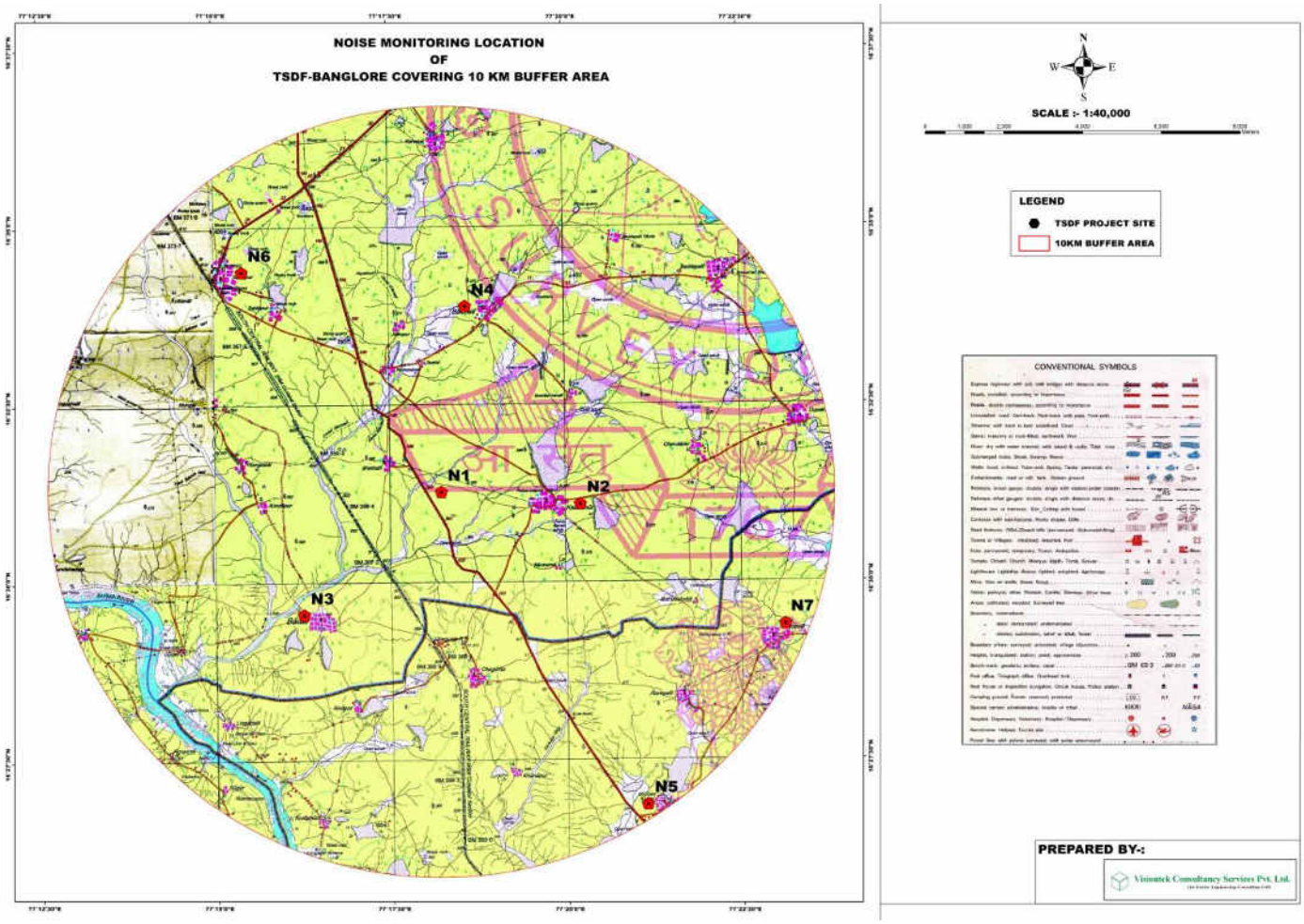


Figure No. 3.6: Noise Monitoring Locations

Table No. 3.6: Noise Monitoring Results (Dec 2017 to Feb 2018)

Location Code	Noise Sampling Location	Environmental Setting	Leq (Day)	Leq (Night)
N1	Project Site	Industrial	55.0	41.3
N2	Kadechur	Industrial	52.1	43.1
N3	Balched	Residential	50.5	42.2
N4	Kottapalle	Residential	50.9	40.1
N5	Baddepalli	Residential	51.7	41.1
N6	Kunsi	Residential	53.3	40.2
N7	Badiyal	Residential	52.1	43.1
N8	Saidapur	Residential	50.2	41.0

Table No. 3.7: Ambient Noise Standard

Area Code	Category of Area	Noise Levels dB(A) eq	
		Day time*	Night time
A	**Industrial**	**75**	**70**
B	**Commercial**	**65**	**55**
C	**Residential**	**55**	**45**
D	**Silence****	**50**	**40**

Note: -

1. Day time shall mean from 6.00 a.m. to 10.00 p.m.

2. Night time shall mean from 10.00 p.m. to 6.00 a.m.

3. Silence zone is an area comprising not less than 100 meters around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the Competent authority.

4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

** dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.*

A "decibel" is a unit in which noise is measured.

"A"in dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

Leq: It is energy mean of the noise level over a specified period.

It is evident from the above discussion that the recorded Leq during day time and night time is well within the standards prescribed vide MoEF&CC notification.

Noise Level within resident Premises: The noise level within the resident premises has been continuously monitored and the levels are well within the standards for residential zone as prescribed vide MoEF&CC notification.

3.6 Soil Environment

Soil may be defined as a thin layer of earth's crust which serves as a natural medium for the growth of plants. It is unconsolidated mineral matter that has been subjected to and influenced genetic and environmental factors like plant material, climate, organism and topography all acting over a period of time. Soil differs from the parent material in the morphological, physical, chemical and biological properties. Also soils differ among themselves in some or all the properties depending on the difference in the genetic and environmental factors. Therefore some soils are light yellow and others are black. Some are coarse textured and the others are fine textured. They serve as a reservoir of nutrients and water for crops and provide mechanical anchorite and favorable. Soil Sampling is based on agriculture field available in the study area. Composite sampling is done following BIS method. Coning and Quartering method is done & the samples were collected in air locked polythenes following with proper PPE (Personal Protective equipments) and transported to central laboratory.

The present study of the soil profile establishes the baseline characteristics and this will help in future identification of the incremental concentrations if any, due to the operation of the plant. The sampling locations have been identified with the following objectives:

- *To determine the baseline soil characteristics of the study area;*
- *To determine the impact of industrialization on soil characteristics; and*
- *To determine the impact on soils more importantly from agricultural productivity point of view.*

Five locations in and around the proposed plant were selected for soil sampling. At each location, soil samples were collected from three different depths viz. 30 cm, 60 cm and 90 cm below the surface and homogenized. This is in line with IS: 2720 and Methods of Soil Analysis, Part-1, 2nd edition, 1986 of (American Society for Agronomy and Soil Science Society of America). The homogenized samples were analyzed for physical and chemical characteristics. The soil samples were collected during December-2017.

The samples have been analyzed as per the established scientific methods for physico-chemical parameters. The heavy metals have been analyzed by using Atomic Absorption Spectrophotometer. The methodology adopted for each parameter is described in **Table No. 3.8**. The results and standard classification are given in **Table No. 3.10.**

Table No. 3.8: Analytical Techniques for Soil Analysis

Parameters	**Testing Method**
pH	IS:2720(Pt-26):2007
Conductivity	IS:14767:2000
Cation Exchange Capacity	IS : 2720(Part XXIV) 1976
Total Phosphorus as P	USDA:1954-Reaffirmed 2010, Page 134& Method in Environmental Analysis Water, Soil and Air Edition 2000
Total Nitrogen as N	IS 14684(Part-26) 1999,RA 2008
Total Potassium as K	Jackson M L Soil Chemical Analysis Page-183-205 1973
Mercury as Hg	EPA 3050B, 7000B
Sand	Methods of Soil Analyses- Black-1965 American Society of Agronomy USA
Silt	Methods of Soil Analyses- Black-1965 American Society of Agronomy USA
Clay	Methods of Soil Analyses- Black-1965 American Society of Agronomy USA

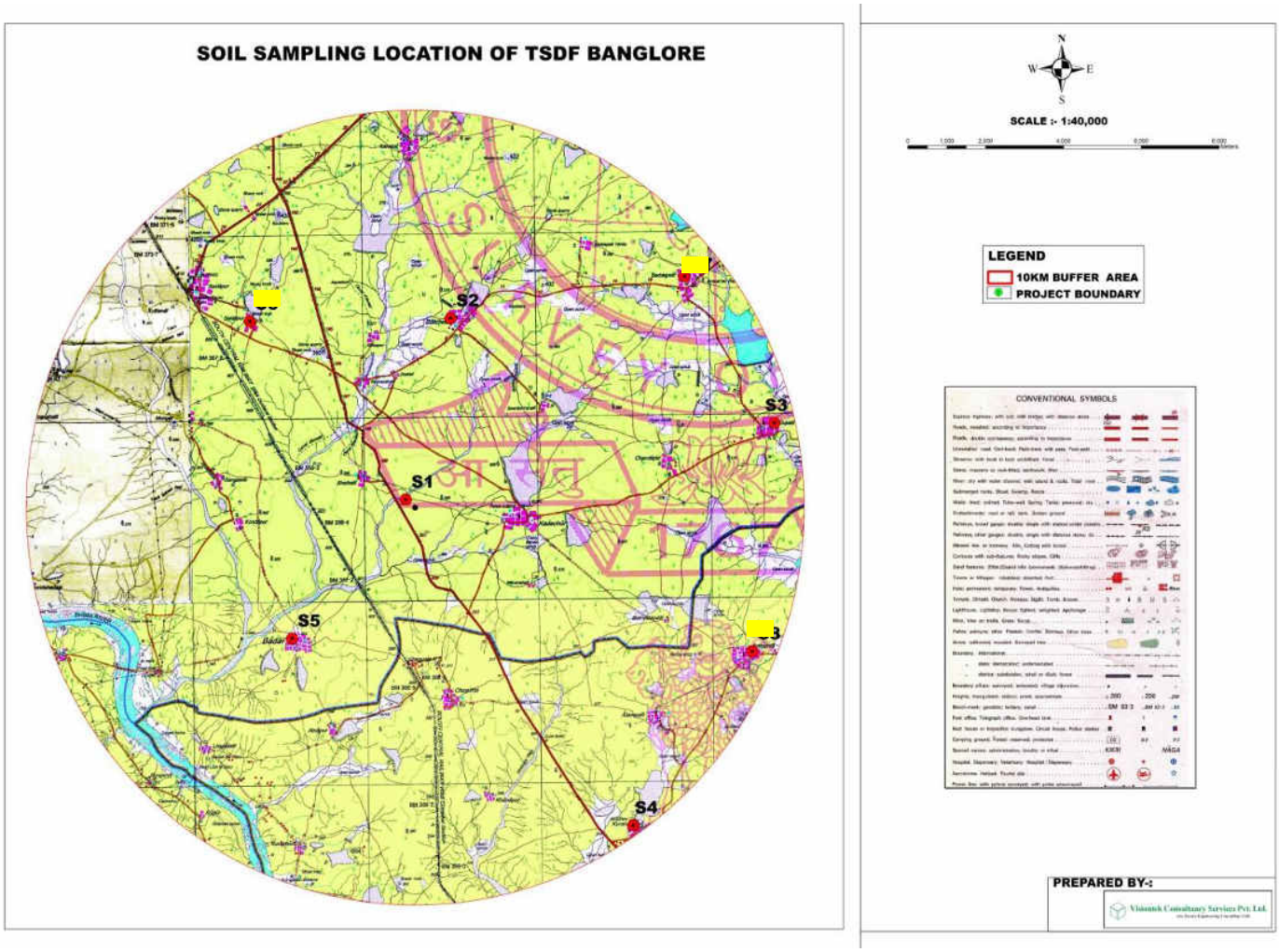


Figure No. 3.7: Soil Quality Sampling Location

Table No. 3.9: Soil Analysis Result

Parameters	Unit	Analysis Result				
		S1	S2	S3	S4	S5
pH	---	6.66	7.16	7.10	6.72	6.80
Conductivity	µmho/cm mhos/cm	41.8	61.4	98.8	23.3	145.5
Total Phosphorus P_2O_5	mg/ kg	18.3	24.3	12.42	84.0	22.6
Nitrates N	mg/ kg	63.1	70.23	68.42	54.88	70.8
Total Potassium K_2O	mg/ kg	120.5	150.4	120.5	158.0	246.5
Sodium Na_2O	mg/ kg	14.24	16.12	13.44	12.84	17.46
Organic Matter	%	0.72	0.84	0.84	0.86	0.76
Calcium Ca	mg/ kg	500	560	420	480	260
Magnesium Mg	mg/ kg	279.4	291.6	206.5	315.9	109.3
Sand	%	36	37	43	39	37
Silt	%	49	50	44	46	51
Clay	%	15	13	13	15	12
Bulk Density	g/cc	1.40	1.34	1.33	1.28	1.48
Moisture Content	%	6.12	6.66	8.12	5.14	6.42
Copper as Cu	mg/ kg	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Zinc as Zn	mg/ kg	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Manganese as Mn	mg/ kg	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Nickel as Ni	mg/ kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium as Cd	mg/ kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium as Cr	mg/ kg	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Sulphate as SO_4	mg/ kg	36.12	22.10	34.76	20.82	28.63
Iron as Fe	mg/ kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Lead as Pb	mg/ kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Table No. 3.10: Standard Soil Classification

Sr. 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 9.01 very strongly alkaline
2	Salinity Electrical Conductivity (µmhos/cm) (1ppm = 640 µmho/cm)	Up to 1.00 Average 1.01-2.00 harmful to germination 2.01-3.00 harmful to crops (sensitive to salts)
3	Organic Carbon (%)	Up to 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)	Up to 50 very less 51-100 less 101-150 good 151-300 Better >300 sufficient
5	Phosphorus (Kg/ha)	Up to 15 very less 16-30 less 31-50 medium 51-65 on an average sufficient 66-80 sufficient >80 more than sufficient
6	Potash (Kg/ha)	0 -120 very less 120-180 less 181-240 medium 241-300 average 301-360 better >360 more than sufficient

Source: Hand Book of Agriculture, Indian Council of Agricultural Research

Observations of the Results

It has been observed that the pH of the soil ranged from 6.66 to 9.10 indicating that the soils are Very strongly basic to Neutral in nature. The soil in the study area is clay ranging from 12 to 15 %. The electrical conductivity was observed to be in the range of 145.5 to 23.3 μS/cm.

The nitrogen concentrations are in the range of 54.88-70.80 kg/ha indicating that soils have high quantities of nitrogen. The phosphorous concentrations are in the range up to 84 kg/ha indicating that soils have sufficient quantities of phosphorus. The potassium concentrations range up to 246.5 kg/ha, which indicate that the soils have very less of potassium.

3.7 Water Quality

3.7.1 Ground & Surface Water Quality Analysis

Selected water quality parameters of surface and ground water resources in the study area have been studied for assessing the water environment and evaluate anticipated impact of the proposed CHWTSDF. Understanding the water quality is essential in preparation of Environmental Impact Assessment and to identify critical issues with a view to suggest appropriate mitigation measures for implementation.
The purpose of this study is to:

- Assess the water quality characteristics for critical parameters;
- Evaluate the impacts on agricultural productivity, habitat conditions, recreational resources and aesthetics in the vicinity; and
- Predict impact on water quality by this project and related activities.

The information required has been collected through primary surveys and secondary sources. Groundwater is being used as source of water in almost all the villages via open wells and tube wells.

Grab water samples from Eight (8) Ground Water and Five (5) Surface Water sources were collected once during the monitoring period .The sampling locations were selected based on reconnaissance survey with the following consideration:

- Drainage Pattern;
- Location of water sources; and

- Location of residential areas representing different activities/ likely impact areas.

Eight (08) surface and ground water samples each were analyzed for physico-chemical, heavy metals and bacteriological parameters as per the procedures mentioned in Standards as per IS-2296 Class –'C' and IS: 10500 respectively.

The methodology for sample collection and preservation techniques was followed as per the Standard Operating Procedures (SOP) mentioned in **Table No. 3.1**1.

Table No. 3.11: Analytical Techniques for Water and Wastewater Sampling and Analysis

Parameters	Standards
pH Value	APHA 4500H^+B
Temperature	---
Conductivity	APHA 2510 B
Suspended solids	APHA 2540 D
Dissolved Oxygen as DO	APHA 4500 O^-C
Chloride (max)	APHA 4500Cl^-B
Total Dissolved Solids as TDS	APHA 2540 C
Alkalinity as $CaCO_3$	APHA 2320 B
Total Hardness or TH	APHA 2340 C
Calcium as Ca	APHA 3500Ca B
Magnesium as Mg	APHA 3500Mg B
BOD (3) days at 27^0C (max)	APHA 5210 B
Chemical Oxygen Demand as COD	APHA 5220 C
Sodium as Na	APHA 3500Na B
Potassium as K	APHA 3500K B
Silica	APHA SiO_2 C
Oil & Grease	APHA 5520 B
Fluoride as F (max)	APHA 4500F C
Sulphates (SO_4) (max)	APHA 4500SO_4^{2-} E
Phenolic Compounds as C_6H_5OH (max)	APHA 5530 B,D
Nitrate as NO_3, (max)	APHA 4500 N_{org} B
Phosphate as PO_4	APHA 4500 P, D

Total Coliform as TC	APHA 9221 B
Arsenic as As	APHA 3500 As B
Mercury as Hg	APHA 3112B
Lead as Pb	APHA 3111 B
Cadmium as Cd	APHA 3111 B
Hexavalent Chromium as Cr^{6+}	APHA 3500 Cr B
Total Chromium as Cr	APHA 3111 B
Copper as Cu	APHA 3111Cu B
Zinc as Zn	APHA 3111 B
Selenium as Se	APHA 2340 C
Iron as Fe	APHA 3500 Fe B

The details of surface and ground water sampling locations are given in **Table 3.12 & 3.13** and shown in **Figures 3.8 & 3.9** respectively.

Table No. 3.12: Sampling Location Details (Surface Water)

Location Code	Name of the Location	Geographical Co-Ordinates		Direction& Distance from Proposed Plant
		Latitude	Longitude	
SW1	Project Site	16°31'16.32"N	77°18'13.63"E	Core Zone
SW2	Kadechur	16°31'5.64"N	77°20'12.65"E	E , 3.5 KM
SW3	Balched	16°33'52.99"N	77°18'35.23"E	N , 4.8 KM
SW4	Baddepalli	16°34'21.53"N	77°21'59.53"E	NE , 8.8 KM
SW5	Kottapalle	16°29'23.61"N	77°23'7.31"E	EES , 9.3 KM

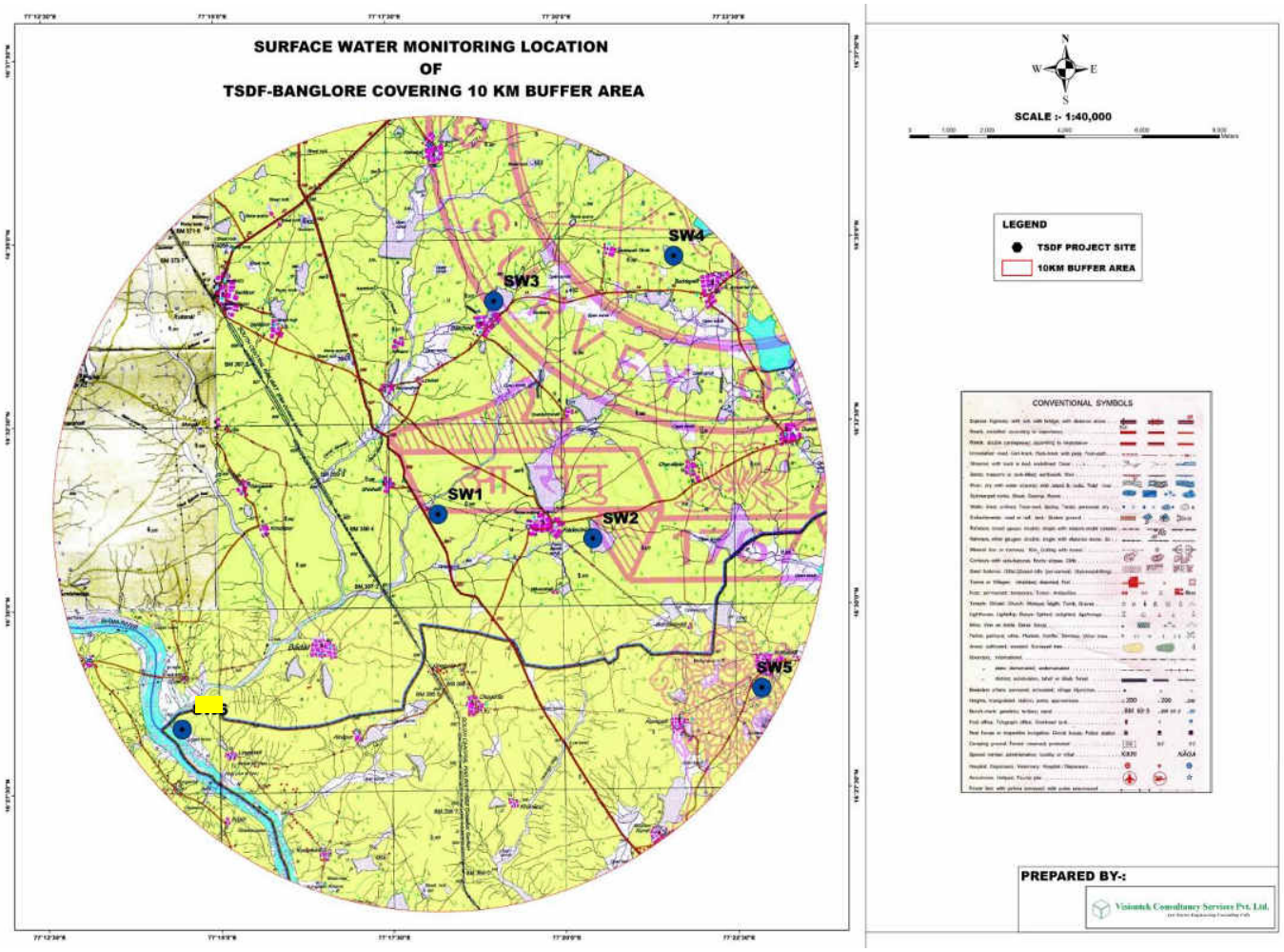


Figure No. 3.8: Details of Surface Water Sampling Locations

Table No. 3.13: Surface Water Results

Parameters	Unit	IS-2296, Class C	Analysis Results				
			SW-1	SW-2	SW3	SW-4	SW-5
Total Suspended Solid	mg/l	**-**	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
pH		**8.5**	7.86	7.62	7.94	7.72	7.92
Temperature	^{0}C	**-**	27.1	27.1	27.0	27.1	27.1
Conductivity	µm/cm	**-**	310	335	200	215	495
Alkalinity as CaCo3	mg/l	**-**	130	145	80	95	180
Total Dissolved Solid	mg/l	**1500**	215	230	145	160	355
Total Hardness as CaCo3	mg/l	**-**	110	120	85	90	170
Calcium as Ca	mg/l	**-**	32.06	26.05	22.04	24.08	38.08
Magnesium as Mg	mg/l	**-**	7.29	13.37	6.08	6.12	23.09
Chloride as Cl	mg/l	**600**	5.6	9.42	9.59	8.15	25.82
Nitrate as NO3	mg/l	**50**	1.02	1.04	1.06	0.95	1.54
Sulphate as SO4	mg/l	**400**	5.60	4.8	3.40	2.6	27.96
Fluoride as F	mg/l	**1.5**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Copper as Cu	mg/l	**1.5**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nickel as Ni	mg/l	**-**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Cadmium as Cd	mg/l	**0.01**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Lead as Pb	mg/l	**0.1**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Zinc as Zn	mg/l	**15**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachromium as Cr+6	mg/l	**0.05**	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Total Chromium as Cr	mg/l	**0.05**	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Iron as Fe	mg/l	**50**	0.15	0.18	0.12	0.14	0.16
Sodium as Na	mg/l	**-**	9.35	9.42	9.49	6.15	9.54
Potassium as K	mg/l	**-**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
DO	mg/l	**-**	5.2	5.1	5.3	5.1	5.3
Chemical Oxygen Demand	mg/l	**-**	4.0	4.0	4.0	4.0	4.0
Biochemical Oxygen Demand	mg/l	**-**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Coliform	MPN/ 100 ml	**-**	50	55	60	52	50

Table No. 3.14: Sampling Location Details (Ground Water)

Location Code	Name of the Location	Geographical Co-Ordinates		Direction& Distance from Proposed Plant
		Latitude	Longitude	
GW1	Project Site	16°31'22.96"N	77°18'5.55"E	CORE ZONE
GW2	Balched	16°33'50.79"N	77°18'46.07"E	N , 4.8 KM
GW3	Dupali	16°32'22.05"N	77°23'25.58"E	E , 9.4 KM
GW4	Kunsi	16°26'54.28"N	77°21'19.39"E	SE , 9.7 KM
GW5	Badal	16°29'30.41"N	77°16'25.64"E	SW , 4.5 KM
GW6	Saidapur	16°33'50.06"N	77°15'52.02"E	NE , 6.3 KM
GW7	Baddepalli	16°34'22.77"N	77°22'9.09"E	NE , 9 KM
GW8	Kottapalle	16°29'15.60"N	77°23'4.02"E	EES , 9.3 KM

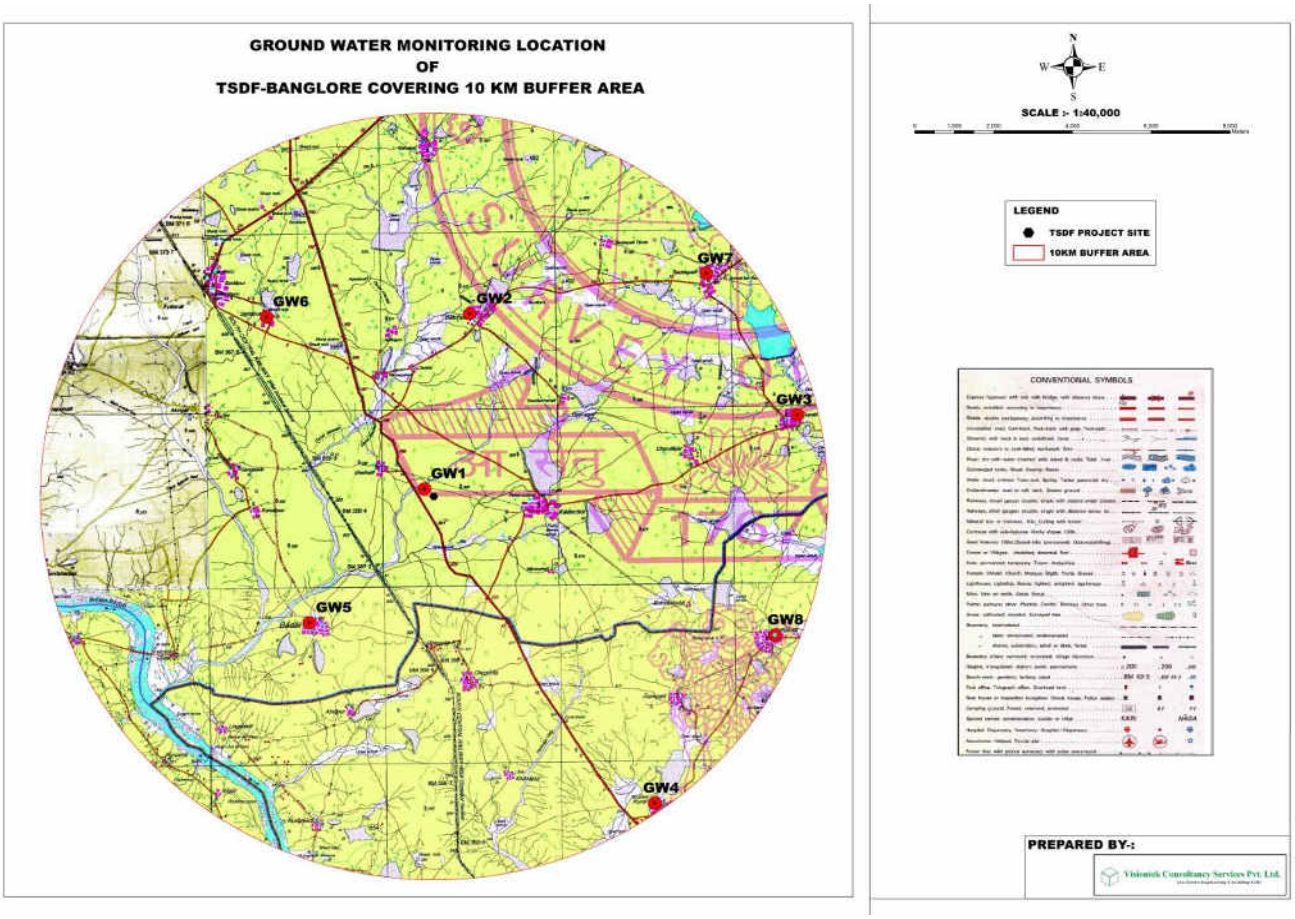


Figure No. 3.9: Details of Ground Water Sampling Locations

Table No. 3.15: Groundwater Analysis Results

Parameter	Unit	Permissible Limit	Acceptable Limit	Analysis Results							
				GW-1	GW-2	GW-3	GW-4	GW-5	GW-6	GW-7	GW-8
Color	Hazen	**15**	**5**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Odour	--	**Agreeable**	**Agreeable**	**Agreeable**	**Agreeable**	**Agreeable**	**Agreeable**	**Agreeable**	**Agreeable**	**Agreeable**	**Agreeable**
pH	--	**6.5**	**8.5**	7.21	7.39	7.46	7.52	7.55	7.68	7.85	7.32
Conductivity	umho/cm	**-**	**-**	770	1385	560	810	590	725	1920	2845
Alkalinity as $CaCo_3$	mg/l	**600**	**200**	240	320	210	255	225	210	500	520
Total dissolved solids	mg/l	**2000**	**500**	495	925	395	515	410	480	1265	1840
Total Hardness	mg/l	**600**	**200**	230	430	230	250	230	215	440	410
Calcium as Ca	mg/l	**200**	**75**	50.1	126.25	60.12	62.12	58.29	50.1	62.29	58.12
Magnesium as Mg	mg/l	**100**	**30**	24.3	26.73	18.23	21.87	19.44	21.87	68.04	64.4
Chloride as Cl	mg/l	**1000**	**250**	67.14	210	21.53	69.39	26.32	81.35	351.7	650.86
Nitrate as Nitrogen	mg/l	**45**	**45**	2.9	3.69	2.5	1.9	3.4	2.03	4.85	5.89
Sulphate So_4	mg/l	**400**	**200**	39.67	49.51	44.77	33.5	38.52	45.72	23.57	88.7
Flouride as F	mg/l	**1.5**	**1.0**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Copper as Cu	mg/l	**1.5**	**0.05**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nickel as Ni	mg/l	**0.02**	**0.02**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Cadmium as Cd	mg/l	**0.003**	**0.003**	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Lead as pb	mg/l	**0.01**	**0.01**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Zinc as Zn	mg/l	**15.0**	**5.0**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Total chromium as Cr	mg/l	**0.05**	**0.05**	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Iron as Fe	mg/l	**0.3**	**0.3**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sodium as Na	mg/l	**-**	**-**	43.5	136.25	13.97	45.02	17.08	52.78	228.2	422.2
Potassium as K	mg/l	**-**	**-**	2.96	4.58	3.55	1.83	2.74	2.07	5.7	8.2

3.7.2 Result & Discussion

The surface water quality parameters were analyzed at five locations for three months i.e. from December 2017 to February 2018.

3.7.2.1 Ground Water Quality

The pH values observed were in the range of 7.21-7.85, with total dissolved solid ranging from 395 mg/l to 1840 mg/l. Total Hardness was in the range of 215 mg/l to 440 mg/l,. The concentration of sulphates and nitrates in all the samples were less than prescribed limits.

3.7.2.2 Surface Water Quality

The pH values observed were in the range of 7.62 to 7.94 with total dissolved solids in the range of 145 mg/l to 355 mg/l. BOD were observed less than 2.0 . Chloride varied between 5.6 mg/l & 25.82 mg/l. Sulphates varied from 2.6 to 27.96 mg/l, Nitrate varied from 0.95 to 1.54 mg/l. Overall, the surface water samples were found within the prescribed limits.

3.7.2.3 Heavy Metals in Surface Water Quality

Heavy metal concentrations: Iron (Fe) ranging from 0.12 to 0.18 mg/l and Zinc (Zn) is below 0.50.

3.7.2.4 Heavy Metals in Ground Water Quality

Heavy metal concentrations i.e. Iron (Fe) is below0.10 and Zinc (Zn) is below detection limit i.e 0.50.

3.8 Hydrology and Hydrogeology of the Area

The southern part of the district comprises the Peninsular Gneiss and granites. Central, northeastern and southwestern part comprises of sedimentary formations viz. sandstone, quartzite, shale, slate, limestone and dolomite **Figure No. 3.10** Deccan Trap basalts cover eastern parts.

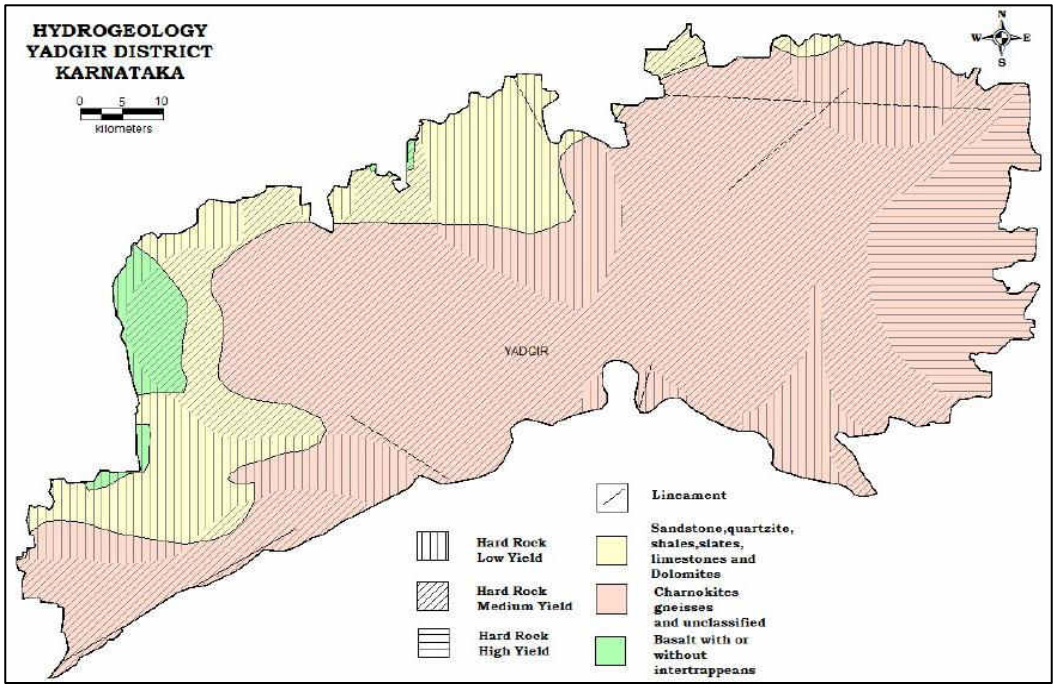


Figure No. 3.10: Hydrogeology Map

Occurrences of ground water Major ground water bearing formations are granite, gneiss, limestone and vesicular basalt. Ground water occurs in weathered, fractured & jointed zones of these formations. In weathered zones ground water occurs in phreatic condition, whereas in the fractured & jointed formation it occurs in semi confined to confined condition. The main source of recharge to ground water is precipitation, followed by seepage from canals and return flow from irrigation.

A small portion of Deccan Trap basalts, which comprise different flows, fractures & interstitial pore spaces of vesicular zone, are good repositories of ground water. In limestone, solution cavities are considered to be more potential than weathered and fractured zones. Laterite have primary porosity and are considered to be moderately good aquifer.

3.8.1 Depth to water Level

Out of 32 National Hydrograph Station (NHS) dug wells located in Yadgir district, the depth to water levels recorded during pre – monsoon and post – monsoon periods were in the range of 1.15 to 8.75 mbgl and 0.77 to 9.53 mbgl respectively (**Figure No. 3.11 & 3.12**). The map depicts that a major part of the district has moderate to moderately deep water levels between 2 to 5 and 5 to 10 mbgl during pre – monsoon period. Depth to water level in 6 NHS piezometers in the district during pre – monsoon and post – monsoon periods were in the range of 3.90 to 10.30 mbgl and 0.35 to 8.73 mbgl respectively.

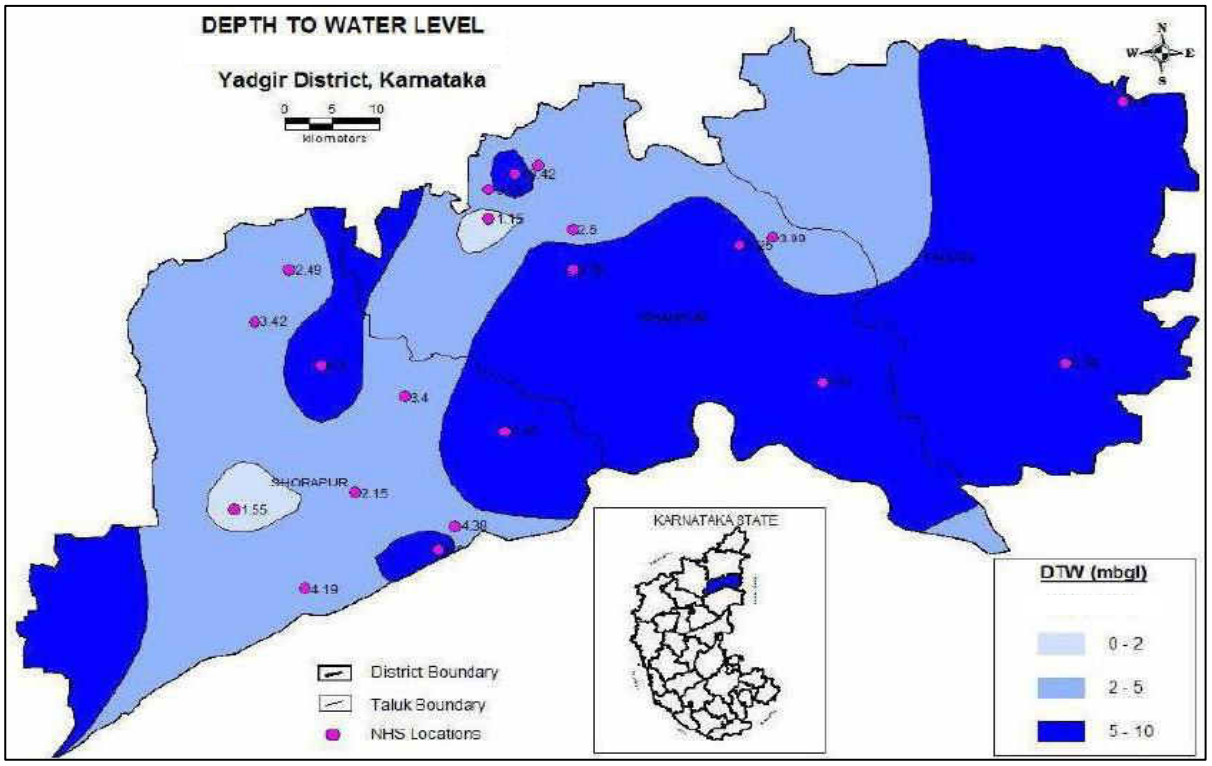


Figure No. 3.11: Depth of Water Level in Pre Monsoon

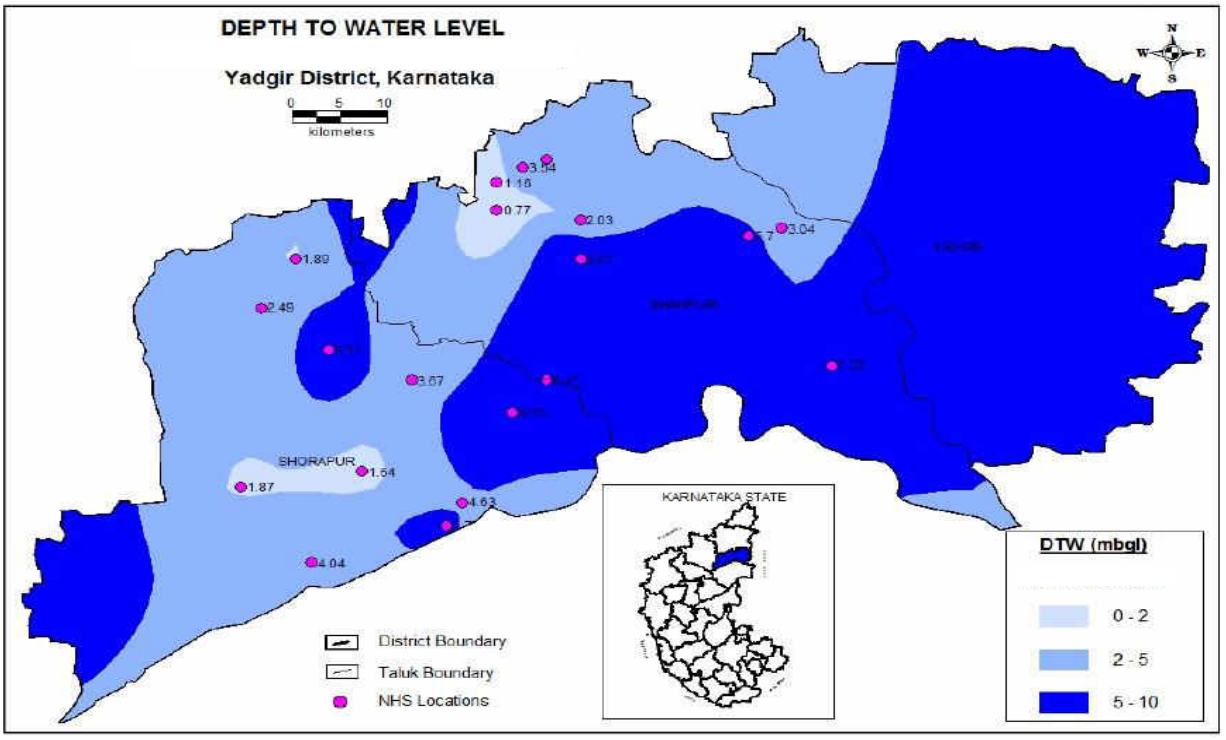


Figure No. 3.12: Depth of Water Level in Post Monsoon

3.8.2 Seasonal Ground Water Level Fluctuation

Subsequent to seasonal rainfall, ground water level records a rise, indicating recharge to ground water. During pre-monsoon period there is depletion of ground water level due to exploitation, natural discharge and no recharge. This is manifested as fall in ground water level during pre-monsoon period. Therefore, ground water level in general shows a receding trend from December to May.

Seasonal water level fluctuation as observed in 12 NHS dug wells indicate that in 90% of NHS there is rise in ground water level in the range of 0.15 to 2.35 m, whereas in 8 wells indicate 14% of NHS there is fall in ground water level in the range of 0.01 to 1.28 m. Seasonal water level fluctuation as observed in 6 NHS piezometers indicate that there is rise in ground water level in the range of 0.21 to 4.25 m and there is no fall.

3.8.3 Long–Term Water Level Trend

Pre-monsoon ground water level data for NHS in Yadgir district, water level trend of 16 NHS show rise in the range of 0.015 to 0.283 m/year. Similarly, for 7 NHS falling trend in the range of 0.03 to 0.247 m/year. Rising water level trend during pre –

monsoon period may be attributed to less ground water draft and recharge through canal, tanks or reservoir.

Post – monsoon water level trend indicate that in 16 NHS there is rise in the range of 0.018 to 0.265 m/year. Similarly, water level trend of 9 NHS show fall in the range of 0.007 to 0.499 m/year. Falling water level trend during post – monsoon period may be attributed to poor recharge to ground water and excessive ground water draft.

In some NHS, rising trend of ground water level is observed in both pre and post monsoon periods, **Figure No. 3.13 & 3.14** which indicates augmented ground water recharge or reduce ground water draft.

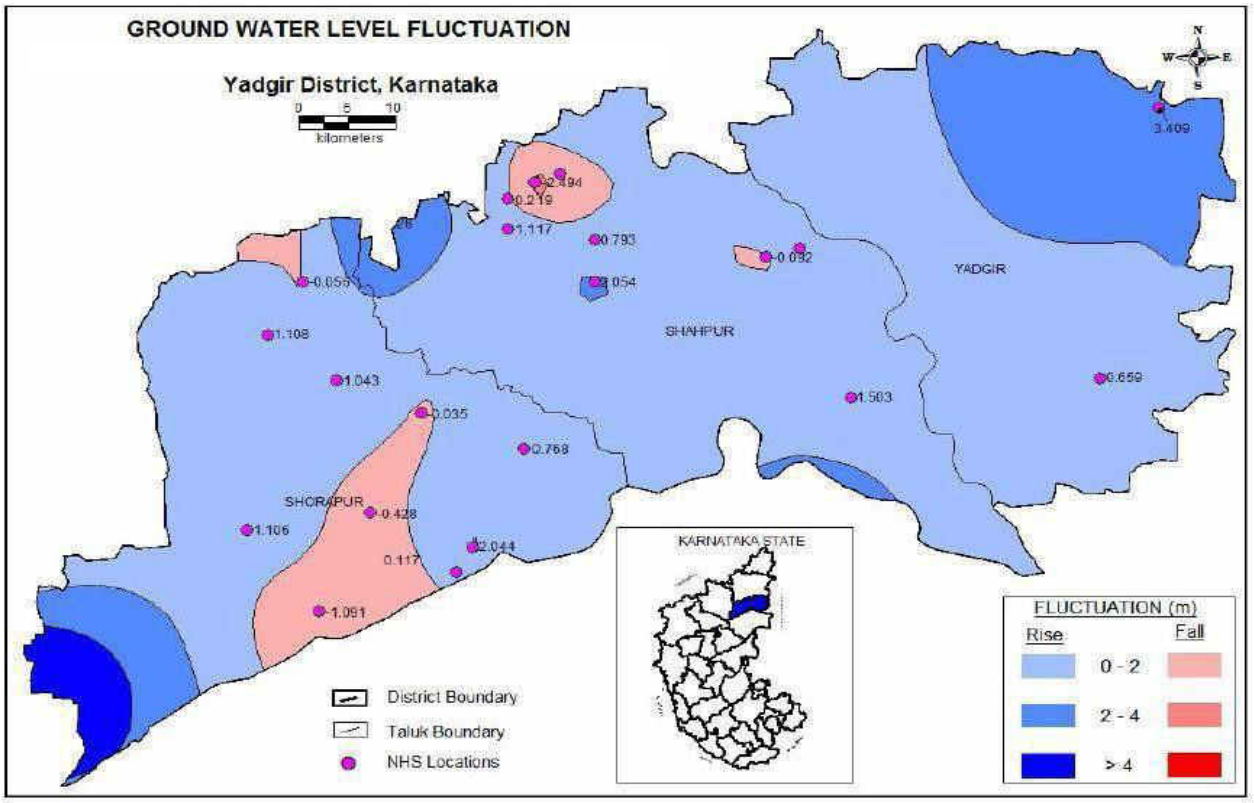


Figure No. 3.13: Decadal Fluctuation of GWL in Pre Monsoon

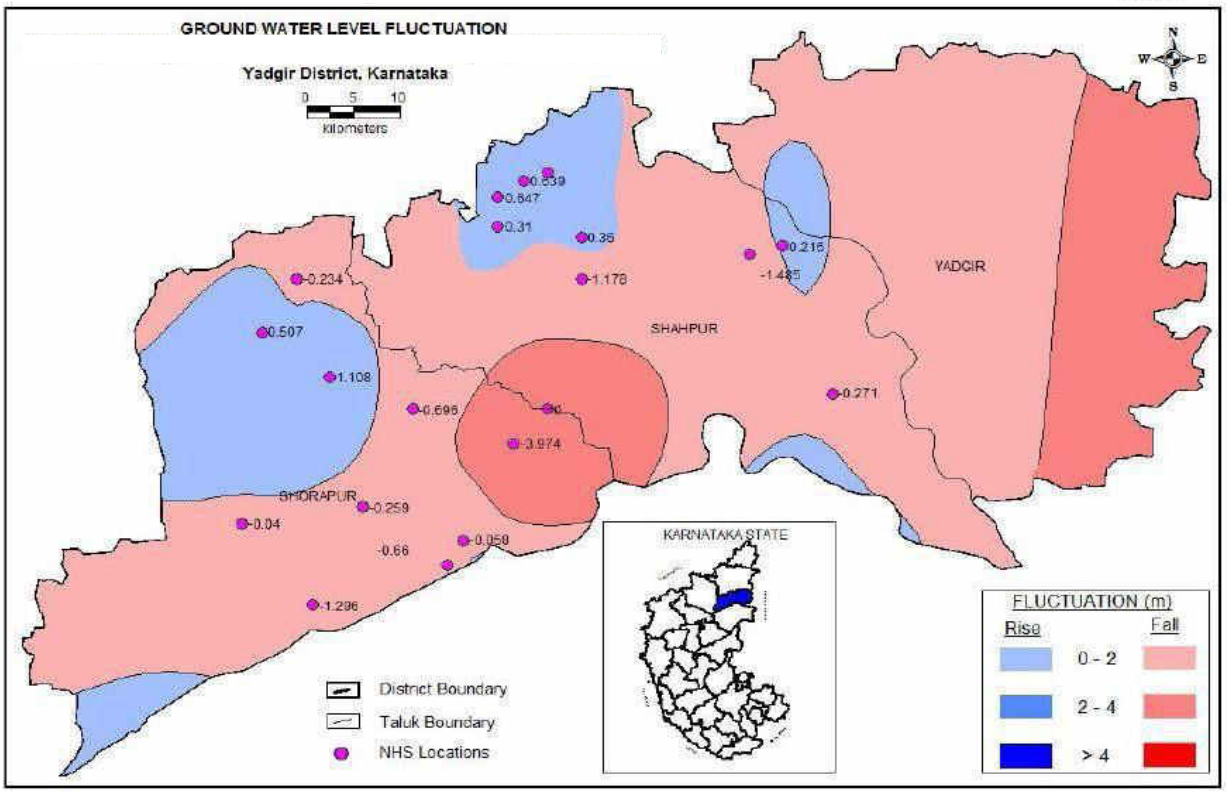


Figure No. 3.14: Decadal Fluctuation of GWL in Post Monsoon

Table No. 3.16: Taluka Wise Ground Water Resource of Yadgir District

TALUK	Net Ground water Availability (HAM)	Irrigation draft (HAM)	Domestic and industrial draft (HAM)	Total annual ground water draft (HAM)	Projected domestic and industrial draft 2025 (HAM)	Ground water availability for future irrigation** (HAM)	Average Stage of development (%)	STAGE OF DEVELOPMENT AS ON MARCH 2004			
								SAFE AREA (%)	SEMI-CRITICAL AREA (%)	CRITICAL AREA (%)	OE AREA (%)
SHAHPUR	14692	808	461	1270	1133	12750	75	SAFE			
SHORAPUR	11898	2077	585	2662	1042	8922	22	85			15
YADGIR	6969	4900	895	5795	1034	1035	83	40	60		
TOTAL	**33559**	**7785**	**1941**	**9727**	**3209**	**22707**	**60**	**SAFE**			

Table 3.17: Taluka wise Ground Water under various minor irrigation schemes in Yadgir district

Sr. No.	Taluka	Dug Wells	Shallow tube wells	Surface flow Irrigation	Lift Irrigation
1	Shahapur	1222	373	69	1030
2	Shorapur	1152	188	58	1047
3	Yadgiri	668	4884	264	313
Total		**3042**	**5445**	**391**	**2781**

Yadgiri taluk is located towards southeastern part of Yadgir district. Major water bearing formation is granite genesis. The depths of bore wells drilled by CGWB are within the range 17.40 to 90 mbgl and drill time discharge is within 0.07 to 28.6 lps. 668 irrigation-dug wells exist, (as per iv the Census of Minor Irrigation Schemes 2006 – 07), out of which, 229 are in use. Water lifting devices fitted in dug wells is either electric or diesel pump of 2 to 6 HP with average pumping of 4 to 8 hours. Season wise irrigation potential created through dug wells is 313 ha.

3.8.4 Water Management Strategy

Ground water development

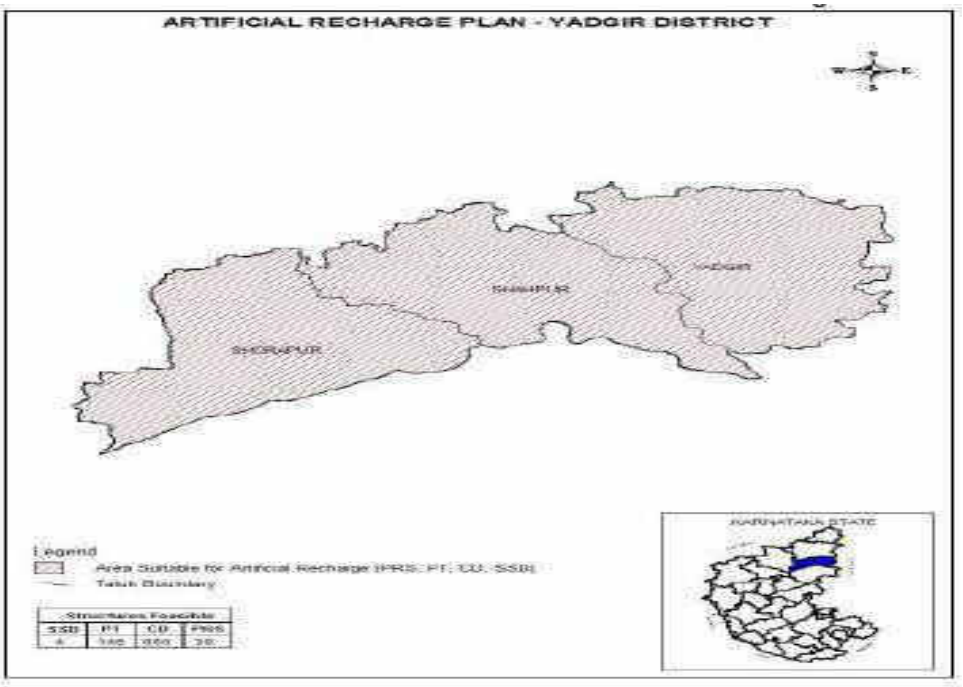
Ground water development has reached 60% for the district as a whole and the district falls in the **"SAFE"** category. There is a lot of scope for further development of ground water resource.

Based on the annual ground water availability for future irrigation use it is proposed that the ground water development structures viz. Dug wells, dug cum bore wells and bore wells can be constructed in the entire district, since a marginal portion of the district area in Shorapur taluk is categorized as semi-critical and over exploited. Location of ground water abstraction structures may be decided based on local hydro geological condition and topography of the area, after scientific survey.

Dug wells are the ideal **(as indicated in Table No. 3.17)** and prevalent ground water abstraction structure in the district. Their diameter may be 4.5 to 5m and depth between 15 and 20m. Dug cum bore wells may be constructed to tap the weathered

and fractured zone wherever feasible, based on hydro geological considerations. The bore wells from the bottom of dug wells may be drilled up to a depth of
40 to 80mwith a diameter of extension bore wells in the range of 100 to 152 mm. Bore wells of 152 mm diameter can be constructed from the surface by lowering the casing pipe up to the semi- weathered formation and leaving the rest of bore well naked. The depth of bore wells in the range of 8 to 100m, yielding between 0.50 to 9.5 lps or more can be drilled at suitable sites after hydro geological and geophysical investigations.

Water conservation & Artificial recharge



As per ground water resource assessment data, major part of the district is falling under SAFE category. The stage of ground water development in the district is 60%, which implies that there is enough scope for further ground water development. However, water conservation and artificial recharge, as well as in non- command areas.

On the basis of data available, about 10517 ha is the net area irrigated through canal, which constitutes a major part of all sources of irrigation. Hence, the canal command area may not require adoption of artificial recharge techniques. Thus, based on hydro geological conditions and terrain type, the area suitable for artificial recharge to ground water is depicted in Map.

Net area irrigated through tanks in the district is 15649 ha, of which a maximum of 8048 ha, is in Shahapur taluk followed by Shorapur (4724), and Yadgiri (2878 ha).

It is therefore, recommended that proper maintenance of existing tanks through desilting and construction of additional percolation tanks will help in recharging the phreatic zone. Sub-surface dykes may be constructed at suitable locations of the river course, preferably at those sites where the thickness of alluvium is more. In addition to these, infiltration dug/ bore wells and check dams are also feasible at suitable locations.

3.8.5 Details of the watertanks /pond existing on the North ofthe proposed Industrial Area

There are no major water courses around 10 km of the proposed Industrial area. The following are the water tanks/ponds on north direction

1. Kadechuru Tank - 0.5km NE
2. Rampur village Tank - 5.1 km N
3. Neelhalli Tank - 9.7 km N
4. Bardehalli Tank - 8.2 km NE
5. Duppalli village Tank - 6.8 km NE

The Bheema river is a major source of the water resource for the project and it is located 5.6 km from the proposed industrial area and flows in the SW-S direction.

3.8.6 Surface Water in the Study Area

The map showing the drainage pattern in the study area is given in **Figure No.** The tributaries of Bheema river are passing through the northern half of the proposed industrial area. To maintain the natural drainage pattern, the tributaries will not be realigned under any circumstances. Green belt (50 m wide) is also proposed along either side of Bhima river tributaries. Storm water drains will be planned along the sides of the roads to collect the surface run-off water from the roads. No tributary diversion will be planned to collect the surface run-off water. The storm water runoff from the different zones shall be collected and treated at the proposed CETP / STP. The treated water shall be used for greenbelt development.

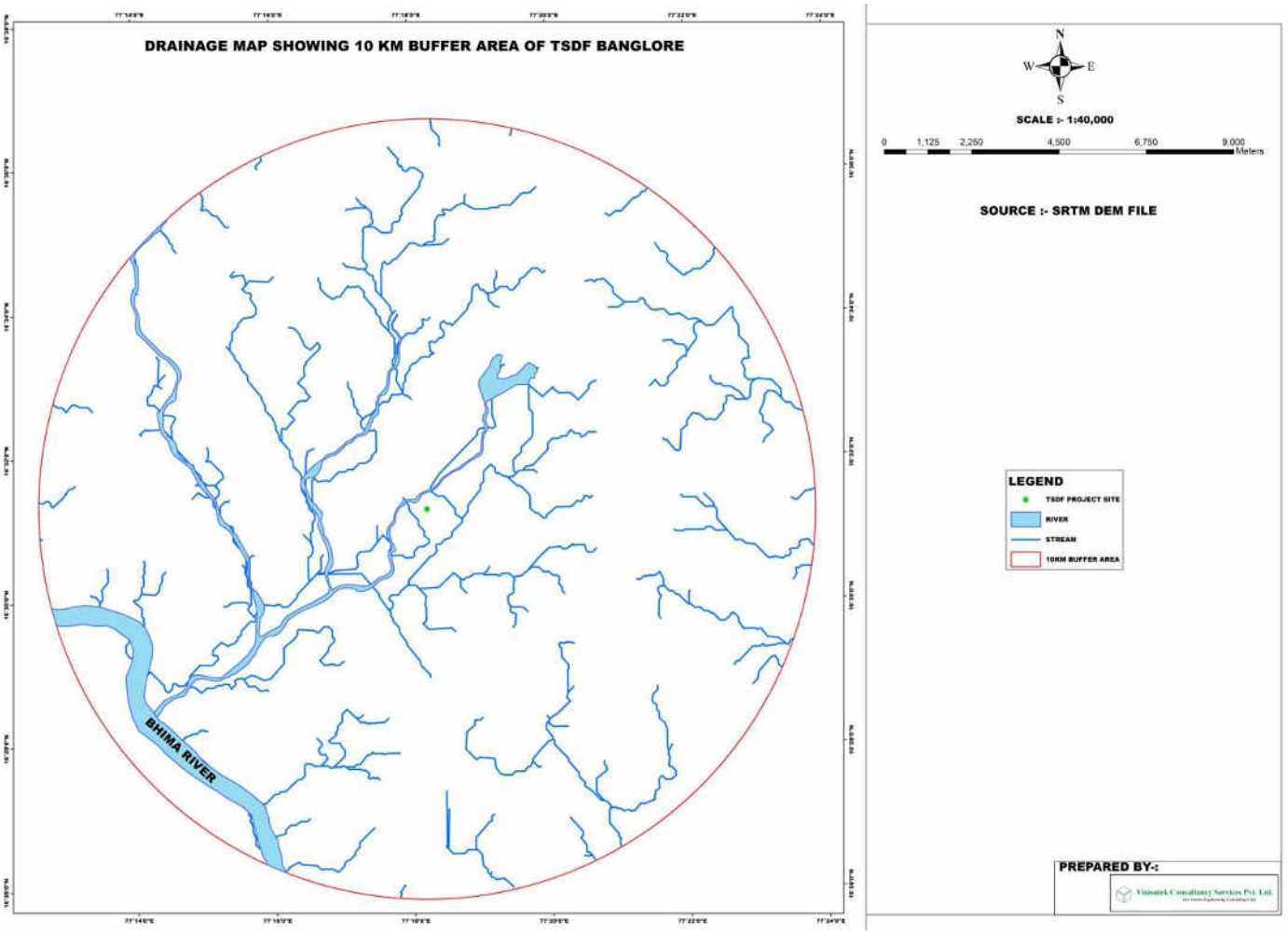


Figure No. 3.15: Drainage Pattern Of the study area

3.9 Biological Environment

Ecology & Biodiversity

The ecological study of the surrounding area up to 10 km radius and other longitudinally influenced area in catchment and downstream power house has been conducted in order to understand the ecological status of the existing flora and fauna to generate baseline information and evaluate the probable impacts on the biological environment. Similarly, longitudinal stretch of Bhima River has been surveyed for aquatic ecology.

For Floral accounts, a herbarium for unidentified species shall be prepared during the course of the ecological survey. The survey has been conducted at eight locations following random quadrat technique for flora and line transect for fauna. The quadrate size will range from 01 m2 to 100 m2 depending on the type of species number (i.e., Trees, Shrubs & Herbs etc.) and sensitivity of species. At each sampling location, at least 25 quadrats have been studied which are varies due to prevailing field conditions of undulating plains. The objectives of the work as follows:

3.9.1 Flora(Vegetation)

- Identification of forest type and density, bio-diversity in the study area
- Preparation of comprehensive checklist of flora (Angiosperm, Gymnosperm, Bryophyte, pteridophyte, algae, fungi, Lichen)
- Importance value index of the dominant vegetation in the study area of proposed project
- Frequency, Abundance and Density of each species of Trees, Shrubs, Herbs & Grasses at representative sampling sites will be estimated
- Identification and listing of Rare Endangered species -RET
- Identification and listing of plants of genetically, biologically, economical and medicinal importance
- Ethno botanical aspects of each species need to be assessed
- Assessment of economic values and uses of existing forests in the study area
- Identification of potentially important species from conservation and economic point of view
- Major forest produce, if any and dependence of locals on the same in the forests

3.9.2 Fauna

For Fauna in ventorisation i.e. wildlife as mammals, avifauna, reptiles and butterflies etc., the study was carried out in the proposed project vicinity with respect to the following objectives:

- To prepare an inventory of the terrestrial fauna (Mammal, bird, reptile, amphibian, Lower invertebrate etc.)
- To assess present status of the terrestrial fauna present in the study area
- To assess the impacts on terrestrial fauna present in the study area
- Identification and listing of RET- Fauna following WPA

3.9.3 Aquatic Ecology

The Aquatic Ecological Monitoring is to be conducted minimum at five locations in summer season. The details of the monitoring work proposed to be carried out are as follows:

- Assessment of biotic resources with special reference to primary productivity, zooplanktons, phytoplankton's, benthos, macrophytes, macro invertebrates and fishes in the study area
- Population densities and diversities of phytoplankton's, zooplanktons benthos, macrophytes, macro invertebrates and fish shall be estimated Diversity indices of these ecological groups will also be calculated separately
- Spawning breeding grounds if any, have to be identified
- Assessment of loss of habitat and conservation needs for Fish species in the project area
- Based on the existing status of riverside ecology the ecosystems shall be characterized for tropic status
- Fish species community in the project area and mitigation measures

3.9.4 TerrestrialEcology

***a. Secondary* data**

Published documents of the concerned Forest Divisions are used as the secondary information source of the area. Also various published reports and research papers are used as the secondary source of data.

***b. Primary* data**

A detail investigation was made to understand overall vegetation profile and floral resource characteristics within 10 km radius of the proposed project area. The study was carried out during the pre-monsoon, monsoon and post monsoon seasons.

3.9.5 Forest and Forest Type

Forest and Forest types are classified as per Champain and Seth Forest classification of India.

Floral Study

The present report on the plants of project area is based on field survey conducted during monsoon seasons. The project area has been divided into three zones based on project appurtenances in the river course i.e. dam axis site, catchment area or submergence zone u/s of dam axis, and project influenced area d/s of dam site following surrounding area upto 10 km radius including the proposed command area for lift canal irrigation scheme. Therefore, detail survey was conducted in the different habitats for having a holistic view of phyto-sociological aspects.

Phytosociology

Phytosociological study was carried out following Random Qudrat Sampling method. In order to accommodate maximum representation of different types of plant species, sample plots were laid in selected places in different parts of study area of project that contain natural vegetation. Quadrats of 10 m X 10 m (100 sq meters) size were randomly laid to study tree species. Within these sample plots, sub-plots of 5 m x 5 m were laid down randomly for studying the shrub layer and regeneration of tree species. For information on ground layer including herbaceous species, quadrats of 1 m x 1 m size were laid down randomly.

Quantitative analysis: The primary data recorded by laying quadrats were utilized to derive density, frequency and abundance following standard phyto-sociological methods of Misra (1968). Important Value Index for trees only was estimated following the formula developed by Cottam and Curtis (1956) taking into consideration of relative frequency, relative density and Relative Dominance. Species diversity indices like Shannon-

Magurran (1988). Formulae used for various calculations are as given below:

Density: It is an expression of the numerical strength of a species where the total number of individuals of each species in all the quadrats is divided by the total number of quadrats studied. Density is calculated by the equation:

Density (D) = Total number of individuals in all quadrats

Total number of quadrats studied

Frequency: This term refers to the degree of dispersion of individual species in an area and usually expressed in terms of percentage occurrence. It was studied by sampling the study area at several places randomly and recorded the name of the species that occurred in each sampling units. It is calculated by the equation:

Frequency (F) = Total number of quadrats of occurrence of a species X 100

Total number of quadrats studied

Abundance: It is the study of the number of individuals of different species in the community per unit area. By quadrats method, samplings are made at random at several places and the number of individuals of each species was summed up for all the quadrats divided by the total number of quadrats in which the species occurred. It is represented by the equation:

Abundance (A) =Total number of individuals in all quadrats X 100

Total number of quadrats of occurrence

Important Valued Index: This index is used to determine the overall importance of each species in the community structure. In calculating this index, the percentage values of the relative frequency, relative density and relative dominance are summed up together and this value is designated as the Importance Value Index. IVI is calculated only for tree category.

Relative Density: Relative density is the study of numerical strength of a species in relation to the total number of individuals of all the species and can be calculated as:

Relative Density (RD) = Number of individuals of a species X 100

Total number of individuals of all species

Relative Frequency: The degree of dispersion of individual species in an area in relation to the number of all the species occurred.

Relative Frequency (RF) = Number of occurrences of a species X 100

Total number of occurrences of all species

Relative Dominance: Dominance of a species is determined by the value of the basal cover. Relative dominance is the coverage value of a species with respect to the sum of coverage of the rest of the species in the area.

Relative Dominance (RDo) = Basal area of individual species X 100

Basal area of all species

The total basal area was calculated from the sum of the total diameter of all trees. The basal area was measured at breast height (1.5 m) and by using the formula πr^2.

Shannon's diversity index and Simpson's index of dominance by using the following equation:

Wiener Index (H') and Simpson's Index (□) were calculated as per

Shannon-Wiener Diversity Index (H') = -□ pi ln pi

Simpson's Dominance index (□) = □ pi2

where,

pi is the proportion of individuals of the ith species; pi = Ni / N Ni is the number of individuals in the ith species and

N is the total number of individuals of all species in the stand

Identification of Rare, Endangered and Threatened plant species

Rare and endangered species were identified referring to the Red Data Book of India and other available literature, flora and herbarium pertaining to the rare/ endangered species of state of Karnataka.

Medicinal & Economic important Plants: An Ethno botanical survey is carried out to identify the wild plants used by the local peoples for different purposes.

Agronomy and Agro forestry Practice in the Area - Cropping Pattern

Name of Crops (Season wise)

(I) Khariff	**(II) Rabi**	**(III) Two Seasonal**
1) Tur dal	1) Toor	1) Cotton
2) Bajra	2) Bajra	2) Chilies
3) Jawar Khariff	3) Ground nut	
4) Oil Seeds	4) Jawar rabi	
5) Pulses (Black gram, Green gram, Cow Pea)	5) Sun flower	
	6) Safflower	
6) Ground nut	7) Pulses	
7) Maize	8) Wheat	
	9) Cotton	
	10) Other crops	

Table No. 3.18: List of Crops in the Study Area

Sr. No.	Crops	Common name	Scientific name
Cereal			
1.	Maize	Corn (macca)	Zea mays
2.	Bajra	Bajra	Pennisetum glaucum
3.	Jowar	Jowar	Sorghum vulgare
4.	Wheat	Gahuun	Triticum aestivum
5.	Barley	Jo	Hordeum vulgare
6.	Oats	Jaie	Avena fatua
7.	Sugarcane	Sugarcane	Saccharum officinarum
8.	Torai	Arhar (Redgram)	Cajanus cajon
Oil seeds			
9.	Sunflower	Oil seed	Helianthus annuus
10.	Groundnut	Moongfali	Arachis hypogaea
Fruits			
11.	Bananaas	Sweet banana	Musa bulbisiana

12.	Grapes	Angoor	Vitis vinifera
Vegetables			
13.	Onion	pyaj	Allium cepa

3.9.6 Vegetation Accounts in & around project site & Study area

The area lies in a region of moderate to low rainfall zone. Besides these vagaries of monsoon, the prolonged dry periods have rendered the area into draught prone Yadgir districts. Therefore, severe droughts in the area often leads to damage to the natural regeneration of natural forests and plantations. During the survey, individuals within the quadrat were identified up to the species level, and the number of individuals of each species in each quadrat was counted and described in the below sections.

Florostics

The floristic exploration of present study in different seasons, a total of 129 plant species belonging to 106 genera under 42 families have been recorded. The habit approach of plants revealed that out of 129 flowering plants, the biggest group was herbs, contributed 76 species (58.91%) which is followed by trees with 29 species (22.48%), shrubs with 18 species (13.95%), climbers with 5 species (3.88%) and parasite with single species **Table No. 3.19.**

Table 3.19: Vegetation status of the study site

Plant Habit	No. of Species	% of Species
Herbs	76	58.91%
Trees	29	22.48%
Shrubs	18	13.95%
Climber	5	3.88%
Parasite	1	0.78%
Total	**129**	

The composition of floristic elements of the study area consisted of 77.52% dicots and 22.48% monocots. A total 129 plant species (100 dicots and 29 monocots) belonging to 106 genera (82 dicots and 24 monocots) and 42 families (37 dicots and 5 monocots) were recorded. It is evident that dico ts families are over 7 times larger than monocots, the genera are more than three times the monocots and species are also more than three times the monocots. The details are given in **Table No. 3.20**

Table No. 3.20: Showing the percentage composition of the floristic elements of the study site

Group	Family		General		Species	
	No.	%	No.	%	No.	%
Dicots	37	88.10	82	77.36	100	77.52
Monocots	5	11.90	24	22.64	29	22.48
Total	**42**		**106**		**129**	

Description of families, genera and species along with their local name and habit observed at various sampling locations in different seasons are depicted in **Table No.3.21**

Table No 3.21: Total list of plant species recorded

Plant Species	Local name	Family	Habit
Abutilon indicum (L.) Sweet	Kakari	Malvaceae	Shrub
Acacia catechu (L. f.) Willd.	Kachu/Khadira	Mimosaceae	Tree
Acacia ferruginea DC.	Banni	Mimosaceae	Tree
Acacia leucophloea Roxb.	-	Mimosaceae	Tree
Acacia nilotica Willd. Ex Delile	Karjali	Mimosaceae	Tree
Acalypha indica L.	-	Euphorbiaceae	Herb
Acanthospermum hispidum DC.	-	Asteraceae	Herb
Achyranthes aspera L.	-	Amaranthaceae	Herb
Aegle marmelos (L.) Correa	Bael	Rutaceae	Tree
Agave cantula Roxb.	-	Agavaceae	Shrub
Albizia amara (Roxb.) B. Boivin	Tugli,Chigare	Mimosaceae	Tree
Albizia lebbeck (L) Benth.	Bage/ Siris	Mimosaceae	Tree
Albizia saman (Jacq.) Merr.	Rain tree	Mimosaceae	Tree
Albizzia procera (Roxb.) Benth.	Belati/ Safed siris	Mimosaceae	Tree
Alternanthera sessilis (L.) DC.	-	Amaranthaceae	Herb
Alysicarpus vaginalis (L.) DC.	-	Fabaceae	Herb
Amaranthus spinosus L.	-	Amaranthaceae	Herb
Amaranthus viridis L.	-	Amaranthaceae	Herb
Andrographis paniculata (Burm. F.) Wall. Ex Nees	-	Acanthaceae	Herb
Andropogon schoenanthus L.	Rausa grass	Poaceae	Herb

Annona squamosa L.	Shareefa/Seetafal	Annonaceae	Shrub
Apluda mutica L.	Karrigudi	Poaceae	Herb
Argemone mexicana L.	-	Papaveraceae	Herb
Aristida setacea Retz.	-	Poaceae	Herb
Azadirecta indica A. Juss	Bevu/Neem	Meliaceae	Tree
Bahunia racemosa Lam.	-	Caesalpiniaceae	Tree
Calotropis gigentea (L.) R. Br. Ex Ait.	Madare	Asclepiadaceae	Shrub
Calotropis procera (Aiton) R. Br.	-	Asclepiadaceae	Shrub
Carex cyperoides Dewey.	-	Cyperaceae	Herb
Carica papaya L.	Papita	Caricaceae	Tree
Carissa carandas L.	Kavale	Apocynaceae	Shrub
Cassia auriculata L.	Thangadi	Caesalpiniaceae	Shrub
Cassia mimosoides L.	-	Caesalpiniaceae	Herb
Cassia occidentalis L.	-	Caesalpiniaceae	Shrub
Cassia pumilla Lam.	-	Caesalpiniaceae	Herb
Cassia siamea Lam.	Seeme/ Tangudi	Caesalpiniaceae	Tree
Cassia tora L.	-	Caesalpiniaceae	Herb
Celosia argentea L.	-	Amaranthaceae	Herb
Centella asiatica (L.) Urban	Brahmi	Apiaceae	Herb
Chrysopogon spp	-	Poaceae	Herb
Cissampelos pareira L.	-	Menispermaceae	Climber
Coccinia grandis (L.) Voigt	-	Cucurbitaceae	Climber
Cocos nucifera L.	-	Arecaceae	Tree
Coix lacryma-jobi L.	-	Poaceae	Herb
Commelina benghalensis L.	-	Commelinaceae	Herb
Corchorus aestuans L.	-	Tiliaceae	Herb
Cryptostagia grandiflora (Roxb.ex R.Br).	-	Asclepiadaceae	Climber
Cuscuta reflexa Roxb.	-	Cuscutaceae	Parasite
Cyanotis cristata L. D. Don	-	Commelinaceae	Herb
Cymbopogon martinii (Roxb.) Wats.	Rosha grass	Poaceae	Herb
Cynodon dactylon (L.) Persoon	-	Poaceae	Herb
Cyperus cyperoides Britton.	-	Cyperaceae	Herb
Cyperus difformis L.	-	Cyperaceae	Herb
Cyperus distans L.f.	-	Cyperaceae	Herb
Cyperus niveus Retz.	-	Cyperaceae	Herb
Cyperus nutans Vahl	-	Cyperaceae	Herb
Cyperus rotundus L.	Konnerigadde	Cyperaceae	Herb

Dactyloctenium aegypticum (L.) P. Beauv.	-	Poaceae	Herb
Dalbergia sissoo Roxb.	Sissoo	Fabaceae	Tree
Datura innoxia Mill.	-	Solanaceae	Herb
Desmodium hetrocarpon (L.) DC.	-	Fabaceae	Herb
Desmodium triflorum (L.) DC.	-	Fabaceae	Herb
Dicliptera bupleuroides Nees	-	Acanthaceae	Herb
Digitaria ciliaris (Retz.) Koeler	-	Poaceae	Herb
Echinochloa colona (L.) Link	-	Poaceae	Herb
Eclipta prostrata (L.)	Taila	Asteraceae	Herb
Eleusine indica (L.) Gaertner	-	Poaceae	Herb
Eragrostis tenella (L.) P.Beauv. ex	-	Poaceae	Herb
Roem. & Schult.			
Eucalyptus spp	Nilgiri	Myrtaceae	Tree
Euphorbia helioscopia L.	-	Euphorbiaceae	Herb
Euphorbia heterophylla L.	-	Euphorbiaceae	Herb
Euphorbia hirta L.	-	Euphorbiaceae	Herb
Ficus bengalensis L.	Aala	Moraceae	Tree
Ficus religiosa L.	Arali/ Peepal	Moraceae	Tree
Foeniculum vulgare (L.) Miller	-	Apiaceae	Herb
Grewia tiliaefolia vahl	Tadasalu	Tiliacaeae	Shrub
Hyptis suaveolens (L.) Poit.	-	Lamiaceae	Herb
Indigofera linifolia (L.f.) Retz.	-	Fabaceae	Herb
Ipomoea carnea Jacq.	-	Convolvulaceae	Shrub
Justicia procumbens L.	-	Acanthaceae	Herb
Lantana camara L.	Lantana	Verbenaceae	Shrub
Leucas cephalotes (Roth.) Sprengel	-	Lamiaceae	Herb
Lycopersicon lycopersicum (L.) Karsten	-	Solanaceae	Herb
Malvastrum coromandelianum (L.) Garcke	-	Malvaceae	Herb
Mangifera indica L.	Mavinamara/Aam	Anacardiaceae	Tree
Martynia annua L.	-	Martyniaceae	Herb
Melia azedarach L.	Arebevu/ Huchbevu	Meliaceae	Tree
Mucuna pruriens (L.) DC.	-	Fabaceae	Climber
Musa bulbisiana Colla	-	Musaceae	Herb
Nymphaea nouchali Burm.f.	-	Nymphaeaceae	Herb

Ocimum tenuiflorum L.	Tulsi	Lamiaceae	Herb
Oplismenus compositus (L.) P. Beauv.	-	Poaceae	Herb
Parthanium hysterophorus L.	Congress grass	Asteraceae	Herb
Peltophorum pterocarpum (DC.) K. Hene	-	Caesalpiniaceae	Tree
Phoenix sylvestris (L.) Roxb.	Ichalu	Arecaceae	Tree
Physalis minima L.	-	Solanaceae	Herb
Polyalthia longifolia (Sonn.) Hook. f.	Asoka	Annonaceae	Tree
Polygonum barbatum L.	-	Polygonaceae	Herb
Pongamia pinnata (L.) Pierre.	Honge/ Kanige	Fabaceae	Tree
Prosopis juliflora DC.	Bellary Jali	Mimosaceae	Shrub
Psidium guajava L.	Amrood	Myrtaceae	Tree
Randia dumetorum (Retz.) Poiret	Mangare	Rubeaceae	Shrub
Rhynchosia spp	-	Fabaceae	Climber
Ricinus communis L.	-	Euphorbiaceae	Shrub
Saccharum spontaneum L.	-	Poaceae	Herb
Scirpus articulates L.	-	Cyperaceae	Herb
Setaria verticillata (L.) P. Beauv.	-	Poaceae	Herb
Sida cordata (Burm. F.) Borss. Waalk.	Bala	Malvaceae	Herb
Sida rhombifolia L.	-	Malvaceae	Herb
Solanum nigrum L.	-	Solanaceae	Herb
Sonchus brachyotus DC.	-	Asteraceae	Herb
Sorghum halepense (L.) Persoon	-	Poaceae	Herb
Syzygium cumini (L.) Skeels	Nerale	Myrtaceae	Tree
Tamarindus indica L.	Hunise	Caesalpiniaceae	Tree
Tectona grandis L. f.	Tegal/ Sagavani	Verbenaceae	Tree
Tephrosia purpurea (L.) Pers.	-	Fabaceae	Shrub
Terminalia tomentosa (Roxb.) Wight & Arn.	Karrinatti	Combritaceae	Tree
Tribulus terrestris L.	Neggilu	Zygophyllaceae	Herb
Trichodesma indicum (L.) R. Br.	-	Boraginaceae	Herb

Tridax procumbens L.	-	Asteraceae	Herb
Triumfetta rhomboidea Jacq.	-	Tiliaceae	Herb
Typha angustata Bor & Chaubard	Aapu/ Anechondu	Typhaceae	Herb
Vernonia cinrea (L.) Lessing	-	Asteraceae	Herb
Vitex negundo L.	Sakkigida	Verbenaceae	Shrub
Waltheria indica L.	-	Malvaceae	Herb
Xanthium indicum Koenig	-	Asteraceae	Herb
Ziziphus mauritiana Lam.	Bare	Rhamnaceae	Shrub
Zornia gibbosa Spanoghe	-	Fabaceae	Herb

The most dominant family of the study area as per number of genera and species was Poaceae with 16 species belonging to 16 genera. The co-dominant families were mimosaceae with 10 species and 5 genera, Fabaceae with 10 species and 10 genera, Caesalpiniaceae with 9 species and 4 genera and Cyperaceae with 8 species and 3 genera.

3.9.7 Economically Important Plant Species

Vegetation is the most precious gift that nature has provided to us, as it is meeting all kinds of essential requirements of the humans in the form of food, fodder, fuel, medicine, timber, resins, and oil, etc. Most of the plant species recorded in the present study was used by the local villagers for variety of uses ranging from food, religious uses medicinal, fodder, dye, household articles, agricultural implements, vegetables, fuel, ornamental and fruits etc. The list of economically important plant species observed in various seasons is enumerated in **Table No. 3.22.**

Table No. 3.22: List of economically important plant species recorded from the study area

Plant Species	Local name	Habit	Economic value
Cryptostagia grandiflora (Roxb.ex R.Br).	-	Climber	Medicinal
Acalypha indica L.	-	Herb	Medicinal
Achyranthes aspera L.	-	Herb	Medicinal
Amaranthus spinosus L.	-	Herb	Medicinal
Amaranthus viridis L.	-	Herb	Green vegetable
Andrographis paniculata (Burm. F.) Wall. Ex Nees	-	Herb	Medicinal
Apluda mutica L.	Karrigudi	Herb	Fodder grass
Argemone mexicana L.	-	Herb	Medicinal
Cassia tora L.	-	Herb	Medicinal
Centella asiatica (L.) Urban	Brahmi	Herb	Medicinal
Chrysopogon spp	-	Herb	Fodder grass
Cymbopogon martinii (Roxb.) Wats.	Rosha grass	Herb	Fodder grass
Cyperus rotundus L.	Konnerigadde	Herb	Medicinal
Datura innoxia Mill.	-	Herb	Medicinal
Dicliptera bupleuroides Nees	-	Herb	Medicinal
Eclipta prostrata (L.)	Taila	Herb	Medicinal
Euphorbia helioscopia L.	-	Herb	Medicinal
Euphorbia hirta L.	-	Herb	Medicinal
Foeniculum vulgare (L.) Miller	-	Herb	Condimental
Hyptis suaveolens (L.) Poit.	-	Herb	Medicinal
Justicia procumbens L.	-	Herb	Medicinal
Leucas cephalotes (Roth.) Sprengel	-	Herb	Medicinal
Lycopersicon lycopersicum (L.) Karsten	-	Herb	Salad/ vagetable
Musa bulbisiana Colla	-	Herb	Eruit edible
Ocimum tenuiflorum L.	Tulsi	Herb	Medicinal
Physalis minima L.	-	Herb	Medicinal
Saccharum spontaneum L.	-	Herb	Sand binder
Sida cordata (Burm. F.) Borss. Waalk.	Bala	Herb	Medicinal
Solanum nigrum L.	-	Herb	Medicinal/Fruit edible
Sorghum halepense (L.) Persoon	-	Herb	Fodder grass
Tribulus terrestris L.	Neggilu	Herb	Medicinal
Tridax procumbens L.	-	Herb	Medicinal
Typha angustata Bor & Chaubard	Aapu/ Anechondu	Herb	Medicinal

Plant Species	Local name	Habit	Economic value
Vernonia cinrea (L.) Lessing	-	Herb	Medicinal
Cuscuta reflexa Roxb.	-	Parasite	Medicinal
Agave cantula Roxb.	-	Shrub	Fencing
Calotropis gigentea (L.) R. Br. Ex Ait.	Madare	Shrub	Medicinal
Calotropis procera (Aiton) R. Br.	-	Shrub	Medicinal
Carissa carandas L.	Kavale	Shrub	Fencing
Cassia auriculata L.	Thangadi	Shrub	Medicinal
Grewia tiliaefolia vahl	Tadasalu	Shrub	Fodder
Lantana camara L.	Lantana	Shrub	Medicinal
Prosopis juliflora DC.	Bellary Jali	Shrub	Fencing
Tephrosia purpurea (L.) Pers.	-	Shrub	Medicinal
Vitex negundo L.	Sakkigida	Shrub	Medicinal
Ziziphus mauritiana Lam.	Bare	Shrub	Fruit edible
Acacia ferruginea DC.	Banni	Tree	Timber
Acacia leucophloea Roxb.	-	Tree	Timber
Acacia nilotica Willd. Ex Delile	Karjali	Tree	Timber
Aegle marmelos (L.) Correa	Bael	Tree	Medicinal
Albizia amara (Roxb.) B. Boivin	Tugli,Chigare	Tree	Timber/Fuel wood
Albizia lebbeck (L) Benth.	Bage/ Siris	Tree	Timber/Fuel wood
Albizia saman (Jacq.) Merr.	Rain tree	Tree	Planted
Albizzia procera (Roxb.) Benth.	Belati/ Safed siris	Tree	Timber
Azadirecta indica A. Juss	Bevu/Neem	Tree	Medicinal/ Fuelwood
Bahunia racemosa Lam.	-	Tree	Medicinal
Carica papaya L.	Papita	Tree	Fruit edible
Cassia siamea Lam.	Seeme/ Tangudi	Tree	Ornamental
Cocos nucifera L.	-	Tree	Fruit edible
Dalbergia sissoo Roxb.	Sissoo	Tree	Timber/planted
Eucalyptus spp	Nilgiri	Tree	Planted
Ficus religiosa L.	Arali/ Peepal	Tree	Religious tree
Mangifera indica L.	Mavinamara/Aam	Tree	Fruit edible
Melia azedarach L.	Arebevu	Tree	Fodder/Fuel wood
Peltophorum pterocarpum (DC.) K. Hene	-	Tree	Planted/Ornamental
Polyalthia longifolia (Sonn.) Hook. f.	Asoka	Tree	Planted/Ornamental
Pongamia pinnata (L.) Pierre.	Honge/ Kanige	Tree	Soil binder
Psidium guajava L.	Amrood	Tree	Fruit edible
Syzygium cumini (L.) Skeels	Nerale	Tree	Fruit edible/Fuel wood
Tamarindus indica L.	Hunise	Tree	Fruit edible
Tectona grandis L. f.	Tegal/ Sagavani	Tree	Planted
Terminalia tomentosa (Roxb.) Wight & Arn.	Karrinatti	Tree	Medicinal

3.9.8 Gymnosperm Diversity

No Gymnosperm species was recorded from the Sonthi Lift Irrigation project of Gulbarga district.

3.9.9 Pteridophytic Diversity

Only three Pteridophytic groups of species were recorded from the study area are Equisetum debile, Selaginella monospora and adiantum philippense. All three species was found along river side of the area.

3.9.10 Bryophytic Diversity

Few species of bryophyte are Riccardia indica, Marchantia polymorpha, Notothylas indica, Funaria spp., Polytrichum densifolium, Pogonatum spp. and Desmatodon latifolius recorded from the Sonthi Lift Irrigation Project.

3.9.11 Red Status of Plant Species

As per the Red Data book of plants and Following IUCN Red List of Threatened Species, no species fall under the threat category. However some regional medicinal plants species recorded in the project area which is important from conservation point of view.

Figure No. 3.16: Floristic Diversity of plants in project site

	
Cassia auriculata	**Cryptostagia grandiflora**

Euphorbia hirta

Martynia annua

Prosopis juliflora community in the study area

Open shrub forest in the command area /canal crossing site

3.9.12 Faunal Study

The fauna of the study area consists mostly of species with zoo-geographic affinities of palaearctic, Indo-Malayan and indigenous variably. However, to gain an insight in the following respects for species of carnivore, ungulates, non-human primates, mammals, birds/butterflies, reptiles and other fauna, the survey was conducted in the study area up to 10km radius from the project appurtenances

Ground surveys was carried out by trekking the impact zone for identification of faunal species inhabiting the area along the riverbanks, adjoining forest, nullahs, riparian zone, hillock slopes and agricultural fields. Apart from direct sightings and primary data generated through transects and trails, we have also collected secondary data from literatures published, forest department and other sources like citing of animals by the locals in the study area. The sighting of wild animals and other faunal groups were carried out during study period though being undulating terrain with vast agriculture land and few scattered deccan platue hillocks, the possible accounts are taxed in this section. The general methodology followed is described below as:

- For sampling butterflies the standard 'Pollard Walk' methodology was used by recording all the species that were encountered while trekking along the foot trails between these two sites, daily. Photographs of specimens of species were taken in the field for identification purpose. Sampling was done for 1 hour in a stretch on each transect (n=4).
- For sampling birds 'point sampling' along the fixed transects (foot trails) was carried out to record all the species of birds observed with the help of binoculars; field guides and photography for 1 hour on each transect(n=4).
- For sampling mammals, 'direct count on open width (20 m) transect' was used on the same transects (n=4) for 1 hour in each transect. Besides, information on recent sightings / records of mammals by the villagers and locals was also collected form these areas.
- 'Reptiles' mainly lizards were sampled by 'direct count on open width transects' (n = 4) for 1 hour in each transect.

3.9.13 Faunal in the study Area

In the absence of substantial forest cover in the project vicinity and command area, the faunal variety is not much. However, along different water bodies, villages and agriculture field areas some faunal life forms have been observed.

The influence of life near water bodies is viewed from the Bonal tank located in Bonal village of Shorapur Taluka, Yadgir district about 75-80 km near Krishna river confluence of Bhima, which has been declared state Bird Sanctuary (Bonal Bird Sanctuary). The Bonal Tank is an important ecological 'niche' attracting large number of migratory birds like open bill stork (Anastomus oscitans), lesser adjutant (Leptotilos javanicus), Brahminy Duck (Tadorna feruginneal), Common pochard (Anthiya farina), Tufted pochard (Anthiya fuligula), Pheasant-tailed jacana (Hydro phasianus chirugees), Bronze winged jacana (Meeto pidius indicus), Bar headed goose (Anser indicus), and the Indian river tern (Sterna aurantia) etc.

Table 3.23: Mammals

Sr. No.	Zoological Name	Local Name	IUCN status	Schedule as per Wildlife Protection Act
1	**Order Chiroptera**			
2	Cynopterus sphinx	Fruit Bat	Least Concern	SCHEDULE V
	Order Canrnivora			
3	Felis chaus	Common Jungle Cat	Least Concern	SCHEDULE II
4	Herpestes edwadsi	Common Mongoose	Least Concern	SCHEDULE IV
5	Canis aureus	Jackal	Least Concern	SCHEDULE II
6	Canis lupus pallipes	Wolf		
7	Vulpes bengalensis	Common Fox		
	Order Rodentia			
8	Funambulus pennantii	Common Squirrel	Least Concern	SCHEDULE IV
9	Rattus rattus	Common House Rat	Least Concern	SCHEDULE V
10	Mus muscatus	mice		
11	Hystrix Indica	Common Indian	Least Concern	SCHEDULE IV

		Porcupine		
12	Lepus nigricollis	Common Indian Hare	Least Concern	SCHEDULE IV
	Order Ungulata			
13	Sus scrofa	Indian Wild Boar	Least Concern	SCHEDULE III
14	Axis axis	Spotted Deer	Least Concern	SCHEDULE III
15	Presbtlis entellus	Common Langur		

Table 3.24: List of Domestic Fauna Observed in the Study Area

Sr. No.	Zoological Name	Common Name
1.	Bos indicus	Cow
2.	Bubalus indicus	Buffalo
3.	Cains familieris	Dog
4.	Capra hircus	Goat
5.	Equus cabilus	Horse
6.	Equus hermionus	Ass
7.	Felis domesticus	Cat
8.	Ovius polic	Sheep
9.	Sus cristatus	Pig
10.	Presdystis entellus	Common langoor
11.	Macaca sp	Monkey

Reptiles

Table 3.25: List of Reptiles

Sr. No.	Scientific Name	Common Name	IUCN Status
1	Naja tripudians	Cobra	
2	Laudakia minor	Lesser Agama	Least Concern
3	Hemidactylus brookii Gray	Brook's House Gecko	
4	Hemidactylus flaviviridis Ruppell	Yellow green House Gecko	
5	Hemidactylus leschenaultia	Bark Gecko	
6	Brachysaura minor	Lesser Agama	Data Deficient

7	Mabuya dissimillis	Striped Grass Skink	Data Deficient
8	Calotes sp	Garden Lizard	
9	Varanus sp	Monitor lizard	
10	Chameleo calcaatus	chameleon	
11	Bangarus ceruleus	Krait Python	
12	Ptyas muscosus	Rat Snake Viper	
13	Echis carinata	Tortoise	

Butterflies:

Eight species of butterflies were sited in the area (**Table 28**). Among them cabbage fly was found occurring commonly. The fauna listed consists of mostly 'common' and generalist species as none of the animal species is threatened globally as per the IUCN Red list 2012.

Table No. 3.26: Butterflies spotted in the area

Sr. No.	Butterflies	Common Name
1.	Precis lemonias	Lemon pansy
2.	Genopterys sp	Common brimstone
3.	Danaus sp	common tiger
5.	Pieris canidia	Cabbage white
6.	Eurema sp	Lemmon grass yellow
7.	Pachliopta hector	Crimsone rose
8.	Zizeeria sp	Dark grass blue

3.9.14 Aquatic Ecology

Ecology is the scientific study of the interactions of organisms with themselves and the abiotic and biotic factors of the surrounding environments. Therefore, any change in the natural environment can alter the habitat fragmentation, which leads to change/loss of biodiversity as the species specific interaction and their food chain link gets widely impacted in response to the stress generated from the change in physical, chemical and biological environment due to erection of barriers (diversion structures, weirs, barrages, dams etc.) or blockage of the flowing water of river/stream.

Thus, in order to predict the likely impacts of proposed project of large barrage /dam of about 8 m height on the Bhima river, hydro-biological characteristics like physical, chemical, biological, fishes and fisheries characteristics of this river water, the present study is undertaken. Water resources projects have beneficial as well as adverse impacts on fish production. The secondary data on the aquatic lifeforms-fisheries in the rivers was collected through review of literature as well. Sampling was made at various sites in the project area and river stretches both upstream and downstream of the project site to ascertain the distribution pattern of aquatic life forms imparting aquatic ecological health. The possible impact on aquatic life due to conversion of lentic to lotic conditions has also been identified from the proposed project

3.11 Demography & Socio-Economic Environment

The growth of industrial sectors and infrastructure developments in villages and towns are bound to create its impact on the socio-economic aspects of the local population. The impacts may be positive or negative depending upon the developmental activities. To assess the impacts on the local people, it is necessary to study the existing socio-economic status of the local population, which will be helpful for making efforts to further improve the quality of life in the study area. To study the socio-economic aspects of people in the study area around the KIADB Kadecheru project site, the required data has been collected from various secondary sources and supplemented by the primary data.

3.11.1 Methodology Adopted for the Study

The methodology adopted for the study is based on the review of secondary data, such as Census of India 2011, Karnataka and Telangana state Administrative Atlas for the parameters of demography, occupational structure of people within the study area of 10-km radius around the project site.

Socio-economic environment includes description of demography, basic amenities housing, water facilities, health care services, transportation and education. Information on the above said factor has been collected to define the socio-economic profile of the study area (10 km radius), which is also a part of Environmental Impact Assessment study for the proposed activities.

3.11.2 Demography

The study area following in total 52 villages, 2 districts (Yadgir from KA, and Mahbubnagar from TS), and 3 sub districts namely Yadgir and Shahpur from Karnataka and Maganoor from Telangana states comprises in the buffer zone, total population is 77717 among them 38819 are male and 38898 are female, among them 12059 are total children, male children are 6121 and female children are 5938. The male and female ratio of the study area is 998 males per every 1000 females. Village wise socioeconomic details summarized in **Table below**

Table No. 3.27: Demography Details of the Study Area

Description	Numbers
Demography	
Total Villages	52
Total no. of House Hold	13921
Total Population	77717
Total Male Population	38819
Total Female Population	38898
Total ST Population	2909
Total SC Population	14114
Literacy Level	
Total Literate Population	30305
Employment Pattern	
Cultivators	12186
Agricultural Labour	19025
House Hold Workers	812
Other Workers	7826
Total Main Workers	31357
Total Marginal Workers	8492
Total Non-Workers	37868

Infrastructure Facilities*			
Water facilities*			
Tap	28	River	0
Well	17	Canal	2
Tank	30	Lake	30
Hand Pump	52	Others	1
P & T Facilities			
Post Office	5	Post & Telegraph Office	1
Sub post Office	17	Mobile network	45
Power Supply*	Available in 52 villages		
Medical Facilities*			
Maternity & Child Welfare Center	1	Family Welfare Center	6
Public Health Center	2		
Education Facilities			
Primary School	69	Senior Secondary	2
Middle School	34	College	0
Secondary	7	School for disabled	0

Source: Census 2011

3.11.3 Status of Literacy in the Study Area

As per the 2011 census data the total literacy level in the buffer zone is 39% among them, male are 3.9% literates and 15.1% are the female literates. The Yadgir district average literacy ratio is 43.4% and the Mahbubnagar district average literacy ratio is 47.9% from the analysis, it is concluded that people are poor and are not well educated; therefore the company need to focus on education and more on girl child and women education and development will provide the necessary alternate source of income generation in this area, which improves the standard of living of the population in the study area literacy details are given in **Table No. 3.28**

Table No. 3.28: Status of Literacy

S. No.	Particular	(Except below 06 years age population)
1	Total Population	77717
2	Total Literates	30305
3	Total Literacy Rate	39 %
4	Male Literates	18588
5	Male Literacy Rate	23.9 %
6	Female Literates	11717
7	Female Literacy Rate	15.1

Source: Census 2011

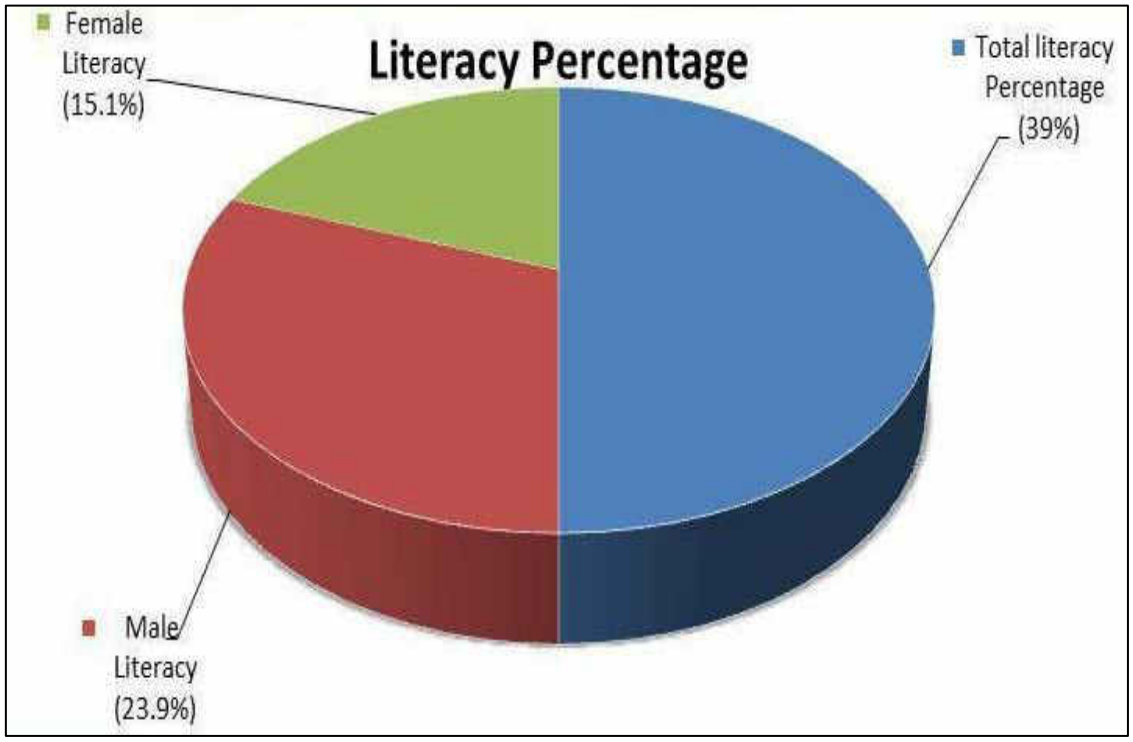


Figure No. 3.17: Status of Literacy Rate

3.11.4 Status of Occupation

The economic status of the population is poor and mostly engaged in Cultivation agriculture local resources for their livelihood the details showing **Table No. 3.29**

Table No. 3.29: Status of occupation

Sr. No.	Particular	Details of Study Area	%
1	Main workers	31357	40.3
2	Marginal workers	8492	10.9
3	Total workers (Main +Marginal)	39849	51.3
4	Non Workers	37868	48.7

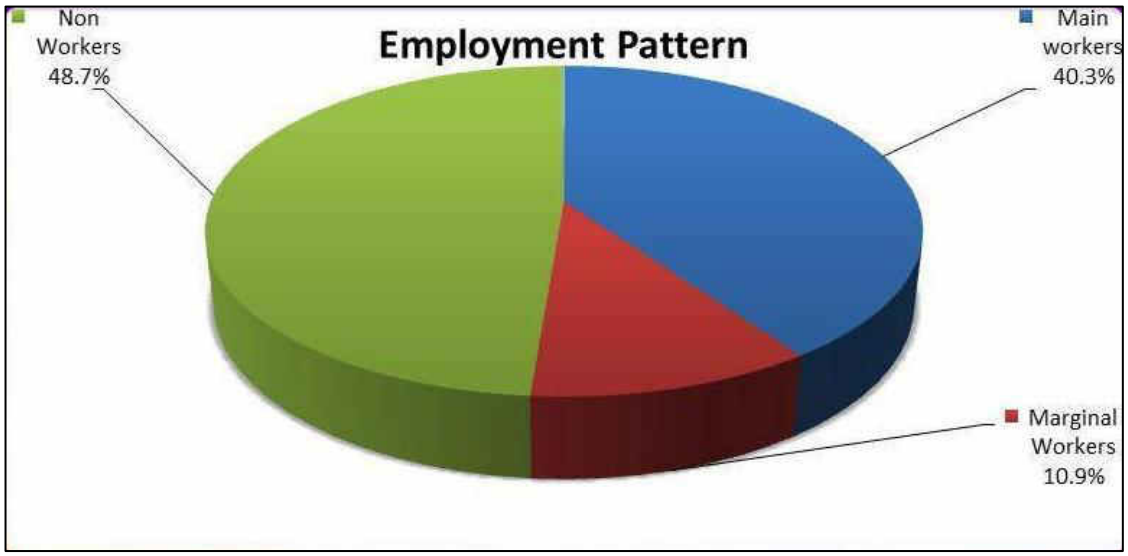


Figure No. 3.18: Status of Occupation

The percent of non-workers is 48.7%; the total workers are 51.3% i.e. main and marginal workers in the study area. It may also be seen from the pie chart and **Table No. 3.30**

Table 3.30: Status of Workers

Sr .No.	Particular	Details of Study Area	%
1	Cultivators	12186	15.7
2	Agricultural Labor	19025	24.5
3	Household Workers	812	1
4	Other Workers	7826	10.1

Source: Census 2011

The Socio Economic Conditions of this 10-km radius area shows that of the total Main workforce 15.7% are engaged in cultivation 24.5% are agricultural labourers and 1.% of workers engaged in Household labour, the remaining 10.1% workers are engaged in other activities.

The socio-economic analysis of the Study area shows that in terms of education and employment, the area is not developed. The overall socio-economic status of the target population is low in terms of literacy; less work participation rate is, etc.

More attention and care shall be taken so that the needs and demand of these marginalized classes of the influence area population can get more exposure to modern facilities of education and development.

3.11.5 Vulnerability Groups

The vulnerability groups details present in the project study area are presented in **Table No. 3.31**

Table 3.31: Vulnerability Groups

Sr. No.	Particular	Details of Study Area
1	Total Population	77717
2	Total SC Population	14114
3	% of SC Population	18.2%
4	Total ST Population	2909
5	% of ST Population	3.7%
6	Others Population	60694
7	% of others	78.1%

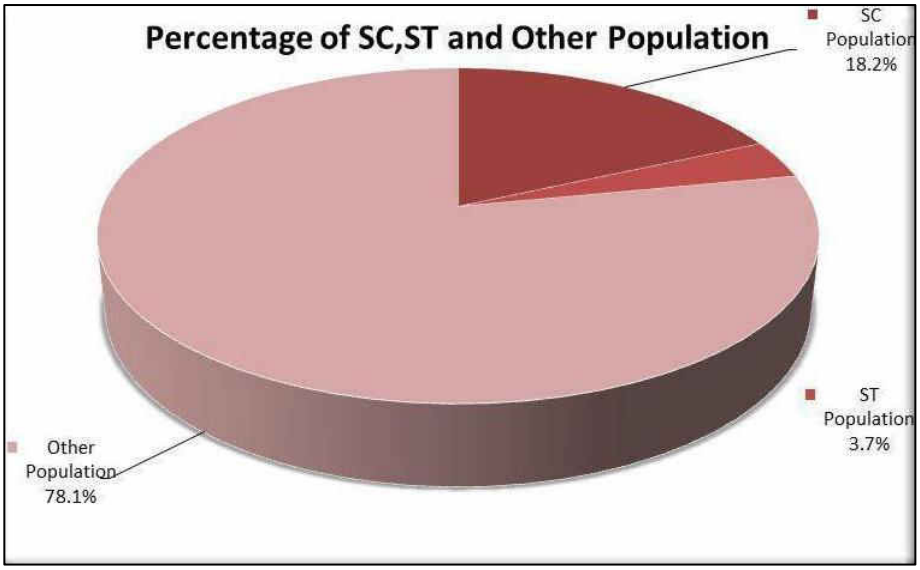


Figure No. 3.19: Vulnerable Group

The marginalized population of Scheduled Caste (SC) and Scheduled Tribe (ST) in the study area and special attention has to be given towards these groups. Among the total population Scheduled Caste (SC) is 14114 and Scheduled Tribe (ST) is 2909, percentage wise 18.2% of Scheduled Caste (SC) and 3.7% of Scheduled Tribe (ST) population the details given in the Table 35 and the pie chart.

Marginal groups are very important to identify the population who fall under the marginalized and vulnerable groups and special attention has to be given towards these groups while making action plans. Special provisions shall be made for them..

3.11.6 Land use Pattern in the Study Area

Land Use of Project Site		
Sr. No	**Component**	**Percentage of Total Area (%)**
1	Industrial	45-55
2	Residential	10-15
3	Parks and tank	10-15
4	Civic amenities	3-5
5	Commercial	3-5

6	Public utility	5-8
7	Solid waste disposal	1-2
8	Buffer	6-10
	Total	**100**

As per the 2001 census data the land use pattern is like this total area 31672.54 hectors comprises in the buffer zone among that Irrigated land is 8383.07 hectors, un irrigated land is 9418.11 hectors, cultivable waste 3407.68 hectors, forest area is 1646.72 hectors and area not available land for Cultivation is 8816.96 hectors can see the details in **Table 3.32** and chart.

Table 3.32: Land use Pattern In The Study Area (In Ha)

Sr. No.	Particulars	Land Use pattern (In Ha)	%
1	Irrigated Area	2629.80	89.31
2	Un-irrigated area	44081.61	89.31
3	Cultivable Waste	386.63	0.78
4	Forest Area	28.95	0.06
5	Area Not Available for Cultivation	2229.10	4.52
	Total Area	**49356**	**100**

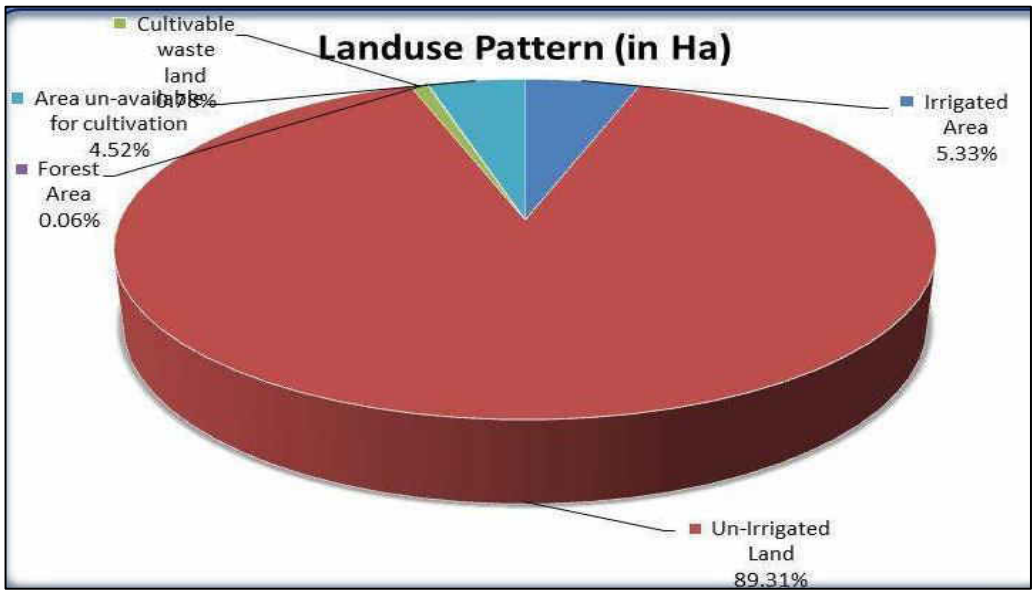


Figure No. 3.20: Land Use Pattern in the Study Area

3.11.7 Basic Amenities

The basic amenities existing in study area are as follows:

- The education facilities are evenly distributed in the study area. Primary schools are available in 52 villages. There are 69 primary schools; followed by 34 middle schools, 7 Secondary schools, 2 senior secondary school and none of the disabled school are not available in the study area.
- Drinking water facilities are available in all 52 villages in the form of Tap, Well, Tank, Tube well, hand pump and river.
- Communication services in the form of post offices and Telephone connections and Mobile network are available in the villages.
- All 52 villages in the study area electricity are available

Chapter - 4

Anticipated Environmental Impacts & Mitigation Measures

4.0 Identification of Impacts

Any developmental activity in its wake will bring about some impacts associated with its origin, which can be broadly classified as reversible, irreversible, long and short-term impacts. In this chapter, an endeavor has been made to identify various environmental impacts associated with the operation of facility and other activities wherein, there may be a chance of pollution. Based on the possible worst case emissions and waste generation from the proposed project and also taking into consideration the baseline environmental status at the proposed project site, the environmental factors that are likely to be affected (Impacts) are identified, quantified and assessed. Both instrumental (positive) and detrimental (negative) impacts are accounted for this purpose. The prediction of impacts helps in the preparation of a sound environmental management plan which has to be executed during the on-going activities for the proposed project to minimize the adverse impacts on the environmental quality.

A large number of adverse impacts occur from facility operations. These impacts can be fatal accidents (e.g., scavengers buried under waste piles) infrastructure damage (e.g., damage to access roads by heavy vehicles) pollution of the local environment (such as contamination of groundwater and/or aquifers by leakage and residual soil contamination during landfill usage, as well as after landfill closure) off-gassing of methane generated by decaying organic wastes (methane is a greenhouse gas many times more potent than carbon dioxide, and can itself be a danger to inhabitants of an area); harboring of disease vectors such as rats and flies, particularly from improperly operated landfills.

Methodology

The potential impacts on the environment from the proposed project are identified based on the nature of the various activities associated not only with the project implementation and operation, but also on the current status of the environmental quality at the project site.

Potential Impacts

The potential significant environmental impacts associated with the project are grouped as below.

Air & Noise Environment

- Impacts on ambient air quality
- Impacts on ambient odor
- Impacts on ambient noise

Water Environment

- Impacts on surface & ground water quality
- Impacts on aquatic life

Land Environment

- Impacts on land use
- Impacts on soil fertility
- Impacts on agriculture

Socio Economic

- Impacts on infrastructure
- Impacts on employment

Indirect Impacts

- Impacts on public health and safety
- Impacts on aesthetics

4.1 Prediction of Impacts

Prediction of Impacts is the most important component in the Environmental Impact Assessment studies. Several scientific techniques and methodologies are available to predict impacts of developmental activities on physical, ecological and socio-economic environments. Such predictions are superimposed over the baseline

(pre-project) status of environmental quality to derive the ultimate (post-project) scenario of environmental conditions.

The prediction of impacts helps in minimizing the adverse impacts on environmental quality during pre and post project execution. In case of water, land and socio-economic environments, the predictions have been made based on available scientific knowledge and judgments. In this chapter, an attempt has been made to predict the incremental rise of various ground level concentrations above the baseline status due to the emissions from this proposed project.

4.2 Assessment / Evaluation of Impacts

The identification and general assessment of impacts of the proposed project has been carried out in the earlier section. The impact of activities related to proposed project on each environmental attribute was assessed. The environmental impact evaluation presented in this section describes the cumulative impact of all project activities on each environmental attribute in the local environmental setting.

4.3 Environmental Setting

Considering the issues involved in proposed Kedechuru Industrial Area Development Project, the activities can be divided into two phases viz Construction Phase and Operation Phase activities.

4.4 Impacts during Construction Phase

Developmental works include site clearance, site formation, building works, infrastructure provision and any other infrastructure activities. The important activities involved during the development of proposed project are as mentioned below:

- Water Supply (Maximum 62 KLD)
- Water storage for Fire Hydrant facility
- Common Effluent Treatment Facility
- Electricity for Common facilities with standby power (DG set- 150 KVA).
- Storm-water
- Drainage System,
- Green Area development.

- Common Internal Roads
- Parking area
- Construction of Boundary wall
- Security system at the Entrance

The above activities will have impact on various environmental components such as air, noise, water, land and social environment. The impacts due to above mentioned developmental activities are of short term in nature and are limited to the construction phase.

Gaseous emissions like Sulphur dioxide (SO_2), Oxides of Nitrogen (NO_X), and CO might be released from the vehicular movement and also from the stationary sources like compressors etc. The impacts on air will be experienced only in the immediate vicinity of the construction areas. The impacts on the air environment could be decreased on exercising controls such as sprinkling of water along unpaved roads, provision of acoustic enclosures to construction of machinery, setting up of construction yards away from habitations etc.

The likely activities, which affect the air environment, also impact the noise environment. The issues related to air pollution during the construction phase also apply to noise pollution.

4.4.1 Impacts on Air Quality

The potential dust sources associated with construction activities is likely to be generated from loading and unloading, top soil removal, travel over dirt roads, wind erosion and other related processing units used for the construction of proposed project.

Vehicular emissions are the major source of air quality impacts. The principal cause of air pollution during the construction phase is the diesel-powered vehicles used in haulage of aggregates, earth and other construction material. In addition, the construction activities are also one of the contributors to air pollution. Air quality could also be affected by dust & particulate matter arising due to site clearing, vehicular emissions, processing & handling of construction materials, Water & wastewater treatment plant, common solid waste disposal and other civil structures. Most of the construction dust will be generated from the movement of construction

vehicles on dirt roads. Uploading and removal of spoil material will also be the potential source for dust nuisance.

The most direct and effective dust suppression measures are regular watering for the main haul roads within site formation area. With the help of regular watering all over the exposed area, at least twice a day, a 50% reduction on the dust contribution from the exposed surface can be reduced.

Construction of drains, sewers and water mains will require excavation of trenches. Laying these new infrastructure are likely to be conducted section by section, thus the quantity of the excavated material is unlikely to be large enough to cause dust nuisance. It is anticipated that excavated material will only be stockpiled on each local works area.

The main sources for impact of air quality during construction period is due to movement of equipment at site, dust emitted during the leveling, grading, earthmoving, foundation works, transportation of construction material to the project site from various sites. CO emissions would be resulted from the operation of construction equipment and is likely to impact the environment. However these impacts would be temporary in nature.

4.4.2 Prediction of Impacts on the Air Environment

Prediction of impacts from the proposed project on the ambient air quality was carried out using air quality simulation models. The main sources of air pollution are as follows.

1. Area source emissions from Landfill operations
2. Line source emissions from Vehicular movement
3. Point source emissions from DG set.

The emissions from the DG sets are minimal since they will be operated only during power failures.

4.5 Atmospheric Dispersion of Stack Emissions

In order to estimate the ground level concentrations due to the emissions from the proposed project, EPA approved American Meteorological Society/ Environmental

Protection Agency Regulatory Model - AERMOD 9.6.4 dispersion Model has been used. AERMOD dispersion Model provides option to model emissions from a wide range of sources that are present at a typical industrial source complex. The model considers the sources and receptors in undulated terrain as well as plain terrain and the combination of both. The basis of the model is the straight line steady state Gaussian Plume Equation, with modifications to model simple point source emissions from stacks, emissions from stack that experience the effect of aerodynamic down wash due to nearby buildings, isolated vents, multiple vents, storage piles etc.

AERMOD dispersion model with the following options has been used to predict the cumulative ground level concentrations due to the proposed emissions.

Area being rural, rural dispersion parameters is considered as

- Predictions have been carried out to estimate concentration values over radial distance of 10 km around the sources
- A combination of Cartesian and Polar receptor network has been considered
- Emission rates from the sources were considered as constant during the entire period
- The ground level concentrations computed were as is basis without any consideration of decay coefficient
- Calm winds recorded during the study period were also taken into consideration 24-hour mean meteorological data extracted from the meteorological data collected during the study period as per guidelines of IMD/CPCB has been used to compute the mean ground level concentrations to study the impact on study area.

4.5.1 Pollution Sources

Area Sources

Daily waste will be discharged by tipping at the working area on a landfill, within the area demarcated for the cell. Daily/Weekly cover (optional) is primarily used for prevention windblown dust, litter and odours, deterrence to scavengers, birds, reduction of infiltration (during unseasonal rain) and in improving the sites visual appearance. Soil used as daily / weekly cover shall give a pleasing uniform

appearance from the site boundary. To achieve this thickness of about 150mm is usually adequate and shall be adopted.

Point Sources

The point source emissions considered for the proposed project are from DG set and inclinators. The DG set will be used only during power failure for emergency requirements. Hence the impacts from the DG set will be felt only during power failure. The inputs used to run the model are stack details, emissions details are given in **Table 4.1** and twenty four hours mean meteorological data is given in **Table 4.2.** The Predicted maximum Ground level concentration of PM, SO_2 and NO_X concentrations considering 24 hour mean meteorological data of study season are superimposed on the maximum baseline concentrations obtained during the study period to estimate the post project scenario, which would prevail at the post operational phase. The overall scenario with predicted concentrations over the maximum baseline concentrations is shown in the following **Table 4.3** and isopleths are shown in the **Figure 4.1**

Table No. 4.1: Emissions Details

Details	DG	Incinator
Plant capacity	150 KVA	12 T/day
Type of fuel	Diesel	Diesel
Fuel	25 liter/hr	150 liter/hr
Height of the stack (m)	10	30
Temp of flue gas (degree Celsius)	110	40
Internal Dia. of the stack (m)	0.15	0.9
Velocity of flue gas (m/s)	15	15
Flue gas Flow rate (m^3/hr)	250	1200
PM_{10} Emissions (g/s)	**0.338**	**0.373**
$PM_{2.5}$ Emissions (g/s)	**0.178**	**0.140**
SO_2 Emissions (g/s)	**0.59**	**1.492**
NO_X Emissions (g/s)	**0.212**	**2.985**

Table No. 4.2: Mixing Height in Winter Season, Yadgir Karnataka

Hours	Morning Mixing Height (m)	Afternoon Mixing Height (m)
6	42	81
7	80	120
8	235	285
9	400	496
10	769	869
11	1035	1135
12	1208	1308
13	1271	1417
14	1288	1408
15	1204	1304
16	1054	1154
17	848	954
18	600	700

Emission Source Coordinates

The center of mine was considered (0, 0) in the Mathematical Modeling.

Mathematical Model for Pollutants Dispersion

Model Set-up

The model simulations are done for the air pollutant arising from the mining operations, namely PM_{10}, $PM_{2.5}$, SO_2, NO_X& CO. **Ground Level Concentration (GLC)** have been computed using hourly meteorological data. The model set-up details are presented in below:

Parameter Details

- Model Name: AERMOD (Version 9.6.5)
- Model Type: Steady state Gaussian Plume Air Dispersion model
- Averaging Time 24 hours
- Source Type: Point Source
- Boundary Limits: 10 km x 10 km
- Co-ordinate System: Uniform Cartesian Grid
- Anemometer: 10 m

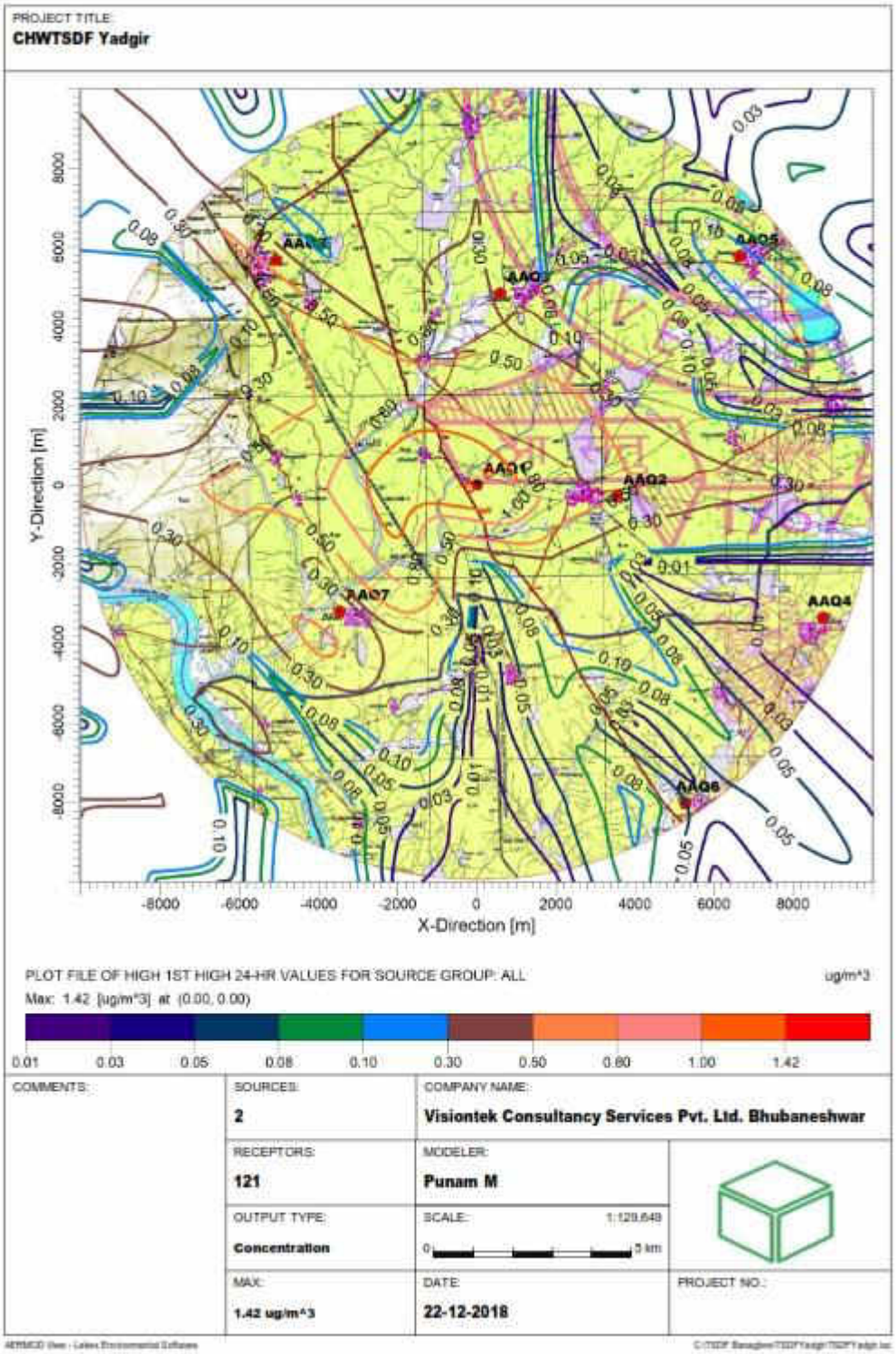


Figure No. 4.1: GLC Concentration for DG Set for PM_{10}

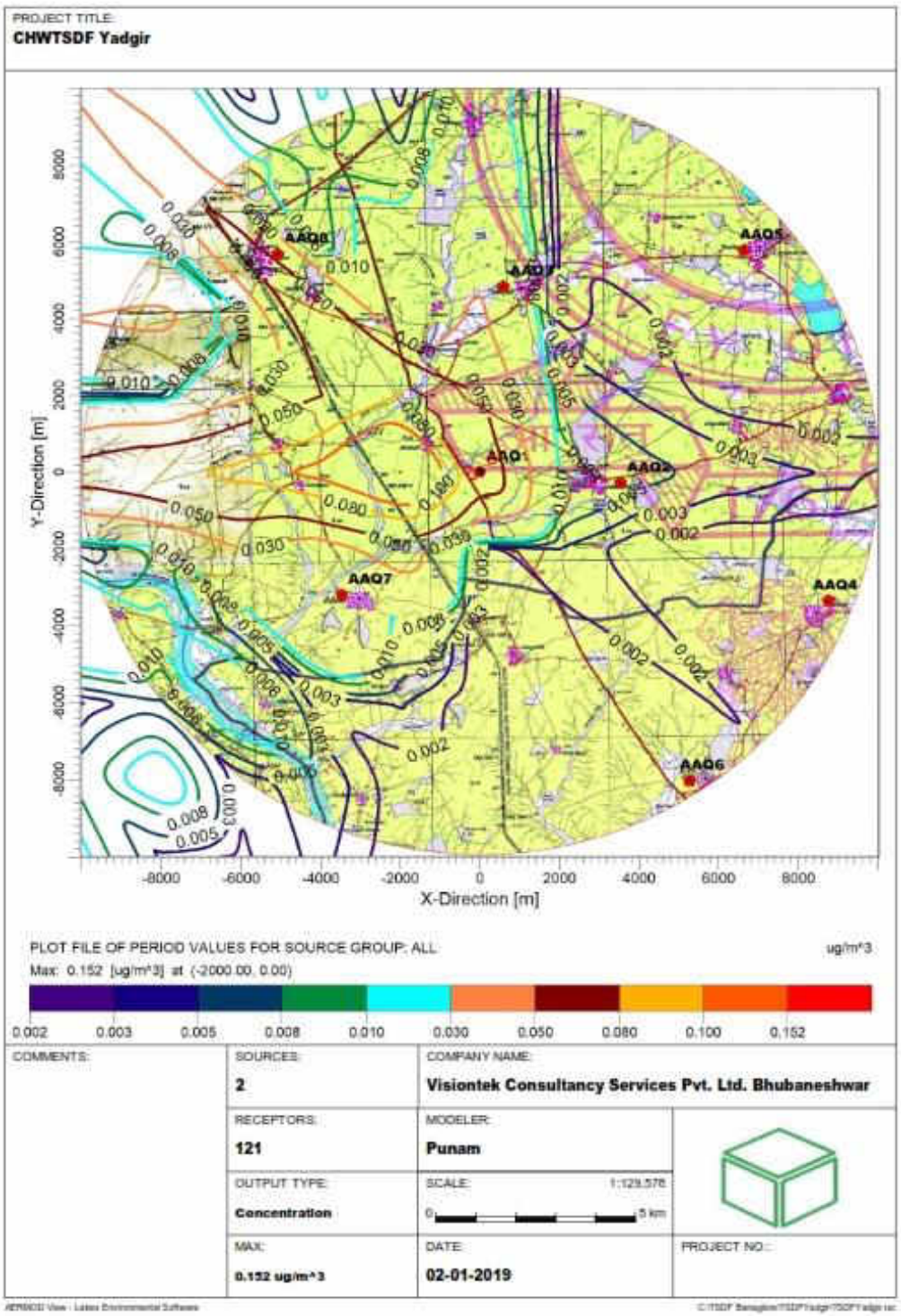


Figure No. 4.2: GLC Concentration for DG Set for $PM_{2.5}$

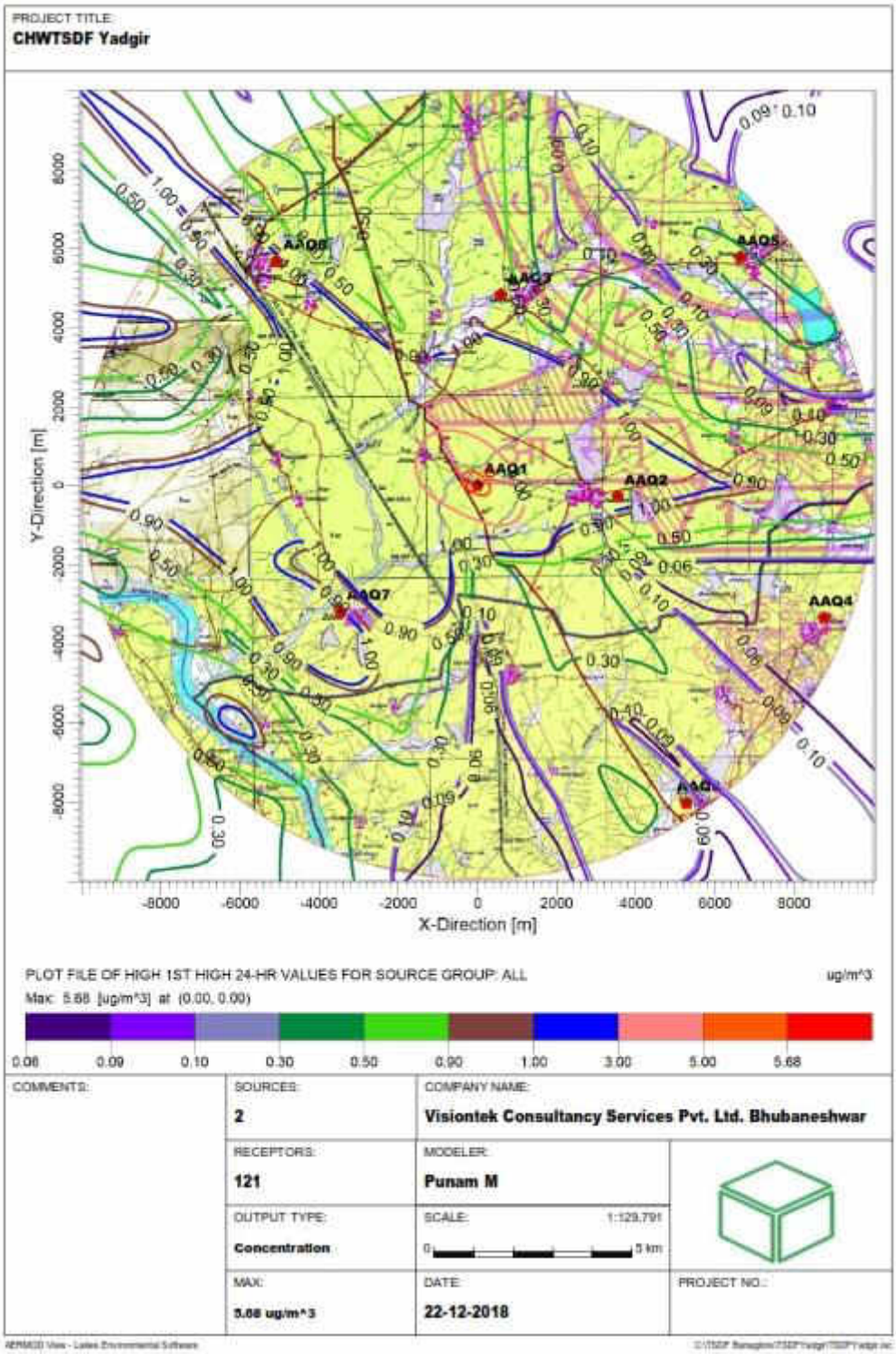


Figure No. 4.3: GLC Concentration for DG Set for SOx

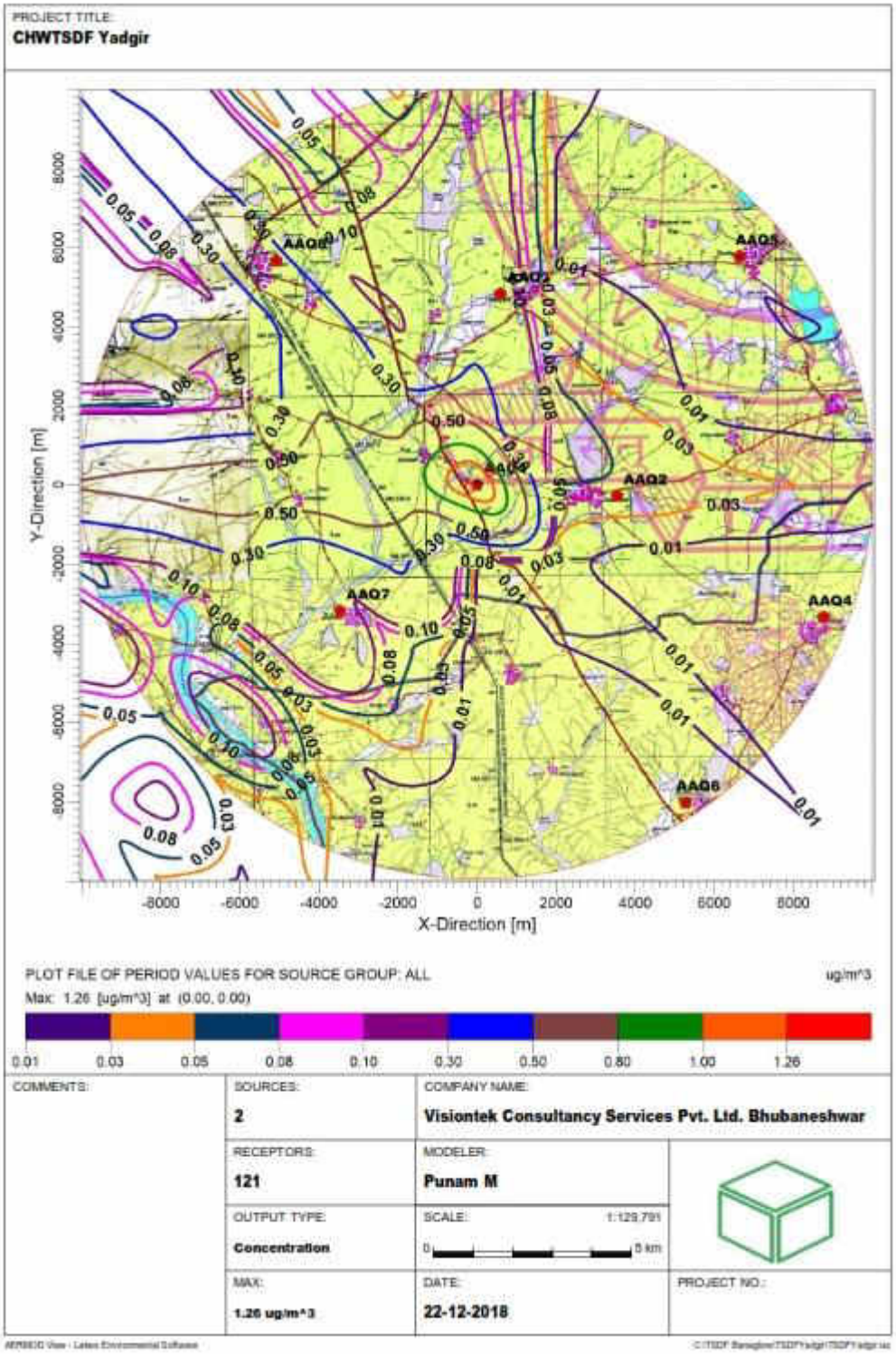


Figure No. 4.4: GLC Concentration for DG Set for NOx

Table No. 4.3: Post Project Scenario – Units: µg/m3

Particulars	PM_{10}	$PM_{2.5}$	SOx	NOx
Predicted additional GLC (Max)	1.42	0.152	5.68	1.26
NAQQS	**100**	**60**	**80**	**80**

Location Code	Name of the Location	PM_{10}			$PM_{2.5}$			SOX			NOX		
		Baseline	Incremental	Resultant	Baseline	Incremental	Resultant	Baseline	Incremental	Resultant	Baseline	Incremental	Resultant
AAQ1	Project Site	72.4	1.42	**73.82**	15.1	0.152	**15.3**	27.7	5.68	**33.38**	33.9	1.26	**35.16**
AAQ2	Kadechur	70.1	0.50	**70.6**	25.1	0.03	**25.1**	17.5	1.31	**18.81**	21.5	0.8	**22.3**
AAQ3	Balched	71.2	0.38	**71.58**	30.3	0.02	**30.3**	17.5	0.74	**18.24**	35.5	0.5	**36**
AAQ4	Kottapalle	63.8	0.01	**63.81**	26.3	0.01	**26.3**	15.7	0.01	**15.71**	19.1	0.01	**19.11**
AAQ5	Baddepalli	68.3	0.13	**68.43**	24.6	0.10	**24.7**	15.2	0.37	**15.57**	37.2	0.2	**37.4**
AAQ6	Kunsi	72.7	0.11	**72.81**	31.3	0.02	**31.3**	18.2	0.06	**18.26**	21.3	0.01	**21.31**
AAQ7	Badiyal	70.2	0.30	**70.5**	26.8	0.11	**26.9**	17	2.67	**19.67**	17	0.7	**17.7**
AAQ8	Saidapur	73.6	0.38	**73.98**	32.6	0.02	**32.6**	32.6	1.42	**34.02**	25	0.4	**25.4**

4.5.2 Air Pollution Mitigation Measures

Control of odour

During operation part of the Secured land fill, to minimize the odour and gases generation, daily it will be covered with soil/ash and during rainy period with temporary cover (HDPE/ Plastic sheets).

4.5.3 Impacts on Land Use

Preparatory activities like construction of access roads, temporary offices, and godowns, piling, storage of construction materials etc. will be confined within the project area. These will not generally exercise any significant impact except altering the land use pattern of the proposed site. The impact will be insignificant on the adjoining land. No forestland is involved.

4.5.4 Impact due to Rainfall and Soil Erosion

It is important to consider and understand factors such as soil characteristics, climate, rainfall intensity and duration, vegetation, and topography to predict the extent and consequences of soil erosion. Sedimentation occurs when soil particles are suspended in surface runoff or wind and are more dependable in streams and other water bodies.

Anthropogenic activities during construction can accelerate erosion by removing vegetation, compacting or disturbing the soil, changing natural drainage patterns, and by covering the ground with impermeable surfaces (pavement, concrete, buildings).

When the land surface is developed or “hardened” in this manner, storm water cannot seep into or “infiltrate” the ground. This results in larger amounts of water moving more quickly across a site which can carry more sediment and other pollutants to streams and rivers. The soil conditions and the ground slope determine the impermeability factor (i.e. the proportion of the total rainfall received on which gets discharged into the storm water drainage, after the initial absorption through evaporation, vegetation and other losses).

4.6 Impact on Water Quality

Water for the construction activities will be supplied by the KIADB. During construction, water will be required for development of structures, sprinkling on pavements for dust suppression, and non domestic usage.

Impact on water quality during construction phase may be due to non-point discharges of sewage generation from the construction work force stationed at the proposed project. The overall impact on water environment during construction phase due to proposed project is likely to be short term and minimum.

4.7 Impact on Noise Quality

The major sources noise during the construction phase is.

i) Site formation

ii) Road construction (Including upgrading and widening)

iii) Provision of drains, sewer and water recirculation system and

iv) Construction of Infrastructure facilities - manufacturing industries and common facilities like water supply, basic Infrastructure, CETP, Fire hydrant etc.,

The noise control measures during construction phase include provision of caps on the construction equipment and regular maintenance of the equipment. Workers working near noise generating equipment would be provided with noise protective equipments like earmuffs and earplugs. Overall, the impact of generated noise on the environment is likely to be insignificant, reversible and localized in nature and mainly confined to the day hours.

4.8 Impact on Solid Waste Generation

Construction and demolition waste is generated during the construction activity. Construction site activities such as site clearance, site formation, building works, infrastructure provision and any other infrastructure activities are predicted to generate solid waste. It consists of inert and non- biodegradable materials such as concrete, metal, plastics etc.

In order to avoid any solid waste disposal problems effective solid waste management systems for collection of waste in dust bins and reusing the construction waste will be taken.

4.9 Impact on Socio-Economic Status

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

- Increase of floating population.
- Increase in demand of services includes hotels, lodges, public transport (including taxis), etc.
- Economic upliftment of the area.
- Raising of Home rents and land prices and increase in Labour rates.
- Rapid growth of service sector will result in increase of incomes in the area.
- Beneficiation of the civil construction and transportation companies
- Expanding of services like retail shops, banks, automobile workshops, school, health care, etc.

4.9.1 Demography and Socio-Economic Environment

The impacts of the proposed Industrial Development project on demography and socio economic condition are as follows.

- The proposed Development project will help to the development of surrounding areas of Development project.
- Increase in employment opportunities and reduction in migrants to outside for employment
- The project would provide direct employment.
- Increase in literacy rate.
- Growth in service sectors
- Improvement in socio cultural environment of the study area.
- Improvement in transport, communication, health and educational services.
- Increase in employment due to increased business, trade commerce and service sector.
- The overall impact on the socio economic environment will be beneficial.

4.9.2 Impact on Human Settlements

Due to the support services requirement of the guest community in the proposed Project, the host community will be benefited by way of generation of employment opportunities, increased demand for the local produce and services. Hence, there will be rise in the income level of the host community. The land acquired by KIADB for proposed project and resettlement or displacement of any community there will be no impact due to project on the social environment. Moreover, the project will lead to provision of more infrastructural facilities, educational facilities, medical facilities and etc.

Measures to improve on Socio economic conditions

For the benefit of the community in the vicinity of the project, KIADB has been taking several measures to develop various amenities in an effort to improve standard of living.

Employment Projection:

Based on requirement of the employment of the project, the priority shall be preferable to local people, even the direct and indirect employment.

4.10 Impacts on Hydrology during Construction

The drainage pattern of overland water flow will be suitably regulated by providing drains based on the existing profile and slope of the land.

Impacts during Operation Phase

During the Operation Phase the establishment of the project results in emissions and generation of wastes. The impacts during Operational Phase are listed in the **Table No. 4.4.**

Table No. 4.4: Nature of Impacts during Operation Phase

Aspects	Impact
Air emissions	• Impact on air quality due to increase in dust levels • Impact on flora and fauna,

	• Impact on soil and groundwater
Water Pollution	• Impact on soil • Surface & Ground water
Noise emissions	• Affects community noise environment of the region due to increase in day-night equivalent noise levels
Solid Waste	• Affects the ground water quality • Fugitive emissions due to ash

4.11 Impacts on Air Quality

Impacts on Air Quality is mainly due to the increase in vehicular traffic to the proposed project, The impacts envisaged due to CHWTSDF will be taken care by the project proponents and clearance for the same will be obtained from Karnataka State Pollution Control Board.

The principal potential source of air quality impact arising from the construction of the proposed project is fugitive dust generation. The dust, measurable as Suspended Particulate Matter and Respirable Suspended Particulates would be generated as a result of construction activities. The construction program of the projects shall commence immediately after obtaining statutory clearances.

The potential dust sources associated with construction activities are loading and unloading of the materials, top soil removal, travel over unpaved roads and wind erosion etc. The construction works associated with the proposed development are broadly given below.

1. Site development and foundation works
2. Dust generation due to vehicles bringing raw materials
3. Unloading of raw materials, removal of unwanted waste material from site
4. Civil constructions and provision of infrastructure required for various activities proposed

Among all the construction activities, site formation has the highest potential for causing dust nuisance to the nearby air sensitive locations. During the construction of the project, existing houses nearby may be subject to the potential dust impacts.

Exhaust emissions from vehicles and equipment deployed during the construction phase is also likely to result in marginal increase in the levels of SO_2, NO_X, PM, CO and un-burnt hydrocarbons. The impact of such activities would be temporary and restricted to the construction phase. The impact is generally confined to the project area and is expected to be negligible outside the plant boundaries.

Mitigation Measures

For the proposed project site leveling and grading will be carried out, where ever possible to maintain the natural elevations they will not be disturbed, only leveling activity will be carried out for providing roads, sewage network, storm water system, and places required for providing buildings for administrative and plant shed erection. According to the engineering assessment; most of the excavated material shall be reused within the project boundary. The movement of cut and fill material will be limited.

Most of the construction dust will be generated from the movement of construction vehicles on unpaved roads. Unloading and removal of soil material shall also act as a potential source for dust nuisance. The control measures proposed to be taken up are given below.

1. The important dust suppression measures proposed will be regular water sprinkling on main haul roads in the project area, this activity will be carried out at least twice a day, if need arises frequency will be increased on windy days, in this way around 50% reduction on the dust contribution from the exposed surface will be achieved.
2. The duration of stockpiling will be as short as possible as most of the material will be used as backfill material for the open cut trenches for road development.
3. Temporary tin sheets of sufficient height (3m) will be erected around the site of dust generation or all around the project site as barrier for dust control.
4. Tree plantations around the project boundary will be initiated at the early stages of the project.
5. Plantation of 2 to 3 years old saplings, regular watering will be done, so that the area will be moist for most part of the day.

6. To reduce the dust movement from civil construction site to the neighborhood the external part of the building (administration, canteen, etc) will be covered by plastic sheets

Given the implementation of proper control measures for dust suppression, no adverse impacts are expected and compliance with the Ambient Air Quality is achieved at ASR's (Air Pollution Sensitive Receivers) at all time.

Fugitive Emissions

The following measures will be adopted to control fugitive emissions:

- Green belt development and afforestation in the project and surroundings.
- Dust suppression system will be taken up to control fugitive emission.

4.12 Impact on Water Quality

The normal rainfall of the area is due to South-West monsoon contributing 420 mm. from June to September. The water requirement in the proposed project will be for scrubber in Incinerator section as well as for non-processing areas. In addition to that water will also be required for greenbelt development/ greenery, amenities & specialized infrastructure and roads & utilities. Also, this water will be required for meeting the fire protection demand.

Since the water is to be tapped for construction and operation phases of the project, supplied by KIADB, the impact on quantity of water attribute will be negligible in nature, as this will lead to complete utilization of the facilities.

Impact on Drainage

Kedechuru Industrial Area Development site drainage will be designed with a network of main and subsidiary surface to cater for maximum intensity of rainfall expected in the area. The surface water run-off from the proposed project area would be discharged into the network of drains connected to Rain water harvesting pits. The surface water run-off will be routed to CETP for onward disposal. Surface drains would be open drains of brick lined trapezoidal in section.

(A) Impact on Surface Water Quality

Leachate collected from Secured Landfill and other wastewater including vehicle and container washing, leachate generated at treatment, incineration, plants are treated together (excluding domestic wastewater). Leachate from the landfill and all other places of generation like storage sheds, vehicle wash, and wheel wash etc., will be treated in ETP. The leachate /waste water will be sent to Solar Pond, the dry sludge from Solar Pond will be handled as a solid waste and will be disposed in the landfill. The domestic wastewater will be sent to septic tank followed by soak pit.

Rain Water Harvesting and Strom Water Management

Project Management will make proper utilization of rainwater by harvesting by appropriate rain water-harvesting mechanism. Roof water will be collected by adopting proper treatment; the collected water will be used for various uses (dust suppression, floor washings, toiler flushing, greenbelt, etc.).

Based on the rainfall intensity of the plant area, storm water drainage system will be designed. Strom water drainage system consists of well-designed network of open surface drains, so that all the storm water is efficiently drained off without any water logging.

(B) Impact on Ground water

No major impact on ground water quality will be anticipated because all the wastewater generated from the proposed project will be treated in CETP.

Mitigation Measures

- For the proposed project site leveling and grading will be carried out, garland drain around the facility and landfill will be provided.
- All the leachate and wastewater will be collected and routed to CETP for treatment.
- The landfill will be made impervious so that there is no seepage of wastewater to the ground.
- Also the base of the land will be kept at least 2 m above the ground water table in that area.

- The treated water will be regularly monitored to meet the standard. No discharge of any effluent outside the premises.
- Storm water drains will be kept separate from the wastewater and leachate pipeline. The rainwater collected will be used for operation of the facility and other activities as – sprinkling for dust suppression, cleaning, floor washing, flushing etc. and corresponding intake of water reduced.
- Online continuous monitoring system will be provided in the outlet of CETP as per norms of CPCB.

4.13 Impacts of the Project on Flora and Fauna

The direct impacts of the project are limited to the project site only.

- Reduction in grazing area and movement of animals
- Reduction in shrubs and herbs
- Temporary displacement of local fauna due to construction activities

4.14 Impacts on Noise Environment

The sound pressure levels generated by CHWTSDF generally decrease with increased distance from the source due to wave propagation. An additional decrease in sound pressure level is expected with distance due to atmospheric effect or its interaction with objects in the transmission path. For hemispherical sound wave propagation thorough homogeneous medium, one can estimate noise levels at various locations, due to different sources using model based of first principle as per the following equation:

$$Lp_2 = Lp_1 - 20 \text{ Log } (r_2/r_1) - Ae_{1.2} \quad \ldots. (1)$$

Where Lp_1 and Lp_2 are sound pressure levels at points located at distances r_1 and r_2, from the source and $Ae_{1.2}$ is the excess attenuation due to environmental conditions. Combined effect of all the sources can then be determined at various locations by logarithmic addition.

In the first approximation one can assume that for all general population in the villages, every noise source in the member industry is a point source.

Noise Mitigate Measures

Some of the design features provided to ensure low noise levels are given below:

- All rotating items will be well lubricated and provided with enclosures as far as possible to reduce noise transmission. Extensive vibration monitoring system is provided to check and reduce vibrations. Vibration isolators are being provided to reduce vibration and noise wherever possible;
- Noise generating items such as fans, blowers, compressors, pumps, motors etc. are so specified as to limit their speeds and reduce noise levels. Static and dynamic balancing of equipment will be insisted upon and will be verified during inspection and installation; For DG sets, acoustic enclosures will be provided.
- Provision of silencers will be made wherever possible;
- The insulation provided for prevention of loss of heat and personnel safety will also act as noise reducers;

4.15 Solid Waste Generation and Impact

This category of waste generation in the proposed project is due to different types of raw materials being used during construction stage in general may comprise the following

- Cement concrete
- Bricks, tiles,
- Cement plaster
- Steel (RCC, door/ window frames, roofing support, railings of staircase etc)
- Rubble, sand, Stone (Marble, granite, sand stone)
- Timber/wood
- Paints/varnishes

Besides above there are some major and minor components namely conduits, pipes, electrical fixtures, panels, etc. all the above items will be segregated and stored at the site and once the facility established will be process the same in respective treatment facilities within the site.

4.16 Hazardous Waste Management

During construction phase no hazardous waste will be generated. During operation phase hazardous waste management for storage, handling and transport of

hazardous waste shall be as per the Hazardous and other Wastes (Handling and Trans-boundary Movement) Rules, 2016.

4.17 Impact on Ecology

The direct impacts of the project area are confined to the project site only. The project will not have adverse impacts on the existing flora and fauna. Hence, there will not be any impact on biodiversity.

Impact on Human Settlements

Due to the support services requirement of the guest community in the proposed Project, the host community will be benefited by way of generation of employment opportunities, increased demand for the local produce and services. Hence, there will be rise in the income level of the host community. Since the project does not involve any land ouster or home oustees and resettlement or displacement of any community there will be no impact due to project on the social environment. Moreover, the project will lead to provision of more infrastructural facilities, educational facilities, and medical facilities.

Measures to improve on Socio economic conditions

The infrastructure facilities of the surrounding areas need development notably Medical, Education and Communication facilities in nearby villages. It is expected that the proposed project will catalyze the infrastructure development of the surroundings as it will attract investment of a considerable part of capital of the District.

Drinking water requirement, Promotion of Educational institutions, and Medical facilities to the villagers (especially Senior Citizens and infants or pregnant ladies). Community centers, recreation facilities etc., will also be developed as part of social responsibility. The basic target would be the development the local villages in the vicinity of the project. Hence, the scope for development of the local population economical status is envisaged.

Green belt development along the roads, boundary walls within the plant area premises will be made, which contributes to 33% (53460 sq m)of the total area (162000 sq m) and the other provisions to be provided would be taken in to

consideration as per requirement of the industries and would be notified to the KSPCB and MOEF as applicable. For the benefit of the community in the vicinity of the project, KIADB has been taking several measures to develop various amenities in an effort to improve standard of living.

Employment Generation (Direct and Indirect) due to the Project

It is expected that, during construction phase the requirement of labour will be 100 persons per day. Local labours will be employed from the surrounding villages. A temporary labour camp also may be provided as per the situation. However, the responsibility of constructing a labour camp, if the need be, will lie with the Civil contract awarded.

During Operational phase, there will be both Direct and Indirect employment generation. About 30 -40 persons (8 skilled labour and 22 semi-skilled) will work in the integrated TSDF in its fully operational phase.

Impact on Health

Adequate air pollution, water and noise control measures will be undertaken in proposed project to conform to regulatory standards. The environmental management and emergency preparedness plans are proposed to ensure that the probability of undesired events and consequences are greatly reduced, and adequate mitigation is provided in case of an emergency.

Typical Mitigation Measures

Soil erosion	➢ Windscreens, maintenance, and installation of ground cover. ➢ Installation of drainage ditches. ➢ Runoff and retention ponds. ➢ Minimize disturbances and scarification of the surface ➢ Usage of appropriate monitoring and control facilities for construction equipments deployed ➢ Methods to reuse earth material generated during excavation, etc.
Resources – fuel/construction material, etc.	➢ Optimization of resource use ➢ Availing resources with least impact – eco-efficiency options are applicable ➢ Availing the resources which could be replenished by natural systems,etc.
Deforestation	➢ Planting or creating similar areas ➢ Initiating a tree planning program in other areas ➢ Donating land to conservationalist groups, etc.

Water pollution	➢ Conjunctive use of surface water, to prevent flooding/water logging/depletion of water resources. ➢ Minimize flow variation from the mean flow ➢ Storing of oil wastes shall be minimized in order to avoid possible contamination of the ground water system. ➢ All effluents containing acid/alkali/organic/toxic wastes shall be properly treated. ➢ Collection and treatment of lechate, sewage and storm water run-off ➢ Monitoring of ground waters ➢ Neutralization and sedimentation of wastewaters, where applicable ➢ Dewatering of sludges and appropriate disposal of solids ➢ Construction of liners before disposing waste ➢ In case of oil waste, oil separation before treatment and discharge into the environment

	➢ Controlling discharge of sanitary sewage and industrial waste into the environment. ➢ By avoiding the activities that increases erosion or that contributes nutrients to water ➢ For waste water containing high TDS, treatment shall be in CETP. ➢ Develop spill prevention plans in case of chemical discharges and spills ➢ Develop traps and containment system and chemically treat discharges on site, etc.

Air Pollution	➢ Attenuation of pollution/protection of receptor through green belts/green cover ➢ Use of scrubbers to minimize the air pollution ➢ Use of protected, controlled equipments such as oxygen masks, etc. as per requirement. ➢ Control of stationary source emission (incineration and absorption) ➢ Dilution of odourant (dilution can change the nature as well as strength of an odour), odour counteraction or neutralise (certain pairs of odours in appropriate concentrations may neutralise each other), odour masking or blanketing (certain weaker malodours may be suppressed by a considerably stronger good odour). ➢ Regular monitoring of air polluting concentrations, etc.
Dust pollution	➢ Wetting of roadways to reduce traffic dust and re-entrained particles ➢ Providing dust collection equipment at all possible points ➢ Maintaining dust levels within permissible limits ➢ Provision for masks when dust level exceeds.

Noise pollution	➢ Use of heavy duty muffler systems on heavy equipment ➢ Limiting certain activities ➢ By using damping, absorption, dissipation, and deflection methods ➢ Use of common techniques such as constructing sound enclosures, applying mufflers, mounting noise sources on isolators, and/or using materials with damping properties ➢ Performance specifications for noise represent a way to insure the procured item is controlled ➢ Use of ear protective devices ➢ In case of steady noise levels above 85-dB (A), initiation of hearing conservation measures, etc.
Biological	➢ Installation of systems to discourage nesting or perching of birds in dangerous environments ➢ Increased employee awareness to sensitive areas
Social	➢ Health and safety measures for workers ➢ Development of traffic plan that minimizes road use by workers ➢ Up-gradation of roads and intersections ➢ Provision of alternate jobs in unskilled and skilled categories, etc.

Occupational health and safety	➢ Provision of worker camps with proper santiation and medical facilities, as well as making the worker camps self- sufficient with resources like water supply, power supply, etc ➢ Arrangement of periodic health check-ups for early detection and control of communicatble diseases. ➢ Arrangement to dispose off the wastes at approved disposal sites. ➢ Provide preventive measures for potentital fire hazards with requisite fire detection, fire-fighting facilities (Fire Hydrant and Fire Extinguishers) and adequate water storage, etc.
Construction	➢ Have a Transport Management Plan in place in order to prevent/minimize the disturbance on surrounding habitats ➢ Initiate traffic density studies, etc.

Chapter 5

Analysis of Alternatives

5.1 Site Access, Linkage

The proposed integrated TSDF is proposed over a 16.2 ha land inside the KIADB Kadechur IE (Plot Numbers 158 to 164). The plot is 770 m east of the Raichur to Yadgiri highway SH-51, Kadechur village is 1.6 km away from the site's eastern boundary. A 24 m, four lane, un-mediated tarred road passes from in front (south) of the site which will act the prime easement for the site.

The Kadechur IE is about 40 km south (by road) from Yadgir, the District Headquarter. River Bhima, tributary of perennial River Krishna is about 8.2 km south west of the site. River Krishna is about 12.3 km south of the site. Bada talab (village irrigation tank) is about 1.45 km east of the site.

Chegunta is the nearest railway station, about 3.8 km (aerial distance) south of the site on the South Central Railway line (double track, electrified, 374 m MSL). Saidapur is the second nearest railway station, about 8.2 km (aerial distance) north west of the site on the South Central Railway line (double track, electrified, 379 m MSL). Railway track is about 2.5 km south west of the Project site. The nearest airport is Rajiv Gandhi International Airport, Hyderabad, located about 140 km in the north east direction (aerial distance) from the proposed Project site.

The site is 2.15 km away from the inter-state boundary of Telengana in the east. Maganur Mandal taluka, Mahbubnagar District is the adjoining administrative unit of Telengana from the site.

Yadgir, popularly called as "Yadavagiri" by the local people, was once a capital of the Yadava Kingdom. Has a rich historical and cultural tradition. Yadavas, the earliest Muslim empire of South India chose Yadgir to be their capital and ruled from here from 1347 to 1425 A.D. The famous dynasties of the south, the Satavahans, the Chalukyas of Badami, the Rastrkuta, Shahis, the Aidil shahis, the Nizam Shahis have ruled over the district.

Yadgir district has two perennial rivers, Krishna and Bhima passing through it. The district (notified in December, 2009) is the 2nd smallest district in the state, area

wise. The district features fertile black soil; is known for productive red gram and jawar crops. The district is also called "Daal bowl" of the state. Yadgir is also known for cluster of cement industries and a distinct stone popularly know as "Malakheda Stone".

5.2 Knock-out Criteria for Site Alternatives

The site within Kadechur KIADB IE was selected based on site selection criteria as given in CPCB's "Guideline for conducting EIA and Site Selection for Common Hazardous Waste Management Facility, New Delhi, 2003.

Two sites other than the presently selected site were identified for the proposed Integrated TSDF. Their location is shown on the Google Earth as given Figure No. 5.1

Site attributes of the chosen site, site alternatives 01 and 02 alternative are given in **Table 5.1**. The Knock-out Criteria for site alternatives for integrated TSDF is given in **Table 5.2.**

Table No. 5.1: Site attributes of Site Alternatives

Attributes	Proposed site	Site Alternative 01	Site Alternative 02
Location	Kadechur KIADB IE (Plot no. 158 to 164)	Sawoor village, Ta. Yadgir, Dist. Yadgir	Kadechur KIADB IE (Plot no. 568)
Coordinates	16°31'8.0436"N, 77°18'31.2588"E	16°36'30.54"N, 77°12'15.73"E	16°30'06.91"N, 77°17'41.79"E
Area	16.2 ha	4.41 ha	6.1 ha

The Yadgir district overall is very fertile, well supplied with irrigation water and features double cropping. Land other than for agricultural and with good road connectivity is not easily available.

The site alternative 01 is very close to the village Sawoor (14.4 km away from the proposed site in the NW direction), and almost on the edge of a season nallah which floods and spills over the site. Site alternative 02, though within the KIADB Kadechur IE is odd sized and not suitable for laying out a landfill. It is also closer to

the railway line and intercepts the drainage pathway on the eastern side of the rail line embankment. Both site alternative 01 and 02 are of much smaller area; a minimum of 10 ha is required to site the TSDF as well as the 5 MLD CETP.

Table No. 5.2: Knock-out Criteria for Site Alternatives

			Identification location of Site		
Sr. No.	**Criteria (to avoid)**	**Weightage**	**Score (marks x weightage)**		
			Proposed site	**Site Alternative 01**	**Site Alternative 02**
1.	Existing or planned drinking water protection and catchment areas	20	100	100	100
2.	High flood prone areas	15	75	30	75
3.	Areas with unstable ground	10	50	20	50
4.	Closer than 200 meters to populated areas	20	100	0	40
5.	Closer than 200 meters to river boundaries	15	75	0	0
6.	Close to National Parks, Monuments, and Forests with large no. of flora and fauna, historical, religious and other important cultural places.	10	50	50	50
7.	Existing use of site (Agricultural/ Forest/ Old dump site)	10	20	20	20
Normalized Cumulative score		**100**	**94**	**44**	**67**
Site is suitable for detailed EIA study (Suitable/Not suitable)			Suitable	Not Suitable	Not Suitable

Marks: 0 – Not meeting criteria; 5 – completely meeting criteria; 2 – partially meeting criteria

Weightage: in % as per environmental impact.

Selection: Min. Normalized Cumulative Score - 80

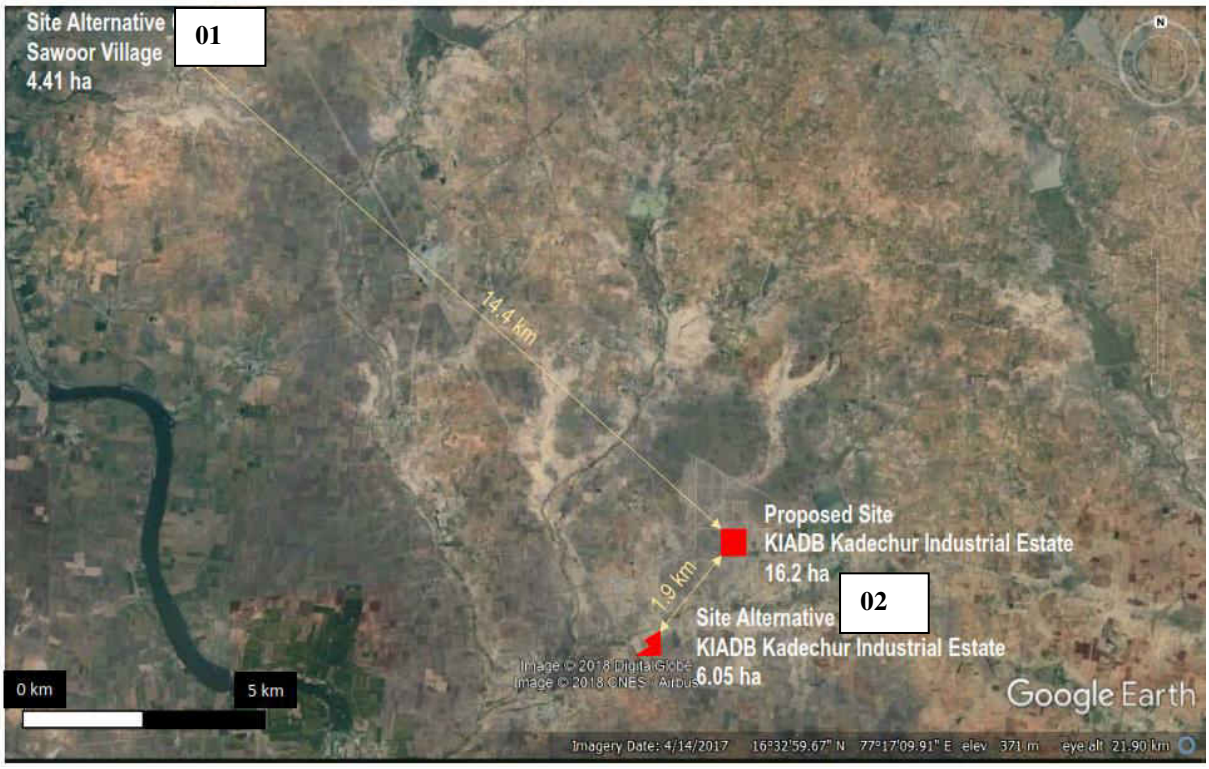


Figure No. 5.1: Alternate Sites considered for the Integrated TSDF shown on Google Earth

5.3 Site Selection

Hazardous waste landfills should preferably be located in areas of low population density, low alternative land use value, low ground water contamination potential and at sites having high clay content in the subsoil.

The pre-identified hazardous wastes disposal sites have been evaluated based on existing environmental settings and as per the criteria developed by CPCB and MoEF.

All the features as described in all the criteria have been investigated with respect to pre-identified sites. The evaluation of site is given in **Table No. 5.3.**

Table No. 5.3: Evaluation of site

Sr. No.	Criteria	Conformity with the criteria (Y/N)
CPCB criteria		
1	Any Lake or pond shall be more than 200 m from the site	Y
2	A navigable river or stream shall be more than 100 m away from the site	Y
3	Site shall be outside 100 year flood plain of major rivers	Y
4	Right of way of any National or State highway shall be 500 m away from the site	Y
5	A notified habitat area shall be 500 meter away from the site	Y
6	A public park shall be 500 meter away from site	Y
7	No site shall be within critical habitat area (like reserved forest)	Y
8	No site shall be within wetlands	Y
9	No site shall be within a zone notified by aviation authority around airport	Y
10	Water supply well shall be 500 m away from the site	Y
11	No site shall be within coastal regulation zone (closer than 500 m from high tide line as per MoEF guideline)	Y
12	No site in areas of groundwater table less than 2 m below the base of the landfill	Y

MOEF Guidelines		
1	The site shall be more than 25 Km away from ecologically and or other sensitive areas	Y
2	The site shall be more than 1/2 Km from high tide line.	Y
3	The site shall be 1/2 km away from flood plain or modified flood plain affected by dam in the upstream or by flood control systems	Y
4	The site shall be more than 1/2 Km from highway and railway	Y
5	The site shall be 25 km away from the projected growth boundary of the settlement for at least a decade.	Y

Table No. 5.4: CPCB criteria with Observation to Project Site

Sr. No.	Parameter	Criteria	Observation w.r.t Proposed Site
1	Lake or pond (Distance from SW body)	Should not be within 200m	The nearest lake/pond is at 1.56 km in the east direction
2	Navigable river or stream	Should not be within 100m	There is a non-navigable Stream at distance of 410 m in north-west Direction.
3	Flood Plain	Should not be within 100 year flood plain	There is no flood plain or HFL 400 m from the periphery of the facility.
4	Highway-State or National	Should not be within 500m	The SH-51 runs to the East of the facility at a distance of 770 m.
5	Habitation-Notified habituated area	Should not be within 500m	The nearest notified village of Kadechur is at a distance of 1.41 km in ESE direction.
6	Public Parks	Should not be within 500m	There is no identified Public Park within 2 km radius.
7	Critical habitat area-area in which one or more endangered special live	Should not be within such area	The 10 km buffer zone is devoid of any Critical habitat area.
8	Wet lands	Should not be within such area	There is no Wet land of any kind within the radius of 5 km.
9	Air port	Should not be within 20 km Zone around the airport(s)	The nearest Airport is Hydrabad at a distance of 140 km

10	Water supply	No Water supply well within 500 m	The area is under Kadechur industrial area developed by KIADB, where it is proposed to draw water from Sangam river.
11	Coastal Regulation Area	Should not be within a coastal regulation zone	It does not come under any coast line.
12	Ground water Table level	GW table should be > 2m from the base of the landfill	The local Ground water table varies between 4 to 8 mtr below ground level.
13	Presence of monuments/religious structure	Not Suitable	Nil

In additional to this following features also consider at the time of site selection for TSDF.

- Availability of adequate land;
- Hazardous waste generating units in the proximity of the site;
- Easy to develop transportation facility;
- Easy to develop basic infrastructure facilities such as water supply, power, roads, social infrastructure and man power;
- Easy to develop good communication and transportation facilities;
- No R & R will be required
- No national park or wildlife habitat falls within 10 km radial distance from proposed project site;

The location of project is best suited for proposed activities in comparison to two other alternative sites.

Chapter 6

Environmental Monitoring Program

6.1 Environmental Monitoring Program

Environmental monitoring program describes the processes and activities that need to take place to characterize and monitor the quality of the environment. Environmental monitoring is used in the preparation of environmental impact assessments, as well as in many circumstances in which human activities carry a risk of harmful effects on the natural environment. All monitoring strategies and program have reasons and justifications which are often designed to establish the current status of an environment or to establish trends in environmental parameters. In all cases the results of monitoring will be reviewed, analyzed statistically and submitted to concerned authorities. The design of a monitoring program must therefore have regard to the final use of the data before monitoring starts.

The monitoring program will have three phases

1. Construction phase
2. Operational phase
3. Post monitoring phase

6.2 Construction Phase

The proposed project envisages setting up of Integrated Common Hazardous Waste Treatment Storage And Disposal Facilities (CHWTSDF), major construction activities involved in setting up the unit are construction of sheds for treatment units, stores, administrative blocks, canteen etc major components in the industry are secured landfill, diesel generator, and other civil, mechanical and electrical equipment. The construction activities require clearing of vegetation, mobilization of construction material and equipment. The construction activities are expected to last for few months.

During construction stage of secured landfill at every stage quality of construction will be monitored viz. base preparation, liners quality, drainage layers, leachate collection system, storm water management system, gas vent systems, etc. The generic environmental measures that need to be undertaken during project construction stage are given in the following **Table No. 6.1**

Table No. 6.1: **Environmental Measures during construction site**

Sr No	Potential Impact	Detailed actions to be followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
1.	Air Emissions	All equipments are operated Within specified design parameters.	Random checks of equipment logs/ manuals	Periodic
		Vehicle trips to be minimized to the extent possible	Vehicle logs	Periodic during site clearance & construction
		Any dry, dusty materials stored in sealed containers or prevented from blowing.	Stockpiles or open Containers of dusty materials.	Periodic during construction activities
		Compaction of soil during various construction activities	Construction logs	Periodic during construction activities
		Maintenance of construction DG set emissions to meet stipulated standards	Gaseous emissions (PM, SO2, CO, NOx)	Periodic emission monitoring
		Ambient air quality within the Premises & adjacent villages of the proposed unit to be monitored.	PM10, PM2.5, SO2, NOx, and CO	As per CPCB/ SPCB requirement

2.	Noise	List of all noise generating machinery onsite along with age to be prepared.	Equipment logs, noise reading	Regular during construction activities
		Night working is to be minimized.	Working hour records	Periodic during construction activities
		Generation of vehicular noise	Maintenance records of vehicles	Periodic during construction activities
		Implement good working Practices (equipment selection and sitting) to minimize noise and also reduce its impacts on human health (ear muffs, safe distances, and enclosures).	Site working practices records, noise readings.	Periodic during construction activities
		No machinery running when not required.	Checking of log book/ records.	Periodic during construction activities
		Acoustic mufflers / enclosures to be provided in large engines	Mufflers / enclosures Shall be in place.	Prior to use of equipment.
		Noise to be monitored in Ambient air within the plant premises.	Instant Noise recording	As per CPCB/SPCB requirement

		The Noise level will not exceed the permissible limit both during day and night times.	Random check of equipment log book	Periodic during construction activities
		All equipments operated within Specified design parameters.	Random checks of equipment logs/ manuals	Periodic during construction activities
		Vehicle trips to be minimized to the extent possible	Vehicle logs	Regular during construction activities
3.	Wastewater Discharge	The discharge point would be selected properly and sampling and analysis would be undertaken prior to discharge	Discharge norms for effluents as given in Permits	Periodic during construction activities
		No direct discharge of Waste water to be made to surface water, groundwater or soil.	No discharge hoses Shall be in vicinity of watercourses.	Periodic during construction activities
		Take care in disposal of Waste water generated such that soil and groundwater resources are protected.	Discharge norms for effluents as given in permits	Periodic during construction activities
		Minimize area extent of site clearance, by staying within the defined boundaries	Site boundaries not Extended / breached as per plan document.	Periodic during construction activities

4	Soil Erosion	Protect topsoil stockpile	Effective cover in Place.	Periodic during construction activities
		Ensure drainage system and specific design measures are working effectively. The design to incorporate existing drainage pattern and avoid disturbing the same.	Visual inspection of drainage and records thereof	Periodic during construction activities
5.	Drainage and effluent Management	Implement waste management plan that identifies and characterizes every waste arising associated with proposed activities and which identifies the procedures for collection, handling & disposal of each waste arising.	Comprehensive Waste Management Plan should be in place and available for inspection on-site. Hazardous Wastes (Management and Handling) Rules, 2016	Periodic check during construction activities
6.	Risk Assessment	Plan will be drawn, considering likely emergencies and steps required to prevent / limit consequences.	Mock drills and records of the same	Periodic during construction activities
7.	Non-routine events and accidental releases	Employees and migrant labour health check ups	All relevant parameters including HIV	Regular checkups as per Factories Act

6.3 Operation Phase

During operational stage period air emissions from incinerator, DG set, landfill if any, wastewater characteristics, ash generation quantity, etc are shall be monitored. The following attributes which merit regular monitoring based on the environmental setting and nature of project activities are listed below:

- Point Source emissions and ambient air quality in nearby villages;
- Groundwater Levels and ground water quality;
- Water & wastewater quality & quantity;
- Solid waste characterization (Ash, leachate treatment plant & Septic tank/soak pit sludge);
- Soil quality;
- Noise levels (equipment and machinery noise levels, occupational exposures and ambient noise levels); and
- Ecological preservation and afforestation

Table 6.2: Environmental Monitoring during Operational Phase

Sr. No	Potential Impact	Action to be Followed	Parameters for Monitoring	Frequency of Monitoring
1.	Air Emissions	Gas quality from landfill areas	VOC, HC	• As per CFE norms given by SPCB or EC norms given by MOEF and CPCB protocol for TSDF. • Continuous online stack monitoring system for PM, Various Gases
		Stack emissions from Incinerator	Temperature, Pressure, CO, Excess Oxygen, PM, HCl, SO2, NOx, HF, TOC, Mercury, Heavy metals, Dioxin and Furon	
		Stack emissions - DG Sets	PM, SO_2, NOx, HC	
		AAQ within the	As per CFE	

		project premises. All vehicles to be PUC certificate.	conditions /NAAQ Standards Vehicle logs to be maintained	and other parameters as per CPCB norms.
		Meteorological data	Wind speed, direction, temp., relative humidity and rainfall.	• Monitoring of Dioxin and Furon will be done as prescribed by concerned authorities and record maintained
2.	Noise	Noise generated from operation of Incinerator and plant area	Spot Noise Level recording;	Periodic during operation phase Once in month
3.	Waste water Discharge (leachate)	Compliance to waste water discharge standards	pH, TSS, TDS, BOD, COD & Oil & grease (Heavy metals if required)	Daily at regular Intervals Once in a month Continuous online effluent monitoring system for pH, Oil & Grease, BOD, COD, TDS and other parameters as per CPCB norms.
4.	Solid waste/ Haz. Waste	Check compliance to HWM rules,2016	Quality & quantity monitoring	Periodically / CPCB norms.

5.	Ground Water Quality	Monitoring ground water quality, through pyrometers within 50 m and 100 m around the Landfill in all four direction and at least one sample in vadose zone	as per CPCB guidelines	Periodically & as per CPCB norms.
6.	Flora and fauna	Vegetation, greenbelt /green cover development	No. of plants, species	Once a year
7.	Soil quality	Checking & Maintenance of good soil quality around	Physicochemical Parameters and metals.	Once a year
8	Health	Employees and migrant labour health check ups	All relevant parameters (BP, HIV, chest X-ray, Eye vision, etc.)	Regular checkups as Per factories act.

6.4 Post Operational Phase

Post-closure monitoring of the landfill will be done primarily as a compliance requirement in addition to social responsibility for 30 years; this also provides an early warning towards possible adverse impacts on human health and the environment. The post-closure program of monitoring for water quality in the ground water and surface waters down gradient of the landfill will be similar to that established for the operational stage of the facility. The frequency of monitoring may be varied from time to time depending on changing circumstances.

The post-closure monitoring of air quality, noise or visual effects during the post-closure period is not as much important as during operation period,

however this need will be reviewed periodically and should any aspects warrant further monitoring they will be included in the program.

The details of the post closure monitoring are given in **Table 6.3.**

Table No. 6.3: **Environmental Monitoring during Post Operation phase**

Sr. No.	Potential Impact	Action to be Followed	Parameters for Monitoring	Frequency of Monitoring
1	Air Emissions	Gas quality from landfill areas	VOC, HC	As per CFE norms given by SPCB or EC norms given by MOEF and as per CPCB protocol for TSDF.
		Gas quality from landfill areas	VOC, HC	
		Meteorological data	Wind speed, Direction, temperature, relative humidity and rainfall.	
2	Wastewater Discharge (leachate) if present	Compliance to wastewater discharge standards	pH, TSS, TDS, BOD, COD, Oil & grease	Once in a month (during initial period more regularly)
3.	Ground Water Quality and Water Levels	Monitoring ground water quality, and water levels within plant site through piezometer within 50 m and 100 m around the Landfill in all four direction and at least one sample in vadose zone	As per CPCB protocol	Periodically and CPCB Protocol for TSDF.
4.	Flora and fauna	Vegetation, greenbelt / green cover	No. of plants, species	-

		development		
5.	Health	Employees and migrant labor health check ups	All relevant Parameters (BP, Sugar, chest X-ray, Eye vision, etc.)	Regular checkups as per Factories act.

6.5 Environmental Laboratory Equipment

The proposed project will have an in-house environmental laboratory for the routine monitoring of Air, Water, Soil, Meteorology and Noise. For all non-routine analysis, the plant will utilize the services of external recognized laboratories and facilities. The procedures given in IS standards or CPCB approved methods will be followed of analysis and sampling of various environmental parameters.

The list of laboratory equipment need for the environmental monitoring is given in Table 6.4 below

Table No 6.4: List of Laboratory Equipment

Name of the Equipment	No of Instruments
Weather Station, which can record wind speed, wind direction Temperature, Relative Humidity (Automatic or Manual)	1
Respirable Dust samplers	3
Fine Dust samplers	3
Portable Flue Gas Combustion Analyzer	1
Portable Noise level meter (Dosimeter)	1
Portable Wastewater Analysis Kit	1
BOD Incubator	1
COD Digester with colorimeter	2
Electronic Balance	2
Spectrophotometer	2
Hot Air Oven	2
Laboratory Water Distillation and demineralization unit	2

General glass ware and laboratory chemicals, etc	As Required
MoEF approved parties will be monitoring at regular intervals	

6.5.1 Environmental Management Cell

An efficient environmental management cell headed by a Project In- charge/ head having a minimum of 5 to 10 years of experience will be formed. The project-In-charge/head will be supported by team of members (Managers, Operators, Chemists, Technicians, etc.) having minimum of 2 to 3 years' experience in their respective fields of work.

- Monitor the health of workers within the project site to identify adverse health effects, and
- Periodically obtain feedback from local doctors regarding any potential indicators of adverse health effects due to environmental cause in the communities surrounding, and particularly down-stream of the landfill.
- By organizing health camps on a regular basis.

6.5.2 Budgetary Provision for EMP

On regular basis, environment management cell shall inspect the necessity & availability of the materials, technologies, services & maintenance works. The cell shall make appropriate budget for the purpose. Regular record review for change in financial requirement of environment management shall be done and appropriate budgetary provisions shall be made. Budget for environmental management shall be prepared and revised regularly. The budget shall include provisions for:

- Environmental Monitoring Program
- Operation & Maintenance of environmental Technologies/Equipment
- Laboratory works for Environmental management activities
- Emergency Purchase of necessary material, equipment, tools, services
- Greenbelt development
- Social & Environmental Welfare & Awareness programs/training
- Annual Environmental Audit.

Company has made budgetary provision for the proposed expansion project along with existing plant facilities as a part of their initial planning. In order to comply with the environmental protection measures as suggested in the above sections, the project management has made budgetary provision for environmental protection and safety measures. Cost towards environmental mitigation measures are given in Table No. 6.5.

Table No. 6.5: **Budget of Implementation of Environmental Management Plan**

Sr. No.	Particulars	Capital Cost (Rs) lakhs	Recurring Cost (Rs) lakhs/annum
1	Air Pollution Control Systems	27.0	2
2	CETP, holding tank, STP, etc	43.0	1.2
3	Noise Control measures – Acoustic enclosures for DG set, Noise barriers for pumps, boiler, etc	16.0	1.32
4	Greenbelt development	17.0	2
5	Rainwater harvesting, storm water drains,	16.0	2
6	Ambient Air Quality Monitoring, Instruments/ equipments, etc	20.0	20
7	Third party monitoring, energy audit, environmental audit, training programs, etc	10.0	2
8	Environmental control measures during construction stage	11.0	3
Total		**160.0**	**33.52**
Capital Cost of the project is Rs. 59 Cr.			

6.5.3 Public health monitoring

The value of Public Health studies in seeking to establish whether or not a site or facility has caused significant adverse health effects is well known. In this situation the results form a public health study may not fulfil the primary objective of such a program, which is to detect health changes before the manifestation of adverse health effects. However, three-stage health monitoring program is proposed.

- Monitor health of workers within the project site to identify adverse health effects, and
- Periodically obtain feedback from local doctors regarding any potential indicators of adverse health effects due to environmental cause in the communities surrounding, and particularly down-stream of the landfill.
- By organizing health camps on a regular basis.

Pollution control devices

- Pollution control devices are required to comply with prescribed standards for particulate matter, HCl, SO2, CO, Total Organic Carbon, HF, NOx (NO and NO2 expressed as NO2), Hydrocarbons, Dioxins/Furans, Besides the above, SPCB/PCC can prescribe additional parameters, as deem fit, in consultation with the CPCB.
- Incineration facility shall explore ways for heat recovery, to the extent possible.
- There are many combinations of treatment units installed for gas cleaning and removal of air pollutants, to comply with the standards. Designed treatment scheme shall comprise of following equipment, in combination, with adequate efficiencies to meet the emission standards:
  - Particulate matter: Proper care shall be taken to minimize the particulate matter in the Incinerator stack and DG set.
  - SO2: Sulphur present in the Incinerator stack shall be kept minimum by scrubbing with Sodium Hydroxide solution.
- Stack height
  - Stack height shall not be less than 30 meters, in any case.

Monitoring and on-line display requirements

- The online monitoring systems attached with the incinerators require periodic calibration
- Sampling platform shall be provided as per CPCB norms to collect stack samples from the chimney for monitoring the air pollutants, as and when required. Holes need to be provided on chimney as per standard CPCB norms, following diametric calculations
- Frequency of monitoring for various parameters is given below

Frequency of Monitoring of Various Parameters

S.No	Parameter	Location	Frequency
1	Temperature	Secondary combustion chamber, stack emissions	Continuous monitoring
2	Carbon monoxide	Stack emissions	Continuous
3	Excess oxygen	Secondary combustion chamber, stack emissions	Continuous
4	Pressure	Combustion chambers	Continuous
5	Total particulate	Stack emissions	Continuous
6	HCl	Stack emissions	Continuous
7	SO_2	Stack emissions	Continuous
8	NO_x	Stack emissions	Continuous
9	TOC	Stack emissions	Continuous
		Residues from the combustion processes (slag / ash)	Once in every week (pooled sample), initially for first year. If there is consistency in meeting the standard, may be relaxed to once in a month (pooled sample)
10	Loss on ignition	Residues from the combustion processes	-do-

11	Dioxins and furans	Stack emissions, ash/dust, scrubber liquors, quench liquor	Twice a year under critical operating conditions

- Access shall be provided online, to see the continuous monitoring data by the local regulatory Board/Committee and annual environmental report giving complete details of operation and compliance with regulatory requirements. These details need to be published and made available to the public.

Chapter-7

Additional Studies (Risk Assessment Study)

7.1 Introduction

Hazard analysis involves the identification and quantification of the various hazards (unsafe conditions). On the other hand, risk analysis deals with identification and computation of consequence and risks. The personnel and the property in the proposed TSDF project are prone to accidents resulting from the hazards present in the site.

Risk analysis follows an extensive hazard analysis. It involves the identification and assessment of risks the neighboring populations are exposed to as a result of hazards present. This requires a thorough knowledge of probability of failure, credible accident scenario, vulnerability of population to exposure etc. Much of this information is difficult to get or generate. Consequently, the risk analysis is often confined to maximum credible accident studies. It provides basis for preparation of on-site and off-site emergency plan and also to incorporate safety measures. The risk and hazards assessment studies have been conducted for identification of hazards, to calculate damage distances and to spell out risk mitigation measures.

Risk Assessment

The word 'disaster' is synonymous with 'emergency' as defined by the Ministry of Environment and Forests (MoEF). An emergency occurring in the proposed project for manufacturing industries is one that may affect several sections within it and/ or may cause serious injuries, loss of lives, extensive damage to environment or property or serious disruption outside the plant. It will require the best use of internal resources and the use of external resources to handle it effectively. It may happen usually as the result of a malfunction of the normal operating procedures. It may also be precipitated by the intervention of an outside force such as a cyclone, flood or deliberate acts of arson or sabotage.

It is imperative to conduct risk analysis for all the projects where hazardous materials, fuels are handled. The risk assessment has been carried out as a few hazardous materials will be handled in the proposed plants.

The following have been addressed as part of the risk analysis.

- Introduction
- Hazard Identification and Risk Analysis
- Risk Reducing Measures

The Introduction deals with the objective and methodology of carrying out the risk analysis.

Hazard Identification and Risk Analysis discusses about the various types of hazards associated with the operation of the project consisting of CETP due to process, storage & handling, human errors, electric failures and natural calamities. It also presents the calculated frequencies of occurrence of different accident scenarios for the identified potential hazard occurrence in the proposed plants and the details of consequence modeling/ analysis for the identified potential accidents/disaster scenarios in the project. Risk Reducing Measures based on the calculated frequencies and consequences.

Storage and handling of hazardous materials

Both Hazardous materials shall be temporarily accommodated in designated storage area built/made in line with the safety, health and environmental standards.

Size of these temporary storage area would depend on the quantity and type of hazardous waste with appropriate storage capacities in compliance with the Hazardous Waste Management and Handling Rule 2016. In case each unit in the facility shall be have fire hydrant system to handle fire hazards.

Hazard identification

All Hazardous wastes need to be thoroughly examined to assess their potential for initiating or propagating an unplanned event/sequence of events, which can be termed as an accident.

Hazardous substances may be classified into three main categories namely flammable, unstable and toxic substances. Flammable substances require interaction

with air for their hazard to be realized. Under certain circumstances, vapours arising from flammable substances when mixed with air may become explosive, especially in confined spaces. However, if present in sufficient quantity, such clouds may explode in open air also. Unstable substances are liquids or solids, which may decompose with such violence giving rise to blast waves. Besides, toxic substances are dangerous and cause substantial damage to life when released into the atmosphere.

Hazard assessment and evaluation

A preliminary hazard analysis shall be carried out to identify major hazards associated with storages in the facility. This is followed by consequence analysis to quantify these hazards. Finally the vulnerable zones are plotted for which risk reducing measures are deduced and implemented.

Frequent causes of accidents

- Fire and explosion: explosives, flammable material
- Being struck by falling objects
- Caught in/compressed
- Snapping of cables, ropes, chains, slings
- Handling heavy objects
- Electricity (electrocution)
- Poor illumination
- Falls from height inside industrial units or on the ground
- Struck by moving objects
- Slipping on wet surfaces
- Sharp objects
- Oxygen deficiency in confined spaces
- Lack of personal protective equipment (PPE), housekeeping practices, safety signs
- Hackles, hooks, chains
- Cranes, winches, hoisting and hauling equipment;

Physical hazards

- Noise
- Extreme temperatures
- Vibration

- Radiation (UV, radioactive materials)

Mechanical hazards

- Trucks and transport vehicles
- Scaffolding, fixed and portable ladders
- Impact by tools, sharp-edged tools
- Power-driven hand tools, saws, grinders and abrasive cutting wheels
- Failure of machinery and equipment
- Poor maintenance of machinery and equipment
- Lack of safety guards in machines
- Structural failure

General concerns

- Lack of safety and health training
- Poor work organization
- Inadequate housing and sanitation
- Inadequate accident prevention and inspection
- Inadequate emergency, first-aid and rescue facilities
- Lack of medical facilities and social protection

7.1.1 Scope of Study

The scope of work is to carry out risk analysis for the proposed plant covering all the hazardous chemicals to be handled and stored at the plant.

7.1.2 Study Objective

The objective of the risk analysis includes the following:

- Identification of hazards
- Selection of credible scenarios
- Consequences Analysis of selected accidents scenarios
- Risk Mitigation Measures

7.1.3 Study Approach

The risk assessment study broadly comprised of the following steps:

- System Description
- Identification of Hazards
- Selection of Credible Accident Scenarios
- Consequence Analysis
- Risk Mitigation Measures

7.1.4 Identification of Hazards

Hazards associated with the plant are identified. Summary of relevant accident cases was reviewed. Identification of hazards at the proposed TSDF 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 TSDF need to be thoroughly examined to assess their potential for initiating or propagating an unplanned event/sequence of events, which can be termed as an emergency.

At the proposed TSDF site, 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:

- Explosive wastes in form of explosive solid and explosive liquid. [No such materials are involved in the proposed project].
- Flammable wastes
- Corrosive wastes
- Reactive wastes
- Toxic wastes

Flammable wastes containing solvent residue, can form explosive mixture with air, and heating may cause pressure rise with risk of bursting and explosion (however in case of TSDF explosion probability is very less as highly reactive materials and pressure vessels are not there). Sometime vapour may be heavier than air and spreads along the ground, narcotic in high concentrations, gives off toxic or irritant fumes in a fire.

Various type of organic hazardous wastes, paint wastes, waste oil, etc are flammable in nature and can catch fire if getting source of ignition. There will release toxic fume at the time of burring in the event of fire.

7.2 Hazardous Activities at TSDF Site

During operation of the proposed TSDF, following activities can pose hazards and risk to human and surrounding environment:

- Maneuvering of Wastes and Manual Handling
- Loading and unloading hazardous wastes on vehicle – mechanical movements
- Removal of bungs from drums, cuts & abrasions
- Contact with hazardous chemicals.
- Chemical reaction – fire, gas (Not likely in proposed TSDF site)
- Access egress – fatigue, chemical exposure

7.3 Human Health Risk and Hazards from Proposed TSDF Site

Hazardous wastes managed in barrels or tanks can release COCs into the atmosphere via volatilization. During the operation of TSDF site, wastes may be entered into the environment though the following sources:

- Emission of particulate matters due to windblown erosion of disposed wastes.
- Volatization of organic liquid wastes; (Not likely in proposed TSDF site)
- Infiltration of leachate into ground and subsequently contamination of ground water in an unlikely event of damage to the liner system of TSDF site;
- Spillage of contaminated runoff from the TSDF site during heavy rains;

7.4 Hazards Due to Loss of Containment

Hazardous waste handled, stored and disposed at the TSDF will be mostly toxic in nature. In the event of spillage, leakage or accidental release of these there hazardous wastes, it will create localized effects within the short distances inside the site in the form of toxic material release on ground. However some of the wastes (carbon sludge are inflammable). Safety measures include toxic hazardous material collecting/handling facilities will be provided at the TSDF to attend any emergency due to handling and storage and disposal of such hazardous wastes. It includes post clean up the affected

site. No toxic gas as hazardous wastes will be handled at the TSDF; therefore, dispersion of toxic vapour cloud is not an issue at the TSDF. At the proposed TSDF site, 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:

- Corrosive Wastes
- Toxic wastes

7.4.1 Release of Flammable Wastes

Hazardous wastes containing fraction of organic waste and residue, paint wastes (not in proposed site), will be stored in drums and tanks of various sizes. 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.

7.4.2 Fire in Stored Hazardous Wastes at TSDF Sites

At TSDF, hazardous waste will be stored in bags/ containers and drums. The hazardous wastes stored may be in solid and semisolid state.

In normal condition, hazardous wastes at TSDF 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 fume will complex of suspended particulate matter, shoots, carbon monoxide, carbon dioxide, oxides of nitrogen, and other toxic constituents, etc. In the event of fire, hazardous waste may act as area source of toxic gas emissions (depending upon waste involved/ its constituents) and disperse in to the atmosphere and responsible for deterioration of ambient air quality, subsequently, adverse impacts on the heath due to inhalation of toxic gases.

The extent of injury to people depends on the heat flux and duration of exposure. The extent of damage to property or environment depends on the size of the pool and the duration of fire. At this stage, precise characteristics of hazardous wastes and storage type (container size) are not known; therefore, computation of consequence analysis is not possible.

7.5 Consequence Analysis:

At the TSDF site HSD for DG set will be stored in 200 lt. drums. As there is no source of ignition in the storage area, possibility of fire and explosion is negligible. For worst case, 200 lt. drums filled with HSD have been considered ruptured for calculation of damage distances.

- HSD Tank Leakages; Heavy Spillage; Burning Puddle
- Wind: 4.5 meters/second from E at 3 meters
- Air Temperature: 25˚C
- Stability Class: C
- Relative Humidity: 50%

THREAT ZONE:

- Threat Modeled: Thermal radiation from pool fire
- Red: 17 meters --- (10.0 kW/(sq m) = potentially lethal within 60 sec)
- Orange: 23 meters --- (4 kW/(sq m)) 1st Degree burn
- Yellow: 30 meters --- (2.0 kW/(sq m) = pain within 60 sec)

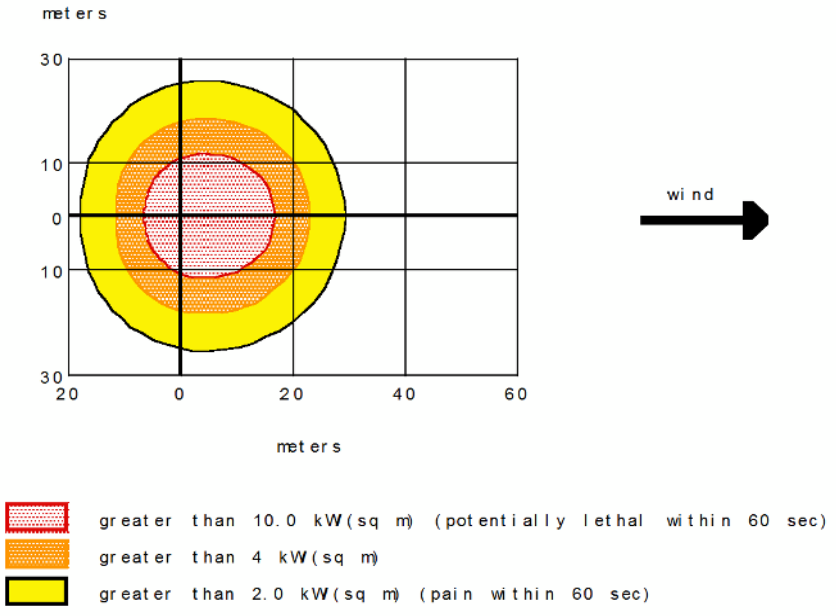


Figure 7.1: HSD drums heavy Spillage- Burning Puddle

The HSD fire drums will be limited to 23 m from the pool i.e. within the plant battery limit.

7.6 Risk Mitigation Measures for Proposed TSDF

Some of the risk mitigation measures have been described for the proposed TSDF site as given below:

- Collection and Transportation of Hazardous Wastes
- Transportation of waste by covered vehicles.
- Regular training to drivers to handle emergency situation during transportation of waste.
- Implementation of TREM card.
- Hazardous waste should be transported by manifest mechanism.

7.6.1 Storage area/TSDF site area

- Loading and unloading of wastes should only be done under the supervision of the well trained and experienced staff.
- Appropriate measures to prevent percolation of spills, leaks etc. to the soil and ground water, the approach area of TSDF site should be provided with concrete floor and the floor must be structurally sound and chemically compatible with wastes.
- Measures should be taken to prevent entry of runoff into the TSDF site area. The TSDF site area shall be designed in such a way that the floor level is at least 150 mm above the maximum flood level.
- The primary storage area 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.

7.6.2 Miscellaneous Risk Mitigation Measures

- Good housekeeping needs to be maintained around the TSDF site.
- Signboards showing precautionary measures to be taken, in case of normal and emergency situations should be displayed at appropriate locations.
- To the extent possible, manual operations within TSDF site are to be
- Avoided. In case of manual operation, proper precautions need to be taken, particularly during loading / unloading of hazardous waste.

- A system for inspection of checks the conditions of the spillages, leakages etc. should be established and proper records should be maintained.
- Only persons authorized to enter in the TSDF site.

7.6.3 General Working Conditions

House Keeping

- All the passages, floors and stairways should be maintained in good condition. The system should be available to deal with any spillage of dry or liquid waste at the site.
- Sufficient disposable bins should be clearly marked and these should be suitably located in the plant.
- Walkways should be clearly marked and free from obstructions.
- In the plant, precaution and instructions should be displayed at strategic locations.
- All pits, sumps should be properly covered or securely fenced.
- Roads/walkway within the plant should be maintained neat and clean.

7.6.4 Safe Operating Procedures

- Safe operating procedures should be available for mostly all operations at TSDF site.
- The workers should be informed of the consequences of failure to observe the safe operating procedures.

7.6.5 Fire Mitigation Measures

- Adequate firefighting facilities should be available at the plant, including, dry chemical powder type, water CO_2 type, mechanical foam type, CO_2 type and sand buckets.
- The firefighting system and equipment should be tested and maintained as per relevant standards.
- The fire drills should be conducted once in six months.
- Installation of smoke detector, fire alarm, ambient/ Personal CO monitors, fire hydrant system & fire extinguisher system should be done.

- A list showing location of fire hydrant points and its types should be available at all departments.
- Fire hydrant should be inspected on a regular basis and every hydrant inspection should be documented. In case of any problem with the hydrants should be reported immediately.

7.6.6 Emergency Preparedness

- On-site emergency plan should be prepared and readily available for an unlikely event of emergency.
- Emergency telephone numbers should be available and display properly strategic locations.

7.6.7 Access

- Adequate safe access should be provided to all places where workers need to work and all such access should be in good condition.

7.6.8 Material Handling

- Material handling areas should be clearly defined.
- The workers should be made aware about the hazards associated with manual material handling.

7.6.9 Communication System

- Adequate communication facilities should be available at the plant and supported with uninterrupted power supply.
- Communication facilities should be checked periodically for its proper functioning.

7.6.10 First Aid Facilities

- First box should be provided at strategic locations within the plant.
- At least one stature should be available in first aid room.
- List of important telephone numbers should be displayed in first aid room.

7.6.11 Accident Reporting, Investigation and Analysis

A system should be initiated for accident and near miss reporting, investigation and analysis. To motivate and awareness among the personnel at the plant about safety, total accident (lost time injury) free days can be displayed on the board prominently at strategic location.

7.6.12 Safety Inspections

The system should be initiated for checklist based routine safety inspection and internal audit of the plant periodically. Safety inspection team should be formed from various disciplines and departments.

7.6.13 Safe Operating Procedures

Safe operating procedures should be formulated and updated, specific to process & equipment and distributed to concerned plant personnel.

Occupational Health and Safety

Some workplace hazards have the potential to cause so much injury or disease that specific regulations or codes of practice are warranted. These regulations and codes, adopted under state and territory OH & S Acts, explain the duties of particular groups of people in controlling the risks associated with specific hazards. Codes of Practice provide advice on how to meet regulatory requirements. As such, codes are not legally enforceable, but they can be used in courts as evidence that legal requirements have or have not been met.

Safety in the workplace is critical to the success of running a business, no matter what size it is. As a small business owner one has certain rights and responsibilities regarding health and safety in the workplace. Even without any employees, one must ensure that the business doesn't create health and safety problems for the customers and the general public.

All safety gears will be provided to workers and care will be taken by EMC that these are used properly by them. All safety norms will be followed.

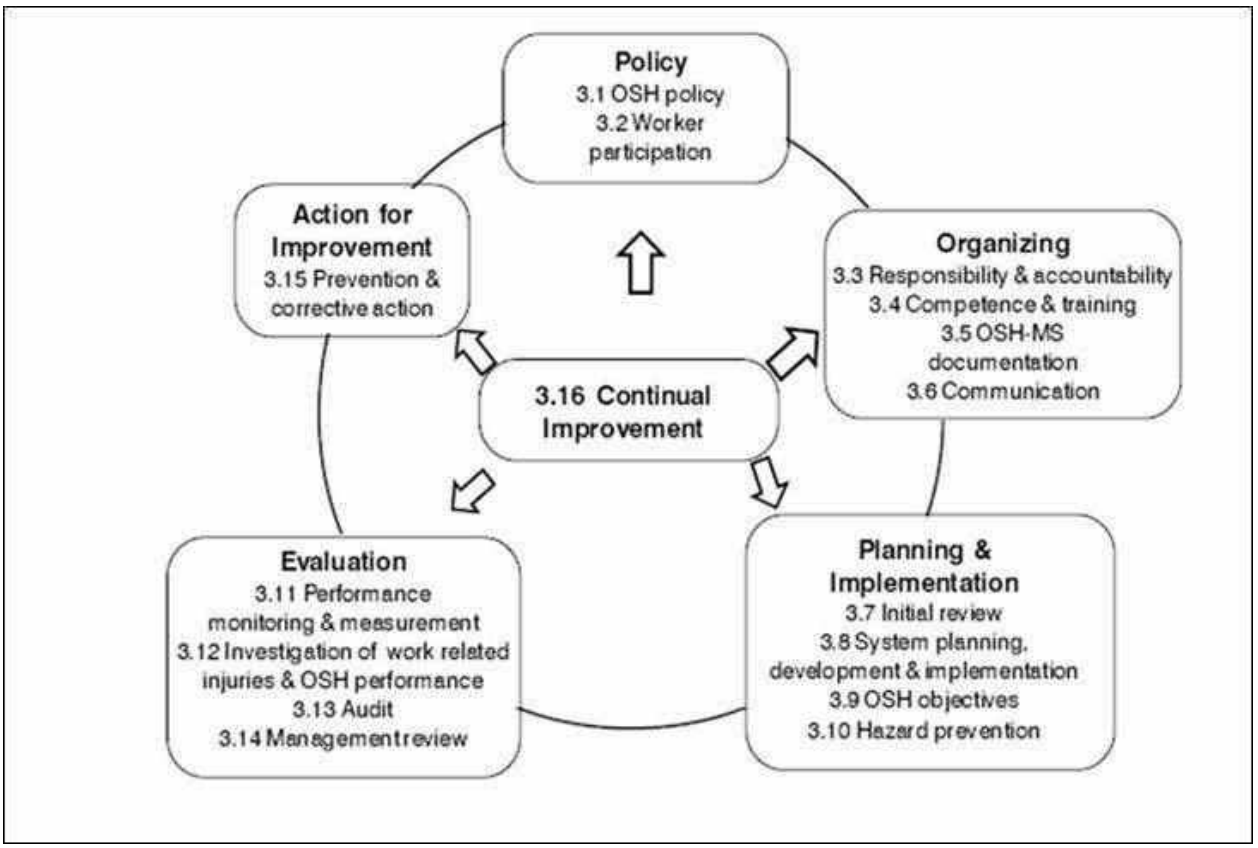


Figure No. 7.2: OHS Cycle

Preventing Fires & Explosions

Regular safety audits should be undertaken to ensure that hazards are clearly identified and risk- control measures maintained at an optimum level.

Personal Protective Equipment (PPE)

General Provisions

- As a supplementary protection against exposure to hazardous conditions where the safety of workers cannot be ensured by other means, such as eliminating the hazard, controlling the risk at source or minimizing the risk, suitable and sufficient PPE, having regard to the type of work and risks, and in consultation with workers and their representatives, should be used by the worker and provided and maintained by the employer, without cost to the workers.
- Items of PPE provided should comply with the relevant national standards and criteria approved or recognized by the competent authority.

- Those responsible for the management and operation of the personal protection programme should be trained in the selection of the proper equipment, in assuring that it is correctly fitted to the people who use it, in the nature of the hazards the equipment is intended to protect
- against, and provide adequate comfort, and in the consequences of poor performance or equipment failure.
- PPE should be selected considering the characteristics of the wearer and additional physiological load or other harmful effects caused by the PPE. It should be used, maintained, stored and replaced in accordance with the standards or guidance for each hazard identified at the facility and according to the information given by the manufacturer.
- PPE should be examined periodically to ensure that it is in good condition.
- Different PPE & their components should be compatible with each other when worn together.
- PPE should be ergonomically designed and, to the extent practicable, should not restrict the
- user's mobility or field of vision, hearing or other sensory functions.
- Employers should ensure that the workers who are required to wear PPE are fully informed of the requirements and of the reasons for them, and are given adequate training in the selection, wearing, maintenance and storage of this equipment.
- When workers have been informed accordingly, they should use the equipment provided throughout the time they may be exposed to the risk that requires the use of PPE for protection.
- The PPE should not be used for longer than the time indicated by the manufacturer.
- Workers should make proper use of the PPE provided, and maintain it in good condition, consistent with their training and be provided with the proper means for doing so.

Protection from Falls

- When other measures do not eliminate the risk of falling, workers should be provided with and trained in the use of appropriate fall protection equipment, such

as harnesses and lifelines. Workplaces and traffic lanes in which there are fall hazards or which border on a danger zone should be equipped with devices which prevent workers from falling into or entering the danger zone.

- Devices should be provided to prevent workers from falling through floors and openings.
- Safety harnesses should be worn where required and the lifeline should be attached to an adequate anchor point.
- Harnesses should be chosen that are safely used with other PPE that may be worn simultaneously.
- Appropriate and timely rescue should be provided when using fall-arrest equipment to prevent suspension trauma.

Occupational Health –Proposal for Surveillance

The choice and the implementation of specific measures for preventing workplace injury and ill health in the work-force depends on the recognition of the principal hazards, and the anticipated injuries and diseases, ill health and incidents. Below are the most common causes of injury and illness:

- Slips, trips and falls on the same level; falls from height; unguarded machinery; falling objects;
- Engulfment; working in confined spaces; moving machinery, on-site transport, forklifts and cranes;
- Exposure to controlled and uncontrolled energy sources; exposure to mineral wools and fibres; inhalable agents (gases, vapours, dusts and fumes);
- Skin contact with chemicals (irritants acids, alkalis), solvents and sensitizers); contact with hot objects;
- Fire and explosion; extreme temperatures; radiation (non-ionizing, ionizing);
- Noise and vibration; electrical burns and electric shock;
- Manual handling and repetitive work; failures due to automation; ergonomics;
- Lack of OSH training; poor work organization;
- Inadequate accident prevention and inspection; inadequate emergency first-aid and rescue facilities; lack of medical facilities and social protection
- Dust may enter into the systemic circulation and thereby reach the essentially all the organs of body and affects the different tissues.

- Working near heavy noise generating equipments may cause hearing and blood pressure related diseases
- Continuous working and improper working position leading to pain & exhaustion.

Plan of evaluation of health of workers

- By pre designed format during pre placement and periodical examinations.
- Proper schedule will be devised and followed with help of occupational health experts and doctors.
- Health effects of metals used and health hazard plans based on monthly correlation of these metal related diseases and people affected.

Schedule of medical check-up during operational phase

- Comprehensive Pre-employment medical check up for all employees
- General check up of all employees once every year.
- Medical examination will be done for all the employees after retirement and all those employees with more than 5 years of service leaving the company. After retirement, medical examination facility will be provided for a period of 5 years.
- Local hospitals and Govt. health monitoring system will be engaged.
- Dispensary and ESI facility will be provided to all workers as applicable
- All safety gears will be provided to workers and care will be taken by EMC that these are used properly by them. All safety norms will be followed

Disaster Management Plan

This DMP has been designed based on the range, scales and effects of "Major Generic Hazards" described in the Risk Assessment and prediction of their typical behavior. The DMP addresses the range of thermal and mechanical impacts of these major hazards so that potential harm to people onsite and off-site, plant and environment can be reduced to a practicable minimum. The scenarios of loss of containment are credible worst cases to which this DMP is linked.

The project is in its formative stage and detail engineering is yet to be done, so the elements of the DMP are based on concepts.

Capabilities of DMP

The emergency plan envisaged will be designed to intercept full range of hazards such as fire, explosion, major spill etc. In particular, the DMP will be designed and conducted to mitigate those losses of containment situations, which have potentials to escalate into major perils.

Another measure of the DMP's capability will be to combat small and large fires due to ignition, of flammable materials either from storage or from process streams and evacuate people from the affected areas speedily to safe locations to prevent irreversible injury. Emergency medical aids to those who might be affected by incident heat radiation flux, shock wave overpressures and toxic exposure will be inherent in the basic capabilities.

The most important capability of this DMP will be the required speed of response to intercept a developing emergency in good time so that disasters such as explosion, major fire etc. are never allowed to happen.

Disaster Control Philosophy

The principal strategy of DMP is "Prevention" of identified major hazards. The "Identification" of the hazards will employ one or more of the techniques [e.g. Hazard and Operability Study (HAZOP), accident consequence analysis etc.]. Since these hazards can occur only in the event of loss of containment, one of the key objectives of technology selection, project engineering, construction, commissioning and operation is "Total and Consistent Quality Assurance". The Project Authority will be committed to this strategy right from the conceptual stage of the plant so that the objective of prevention can have ample opportunities to mature and be realised in practice.

The DMP or Emergency Preparedness Plan (EPP) will consist of:

- On-site Emergency Plan
- Off-site Emergency Plan

Disaster Management Plan preparation under the headlines of On-site Emergency Plan and Off-site Emergency Plan is in consonance with the guidelines laid by the Ministry of Environment and Forests (MOEF) which states that the "Occupier" of the facility is responsible for the development of the On- site Emergency Plan. The Off-site

Emergency Plan should be developed by the Governments district emergency authorities/district collector.

On-Site Emergency Plan

Objectives

The objective of the On-site Emergency Plan should be to make maximum use of the combined resources of the plant and the outside services to

- Effect the rescue and treatment of casualties
- Safeguard other personnel in the premises
- Minimise damage to property and environment
- Initially contain and ultimately bring the incident under control
- Identify any dead
- Provide for the needs of relatives
- Provide authoritative information to the news media
- Secure the safe rehabilitation of affected areas
- Preserve relevant records and equipment for the subsequent enquiry into the cause and circumstances of emergency

Action Plans & Emergency actions

The Action Plan should consist of:

- Identification of Key Personnel
- Defining Responsibilities of Key Personnel
- Designating Emergency Control Centres and Assembly Points
- Declaration of Emergency
- Evacuation of Personnel
- Public information and warning
- Co-ordination with local authorities
- Mutual aid
- Defining actions to be taken by non-key personnel during emergency
- Sending All Clear Signal

Emergency facilities

- Emergency Control Center – with access to important personnel, telephone, fax, telex facility, safe contained breathing apparatus, hand tools, emergency shutdown

procedures, duties and contact details of key personnel and government agencies, emergency equipments, etc.

- Assembly Point – with minimum facilities for safety and rescue
- Emergency Power Supply – connected with diesel generator, flame proof emergency lamps, etc.
- Fire Fighting Facilities – first aid firefighting equipment, fire alarms, etc.
- Location of wind Sac – located at appropriate location to indicate the direction of wind for emergency escape
- Emergency Medical Facilities – Stretchers, gas masks, general first aid, emergency control room, breathing apparatus, other emergency medical equipment, ambulance

Key Personnel

The actions necessary in an emergency will clearly depend upon the prevailing circumstances. Nevertheless, it is imperative that the required actions are initiated and directed by nominated people, each having specified responsibilities as part of co-ordinated plan. Such nominated personnel are known as Key Personnel.

The Key Personnel are:

- Site Controller (SC)
- Incidental Controller (IC)
- Liaison and Communication Officer (LCO)
- Fire and Security Officer (FSO)
- Team Leaders (TL)

Site Controller (SC)

In the emergency situation, decisions have to be taken which may affect the whole or a substantial part of the plant and even places outside. Many of these decisions will be taken in collaboration with the other officers at the plant and the staff. It is essential that the authority to make decision be invested in one individual. In this plan, he is referred to as the 'Site Controller'. The Plant Manager (however called) or his nominated deputy will assume responsibility as SC.

Incident Controller (IC)

In the emergency situation, someone has to direct the operations in the plant area and co-ordinate the actions of outside emergency services at the scene of incident. The one who will shoulder this responsibility is known as 'Incident Controller' in this plan.

A Senior Operations Officer or an officer of similar rank of the unit may be nominated to act as the IC.

Liaison and Communication Officer (LCO)

Operations Officer or any other officer of deputy rank will work as LCO and will be stationed at the main entrance during emergency to handle Police, Press and other enquiries. He will maintain communication with the IC

Fire and Safety officer (FSO)

The Fire and Safety Officer will be responsible for fire fighting. On hearing the fire alarm he shall contact the fire station immediately and advise the security staff in the plant and cancel the alarm. He will also announce on PAS (public Address System) or convey through telephones or messengers to the SC, IC and LCO about the incident zone. He will open the gates nearest to the incident and stand by to direct the emergency services. He will also be responsible for isolation of equipment from the affected zone.

Team Leaders (TL)

A number of special activities may have to be carried out by specified personnel to control as well as minimize the damage and loss. For this purpose designated teams would be available. Each team will be headed by a Team Leader (TL).

Following teams are suggested:

- Repair Team
- Fire Fighting Team
- Communication Team
- Security Team
- Safety Team
- Medical Team

Responsibilities of Key Personnel

Site Controller (SC)

- On getting information about emergency, proceed to Main Control Centre
- Call in outside emergency services
- Take control of areas outside the plant, which are affected
- Maintain continuous communication, review situation and assess possible course of events
- Direct evacuation of nearby settlements, if necessary
- Ensure that casualties are getting enough help
- Arrange for additional medical help and inform relatives
- Liaison with Fire and Police Services and Provide advice on possible
- effects on outside areas
- Arrange for chronological recording of the emergency
- Where emergency is prolonged, arrange for relieving personnel, their catering needs etc.
- Inform higher officials in head office
- Ensure preservation of evidence
- Direct rehabilitation work on termination of emergency

Incident Controller (IC)

- On getting emergency information, proceed to Main Control Centre
- Activate emergency procedure such as calling in various teams

Direct all operations within plant with following priorities:

a) Control and contain emergency
b) Secure safety of personnel
c) Minimize damage to plant, property and the environment
d) Minimize loss of material

- Direct rescue and repair activities
- Guide fire-fighting teams
- Arrange to search affected area and rescue trapped persons
- Arrange to evacuate non-essential personnel to safe area/assembly point
- Set up communications network and establish communication with SC
- Arrange for additional help/equipment to key personnel of various teams
- Consider need for preserving all records, information for subsequent enquiries

Liaison and Communications Officer

- To ensure that casualties receive adequate attention, arrange additional help if required and inform relatives
- To control traffic movements into the plant and ensure that alternative transport is available when need arises
- When emergency is prolonged, arrange for the relief of personnel and organize refreshments/catering facility
- Advise the Site Controller of the situation, recommending (if necessary) evacuation of staff from assembly points
- Recruit suitable staff to act as runners between the Incident Controller and himself if the telephone and other system of communication fail. -Maintain contact with congregation points
- Maintain prior agreed inventory in the Control Room
- Maintain a log of the incident on tape
- In case of a prolonged emergency involving risk to outside areas by windblown materials - contact local meteorological office to receive early notification of changes in weather conditions

Fire and Safety Officer

- Announce over the PAS in which zone the incident has occurred and on the advice of the Shift Officer informs the staff to evacuate the assembly
- Inform the Shift Officer In-charge, if there is any large escape of products
- Call out in the following order:
  a) Incident Controller or his nominated deputy
  b) Maintenance Officer
  c) Personnel and Administrative Officer
  d) Departmental Head in whose area the incident occurred
  e) Team Leaders (TL)

Emergency Control Centre

The Emergency Control Centre will be the focal point in case of an emergency from where the operations to handle the emergency are directed and coordinated. It will control site activities.

Emergency management measures in this case have been proposed to be carried from single control

Centre designated as Main Control Centre (MCC)

MCC is the place from which messages to outside agencies will be sent and mutual aids and other helps for the management of emergency will be arranged. It will be located in the safe area. It will be equipped with every facility for external and internal communication, with relevant data, personal protective equipments to assist hose manning the centre to enable them to co-ordinate emergency control activities. CC will be attended by SC.

Following facilities would be available in the MCC:

- P&T phones, mobile phones, intercoms, and wireless
- Fax and telex
- Emergency manuals
- Blown up area maps
- Internal telephone directories
- District telephone directories
- Emergency lights
- Wind direction and speed indicator
- Requisite sets of personal protective equipment such as gloves, gumboots and aprons

MCC will be furnished with call out list of key persons, fire, safety, first aid, medical, security, police and district administrative authorities. MCC will also contain safety data pertaining to all hazardous materials likely to cause emergency and well-defined procedures of fire fighting, rescue operations, first aid etc.

Assembly Point

In an emergency, it will certainly be necessary to evacuate personnel from affected areas and as precautionary measure, to further evacuate non-essential workers, in the first instance, from areas likely to be affected, should the emergency escalate. The evacuation will be effected on getting necessary message from i.e. On

evacuation, employees would be directed to a predetermined safe place called Assembly Point.

Proposed Location: Area opposite to service building will be the Assembly Point where all non-key personnel would assemble on getting direction over Public-Address System.

Outdoor assembly points, predetermined and pre-marked, will also be provided to accommodate evacuees from affected plant area(s). Roll call of personnel collected at these assembly points, indoor and outdoor will be carried out by roll call crew of safety team to account for any missing person(s) and to initiate search and rescue operations if necessary.

Declaration of Emergency

An emergency may arise in the plant due to major leakage of oil or major outbreak of fire/explosion. In case of major leak or major outbreak of fire the state of emergency has to be declared by the concerned by sounding Emergency Siren.

Upon manual or sensor detection of a major loss of containment of volatile hazardous substance, the DMP is activated by raising an audible and visual alarm through a network of geographically dispersed gas/vapour and heat detectors and also "break glass" type fire alarm call points with telephone hand sets to inform the Central Control Room.

A separate siren audible to a distance of 5 km range will be available for this purpose. The alarm is coded such that the nature of emergency can be distinguished as a leakage or major fire.

The Control Centre and Assembly point will 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, leakage etc.

After cessation of emergency, FSO will communicate to IC. After verification of status, IC will communicate with SC and then announce the "All Clear" by instructing the Time Office to sound the "All Clear Signal".

Alarms would be followed by an announcement over Public Address System (PAS).In case of failure of alarm system, communication would be' by telephone operator who will make announcement in the complex through PAS. Walkie-talkie system is very useful for communication during emergency with predetermined codes of communication. If everything fails, a messenger could be used for sending the information.

Two 5.0 km, range variable pitch electric sirens (one in service and the other standby)will generate the main alarm for the entire site as well as for the district fire brigade. The alarm is coded such that the nature of emergency can be distinguished as a leakage or major fire. Fire and Gas alarm matrices are provided at the Central Control room, security gate, on-site fire station and main administrative office corridor to indicate location of the site of emergency and its nature.

Mutual Aid

Procedure

All factories may not be equipped with an exhaustive stock of equipment/materials required during an emergency. Further, there may be a need to augment supplies if an emergency is prolonged. It would be ideal to pool all resources available in the and nearby outside agencies especially factories during an emergency, for which a formal Mutual Aid scheme should be made among industries in the region.

Essential Elements

Essential elements of this scheme are given below:

- Mutual aid must be a written document, signed by Location In-charge of all the industries concerned
- It should specify available quantity of materials/ equipment that can be spared (not that which is in stock)
- Mode of requisition during an emergency.
- It should authorize the shift-in-charge to quickly deploy available material/equipment without waiting for formalities like gate pass etc.
- It should spell out mode of payment/replacement of material given during an emergency
- It should specify key personnel who are authorized to requisition materials from other industries or who can send materials to other industries
- It should state clearly mode of receipt of materials at the affected unit without waiting for quantity/quality verification etc.
- Revision number and validity of agreement should be mentioned
- This may be updated from time to time based on experience gained

Emergency Management Training

The Key Personnel would undergo special courses on disaster management. This may preferably be in-plant training. The Managers, Senior Officers and Staff would undergo a course on the use of personal protective equipment.

The Key Personnel belonging to various Teams would undergo special courses as per their expected nature of work at the time of emergency.

The plant management should conduct special courses to outside agencies like district fire services to make them familiar with the plant layout and other aspects, which will be helpful to them during an emergency.

Mock Drills

It is imperative that the procedures laid in this Plan are put to the test by conducting Mock Drills. To avoid any lethality, the emergency response time would be clocked below 2 minutes during the mock drill.

1st Step: Test the effectiveness of communication system

2nd Step: Test the speed of mobilization of the plant emergency teams

3rd Step: Test the effectiveness of search, rescue and treatment of casualties

4th Step: Test emergency isolation and shut down and remedial measures taken on the system

5th Step: Conduct a full rehearsal of all the actions to be taken during an emergency

The Disaster Management Plan would be periodically revised based on experiences gained from the mock drills.

Proposed Communication System

The instrument and control system will take care of the following operating philosophy of the plant:

- The project will be provided with a control system located in a central control room.
- The shift engineer will operate the plant from his console panel.
- All operations will be represented in a graphic panel on the console and every operation will be depicted as operating sequences.
- All operating parameters will be displayed in digital format.
- Alarms will be provided for all parameters, when they exceed set values.

- High-High/Low-Low alarms and trip functions will be provided to trip
- Pumps/compressors to bring the entire system to a safe shutdown.

Proposed Fire Fighting System

Elaborate fire fighting system will be available for fighting fires in any corner of the plant. Including Fire Hydrant System and Fire Extinguishers. A comprehensive fire detection and protection system is envisaged for the project Area.

Proposed Safety System

Considering that fire and explosion is the most likely hazard in such installations, the plant is being provided with systems to guard against such hazards. Salient among these are:

- A proper layout to prevent and minimize the effects of any hazardous situation
- Design of storage vessels and all components to codes and standards to withstand the rigorous duty
- Provision of operating systems to conduct the process through well established safe operating procedures
- A control system, which monitors all, plant parameters and give alarms
- Control system, which has trip provisions to prevent hazard conditions escalating
- A gas detection system which will provide early warning of any leaks
- Provision of a fire protection system to control fire
- Provision of flame-proof lighting system in the fire prone areas

Proposed First Aid and Medical Facilities

The First Aid Medical Centre has been proposed. It will be fully equipped with emergency facilities. It will be open round the clock. A Medical attendant will always be available in the centre. Emergency cars will be available in all the shifts. Adequate number of first aid boxes will be kept at strategic locations. Required stock of first aid medicines will be maintained. Trained first aiders will be available in all departments.

Facilities to be kept in the Medical Room along with others will include: Oxygen Cylinders, Injection Corarnine, Glucose Saline, LV. Sets, Syringes, Injection Needles, Stretchers and medicines.

Proposed Emergency Power Supply

Strategic areas will be provided with emergency lights fed through stationed battery system. Portable emergency lamps will be also available at required points. A Diesel Driven Generator of adequate capacity will be available to keep the operations running in case of power failure. Diesel Engine operated fire pumps will be available.

Off Site Emergency Plan

Objective: If the effects of the accident or disaster inside the plant are felt outside its premises, it calls for an off- site emergency plan, which should be prepared and documented in advance in consultation with the District Authorities.

Key Personnel

The ultimate responsibility for the management of the off-site emergencies rests on the Collector / District Magistrate / Deputy Commissioner. He will be assisted by representatives from all concerned organisations, departments and services at the District level. This core group of officers would be called the District Crisis Management Group (CMG). The members of the group will include:

1. Collector/District Magistrate Deputy Commissioner
2. Commissioner of Police
3. Municipal Commissioner, if municipalities are involved
4. Deputy Director, Health
5. Pollution Control Board Representative

An Operation Response Group (ORG) will then be constituted to implement the directives of the CMG. The various government departments, some or all of which will be concerned, depending on the nature of the emergency, could include:

- Police
- Health & Family Welfare
- Medical
- Revenue
- Fire Service
- Transport
- Electricity
- Animal Husbandry

- Agriculture
- Civil Defense
- PWD
- Civil Supplies
- Panchayats

The SC and IC, of the on-site emergency team, will also be responsible for communications with the CMG during the off-site emergency.

Education to Public

People living within the influence zone should be educated on the emergency in a suitable manner. This can be achieved only through the Local and District Authorities. However, the Project Authority can extend necessary information to the Authorities.

Training

- Training sessions need to be provided in which personnel are briefed on their specific duties in an emergency.
- To provide training to all emergency responders. The concerned personnel are shown how to wear and properly use personal protective clothing and devices.
- Periodic drills to be conducted to test the overall efficiency and effectiveness of the emergency response plan and emergency response capabilities.
- The types of training required for emergency response personnel with responsibilities in any or all phases of the response is based upon the types of incidents most likely to occur and the related response and planning activities.
- Responsibility, Frequency and Procedure for Evaluation The CEC is responsible for evaluating the effectiveness of the on- site emergency plan. Emergency mock drill should be conducted at an interval of six months. Experts should be invited to observe the mock drill in order to know their response and opinion. The recommendations following the discussions will help to identify the loopholes in the plan and response capability of the organization. Such periodic recommendations of the mock drill should be kept in order to update the plan.
- The CEC will be responsible to update their on-site emergency plan regularly. A regular review of the plan at least once in a year should be carried out to replace outdated information or to incorporate the results of mock drill.

Post Emergency – Recovery

When an emergency is over, it is desirable to carry out a detailed analysis of the causes of accidents to evaluate the influence of various factors involved and to propose methods to eliminate or minimize them in future. Simultaneously, the adequacy of the disaster preparedness plan will be evaluated and any shortcomings will be rectified.

Accident Investigation

a.	As soon as possible after the emergency is over and plant operation has become normal, the investigation will be carried out to determine the cause of the event.
b.	Representatives from various disciplines will be members of the investigating team.
c.	The area of the event will be sealed off so that tampering or alteration of the physical evidence will not occur.
d.	Key components will be photographed and logged with time, place, direction, etc.
e.	Statements will be taken from those who were involved with the operation or who witnessed the event.

Damage Assessment

This phase of recovery establishes the quantum of replacement machinery considered necessary for bringing back the plant to normal operation, property and personnel losses, and culminates in a list of necessary repair, replacement and reconstruction work.

Insurance companies will be informed of the damage and requested to pay the compensation as per claim.

Cleanup and Restoration

- This phase will only begin after the investigation is complete.
- Reporting documentation will be prepared and forwarded to appropriate authorities.
- Repairs, restoration and cleanup will begin.
- Insurance claims will be prepared and submitted.

Chapter – 8

Project Benefits

Project Benefits

The integrated TSDF site has been judiciously selected per Knock Down Criteria as given in "Guideline for conducting EIA and Site Selection for Common Hazardous Waste Management Facility, New Delhi, 2003". Being inside an Industrial Estate, it will have at its battery limits planned utilities in well laid out corridors, water and power supply, facility for evacuation of storm water and municipal solid waste, wide, multi-landed, metalled roads and roadside illumination of high standard and availability. Being inside an approved IE, the site does not have any social or land/ R&R/ easement/ encroachment into public commons related issues.

The land of 16.2 ha land will serve the state of Karnataka for hazardous waste disposal service for more than 5-6 decades at an increased infill/treatment rate.

The project also envisages the subsidies from the Central and State Government for developing common TSDFs.

8.1 Introduction

Secured landfill as a part of Common Hazardous Waste Treatment, Storage and Disposal facility would minimize the risk involved in hazardous waste management by way of transportation and waste movement through manifest and regular monitoring of such facility would be better and feasible as compared to captive facilities by individual industries. These factors as well as a strong desire to come up as a single window solution provider for waste management issues have led to embark setting up this Common Hazardous Waste Treatment, Storage and Disposal facility (CHWTSDF), apart from achieving other social objectives.

The Hazardous Waste (Management & Handling) Rules, 1989 and its subsequent amendments bar the industries from dumping their solid wastes indiscriminately. At the same time they permit the industries to dispose of their wastes in safe & secured manner. It has been made mandatory by the government to

dispose of Hazardous waste in systematic and scientific disposal way and pollution control boards have been asked to ensure it. 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

8.2 Hazardous Waste Management Benefits

Having an integrated facility would minimize the risk involved in waste transportation and waste movement and monitoring of such facility would be better and feasible. These factors as well as a strong desire to come up as a single window solution provider for waste management issues; led to embark setting up this Integrated Waste Management project, apart from achieving other social objectives.

This project will serve as a single facility for Hazardous Waste management. It will have various facilities such as Common Hazardous Waste Treatment Storage and Disposal Facility comprising of secured landfill .

The main benefits of the proposed project are

- The proposed project facilitates better management of the industrial wastes
- It will be the showcase for management of hazardous waste with additional benefit of green and clean Environment.
- It minimizes the pollution load on environment from hazardous waste.
- Compliance with prescribed regulatory norms which in turn avert the risk of closure on account of violation of rules.
- It reduces the number of hazardous waste dump sites in the area and also eliminates the pollution potential.
- 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.
- In absence of expertise or availability of less expertise this route is confirmed to be most viable and workable
- 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.

8.2.1 Benefits of Landfill

Landfills minimize the natural impact of solid waste on the environment by the following mechanism

- Elimination of polluting pathways.
- Isolation of inert waste through containment.

8.2.2 Improvements in physical and social infrastructure

The project will lead to indirect and direct employment opportunity. Employment is expected during construction and operation period, waste lifting and other ancillary services. Employment in these sectors will be temporary or contractual and involvement of unskilled labor will be more. A major part of this labor force will be mainly from local villagers who are expected to engage themselves both in agriculture and project activities. This will enhance their income and lead to overall economic growth of the area.

The following changes in socio-economic status are expected to take place with this project. The project is going to have positive impact on consumption behavior by way of raising average consumption and income through multiplier effect. The project is going to bring about changes in the pattern of demand from food to nonfood items and sufficient income is generated.

Due to the corporate social responsible activities by project authorities, the socio economic condition of the people will be improved.

People perceive that the project will in the long run help in the development of social Infrastructures /such as

- Education facilities
- Banking facilities
- Post offices and Communication facilities
- Medical facilities
- Plantation and parks
- Community facilities

Industrial development and consequent economic development should lead to improvement of environment through better living and greater social awareness. On the other hand, the proposed project is likely to have several benefits like better disposal and treatment of hazardous wastes, improvement in indirect employment generation and economic growth of the area, by way of improved infrastructure facilities and better socioeconomic conditions. Better hygienic conditions, as solid waste being dumped at several places will be brought to one place for further treatment and scientific disposal.

8.2.3 Employment Potential

The main advantage of the proposed project is direct employment generation

i. absorbs rural labor 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. The maximum benefit will be for local villagers as they are easily accessible.

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.

Employment in these sectors will be permanent based on own initiatives and interest of the individual. Involvement of unskilled labor requirement will be continuous basis depending on the requirement of contractor at site. A major part of this labor force will be hired from nearby places.

8.2.4 Green Belt

Free space will be provided for plantation purpose and the right saplings will be planted to provide ambience to the people working at the facility and also keeping in mind the environmental benefits of these plants.

Green belt though not associated directly with treatment/disposal facility is a major psychological aspect creating impact of effective disposal scheme around the CHWTSDF site area.

The green belt will be developed along plot boundaries with width of 20 m using varieties of plant species suitable to local environment. Species type will be based on soil characteristics and other related aspects to mitigate pollution effects due to noise, odor, dust etc. The major advantage of green belt is development of buffer zone and visual barrier for surrounding locality.

Green belt will be also helpful for reducing the soil erosion, suppress dust generation and enhancing the aesthetic value of the area.

Green Belt Development Plan

Total Area 16.2 Ha (162000 Sq m) out of which 33% 5.4 Ha (53460Sq m) Green belt. Around 10800 Trees to be planted as per the Horticulture Department.

Name of Trees for Green Belt Plan

Acacia ferruginea DC.	Banni
Acacia leucophloea Roxb.	-
Acacia nilotica Willd. Ex Delile	Karjali
Aegle marmelos (L.) Correa	Bael
Albizia amara (Roxb.) B. Boivin	Tugli,Chigare
Albizia lebbeck (L) Benth.	Bage/ Siris
Albizia saman (Jacq.) Merr.	Rain tree
Albizzia procera (Roxb.) Benth.	Belati/ Safed siris
Azadirecta indica A. Juss	Bevu/Neem
Cocos nucifera L.	-
Dalbergia sissoo Roxb.	Sissoo

Eucalyptus spp	Nilgiri
Ficus religiosa L.	Arali/ Peepal
Mangifera indica L.	Mavinamara/Aam
Melia azedarach L.	Arebevu
Peltophorum pterocarpum (DC.) K.Hene	-
Polyalthia longifolia (Sonn.) Hook. f.	Asoka
Pongamia pinnata (L.) Pierre.	Honge/ Kanige
Psidium guajava L.	Amrood
Syzygium cumini (L.) Skeels	Nerale
Tamarindus indica L.	Hunise
Tectona grandis L. f.	Tegal/ Sagavani
Terminalia tomentosa (Roxb.) Wight & Arn.	Karrinatti
Bambusoideae	Bamboo

Year wise Green Belt Development

Year	Area (Ha.)	No. of Saplings
1st	1.08	2160
2nd	1.08	2160
3rd	1.08	2160
4th	1.08	2160
5th	1.08	2160
Total	**5.4**	**10800**

8.2.5 Corporate Environment Responsibility (CER)

- Additional housing demand for rental accommodation will increase
- Cultural, recreation and aesthetic facilities will also improve.
- Improvement in communication, transport, education, community development and medical facilities.

- Overall change in employment and income opportunity

The State Government will also benefit directly from the proposed project, through cleaner environment.

Corporate Environment Responsibility (CER)

Expenditure incurred on CER	**Expenditure proposed (Rs.) Lakhs**
General development in the area	
a) Housing	25
b) Water supply	15
c) Education	21
d) Health, safety and medical facilities.	26
Infrastructure-public transport, roads, communication and electricity	2
Recreation and other sports activities	11
Total	**118**

Chapter-9

Environmental Cost Benefit Analysis

The Total Cost for proposed project is **Rs. 5948.69 Lakhs** The proposed activity is intended to take care of the contaminants from industrial activities in Karnataka state. Hence CPCB has directed the medium waste generating states like Karnataka to develop an Integrated Common Facility where the waste can be safely treated/ disposed off and the facility will be scientifically designed, operated and maintained. Thus, the creation of this facility is a mandatory requirement for the state of Karnataka and the state will also benefit greatly by way of managing its wastes safely. The availability of a CHWTSDF facility will give a boost to industrialization in Karnataka as industries will prefer to set up their units in the state. As seen above, the people in nearby villages have perceived the benefits that industry has provided to the state in terms of alternate employment opportunities, thus the state will greatly benefit due to setting up of CHWTSDF.

M/s Mother Earth Environ Tech Pvt. Ltd. (shall be operating common TSDF and doing Environment Management through Hazardous waste treatment and disposal, so all activities, process and operation is concerned with Environment management and improvement. The investment in developing the facility is pegged at about Rs **5948.69 Lakhs** and the capital investment proposed for Environmental protection measures is Rs **160.00 Lakhs**. The funds earmarked for environment protection measures will be maintained in a separate account and there shall be no diversion of these funds for any other purpose. It shall be also ensured that sufficient funds are set aside M/s Mother Earth Environ Tech Pvt. Ltd. by for the Closure and Post closure phase Monitoring, Inspection and Maintenance over long duration.

Compared to individual industry managing hazardous waste of their own including in captive facility, the common facility for proposed expansion will have significant environmental benefit in terms of proper land filling designed and established as per guidelines by CPCB.

The upcoming project will generate direct and indirect employment opportunities for the local people. During Construction phase, the labors and workers

will be hired from nearby villages. About 30 persons (8 skilled, 22 semi-skilled) will work in the integrated TSDF in its fully operational state. In addition 35-40 contract labourer and 12 security personnel will be needed for operation of the facility.

The secondary employment in the form of contracts for services like maintenance, landscaping, water tanker, civil works and waste handling, waste transport etc will also be developed in the neighbouring villages. The company will also provide the helping hand in the development of the nearby villages by arranging regular medical check-up camp for the employees.

The project will generate employment in the study region & in Karnataka state since availability of CHWTSDF may attract more industries to Karnataka & other Industrial Areas. The local economy will receive a boost due to employee spending and services generated by applicant.

Project Cost

We would like to inform that M/s Mother Earth Environ Tech Private Limited (MEEPL) has conceived both integrated TSDF and CETP as a single project and land allocation has been done by KIADB accordingly. Hence, initially when the Form-1 was submitted, a combined cost of the project was mentioned as Rs.135 crores which include cost of TSDF and cost of CETP.

However, since CETP was already approved by MoEF&CC and issued EC as part of the Kadechure Industrial Area, MEEPL is now requesting the stand alone EC for TSDF.

Hence, after separating the cost of CETP, the cost of integrated TSDFwill be Rs. 59.48 crores.

The **breakup of project cost as given in table below. Serial No. 2 (**Building, Storage Shed and other Civil Works) **& 3 (**Machinery, vehicles and Laboratory Equipments) **are varying and other cost remain unchanged.**

Table 9.1: Breakup of Project Cost

Sr. No.	Item	Cost (INR) of Integrated TSDF only	Previous Cost (INR) of the project including integrated TSDF and CETP
1	Land Cost	3,90,00,000.00	3,90,00,000.00
2	Building, Storage Shed and other Civil Works	38,30,25,965.00	55,08,16,465.00
3	Machinery, vehicles and Laboratory Equipments	12,21,75,160.00	69,44,12,264.00
4	Pollution Control Measures	1,60,00,000.00	1,60,00,000.00
5	Office Equipment and Power Supply & other development works	1,58,69,792.00	1,58,69,792.00
6	Miscellaneous	69,01,479.00	69,01,479.00
7	CSR Activities	1,18,97,396.00	2,70,00,000.00
Total Cost		**59,48,69,792.00**	**1,35,00,00,00,000.00**

Chapter-10

Environmental Management Plan

10.1 Introduction

EIA report has identified a number of impacts that are likely to arise, where adverse impacts have been identified; the EIA has examined the extent to which these impacts would be mitigated through the adoption of industry standard practice and guidelines and following legislative requirements of the State Pollution Control Board (SPCB). The Environmental Management Plan (EMP) describes both generic good practice measures and site specific measures, the implementation of which is aimed at mitigating potential impacts associated with the proposed activities.

The Environmental Management Plan is prepared with the main objective of enlisting all the requirements to ensure effective mitigation of adverse impacts for all the components of the proposed project. The objectives taken into account in preparation of EMP are summarized here as follows:

a) The prevention, control and abatement of pollution, i.e. air pollution, water pollution, hazardous/ non-hazardous wastes and noise pollution,
b) To comply with the stipulated enviro-legal requirements and standards,
c) To direct the steps to be followed, for effective maintenance and regulation of environmental management system.
d) To ensure the better and safe work environment through pre-meditated planning of prevention and control of hazards,
e) To direct the investments towards sustainable development by considering the cost of effluent treatment, emission control, waste disposal, social development, green belt development and health & safety in the planning stage only,
f) To account for recycling and reusing measures, proposed or required to be adopted for minimization of consumption of resources and generation of pollutants.

10.2 Purpose of the Environmental Management Plan

Environment Management Plan (EMP) is a site specific plan developed to ensure that the project is implemented in an environmental sustainable manner. EMP also ensures that project implementation is carried out in accordance with design by taking appropriate mitigation measures to minimize impacts on the environment during construction and operational phase. EMP will outline Environmental aspects of concern as well as their level of risk and environmental protection measures to diminish this risk. It emphasizes how the development may impact on relevant environmental factors and how these impacts may be mitigated and managed so as to be environmentally acceptable.

Environment Management Plan (EMP) plays a vital role in safeguarding the environment and ensures, where all contractors and subcontractors including consultants, understand the potential environmental risks arising from the proposed project. The proposed project of setting up a Waste Management facility itself is a project for environmental and social betterment of the city. However, any activity aimed at development will have repercussions on the environment, both positive and negative. This section attempts to briefly analyze the environmental impacts of the proposed project and suggest the possible mitigate measures and management plans for perceived negative impacts. This section also highlights the positive project impacts and serves as a Management tool for project implementation with environmental safeguard.

The environment management plan is prepared with a view to facilitate effective environmental management of the project, in general and implementation of the mitigation measures in particular. The EMP provides a delivery mechanism to address potential adverse impacts and to introduce standards of good practice to be adopted for all project works. For each stage of the programme, the EMP lists all the requirements to ensure effective mitigation of every potential biophysical and socio-economic impact identified in the EIA. For each impact or operation, which could otherwise give rise to impact, the following information is presented:

Role of Mother Earth Environ Tech Pvt. Ltd.

A comprehensive listing of the mitigation measures (actions) that shall implement; the parameters that shall be monitored to ensure effective implementation of the action, the "implementation action plan timings" to ensure that the objectives of mitigation are fully meet.

Sr. No.	Activity	Environmental issue	Management action to be taken
I. Operation of Plant Facilities			
1	Hazardous waste treatment and disposal facilities.	Air, Land And Water	Ensure proper unloading procedure during Hazardous waste treatment & disposal.
			Provide required personnel protective equipment to all employees.
			The organization will ensure proper usage of PPE's by workers and explore methods for reducing the fugitive emission.
			Monitoring data will analyze and review at regular intervals and compared with the operating standards so that any necessary corrective actions can be taken.
			Ground and surface Water use will be carefully monitored.
			Practices such as process optimization, production scheduling, materials tracking and inventory control, special material handling and storage procedures, preventive maintenance programs, and waste stream segregation will be adopted.
			Contaminated solid waste should be stored.
			Installation of a storage area with proper top covering and impervious flooring to avoid soil contamination due to leachate infiltration and during rainy season.

			The construction of landfill and development phase requires proper planning and proper selection of the earthwork / lining material. The containment system of landfill is proposed with double liner system with a view to avoid the leachate infiltration into the ground.
II. Operation of Utilities			
1	DG sets (only in emergency)	Noise, Land and Air	Ensure proper maintenance of machinery to reduce noise level
			Ensure proper disposal of contamination due to spillage clean up.
			Ensure proper disposal of contamination due to spillage clean up.
2	Solar Evaporation Pond	Water and Land	Ensure disposal of waste water in ETP, reuse after treatment and maintain records.
3	Air Compressors	Noise and Land	Ensure proper maintenance of machinery to reduce noise level.
			Ensure disposal of oil through registered Re-processor and maintain records of the same.
			Ensure proper disposal of contamination due to spillage clean up.
4	Effluent Treatment Plant	Water and Land	Ensure disposal of contaminated water by Treatment.
5	Temporary Solid Waste storage and handling within the premises	Land and Water	Ensure only decontaminated liners - bags, drums to maintain records of same.

III. Storage, Handling & Transportation of Haz. waste input materials			
1	Storage of all the input materials,	Air, Water and Land	Install proper facilities to prevent rain/storm water contamination during the storage of Haz.waste input materials.
			Ensure compliance of Compatibility chart for hazardous waste storage and transportation of CPCB
			Ensure compliance of Compatibility chart for hazardous waste storage and transportation of CPCB
			Ensure proper training to drivers for transportation of hazardous chemicals, spill control and emergency actions.
			Ensure availability of Hazardous characteristics of all the input waste materials and fuel etc. to the Off-site Emergency team, whenever required.
2	Transportation of hazardous wastes.	Air, Water and Land	Ensure provision of PPE's to truck drivers during transportation.
			The dust generated due to the movement of the vehicles will be controlled by frequent sprinkling water or good roads which are regularly maintained.
			Ensure availability of Hazardous Waste characteristics.
			Ensure the compliance of compatibility chart for transportation of Wastes to facility
V. Other facilities			
1.	Toilets	Water	The sewage water disposes to soak Pit
2	Direct/ Indirect Employment	Socioeconomic issue	Continue policy of local employment

3	Development and maintenance of green belt	Air and Land	Development of greenbelt based on water quantity and soil quality in area. Green belt though not associated directly with treatment/disposal facility will help screen the site and improve aesthetics – it will also help for slope stabilization and soil erosion prevention. The green belt will be developed along plot boundaries with minimum width of 20 m and in centre portion of plot using varieties of plant species suitable to local environment. Species type will be based on soil characteristics and other related aspects to mitigate pollution effects due to noise, odour, dust etc.

Preparation of environmental management plan is required for formulation, implementation and monitoring of environmental protection measures during and after commissioning of projects. The plans should indicate the details as to how various measures have been or are proposed to be taken including cost components as may be required. Cost of measures for environmental safeguards should be treated as an integral component of the project cost and environmental aspects should be taken into account at various stages of the projects.

- Conceptualization: preliminary environmental assessment
- Planning: detailed studies of environmental impacts and design of safeguards
- Execution: implementation of environmental safety measures
- Operation: monitoring of effectiveness of built-in safeguards

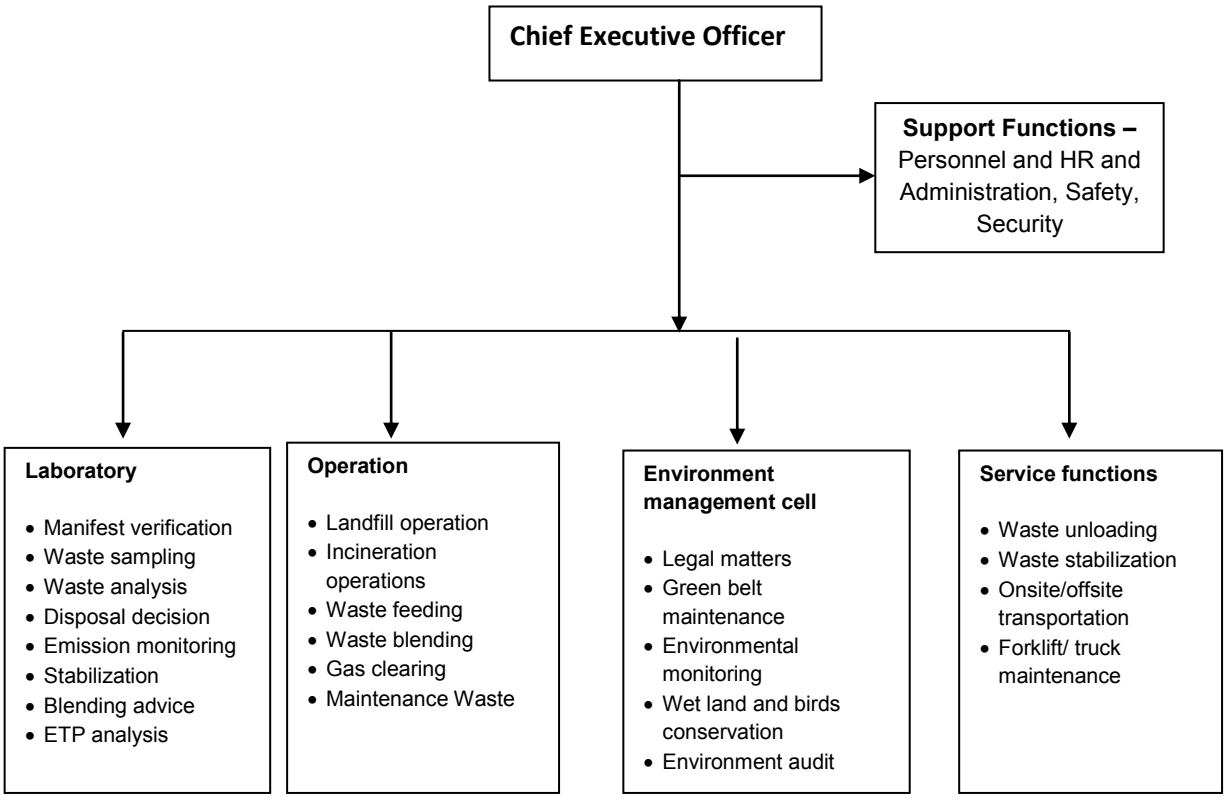
10.2.1 Financial Provisions for EMP Implementation

Costs for pollution control, monitoring will be included in the account under separate head in CAPEX as well as OPEX provisions.

10.2.2 Authorities Responsible for EMP Implementation

Structural measures (such as installation of ETP / STP, preventive and protective equipment etc): Directors, Project manager, accounting head/ manager, Site Officer & engineers, Contractors.

Non-Structural (SOP's, studies, implementing systems etc): Directors, Manager, accounting head/ manager, Plant in-charge, Safety & Environment Officer & engineers, Contractors & operators.



10.2.3 EMP Implementation Schedule

The project implementation schedule after obtaining Environmental Clearance is mentioned below in Table 10.1.

Table No. 10.1: Project Implementation Schedule

Sr. No.	Activities	Duration (Months)
1	Appointment of consultant, basic engineering and issue of tender enquiries	1
2	Detail engineering	2
3	Civil Design	1
4	Civil Construction	7
5	Mechanical erection	1
6	Electric and instrumentation	1
7	Trail run and Commissioning	1

It is observed that the recommendations for environmental protection made in this EIA can be grouped in several heads. The implementation of the measures will progress as other phases are progressing as given below:

Table 10.2: Implementation Schedule for Major actions in the EMP

Sr. No.	Broad category of EMP Measures	Typical Examples	Phase to be taken up
1	Land Related	Development of garland drains, Berm /retaining wall, terracing of slopes, Top soil preservation etc	Start of Construction Phase
2	Air Pollution related	Water sprinkling, Use of PUC vehicles, Preventive maintenance of vehicles, PPE for personnel etc	Throughout construction, Phase

3	Noise Pollution related	Use of DG sets and Construction machinery generating low noise, Preventive maintenance of Vehicles and Construction machinery, PPE for personnel	Throughout construction, Phase
4	Water Pollution related	Development of garland drains, Berm/retaining wall terracing of slopes	Start of Construction, Phase
5	Ecology and Biodiversity	Development of Green Belt	Start of Construction Phase
6	Socioeconomic	Employing local youth , contractors, suppliers etc	Throughout construction, Phase
7	Technological initiatives for Water/Air Pollution Control	Construction of ETP, Leachate tank, Sediment traps on garland drains	Mid of Construction Phase
		Rain Water harvesting	Mid of Construction Phase
8	Administrative Measures	PPE for staff	Throughout construction phase
		Insurance cover for staff	Before start of construction / erection at site
		Public liability Insurance cover	End of construction phase
9	Engineering Measures	Pollution control Equipment	Before start of erection at site

Chapter 11

Summary & Conclusion

Introduction

M/s Mother Earth Environ Tech Pvt. Ltd. Bangalore (MEETPL) is proposing an integrated Treatment, Storage and Disposal Facility (TSDF) for hazardous waste (HW) under the setting-up and operational compliance framework of the Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016 (Hazardous Waste Rules) over a 16.2 ha Industrial Plot within Notified Industrial Estate (IE) of Karnataka Industrial Area Development Board (KIADB), Kadechur, Taluka and District Yadgir, Karnataka. The proposed integrated TSDF will comprise a secured landfill of 1.21 MT and an incinerator of 12 T/day (Phase I – Stationary hearth type), expandable to 24 T/day, Phase II - Rotary kiln primary chamber type) treatment and terminal disposal of hazardous waste, along with essential utilities and amenities.

The site will also feature a 5 MLD CETP based on conventional technology, to be developed in phases of 1.2, 1.2 and 2.6 MLD.

Identification of the Project & Project Proponent

The Proposed Project falls under S. No. 7(d) of Activity “Common Hazardous Waste Treatment, Storage and Disposal Facilities (CHWTSDFs)” Category ‘A’ as per EIA Notification, 2006 as amended till date.

Salient features of the project are summarised in table below:

1	**Name of the project**	Establishment of Integrated Common Hazardous Waste Treatment, Storage and Disposal Facility (CHWTSDF) at Village- Kadechur, Teshil- Yadgir, Karnataka
2	**Promoters**	M/s Mother Earth Environ Tech Private Limited Bangalore

4	**Location**	The project is located at Latitude 16^0 31' 8.0436" North Longitude 77.18' 31.2588" East Plot No- 158 to 164 Village - Kadechur, Teshil- Yadgir
5	**Total Plot Area**	16.2 ha
6	**Business**	Integrated Hazardous Waste Management Facility. Collection, Transportation, Reception, Treatment, Storage, Blending and Disposal of Industrial and Hazardous Wastes Generated in the state of Karnataka
7	**Installed Capacity**	secured landfill of 1.21 MT and an incinerator of 12 T/day (Phase I - Stationary hearth type), expandable to 24 T/day, Phase II - Rotary kiln primary chamber type)
9	**Principle of Operation**	User-Pay-Principle
10	**Water Requirement**	Maximum water consumption will be 100 KLD. That will be available from KIADB Water Supply
11	**Waste Water**	Leachate and effluent from landfill will be treated in Effluent Treatment plant (ETP) and Solar evaporation pond(SEP) and send to CETP as per requirement.
12	**Man power**	During construction phase, the labours and workers will be hired from local village Construction Phase- 35 to 40 workmen Operation Phase – 30 workmen Security-12 , Contract Labourer-35-40
13	**Electricity and Power Requirement**	Proposed project is secured landfill facility (SLF) with Treatment and Stabilization facility at TSDF site. The power requirement 450 KW will be met from (GCSCOM). In case of power failure, D.G. Set will be used (150 KVA capacity) in Emergency only. HSD at rate of 3 KL/Month will be used as fuel in D.G.

		set.
14	**Project Cost**	Rs. 5948.69 Lakhs
15	**Scope of the Project**	• Establishment of CHWTSDF facilities on Built, Own, Operate and Transfer (BOOT) basis • Training in segregation and occupational safety • Collection and Transportation of Hazardous waste from the generator to the TSDF facility duly following the manifest and other regulatory requirements as per KSPCB guidelines • Onsite Environmental monitoring including emergency procedures • Treatment storage and disposal of wastes • Periodical Reporting to Regular Authorities • Carrying out Comprehensive and Fingerprint analysis of wastes as per Hazardous Waste(Management, Handling and Trans boundary) Rules 2016
17	**Conclusion**	The estimated cost of the Project is approximately Rs. 5948.69 Lakhs. M/s Mother Earth Environ Tech Private Limited shall be an important endeavour to mitigate the degradation of environment in the region. The Facility is designed to cater industrial waste who are generating Hazardous waste

The proposed project will be established and operated by M/s Mother Earth Environ Tech Private Limited.

Project Location and Its Advantage

The proposed Kadechur Industrial Area is located near village Kadechur, around 45 Kms from Yadgir. The project site gradually slopes towards South-East

direction with rolling terrain. The soil is predominantly Blackish to Grey clayey sand. The project area is approachable on National Highway towards Raichur- Mumbai National Highway. Thus the project location is strategically located and in fact this National Highway bifurcates the entire industrial area and has potential for attracting more industries. Further, this industrial area is also located adjoining main railway line connecting Raichur, Ananthpur, Bengaluru on southern direction and Gulbarga, Solapur, Miraj, Pune and Mumbai on North- West direction. Yadgiri is also the connecting point to the Indian Capital, i.e. Delhi & other major metros viz. Bangalore, Chennai, Hyderabad, Bhopal, etc.

Project Objectives

To collect and receive the hazardous wastes generated from the various industries situated in the state of Karnataka on a regular basis.

- To ensure proper storage of the wastes with respect to their classification, characterization and compatibility.
- To arrange for treatment of wastes, solidification/stabilization and Secured landfill Disposal with or without pre-treatment or depending upon the characteristics of the wastes.
- To educate and make the individual industry aware of storing the hazardous waste in scientific manner and comply with the regulations
- To educate the industry to minimize the generation of hazardous waste at source and manage the industrial growth in sustainable manner.

Need for the Project

With the ever-increasing population, industrial growth and urbanisation, waste management has emerged as a huge challenge in the country. Not only the waste has increased in quantity, but the characteristics of waste have also changed tremendously over a period due to change in industrial process integration, consumption pattern, lifestyle and use of civic consumables and durables. It is estimated that about 62 million tonnes of waste is generated annually in the country, out of which 5. 6 million is plastic waste, 0.17 million is biomedical waste. In addition, hazardous waste generation is 7.90 million TPA and 15 lakh tonne is e-waste. The

per capita waste generation in Indian cities range from 200 gm to 600 gm/day (2011). 43 million TPA is collected, 11.9 million is treated and 31 million is dumped in landfill sites.

According to Karnataka State Pollution Control Board (KSPCB) Inventory of Hazardous Waste as on 20th December, 2017, the state of Karnataka generates about 1,91,990 MT/annum (plus 9,52,199 nos of contaminated units – containers, filters, etc. which are not measured in weight units) of hazardous waste from 3134 industrial/ other units, 46,596 MT/annum (24.2%) of which is land-fill able waste and 79,542 MT/annum (plus 74,068 nos.) (41.4%) is incinerable waste.

The generation of hazardous waste, both landfill and incinerable is heavily skewed towards Bangalore (Urban and Rural), contributing a dominant portion of the wastes in both incineration and landfill categories. There are no integrated TSDFs (featuring both secured landfill and HW incinerator at the same site) in Karnataka.

Estimation of HW Quantity

Sr. No.	District	No of Population	Industries	Total HW(MT/Y)	Total HW(TPD)
1	Gulbarga	3659928	12	5213.1	14
2	Yadgir	956180	9	2.5	0
3	Bellary	4145421	66	1325.6	4
4	Bidar	2659871	19	1318	4
5	Raichur	2918687	19	214	1
6	Belgavi	8346178	24	204.3	1
7	Bagalkote	3182882	41	73	0
8	Chitradurga	2992390	26	155	0
9	Gadag	1750685	14	103	0

10	Haveri	2840948	18	706.8	2
11	Koppal	1917621	40	173	0
12	Davangere	3264721	41	408	1
Total		**38635512**	**329**	**9896.3**	**27**

Description of Connectivity of the Area

Road: National and State Highways passes through the District providing good connectivity to the Capital City Bangalore and other important Districts and also parts of Maharashtra, Kerala, Tamilnadu and Andhra Pradesh

Rail: The District is connected well to the important cities like Mangalore and Bangalore through south central railway network. Nearest railway station of the proposed project site is Chegunta railway station located at 3.8 km

Air: The International Airports located in Karnataka are at Bangalore and Mangalore and nearest Hyderabad Airport is 140 km away from the project site. However, there is helipad facility available in the district.

Port: The sea port of Karnataka is at Mangalore.

The Village Kadechur situated besides the project site. However the habitation of the village is scattered in nature.

Land Form

The total project area is16.2 ha. The land breakup is given below

Land Breakup

Sl. No.	Description	Area in Sq. mt.
1	Hazardous Waste Land Fill	65,660.00 Sq.mt
2	Incineration	3,000.00 Sq.mt

3	Incineration Waste Storage Shed	1,000.00 Sq.mt
4	Haz. Waste Temporary Storage Shed	900.00 Sq.mt
5	Vehicle Parking Area	600.00 Sq.mt
6	Stabilization Bin	225.00 Sq.mt
7	Stock Piling	900.00 Sq.mt
8	Material Storage Shed	400.00 Sq.mt
9	Vehicle washing with Sump	50.00 Sq.mt
10	Office Building with Laboratory	100.00 Sq.mt
11	Storm Water bin for plant Layout	150.00 Sq.mt
12	Storm Water bin for Land Fill	36.00 Sq.mt
13	Solar Evaporation Pond	200.00 Sq.mt
14	Primary Treatment Plant	50.00 Sq.mt
15	Leachat Storage	100.00 Sq.mt
16	Roads along with Drains	8628.50 Sq.mt
17	Security Cabin	15.00 Sq.mt
18	Weigh Bridge	48.00 Sq.mt
19	Green Belt	53,419.00 Sq.mt
20	Work Shop	600.00 Sq.mt
21	Transformer Yard	100.00 Sq.mt
22	Fire Hydrant Extension	60.00 Sq.mt
23	Utility Purposes	6310.50 Sq.mt

Water Requirement

The total water requirement for the proposed facility is 100 KLD, fresh re-circulating Water will be supplied by KIADB and waste water, which will be treated and sent to solar Pond or to CETP.

Utilities

Following utilities would be required for the routine operation.

Utilities Facilities

Electricity	450 KW
DG set	150 KVA (One)
Telephone	3 Lines (Dot)
Mobile connections	3 lines
E-mails	Given all to Managers
Water	62 KLD
Canteen	adequate staff requirements and will be enhanced as required

Manpower

About 42 persons will work in the integrated TSDF in its fully operational state including security personnel.

Manpower Requirement for Proposed Plan

Sr. No.	Item	Nos Rqrd.
A	Primary Operation	
1	Land Fill operator	22
2	Machine Operator	4
3	Heavy Vehicle driver	4

B	Secondary Operation	
4	Security	12
5	Contract Labourer	35-40

Description of Environment

1) Air Environment

Summary of Ambient Air Quality Results Dec 2017 to Feb 2018 in (µg/m^3)

Sampling Stations	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO*
AAQ-1: Project Site					
Max	72.4	15.1	27.7	33.9	0.87
Min	62.5	12.1	20.2	24.3	0.65
Average	67.5	13.6	24.0	29.1	0.76
98%tile	72.2	15.0	27.6	33.7	0.86
AAQ-2: Kadechur					
Max	70.1	25.1	17.5	21.5	0.83
Min	56.7	17.9	14.3	16.4	0.24
Average	63.4	21.5	15.9	19.0	0.54
98%tile	69.9	25.0	17.4	21.4	0.82
AAQ-3: Balched					
Max	71.2	30.3	17.5	35.5	0.87
Min	62.2	20.1	14.3	28.6	0.29

Average	66.7	25.2	15.9	32.0	0.58
98%tile	71.0	30.0	17.4	35.3	0.86
AAQ-4: Kothapalle					
Max	63.8	26.3	15.7	19.1	0.59
Min	55.9	18.4	11.7	12.5	0.21
Average	59.9	22.4	13.7	15.8	0.40
98%tile	63.7	26.2	15.6	19.0	0.58
AAQ-5: Baddepalli					
Max	68.3	24.6	15.2	37.2	0.36
Min	59.3	16.5	11.7	30.2	0.13
Average	63.8	20.6	13.7	33.7	0.25
98%tile	**68.1**	24.4	15.6	37.1	0.35
AAQ-6: Kunsi					
Max	72.7	31.3	18.2	21.3	0.88
Min	63.5	23.3	14.4	16.7	0.71
Average	68.1	68.1	16.3	19.0	0.80
98%tile	72.5	72.5	18.1	21.2	0.87
AAQ-7: Badiyal					
Max	70.7	26.8	17.0	17.0	0.51
Min	62.4	17.7	11.3	11.3	0.11
Average	66.5	22.3	14.1	14.1	0.31

98%tile	70.5	26.6	16.8	16.8	0.50
AAQ-8: Saidapur					
Max	73.6	32.6	32.6	25.3	0.88
Min	64.6	25.2	25.2	18.1	0.75
Average	69.1	28.9	28.9	21.7	0.82
98%tile	73.4	32.4	32.4	25.2	0.86

The observations based on a perusal of the results for Winter Season are summarized below:

Respirable Particulate Matter (PM_{10}):

A maximum value of 73.4 $\mu g/m^3$ was observed at Saidapur (AAQ-8) and minimum value of 56.7 $\mu g/m^3$ was observed at Village at Kadechur (AAQ-2). The average values were observed to be in the range of 59.9 to 69.10 $\mu g/m^3$ and the 98% tile was observed by in the range of 63.7 to 73.4 $\mu g/m^{3.}$

Particulate Matter ($PM_{2.5}$):

A maximum value of 32.6 $\mu g/m^3$ was observed at Saidapur (AAQ-8) and minimum value of 12.1 $\mu g/m^3$ was observed at Project Site (AAQ-1). The average values were observed to be in the range of 13.6 to 28.9 $\mu g/m^3$ and the 98% tile was observed by in the range of 15.0 to 32.4 $\mu g/m^3$.

Oxides of Nitrogen (NO_x):

Maximum concentration of NO_2 is observed to be 37.2 $\mu g/m^3$ at Baddepalli (AAQ-5) and minimum value of 11.3 $\mu g/m^3$ observed at AAQ-7 Badiyal. The average values were observed to be in the range of 14.1 to 33.7 $\mu g/m^3$ and the 98% tile was observed by in the range of 16.8 to 37.1 $\mu g/m^3$.

Sulphur Dioxide (SO_2):

Maximum concentration of SO_2 is observed to be 32.6 $\mu g/m^3$ at AAQ-8 Saidapur and minimum value of 11.3 $\mu g/m^3$ observed at AAQ-7 Badiyal. The average values were observed to be in the range of 13.4 to 28.9 $\mu g/m^3$ and the 98% tile was observed by in the range of 15.1 to 32.7 $\mu g/m^3$.

Carbon Monoxide (CO):

Maximum concentration of CO is observed to be 0.88 mg/m^3 at Saidapur (AAQ-8) and minimum value of 0.11 mg/m^3 observed at AAQ-7 Badiyal. The average values were observed to be in the range of 0.10 to 0.16 mg/m^3 and the 98% tile was observed by in the range of 0.35 to 0.87 mg/m^3.

2) Wind Pattern

The predominant wind direction in the month of Dec 2017 to Feb 2018 is E followed by SE with wind speeds recording up to 2.5 m/s.

The predominant wind direction in the month of Dec 2017 is E followed by SE with average wind speeds recording up to 2.0 m/s.

The predominant wind direction in the month of Jan 2018 was E followed by SE with average wind speeds recorded up to 2.3 m/s.

The predominant wind direction in the season Feb 2018 was SE followed by E with average wind speed up to 2.5 m/s

3) Noise Environment

Noise Monitoring Results (Dec 2017 to Feb 2018)

Location Code	Noise Sampling Location	Environmental Setting	Leq (Day)	Leq (Night)
N1	Project Site	Industrial	55.0	41.3
N2	Kadechur	Industrial	52.1	43.1
N3	Balched	Residential	50.5	42.2
N4	Kottapalle	Residential	50.9	40.1
N5	Baddepalli	Residential	51.7	41.1
N6	Kunsi	Residential	53.3	40.2
N7	Badiyal	Residential	52.1	43.1
N8	Saidapur	Residential	50.2	41.0

4) Soil Environment

Soil Analysis Result

Parameters	Unit	Analysis Result				
		S1	S2	S3	S4	S5
pH	---	6.66	7.16	7.10	6.72	6.80
Conductivity	µmho/cm	41.8	61.4	98.8	23.3	145.5
Total Phosphorus P_2O_5	mg/ kg	18.3	24.3	12.42	84.0	22.6
Nitrates N	mg/ kg	63.1	70.23	68.42	54.88	70.8
Total Potassium K_2O	mg/ kg	120.5	150.4	120.5	158.0	246.5
Sodium Na_2O	mg/ kg	14.24	16.12	13.44	12.84	17.46
Organic Matter	%	0.72	0.84	0.84	0.86	0.76

Calcium Ca	mg/ kg	500	560	420	480	260
Magnesium Mg	mg/ kg	279.4	291.6	206.5	315.9	109.3
Sand	%	36	37	43	39	37
Silt	%	49	50	44	46	51
Clay	%	15	13	13	15	12
Bulk Density	g/cc	1.40	1.34	1.33	1.28	1.48
Moisture Content	%	6.12	6.66	8.12	5.14	6.42
Copper as Cu	mg/ kg	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Zinc as Zn	mg/ kg	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Manganese as Mn	mg/ kg	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Nickel as Ni	mg/ kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium as Cd	mg/ kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium as Cr	mg/ kg	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Sulphate as SO_4	mg/ kg	36.12	22.10	34.76	20.82	28.63
Iron as Fe	mg/ kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Lead as Pb	mg/ kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Observations of the Results

It has been observed that the pH of the soil ranged from 6.66 to 9.10 indicating that the soils are Very strongly basic to Neutral in nature. The soil in the study area is clay ranging from 12 to 15 %. The electrical conductivity was observed to be in the range of 145.5 to 23.3 μS/cm.

The nitrogen concentrations are in the range of 54.88-70.80 kg/ha indicating

that soils have high quantities of nitrogen. The phosphorous concentrations are in the range up to 84 kg/ha indicating that soils have sufficient quantities of phosphorus. The potassium concentrations range up to 246.5 kg/ha, which indicate that the soils have very less of potassium

5) Water Environment

Ground Water Quality

The pH values observed were in the range of 7.21-7.85, with total dissolved solid ranging from 395 mg/l to 1840 mg/l. Total Hardness was in the range of 215 mg/l to 440 mg/l, The concentration of sulphates and nitrates in all the samples were less than prescribed limits.

Surface Water Quality

The pH values observed were in the range of 7.62 to 7.94 with total dissolved solids in the range of 145 mg/l to 355 mg/l. BOD were observed less than 2.0 Chloride varied between 5.6 mg/l & 25.82 mg/l. Sulphates varied from 2.6 to 27.96 mg/l, Nitrate varied from 0.95 to 1.54 mg/l. Overall, the surface water samples were found within the prescribed limits.

Heavy Metals in Surface Water Quality

Heavy metal concentrations: Iron (Fe) ranging from 0.12 to 0.18 mg/l and Zinc (Zn) is below 0.50.

Heavy Metals in Ground Water Quality

Heavy metal concentrations i.e. Iron (Fe) is below0.10 and Zinc (Zn) is below detection limit i.e 0.50.

6) Socio-Economic

Demographics

The study area following in total 52 villages, 2 districts (Yadgir from KA, and Mahbubnagar from TS), and 3 sub districts namely Yadgir and Shahpur from Karnataka and Maganoor from Telangana states comprises in the buffer zone, total population is 77717 among them 38819 are male and 38898 are female, among them 12059 are total children, male children are 6121 and female children are 5938. The male and female ratio of the study area is 998 males per every 1000 females.

Education

As per the 2011 census data the total literacy level in the buffer zone is 39% among them, male are 3.9% literates and 15.1% are the female literates. The Yadgir district average literacy ratio is 43.4% and the Mahbubnagar district average literacy ratio is 47.9% from the analysis, it is concluded that people are poor and are not well educated; therefore the company need to focus on education and more on girl child and women education and development will provide the necessary alternate source of income generation in this area, which improves the standard of living of the population in the study area literacy.

Status of Literacy

Sr. No.	Particular	(Except below 06 years age population)
1	Total Population	77717
2	Total Literates	30305
3	Total Literacy Rate	39 %
4	Male Literates	18588
5	Male Literacy Rate	23.9 %
6	Female Literates	11717
7	Female Literacy Rate	15.1

The Socio Economic Conditions of this 10-km radius area shows that of the total Main workforce 15.7% are engaged in cultivation 24.5% are agricultural labourers and 1.% of workers engaged in Household labour, the remaining 10.1% workers are engaged in other activities.

The socio-economic analysis of the Study area shows that in terms of education and employment, the area is not developed. The overall socio-economic status of the target population is low in terms of literacy; less work participation rate is, etc.

More attention and care should be taken so that the needs and demand of these marginalized classes of the influence area population can get more exposure to modern facilities of education and development.

The marginalized population of Scheduled Caste (SC) and Scheduled Tribe (ST) in the study area and special attention has to be given towards these groups. Among the total population Scheduled Caste (SC) is 14114 and Scheduled Tribe (ST) is 2909, percentage wise 18.2% of Scheduled Caste (SC) and 3.7% of Scheduled Tribe (ST) population

Basic Amenities

The basic amenities existing in study area are as follows:

- The education facilities are evenly distributed in the study area. Primary schools are available in 52 villages. There are 69 primary schools; followed by 34 middle schools, 7 Secondary schools, 2 senior secondary school and none of the disabled school are not available in the study area.
- Drinking water facilities are available in all 52 villages in the form of Tap, Well, Tank, Tube well, hand pump and river.
- Communication services in the form of post offices and Telephone connections and Mobile network are available in the villages.
- All 52 villages in the study area electricity are available

Analysis of Site and Its Selection

Site Selection Criteria

Sr. No.	Parameter	Criteria	Observation w.r.t Proposed Site
1	Lake or pond (Distance from SW body)	Should not be within 200 m	The nearest lake/pond is at 1.56 km in the east direction
2	Navigable river or stream	Should not be within 100 m	There is a non-navigable Stream at distance of 410 m in north-west Direction.
3	Flood Plain	Should not be within 100 year flood plain	There is no flood plain or HFL 400 m from the periphery of the facility.
4	Highway-State or National	Should not be within 500 m	The SH-51 runs to the East of the facility at a distance of 770 m.
5	Habitation-Notified habituated area	Should not be within 500 m	The nearest notified village of Kadechur is at a distance of 1.41 km in ESE direction.
6	Public Parks	Should not be within 500 m	There is no identified Public Park within 2 km radius.
7	Critical habitat area-area in which one or more endangered special live	Should not be within such area	The 10 km buffer zone is devoid of any Critical habitat area.
8	Wet lands	Should not be within such area	There is no Wet land of any kind within the radius of 5 km.
9	Air port	Should not be within 20 km	The nearest Airport is

		Zone around the airport(s)	Hydrabad at a distance of 140 km
10	Water supply	No Water supply well within 500 m	The area is under Kadechur industrial area developed by KIADB
11	Coastal Regulation Area	Should not be within a coastal regulation zone	It does not come under any coast line.
12	Ground water Table level	GW table should be > 2m from the base of the landfill	The local Ground water table varies between 6 to 10 mtr below ground level.
13	Presence of monuments/religious structure	Not Suitable	Nil

Environmental Management Plan

Preparation of environmental management plan is required for formulation, implementation and monitoring of environmental protection measures during and after commissioning of projects. The plans should indicate the details as to how various measures have been or are proposed to be taken including cost components as may be required. Cost of measures for environmental safeguards should be treated as an integral component of the project cost and environmental aspects should be taken into account at various stages of the projects.

- Conceptualization: preliminary environmental assessment
- Planning: detailed studies of environmental impacts and design of safeguards
- Execution: implementation of environmental safety measures
- Operation: monitoring of effectiveness of built-in safeguards

Budget of Implementation of Environmental Management Plan

Sr. No.	Particulars	Capital Cost (Rs) lakhs
1	Air Pollution Control Systems	**27.0**
2	ETP, holding tank, STP, etc	**43.0**
3	Noise Control measures – Acoustic enclosures for DG set, Noise barriers for pumps, boiler, etc	**16.0**
4	Greenbelt development	**17.0**
5	Rainwater harvesting, storm water drains,	**16.0**
6	Ambient Air Quality Monitoring, Instruments/ equipments, etc	**20.0**
7	Third party monitoring, energy audit, environmental audit, training programs, etc	**10.0**
8	Environmental control measures during construction stage	**11.0**
Total		**160.0**
Capital Cost of the project is Rs. 59 Cr.		

Impacts & Mitigation Measures

The potential significant environmental impacts associated with the project are grouped as below.

Air & Noise Environment

- Impacts on ambient air quality
- Impacts on ambient odour
- Impacts on ambient noise

Water Environment

- Impacts on surface & ground water quality
- Impacts on aquatic life

Land Environment

- Impacts on land use
- Impacts on soil fertility
- Impacts on agriculture

Socio Economic

- Impacts on infrastructure
- Impacts on employment

Indirect Impacts

- Impacts on public health and safety
- Impacts on aesthetics

Greenbelt

The area of plot is 16.2 ha and the proposed facility will cater the needs of all hazardous waste generated in surrounding industries. A greenbelt development plan will be prepared and implemented along with the project. Total green belt area shall be of **5346 sq m (33% of 162000 Sq m)**. The main objective of the greenbelt is to provide a barrier between the plant and the surrounding areas.

Project Cost

The Total Cost (Revised) for proposed project is **Rs. 5948.69 Lakhs** The proposed activity is intended to take care of the contaminants from industrial activities in Karnataka state. Hence CPCB has directed the medium waste generating states like Karnataka to develop an Integrated Common Facility where the waste can be safely treated/ disposed off and the facility will be scientifically designed, operated and maintained.

Breakup of Project Cost

Sr. No.	Item	Previous Project Cost (Rs) Lakhs	Revised Project Cost (Rs) Lakhs
1	Land Cost	3,90,00,000.00	3,90,00,000.00
2	Building, Storage Shed and other Civil Works	55,08,16,465	38,30,25,965.00
3	Machinery, vehicles and Laboratory Equipments	69,44,12,264	12,21,75,160.00
4	Pollution Control Measures	1,60,00,000.00	1,60,00,000.00
5	Office Equipment and Power Supply & other development works	1,58,69,792.00	1,58,b69,792.00
6	Miscellaneous	69,01,479.00	69,01,479.00
7	CSR Activities	2,70,00,000	1,18,97,396.00
Total Cost		**1,35,00,00,000.00**	**59,48,69,792.00**

EMP Implementation Schedule

The project implementation schedule after obtaining Environmental Clearance is as given here:

Project Implementation Schedule

Sr. No.	Activities	Duration (Months)
1	Appointment of consultant, basic engineering and issue of tender enquiries	1
2	Detail engineering	2
3	Civil Design	1
4	Civil Construction	7

5	Mechanical erection	1
6	Electric and instrumentation	1
7	Trail run and Commissioning	1

Infrastructure Demand and Amenities

The demand of infrastructure (Physical & Social) in nearby area of the proposed site will be developed under Entrepreneur Social Commitment programs.

Development of amenities/ facilities in nearby area of the proposed project site as per requirement of local people of the nearby area shall be carried out under ESC programs.

Chapter-12

Disclosure of Consultant

12.0 CONSULTANT'S PROFILE

Organization	: Visiontek Consultancy Services Pvt. Ltd.
Address	: Plot No-M-22 & 23, Chandaka Industrial Estate, Patia, Bhubaneswar-24 (Odisha)
Contact Person	: P.Kumar Ranjan
Contact No	: 9338772882
E Mail ID	: visiontekin@gmail.com
Principal Field	: Consulting Services

Visiontek Consultancy Services Private Limited is a pioneer consulting organisation of India as a Pvt. Limited company, specializing in Environmental Protection, Industrial Pollution Control & Engineering field. This is also rendering consultancy services for Geotechnical Investigations, Topographical Survey, Planning and Designs, Supervision, Quality Monitoring and Preparing detailed Project Reports. VCSPL assists a client in comprehensive environmental and engineering services ranging from conceptual planning and preliminary investigation to detailed engineering design. Local knowledge coupled with national and international experience of proven technical know-how and a strong commitment from our team of experts; enable VCSPL to assist in solving the clients environmental and engineering problems successfully with competence by first analyzing then visualizing and finally utilizing technically strong and dedicated skill.

VCSPL has successfully completed a wide range of multi disciplinary assignments. VCSPL project formulation requires preliminary and detailed project investigation. The objective of the investigation is to assess the technical viability and cost effectiveness of the proposals vis-à-vis the objective and benefit. VCSPL was founded in 2001 and brought together a number of consultancy services with a track record of performance in the environmental Science and Engineering field ranging conceptual planning and preliminary investigation to detailed engineering design Today it has over more than 100 people working in our corporate office at Bhubaneswar, Orissa and branch office

at Asansol, Ranchi and Pune also at various industrial sites.

Vision:

- Build stability and success through sustainable growth and profit.
- Put clients and their needs back at the heart of business.
- Deliver more than just compliance with environmental, health & safety requirements.

Mission:

To continue to create value for its clients, shareholders and employees and to be considered as the leading global professional service provider of technical and environmental consulting services by its clients, employees and peers.

Environment Policy:

Good environment management is the central focus of our business activities. We extend this through our own operation and management, in order to reflect positively in our clients, share holders and staffs. Visiontek takes its commitment to quality, health, safety & environmental management very seriously.

The Organization:

Visiontek Consultancy Services Pvt. Ltd. is floated by the master brain of few former Chief Engineers of the State Government, Central Govt. and young Enthusiastic Engineers and Scientists. The Organization has Seven Divisions each headed by an eminent Engineer and allied laboratory and computerized services. The divisions are as follows.

1	Planning project preparation and Monitoring
2	Infrastructure Roads, Highways & Bridges
3	Designs and Detailed Engineering
4	Water Resources Management
5	Industrial Pollution Control and Socioeconomic Study
6	Construction management & Quality Control
7	Survey and Investigation

12.1 EIA CORDINATORS & FUNCTIONAL EXPERTS INVOLVE IN THIS PROJECT

1. **Prof. Madhab Chandra Dash, M.Sc (Zoology), Ph.D (Biology) (Ecology & Env. Science) - EIA Coordinator.**

He has experience in Ecology & Biodiversity & Environmental Science. He has worked as Chief Advisor in M/s Visiontek Consultancy Services Private Limited. Since 2010 to till date, Resource Person and Chief Editor in SPCB, Orissa since 2004 to 2006 & Senior Env. Advisor in Adam Smith International Ltd., London since 2006 to 2009.

2. **Mr. Manoj Kumar,** B.Sc.(Chemical Engineering), MBA –Marketing**, FAE-AP,AQ**

He has experience in Preparation of EIA/EMP and presentation before the Concerned authority, Space Marketing and Event Management, Operation of ETP, Scrubber, Cyclone, Bag Filters and other Pollution Control Equipments, Chemical Plant & FBC Boiler, Water Treatment & Softener Plant - operation of Boiler, Review of EIA, EMP, EMS of industries, mines etc. He has worked as Executive - industry & Technical in Eco Care, Ranchi since May 2005 to Sept 2011, P.A. to Chairman & JRF in Jharkhand State Pollution Control Board, Ranchi in Feb 2003 - April 2005, Project Coordinator (Marketing) in CBMD, Jamshedpur since June 1999 - January 2003, Deputy Manager, Production in TRIPL, Khunti since May 1998- April 1999, Shift Engineer (Production) in Sanderson Industries Ltd, Jamshedpur since May 1994 - April 1998, & Competent Person (Testing & Audit) in Institute of Industrial Safety & Risk Management Services since December 2009 – till Date.

3. **P. Kumar Ranjan,** Bachelor of Engineering (Civil), **FAE-LU**

He has experience in Design, Drawing and Execution of ETP & STP, Solid Waste Management, Civil Engineering & Environmental Planning. He has worked as Dy. Manager (Works) executed various road construction works, in Kolkata Municipal Corporation since 2000-2001, Engineer (Design Engineer in civil structural works for highways, railways sector) in Bridge and Roofing Limited since 1998 to 2000.

4. **Dr. Arati Nanda,** M.A (A & A Economics), Ph.D (A & A Economics), **FAE-SE**

She has experience in Socio-economic survey, Compilation and Analysis of Data and Writing of Report, Monitoring and Supervision, Implementing HH Survey. She has

worked as Sr. Research Officer (Socio Econom ic) in ARDCOS, Bhubaneswar since 2004 to till Now, Project Associate & Supervisor (Socio Economic) in Nabakrushna Choudhury Centre for Development Studies, (NCDS), Bhubaneswar since 1998-2001 and 2002-2003.

5. Dr. Shrustidhar Rout, M.Sc in Botany (Biochemistry & Enzymology Specialization), PG Diploma in Ecology & Environment, Ph.D. in Botany: Medicinal Plants of Similipal Biosphere Reserve.**-FAE-EB**

Former Reader in Wildlife & Biodiversity Conservation, North Orissa University; Wildlife Research Technician in Similipal Tiger Reserve. Experience in preparation of Wildlife Management Plan, Biodiversity study on Coastline flora & fauna, Medicinal Plants, Evaluation of Forest Development Agency (FDA), ecological enumeration of flora and fauna, etc

6. Mr. P.K. Panda, M.Sc (Geology),**FAE-HG& GEO**

He has experience in Geological survey, mapping, exploration, & engineering geology, hydrogeology. He is involved in preparation of project report related to EIA/EMP related to Geological Exploration of Ground water/Delineation of Aquifers by Geophysical method and preparation of Hydrogeological Report.

7. Mr. Pralhada Chandra Mishra- ***B.Sc*** (Mech. Engg.) **FAE-NV & RH**

EC Open Cast Mining & Coal washery. He has more than 20years of experience in coordination, monitoring, guidance & preparation of EIA/ EMP report.

8. Mr. S.C. Mishra, Bachelor in Engineering (Chemical), **Mentor**

He has experience in Preparation of EIA/EMP and presentation before the concerned authority. He has worked as Executive Director in Indian Rare Earths Ltd, Manvala Kurichi, Kanyakumari (Tamil Nadu) from 1977-2000. He has wide experience in Production, maintenance, process control, Process modification related to safety& environmental aspects of mineral beneficiation Plant, Monitoring, control of Environmental aspects of the plant. He worked as CGM in Indian Rare Earths Ltd, Chatrapur, Odisha from 1988-1997. There he was involved in Production, maintenance, process control functions, Environmental related issues, technical designing, Modification of Mineral beneficiation & Chemical plants.

9. B. K. Mishra, B.Sc.(Chemical Engineering), FAE-SHW

He has more than 20 years of experience in Design, Drawing and Execution of ETP & STP, Solid Waste Management Including MSW and Design, drawing & Execution of TSDF facilities. He has also experience in preparation of EIA/ EMP report, Third Party Audit of Hazardous Waste Report Disaster Management Plan and safety Reports

10. Dr. B. C. Nageraja: FAE-EB, LU & SC.

He has shared his valuable information in the Functional Areas of Ecology & Biodiversity, Landuse and Soil Conservation. He has given his inputs in ecological environment.

12.2 ENVIRONMENT POLICY

Good environment management is the central focus of our business activities. This is extended to through operation and management, in order to reflect positively in our clients, share holders and staffs. Visiontek takes its commitment to quality, health, safety & environmental management very seriously.

12.3 INVOLVMENT IN THE EIA

VCSPL has carried out a large number of assignments in Environmental Impact Assessment and Environmental Management Plans (EMP) in the following fields:

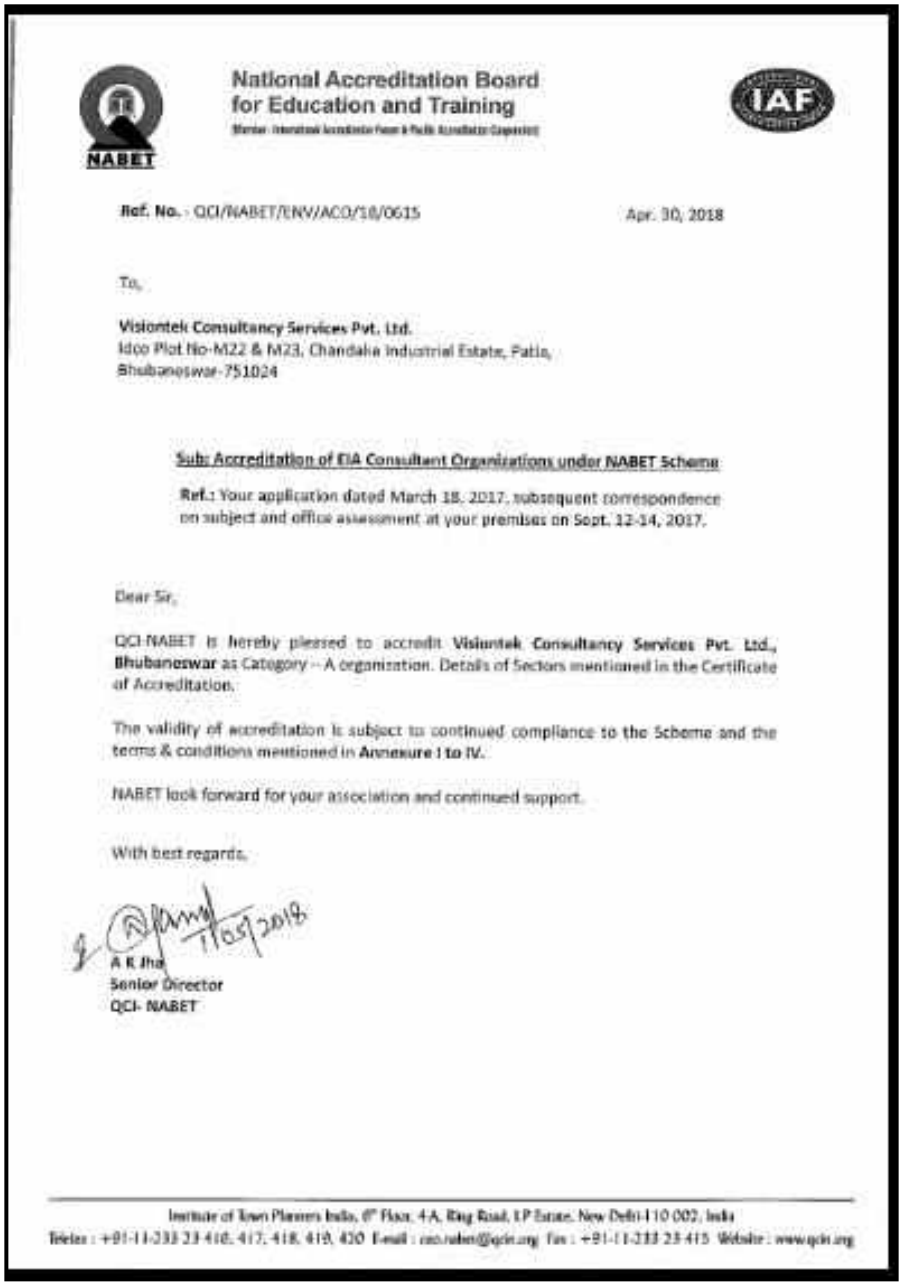
- Mining of Minerals
- River Valley, Hydel, Drainage and Irrigation Projects.
- Thermal Power Plants.
- Coal Washeries.
- Mineral Beneficiation.
- Metallurgical Industries
- Cement Plants.
- Coke Oven Plants.
- Leather/Skin/Hide processing industry.
- Common Hazardous waste treatment, storage and disposal facilities.
- Building & Large construction projects.

The organization helps the Government bodies and other agencies in identifying and specifying EIA requirements. The task included highlighting environmental constraints,

monitoring air & water qualities, determining soil characteristics, background noise levels for the identification of the projects impact on the environment. Impact on Flora, Fauna and Agriculture and impact on land use are then carried out. The organization is also undertaking post project impact studies.

12.4 ACCREDITATION OF VCSPL:

VCSPL has been accredited by NABET, QCI as per the letter no. NABET/EIA/1720/RA0090, dtd- 30.04.2018. VCSPL's Environmental Laboratory has been recognized under E (P) Act, 1986 by MoEF & CC. The copy of gazette notification is given in VCSPL Credentials.



National Accreditation Board for Education and Training

Ref. No. : QCI/NABET/ENV/ACO/18/0615 Apr. 30, 2018

To,

Visiontek Consultancy Services Pvt. Ltd.
Idco Plot No-M22 & M23, Chandaka Industrial Estate, Patia,
Bhubaneswar-751024

Sub: Accreditation of EIA Consultant Organizations under NABET Scheme

Ref.: Your application dated March 18, 2017, subsequent correspondence on subject and office assessment at your premises on Sept. 12-14, 2017.

Dear Sir,

QCI-NABET is hereby pleased to accredit **Visiontek Consultancy Services Pvt. Ltd., Bhubaneswar** as Category – A organization. Details of Sectors mentioned in the Certificate of Accreditation.

The validity of accreditation is subject to continued compliance to the Scheme and the terms & conditions mentioned in **Annexure I to IV.**

NABET look forward for your association and continued support.

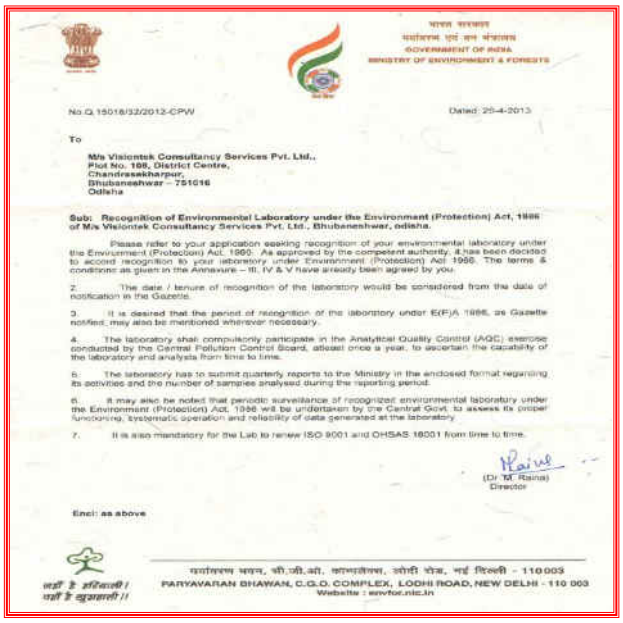
With best regards,

1/05/2018

A K Jha
Senior Director
QCI- NABET

Institute of Town Planners India, 6th Floor, 4-A, Ring Road, I.P Estate, New Delhi-110 002, India
Telefax : +91-11-233 23 416, 417, 418, 419, 420 E-mail : nabet@qci.org Fax : +91-11-233 23 415 Website : www.qci.org

Re-Accreditation approved Letter



भारत सरकार
पर्यावरण एवं वन मंत्रालय
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT & FORESTS

No.Q.15018/32/2012-CPW Dated: 25-4-2013

To

M/s Visiontek Consultancy Services Pvt. Ltd.,
Plot No. 108, District Centre,
Chandrasekharpur,
Bhubaneshwar – 751016
Odisha

Sub: Recognition of Environmental Laboratory under the Environment (Protection) Act, 1986 of M/s Visiontek Consultancy Services Pvt. Ltd., Bhubaneshwar, odisha.

Please refer to your application seeking recognition of your environmental laboratory under the Environment (Protection) Act, 1986. As approved by the competent authority, it has been decided to accord recognition to your laboratory under Environment (Protection) Act 1986. The terms & conditions as given in the Annexure – III, IV & V have already been agreed by you.

2. The date / tenure of recognition of the laboratory would be considered from the date of notification in the Gazette.

3. It is desired that the period of recognition of the laboratory under E(F)A 1986, as Gazette notified, may also be mentioned wherever necessary.

4. The laboratory shall compulsorily participate in the Analytical Quality Control (AQC) exercise conducted by the Central Pollution Control Board, atleast once a year, to ascertain the capability of the laboratory and analysts from time to time.

5. The laboratory has to submit quarterly reports to the Ministry in the enclosed format regarding its activities and the number of samples analysed during the reporting period.

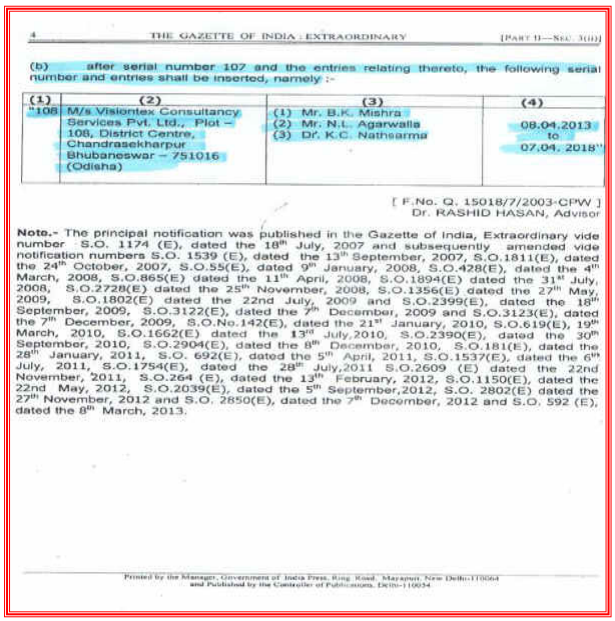
6. It may also be noted that periodic surveillance of recognized environmental laboratory under the Environment (Protection) Act, 1986 will be undertaken by the Central Govt. to assess its proper functioning, systematic operation and reliability of data generated at the laboratory.

7. It is also mandatory for the Lab to renew ISO 9001 and OHSAS 18001 from time to time.

(Dr. M. Raina)
Director

Encl: as above

पर्यावरण भवन, सी.जी.ओ. कॉम्प्लेक्स, लोधी रोड, नई दिल्ली - 110003
PARYAVARAN BHAWAN, C.G.O. COMPLEX, LODHI ROAD, NEW DELHI - 110 003
Website : envfor.nic.in



4 THE GAZETTE OF INDIA : EXTRAORDINARY [PART II—SEC. 3(ii)]

(b) after serial number 107 and the entries relating thereto, the following serial number and entries shall be inserted, namely :-

(1)	(2)	(3)	(4)
"108	M/s Visiontex Consultancy Services Pvt. Ltd., Plot – 108, District Centre, Chandrasekharpur Bhubaneswar – 751016 (Odisha)	(1) Mr. B.K. Mishra (2) Mr. N.L. Agarwalla (3) Dr. K.C. Nathearma	08.04.2013 to 07.04. 2018"

[F.No. Q. 15018/7/2003-CPW]
Dr. RASHID HASAN, Advisor

Note.- The principal notification was published in the Gazette of India, Extraordinary vide number S.O. 1174 (E), dated the 18th July, 2007 and subsequently amended vide notification numbers S.O. 1539 (E), dated the 13th September, 2007, S.O.1811(E), dated the 24th October, 2007, S.O.55(E), dated 9th January, 2008, S.O.428(E), dated the 4th March, 2008, S.O.865(E) dated the 11th April, 2008, S.O.1894(E) dated the 31st July, 2008, S.O.2728(E) dated the 25th November, 2008, S.O.1356(E) dated the 27th May, 2009, S.O.1802(E) dated the 22nd July, 2009 and S.O.2399(E), dated the 18th September, 2009, S.O.3122(E), dated the 7th December, 2009 and S.O.3123(E), dated the 7th December, 2009, S.O.No.142(E), dated the 21st January, 2010, S.O.619(E), 19th March, 2010, S.O.1662(E) dated the 13rd July,2010, S.O.2390(E), dated the 30th September, 2010, S.O.2904(E), dated the 8th December, 2010, S.O.181(E), dated the 28th January, 2011, S.O. 692(E), dated the 5th April, 2011, S.O.1537(E), dated the 6th July, 2011, S.O.1754(E), dated the 28th July,2011 S.O.2609 (E) dated the 22nd November, 2011, S.O.264 (E), dated the 13th February, 2012, S.O.1150(E), dated the 22nd May, 2012, S.O.2039(E), dated the 5th September,2012, S.O. 2802(E) dated the 27th November, 2012 and S.O. 2850(E), dated the 7th December, 2012 and S.O. 592 (E), dated the 8th March, 2013.

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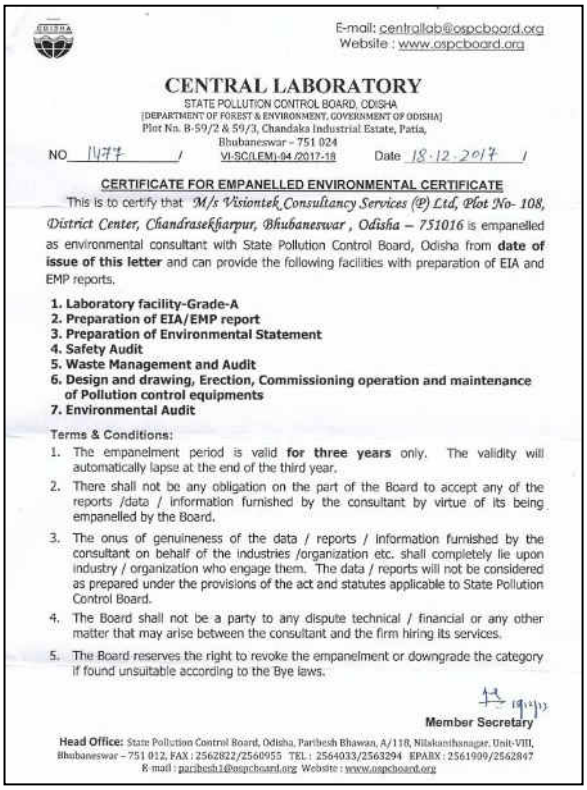
and Published by the Controller of Publications, Delhi-110054

MoEF&CC ACCREDITATION FOR LAB



E-mail: centrallab@ospcboard.org
Website : www.ospcboard.org

CENTRAL LABORATORY
STATE POLLUTION CONTROL BOARD, ODISHA
[DEPARTMENT OF FOREST & ENVIRONMENT, GOVERNMENT OF ODISHA]
Plot No. B-59/2 & 59/3, Chandaka Industrial Estate, Patia,
Bhubaneswar - 751 024

NO 1477 / VI-SC(LEM)-94 /2017-18 Date 18.12.2017

CERTIFICATE FOR EMPANELLED ENVIRONMENTAL CERTIFICATE

This is to certify that *M/s Visiontek Consultancy Services (P) Ltd, Plot No- 108, District Center, Chandrasekharpur, Bhubaneswar , Odisha – 751016* is empanelled as environmental consultant with State Pollution Control Board, Odisha from **date of issue of this letter** and can provide the following facilities with preparation of EIA and EMP reports.

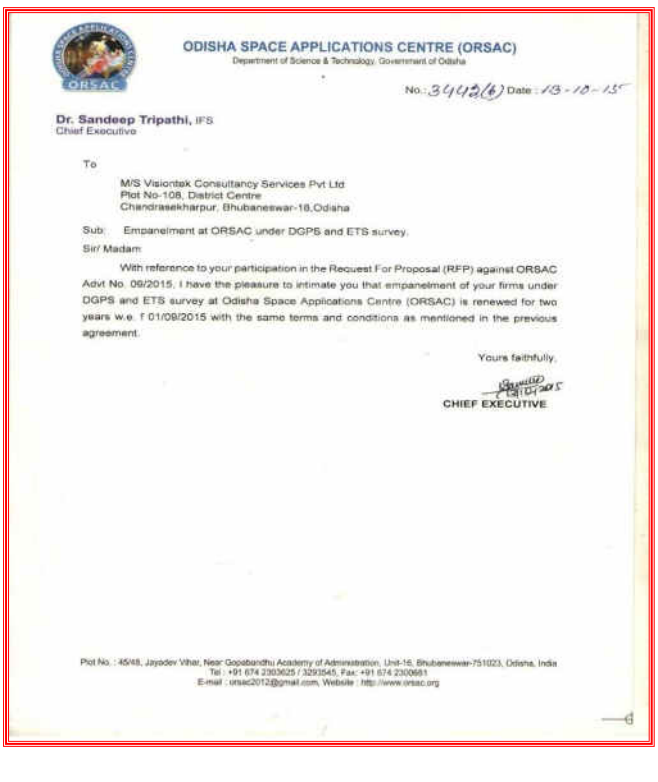
1. **Laboratory facility-Grade-A**
2. **Preparation of EIA/EMP report**
3. **Preparation of Environmental Statement**
4. **Safety Audit**
5. **Waste Management and Audit**
6. **Design and drawing, Erection, Commissioning operation and maintenance of Pollution control equipments**
7. **Environmental Audit**

Terms & Conditions:

1. The empanelment period is valid **for three years** only. The validity will automatically lapse at the end of the third year.
2. There shall not be any obligation on the part of the Board to accept any of the reports /data / information furnished by the consultant by virtue of its being empanelled by the Board.
3. The onus of genuineness of the data / reports / information furnished by the consultant on behalf of the industries /organization etc. shall completely lie upon industry / organization who engage them. The data / reports will not be considered as prepared under the provisions of the act and statutes applicable to State Pollution Control Board.
4. The Board shall not be a party to any dispute technical / financial or any other matter that may arise between the consultant and the firm hiring its services.
5. The Board reserves the right to revoke the empanelment or downgrade the category if found unsuitable according to the Bye laws.

Member Secretary

Head Office: State Pollution Control Board, Odisha, Paribesh Bhawan, A/118, Nilakanthnagar, Unit-VIII, Bhubaneswar – 751 012, FAX : 2562822/2560955 TEL : 2564033/2563294 EPABX : 2561909/2562847
E-mail : paribesh1@ospcboard.org Website : www.ospcboard.org



ODISHA SPACE APPLICATIONS CENTRE (ORSAC)
Department of Science & Technology, Government of Odisha

No.: 3442(6) Date : 13-10-15

Dr. Sandeep Tripathi, IFS
Chief Executive

To

M/S Visiontek Consultancy Services Pvt Ltd
Plot No-108, District Centre
Chandrasekharpur, Bhubaneswar-18,Odisha

Sub: Empanelment at ORSAC under DGPS and ETS survey.

Sir/ Madam

With reference to your participation in the Request For Proposal (RFP) against ORSAC Advt No. 09/2015, I have the pleasure to intimate you that empanelment of your firms under DGPS and ETS survey at Odisha Space Applications Centre (ORSAC) is renewed for two years w.e.f 01/09/2015 with the same terms and conditions as mentioned in the previous agreement.

Yours faithfully,

CHIEF EXECUTIVE

Plot No. : 45/48, Jayadev Vihar, Near Gopabandhu Academy of Administration, Unit-16, Bhubaneswar-751023, Odisha, India
Tel : +91 674 2303025 / 3293545, Fax: +91 674 2300681
E-mail : orsac2012@gmail.com, Website : http://www.orsac.org

SPCB EMPANELMENT **ORSAC EMPANELMENT**

DNV·GL

MANAGEMENT SYSTEM CERTIFICATE

Certificate No:	Initial certification date:	Valid:
99818-2011-AQ-IND-NABCB	20, July, 2011	20, July, 2017 - 15, September, 2018

This is to certify that the management system of

Visiontek Consultancy Services Pvt. Ltd.
IDCO, Plot No. M22 & M23, Chandaka Industrial Complex, Patia – 751 024, Bhubaneswar, India

has been found to conform to the Quality Management System standard:
ISO 9001:2008

This certificate is valid for the following scope:
Provision of consultancy in environmental management, civil engineering and infrastructure development
Provision of environment monitoring & soil & material testing services

Place and date:
Chennai, 20, June, 2017

NABCB
QM 001

For the issuing office:
DNV GL – Business Assurance
ROMA, No. 10, GST Road, Alandur, Chennai - 600 016, India

Sivadasan Madiyath
Management Representative

Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.
ACCREDITED UNIT: DNV GL BUSINESS ASSURANCE INDIA PVT. LTD., 201-A Wing, Kumar Plaza, 2nd Floor, Near Kalina Masjid, Kalina- Kurla Road, Santacruz-E Mumbai -400029, Maharashtra, INDIA. TEL: +91 22 [illegible] assurance.dnvgl.com

DNV·GL

MANAGEMENT SYSTEM CERTIFICATE

Certificate No: 125225-2012-HSO-IND-DNV | Initial certification date: 05, November, 2012 | Valid: 05, November, 2015 - 04, November, 2018

This is to certify that the management system of

Visiontek Consultancy Services Pvt. Ltd.
Plot No. 108, District Centre, Chadrasekharpur, Bhubaneswar - 751 016, Odisha, India

has been found to conform to the Occupational Health and Safety Management System standard:
OHSAS 18001:2007

This certificate is valid for the following scope:
Provision of consultancy in environmental management, civil engineering & infrastructure development

Provision of environmental monitoring & soil and material testing services

Place and date:
Chennai, 30, October, 2015

MANAGEMENT SYSTEM CERTIFICATION DNV·GL

For the issuing office:
DNV GL – Business Assurance
ROMA, No. 10, GST Road, Alandur, Chennai - 600 016, India

Sivadasan Madiyath
Management Representative

Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.
ACCREDITED UNIT: DNV GL BUSINESS ASSURANCE INDIA PRIVATE LIMITED, ROMA, No. 10, GST Road, Alandur, Chennai, , 600 016, India.

OHSAS 18001:2007

DNV·GL

MANAGEMENT SYSTEM CERTIFICATE

Certificate No:
149811-2014-AE-IND-RvA

Initial certification date:
19, March, 2014

Valid:
19, March, 2017 - 15, September, 2018

This is to certify that the management system of

Visiontek Consultancy Services Pvt. Ltd.
IDCO Plot No. M22 & M23, Chandaka Industrial Estate, PO: Patia,
Bhubaneswar – 751 024, Odisha, India

has been found to conform to the Environmental Management System standard:
ISO 14001:2004

This certificate is valid for the following scope:
Provision of consultancy in environmental management, civil engineering and infrastructure development

Provision of environmental monitoring & soil and material testing services

Place and date:
Chennai, 03, April, 2017

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT
IAF
MGMT. SYS.
RvA C 024
The RvA is a signatory to the IAF MLA

For the issuing office:
DNV GL – Business Assurance
ROMA, No. 10, GST Road, Alandur,
Chennai - 600 016, India

Sivadasan Madiyath
Management Representative

Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.
ACCREDITED UNIT: DNV GL Business Assurance B.V., ZWOLSEWEG 1, 2994 LB, BARENDRECHT, NETHERLANDS. TEL:+31102922689.
assurance.dnvgl.com

ISO: 14001: 2004

12.5 QUALITY POLICY OF VCSPL

INTEGRATED MANAGEMENT SYSTEM MANUAL	Page No: 2 of 2
VCSPL/IMSM/001/02	Section No.:7.2

QUALITY, ENVIRONMENT AND OCCUPATIONAL HEALTH & SAFETY POLICY
(Based on ISO 9001:2008, ISO 14001:2004, ISO 18001:2008 & QCI-NABET)

Visiontek Consultancy Services Pvt. Ltd. is committed to enhance shareholder's value and emerge as a global professional service provider by providing qualitative consultancy & monitoring services in the field of environment & engineering including impact assessment, auditing, design & development, due diligence etc. by putting customer's need at the heart of our business while maintaining green, clean, safe & healthy working conditions in our activities.

We shall achieve the same through

- Timely delivery of services.
- Improving accuracy in service deliverables & reduction in non-conforming services.
- Prevention of injury & ill health.
- Prevention of pollution & protection of environment through optimum resource Utilization & efficient waste management.
- Development of human resource through training.
- Compile with current applicable legal requirements & other requirements to which organization subscribes.
- Sustainable business growth & profit.
- Communicate to all stake holders through appropriate media and obtain feedback for further needful and improvement.
- ***Periodically reviewing of service provision and effectiveness of Quality Environment and Occupational Health & Safety Management System in achieving objectives set for continual improvement.***

Date : 18.09.2017

P. Kumar Reddy

(Signature of Managing Director)

Prepared & Issued by	Approved by	IMS POLICY	Issue No:01	Date :03.02.2016
(Management Representative)	P. Kumar Reddy (Managing Director)		Rev No.: 01	Date:18.09.2017

Annexure-I

F.No.21-8/2014-IA-III
Government of India
Ministry of Environment, Forest and Climate Change
(IA.III Section)

Indira Paryavaran Bhawan
Jor Bagh Road, New Delhi - 3

Dated: 14th October, 2016

To

The Development Officer,
Karnataka Industrial Areas Devl. Board (KIADB),
KIADB Zonal Office, Kapanoor Industrial Area,
Humnabad Road,
Gulbarga – 585104 (Karnataka)

Sub: 'Kadechuru Industrial Area' at Kadechuru Village, Taluka & Distric Yadgir (Karnataka) by Karnataka Industrial Areas Development Board Environmental Clearance - reg.

Sir,

This has reference to your application No.KIADB/DO/KLB/1068/2015-16 dated 4th January, 2016 and subsequent letters dated 2nd May, 2016 and 23rd May 2016, submitting the above proposal to this Ministry for grant of Environmenta Clearance (EC) in terms of the provisions of the Environment Impact Assessmen (EIA) Notification, 2006 under the Environment (Protection) Act, 1986.

2. The proposal for **'Kadechuru Industrial Area'** at Kadechuru Village, Taluka & District Yadgir (Karnataka) by Karnataka Industrial Areas Development Board was considered by the Expert Appraisal Committee (EAC) in the Ministry for Infrastructure Development, Coastal Regulation Zone, Building/ Construction and Miscellaneous projects, in its meetings held on 28-29 March, 2016, 30-31 May 2016 and 26th July, 2016.

3. The details of the project, as per the documents submitted by the project proponent, and also as informed during the above said EAC meetings, are reported to be as under:-

(i) The project involves development of Kadechuru Industrial Area at Kadechuru Village, Taluka & District Yadgir (Karnataka) by Karnataka Industrial Area Development Board (KIADB).

(ii) The proposed area to be developed is 1311.18 ha (3240 acres). The details of the areas demarcated as follows:

S.No	Description	Acres	Percentage%
1	Industrial	1426.92	44.04
2	KSSIDC	67.9	2.10
3	Commercial	74.2	2.29
4	Amenities	62.7	1.94
5	Utility	53.4	1.65
6	Greenbelt	413.58	12.76
7	Truck Parking	133.95	4.13
8	Road	172.4	5.32
9	Bulk Land (Coca cola, Railway Bogie, Pet Bottle Plant)	834.95	25.77
Total		**3240**	**100**

(iii) Total water requirement is estimated to be 3.24 MLD proposed to be drawn through Sangam River. The Industries to be proposed are "B" Category industries utilizing minimum water.

(iv) Waste water generated from the industrial units/different zones will be collected and treated at the proposed STP/CETP. The treated water will be recycled and reused for green belt development as well as fire water.

(v) During construction phase, no hazardous waste will be generated. During operation phase hazardous waste management would be the responsibility of individual industries. Prior to the commencement of production, each unit will take authorization for storage, handling and transport of hazardous waste, as per the Hazardous Waste (Management, Handling and Trans-boundary Movement) Rules, 2008 and amendments thereof.

(vi) The ETP is of 5 MLD capacity in an area of 27.60 acres of land allocated at plot No.162. Based on extended aeration, RO will be provided as tertiary treatment for reutilisation of treated effluent and resource conservation.

(vii) The nearest abadi would be at a distance of about 1 km from the waste disposal site and 2 km from the ETP. The waste water shall be treated to the discharge standards which would be recycled to use after reverse osmosis process.

(viii) **Water bodies**: Kedechuru tank is 0.5 km, E and Bhima river is 5.8 km, WSW from the project site.

(ix) Storm water drains will be planned along the sides of the roads to collect the surface run-off water from the roads.

(x) **RWH**: Based on the runoff calculations, 300 rainwater harvesting pits are proposed.

(xi) **Wildlife issues**: There are no Eco-sensitive areas in 10 km radius of the project site.

(xii) **Greenbelt facilities**: 12.76% of the total project area is allocated for greenbelt development and individual industries will also contribute from the land allotted to them. Green belt (50 m wide) is also proposed along either sides of river tributaries. The treated water will be recycled and reused for greenbelt development as well as fire water.

(xiii) **Investment/Cost:** Estimated cost of the project is Rs.1134 Crores.

(xiv) **ToR details**: Terms of Reference granted by the Ministry vide letter No.21-8/2014-IA-III dated 18th September, 2014.

(xv) **Public Hearing:** Public Hearing was conducted on 14th September, 2015 in Kadechur village, Taluka, District Yadgir (Karnataka).

(xvi) **Employment potential**: About 300 to 500 number of people for direct and another 4500 to 5000 number of people for indirect.

(xvii) **Benefits of the project**:

- Improvement on standard of leaving
- Education system will improve by having Schools, Colleges, Vocational training institutes etc.,
- Existing approach roads will be strengthened with Black Top Roads
- Economic growth of nearby surrounding area
- Community halls will be constructed to nearby villages.
- Medical Assistance with Ambulance facility to nearby Hospitals.
- Potable drinking water facilities will improve

4. The EAC, in its 161st meeting held on 26th July, 2016, has recommended the project for grant of Environmental Clearance. As per recommendations of the EAC, the Ministry of Environment, Forest and Climate Change hereby accords Environmental Clearance to the above project **'Kadechuru Industrial Area'** at Kadechuru Village, Taluka & District Yadgir (Karnataka) promoted by Karnataka Industrial Areas Development Board, under the provisions of the EIA Notification,

2006 and amendments/circulars issued thereon, and subject to the specific and general conditions as under:-

PART A - SPECIFIC CONDITIONS

I. Construction Phase

(i) 'Consent to Establish' shall be obtained from State Pollution Control Boarc under the Air (Prevention and Control of Pollution) Act, 1981 and the Wate (Prevention and Control of Pollution) Act, 1974.

(ii) As per the undertaking submitted by project proponent vide letter No KIADB/CDO&CE/7192/201-17 dated 5th August, 2016, the flood plair streams as demarcated in the layout plan of Kadechuru Industrial Area by the Irrigation Department, shall be maintained as it is and shall not be allotted to any individual henceforth. The flood plain areas as demarcated by the Irrigation Department shall be reserved and maintained as buffer zone No civil constructions other than bridges and culverts shall be constructed or the flood plain in the industrial area.

(iii) There shall be a continuous green belt along the plant premises, except at the designated entry and exit points.

(iv) The quantity of fresh water usage, water recycling and rainwater harvestin shall be measured and recorded to monitor the water balance as projected by the project proponent. The record shall be submitted to the Regional Office MoEF&CC along with six Monthly Monitoring reports.

(v) Special purpose vehicle shall be established for implementation, monitorin and compliance of the environmental safeguards.

(vi) All the recommendation of the EMP shall be complied with letter and spirit All the mitigation measures submitted in the EIA report shall be prepared ir a matrix format and the compliance for each mitigation plan shall be submitted to RO, MoEF&CC along with half yearly compliance report.

(vii) The member units shall provide storage tanks for storage of effluent fo monitoring the characteristics of effluent before taking into the CETP fo further treatment.

(viii) Proper meters with recording facilities shall be provided to monitor th effluent quality and quantity sent from member industries to CETP and fron CETP to the final disposal/re-use on a continuous basis.

(ix) Member industries shall treat the effluent to meet the prescribed CETP inle norms.

(x) The project proponent shall establish an environmental monitoring cell witl all the potential polluting units as members to review the environmenta monitoring data and suggest for improvements.

(xi) Internal Road widths within the industrial area shall be minimum 24 r ROW.

(xii) Common facilities such as repair shops, rest rooms for drivers an attendants shall be provided.

(xiii) All required sanitary and hygienic measures should be in place before startin construction activities and to be maintained throughout the constructio phase.

(xiv) Soil and ground water samples will be tested to ascertain that there is no threat to ground water quality by leaching of heavy metals and other toxic contaminants.

(xv) Construction spoils, including bituminous material and other hazardous materials, must not be allowed to contaminate watercourses and the dump sites for such material must be secured so that they should not leach into the ground water.

(xvi) Parking space to accommodate trucks, cars, two wheelers and bicycles shall be provided as per the norms.

(xvii) Any hazardous waste generated during development/ construction phase, should be disposed off as per applicable rules and norms with necessary approvals of the State Pollution Control Board.

(xviii) The diesel generator sets to be used during development/ construction phase should be low sulphur diesel type and should conform to Environment (Protection) Rules prescribed for air and noise emission standards.

(xix) The diesel required for operating DG sets shall be stored in underground tanks and if required, clearance from Chief Controller of Explosives shall be taken.

(xx) Vehicles hired for bringing construction material to the site should be in good condition and should have a pollution check certificate and should conform to applicable air and noise emission standards and should be operated only during non-peak hours.

(xxi) Ambient noise levels should conform to residential standards both during day and night. Incremental pollution loads on the ambient air and noise quality should be closely monitored during development/ construction phase. Adequate measures should be made to reduce ambient air and noise level during construction phase, so as to conform to the stipulated standards by CPCB/SPCB.

(xxii) Fly ash should be used as building material in the construction as per the provisions of Fly Ash Notification of September, 1999 and amended as on 27th August, 2003.

(xxiii) Ready mixed concrete must be used in site development and building construction.

(xxiv) Storm water control and its re-use as per CGWB and BIS standards for various applications.

(xxv) Water demand during development/construction should be reduced by use of pre-mixed concrete, curing agents and other best practices referred.

(xxvi) Permission to draw ground water shall be obtained from the competent Authority prior to construction/operation of the project.

(xxvii) Separation of grey and black water should be done by the use of dual plumbing line for separation of grey and black water.

(xxviii) Fixtures for showers, toilet flushing and drinking should be of low flow either by use of aerators or pressure reducing devices or sensor based control.

(xxix) Use of glass may be reduced by upto 40% to reduce the electricit consumption and load on airconditioning. If necessary, use high quality low value glass.

(xxx) Roof should meet prescriptive requirement as per Energy Conservatio Building Code by using appropriate thermal insulation material to fulfi requirement.

(xxxi) Opaque wall should meet prescriptive requirement as per Energy Conservatio Building Code which is proposed to be mandatory for all airconditioned space while it is aspirational for non-airconditioned spaces by use of appropriat thermal insulation material to fulfill requirement.

(xxxii) The approval of the competent authority shall be obtained for structural safet of the buildings due to earthquake, adequacy of fire fighting equipments, etc as per National Building Code including protection measures from lightenin etc.

(xxxiii) Regular supervision of the above and other measures for monitoring should b in place all through the development/ construction phase, so as to avoi disturbance to the surroundings.

(xxxiv) Under the provisions of Environment (Protection) Act, 1986, legal action shal be initiated against the project proponent if it was found that construction o the project has been started without obtaining environmental clearance.

(xxxv) The responses/commitments made to the issues raised during public hearin shall be complied with in letter and spirit. A hard copy of the action take shall be submitted to the Ministry.

(xxxvi) 2% of the project cost shall be earmarked for Corporate Environmen Responsibility activities.

(xxxvii) Necessary provision to develop facilities for disabled people shall be mad under Corporate Environment Responsibility.

(xxxviii) Corporate Environment Responsibility:

a) The Company shall have a well laid down Environment Policy approved b the Board of Directors.
b) The Environment Policy shall prescribe for standard operating process procedures to bring into focus any infringements/deviation/ violation o the environmental or forest norms/ conditions.
c) The hierarchical system or Administrative Order of the company to dea with environmental issues and for ensuring compliance with th environmental clearance conditions shall be furnished.
d) To have proper checks and balances, the company shall have a well lai down system of reporting of non-compliances/ violations of environmenta norms to the Board of Directors of the company and/or shareholders o stakeholders at large.

II. Operation Phase

(i) All the topsoil excavated during development/construction activities should b stored for use in horticulture/landscape development within the project site.

(ii) Disposal of muck during development/construction phase should not creae any adverse effect on the neighbouring communities and be disposed takin

the necessary precautions for general safety and health aspects of people, only in approved sites with the approval of competent authority.

(iii) The solid waste generated should be properly collected and segregated. Wet garbage should be composted and dry/inert solid waste should be disposed off to the approved sites for land filling after recovering recyclable material.

(iv) Diesel power generating sets proposed as source of back up power for elevators and common area illumination during operation phase should be of enclosed type and conform to rules made under the Environment (Protection) Act, 1986. The height of stack of DG sets should be equal to the height needed for the combined capacity of all proposed DG sets. The location of the DG sets may be decided with in consultation with State Pollution Control Board.

(v) Noise should be controlled to ensure that it does not exceed the prescribed standards. During night time the noise levels measured at the boundary of the building shall be restricted to the permissible levels to comply with the prevalent regulations.

(vi) The green belt of the adequate width and density preferably with local species along the periphery of the plot shall be raised so as to provide protection against particulates and noise.

(vii) Weep holes in the compound walls shall be provided to ensure natural drainage of rain water in the catchment area during the monsoon period.

(viii) Rain water harvesting for roof run- off and surface run- off, as plan submitted should be implemented. Before recharging the surface run off, pre-treatment must be done to remove suspended matter, oil and grease. The borewell for rainwater recharging should be kept at least 4 mts. above the highest ground water table.

(ix) The ground water level and its quality should be monitored regularly in consultation with Central Ground Water Authority.

(x) Traffic congestion near the entry and exit points from the roads adjoining the proposed project site must be avoided. Parking, loading and unloading should be fully internalized and no public space should be utilized.

(xi) A Report on the energy conservation measures confirming to energy conservation norms finalise by Bureau of Energy Efficiency should be prepared incorporating details about building materials & technology, R & U Factors etc and submit to the Ministry in three months time.

(xii) Energy conservation measures like installation of CFLs/TFLs for the lighting the areas outside the building should be integral part of the project design and should be in place before project commissioning. Use CFLs and TFLs should be properly collected and disposed off/sent for recycling as per the prevailing guidelines/rules of the regulatory authority to avoid mercury contamination. Use of solar panels may be done to the extent possible.

(xiii) The building should have adequate distance between them to allow movement of fresh air and passage of natural light, air and ventilation.

PART – B: GENERAL CONDITIONS

i) The environmental safeguards contained in the EIA Report should be implemented in letter and spirit.

ii) Provision should be made for supply of kerosene or cooking gas and pressur cooker to the labourers during construction phase.

iii) Six monthly monitoring reports should be submitted to the Ministry and it Regional Office, Bangalore.

iv) A copy of the environmental clearance letter shall also be displayed on th website of the concerned State Pollution Control Board. The EC letter shal also be displayed at the Regional Office, District Industries centre anl Collector's Office/ Tehsildar's office for 30 days.

v) The project proponent shall set up a separate environmental management cel for effective implementation of the stipulated environmental safeguards unde the supervision of a Senior Executive.

vi) The funds earmarked for environment management plan shall be included i the budget and this shall not be diverted for any other purpose.

5. The above stipulations would be enforced among others under the provisions of Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention anl control of Pollution) act 1981, the Environment (Protection) Act, 1986, the Publi Liability (Insurance) Act, 1991 and the EIA Notification, 2006.

6. Officials from the Regional Office of MoEF&CC at Bangalore who would b monitoring the implementation of environmental safeguards should be given ful cooperation, facilities and documents/data by the project proponents during the inspection. A complete set of all the documents submitted to MoEF&CC should b forwarded to the CCF, Regional Office of MoEF&CC at Bangalore.

7. In the case of any change(s) in the scope of the project, the project woull require a fresh appraisal by this Ministry.

8. The Ministry reserves the right to add additional safeguard measure subsequently, if found necessary, and to take action including revoking of th environment clearance under the provisions of the Environmental (Protection) Ac, 1986, to ensure effective implementation of the suggested safeguard measures in time bound and satisfactory manner.

9. All other statutory clearances such as the approvals for storage of diesel fron Chief Controller of Explosives, Fire Department, Civil Aviation Department, Fore Conservation Act, 1980 and Wildlife (Protection) Act, 1972 etc. shall be obtained, a applicable by project proponents from the respective competent authorities.

10. The project proponent should advertise in at least two local Newspapers wide circulated in the region, one of which shall be in the vernacular language informin that the project has been accorded Environmental Clearance and copies of clearanc letters are available with the State Pollution Control Board and may also be seen o the website of the Ministry of Environment, Forest and Climate Change a http://www.envfor.nic.in. The advertisement should be made within Seven days from the date of receipt of the Clearance letter and a copy of the same should b forwarded to the Regional office of this Ministry at Bangalore.

11. This clearance is subject to final order of the Hon'ble Supreme Court of Indi in the matter of Goa Foundation Vs Union of India in Writ Petition (Civil) No.460 o 2004 as may be applicable to this project.

12. Any appeal against this clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.

13. A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parishad/Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions/ representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent.

14. The proponent shall upload the status of compliance of the stipulated EC conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; SPM, RSPM, SO2, NOx (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the project shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.

15. The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of EC conditions and shall also be sent to the respective Regional Offices of MoEF&CC by e-mail.

SKS 14/10/2016

(S.K. Srivastava)
Scientist E

Copy to: -

(1) The Secretary, Department of Environment, Govt. of Karnataka, Bangalore.
(2) The Chairman, Central Pollution Control Board, Parivesh Bhawan, CBD-cum-Office Complex, East Arjun Nagar, Delhi – 32.
(3) The Member Secretary, Karnataka State Pollution Control Board, "Parisara Bhavan, 4th & 5th Floor, # 49, Church Street, Bangalore-01.
(4) The APCCF (C), MoEF&CC, Regional Office (SZ), Kendriya Sadan, 4th Floor, E&F Wing, 17th Main Road, Koramangala II Block, Bangalore - 34.
(5) IA Division, Monitoring Cell, MOEF, New Delhi - 3.
(6) Guard file.

SKS 14/10/2016

(S.K. Srivastava)
Scientist E

Annexure-2

KARNATAKA INDUSTRIAL AREAS DEVELOPMENT BOARD

(A Government of Karnataka Undertaking)

 # 49, 4th & 5th Floors, 'East Wing', Khanija Bhavan, Race Course Road, Bengaluru - 560 001

Phone : 080-22265383 Fax : 080-22267901

Website : www.kiadb.in email: ceoemkiadb@gmail.com

No:KIADB/CDO&CE/FCN-43/ 809 /2018-19 Date:11-09-2018

RPAD

M/S. Mother Earth Environ Tech Pvt Ltd.,
#2542, 17th Main, 28th Cross,
Banashankari 2nd stage,
Near BDA Complex,
Bengaluru – 560070.

Sir,

Sub: Half Yearly EC Compliace Report for KIADB Kadechuru Industrial Estate, Yadgir Taluk & District, Karnataka.

Ref: 1 Your letter No. MEEPL/HO/YADGIR/006/2018-19 Dtd. 07-08-2018

******

With reference to the above, MoEF has issued Environmental Clearance (EC) for the Kadechuru Industrial Area (1311.18 Ha) vide letter No. F.No.21-8/2014-IA-III, on 14th October, 2016.

The KIADB has taken all effective steps as per the terms & condition of the EC approval, accordingly tendering process for appointing consultant for monitoring of conditions stipulated in the EC would be finalized shortly.

Thanking You,

Yours faithfully,

Chief Development Officer &
Chief Engineer

ANNEXURE									
Sl.No.	Regional Office	Total No. Of industries	Land fillable HW(MT)	Recyclable HW(MT & No's)		Incinerable HW		Total Qty HW Generation (MT & No's)	
				MT*	No's **	MT*	No's**	MT*	No's **
1	Anekal	225	5304.43	2012.62	59365.00	2882.16	320.00	10199.21	59685.00
2	Bengaluru City East	172	25.11	174.92	0.00	42.82	0.00	242.85	0.00
3	Bengaluru City South	63	132.07	399.85	0.00	663.57	0.00	1195.49	0.00
4	Bengaluru city west	149	5.59	183.60	0.00	1.26	0.00	190.45	0.00
5	Peenya	243	991.01	3376.57	2808.00	233.49	23432.00	4601.07	26240.00
6	Bommanahalli	208	86.30	272.13	23000.00	59.31	0.00	417.74	23000.00
7	Dasarahalli	95	99.77	1494.48	0.00	433.37	0.00	2027.63	0.00
8	Mahadevapura	169	912.20	2256.87	9516.00	946.58	5189.00	4115.65	14705.00
9	Rajarajeshwarinagar	89	998.70	2274.50	939.00	1044.29	5745.00	4317.49	6684.00
10	Sarjapura	197	91.50	1288.07	41625.00	1213.22	272.00	2592.79	41897.00
11	Yelahanka	23	800.15	63.64	0.00	56.35	0.00	920.14	0.00
12	Doddaballapura	68	2362.92	817.88	0.00	870.18	0.00	4050.98	0.00
13	Hoskote	56	9.31	184.50	22921.00	164.70	7298.00	358.51	30219.00
14	Nelamangala	95	608.18	169.89	0.00	3594.33	0.00	4372.40	0.00
15	Bagalkote	41	0.00	73.23	0.00	0.00	0.00	73.23	0.00
16	Belgam-1	87	3.45	2018.83	34655.00	9.58	106.00	2031.85	34761.00
17	Belgaum-2	43	19.91	135.92	0.00	272.69	0.00	428.52	0.00
18	Bellari	66	560.00	3707.00	0.00	1689.00	0.00	5956.00	0.00
19	Bidar	19	668.00	0.20	0.00	650.03	0.00	1318.23	0.00
20	Bijapur	30	0.00	139.22	2590.00	8.31	0.00	147.53	2590.00
21	Chamarajanagara	7	0.00	12.66	5620.00	0.00	0.00	12.66	5620.00
22	Chikkaballapura	23	124.00	22.47	757.00	6.24	45.00	152.71	802.00
23	Chikkamagalur	3	0.00	1.50	480.00	0.00	0.00	1.50	480.00
24	Chitradurga	26	0.00	93.80	0.00	61.34	0.00	155.14	0.00
25	Davangere	41	291.08	103.66	0.00	12.96	0.00	407.70	0.00
26	Dharwad	84	614.76	405.77	40374.00	918.26	916.00	1938.78	41290.00
27	Gadag	14	0.00	91.52	24.00	11.55	2384.00	103.07	2408.00

28	Gulbarga	12	0.00	127.50	0.00	52004.17	0.00	52131.67	0.00
29	Hassan	48	1681.00	20011.00	23450.00	428.00	0.00	22120.00	23450.00
30	Haveri	18	0.00	3626.97	4090.00	442.00	0.00	4068.97	4090.00
31	Karwar	41	0.00	2050.00	0.00	0.00	5538.00	2050.00	5538.00
32	Kodagu	12	0.00	26.96	7542.00	0.00	0.00	26.96	7542.00
33	Koppal	40	1295.04	179.02	0.00	255.97	0.00	1730.03	0.00
34	Mandya	55	144.42	136.68	218.00	1306.49	1830.00	1587.59	2048.00
35	Mangalore	134	4000.00	6978.00	72590.00	1100.00	0.00	12078.00	72590.00
36	Mysuru-1	25	422.69	1609.00	258416.00	280.59	0.00	2312.28	258416.00
37	Mysuru-2	27	4609.73	7452.56	77825.00	2205.91	5051.00	14268.20	82876.00
38	Kolar	73	6390.00	895.00	8450.00	916.00	3270.00	8201.00	11720.00
39	Raichur	19	2020.29	34.00	1424.00	85.27	0.00	2139.56	1424.00
40	Ramanagara	86	6026.35	489.33	168152.00	4390.30	0.00	10905.98	168152.00
41	Shivamoga	80	3753.00	145.67	6500.00	53.73	12092.00	3952.40	18592.00
42	Thumkur	70	59.12	278.75	0.00	210.18	0.00	548.04	0.00
43	Udupi	49	1486.60	33.00	4800.00	18.54	580.00	1538.14	5380.00
44	Yadgiri	9	0.00	2.50	0.00	0.00	0.00	2.50	0.00
	Total	**3134**	**46596.67**	**65851.23**	**878131.00**	**79542.72**	**74068.00**	**191990.63**	**952199.00**

Note

* The quantities excluding those given in numbers ** Nos only (Discarded containers, oil filters etc)

Senior Environmental Officer (WMC)

Annexure-4

KARNATAKA INDUSTRIAL AREAS DEVELOPMENT BOAR

(A Government of Karnataka Undertaking)
49, 4th & 5th Floors, 'East Wing', Khanija Bhavan, Race Course Road, Bengaluru - 560 0
Phone : 080-22265383 Fax : 080-22267901
Website : www.kiadb.in email: ceoomkiadb@gmail.com

No. KIADB/HO/Allot/Secy-3/ 18032 /2017-18 Date: 21.02.2018

M/s. Mother Earth Environ,
Tech Private Limited,
No. 2542, 28th Cross,
17th Main, Banashankari 2nd Stage,
Bengaluru -560 070.

RPAD

Sir/Madam/Sirs,

ALLOTMENT LETTER

Sub: Allotment of 40.01 acres of land in Plot Nos. 158 to 164 at Yadgeer District, Kadechur –Badiyala Indl., Area.

Ref: 1. Approval of 90th SLSWCC Meeting dtd: 01.02.2016.
2. Approval of 350th Board Meeting dtd: 22.08.2017.
3. Your application dt: 09.02.2018.
4. G.O.No.CI261 SPI 2010, Bengaluru, dtd: 06.09.2016.

-oOo-

In pursuance of the approval given by the **90th SLSWCC held on 01.02.2016,** you have been allotted **40.01 acres** of land in **Plot Nos. 158 to 164** at **Yadgeer District, Kadechur –Badiyala Indl., Area.** for Setting up **" Hazardous Waste & Other Waste management facilities & CETP "** subject to the terms and conditions indicated in the 350th Board Meeting dtd: 22.08.2017 and also the terms and conditions mentioned hereafter.

1. The allotment of land is on lease basis for a period of **99 years**. The lease is liable to be cancelled automatically in case the land is not utilized within a period of three years in case of MSME, large projects or five years in cases of mega, ultra mega, super mega projects as defined in the industrial policy or the land is not utilized within a specified period approved **in 350th Board Meeting held on 22.08.2017.**

2.The premium payable for allotment of the said land has been tentatively fixed at **Rs.19.50 lakhs per acre** and as per the 350th Board Meeting dated: 22.08.2017, 50% rebate @ of Rs. 9,75,000=00 per acre.

3. (a) The premium of the land shall be paid as follows:

i) A sum of **Rs.78,01,950/-** being the balance 20% of the tentative premium of land paid vide receipt No.0040660 dt:17.02.2018.

....2...

KARNATAKA INDUSTRIAL AREAS DEVELOPMENT BOARD
(A Government of Karnataka Undertaking)
49, 4th & 5th Floors, 'East Wing', Khanija Bhavan, Race Course Road, Bangalore - 560 001
Phone : 080-22205383 Fax : 080-22267901
Website : www.kiadb.in email: ceoomkiadb@gmail.com

ii) A sum of Rs.7,31,250-00 15% Corner Charges for 5.00 acres @ the rate Rs. 9,75,000-00 per acre being the balance land cost within shall be paid within 30 days from the date of issue of this letter on before 22.03.2018.

iii) A Sum of Rs.3,12,12,800-00 being the balance 80% tentative premium of land shall be paid within 90 days from the date of issue of this letter ie on or before 20-05-2018.

(b) In the event of your furnishing letter of commitment from KSFC/KSIIDC/Reserve Bank of India approved Financial Institutions/Corporations/Companies agreeing to pay the premium indicated at 3(a)(2) directly to the Board (applicable only to Medium, Small and Micro Enterprises) the allotment will be confirmed and documentation will be permitted subject to payment of interest @ 9% per annum on amount due from the date of handing over possession of land to the date of payment which should be made within 180 days from the date of execution of lease agreement.

(c) You should pay lease rent of Rs.1000/- per acre/per annum.

(d) You should pay maintenance charges as may be fixed by the Board from time to time.

(e) Interest at 9% per annum shall be levied in case the lease rents are not paid within one month from the date on which the lease rents fall due every year.

4(a) In case of your failure to pay the amount mentioned at Para 3(a)(2) before the expiry of the time stipulated therein, this offer of allotment stands automatically cancelled and the Earnest Money Deposit and 10% of the amount paid by you towards premium stands automatically forfeited.

4(b) If the balance premium is not paid within 90 days from the date of execution of lease agreement in respect of cases mentioned at Para3(b), the plot would be resumed on expiry of the time stipulated without issuing any fresh notice.

5. Soon after receipt of 100% premium and on your acceptance of all the terms and conditions indicated herein before and also those mentioned hereinafter, the possession of land will be handed over within 30 days from the date of payment. At the time of taking over possession, you should produce the original receipts, issued for the payments made, to the Engineer in charge of the area.

6. On taking possession of land, you shall adhere to the time schedule indicated in the Annexe-A.

KARNATAKA INDUSTRIAL AREAS DEVELOPMENT BOARD
(A Government of Karnataka Undertaking)
49, 4th & 5th Floors, 'East Wing', Khanija Bhavan, Race Course Road, Bengaluru - 560 001
Phone : 080-22265383 Fax : 080-22267901
Website : www.kiadb.in email: ceoemkiadb@gmail.com

7. Your failure to take possession of land within 30 days from the date of payment of the premium shall result in cancellation of allotment and 10% of the amount paid towards premium and E.M.D shall stand forfeited.

8. The Board may accept voluntary surrender of plot subject to levy of penalty at 15% of the allotment cost paid by you.

9. All taxes in respect of the lease including service tax shall be payable by you to the Board.

10. Any deposits made by the allottee towards allotment will not carry any interest.

11. It shall be mandatory for you to obtain all statutory clearances from the Karnataka State Pollution Control Board and other statutory competent authorities before commencement of the approved project.

12. You are also requested to remit **Rs.NIL** towards Slum Improvement Cess as **per G.O.No.HUD/180/MIB/94/dt.29.3.1984 together with balance premium.**

13. Only courts situated in the city of Bangalore/ Gulbarga/ Dharwad shall have jurisdiction.

14. You are required to inform any change in address of the Registered Office or Administrative Office, to the Board immediately.

15. This allotment is subject to other terms and conditions of the lease deed.

16. This allotment letter is issued with the approval of Chief Executive Officer & Executive Member.

Yours faithfully,

AUTHORISED SIGNATORY 21.02.18

KARNATAKA INDUSTRIAL AREAS DEVELOPMENT BOARD
(A Government of Karnataka Undertaking)
49, 4th & 5th Floors, 'East Wing', Khanija Bhavan, Race Course Road, Bengaluru - 560 001
Phone : 080-22265303 Fax : 080-22267001
Website : www.kiadb.in email: ceoomkiadb@gmail.com

Annexe-A

CONDITIONS OF ALLOTMENT

The time schedule prescribed for various activities subsequent to payment of premium.

1.(a) For taking over possession of land.	30 days from the date of payment of entire premium.
(b) For execution of Lease Agreement	30 days from the date of receipt of Possession Certificate.
(c) For commencement of construction and completion of project by commencing production.	Construction should be commenced within nine months from the date of taking over possession and production should be commenced :- i) within a period of three years after taking over possession in case of MSME and large industries ii) within a period of five years after taking over possession in cases of mega, ultra mega and super mega projects. iii) Promoters to seek extension of time in writing by giving valid reasons to be concerned investment approving committees viz., DLSWCC / SLSWCC/ SHLCC/**Allotment Committee** prior to the above mentioned periods.

2. On being satisfied that the land is not put to use for the purpose for which it was allotted, the Board will be free to re-enter upon and take possession of the whole or any part of the land which has not been put to proper use.

. . . . 2 . . .

KARNATAKA INDUSTRIAL AREAS DEVELOPMENT BOARD
(A Government of Karnataka Undertaking)
49, 4th & 5th Floors, 'East Wing', Khanija Bhavan, Race Course Road, Bangaluru - 560 001
Phone : 080-22265303 Fax : 080-22207001
Website : www.kiadb.in email: cooomkiadb@gmail.com

3. If necessary, the interest in this plot of land may be offered as security in order to obtain financial assistance from the Govt., or Corporate bodies like Life Insurance Corporation of India, Karnataka State Financial Corporation, Karnataka State Industrial Investment & Development Corporation, Trustees for Debenture Stock or Banks. However, prior permission of the Board shall be obtained for creating second and subsequent charges on the land.

AUTHORISED SIGNATORY 21.02.18

KARNATAKA INDUSTRIAL AREAS DEVELOPMENT BOARD
(A Government of Karnataka Undertaking)
49, 4th & 5th Floors, 'East Wing', Khanija Bhavan, Race Course Road, Bengaluru - 560 001
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Annexe-A

CONDITIONS OF ALLOTMENT

The time schedule prescribed for various activities subsequent to payment of premium.

1. (a) For taking over possession of land.	30 days from the date of payment of entire premium.
(b) For execution of Lease Agreement	30 days from the date of receipt of Possession Certificate.
(c) For commencement of construction and completion of project by commencing production.	Construction should be commenced within nine months from the date of taking over possession and production should be commenced :- i) within a period of three years after taking over possession in case of MSME and large industries ii) within a period of five years after taking over possession in cases of mega, ultra mega and super mega projects. iii) Promoters to seek extension of time in writing by giving valid reasons to be concerned investment approving committees viz., DLSWCC / SLSWCC/ SHLCC/**Allotment Committee** prior to the above mentioned periods.

2. On being satisfied that the land is not put to use for the purpose for which it was allotted, the Board will be free to re-enter upon and take possession of the whole or any part of the land which has not been put to proper use.

. . . . 2 . . .

KARNATAKA INDUSTRIAL AREAS DEVELOPMENT BOARD
(A Government of Karnataka Undertaking)
49, 4th & 5th Floors, 'East Wing', Khanija Bhavan, Race Course Road, Bengaluru - 560 001
Phone : 080-22205303 Fax : 080-22207001
Website : www.kiadb.in email: cooomkiadb@gmail.com

3. If necessary, the interest in this plot of land may be offered as security in order to obtain financial assistance from the Govt., or Corporate bodies like Life Insurance Corporation of India, Karnataka State Financial Corporation, Karnataka State Industrial Investment & Development Corporation, Trustees for Debenture Stock or Banks. However, prior permission of the Board shall be obtained for creating second and subsequent charges on the land.

AUTHORISED SIGNATORY 21.02.18

Annexure-5

ಕರ್ನಾಟಕ ಸರ್ಕಾರ
GOVERNMENT OF KARNATAKA
ಕೈಗಾರಿಕಾ ಮತ್ತು ವಾಣಿಜ್ಯ ಇಲಾಖೆ
DEPARTMENT OF INDUSTRIES AND COMMERCE

ಆಯುಕ್ತರು ಮತ್ತು ನಿರ್ದೇಶಕರು
ಕೈಗಾರಿಕಾ ಮತ್ತು ವಾಣಿಜ್ಯ ಇಲಾಖೆ

OFFICE OF THE COMMISSIONER
FOR INDUSTRIAL DEVELOPMENT &
DIRECTOR OF INDUSTRIES AND COMMERCE

ನಂ. ೪೯, ೨ನೇ ಮಹಡಿ, ಖನಿಜ ಭವನ,
ರೇಸ್ ಕೋರ್ಸ್ ರಸ್ತೆ, ಬೆಂಗಳೂರು ೫೬೦ ೦೦೧
No. 49, 2nd Floor, Khanija Bhavan.
Race Course Road, Bangalore - 560 00
ಕಛೇರಿ / Off : 080-2238 6796
080-2238 9901 to
ಫ್ಯಾಕ್ಸ್ / Fax : 080-2238 9909

Sub: Approval to the proposal of M/s. Mother Earth Environ Tech Private Limited to establish a unit for "Hazardous Waste Disposal" at Kadechur Industrial Area, Yadgir District.

Read: Proceedings of 90th meeting of State Level Single Window Clearance Committee (SLSWCC) held on 1.02.2016.

*****

Preamble:

M/s. Mother Earth Environ Tech Private Limited has proposed to establish a unit for "Hazardous Waste Disposal" with an investment of Rs.96 Crores and generating employment to about 114 persons at Kadechur Industrial Area, Yadgir District.

The proposal was examined in the 90th meeting of State Level Single Window Clearance Committee (SLSWCC) of the Government held on 1.2.2016 and based on the decision of the committee the following order is issued.

OFFICE ORDER

ORDER NO: I&C/ID/SLSWCC-90/E-2/2015-16, BANGALURU; Date: 07.4.2016

Government is pleased to accord approval to the investment proposal of M/s. Mother Earth Environ Tech Private Limited to establish a unit for "Hazardous Waste Disposal" with an investment of Rs.96 Crores at Kadechur Industrial Area, Yadgir District and generating employment to about 114 persons with the following infrastructure assistance, incentives and concessions:

Land-Acres	KIADB to allot 40 acres of land in one corner of the industrial area at Kadechur Industrial Area, Yadgir District subject to obtain clearances from the concerned authorities
Water-LPD	400 KLPD from KIADB
Power-KVA	2000 KVA from GESCOM
Incentives and Concessions	As per New Industrial Policy 2014-19
Employment to Local persons	Promoters to provide local employment as per New Industrial Policy 2014-19

Sanction of the above infrastructure facilities, incentives and concessions is subject to the following terms and conditions:

1. **Environment:** The company to obtain Consent for Establishment and Consent for Operation from KSPCB and environmental clearance from MoEF, Govt. of India or the Dept of Forest, Ecology & Environment, Govt. of Karnataka if applicable.

2. **Employment:** The company shall comply with the employment provisions of the respective Policy of Govt. of Karnataka, and prepare a plan for development of Human Resources required for the project and also train local people. A copy of Human Resources Development plan shall be sent to the Commissioner for Industrial Development & Director of Industries and Commerce for monitoring.

3. **Vendor Development:** Wherever there is scope for vendor development for the project, the company shall prepare a vendor development plan, develop local vendors and procure the required inputs, components and sub-assemblies from these local vendor units. A copy of the vendor development plan shall be sent to the Commissioner for Industrial Development & Director of Industries and Commerce for monitoring.

4. **Social Infrastructure Development:** The company is advised to take up social infrastructure development projects in the vicinity of the proposed location of the unit and comply with the stipulation of Companies Act, 2013. A copy of such projects shall be sent to the Commissioner for Industrial Development & Director of Industries and Commerce for monitoring.

5. **Others:**
   a) The company shall adopt rainwater harvesting, waste water recycling and water conservation techniques. Zero discharge facility should be adopted wherever applicable
   b) The company shall take all statutory and other necessary clearances from the competent authorities including Govt. of India.
   c) As part of "Ease of Doing Business" Government vide order No. CI 89 SPI 2013, Bangalore Dated 20.12.2014 has accorded approval to operationalise e-Udyami Phase II for obtaining various clearances / approvals / licenses etc. through common e-platform for the projects approved through District Level Single Window Clearance Committee (DLSWCC) or State Level Single Window Clearance Committee (SLSWCC) or State High Level Clearance Committee (SHLCC) w.e.f. 01.01.2015.
   d) The approvals / NOCs of following Departments have been covered under Phase II of e-Udyami.

i. Karnataka Industrial Areas Development Board.
ii. Karnataka Small Scale Industries Development Corporation.
iii. Karnataka State Pollution Control Board.
iv. Factories, Boilers, Industrial Safety and Health Department
v. Industries and Commerce Department
vi. Town Planning Department and Local Planning Authorities
vii. Municipal Administration Department
viii. BESCOM/GESCOM/HESCOM/CESCOM/MESCOM
ix. Karnataka State Fire and Emergency Services Department
x. Water Resources Department

e) The login and passwords which are used for filing application through e-Udyami Phase I are also applicable for filing application through e-Udyami Phase II. E-Udyami Phase II web application may be accessed through www.ebizkarnataka.gov.in and online application along with necessary documents may please be filed for any of above Departments' approval / NOCs.

f) Karnataka Udyog Mitra (KUM) would provide the necessary escort services for the speedy implementation of your project. You are requested to inform the progress made in the implementation of the project every quarter in the proforma.

This approval is valid for a period of two years from the date of issue of this order.

On behalf of Govt. of Karnataka

(Gaurav Gupta, IAS)
Commissioner for Industrial Development and
Director of Industries & Commerce
and Member Secretary,
State Level Single Window Clearance Committee

Copy to:

1. The Chief Executive Officer & Executive Member, Karnataka Industrial Areas Development Board, 4th / 5th Floor, East Wing, Khanija Bhavan, Race Course Road, Bangalore-560 001 – for kind information and needful action in the matter.
2. The Member Secretary, Karnataka State Pollution Control Board, No. 49, Parisara Bhavana, 4th & 5th Floor, Church Street, Bangalore – 560 001 – for kind information and needful action in the matter.
3. The Managing Director, GESCOM, Gulbarga- for information and needful action in the matter.
4. The Joint Director, District Industries Centre, Yadgir District - for information and to monitor the appointment of local persons by the company and implementation of the project and submit the report regularly.

Annexure-6

BIDAR DISTRICT CHEMICAL &PHARMACEUTICAL INDUSTRIES ASSOCIATION

Regd. Off: plot.No.135F,127&128 ,KIADB Kolhar Industrial area
Bidar -585403.E-mail: bdcpia.bidar @gmail.com

No.BDCPIA/MOEF/01/2016-17 Date: 18-11-2016

To:
Shri Anil Madhav Dave,
Hon'ble Minister of State (IC) of
Environment, Forest and Climate Change
Government of India
Paryavaran Bhavan, Jorbagh Road,
New Delhi-110003.

Sir,

Sub: Distance criteria for setting up of Treatment Storage and Disposal Facility (TSDF)-reg.
Ref:1. GOI O.M. No.F.No.12-30/2013 HSMD, Dated 20-06-2013.
2.GOI O.M. No.F.No.23-122/2016-HSMD.

With reference to the above, we wish to bring to your kind notice that we are the Association of chemical &Pharmaceutical industries located in the fast growing industrial region of Bidar Districts and other surrounding industries in Bidar. All the Northern Karnataka Districts are drought hit areas and backward areas. Due to relaxed industrial policies of State Government, several industries have come up and providing employment to the poor localities. Due to several reasons the industries in these areas are facing lot of problems to function.

In this context, our association likes to bring to your kind notice that our industries are generating hazardous waste and other Landfillable hazardous wastes and high calorific/burned (Incineration) hazardous wastes to the tune of hundreds of tons per anum. Presently, these industries are facing acute shortage of TSDF facilities in and around Raichur, Bidar and surrounding Districts to dispose of their industrial waste. To dispose our industrial Hazardous waste we have no other choice but to use far way situated TSDF facilities at Bangalore. As a result

we are sustaining huge losses due to high cost of transportation and time factors. We are also suffering from huge losses on this account and finding it difficult to continue with the existing industries. Due to non-availabilityof nearby TSDF facilities, new entrepreneurs are not showing keen interest to establish any industry in these Northern Karnataka Districts. Therefore there is a immediate necessity to establish a TSDF Facility nearby Raichur- Bidar Districts. we are also facing lot of practical problems of interstate transportation of hazardous waste due to declining the permission for trans boundary movements.

In background we refer your Office Memorandum dated 20-06-2013 referred above which regulates the concept of integrated waste management facilities needs to be encouraged for establishment of integrated facilities for treatment and disposal of hazardous waste, biomedical waste and electronic wastes. In continuation of the said memorandum, The Government of India has also flouted one more Office Memorandum dated 29-8-2016 clarifying that in addition to criteria in terms of distance between TSDFs as prescribed in O.M. Dated 20-06-2013 shall also be adhered to for setting up of new projects of common TSDF for hazardous waste in the country. It has also clarifies mandating that the new project of common treatment facilities within a distance of 400 km radius of the existing TSDFs for hazardous wastes is not permissible.

We would draw your kind attention to Clause No. (vii) of OM Dated 20-06-2013 which reads as "The SPCBs/PCCs should give their permissions only after ensuring their compliance with the norms and guidelines of CPCB, particularly relating to distance criteria and **considering the need of the area as well as availability of adequate waste in the area for installing common treatment facilities".**

In O.M. Dated 20-06-2013 a provision is made to relax the distance criteria for grant of permission to establish TSDF facility within four hundred km radius by considering the need of the area as well as availability of adequate waste in the area for installing Integrated Common Hazardous WasteTreatment Facilities. This relaxation would help the several hundred industries located in North Karnataka Districts and surrounding Districts for getting a TSDF facility to avoid long transportation cost, risky and time factors this relaxation and point of consideration is not considered while issuing OM Dated 29-06-2016. This bar would cause irreparable setback for all the industries located in these northern Karnataka back ward regions.

In the light of the above, we request your kindself to withdraw both of the aforesaid Official Memorandums dated 20-06-2013 and also 29-08-2016 immediately to facilitate establishment of one more TSDF facility in and around Raichur/Bidar Districts. This claim is made to avoid huge losses to the existing industries and also definitely encourages further industrialization in the region.

Thanking you,
Yours faithfully,

For Bidar District Chemicals and Pharmaceuticals' Industries Association

President

Copy to : 1) The Secretary to Govt of India, Ministry of Environment, Forest and Climate Change Paryavaran Bhavan, Jorbagh Road,New Delhi-110003.

2) Additional Chief Secretary to Government of Karnataka, Department of Forest Environment & Ecology, 4th Floor MS Building Bangalore -560001.

KARNATAKA INDUSTRIAL AREAS DEVELOPMENT BOARD

(A Government of Karnataka Undertaking)

 # 49, 4th & 5th Floors, 'East Wing', Khanija Bhavan, Race Course Road, Bengaluru - 560 001

Phone : 080-22265383 Fax : 080-22267901

Website : www.kiadb.in email: ceoemkiadb@gmail.com

No. KIADB/CDO&CE/FCN:3627/96 78/2018-19 Date: 23-10-2018

RPAD

The Joint Secretary,
Ministry of Environment, Forest & Climate Change,
Government of India, Indira Paryavaran Bhawan,
Aliganj, jor Bagh Road
New Delhi-110003.

Sir,

Sub: Development Of "Hazardous Wate & Other Waste Management & CETP" in Plot No.s 158 to 164 of Kadechuru Industrial Area, Yadgir District - reg.

Ref: 1. Environment Clearance (EC) obtained from MoEF&CC F.No. 21-8/2014-IA-III dtd: 14-10-2016

2. KIADB allotment letter No.KIADB/HO/Allot/Secy-3/18032/2017-18 dtd: 21.02.2018

******

With reference to the above subject it is to inform that, KIADB has Obtained EC vide ref (1) for Kadechuru Industrial Area, MoEF&CC F.No. 21-8/2014-IA-III dtd: 14-10-2016 Yadgir District for an extent of 3240 Acres including setting up of ETP of capacity 5.0 mld in plot No 162 (extent of 27.60 Acres) to be set up by KIADB.

Further, we wish to inform that an extent of 40.01 acres of land in plot Nos 158 to 164 located in Kadechuru Industrial Area has been allotted in favour of M/s Mother Earth Environ Tech Private Limited, vide ref(2) for setting up "Hazardous Wate & Other Waste Management & CETP". As M/s Mother Earth Environ Tech Private Limited is setting up Hazardous Wate & Other Waste Management & CETP in the above said Plot, it is requested to process for issuing of EC in favour of this company as per Norms.

Thanking you,

Yours faithfully,

23/10/18

Chief Development Officer &
Chief Engineer

Enclosure: Copies of EC and Allotment Letter.

Savant Envitech Pvt. Ltd.
Plot No. 203, H. No. 5-36/203,
Prashanthinagar, Kukatpally IDA,
Hyderabad - 500 072.
Ph : 040-23070602, 2307 5699
: 040-40126589, 65873137

Name of Customer : M/s Kadechur Project
Date of Report : 02.02.2018
Sample collected by : Savant Envitech Pvt. Ltd.
Sampling Procedure : CPCB guidelines (NAAQMS/Volume – I /2013-14)
Sample Description/Code : Ambient Air Quality Monitoring
Sub Contract Testing : NA
Environmental Condition : Weather Condition: Dry
Temperature: 18-32°C

Test Result

Sample is analyzed "as is where is basis"

Monitoring Locations	PM_{10} (µg/m³)				
	Minimum	Maximum	Average	98 Percentile	CPCB Norms
Project site (Kadechur)	62.5	72.4	67.5	72.2	100
Saidapur	64.6	73.6	69.1	73.4	100
Duppali	56.7	70.1	63.4	69.9	100
Balched	62.2	71.2	66.7	71.0	100
Kunsi	63.5	72.7	68.1	72.5	100
Badiyal	62.4	70.7	66.5	70.5	100
Baddepalli	59.3	68.3	63.8	68.1	100
Kothapalle	55.9	63.8	59.9	63.7	100

Monitoring Locations	$PM_{2.5}$ (µg/m³)				
	Minimum	Maximum	Average	98 Percentile	CPCB Norms
Project site (Kadechur)	20.2	27.7	24.0	27.6	60
Balched	20.1	30.3	25.2	30.0	60
Saidapur	25.2	32.6	28.9	32.4	60
Badiyal	17.7	26.8	22.3	26.6	60
Kothapalle	18.4	26.3	22.4	26.2	60
Duppali	17.9	25.1	21.5	25.0	60
Kunsi	23.3	31.3	27.3	31.1	60
Baddepalli	16.5	24.6	20.6	24.4	60

Savant Envitech Pvt. Ltd.
Plot No. 203, H. No. 5-36/203,
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: 040-40126589, 65873137

Monitoring Locations	SO_2 (µg/m³)				
	Minimum	Maximum	Average	98 Percentile	CPCB Norms
Badiyal	11.3	17.0	14.1	16.8	80
Balched	12.3	17.3	14.8	17.2	80
Saidapur	15.6	20.6	18.1	20.5	80
Project site (Kadechur)	14.3	17.5	15.9	17.4	80
Kothapalle	11.7	15.7	13.7	15.6	80
Kunsi	14.4	18.2	16.3	18.1	80
Baddepalli	11.7	15.2	13.4	15.1	80
Duppali	12.1	15.1	13.6	15.0	80

Monitoring Locations	NO_x (µg/m³)				
	Minimum	Maximum	Average	98 Percentile	CPCB Norms
Project site (Kadechur)	24.3	33.9	29.1	33.7	80.0
Saidapur	18.1	25.3	21.7	25.2	80.0
Duppali	16.4	21.5	19.0	21.4	80.0
Balched	28.6	35.5	32.0	35.3	80.0
Kunsi	16.7	21.3	19.0	21.2	80.0
Badiyal	30.2	37.2	33.7	37.1	80.0
Baddepalli	15.8	19.7	17.7	19.6	80.0
Kothapalle	12.5	19.1	15.8	19.0	80.0

Monitoring Location	CO (µg/m³)				
	Minimum	Maximum	Average	98 Percentile	CPCB Norms
Project site (Kadechur)	0.65	0.87	0.76	0.87	2
Balched	0.29	0.87	0.58	0.86	2
Duppali	0.24	0.83	0.54	0.82	2
Kunsi	0.71	0.88	0.80	0.88	2
Badiyal	0.11	0.51	0.31	0.50	2
Saidapur	0.75	0.88	0.82	0.88	2
Baddepalli	0.13	0.36	0.25	0.36	2
Kothapalle	0.21	0.59	0.40	0.58	2

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Hyderabad - 500 072.
Ph : 040-23070602, 2307 5699
: 040-40126589, 65873137

Opinion and interpretation: Nil

NA: Not Applicable

1. Reports pertained only to the submitted sample.
2. Test reports shall not be reproduced except in full, without written approval of the laboratory

-- End of the report –

Checked By
M.Balachandra Babu
(Envi.Scientist)

Authorized Signatory
V.Alluraiah
Manager – Laboratory

Savant Envitech Pvt. Ltd.
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Prashanthinagar, Kukatpally IDA,
Hyderabad - 500 072.
Ph : 040-23070602, 2307 5699
: 040-40126589, 65873137

Name of the Customer **Date: 02.02.2018**
M/s. Kadechur Project

Sample particulars : Noise monitoring

S.No	Time	N1		N2		N3		N4	
	Hrs.	Day	Night	Day	Night	Day	Night	Day	Night
1	6	46.5	-	38.4	-	40.4	-	45.4	-
2	7	48.2	-	42.1.	-	43.6	-	48.6	-
3	8	52.1	-	45.7	-	48.9	-	53.2	-
4	9	56.2	-	52.3	-	53.2	-	55.1	-
5	10	63.8	-	56.8	-	57.6	-	58.5	-
6	11	67.3	-	60.1	-	62.3	-	60.7	-
7	12	72.1	-	41.4	-	70.2	-	66.2	-
8	13	48.3	-	35.2	-	45.5	-	40.4	-
9	14	45.2	-	32.6	-	40.7	-	38.6	-
10	15	43.4	-	31.5	-	41.6	-	36.8	-
11	16	66.1	-	56.6	-	65.2	-	64.9	-
12	17	72.9	-	58.2	-	67.1	-	67.2	-
13	18	68.3	-	64.1	-	68.4	-	62.4	-
14	19	65.7	-	45.8	-	60.9	-	60.1	-
15	20	58.3	-	42.4	-	52.2	-	50.8	-
16	21	50.2	-	40.9	-	46.5	-	45.3	-
17	22	-	45.6	-	36.2	-	37.2	-	40.3
18	23	-	43.2	-	32.5	-	35.7	-	37.7
19	24	-	39.1	-	30.8	-	32.9	-	33.4
20	1	-	36.8	-	28.2	-	30.4	-	30.7
21	2	-	39.3	-	33.4	-	28.3	-	27.2
22	3	-	40.6	-	35.7	-	26.6	-	26.8
23	4	-	43.2	-	36.2	-	33.1	-	34.2

Savant Envitech Pvt. Ltd.
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: 040-40126589, 65873137

24	5	-	44.1	-	37.9	-	34.5	-	38.5
Leq dB (A)		65.3	42.0	55.1	34.3	62.4	33.1	60.1	35.4

N1. Project Site, N2. Kadechur, N3. Badal, N4. Chegunta

1. Reports pertained only to the submitted sample.
2. Test reports shall not be reproduced except in full, without written approval of the laboratory

-- End of the report –

Checked By
M.Balachandra Babu
(Envi.Scientist)

Authorized Signatory
V.Alluraiah
Manager – Laboratory

Savant Envitech Pvt. Ltd.
Plot No. 203, H. No. 5-36/203,
Prashanthinagar, Kukatpally IDA,
Hyderabad - 500 072.
Ph : 040-23070602, 2307 5699
: 040-40126589, 65873137

Name of the Customer **Date: 02.02.2018**
M/s. Kadechur Project

Sample particulars : Noise monitoring

S.No	Time	N5		N6		N7		N8	
	Hrs.	Day	Night	Day	Night	Day	Night	Day	Night
1	6	46.4	-	42.3	-	47.4	-	41.4	-
2	7	48.6	-	48.5	-	51.6	-	46.8	-
3	8	53.8	-	51.7	-	56.4	-	49.7	-
4	9	55.2	-	54.4	-	61.3	-	56.8	-
5	10	60.4	-	59.7	-	68.6	-	61.6	-
6	11	66.8	-	54.9	-	70.9	-	68.7	-
7	12	43.5	-	56.6	-	56.4	-	70.3	-
8	13	40.1	-	53.4	-	42.3	-	43.6	-
9	14	38.3	-	52.3	-	40.5	-	41.2	-
10	15	42.4	-	48.5	-	41.3	-	38.5	-
11	16	54.8	-	45.3	-	66.9	-	66.7	-
12	17	60.5	-	55.5	-	68.2	-	68.5	-
13	18	66.7	-	58.4	-	69.5	-	55.3	-
14	19	68.8	-	58.7	-	52.8	-	50.7	-
15	20	54.9	-	45.5	-	45.6	-	48.6	-
16	21	46.2	-	40.3	-	41.5	-	43.9	-
17	22	-	42.4	-	39.4	-	38.6	-	40.4
18	23	-	40.1	-	38.7	-	35.5	-	36.6
19	24	-	37.5	-	35.6	-	32.3	-	30.7
20	1	-	32.4	-	32.8	-	30.5	-	28.4
21	2	-	29.9	-	30.4	-	34.8	-	26.3
22	3	-	33.6	-	33.6	-	36.6	-	36.4
23	4	-	35.2	-	39.3	-	38.7	-	37.7

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: 040-40126589, 65873137

24	5	-	38.8	-	42.2	-	43.3	-	39.8
Leq dB (A)		60.4	37.5	53.9	37.6	63.6	37.5	62.6	36.1

N5. Rachanahalli, N6. Kunsi, N7. Gundahadagi, N8. Bomrolododdi

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Authorized Signatory
V.Alluraiah
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Date: 02.02.2018

Name of the Client : **M/s. Kadechur Project**

Report Number : **SEPL/Soil/18 – 101 to 102**
Sampler Particulars : Soil Sample
Collected by/date : SEPL / 23.01.2018
Analysis Commenced on : 27.01.2018
Analysis Completed on : 02.02.2018

S.No	Parameters	Method	Units	1	2
1	P^H (1:2 Soil Water Extract)	IS : 2720 (Part – 26) :2011	--	6.66	7.16
2	Electrical Conductivity (1:2 soil Water Extract)	Lab SOP No: SEPL/SOP/SOIL/LAB-255,Issue no:01,Issue Date:01-08-2013; Based on Method Manual Soil Testing in India Department of Agriculture & Cooperation Ministry of Agriculture Government of India	micro mhos	41.8	61.4
3	Bulk Density	IS : 2720 (Part – 28):2010	g/cc	1.40	1.34
4	Moisture Content	IS : 2720 (Part – 18):2002	%	6.12	6.66
5*	Nitrates as N	--	mg/ kg	63.1	70.23
6	Phosphorous as P_2O_5	Lab SOP No: SEPL/SOP/SOIL/LAB-247, Issue no:01,Issue Date:01-08-2013; Based on Method Manual Soil Testing in India Department of Agriculture & Cooperation Ministry of Agriculture Government of India	mg/ kg	18.3	24.3
7	Potassium as K_2O	Lab SOP No: SEPL/SOP/SOIL/LAB-252, Issue no:01,Issue Date:01-08-2013; Based on Method Manual Soil Testing in India Department of Agriculture & Cooperation Ministry of Agriculture Government of India	mg/ kg	120.5	150.4
8	Sodium as Na_2O	Lab SOP No: SEPL/SOP/SOIL/LAB-253, Issue no:01,Issue Date:01-08-2013; Based on Method Manual Soil Testing in India Department of Agriculture & Cooperation Ministry of Agriculture Government of India	mg/ kg	14.24	16.12

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Report Number : SEPL/Soil/18 – 101 to 102

S.No	Parameters	Method	Units	1	2
9	Calcium as Ca	Lab SOP No: SEPL/SOP/SOIL/LAB-248, Issue no:01,Issue Date:01-08-2013;Based on Method Manual Soil Testing in India Department of Agriculture & Cooperation Ministry of Agriculture Government of India	mg/ kg	500	560
10	Magnesium as Mg	Lab SOP No: SEPL/SOP/SOIL/LAB-248, Issue no:01,Issue Date:01-08-2013; Based on Method Manual Soil Testing in India Department of Agriculture & Cooperation Ministry of Agriculture Government of India	mg/ kg	279.4	291.6
11*	Soil Texture				
	a) Sand (%)	--	--	36	37
	b) Silt (%)		--	49	50
	c) Clay (%)		--	15	13
	Type of Soil		--	Sandy Loam	Silt Loam
12	Copper as Cu	USEPA : 3050B, & Copper by Flame AAS, SEPL/SOP/SOIL/LAB-279, Issue no:01,Issue Date:01-08-2013.	mg/ kg	< 2.0	< 2.0
13	Zink as Zn	USEPA: 3050B, & Zinc by Flame AAS, SEPL/SOP/SOIL/LAB-284, Issue no:01,Issue Date:01-08-2013	mg/ kg	< 2.0	< 2.0
14	Manganese as Mn	USEPA: 3050B, & Manganese by Flame AAS, SEPL/SOP/SOIL/LAB-283, Issue no:01,Issue Date:01-08-2013.	mg/ kg	< 2.0	< 2.0
15	Nickel as Ni	USEPA: 3050B, & Zinc by Flame AAS, SEPL/SOP/SOIL/LAB-285, Issue no:01,Issue Date:01-08-2013	mg/ kg	< 1.0	< 1.0
16	Cadmium as Cd	USEPA: 3050B, & Cadmium by Flame AAS, SEPL/SOP/SOIL/LAB-281, Issue no:01,Issue Date:01-08-2013.	mg/ kg	< 0.5	< 0.5
17	Chromium as Cr	USEPA: 3050B &Chromium by Flame AAS , SEPL/SOP/SOIL/LAB-280, Issue no:01,Issue Date:01-08-2013	mg/ kg	< 2.0	< 2.0
18	Sulphates as So_4	IS : 2720 (Part – 27):2010	mg/ kg	36.12	22.10
19	Total Organic Carbon	IS : 2720 (Part – 22):2010	%	0.72	0.84

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Report Number : SEPL/Soil/18 – 101 to 102

S.No	Parameters	Method	Units	1	2
23	Iron as Fe	USEPA: 3050B,& Iron by UV-Vis spectrophotometer, SEPL/SOP/SOIL/LAB-278, Issue no:01,Issue Date:01-08-2013.	mg/ kg	< 5.0	< 5.0
24	Lead as Pb	USEPA: 3050B, & Lead by Flame AAS SEPL/SOP/SOIL/LAB-282, Issue no: 01, Issue Date:01-08-2013.	mg/ Kg	< 5.0	< 5.0

Opinion and interpretation: Nil NA: Not Applicable

1. Project Site- Kadechur **2. Balched**

Note: The above Mentioned * Parameters not under NABL Scope

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Date: 02.02.2018

Name of the Client : **M/s. Kadechur Project**

Report Number : **SEPL/Soil/18 – 103 to 105**
Sampler Particulars : Soil Sample
Collected by/date : SEPL / 24.01.2018
Analysis Commenced on : 27.01.2018
Analysis Completed on : 02.02.2018

S.No	Parameters	Method	Units	3	4	5
1	P^H (1:2 Soil Water Extract)	IS : 2720 (Part – 26) :2011	--	9.10	6.72	6.80
2	Electrical Conductivity (1:2 soil Water Extract)	Lab SOP No: SEPL/SOP/SOIL/LAB-255,Issue no:01,Issue Date:01-08-2013; Based on Method Manual Soil Testing in India Department of Agriculture & Cooperation Ministry of Agriculture Government of India	micro mhos	98.8	23.3	1455
3	Bulk Density	IS : 2720 (Part – 28):2010	g/cc	1.33	1.28	1.48
4	Moisture Content	IS : 2720 (Part – 18):2002	%	8.12	5.14	6.42
5*	Nitrates as N	--	mg/ kg	68.42	54.88	70.8
6	Phosphorous as P_2O_5	Lab SOP No: SEPL/SOP/SOIL/LAB-247, Issue no:01,Issue Date:01-08-2013; Based on Method Manual Soil Testing in India Department of Agriculture & Cooperation Ministry of Agriculture Government of India	mg/ kg	12.42	84.0	22.6
7	Potassium as K_2O	Lab SOP No: SEPL/SOP/SOIL/LAB-252, Issue no:01,Issue Date:01-08-2013; Based on Method Manual Soil Testing in India Department of Agriculture & Cooperation Ministry of Agriculture Government of India	mg/ kg	120.5	158.0	246.5
8	Sodium as Na_2O	Lab SOP No: SEPL/SOP/SOIL/LAB-253, Issue no:01,Issue Date:01-08-2013; Based on Method Manual Soil Testing in India Department of Agriculture & Cooperation Ministry of Agriculture Government of India	mg/ kg	13.44	12.84	17.46

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Report Number : SEPL/Soil/18 – 103 to 105

S.No	Parameters	Method	Units	3	4	5
9	Calcium as Ca	Lab SOP No: SEPL/SOP/SOIL/LAB-248, Issue no:01,Issue Date:01-08-2013;Based on Method Manual Soil Testing in India Department of Agriculture & Cooperation Ministry of Agriculture Government of India	mg/ kg	420	480	260
10	Magnesium as Mg	Lab SOP No: SEPL/SOP/SOIL/LAB-248, Issue no:01,Issue Date:01-08-2013; Based on Method Manual Soil Testing in India Department of Agriculture & Cooperation Ministry of Agriculture Government of India	mg/ kg	206.5	315.9	109.3
11*	Soil Texture					
	a) Sand (%)	--	--	43	39	37
	b) Silt (%)		--	44	46	51
	c) Clay (%)		--	13	15	12
	Type of Soil		--	Clay Loam	Sandy Loam	Sandy Loam
12	Copper as Cu	USEPA : 3050B, & Copper by Flame AAS, SEPL/SOP/SOIL/LAB-279, Issue no:01,Issue Date:01-08-2013.	mg/ kg	< 2.0	< 2.0	< 2.0
13	Zink as Zn	USEPA: 3050B, & Zinc by Flame AAS, SEPL/SOP/SOIL/LAB-284, Issue no:01,Issue Date:01-08-2013	mg/ kg	< 2.0	< 2.0	< 2.0
14	Manganese as Mn	USEPA: 3050B, & Manganese by Flame AAS, SEPL/SOP/SOIL/LAB-283, Issue no:01,Issue Date:01-08-2013.	mg/ kg	< 2.0	< 2.0	< 2.0
15	Nickel as Ni	USEPA: 3050B, & Zinc by Flame AAS, SEPL/SOP/SOIL/LAB-285, Issue no:01,Issue Date:01-08-2013	mg/ kg	< 1.0	< 1.0	< 1.0
16	Cadmium as Cd	USEPA: 3050B, & Cadmium by Flame AAS, SEPL/SOP/SOIL/LAB-281, Issue no:01,Issue Date:01-08-2013.	mg/ kg	< 0.5	< 0.5	< 0.5
17	Chromium as Cr	USEPA: 3050B &Chromium by Flame AAS , SEPL/SOP/SOIL/LAB-280, Issue no:01,Issue Date:01-08-2013	mg/ kg	< 2.0	< 2.0	< 2.0
18	Sulphates as So_4	IS : 2720 (Part – 27):2010	mg/ kg	34.76	20.82	28.63
19	Total Organic Carbon	IS : 2720 (Part – 22):2010	%	0.84	0.86	0.76

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Report Number : SEPL/Soil/18 – 103 to 105

S.No	Parameters	Method	Units	3	4	5
20	Iron as Fe	USEPA: 3050B,& Iron by UV-Vis spectrophotometer, SEPL/SOP/SOIL/LAB-278, Issue no:01,Issue Date:01-08-2013.	mg/ kg	< 5.0	< 5.0	< 5.0
21	Lead as Pb	USEPA: 3050B, & Lead by Flame AAS SEPL/SOP/SOIL/LAB-282, Issue no: 01, Issue Date:01-08-2013.	mg/ Kg	< 5.0	< 5.0	< 5.0

Opinion and interpretation: Nil NA: Not Applicable

3. Duppali 4. Kunsi 5. Badiyal

Note: The above Mentioned * Parameters not under NABL Scope

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Name of the Customer
M/s. Kadechur Project

Date: 02.02.2018

Test Report No	:	**SEPL/W-WW/18 – 3022**
Sample particulars	:	**Project site _ Ground Water**
Sample quantity	:	2 Liters
Collected by / date	:	SEPL / 22.01.2018
Sample Registration Date	:	27.01.2018
Analysis Commenced on	:	27.01.2018
Analysis Completed on	:	02.02.2018
Sub Contract Testing	:	NA

Sr. No.	Parameter	Method	Unit	Result	IS Drinking WaterLimits10500:2012	
					Desirable	Permissible
1	pH@27.1^{0}C	APHA 22nd Edition; 4500 H^+ B	--	7.21	6.5-8.5	No Relaxation
2	Conductivity@26.9^{0}C	APHA 22nd Edition; 2510 B	µMho/cm	770.0	--	--
3	Color	APHA 22nd Edition;2120 B	CU	< 1.0	5	15
4	Odour	APHA 22nd Edition; 2150 B	Agreeable	Agreeable	Agreeable	Agreeable
5	Total Dissolved Solids	APHA 22nd Edition; 2540 C	mg/L	495.0	500	2000
6	Alkalinity as $CaCO_3$	APHA 22nd Edition; 2320 B	mg/L	240.0	200	600
7	Total Hardness as $CaCO_3$	APHA 22nd Edition; 2340 C	mg/L	230.0	200	600
8	Calcium as Ca^{+2}	APHA 22nd Edition; 3500 Ca B	mg/L	50.1	75	200
9	Magnesium as Mg^{+2}	APHA 22nd Edition; 3500 Mg B	mg/L	24.3	30	100
10	Sodium as Na^+	APHA 22nd Edition; 3500 Na B	mg/L	43.5	--	--
11	Potassium as K^+	APHA 22nd Edition; 3500 K B	mg/L	2.96	--	--
12	Chlorides as Cl^-	APHA 22nd Edition; 4500 Cl- B	mg/L	67.14	250	1000
13	Sulphates as SO_4^{-2}	APHA 22nd Edition; 4500 SO_4^2 E	mg/L	39.67	200	400

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Test Report No : **SEPL/W-WW/18 –3022**

S. No.	Parameter	Method	Unit	Result	IS Drinking WaterLimits10500:2012	
					Desirable	Desirable
14	Nitrate Nitrogen as NO_3^-	APHA 22nd Edition; 4500 NO_3^- B	mg/L	2.9	45	No Relaxation
15	Fluorides as F^-	APHA 22nd Edition; 4500 F- D	mg/L	< 0.5	1	1.5
16	Phosphorus as PO_4^{-3}	APHA 22nd Edition; 4500 P C	mg/L	< 0.1	--	--
17	Iron as Fe^{+2}	APHA 22nd Edition; 3500 Fe B	mg/L	< 0.1	0.3	No Relaxation
18	Copper as Cu^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.05	1.5
19	Total Chromium as Cr	APHA 22nd Edition; 3111 B	mg/L	< 0.05	0.05	0.05
20	Cadmium Cd^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.001	< 0.003	No Relaxation
21	Manganese as Mn	APHA 22nd Edition; 3111 B	mg/L	< 0.05	0.1	0.3
22	Nickel as Ni^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.02	No Relaxation
23	Zinc as Zn^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.5	5	15
24	Lead as Pb^{+4}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.01	No Relaxation
25	Aluminium as Al	APHA 22nd Edition; 3500 Al B	mg/L	< 0.03	< 0.03	0.2
26	Boron as B	APHA 22nd Edition; 4500 B B	mg/L	< 0.2	0.5	1.0

Opinion and interpretation: Nil

NA: Not Applicable

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Name of the Customer **Date: 02.02.2018**
M/s. Kadechur Project
Test Report No : **SEPL/W-WW/18 – 3023**
Sample particulars : **Balched _ Ground Water**
Sample quantity : 2 Liters
Collected by / date : SEPL / 22.01.2018
Sample Registration Date : 27.01.2018
Analysis Commenced on : 27.01.2018
Analysis Completed on : 02.02.2018
Sub Contract Testing : NA

Sr. No.	Parameter	Method	Unit	Result	IS Drinking WaterLimits10500:2012	
					Desirable	Permissible
1	pH@27.1^{0}C	APHA 22nd Edition; 4500 H^+ B	--	7.39	6.5-8.5	No Relaxation
2	Conductivity@26.9^{0}C	APHA 22nd Edition; 2510 B	µMho/cm	1385	--	--
3	Color	APHA 22nd Edition;2120 B	CU	< 1.0	5	15
4	Odour	APHA 22nd Edition; 2150 B	Agreeable	Agreeable	Agreeable	Agreeable
5	Total Dissolved Solids	APHA 22nd Edition; 2540 C	mg/L	925.0	500	2000
6	Alkalinity as $CaCO_3$	APHA 22nd Edition; 2320 B	mg/L	320.0	200	600
7	Total Hardness as $CaCO_3$	APHA 22nd Edition; 2340 C	mg/L	430.0	200	600
8	Calcium as Ca^{+2}	APHA 22nd Edition; 3500 Ca B	mg/L	126.25	75	200
9	Magnesium as Mg^{+2}	APHA 22nd Edition; 3500 Mg B	mg/L	26.73	30	100
10	Sodium as Na^+	APHA 22nd Edition; 3500 Na B	mg/L	136.25	--	--
11	Potassium as K^+	APHA 22nd Edition; 3500 K B	mg/L	4.58	--	--
12	Chlorides as Cl^-	APHA 22nd Edition; 4500 Cl- B	mg/L	210.0	250	1000
13	Sulphates as SO_4^{-2}	APHA 22nd Edition; 4500 SO_4^2 E	mg/L	49.51	200	400

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Test Report No : **SEPL/W-WW/18 –3023**

S. No.	Parameter	Method	Unit	Result	IS Drinking WaterLimits10500:2012	
					Desirable	Desirable
14	Nitrate Nitrogen as NO_3^-	APHA 22nd Edition; 4500 NO_3^- B	mg/L	3.69	45	No Relaxation
15	Fluorides as F^-	APHA 22nd Edition; 4500 F- D	mg/L	< 0.5	1	1.5
16	Phosphorus as PO_4^{-3}	APHA 22nd Edition; 4500 P C	mg/L	< 0.1	--	--
17	Iron as Fe^{+2}	APHA 22nd Edition; 3500 Fe B	mg/L	< 0.1	0.3	No Relaxation
18	Copper as Cu^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.05	1.5
19	Total Chromium as Cr	APHA 22nd Edition; 3111 B	mg/L	< 0.05	0.05	0.05
20	Cadmium Cd^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.001	< 0.003	No Relaxation
21	Manganese as Mn	APHA 22nd Edition; 3111 B	mg/L	< 0.05	0.1	0.3
22	Nickel as Ni^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.02	No Relaxation
23	Zinc as Zn^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.5	5	15
24	Lead as Pb^{+4}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.01	No Relaxation
25	Aluminium as Al	APHA 22nd Edition; 3500 Al B	mg/L	< 0.03	< 0.03	0.2
26	Boron as B	APHA 22nd Edition; 4500 B B	mg/L	< 0.2	0.5	1.0

Opinion and interpretation: Nil

NA: Not Applicable

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Name of the Customer **Date: 02.02.2018**
M/s. Kadechur Project

Test Report No : **SEPL/W-WW/18 – 3024**
Sample particulars **: Duppali_ Ground Water**
Sample quantity : 2 Liters
Collected by / date : SEPL / 23.01.2018
Sample Registration Date : 27.01.2018
Analysis Commenced on : 27.01.2018
Analysis Completed on : 02.02.2018
Sub Contract Testing : NA

Sr. No.	Parameter	Method	Unit	Result	IS Drinking WaterLimits10500:2012	
					Desirable	Permissible
1	pH@27.1^{0}C	APHA 22nd Edition; 4500 H^+ B	--	7.46	6.5-8.5	No Relaxation
2	Conductivity@26.9^{0}C	APHA 22nd Edition; 2510 B	µMho/cm	560.0	--	--
3	Color	APHA 22nd Edition;2120 B	CU	< 1.0	5	15
4	Odour	APHA 22nd Edition; 2150 B	Agreeable	Agreeable	Agreeable	Agreeable
5	Total Dissolved Solids	APHA 22nd Edition; 2540 C	mg/L	395.0	500	2000
6	Alkalinity as $CaCO_3$	APHA 22nd Edition; 2320 B	mg/L	210.0	200	600
7	Total Hardness as $CaCO_3$	APHA 22nd Edition; 2340 C	mg/L	230.0	200	600
8	Calcium as Ca^{+2}	APHA 22nd Edition; 3500 Ca B	mg/L	60.12	75	200
9	Magnesium as Mg^{+2}	APHA 22nd Edition; 3500 Mg B	mg/L	18.23	30	100
10	Sodium as Na^+	APHA 22nd Edition; 3500 Na B	mg/L	13.97	--	--
11	Potassium as K^+	APHA 22nd Edition; 3500 K B	mg/L	3.55	--	--
12	Chlorides as Cl^-	APHA 22nd Edition; 4500 Cl- B	mg/L	21.53	250	1000
13	Sulphates as SO_4^{-2}	APHA 22nd Edition; 4500 SO_4^2 E	mg/L	44.77	200	400

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Test Report No : **SEPL/W-WW/18 –3024**

S. No.	Parameter	Method	Unit	Result	IS Drinking WaterLimits10500:2012	
					Desirable	Desirable
14	Nitrate Nitrogen as NO_3^-	APHA 22nd Edition; 4500 NO_3^- B	mg/L	2.5	45	No Relaxation
15	Fluorides as F^-	APHA 22nd Edition; 4500 F-D	mg/L	< 0.5	1	1.5
16	Phosphorus as PO_4^{-3}	APHA 22nd Edition; 4500 P C	mg/L	< 0.1	--	--
17	Iron as Fe^{+2}	APHA 22nd Edition; 3500 Fe B	mg/L	< 0.1	0.3	No Relaxation
18	Copper as Cu^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.05	1.5
19	Total Chromium as Cr	APHA 22nd Edition; 3111 B	mg/L	< 0.05	0.05	0.05
20	Cadmium Cd^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.001	< 0.003	No Relaxation
21	Manganese as Mn	APHA 22nd Edition; 3111 B	mg/L	< 0.05	0.1	0.3
22	Nickel as Ni^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.02	No Relaxation
23	Zinc as Zn^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.5	5	15
24	Lead as Pb^{+4}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.01	No Relaxation
25	Aluminium as Al	APHA 22nd Edition; 3500 Al B	mg/L	< 0.03	< 0.03	0.2
26	Boron as B	APHA 22nd Edition; 4500 B B	mg/L	< 0.2	0.5	1.0

Opinion and interpretation: Nil

NA: Not Applicable

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M.Balachandra Babu
(Envi.Scientist)

Authorized Signatory
V.Alluraiah
Manager – Laboratory

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Name of the Customer
M/s. Kadechur Project

Date: 02.02.2018

Test Report No : **SEPL/W-WW/18 – 3025**
Sample particulars : **Kunsi _ Ground Water**
Sample quantity : 2 Liters
Collected by / date : SEPL / 23.01.2018
Sample Registration Date : 27.01.2018
Analysis Commenced on : 27.01.2018
Analysis Completed on : 02.02.2018
Sub Contract Testing : NA

Sr. No.	Parameter	Method	Unit	Result	IS Drinking WaterLimits10500:2012	
					Desirable	Permissible
1	pH@27.1^{0}C	APHA 22nd Edition; 4500 H^+ B	--	7.52	6.5-8.5	No Relaxation
2	Conductivity@26.9^{0}C	APHA 22nd Edition; 2510 B	µMho/cm	810.0	--	--
3	Color	APHA 22nd Edition;2120 B	CU	< 1.0	5	15
4	Odour	APHA 22nd Edition; 2150 B	Agreeable	Agreeable	Agreeable	Agreeable
5	Total Dissolved Solids	APHA 22nd Edition; 2540 C	mg/L	515.0	500	2000
6	Alkalinity as $CaCO_3$	APHA 22nd Edition; 2320 B	mg/L	255.0	200	600
7	Total Hardness as $CaCO_3$	APHA 22nd Edition; 2340 C	mg/L	250.0	200	600
8	Calcium as Ca^{+2}	APHA 22nd Edition; 3500 Ca B	mg/L	62.12	75	200
9	Magnesium as Mg^{+2}	APHA 22nd Edition; 3500 Mg B	mg/L	21.87	30	100
10	Sodium as Na^+	APHA 22nd Edition; 3500 Na B	mg/L	45.02	--	--
11	Potassium as K^+	APHA 22nd Edition; 3500 K B	mg/L	1.83	--	--
12	Chlorides as Cl^-	APHA 22nd Edition; 4500 Cl- B	mg/L	69.39	250	1000
13	Sulphates as SO_4^{-2}	APHA 22nd Edition; 4500 SO_4^2 E	mg/L	33.5	200	400

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Test Report No : **SEPL/W-WW/18 –3025**

S. No.	Parameter	Method	Unit	Result	IS Drinking WaterLimits10500:2012	
					Desirable	Desirable
14	Nitrate Nitrogen as NO_3^-	APHA 22nd Edition; 4500 NO_3^- B	mg/L	1.9	45	No Relaxation
15	Fluorides as F^-	APHA 22nd Edition; 4500 F- D	mg/L	< 0.5	1	1.5
16	Phosphorus as PO_4^{-3}	APHA 22nd Edition; 4500 P C	mg/L	< 0.1	--	--
17	Iron as Fe^{+2}	APHA 22nd Edition; 3500 Fe B	mg/L	< 0.1	0.3	No Relaxation
18	Copper as Cu^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.05	1.5
19	Total Chromium as Cr	APHA 22nd Edition; 3111 B	mg/L	< 0.05	0.05	0.05
20	Cadmium Cd^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.001	< 0.003	No Relaxation
21	Manganese as Mn	APHA 22nd Edition; 3111 B	mg/L	< 0.05	0.1	0.3
22	Nickel as Ni^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.02	No Relaxation
23	Zinc as Zn^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.5	5	15
24	Lead as Pb^{+4}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.01	No Relaxation
25	Aluminium as Al	APHA 22nd Edition; 3500 Al B	mg/L	< 0.03	< 0.03	0.2
26	Boron as B	APHA 22nd Edition; 4500 B B	mg/L	< 0.2	0.5	1.0

Opinion and interpretation: Nil NA: Not Applicable

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Name of the Customer
M/s. Kadechur Project

Date: 02.02.2018

Test Report No : **SEPL/W-WW/18 – 3026**
Sample particulars : **Badiyal _ Ground Water**
Sample quantity : 2 Liters
Collected by / date : SEPL / 23.01.2018
Sample Registration Date : 27.01.2018
Analysis Commenced on : 27.01.2018
Analysis Completed on : 02.02.2018
Sub Contract Testing : NA

Sr. No.	Parameter	Method	Unit	Result	IS Drinking WaterLimits10500:2012	
					Desirable	Permissible
1	pH@27.1^{0}C	APHA 22nd Edition; 4500 H^+ B	--	7.55	6.5-8.5	No Relaxation
2	Conductivity@26.9^{0}C	APHA 22nd Edition; 2510 B	µMho/cm	590.0	--	--
3	Color	APHA 22nd Edition;2120 B	CU	< 1.0	5	15
4	Odour	APHA 22nd Edition; 2150 B	Agreeable	Agreeable	Agreeable	Agreeable
5	Total Dissolved Solids	APHA 22nd Edition; 2540 C	mg/L	410.0	500	2000
6	Alkalinity as $CaCO_3$	APHA 22nd Edition; 2320 B	mg/L	225.0	200	600
7	Total Hardness as $CaCO_3$	APHA 22nd Edition; 2340 C	mg/L	230.0	200	600
8	Calcium as Ca^{+2}	APHA 22nd Edition; 3500 Ca B	mg/L	58.29	75	200
9	Magnesium as Mg^{+2}	APHA 22nd Edition; 3500 Mg B	mg/L	19.44	30	100
10	Sodium as Na^+	APHA 22nd Edition; 3500 Na B	mg/L	17.08	--	--
11	Potassium as K^+	APHA 22nd Edition; 3500 K B	mg/L	2.74	--	--
12	Chlorides as Cl^-	APHA 22nd Edition; 4500 Cl- B	mg/L	26.32	250	1000
13	Sulphates as SO_4^{-2}	APHA 22nd Edition; 4500 SO_4^2 E	mg/L	38.52	200	400

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Test Report No : **SEPL/W-WW/18 –3026**

S. No.	Parameter	Method	Unit	Result	IS Drinking WaterLimits10500:2012	
					Desirable	Desirable
14	Nitrate Nitrogen as NO_3^-	APHA 22nd Edition; 4500 NO_3^- B	mg/L	3.4	45	No Relaxation
15	Fluorides as F^-	APHA 22nd Edition; 4500 F- D	mg/L	< 0.5	1	1.5
16	Phosphorus as PO_4^{-3}	APHA 22nd Edition; 4500 P C	mg/L	< 0.1	--	--
17	Iron as Fe^{+2}	APHA 22nd Edition; 3500 Fe B	mg/L	< 0.1	0.3	No Relaxation
18	Copper as Cu^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.05	1.5
19	Total Chromium as Cr	APHA 22nd Edition; 3111 B	mg/L	< 0.05	0.05	0.05
20	Cadmium Cd^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.001	< 0.003	No Relaxation
21	Manganese as Mn	APHA 22nd Edition; 3111 B	mg/L	< 0.05	0.1	0.3
22	Nickel as Ni^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.02	No Relaxation
23	Zinc as Zn^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.5	5	15
24	Lead as Pb^{+4}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.01	No Relaxation
25	Aluminium as Al	APHA 22nd Edition; 3500 Al B	mg/L	< 0.03	< 0.03	0.2
26	Boron as B	APHA 22nd Edition; 4500 B B	mg/L	< 0.2	0.5	1.0

Opinion and interpretation: Nil

NA: Not Applicable

1. Reports pertained only to the submitted sample.

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Name of the Customer
M/s. Kadechur Project

Date: 02.02.2018

Test Report No : **SEPL/W-WW/18 – 3027**
Sample particulars : **Saidapur _ Ground Water**
Sample quantity : 2 Liters
Collected by / date : SEPL / 24.01.2018
Sample Registration Date : 27.01.2018
Analysis Commenced on : 27.01.2018
Analysis Completed on : 02.02.2018
Sub Contract Testing : NA

Sr. No.	Parameter	Method	Unit	Result	IS Drinking WaterLimits10500:2012	
					Desirable	Permissible
1	pH@27.1^{0}C	APHA 22nd Edition; 4500 H^+ B	--	7.68	6.5-8.5	No Relaxation
2	Conductivity@26.9^{0}C	APHA 22nd Edition; 2510 B	µMho/cm	725.0	--	--
3	Color	APHA 22nd Edition;2120 B	CU	< 1.0	5	15
4	Odour	APHA 22nd Edition; 2150 B	Agreeable	Agreeable	Agreeable	Agreeable
5	Total Dissolved Solids	APHA 22nd Edition; 2540 C	mg/L	480.0	500	2000
6	Alkalinity as $CaCO_3$	APHA 22nd Edition; 2320 B	mg/L	210.0	200	600
7	Total Hardness as $CaCO_3$	APHA 22nd Edition; 2340 C	mg/L	215.0	200	600
8	Calcium as Ca^{+2}	APHA 22nd Edition; 3500 Ca B	mg/L	50.1	75	200
9	Magnesium as Mg^{+2}	APHA 22nd Edition; 3500 Mg B	mg/L	21.87	30	100
10	Sodium as Na^+	APHA 22nd Edition; 3500 Na B	mg/L	52.78	--	--
11	Potassium as K^+	APHA 22nd Edition; 3500 K B	mg/L	2.07	--	--
12	Chlorides as Cl^-	APHA 22nd Edition; 4500 Cl- B	mg/L	81.35	250	1000
13	Sulphates as SO_4^{-2}	APHA 22nd Edition; 4500 SO_4^2 E	mg/L	45.72	200	400

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Test Report No : **SEPL/W-WW/18 –3026**

S. No.	Parameter	Method	Unit	Result	IS Drinking WaterLimits10500:2012	
					Desirable	Desirable
14	Nitrate Nitrogen as NO_3^-	APHA 22nd Edition; 4500 NO_3^- B	mg/L	2.03	45	No Relaxation
15	Fluorides as F^-	APHA 22nd Edition; 4500 F-D	mg/L	< 0.5	1	1.5
16	Phosphorus as PO_4^{-3}	APHA 22nd Edition; 4500 P C	mg/L	< 0.1	--	--
17	Iron as Fe^{+2}	APHA 22nd Edition; 3500 Fe B	mg/L	< 0.1	0.3	No Relaxation
18	Copper as Cu^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.05	1.5
19	Total Chromium as Cr	APHA 22nd Edition; 3111 B	mg/L	< 0.05	0.05	0.05
20	Cadmium Cd^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.001	< 0.003	No Relaxation
21	Manganese as Mn	APHA 22nd Edition; 3111 B	mg/L	< 0.05	0.1	0.3
22	Nickel as Ni^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.02	No Relaxation
23	Zinc as Zn^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.5	5	15
24	Lead as Pb^{+4}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.01	No Relaxation
25	Aluminium as Al	APHA 22nd Edition; 3500 Al B	mg/L	< 0.03	< 0.03	0.2
26	Boron as B	APHA 22nd Edition; 4500 B B	mg/L	< 0.2	0.5	1.0

Opinion and interpretation: Nil NA: Not Applicable

1. Reports pertained only to the submitted sample.

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Name of the Customer
M/s. Kadechur Project

Date: 02.02.2018

Test Report No	:	**SEPL/W-WW/18 – 3028**
Sample particulars	:	**Baddepalli _ Ground Water**
Sample quantity	:	2 Liters
Collected by / date	:	SEPL / 24.01.2018
Sample Registration Date	:	27.01.2018
Analysis Commenced on	:	27.01.2018
Analysis Completed on	:	02.02.2018
Sub Contract Testing	:	NA

Sr. No.	Parameter	Method	Unit	Result	IS Drinking WaterLimits10500:2012	
					Desirable	Permissible
1	pH@27.1^{0}C	APHA 22nd Edition; 4500 H^+ B	--	7.85	6.5-8.5	No Relaxation
2	Conductivity@26.9^{0}C	APHA 22nd Edition; 2510 B	µMho/cm	1920.0	--	--
3	Color	APHA 22nd Edition;2120 B	CU	< 1.0	5	15
4	Odour	APHA 22nd Edition; 2150 B	Agreeable	Agreeable	Agreeable	Agreeable
5	Total Dissolved Solids	APHA 22nd Edition; 2540 C	mg/L	1265.0	500	2000
6	Alkalinity as $CaCO_3$	APHA 22nd Edition; 2320 B	mg/L	500.0	200	600
7	Total Hardness as $CaCO_3$	APHA 22nd Edition; 2340 C	mg/L	440.0	200	600
8	Calcium as Ca^{+2}	APHA 22nd Edition; 3500 Ca B	mg/L	62.29	75	200
9	Magnesium as Mg^{+2}	APHA 22nd Edition; 3500 Mg B	mg/L	68.04	30	100
10	Sodium as Na^+	APHA 22nd Edition; 3500 Na B	mg/L	228.2	--	--
11	Potassium as K^+	APHA 22nd Edition; 3500 K B	mg/L	5.7	--	--
12	Chlorides as Cl^-	APHA 22nd Edition; 4500 Cl- B	mg/L	351.7	250	1000
13	Sulphates as SO_4^{-2}	APHA 22nd Edition; 4500 SO_4^2 E	mg/L	23.57	200	400

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Test Report No : **SEPL/W-WW/18 –3028**

S. No.	Parameter	Method	Unit	Result	IS Drinking WaterLimits10500:2012	
					Desirable	Desirable
14	Nitrate Nitrogen as NO_3^-	APHA 22nd Edition; 4500 NO_3^- B	mg/L	4.85	45	No Relaxation
15	Fluorides as F^-	APHA 22nd Edition; 4500 F- D	mg/L	< 0.5	1	1.5
16	Phosphorus as PO_4^{-3}	APHA 22nd Edition; 4500 P C	mg/L	< 0.1	--	--
17	Iron as Fe^{+2}	APHA 22nd Edition; 3500 Fe B	mg/L	< 0.1	0.3	No Relaxation
18	Copper as Cu^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.05	1.5
19	Total Chromium as Cr	APHA 22nd Edition; 3111 B	mg/L	< 0.05	0.05	0.05
20	Cadmium Cd^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.001	< 0.003	No Relaxation
21	Manganese as Mn	APHA 22nd Edition; 3111 B	mg/L	< 0.05	0.1	0.3
22	Nickel as Ni^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.02	No Relaxation
23	Zinc as Zn^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.5	5	15
24	Lead as Pb^{+4}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.01	No Relaxation
25	Aluminium as Al	APHA 22nd Edition; 3500 Al B	mg/L	< 0.03	< 0.03	0.2
26	Boron as B	APHA 22nd Edition; 4500 B B	mg/L	< 0.2	0.5	1.0

Opinion and interpretation: Nil NA: Not Applicable

1. Reports pertained only to the submitted sample.

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Name of the Customer
M/s. Kadechur Project

Date: 02.02.2018

Test Report No	:	**SEPL/W-WW/18 – 3029**
Sample particulars	:	**Kothapalle _ Ground Water**
Sample quantity	:	2 Liters
Collected by / date	:	SEPL / 24.01.2018
Sample Registration Date	:	27.01.2018
Analysis Commenced on	:	27.01.2018
Analysis Completed on	:	02.02.2018
Sub Contract Testing	:	NA

Sr. No.	Parameter	Method	Unit	Result	IS Drinking WaterLimits10500:2012	
					Desirable	Permissible
1	pH@27.1^{0}C	APHA 22nd Edition; 4500 H^+ B	--	7.32	6.5-8.5	No Relaxation
2	Conductivity@26.9^{0}C	APHA 22nd Edition; 2510 B	µMho/cm	2845.0	--	--
3	Color	APHA 22nd Edition;2120 B	CU	< 1.0	5	15
4	Odour	APHA 22nd Edition; 2150 B	Agreeable	Agreeable	Agreeable	Agreeable
5	Total Dissolved Solids	APHA 22nd Edition; 2540 C	mg/L	1840.0	500	2000
6	Alkalinity as $CaCO_3$	APHA 22nd Edition; 2320 B	mg/L	520.0	200	600
7	Total Hardness as $CaCO_3$	APHA 22nd Edition; 2340 C	mg/L	410.0	200	600
8	Calcium as Ca^{+2}	APHA 22nd Edition; 3500 Ca B	mg/L	58.12	75	200
9	Magnesium as Mg^{+2}	APHA 22nd Edition; 3500 Mg B	mg/L	64.4	30	100
10	Sodium as Na^+	APHA 22nd Edition; 3500 Na B	mg/L	422.2	--	--
11	Potassium as K^+	APHA 22nd Edition; 3500 K B	mg/L	8.2	--	--
12	Chlorides as Cl^-	APHA 22nd Edition; 4500 Cl- B	mg/L	650.86	250	1000
13	Sulphates as SO_4^{-2}	APHA 22nd Edition; 4500 SO_4^2 E	mg/L	88.7	200	400

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Test Report No : **SEPL/W-WW/18 –3029**

S. No.	Parameter	Method	Unit	Result	IS Drinking WaterLimits10500:2012	
					Desirable	Desirable
14	Nitrate Nitrogen as NO_3^-	APHA 22nd Edition; 4500 NO_3^- B	mg/L	5.89	45	No Relaxation
15	Fluorides as F^-	APHA 22nd Edition; 4500 F- D	mg/L	< 0.5	1	1.5
16	Phosphorus as PO_4^{-3}	APHA 22nd Edition; 4500 P C	mg/L	< 0.1	--	--
17	Iron as Fe^{+2}	APHA 22nd Edition; 3500 Fe B	mg/L	< 0.1	0.3	No Relaxation
18	Copper as Cu^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.05	1.5
19	Total Chromium as Cr	APHA 22nd Edition; 3111 B	mg/L	< 0.05	0.05	0.05
20	Cadmium Cd^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.001	< 0.003	No Relaxation
21	Manganese as Mn	APHA 22nd Edition; 3111 B	mg/L	< 0.05	0.1	0.3
22	Nickel as Ni^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.02	No Relaxation
23	Zinc as Zn^{+2}	APHA 22nd Edition; 3111 B	mg/L	< 0.5	5	15
24	Lead as Pb^{+4}	APHA 22nd Edition; 3111 B	mg/L	< 0.01	0.01	No Relaxation
25	Aluminium as Al	APHA 22nd Edition; 3500 Al B	mg/L	< 0.03	< 0.03	0.2
26	Boron as B	APHA 22nd Edition; 4500 B B	mg/L	< 0.2	0.5	1.0

Opinion and interpretation: Nil

NA: Not Applicable

1. Reports pertained only to the submitted sample.

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Date: 02.02.2018

Name of the Customer
M/s. Kadechur Project,

Test Report No	:	**SEPL/W-WW/18 - 3030**
Sample particulars	:	**Pond near Kadechur**
Sample quantity	:	2 Liters
Collected by / date	:	SEPL / 22.01.2018
Sample Registration Date	:	27.01.2018
Analysis Commenced on	:	27.01.2018
Analysis Completed on	:	02.02.2018
Sub Contract Testing	:	NA

S.No	Parameter	Method	Unit	Result
1	pH@26.9°C	APHA 22nd Edition 4500 H^+ B	--	7.86
2	Temperature	APHA 22nd Edition 2	^{0}C	27.1
3	Electrical Conductivity @27.3°C	APHA 22nd Edition 2510 B	µMho/cm	310.0
4	Total Dissolved Solids	APHA 22nd Edition 2540 C	mg/L	215.0
5	Total Suspended Solids	APHA 22nd Edition 2540 D	mg/L	< 10.0
6	Total Alkalinity (as $CaCO_3$)	APHA 22nd Edition 2320 B	mg/L	130.0
7	Total Hardness (as $CaCO_3$)	APHA 22nd Edition 2340 C	mg/L	110
8	Calcium (as Ca)	APHA 22nd Edition 3500 Ca B	mg/L	32.06
9	Magnesium (as Mg)	APHA 22nd Edition 3500-Mg B	mg/L	7.29
10	Sulphate (as SO_4)	APHA 22nd Edition 4500 SO_4 E	mg/L	5.6
11	Chloride (as Cl)	APHA 22nd Edition 4500 Cl^- B	mg/L	14.4
12	Lead as Pb	APHA 22nd Edition 3111B	mg/L	< 0.01
13	Copper as Cu	APHA 22nd Edition 3111B	mg/L	< 0.01
14	Zinc as Zn	APHA 22nd Edition 3111B	mg/L	< 0.50
15	Fluorides as F	APHA 22nd Edition 4500 F^- D	mg/L	< 0.50
16	Cadmium as Cd	APHA 22nd Edition 3111B	mg/L	< 0.01

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Test Report No : SEPL/W-WW/18 - 3030

S.No	Parameter	Method	Unit	Result
17	Iron as Fe	APHA 22nd Edition 3500 Fe B	mg/L	0.15
18	Hexavalent Chromium as Cr^{+6}	APHA 22nd Edition, 2012; 3500 Cr B	mg/L	< 0.02
19	Total Chromium as Cr	APHA 22nd Edition 3111B	mg/L	< 0.05
20	Nickel as Ni	APHA 22nd Edition 3111B	mg/L	< 0.01
21	Nitrate Nitrogen	APHA 22nd Edition 4500 NO_3 B	mg/L	1.02
22	Sodium as Na	APHA 22nd Edition 3500 Na B	mg/L	9.35
23	Potassium as K	APHA 22nd Edition 3500 K B	mg/L	< 5.0
24	Boron as B	APHA 22nd Edition 4500 B B		< 0.2
25	Dissolved Oxygen	APHA 22nd Edition 4500 O C	mg/L	5.2
26	Chemical Oxygen Demand	APHA 22nd Edition, 2012; 5220 B	mg/L	4.0
27	BOD(3 Days at 27^0C)	APHA 22nd Edition, 2012; 5210 B, 4500-O. C/ IS-3025 Part- 44	mg/L	< 2.0
28	Total Coliform	IS 1622	MPN/100ml	50.0
29	Feacal Coliforms	IS 1622	MPN/100ml	5.0

Opinion and interpretation: Nil NA: Not Applicable

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Checked By
M.Balachandra Babu
(Envi.Scientist)

Authorized Signatory
V.Alluraiah
Manager – Laboratory

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Date: 02.02.2018

Name of the Customer
M/s. Kadechur Project

Test Report No	:	**SEPL/W-WW/18 - 3031**
Sample particulars	:	**Pond near Balched**
Sample quantity	:	2 Liters
Collected by / date	:	SEPL / 23.01.2018
Sample Registration Date	:	27.01.2018
Analysis Commenced on	:	27.01.2018
Analysis Completed on	:	02.02.2018
Sub Contract Testing	:	NA

S.No	Parameter	Method	Unit	Result
1	pH@26.9°C	APHA 22nd Edition 4500 H^+ B	--	7.62
2	Temperature	APHA 22nd Edition 2	^{0}C	27.1
3	Electrical Conductivity @27.3°C	APHA 22nd Edition 2510 B	µMho/cm	335.0
4	Total Dissolved Solids	APHA 22nd Edition 2540 C	mg/L	230.0
5	Total Suspended Solids	APHA 22nd Edition 2540 D	mg/L	< 10.0
6	Total Alkalinity (as $CaCO_3$)	APHA 22nd Edition 2320 B	mg/L	145.0
7	Total Hardness (as $CaCO_3$)	APHA 22nd Edition 2340 C	mg/L	120.0
8	Calcium (as Ca)	APHA 22nd Edition 3500 Ca B	mg/L	26.05
9	Magnesium (as Mg)	APHA 22nd Edition 3500-Mg B	mg/L	13.37
10	Sulphate (as SO_4)	APHA 22nd Edition 4500 SO_4 E	mg/L	4.8
11	Chloride (as Cl)	APHA 22nd Edition 4500 Cl^- B	mg/L	9.42
12	Lead as Pb	APHA 22nd Edition 3111B	mg/L	< 0.01
13	Copper as Cu	APHA 22nd Edition 3111B	mg/L	< 0.01
14	Zinc as Zn	APHA 22nd Edition 3111B	mg/L	< 0.50
15	Fluorides as F	APHA 22nd Edition 4500 F^- D	mg/L	< 0.50
16	Cadmium as Cd	APHA 22nd Edition 3111B	mg/L	< 0.01

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Test Report No : SEPL/W-WW/18 - 3031

S.No	Parameter	Method	Unit	Result
17	Iron as Fe	APHA 22nd Edition 3500 Fe B	mg/L	0.18
18	Hexavalent Chromium as Cr^{+6}	APHA 22nd Edition, 2012; 3500 Cr B	mg/L	< 0.02
19	Total Chromium as Cr	APHA 22nd Edition 3111B	mg/L	< 0.05
20	Nickel as Ni	APHA 22nd Edition 3111B	mg/L	< 0.01
21	Nitrate Nitrogen	APHA 22nd Edition 4500 NO_3 B	mg/L	1.04
22	Sodium as Na	APHA 22nd Edition 3500 Na B	mg/L	9.42
23	Potassium as K	APHA 22nd Edition 3500 K B	mg/L	< 5.0
24	Boron as B	APHA 22nd Edition 4500 B B		< 0.2
25	Dissolved Oxygen	APHA 22nd Edition 4500 O C	mg/L	5.1
26	Chemical Oxygen Demand	APHA 22nd Edition, 2012; 5220 B	mg/L	4.0
27	BOD(3 Days at 27^0C)	APHA 22nd Edition, 2012; 5210 B, 4500-O. C/ IS-3025 Part- 44	mg/L	< 2.0
28	Total Coliform	IS 1622	MPN/100ml	55.0
29	Feacal Coliforms	IS 1622	MPN/100ml	6.0

Opinion and interpretation: Nil NA: Not Applicable

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Date: 02.02.2018

Name of the Customer
M/s. Kadechur Project

Test Report No	:	**SEPL/W-WW/18 - 3032**
Sample particulars	:	**Pond near Baddepalli**
Sample quantity	:	2 Liters
Collected by / date	:	SEPL / 24.01.2018
Sample Registration Date	:	27.01.2018
Analysis Commenced on	:	27.01.2018
Analysis Completed on	:	02.02.2018
Sub Contract Testing	:	NA

S.No	Parameter	Method	Unit	Result
1	pH@26.9°C	APHA 22nd Edition 4500 H^+ B	--	7.94
2	Temperature	APHA 22nd Edition 2	^{0}C	27.0
3	Electrical Conductivity @27.3°C	APHA 22nd Edition 2510 B	µMho/cm	200.0
4	Total Dissolved Solids	APHA 22nd Edition 2540 C	mg/L	145.0
5	Total Suspended Solids	APHA 22nd Edition 2540 D	mg/L	< 10.0
6	Total Alkalinity (as $CaCO_3$)	APHA 22nd Edition 2320 B	mg/L	80.0
7	Total Hardness (as $CaCO_3$)	APHA 22nd Edition 2340 C	mg/L	85.0
8	Calcium (as Ca)	APHA 22nd Edition 3500 Ca B	mg/L	22.04
9	Magnesium (as Mg)	APHA 22nd Edition 3500-Mg B	mg/L	6.08
10	Sulphate (as SO_4)	APHA 22nd Edition 4500 SO_4 E	mg/L	3.4
11	Chloride (as Cl)	APHA 22nd Edition 4500 Cl^- B	mg/L	9.59
12	Lead as Pb	APHA 22nd Edition 3111B	mg/L	< 0.01
13	Copper as Cu	APHA 22nd Edition 3111B	mg/L	< 0.01
14	Zinc as Zn	APHA 22nd Edition 3111B	mg/L	< 0.50
15	Fluorides as F	APHA 22nd Edition 4500 F^- D	mg/L	< 0.50
16	Cadmium as Cd	APHA 22nd Edition 3111B	mg/L	< 0.01

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Test Report No : SEPL/W-WW/18 - 3032

S.No	Parameter	Method	Unit	Result
17	Iron as Fe	APHA 22nd Edition 3500 Fe B	mg/L	0.12
18	Hexavalent Chromium as Cr^{+6}	APHA 22nd Edition, 2012; 3500 Cr B	mg/L	< 0.02
19	Total Chromium as Cr	APHA 22nd Edition 3111B	mg/L	< 0.05
20	Nickel as Ni	APHA 22nd Edition 3111B	mg/L	< 0.01
21	Nitrate Nitrogen	APHA 22nd Edition 4500 NO_3 B	mg/L	1.06
22	Sodium as Na	APHA 22nd Edition 3500 Na B	mg/L	9.49
23	Potassium as K	APHA 22nd Edition 3500 K B	mg/L	< 5.0
24	Boron as B	APHA 22nd Edition 4500 B B		< 0.2
25	Dissolved Oxygen	APHA 22nd Edition 4500 O C	mg/L	5.3
26	Chemical Oxygen Demand	APHA 22nd Edition, 2012; 5220 B	mg/L	4.0
27	BOD(3 Days at 27^0C)	APHA 22nd Edition, 2012; 5210 B, 4500-O. C/ IS-3025 Part- 44	mg/L	< 2.0
28	Total Coliform	IS 1622	MPN/100ml	60.0
29	Feacal Coliforms	IS 1622	MPN/100ml	7.0

Opinion and interpretation: Nil NA: Not Applicable

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Date: 02.02.2018

Name of the Customer
M/s. Kadechur Project

Test Report No	:	**SEPL/W-WW/18 - 3033**
Sample particulars	:	**Pond near kothapalle**
Sample quantity	:	2 Liters
Collected by / date	:	SEPL / 24.01.2018
Sample Registration Date	:	27.01.2018
Analysis Commenced on	:	27.01.2018
Analysis Completed on	:	02.02.2018
Sub Contract Testing	:	NA

S.No	Parameter	Method	Unit	Result
1	pH@26.9°C	APHA 22nd Edition 4500 H^+ B	--	7.72
2	Temperature	APHA 22nd Edition 2	^{0}C	27.1
3	Electrical Conductivity @27.3°C	APHA 22nd Edition 2510 B	µMho/cm	215.0
4	Total Dissolved Solids	APHA 22nd Edition 2540 C	mg/L	160.0
5	Total Suspended Solids	APHA 22nd Edition 2540 D	mg/L	< 10.0
6	Total Alkalinity (as $CaCO_3$)	APHA 22nd Edition 2320 B	mg/L	95.0
7	Total Hardness (as $CaCO_3$)	APHA 22nd Edition 2340 C	mg/L	90.0
8	Calcium (as Ca)	APHA 22nd Edition 3500 Ca B	mg/L	24.08
9	Magnesium (as Mg)	APHA 22nd Edition 3500-Mg B	mg/L	6.12
10	Sulphate (as SO_4)	APHA 22nd Edition 4500 SO_4 E	mg/L	2.6
11	Chloride (as Cl)	APHA 22nd Edition 4500 Cl^- B	mg/L	8.15
12	Lead as Pb	APHA 22nd Edition 3111B	mg/L	< 0.01
13	Copper as Cu	APHA 22nd Edition 3111B	mg/L	< 0.01
14	Zinc as Zn	APHA 22nd Edition 3111B	mg/L	< 0.50
15	Fluorides as F	APHA 22nd Edition 4500 F^- D	mg/L	< 0.50
16	Cadmium as Cd	APHA 22nd Edition 3111B	mg/L	< 0.01

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Test Report No : SEPL/W-WW/18 - 3033

S.No	Parameter	Method	Unit	Result
17	Iron as Fe	APHA 22nd Edition 3500 Fe B	mg/L	0.14
18	Hexavalent Chromium as Cr^{+6}	APHA 22nd Edition, 2012; 3500 Cr B	mg/L	< 0.02
19	Total Chromium as Cr	APHA 22nd Edition 3111B	mg/L	< 0.05
20	Nickel as Ni	APHA 22nd Edition 3111B	mg/L	< 0.01
21	Nitrate Nitrogen	APHA 22nd Edition 4500 NO_3 B	mg/L	0.95
22	Sodium as Na	APHA 22nd Edition 3500 Na B	mg/L	6.15
23	Potassium as K	APHA 22nd Edition 3500 K B	mg/L	< 5.0
24	Boron as B	APHA 22nd Edition 4500 B B		<0.2
25	Dissolved Oxygen	APHA 22nd Edition 4500 O C	mg/L	5.1
26	Chemical Oxygen Demand	APHA 22nd Edition, 2012; 5220 B	mg/L	4.0
27	BOD(3 Days at 27^0C)	APHA 22nd Edition, 2012; 5210 B, 4500-O. C/ IS-3025 Part- 44	mg/L	< 2.0
28	Total Coliform	IS 1622	MPN/100ml	52.0
29	Feacal Coliforms	IS 1622	MPN/100ml	5.0

Opinion and interpretation: Nil NA: Not Applicable

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Date: 02.02.2018

Name of the Customer
M/s. Kadechur Project

Test Report No	:	**SEPL/W-WW/18 - 3034**
Sample particulars	:	**Bhima River**
Sample quantity	:	2 Liters
Collected by / date	:	SEPL / 24.01.2018
Sample Registration Date	:	27.01.2018
Analysis Commenced on	:	27.01.2018
Analysis Completed on	:	02.02.2018
Sub Contract Testing	:	NA

S.No	Parameter	Method	Unit	Result
1	pH@26.9°C	APHA 22nd Edition 4500 H^+ B	--	7.92
2	Temperature	APHA 22nd Edition 2	^{0}C	27.1
3	Electrical Conductivity @27.3°C	APHA 22nd Edition 2510 B	µMho/cm	495.0
4	Total Dissolved Solids	APHA 22nd Edition 2540 C	mg/L	355.0
5	Total Suspended Solids	APHA 22nd Edition 2540 D	mg/L	< 10.0
6	Total Alkalinity (as $CaCO_3$)	APHA 22nd Edition 2320 B	mg/L	180.0
7	Total Hardness (as $CaCO_3$)	APHA 22nd Edition 2340 C	mg/L	190.0
8	Calcium (as Ca)	APHA 22nd Edition 3500 Ca B	mg/L	38.08
9	Magnesium (as Mg)	APHA 22nd Edition 3500-Mg B	mg/L	23.09
10	Sulphate (as SO_4)	APHA 22nd Edition 4500 SO_4 E	mg/L	27.96
11	Chloride (as Cl)	APHA 22nd Edition 4500 Cl^- B	mg/L	25.82
12	Lead as Pb	APHA 22nd Edition 3111B	mg/L	< 0.01
13	Copper as Cu	APHA 22nd Edition 3111B	mg/L	< 0.01
14	Zinc as Zn	APHA 22nd Edition 3111B	mg/L	< 0.50
15	Fluorides as F	APHA 22nd Edition 4500 F^- D	mg/L	< 0.50
16	Cadmium as Cd	APHA 22nd Edition 3111B	mg/L	< 0.01

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Test Report No : SEPL/W-WW/18 - 3034

S.No	Parameter	Method	Unit	Result
17	Iron as Fe	APHA 22nd Edition 3500 Fe B	mg/L	0.16
18	Hexavalent Chromium as Cr^{+6}	APHA 22nd Edition, 2012; 3500 Cr B	mg/L	< 0.02
19	Total Chromium as Cr	APHA 22nd Edition 3111B	mg/L	< 0.05
20	Nickel as Ni	APHA 22nd Edition 3111B	mg/L	< 0.01
21	Nitrate Nitrogen	APHA 22nd Edition 4500 NO_3 B	mg/L	1.54
22	Sodium as Na	APHA 22nd Edition 3500 Na B	mg/L	< 5.0
23	Potassium as K	APHA 22nd Edition 3500 K B	mg/L	< 0.2
24	Boron as B	APHA 22nd Edition 4500 B B		< 1.0
25	Dissolved Oxygen	APHA 22nd Edition 4500 O C	mg/L	5.3
26	Chemical Oxygen Demand	APHA 22nd Edition, 2012; 5220 B	mg/L	4.0
27	BOD(3 Days at 27^0C)	APHA 22nd Edition, 2012; 5210 B, 4500-O. C/ IS-3025 Part- 44	mg/L	< 2.0
28	Total Coliform	IS 1622	MPN/100ml	50.0
29	Feacal Coliforms	IS 1622	MPN/100ml	5.0

Opinion and interpretation: Nil NA: Not Applicable

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