

Ref: Re IWMSL/EAC/2023/04/28
Date: 28.04.2023

To,

The Member Secretary

Expert Appraisal Committee
Infrastructure and Miscellaneous Project (Infra-2)
Ministry of Environment, Forest and Climate Change (MoEF&CC)
Indira Paryavaran Bhavan, Jor Bagh
New Delhi-110003

Sub: Submission of reply for Additional Details Shout (ADS) on the application for obtaining Terms of Reference for the proposed – "Integrated Common Hazardous Waste Treatment Storage Disposal and Recycling Facility (ICHWTSDRF) at Village Polagam, District Karaikal, Pondicherry by M/s Karaikal Waste Management Project (a unit division of M/s Re Sustainability IWM Solution Ltd)"

Ref: 1. Proposal No. : IA/PY/MIS/286683/2022
2. File No. : 21-65/2022-IA.III
3. MoM of MoEF&CC : 100th EAC (Infra-2) meeting held on 11.01.23, Proposal No. 100.4.2
4. Email-Communication from EAC-Infra-2 dated 27.02.23

Respected Sir,

In reference to the aforementioned subject, we had received an ADS from the EAC committee vide email reference cited in reference no 4 above.

As a project proponent, we had a relook at the infrastructure proposed to be setup in the above project in Puducherry and propose the following for amendments in the Form 1:

S.No.	Description	Desired changes
1.	Spent Pot Liner (Carbon and Refractory Portion) Processing and Disposal	Spent Pot Liner (Carbon and Refractory Portion) Processing and Disposal may kindly be dropped from the proposed infrastructure at Puducherry

Accordingly, we are submitting the revised Pre-feasibility Report along with the updated layout for kind consideration with a request to kindly accord the Terms of Reference (ToR Letter) accordingly for Baseline Studies and preparation of EIA report for our proposed project.

Thanking You,

Yours Faithfully

S. Gaurav
28/04/23

Authorized Signatory

Re Sustainability IWM Solutions Limited
(formerly known as Tamilnadu Waste Management Limited and Ramky Industrial Waste Management Solutions Limited)

Site Address:
Plot No, 5-15, 28-33, Sipcot Industrial Complex,
Gummidipoondi, Thiruvallur Dist - 601 201,
Tamilnadu, India.
CIN No. UJ74140TG2002PLCO39702

Registered Office:
Level 11B, Aurobindo Galaxy,
Hyderabad Knowledge City,
HITECH City Road, Hyderabad-500 081.
India.

T: +91 99443 00444
+91 96771 22683
+91 96779 99673

E: tnwml@resustainability.com
mbdtnwml@resustainability.com
tnwml.com

Form - 1
Appendix- I
(See Paragraph-6)

(I) Basic Information

S.No	Item	Details
1	Name of the Project/s.	Integrated Common Hazardous Waste Treatment, Storage, Disposal and Recycling Facility (ICHWTSDRF) by Karaikal Waste Management Project, Pondicherry a unit division of Re Sustainability IWM Solutions Limited (Formerly /s. Tamil Nadu e Management Limited) Industrial Growth Centre (IGC) under Pondicherry Industrial Promotion Development and Investment Corporation at Polagam Village, Karaikal District, Pondicherry. Project cost: Rs. 35 Crores
2	S.No. in the Schedule	7(d) Common hazardous waste treatment, storage and disposal facilities (CHWTSDF), 7 (da) (Bio Medical Waste Treatment facilities)
3	Proposed capacity / area / length / tonnage to be handled /command area / lease area / number of wells to be drilled.	Total Land Area of the Project is 27 acres Details of capacity given in PFR
4	New / Expansion / Modernization	New
5	Existing Capacity / Area etc.	Not Applicable
6	Category of Project i.e. 'A' or 'B'	A
7	Does it attract the general conditions? If yes, please specify	Yes. There exists a state boundary of Tamil Nadu at a distance of 350 m N from the proposed project site.
8	Does it attract the specific conditions? If yes, please specify	No
9	Location	Industrial Growth Centre, Polagam Village, Karaikal District, Pondicherry, Pin-609606
	Plot / Survey / Khasra No	Plot Nos: B-44pt., B-38, B-29, B-33, B-26, B-30, A-195, E-3, C-20, B-62, A-10, A-14, A-21, B-48, , A-

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S.No	Item	Details
		173, A-162,B-2, A-179, A-171pt., B-63, B-47 pt, A-178, B-9 pt., B-21 pt, , B-1pt., A-190pt., B-14pt., B-17 pt., & B-16 pt.
	Village	Polagam Village
	Tehsil	Thirumalairayan Pattinam Commune Panchayat
	District	Karaikal
	State/UT	Pondicherry
	Pin	609606
10	Nearest railway station/airport along with distance in km.	Railway Station: Tirumalairayanpattinam – 3.1 km, (NE) Airport: Thanjavur Airport – located 77 km (W) (Airforce station)
11	Nearest town, city, district headquarters along with distance in kms	Nearest Town: Karaikal town 6.2 km (N) District Headquarters: Karaikal - 6.2 km (N)
12	Village Panchayats, Zilla Parishad, Municipal Corporation, Local body (complete postal addresses with telephone no.s, to be given)	Polagam Village, Thirumalairayan Pattinam Commune Panchayat Karaikal District, Pondicherry (UT) Pin: 609606
13	Name of the applicant	Mr. Ganesh Sivaramakrishnan
14	Registered Address	Re Sustainability IWM Solutions Limited (Formerly as Tamil Nadu Waste Management Limited) Level-11, Aurobindo Galaxy, Hyderabad Knowledge City, Hitech City Road, Hyderabad, Telangana-500081
15	Address for Correspondence	Re-Sustainability IWM Solutions Limited (Formerly as Tamil Nadu Waste Management Limited) Mr. Ganesh Sivaramakrishnan DGM- Business Development Email: srk.siva2022@gmail.com Telephone No. 40-23015000 Fax No. 40-23015000
	Name	Ganesh Sivaramakrishnan
	Designation (Owner/Partner/CEO)	DGM Business Development (IWM & BMW) Re Sustainability IWM Solutions Limited (Formerly as Tamil Nadu Waste Management Limited).
		Re Sustainability IWM Solution Limited

S. Ganesh

S.No	Item	Details
	Address	(Formerly as Tamil Nadu Waste Management Limited) Mr. Ganesh Sivaramakrishnan DGM Business Development (IWM & BMW) Email: srk.siva2022@gmail.com Telephone No. 40-23015104 Fax No. 040-23015000
	Pin code	500 081
	E-mail	srk.siva2022@gmail.com
	Telephone no.	040-23015000
	Fax no.	
16	Details of Alternate Sites examined if any. The location of these sites should be shown on a top sheet	The project site is within an Industrial area (Industrial Growth Centre under Pondicherry Industrial Promotion Development and Investment Corporation) hence no alternate site has not been examined.
17	Interlinked Projects	Yes
18	Whether separate application of interlinked project has been submitted	Not Applicable, As this is a Common project for both TSDF and BMW
19	If yes, date of submission	As this is a Common project for both TSDF and BMW, hence a single file number is generated.
20	If no, reason	Not applicable
21	Whether the proposal involves approval/clearance under: if yes, details of the same and their status to be given: (a) The Forest (Conservation Act, 1980? (b) The Wildlife (Protection) Act, 1972 (c) The C.R.Z. Notification, 1991?	No No No No

S.No	Item	Details
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 proposed to 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 litigation

(II) Activity

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

S.No.	Information / Checklist confirmation	Yes /No	Details thereof (with approximate quantities /rates, wherever possible) with sources of information data
1.1	Permanent or temporary change in land use, land cover or topography including increase in intensity of land use (with respect to local land use plan).	Yes	The proposed facility will be established in an area of 27 acres consigned by the Pondicherry Industrial Promotion Development and Investment Corporation Limited (PIPDIC). Changes in land use, land cover or topography is envisaged due to project development. Hazardous, Domestic Hazardous Waste, Biomedical, E-waste Dismantling, used oil, paper etc., are processed for storage, treatment, & disposal through stabilization, landfill, incineration & recycling, and allied facilities will be developed in the project.
1.2	Clearance of existing land, vegetation and buildings?	Yes	Fractional clearance of prevailing vegetation is envisaged for the construction of proposed project facilities.
1.3	Creation of new land uses?	Yes	The land allotted by PIPDIC is a notified industrial land. Civil construction activities are necessitated for the development of Integrated

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S.No.	Information / Checklist confirmation	Yes /No	Details thereof (with approximate quantities /rates, wherever possible) with sources of information data
			Common Hazardous Waste Treatment, Storage Disposal & Recycling Facilities (ICHWTSDRF)
1.4	Pre-construction investigations e.g. bore holes, soil testing?	Yes	Essential soil investigations will be carried out before construction
1.5	Construction works?	Yes	Construction activity entails the execution of ICHWTSDRF facilities and other utilities
1.6	Demolition works?	No	No demolition works are envisaged as it is a green field project
1.7	Temporary sites used for construction works or housing of construction works?	No	No temporary sites are anticipated for housing of the workers as they would be hired from the surrounding area
1.8	Above-ground buildings, structures or earthworks including linear structures, cut and fill, or excavations.	Yes	Excavation will be done for laying foundations for proposed ICHWTSDRF facilities and ancillary infrastructure. Excavated soil will be used for the construction of earthen bunds and roads within the project site.
1.9	Underground works including mining or tunneling?	No	Not applicable
1.10	Reclamation Works?	No	Not applicable
1.11	Dredging?	No	Not applicable
1.12	Offshore structures?	No	Not applicable
1.13	Production and manufacturing processes?	No	The proposed project is not involved in any kind of production or manufacturing process. It involves the treatment, storage, disposal of hazardous, domestic hazardous waste. & biomedical wastes with special emphasis on 3 R concept (Reduce, Recycle and Reuse) of waste material depending upon the type of waste. The detailed process involved in project components is given in PFR
1.14	Facilities for storage of goods or materials?	Yes	Facilities required for storage of recyclable, incinerable, hazardous & biomedical solid wastes and same will be constructed ensuing all pertinent regulations/guidelines, relevant for this facility as per MoEF&CC.
1.15	Facilities for treatment or disposal of solid waste or liquid effluents?	Yes	The proposed project ICHWTSDRF with E-waste dismantling and other recycling facilities, aims for the treatment and disposal of various types of hazardous wastes through landfills and incineration. Liquid wastes like effluent and leachate generated from the facility would be treated through leachate management & effluent treatment infrastructures.
1.16	Facilities for long term housing of	No	No housing facilities are proposed within the

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S.No.	Information / Checklist confirmation	Yes /No	Details thereof (with approximate quantities /rates, wherever possible) with sources of information data
	operational workers?		site.
1.17	New road, rail or sea traffic during construction or operation?	No	Not applicable
1.18	New road, rail, air waterborne or other transport infrastructure including new or altered routes and stations, and, ports etc?	No	Not envisaged
1.19	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?	No	No closure or diversion of existing transport routes or infrastructure is foreseen in the proposed project location.
1.20	New or diverted transmission lines or pipelines?	No	Existing power transmission lines would be utilized
1.21	Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers?	No	No Impoundment, damming culverting, realignment or other changes to the hydrology of water courses or aquifers are proposed
1.22	Stream crossings?	No	There is no stream crossing within the proposed project location but there are two canals one passing through the site and another adjacent to the site
1.23	Abstraction or transfers of water from ground or surface waters?	Yes	Water required for the project is 100 KLD and will be sourced from borewells/ tankers/ lakes/ canals
1.24	Changes in water bodies or the land surface affecting drainage or run-off?	No	As the proposed project is based on the concept of Zero Liquid Discharge (ZLD), no change is envisaged in water bodies or the land surface that will affect drainage or run-off.
1.25	Transport of personnel or materials for construction, operation or decommissioning?	Yes	Construction materials will be transported via the existing infrastructure. Workers from the nearby villages and town will be engaged in the project.
1.26	Long-term dismantling or decommissioning which could have an impact on the environment?	No	No long-term dismantling or decommissioning or restoration works are involved.
1.27	Ongoing activity during decommissioning which could have an impact on the environment?	No	Not applicable
1.28	Influx of people to an area in either temporarily or permanently?	Yes	Influx of people to the area will be expected both during construction and operation phases.
1.29	Introduction of alien species?	No	Not envisaged
1.30	Loss of native species or genetic diversity?	No	Ensure to minimize any loss.
1.31	Any other actions?	No	Not applicable

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):

S.No	Information /Checklist confirmation	Yes /No	Details thereof (with approximate quantities /rates, wherever possible) with sources of information data
2.1	Land especially undeveloped or agricultural land (ha)	Yes	The project is located in an area of 27 acres with unused land with natural vegetation.
2.2	Water (expected source & competing users) Unit : KLD	Yes	Water required for the project is 100 KLD which will be sourced from borewells / tankers/ lakes/canals
2.3	Minerals (MT)	No	Not applicable
2.4	Construction material – stone, aggregates, and / soil (expected source-MT)	Yes	Required construction material such as sand, steel, cement etc. will be procured from the nearby sources/local markets on the basis of the design conditions of the plant.
2.5	Forests and timber (source-MT)	No.	The timber will be purchased in local timber depots for building doors, windows and other necessary wooden requirements.
2.6	Energy including electricity and fuels (source, competing users) Unit : fuel (MT), energy (MW)	Yes	The power required for operations is 375 kVA and will be drawn from the electricity board Pondicherry UT. Two DG sets of 250 kVA capacities each will be used as backup power during emergency prerequisite
2.7	Any other natural resources (use appropriate standard units)	No	Not envisaged

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.

S.No	Information /Checklist confirmation	Yes /No	Details thereof (with approximate quantities /rates, wherever possible) with sources of information data
3.1	Use of substance or materials, which are hazardous (as per MSIHC rules) to human health or the environment (flora, fauna and water supplies)	Yes	All Hazardous wastes shall be collected and samples of the same would be analyzed in our laboratory to arrive at the disposal pathway based on the characteristic of the waste and calorific value. The hazardous which required stabilization shall be treated with reagents to neutralize the waste before putting into landfill. Wastes which have high calorific value shall be incinerated as per the guidelines of CPCB and Hazardous and Other Wastes

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			<p>(Management and Transboundary) Rules, 2016. Necessary Air Pollution Control Devices (APCB) infrastructure shall be installed in the facility.</p> <p>All bio-medical wastes shall be disposed or recycled as per the Bio-medical waste Management Rules 2016 and guidelines stipulated by CPCB</p> <p>Hence no hazardous impacts are envisaged on human health and environment.</p>
3.2	Changes in the occurrence of disease or affect disease vectors (e.g. insect or water borne diseases)	No	Suitable drainage and waste management measures will be adopted during both the construction and operational phases which will restrict stagnation of water or accumulation of waste. This will effectively restrict the reproduction and growth of disease vectors and hence no change in occurrence of disease or disease vectors is anticipated.
3.3	Affect the welfare or people e.g. by changing living conditions?	Yes	The proposed project would provide employment to local people in the construction and operation phases of the facility. An improvement in the socio-economic conditions and living standards of the surrounding villagers is expected.
3.4	Vulnerable groups of people who could be affected by the project e.g. hospital patient's, children, the elderly etc.,	No	Not applicable
3.5	Any other causes	No.	None

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

S. No	Information / Checklist Confirmation	Yes /No	Details thereof (with approximate quantities /rates, wherever possible) with sources of information data
4.1	Soil, overburden or mine wastes	No	It is not a mining project. The soil overburden envisaged during construction would be used for green belt development and leveling of the site during post construction.
4.2	Municipal waste (domestic and or commercial wastes)	Yes	The domestic solid waste generated from the project activities will be sent to the nearest municipal bin for further disposal.
4.3	Hazardous wastes (as per Hazardous Waste Management Rules)	Yes	Hazardous Waste Treatment, Storage, Disposal and Recycling Facilities will be developed as per the Hazardous Wastes (Management, Handling and Transboundary Movement) rules, 2016 and amendments thereof

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S. No	Information / Checklist Confirmation	Yes /No	Details thereof (with approximate quantities /rates, wherever possible) with sources of information data
4.4	Other industrial process wastes	Yes	Plastic waste will be processed as per Plastic Waste Management Rules, 2016; E-waste will be processed as per E-waste Management Rules, 2016, Biomedical waste will be processed as per The Bio-Medical Waste Management Rules 2016 and Domestic Hazardous waste shall be processed as per the Solid Waste Management Rules, 2016 and amendments thereof.
4.5	Surplus product	No	Not applicable
4.6	Sewage sludge or other sludge from effluent treatment.	Yes	The sludge generated from the effluent treatment plant will be disposed in secured landfill which is also a part of the proposed facility.
4.7	Construction or demolition wastes.	Yes	Some measure of construction debris may be generated during construction which will be segregated. The re-salable fraction will be sold and the rest of the waste will be used for filling up of low lying areas and the development of internal roads or boundary walls
4.8	Redundant machinery or equipment	No	Not applicable
4.9	Contaminated soils or other materials	No	No contamination of soil is envisaged as the proposed project would be established as per the guidelines and standards prescribed by CPCB & other regulatory institutions
4.10	Agricultural wastes	No.	Not Applicable.
4.11	Other solid wastes	No	No other solid waste is anticipated.

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

S. No.	Information /Checklist confirmation	Yes/ No	Details thereof (with approximate quantities /rates, wherever possible) with sources of information data
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources	Yes	PM, SO ₂ , NO _x emissions are envisaged from incineration due to use of light diesel oil, LDO and waste burning. The emission will meet the MoEF&CC standard for the ICHWTSDRF Incineration facility as per G.S.R 481(E) dated 26th June 2008. Emissions are envisaged from DG sets, boilers and incineration of hazardous wastes. DG set will be provided with adequate stack height, meeting MoEF&CC/CPCB standards. Similarly, the gases coming out of the incinerator will be sent through multi cyclone, spray dryer, wet scrubber, bag

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S. No.	Information /Checklist confirmation	Yes/ No	Details thereof (with approximate quantities /rates, wherever possible) with sources of information data
			house, followed by stack height meeting MoEF&CC/CPCB standards.
5.2	Emissions from production processes	No	No production activities involved in the project
5.3	Emissions from handling including storage and transport	Yes	Emissions from handling of Hazardous waste storage and transport are controlled by handling them in closed containers and earmarked covered storage areas.
5.4	Emissions from construction activities including plant and equipment	Yes	Fugitive emissions are likely during the construction & transportation activities due to use of construction equipment. These are temporary in nature.
5.5	Dust or odors from handling of materials including construction materials, sewage and waste.	Yes	Dust is likely to be generated during construction phase. To control dust generation, following measures will be taken: <ul style="list-style-type: none"> ➤ Water sprinkling will be done at regular intervals ➤ Tarpaulin cover will be provided over stored raw material ➤ Greenbelt development will be taken up along boundary and open areas
5.6	Emissions from incineration of waste	Yes	Emissions from the incineration process will be monitored for meeting the prescribed standards. The emission will meet the MoEF&CC standard for TSDF Incineration facility as per G.S.R 481(E) dated 26th June 2008. PM, SO ₂ , NO _x , Dioxin, Furans, etc. are expected to be generated from incinerator which would be mitigated by providing necessary air pollution control devices suggested by MoEF&CC.
5.7	Emissions from burning of waste in open air (e.g. slash materials, construction debris)	No.	No material will be openly burnt in air.
5.8	Emissions from any other sources	No	Emissions from other sources are not envisaged

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

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

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S.No.	Information /Checklist confirmation	Yes/ No	Details thereof (with approximate quantities /rates, wherever possible) with sources of information data
6.1	From operation of equipment e.g. engines, ventilation plant, crushers	Yes	Noise is expected near DG sets, incinerator, pumps and motors. Necessary PPE (ear muffs) will be provided for the personnel working in this area. Most of the equipment structures are static so the vibration effect of these will be only local. The design of support and foundation will nullify the intensity of vibrations.
6.2	From industrials or similar processes.	Yes	Necessary noise mitigation measures will be followed as per regulations due to which the noise from the proposed facility will be confined to the site premises.
6.3	From construction or demolition	Yes	Envisaged in activities like excavation, drilling and welding during construction which will be temporary
6.4	From blasting or piling	No	-NA-
6.5	From construction or operational traffic	Yes	Noise during daytime is expected due to the vehicular movement and construction activities, however, it would be for a temporary period of time. All necessary precautions will be taken to minimize noise.
6.6	From lighting or cooling systems	No	Not applicable
6.7	From any other sources	No	Not applicable

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:

S.No.	Information /Checklist confirmation	Yes /No	Details thereof (with approximate quantities /rates, wherever possible) with sources of information data
7.1	From handling, storage, use or spillage of hazardous materials.	No	The proposed project will provide facilities to treat hazardous waste material as per the Hazardous & Other Wastes (Management & Transboundary) Rules, 2016.
7.2	From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)	No	Contamination of land or water is not envisaged as the generated leachate is efficiently managed which may include leachate collection and treatment. A part of the treated leachate is recycled and the rest will be sent to incinerator or will be evaporated (mechanically/solar evaporation).
7.3	By deposition of pollutants emitted to air, into the land or into water.	No	The major emissions expected from the proposed ICHWTS DRF facility include PM, SO ₂ , NO _x , Dioxins & Furans. Incinerator will be provided with multi cyclone, spray dryer, wet scrubber, bag house, followed by stack height meeting MoEF&CC/CPCB standards. DG set will be provided with adequate

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			stack height meeting MoEF&CC/CPCB standards. Hence the chance of contamination of land and water by deposition of pollutants is 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	No long-term build-up of pollutants is expected due to the proposed project. All pollution control measures would be adopted and an approved Environmental Management Plan (EMP) will be followed to ensure zero or minimal pollution in the environment.

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

S.No	Information /Checklist confirmation	Yes/ No	Details thereof (with approximate quantities /rates, wherever possible) with sources of information data
8.1	From explosions, spillages, fires etc from storage, handling, use or production of hazardous substances	Yes	No usage of explosives in the project. To deal with any accident, firefighting facility, fire extinguishers, exit sign board, an alternative source of electricity supply, fire alarm system, and water storage tank for firefighting will be provided at TSDF site. PPEs will be provided to the worker Training and awareness about the safety norms are being provided to all persons involved in project activities.
8.2	From any other causes	Yes	Minor accidents during equipment and machinery operations may be expected. Nevertheless, required safety precautions will be followed
8.3	Could the project be affected by natural disasters causing environmental damage (e.g. floods, earthquakes, landslides, cloudburst etc.)?	No	The project area falls under Zone - II: Low Damage Risk Zone (MSK VI or less zone as per the NDMA, 2016 and indicates a low vulnerability.

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.

S. No.	Information /Checklist confirmation	Yes /No	Details thereof (with approximate quantities /rates, wherever possible) with sources of information data
9.1	Lead to development of supporting facilities, ancillary development or development stimulated by the project which	Yes	There will be cumulative positive impact on the environment in terms of better management of wastes (Hazardous, Biomedical, Domestic Hazardous Waste, E-waste, etc.). More employment opportunities will be

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S. No.	Information /Checklist confirmation	Yes /No	Details thereof (with approximate quantities /rates, wherever possible) with sources of information data
	could have impact on the environment e.g.: <ul style="list-style-type: none"> • Supporting infrastructure (roads, power supply, waste or waste-water treatment etc.) • Housing development • Extractive industries • Supply industries • Other 		generated and aesthetics of the area will be improved due to the proposed ICHWTSDRF project. Impact may be felt on local infrastructure. Demand for housing may increase and ancillary industries, shops, small hotels etc. are expected to come up with the establishment of the proposed project.
9.2	Lead to after use of the site, which could have an impact on the environment	No	The closure plan of the proposed project of secured landfill and Incineration System/Facility of Integrated Common Hazardous Waste Treatment, Storage and Disposal Facility (ICHWTSDF) includes to development of greenery and management of storm water drainage. The post project monitoring shall be carried out in accordance with the prescribed norms. Once the existing landfill is fully utilized, post closure care of landfill shall be conducted for at least 30 years. Vegetative cover will be provided over completed cells/site as per the guidelines. Monitoring of leachate collection and ground waters will be carried out in accordance with CPCB/SPCB guidelines.
9.3	Set a precedent for later developments	Yes	The project at setting up state of art infrastructure required for operational of a TSDF for treatment of hazardous waste from existing and upcoming industrial units in the State. The closed landfill site may be carpeted with vegetative cover over completed cells/site as per the guidelines.
9.4	Have cumulative effects due to proximity to other existing or planned projects with similar effects)	No	The proposed project will be established following the local laws to keep cumulative effect under control

III) Environment Sensitivity

S.No.	Areas	Yes /No	Aerial distances (within 15 km.) Proposed project location boundary.

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S.No.	Areas	Yes /No	Aerial distances (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 values.	No	The area apportioned for proposed project is earmarked for development of industrial complex by the PIPDIC. Accordingly there exist no areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related values.
2.	Areas which are important or sensitive for ecological reasons- Wetlands, water courses or other water bodies, coastal zone, biospheres. Mountains, forests	YES	Puravadayinar River-0.7 kms S, Sea / Costal area 3.7 kms E Tirumalarajanar River 3 kms N
3.	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration.	No	Same as mentioned in the above S. No. 2 of this section.
4.	Inland, coastal, marine or underground waters	Yes	No river is positioned within 200 m from site
5.	State, National boundaries	Yes	state boundary of Tamilnadu at a distance of 0.35 km SW from project site
6.	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas	Yes	The site is well connected to all the nearby places with existing road. National Highway NH-32 (Chennai, Karaikal, and Tutticorin) is located 1.3 kms (E) from the site. State Highway SH-67 connecting SH-65 and Nagapattinam town is located 0.7 kms (SW) from the site Polagam village is located 0.7kms NE. The nearest town is Karaikal town 6.1 kms (N).
7.	Defense installations	No.	None in the study area within 15 kms radius
8.	Densely populated or built-up area	No	None in the study area
9.	Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, community facilities)	Yes	Schools, Worship places, hospitals etc. are existing in the nearby villages. Government General Hospital, Karaikal town is located 3.5 kms (N) away from site.
10.	Areas containing important, high quality or scarce resources (ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)	Yes	The site is dominated by scrubland
11.	Areas susceptible to natural	No	There is no major river within 200 mts distance

S. Ganesw

S.No.	Areas	Yes /No	Aerial distances (within 15 km.) Proposed project location boundary.
	hazard which could cause the project to present environmental problems (Earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions)		annulling any potential flood and erosion, as well the site lies in seismic zone II terminating major earthquake damage, while the land is plain detaining any probable landslide.

IV). Proposed Terms of Reference for EIA studies:

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

Signature of the applicant
(Ganesh Sivaramakrishnan)
DGM-Business Development
Re Sustainability IWM Solutions Limited.

S. Ganesh

Pre – Feasibility Report
for
Proposed
Establishment of Integrated Common
Hazardous Waste Treatment, Storage, Disposal
and Recycling Facility (ICHWTSDF)

At
Industrial Growth Centre
under Pondicherry Industrial Promotion Development and
Investment Corporation (PIPDIC),
Polagam Village, Karaikal District, Pondicherry

By
Karaikal Waste Management Project
Unit division of
M/s. Re Sustainability IWM Solutions Ltd.
(Formerly Tamil Nadu Waste Management Ltd.)

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1. Executive Summary

Integrating the environmental protection with industrialization bolsters sustainable development of a nation. Appropriately it was proposed to establish an Integrated Common Hazardous Waste Treatment, Storage Disposal and Recycling Facility (ICHWTSDF) by M/s. Re Sustainability IWM Solutions Ltd in Pondicherry. The anticipated project “Karaikal Waste Management Project” has been proposed to be established at Survey No’s: B-44 pt., B-38, B-29, B-33, B-26, B-30, A-195, E-3, C-20, B-62, A-10, A-14, A-21, B-48, A-173, A-162, B-2, A-179, A-171 pt., B-63, B-47 pt., A-178, B-9 pt., B-21 pt., B-1 pt., A-190pt., B-14pt., B-17 pt. & B-16 pt., within Industrial Growth Centre (IGC) under Pondicherry Industrial Promotion Development and Investment Corporation (PIPDIC) at Polagam (Village), Karaikal (District), Pondicherry. The details of project capacities proposed to be developed are given in **Table 1**.

Table 1: Details of the proposed project capacities

S. No	Name of the facility	Proposed capacity
1	Secured landfill (DLF)	200 TPD
2	Treatment/Stabilization (LAT)	300 TPD
3	Incineration (INC)- common for HW &BMW	55 TPD
4	Incineration (INC)- common for HW &BMW (Back up)	55 TPD
5	Biomedical waste	13 TPD
6	Alternative Fuel and Raw Material (AFRF)	55 TPD
7	E-waste Dismantling	2 TPD
8	Plastic Recycling	10 TPD
9	Paper Recycling	10 TPD
10	Drum Recycling	200 numbers per/day
11	Aluminum Dross Reprocessing	165 TPD
12	Used Oil/Spent Oil Recycling	54 KLD
13	Solvent Recovery	27 KLD

In consistent with notification issued by the Ministry of Environment and Forests, Climate Change (MoEF&CC) S.O.1535, dated 14.09.2006 and its ensuing amendments, the proposed project falls under Project Activity 7(d) - Common Hazardous Waste Treatment, Storage and Disposal Facilities (TSDFs), 7 (da)Bio-Medical Waste Treatment facilities), Category ‘A’ - All Integrated facilities having incineration and landfill or Incineration alone.

A total land of 27.0 acres (10.92 ha.) has been pre-arranged for the proposed project through Pondicherry Industrial Promotion Development and Investment Corporation Limited (PIPDIC). Adhering to the MoEF&CC guidelines, greenbelt development all along the boundary and one row of plants (both sides) will be planted along the internal roads within the project site to minimize the environmental impacts of the site on its surroundings. However around 2 ac. of land is left without any project activities due to the high-tension line passing through the site and all precaution will be taken as per guidelines.

The total water requirement for the project is 100 KLD. The water will be sourced from bore wells/ tankers/ canals/ lakes. The power required for operations is 375 kVA and will be sourced from state electricity board. Two DG sets of 250 kVA capacity each will be used as backup power source during emergency necessity.

The capital cost for the proposed project is estimated to be around Rs 35 Crores. The capital cost allocated for EMP is around Rs. 3.5 Crores with a recurring cost of Rs 0.35 Crores per annum. The CER cost will be provided as per the MoEF&CC guidelines for the local development

2. Introduction of the Project

2.1 Identification of Project and Project Proponent

2.1.1 Identification of Project

Re Sustainability IWM Solutions Ltd has the credit and distinction of experience in operating hazardous waste management facilities across the country. The group today is the leader in waste management in the country. Re Sustainability IWM Solutions Ltd has the credit and distinction of having established the first-ever bio- medical waste management and hazardous waste management facilities operating on a common platform in the country at Hyderabad providing dimension to various other similar projects in the country. Re Sustainability IWM Solutions Ltd. Focused in the fields of Industrial Hazardous Waste Management, Bio-Medical Waste Management and Municipal Solid Waste Management. The company, today operates fourteen hazardous waste management facilities as well offers high-quality uninterrupted services at competitive prices. With this vast experience and expertise available, M/s. Re Sustainability IWM Solutions Ltd is proposing to establish an Integrated Common Hazardous Waste Treatment Storage Disposal and Recycling Facility (ICHWTSDF) at IGC under PIPDIC, at Polagam village, Karaikal district, Pondicherry in compliance with the statutory guidelines. All the operational data and expertise of the established plants will be made available to the newly proposed facility.

2.1.2 Project Proponent

The proposed project will be established and operated by M/s Re Sustainability IWM Solutions Ltd.

2.2 Brief Description of Nature of the Project

The proposed, Karaikal Waste Management Project is an Integrated Common Hazardous Waste Treatment, Storage Disposal and Recycling Facility (ICHWTSDF) at Industrial Growth Centre, Polagam (Village), Karaikal (District), Pondicherry. The project is proposed to treat hazardous and biomedical wastes as well as comprise of AFRE, Paper recycling, Plastic recycling, E-waste dismantling, used oil recycling, Drum recycling/ decontamination recycling plant etc. as per Hazardous and Other Wastes (Management and Transboundary) Rules, 2016.

2.3 Need for the Project and its Importance to the Country and Region

The Union Territory (UT) of Pondicherry encompasses the former French establishments of Pondicherry, Karaikal, Mahe and Yanam, which lie scattered in South India. Pondicherry, the capital of the UT is situated on the Coromandel Coast of the Bay of Bengal and is about 130 km (Aerial distance) from Chennai. About 120 km (Aerial distance) km south of Pondicherry on the East Coast lays Karaikal. Subsequent to the initiatives by the Government of India and Pondicherry towards rapid industrialization, it is likely that the potential waste generated necessitates the establishment of TSDFs with provisions for

Proposed Integrated Common Hazardous Waste Treatment, Storage, Disposal and Recycling Facility (ICHWTSDF) treatment, storage & disposal of numerous wastes in different parts of the region. The proposed facility will be established in accordance with the applicable rules and guidelines issued by MoEF&CC for catering the needs of industries and other units at Karaikal district as well as its neighboring districts and states.

A major concern about the hazardous wastes is that, they need to be disposed of in a secured manner in view of their toxic nature, environmental pollution and wide range of health hazards. At present, the waste generated from industries, commercial and residential activities are either indiscriminately disposed in open areas/within their units/given to small recyclers. However, some waste generators find it difficult to dispose of their wastes without causing environmental disturbance, as very few appropriate disposal facilities are available.

The Government of India has promulgated rules for handling various types of wastes through MoEF&CC under the aegis of Environment (Protection) Act, 1986 during different periods, the details of which are given in **Table 2**.

Table 2: Details of the Rules framed for handling of various solid wastes

Solid Waste	Year in which the rules are framed	Details of amended rules
Hazardous Waste	2008	Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 & 2021 GSR no. 798 (E) 12-11-2021
Bio-Medical Waste	1998	Bio-Medical Waste Management Rules, 2016 & 2018
Municipal Solid Waste	2000	Solid Waste Management Rules, 2016 & 2019 GSR no. 298 (E) 10-04-2019
E-Waste	2011	E-Waste (Management) Rules, 2016 & 2018 GSR no. 261 (E) 22-03-2018
Plastic Waste	2011	Plastic Waste Management Rules, 2016 & 2021 GSR no. 571 (E) 12-08-2021

Having an integrated facility would minimize the risk involved in waste transportation and waste movement. Further, the project will facilitate a one stop solution for management of all types of wastes at a common treatment facility. The wastes would be collected from the waste generators, treated as per their characteristics and finally disposed of, accomplishing MoEF&CC guidelines and standards.

2.4 Demand Supply Gap

Due to rapid industrialization, the generation of waste all over the country is growing proportionally. The proposed project will meet the needs of industries, commercial establishments and Health Care Units (HCUs) situated in Karaikal district and other neighboring districts and the state.

Hazardous waste inventorization of Pondicherry

Around 139 hazardous waste generating industries are present in the UT with an authorization to generate 100378.5 MTA of hazardous wastes, whereas the reported generation of hazardous waste is around **30193.77 MTA as per the** authorized quantity of generation under the National inventory report on hazardous waste generation and management given in **Table: 3**. It was observed that around 30% of hazardous wastes are being generated out of total authorized quantity of generation and still there are 1143 MTA stored in occupier premises as per CPCB inventory data given in **Table: 4**, after sending to other states and within the UT for co-processing, utilization and recycling of hazardous waste given in **Table: 5 & 6**.

So as per authorized generation, the management of hazardous waste will be challenging during all authorized unit full operation and there will be a requirement of TSDf facility within the UT.

In Pondicherry, there is no TSDf facility, and only three authorized Schedule-IV recyclers for the recycling of commonly recyclable hazardous wastes like used/waste oil, lead bearing wastes, brass dross, zinc bearing wastes etc. having an authorized capacity of about 8400 MTA which is very less compare to the volume of hazardous waste generation in the UT.

Table 3: Details on Hazardous Waste Generation - Pondicherry (2020-21)

Serial Number		1	2	Total
Name of the District		Puducherry	Karaikal	
Total Number of HW Generating Industry		129	10	139
Number of Units possessing authorization		129	10	139
Number of Units exempted from obtaining Authorisation		0	0	0
Number of HW Units submitted annual returns		1	8	119
Authorized Quantity of Hazardous Waste (MT)	Landfillable	2	0	4876.33
	Incinerable	3	1.52	1116.03
	Recyclable	4	2642.84	14209.01
	Utilizable	5	4.8	80177.16
Total Quantity (MT)		97729.37	2649.16	100378.5
Quantity of Hazardous Waste generated as per Annual Return (MT)	Landfillable	6	0	1167.76
	Incinerable	7	0.06	140.94
	Recyclable	8	64.76	1980.25
	Utilizable	9	2.77	30193.77
Total Quantity (MT)		33415.13	67.59	33482.72

Details on Import and Export of Hazardous Waste (MT)	Quantity of HW imported during the year (Metric Tonne)	10	0	0	0
	Type of HW*	11	0	0	0
	Quantity of HW exported during the year (Metric Tonne)	12	0	0	0
	Type of HW*	13	0	0	0
Source: https://cpcb.nic.in/uploads/hwmd/Annual_Inventory2020-21.pdf					

Table 4: Details on Hazardous Waste Stored at Occupier Premises

District Name		Puducherry	Karaikal	Total
Total Quantity of HW stored at Occupier premises at the beginning of the financial year i.e. 1st April (MT)	Landfillable	425	0.00	425.00
	Incinerable	31	2	33.00
	Recyclable	276	46	322.00
	Utilizable	506	0.00	506.00
Total		1238	48.00	1286.00
Total Quantity of HW stored at Occupier premises at the end of financial year i.e. 31st March (MT)	Landfillable	91	0.00	91.00
	Incinerable	34	2	36.00
	Recyclable	221	47	268.00
	Utilizable	748	0.00	748.00
Total		1094	49.00	1143.00
Source: https://cpcb.nic.in/uploads/hwmd/Annual_Inventory2020-21.pdf				

Table 5: Details of Hazardous Waste sent to other states for Recycling/Utilization/Disposal

S. No.	Hazardous Waste	Hazardous Waste sent to other State/UT	
		Name of State/UT where waste sent (MT)	Quantity sent (MT)
1	For disposal at common secured landfill	Karnataka	1491
2	For disposal at common Incinerator	Karnataka	137
3	For recycling by Schedule IV recyclers	Tamilnadu	1827
		Kerala	15
		Andhra Pradesh	121
		Telangana	45
		Haryana	25
Total		Total	2033

S. No.	Hazardous Waste	Hazardous Waste sent to other State/UT	
		Name of State/UT where waste sent (MT)	Quantity sent (MT)
4	For utilization in co-processing (cement plants)	Tamilnadu	3322
5	For non-captive utilization based on CPCBs SOPs	Tamilnadu	12184
Total		Karnataka	1804
		Total	13988

Source: https://cpcb.nic.in/uploads/hwmd/Annual_Inventory2020-21.pdf

Table 6: Details on Hazardous Waste Recycled and Utilized within the state

Sr. No.	Name of the district		1	2	Total	
			Puducherry	Karaikal		
Recycling/ Utilization of hazardous waste (Generated within the state/UT)	Quantity of waste Recycled (listed under Schedule-IV Hazardous waste (MT))		Generated within the state	0	0	
			Imported	0	0	0
	Quantity Utilized (MT)	Co-processing in Cement plant	Generated within the state	0	0	0
			Imported	0	0	0
		Non-captive utilization based on CPCBs SOPs	Generated within the state	12645	0	12645
			Imported	0	0	0
Captive utilization of hazardous waste and Other Wastes for which SOP has not been prepared by CPCB			14	0	14	
Recycling/Utilization of hazardous waste (Received from the state/UT)	Quantity of waste Recycled (listed under Schedule-IV Hazardous Wastes) (MT)		0	0	0	
	Quantity Utilized (MT)	Coprocessing in Cement plant	0	0	0	
		Non-captive utilization based on CPCBs SOPs	18	0	18	

Source: https://cpcb.nic.in/uploads/hwmd/Annual_Inventory2020-21.pdf

Biomedical Waste

The total generation of bio-medical waste is about 559 tonnes per day in the country. Based on the annual report information, there are 198 numbers of CBWTFs in the country. In the absence of appropriate facilities, the waste is disposed of through incinerators or deep burial and autoclaves/microwaves. Only 1 CBMWTF exists in the region hence, necessitating for further facilities. **Table 7** shows the current scenario of BMW inventorization for the union territory.

Table 7: Bio-medical Waste Management Scenario in Pondicherry for the Year 2020

No. of Healthcare facilities	No. of CBMWTFs presently in operation	Average quantity BMW handled (kg/day)
267	1	4360
Source: https://cpcb.nic.in/uploads/hwmd/Annual_Inventory2020-21.pdf		

Considering the waste generation scenario and the facilities available to accommodate the increasing amount of waste, a need was felt to establish an ICHWTSDF to treat and dispose the wastes generated from the industries and HCUs in and around region in a scientific manner meeting the guidelines issued by MoEF&CC. The proposed facility will be unique and bridge the yawning gap in the demand and availability of hazardous waste management facilities in the country.

2.5 Imports Vs. Indigenous Production

The project is proposed for the treatment and disposal of various wastes generated by industries, commercial establishments, HCUs etc. Hence, imports vs indigenous production is not applicable for this project. On the contrary, the recycling units proposed for paper, plastic, E-waste, and used oil can reduce the demand for virgin materials.

2.6 Export Possibility

The proposed project being a treatment and disposal facility does not generate any products suitable for export.

2.7 Domestic/Export Markets

The recycled materials (paper, plastic, E-waste, etc.) produced from the proposed project can meet the demand of domestic market to a certain extent.

2.8 Employment Generation (Direct and Indirect) due to the Project

The direct and indirect employments envisaged from the proposed project for both skilled and unskilled are given in **Table 8**.

Table 8: Details of Manpower

S. No.	Description	Direct	Remarks
1	Administrative	13	Indirect employment during operation will be around 100 persons.
2	Skilled Manpower	14	
3	Unskilled Manpower	18	During the establishment period, around 200 persons at peak period.
Total		45	

3. Project Description

3.1 Type of Project including Interlinked and Independent Projects, if any

The proposed project is aimed at establishing an Integrated Common Hazardous Waste Treatment, Storage Disposal and Recycling Facility for the treatment and disposal of hazardous wastes, biomedical wastes and recycling of E-wastes, plastic, paper wastes and drum recycling etc. This will provide a one stop solution for the treatment of various types of wastes on a common platform. There are no interlinked projects. The project will be developed and operated as per prevailing rules, SOP and direction of SPCB.

3.2 Location (Map showing general location, specific location, project boundary and conceptual project site layout) with coordinates

The site is located at following plot numbers: "B-44 pt., B-38, B-29, B-33, B-26, B-30, A-195, E-3, C-20, B-62, A-10, A-14, A-21, B-48, A-173, A-162, B-2, A-179, A-171 pt., B-63, B-47 pt., A-178, B-9 pt., B-21 pt., B-1 pt., A-190pt., B-14pt., B-17 pt. & B-16 pt" within the Industrial Growth Centre, Polagam (V), Karaikal (D), Pondicherry. The location map for the general location of the site is given in **Figure 1** and the specific location with coordinates and project boundary are given in **Figure 2** and list of major co-ordinates of the project boundary given in **Table 9**. The conceptual site layout given in **Figure 3**.

Table 9: Coordinates of the proposed site

ID	Latitude	Longitude
A	10°51'30.31"N	79°48'46.69"E
B	10°51'30.68"N	79°49'01.89"E
C	10°51'21.84"N	79°49'01.83"E
D	10°51'21.41"N	79°48'48.48"E

3.3 Details of alternate sites considered and the basis of selecting the proposed site, particularly the environmental considerations gone into should be highlighted.

Since the project site was identified by PIPDIC in Industrial Growth Centre, Karaikal, no alternate sites have been considered. However, the site is evaluated and selected based on the analysis of site selection criteria and knock-out criteria of MoEF&CC and site evaluation criteria as per CPCB guidelines HAZWAMS/17/2000-2001 and HAZWAMS/25/2002-2003, according to the mentioned guidelines site found to be suitable for the establishment of TSDF facility. The complete evaluation of the site is given in **Annexure 1**.

3.4 Size or Magnitude of Operation

The project is proposed in an area of 27.0 acres (10.92 ha.) for establishing an Integrated Common Hazardous Waste Treatment, Storage Disposal and Recycling Facility for the treatment and disposal of hazardous wastes, biomedical wastes, AFRF, Paper recycling, Plastic recycling, E-waste dismantling, used oil/ Spent Oil recycling, Drum recycling/decontamination recycling plant etc.

Figure 1: Location Map

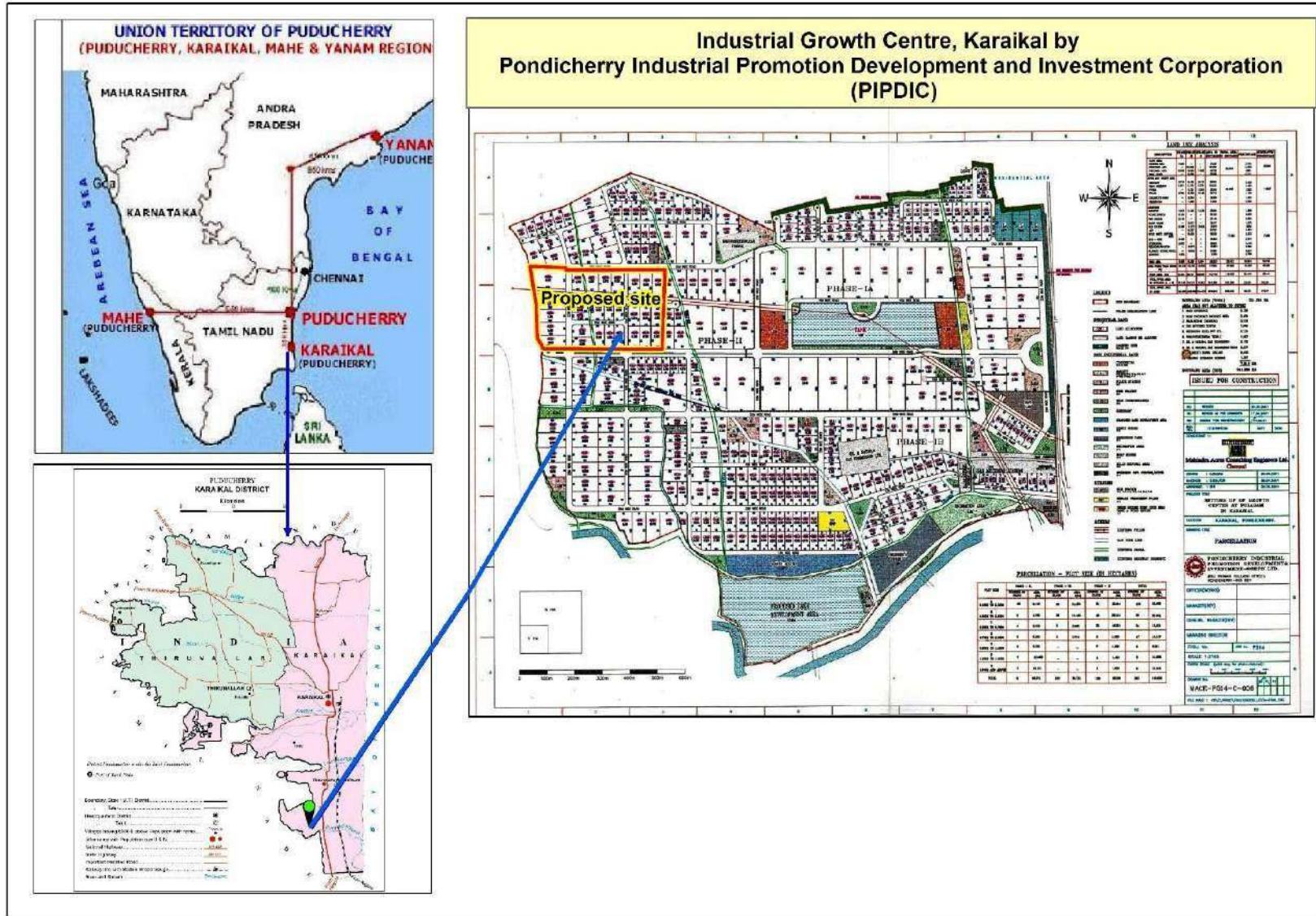
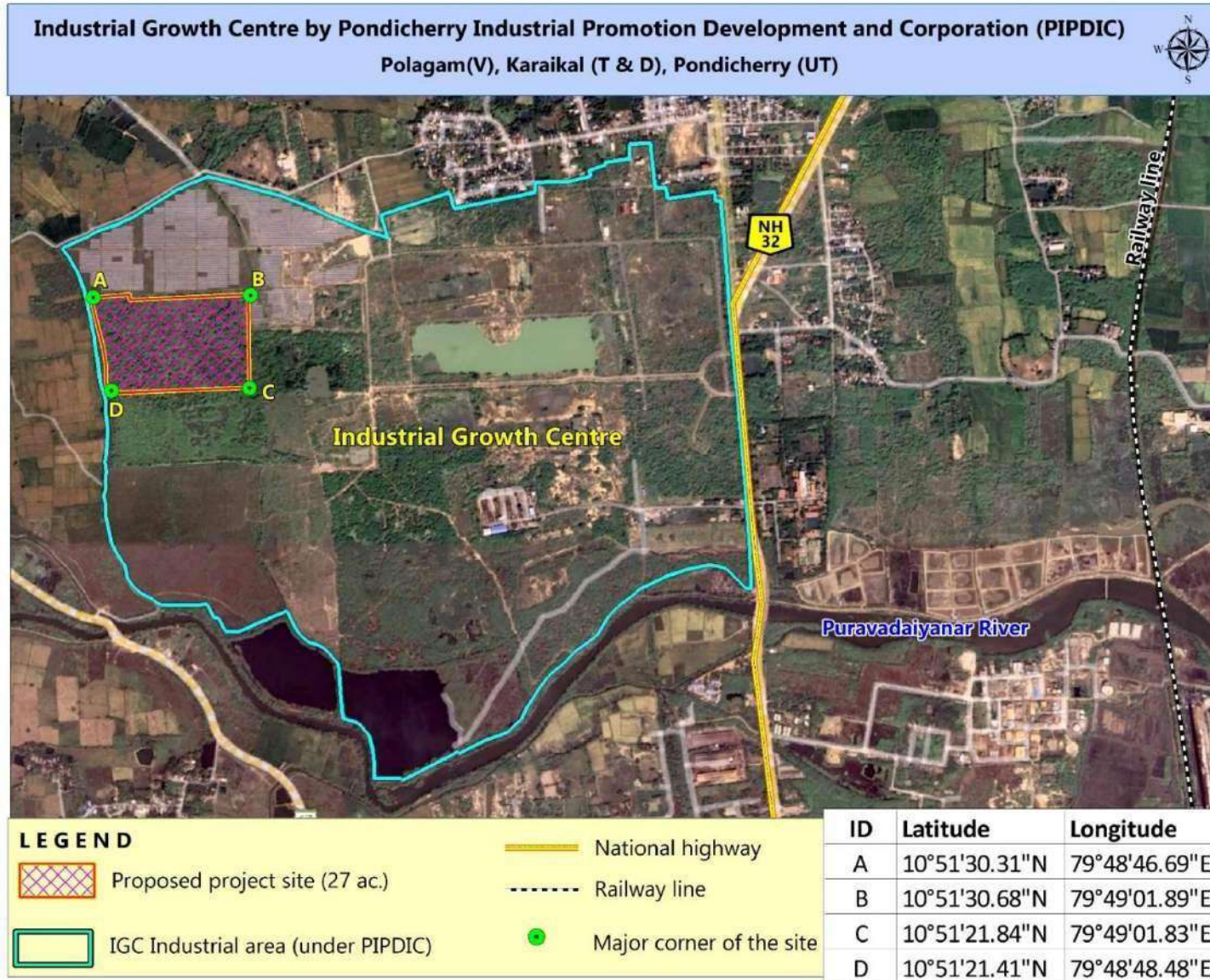
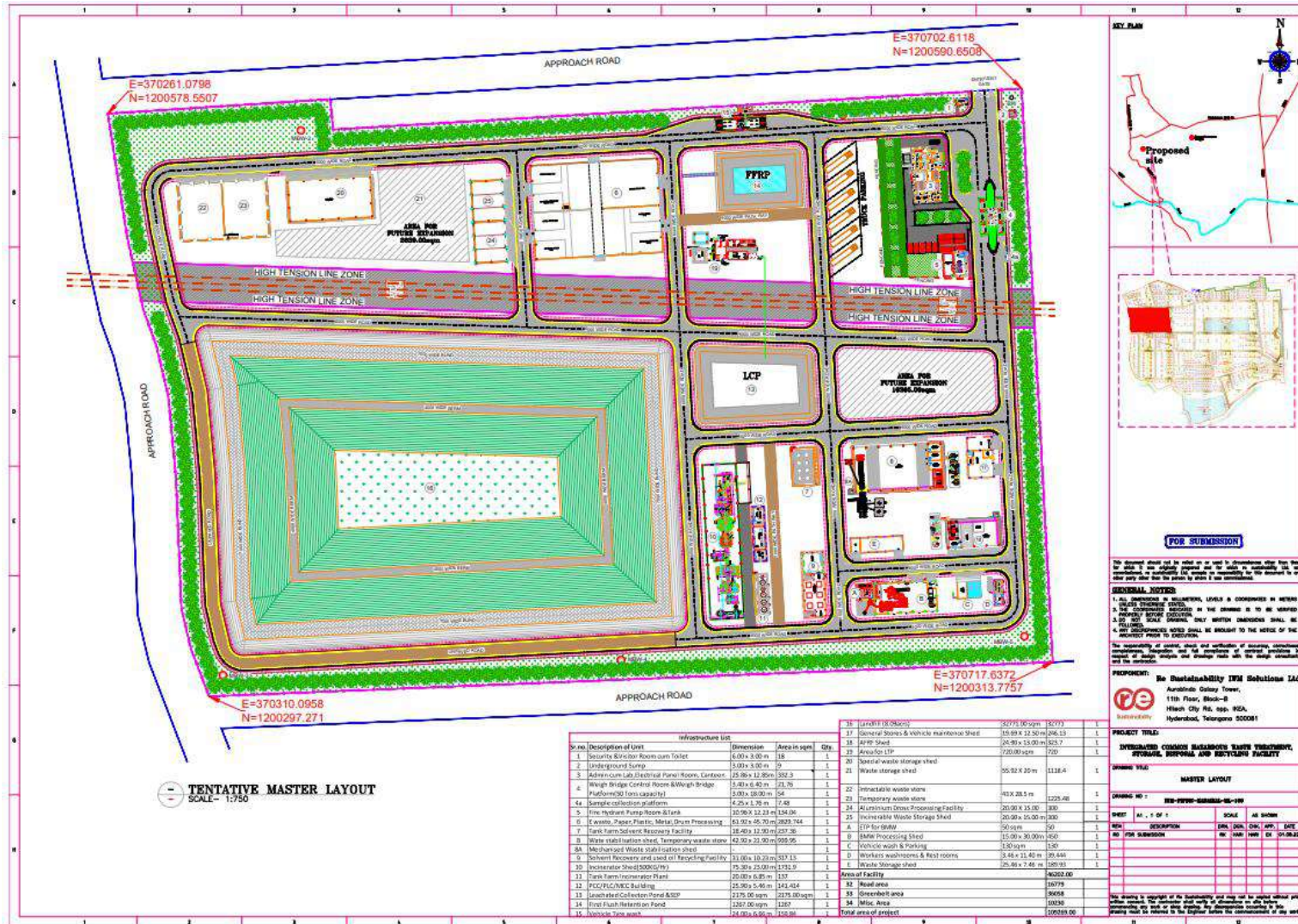


Figure 2: Coordinates of major corner of the proposed site



Proposed Integrated Common Hazardous Waste Treatment, Storage, Disposal and Recycling Facility (ICHWTSDF)

Figure 3: Conceptual Site Layout



3.5 Project Description with Process Details (A schematic diagram/ flow chart showing the project layout, components of the project etc. should be given)

The proposed integrated facility has four principle unit operations viz. physico-chemical treatment units, Hazardous and biomedical incineration plant, scientific engineered secured landfill and recycling facilities. In addition to these, there shall be temporary/permanent/interim storage for intractable/ incompatible wastes respectively. The facility shall also have provision for waste reuse/ recycling of waste that have potential uses after suitable treatment. Supporting infrastructure like wastewater and leachate management plant, air pollution control system, other pollution abatement units, laboratory, utilities, waste collection and transportation system, workshop for maintenance of plant machinery, automobile maintenance workshop and electrical maintenance etc., shall be provided. Administrative infrastructure required for operations of the facility will also be provided.

3.5.1 Hazardous Waste Management Facility

The facility is proposed to handle the following categories of hazardous wastes:

- ETP sludge
- Iron sludge
- Still Bottom residues and process sludge
- Evaporation salts/ other process salts
- Incineration ash
- Slags
- Asbestos and glass fibres
- Aluminium dross
- Other hazardous wastes
- Spent catalysts
- resins etc. as per Hazardous and Other Wastes (Management & Transboundary) Rules, 2016.

Depending on the nature and characteristics of hazardous waste, pre-treatment is given to the waste and disposal methods have been proposed as given below:

- ETP sludge can go to landfill either directly or after stabilization.
- Depending on the characteristics of the impurities, bottom residues, process residues and other organic wastes including can be sent for incineration.
- Incineration ash, slags, asbestos and glass fibers are essentially inorganic in nature and can go to landfill directly or with simple stabilization techniques.
- Salts will have to be bagged and landfilled.
- Based on the above compiled information wastes have been classified by their pathway of disposal:
- Wastes going to direct landfill
- Wastes that require stabilization prior to landfill

- Wastes requiring storage until alternate economically viable techniques are made available.
- Wastes requiring incineration

The following general guidelines shall relate to daily activities associated with the operations of TSDF:

- The secured landfill facility shall operate only during day.
- The landfill will be filled progressively, cell wise and capped to minimize infiltration of wastes.
- The weigh bridge at the main entrance will record all movements and weights and receive waste tracking receipt as required by the waste manifest system.
- The standpipe forming part of the leachate collection system shall be checked regularly for the presence of leachate. Once leachate is detected, it shall be regularly pumped out and transferred to the leachate treatment facility on-site. The level of leachate in the standpipe shall not be allowed to rise above the level of the leachate collection system.
- Materials Safety Data Sheets (MSDS) for every chemical used or handled at the landfill shall be provided at the premises.
- Monitoring and auditing of the facility shall be performed periodically as per CFE issued by state PCB.
- Meteorological station shall be installed with continuous recording system.
- A security system shall be maintained to avoid trespassing of public.
- Once waste is received at the site, a sample of waste shall be collected at the sampling bay/temporary storage facility and shall be subjected to laboratory analysis based on which its pathway of treatment/ disposal shall be determined.
- A waste manifest system shall be developed in accordance with the requirement of the regulatory agencies to cover transportation of waste to TSDF and to provide for record of waste manifestation. The manifest system shall include details of the waste generator, waste transporter, quantity of waste, characteristics of waste, description, consistency of waste in terms of physical state and waste category number as per Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016 and subsequent amendments
- Each load of waste arriving at the facility shall be located properly and logged to identify its pathway of treatment/ storage/ disposal.
- An inventory shall be maintained at the arrival and departure dates of waste loads in and out of the intractable waste storage area.

3.5.2 Waste Disposable Operations

3.5.2.1 Waste Stabilization

Waste stabilization is designed to convert industrial wastes in the form of liquids, semi-solids or reactive solids into low-leachable materials that can be deposited into a secured landfill. The stabilization operation will be carried out for all wastes that require this step to minimize their contaminant leaching potential. This will change the nature of these

wastes to a less hazardous category. Stabilization involves the immobilization of leachable materials by fixation as non-reactive solids. The treated wastes shall be assessed for compatibility with other wastes before being landfilled and for compatibility with the HDPE and the pipe network. Stabilization covers a number of mechanisms including:

- **Immobilization / Chemical Fixation** – Chemical binding of contaminants within a cementing structure to reduce the mobility or leachability of the waste.
- **Encapsulation** –Entrapment of contaminant particles within a solid matrix.
- **Solidification** – Conversion of slurries that do not readily de-water into solids by addition of adsorption agents.

Treatment facility utilizes a range of techniques and processes designed to change the physical, chemical or biological characteristics of the waste. This may include changing the composition so as to neutralize the waste, recover energy or natural resources from the waste, render the waste non-hazardous or less hazardous, safer to transport, store, and dispose or to reduce its volume. Typical reagents used, the infrastructure proposed and operations for waste stabilization unit are presented in **Table 10**.

Table 10: Reagents, infrastructure and operations for waste stabilization unit

Typical reagents	Infrastructure	Typical operations
Cement, lime, fly ash, bentonite clay, saw dust Sodium silicate solution would be used as an additive binding agent wherever required	<ul style="list-style-type: none"> • Storage facilities for reagents • Tanks/Drums for storage of reagents as required • Stabilization bins for mixing the wastes • Earth moving equipment for movement of wastes and mixing. • Place for curing the treated waste • Trucks for hauling the wastes. 	<ul style="list-style-type: none"> • Receiving the waste • Addition of reagents • Mixing • Curing • Analysis of the stabilized wastes • Approval by laboratory for disposal • Transfer of waste materials to the truck • Disposal in landfill

Application criteria: A study of the waste characteristics carried out as an integral part of the project indicates the following applicability to the process as shown in **Table 11**.

Table 11: Stabilization mechanism based on waste characteristics

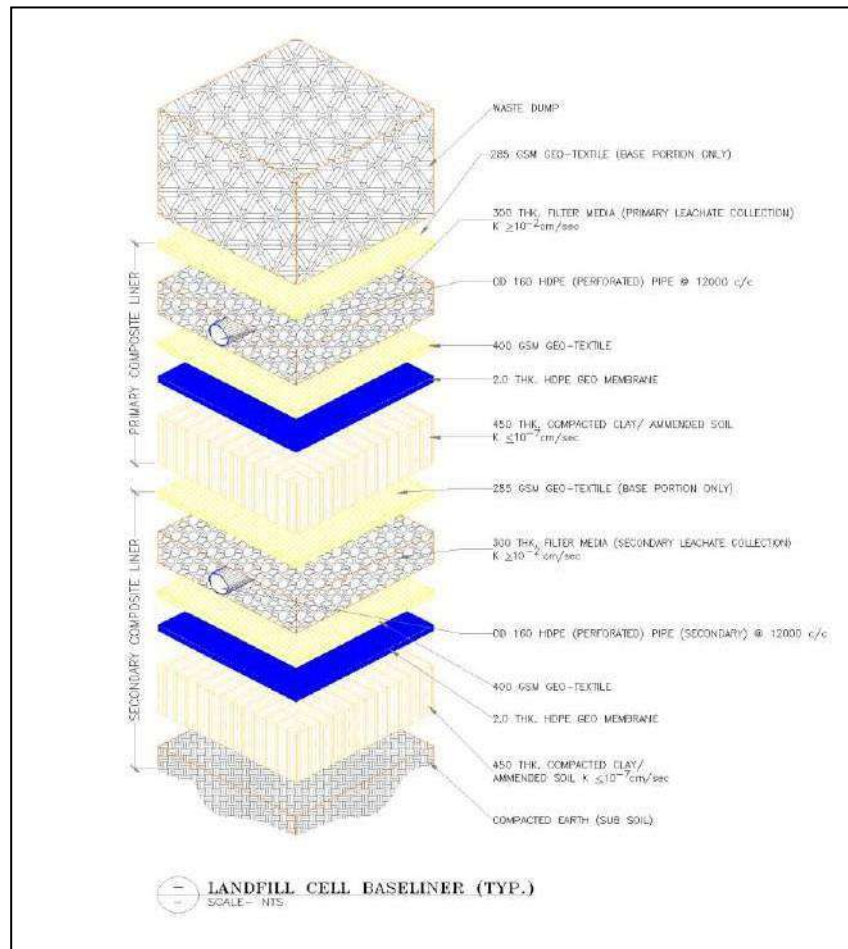
Mechanism	Applicability
Immobilization / Chemical Fixation	<ul style="list-style-type: none"> • Heavy metal and metal plating sludge • Copper-chromium-arsenic wood preservative wastes • Mercury waste • Bag house dust • Tannery wastes • Spent catalysts and others

Solidification	<ul style="list-style-type: none"> • Effluent treatment plant sludge • Oil and paint sludge • Bitumen wastes • Textile industry sludge • Wool scouring slurries
Encapsulation	<ul style="list-style-type: none"> • Aluminum powder • Asbestos • Filler aids

3.5.2.2 Secured landfill

A secure landfill is the final placement area for land fillable hazardous wastes which are treated or wastes does not require treatment. Waste directly or after treatment will be disposed in the landfill as per the laboratory advice. The landfill will be designed and constructed as a secured facility to contain the waste material and any leachate, which is formed by the entrapped moisture or by infiltration of rainfall. To meet these requirements, the base of the landfill has been designed as an engineered liner constructed prior to the placement of waste and also an engineered capping over the surface after completion of filling so as to minimize the infiltration of rainfall.

The base liner of the landfill containment system is proposed to be a double composite liner with synthetic geo-membrane plus clay. Adequate leachate collection system shall be incorporated at the base to collect and remove the leachate. These shall incorporate HDPE pipes embedded in drainage layers of sand/ gravel and /or geonet/ geotextile. The composite liner (Secondary liner) shall comprise of a 0.45 m thick clay compacted to a permeability less than 10^{-9} m/s and above this shall be a HDPE liner with permeability less than 10^{-14} m/s above which a complete drainage system shall be placed. Above the secondary base liner shall be placed a primary liner comprising of primarily clay layer and HDPE membrane which will prevent infiltration into the secondary layer. A leachate collection and removal system shall also be placed over the primary liner to collect and remove any leachate generated by infiltration of precipitation or by the moisture entrapped in the waste. This makes the secondary system to serve as a leak detection system and an early warning of potential future liabilities to necessitate action for remediation. Above the drainage system of the primary liner shall be placed a geo-textile filter to act as a filter/ barrier between the waste and the drainage system. This entire system would make the base liner a double composite liner meeting the national laws. The detailed landfill cross section as per CPCB guidelines is given in **Figure 4**.

Figure 4: Landfill Cross Section

Waste will be spread in the landfill using heavy earth machinery and compacted using vibro compactor. At the end of the landfill operations 10^{-15} cm soil cover is placed as a daily cover. During rainy season a flexible geo-membrane cover shall be placed over the uncapped area of the landfill minimize infiltration of rainfall into the landfill; the rain water shall be diverted to join the surface water drains. At the end of the total landfill operations the final capping shall be done using composite liner with clay and synthetic geo-membrane, with vegetative soil cover grass cover.

3.5.2.3 Leachate Collection/Treatment and Disposal

Leachate collection and removal shall be provided above the geo-membrane in two layers viz., the primary and the secondary liners. The primary liner shall serve as leachate collection and removal system, while the secondary liner shall serve as leak detection system and a signal of potential liabilities in terms of environmental pollution. 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.

The leachate collection system in an engineered landfill takes the form of an under-drain beneath the waste material it is required to ensure 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 design maximum pressure head in the proposed landfill shall be limited to 300mm.

Drainage is affected by a layer of about 300mm thick of graded sand/gravel having a high permeability. 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 the 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 m portion of the pipe and to an extent of 100 cm² per running meter of the pipe.

The key design features of the leachate collection system to be installed at the proposed landfill comprise the following:

- A network of semi perforated HDPE pipes laid directly over the primary and secondary liners and graded towards the collection sump at no less than 2% slope, with a slotting area of 100 cm² per running meter of the pipe.
- A drainage layer 300mm thick of graded sand/gravel placed over the entire base of the landfill, covering the pipe network.
- A geo-textile placed over the primary liner serving the purpose of filter/ barrier between the waste and the drainage media.
- The pipe shall have sufficient strength to withstand the load imposed by the overlying waste and the earth moving activities associated with the placement and the compaction of the waste (min. 6 kg/ Sq.cm).

3.5.2.4 Drainage of Surface Runoff

Network of open channels shall be designed and constructed around the landfill to intercept surface runoff of rainwater and divert it around the facility or collect it for the use at the facility or for disposal. Storm water collected on the landfill site will be directed to a first flush retention pond which shall be designed for a sufficient capacity to cover a 1 in 100 years 10 minutes storm event. In particular the storm water system will be designed and implemented to prevent surface runoff entering the landfill and thus minimizing the leachate.

3.5.3 Incinerator

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

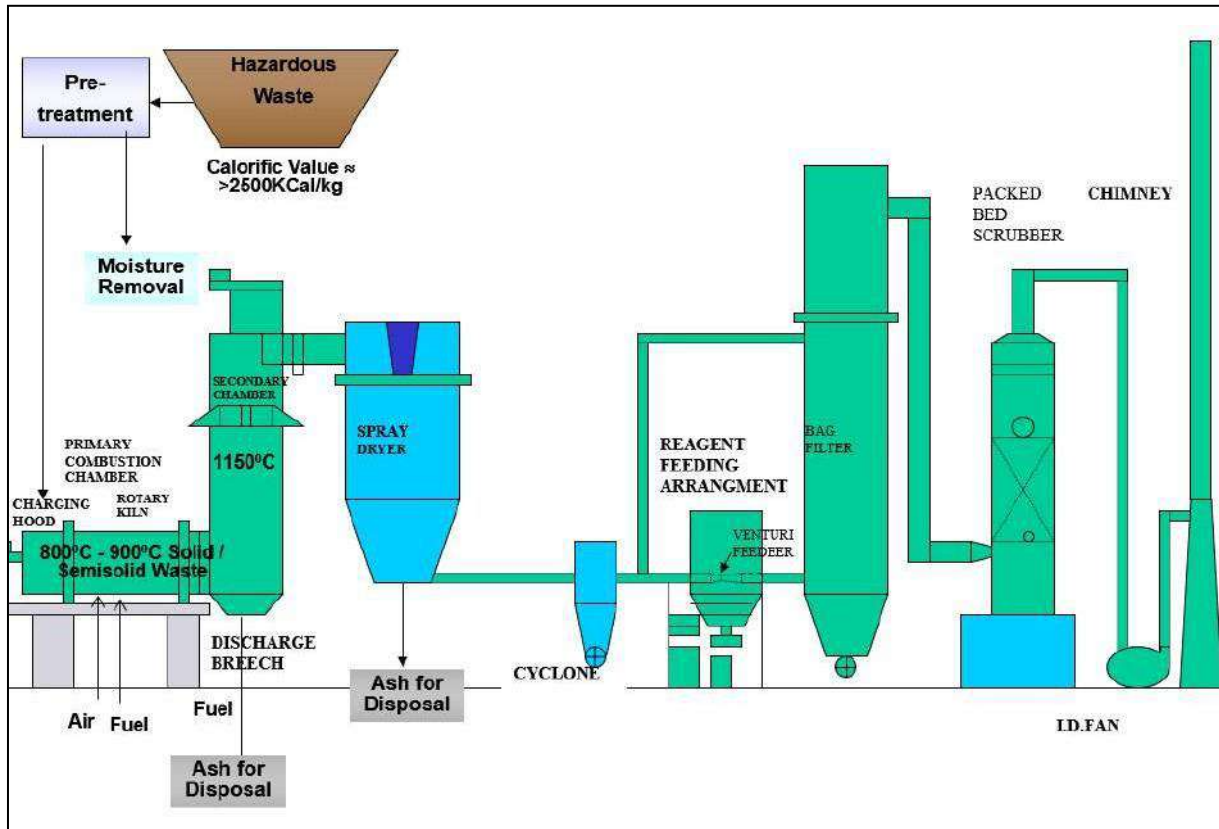
with cleaning as deemed necessary while the solid residue is sent to landfill for disposal. The proposed incinerator would facilitate treatment of following wastes:

- Bio-medical wastes
- Waste oils, oil emulsions and oil mixtures
- Pesticide wastes
- Refinery wastes
- Pharmaceutical wastes
- Phenolic wastes
- Grease and wax wastes
- Organic wastes containing halogens, sulphur, phosphorous or nitrogen compounds
- Solid materials contaminated with oils.
- Organics with high calorific value

An incinerator (Incineration (INC)- common for HW &BMW) of 55 TPD capacity is proposed for the present project. The unit shall be adual chambered incinerator.

The primary chamber's main purpose would be combustion of waste materials into safe end products (ash). The temperature of the primary chamber would be minimum $850^{\circ}\text{C} \pm 50^{\circ}\text{C}$ 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 $1150^{\circ}\text{C} \pm 50^{\circ}\text{C}$ 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. The incinerator will be equipped with air pollution control system including: quencher, venture scrubber and wet alkali scrubber followed by ID fan with 30 m stack. The typical layout of incinerator is shown in **Figure 5**.

Figure 5: Typical Layout of Incinerator



3.5.4 Bio-medical Waste

With increase in population, the medical care facilities have also increased tremendously and proportionately the amount of Bio-medical waste generated. The concern about disposal of BMW generated by the hospitals is increasing rapidly due to the fear of the spread of infectious diseases. A scientific approach is therefore required to manage these wastes. It is also essential that professionally trained personnel should handle the wastes and dispose in a scientific manner.

In order to regulate the environmental threat due to mismanagement of BMW, the MoEF&CC, Government of India has notified the Bio-medical waste (Handling & Management) Rules in 1998, which were amended in 2003, 2011 and 2016. But, all Health Care Units (HCUs) cannot afford to set up treatment and disposal facilities due to the high costs involved. Therefore, the need for a centralized system for treatment was felt. Accordingly, in September 2003, the Central Pollution Control Board enunciated the "Guidelines for Common Bio-Medical Waste Treatment Facility" which in addition to providing common facilities discouraged the setup of individual incineration facilities by health care establishments (hospitals, clinics, laboratories etc.).

3.5.4.1 Bio Medical Waste Categories as per BMW rules

According to the BMW Management Rules 2016, the waste is classified in to four categories. A brief description of different categories of BMW, type and color coding of bags/container along with treatment and disposal are given in **Table 12**.

Table 12: Categories of Bio Medical Waste

Category	Type of Waste	Type of Bag/ Container	Treatment and Disposal options (as per BMW Rules, 2016)	Treatment / Disposal
Yellow	(a)Human	Yellow coloured non-chlorinated plastic bags	Incineration or Plasma Pyrolysis or deep burial	Incineration
	(b)Animal Anatomical Waste			Incineration
	(c)Soiled Waste		Incineration deep burial or Plasma Pyrolysis/ Autoclaving or micro-waving/ Treated waste to be sent for energy recovery.	Incineration
	(d)Expired/Discontinued Medicines antibiotics, cytotoxic drugs including all items contaminated with cytotoxic drugs along with glass or plastic ampoules, vials	Yellow coloured non-chlorinated plastic bags	Expired cytotoxic drugs to be returned back to the manufacturer for incineration at temperature >1200°C or to Common facility for incineration or Encapsulation or Plasma Pyrolysis.	Incineration
	(e)Chemical Waste Chemicals used in production of biological and used or discarded disinfectants.	Yellow coloured containers/ non-chlorinated plastic bags	Disposed of by incineration/or Plasma Pyrolysis/ Encapsulation in hazardous waste treatment, storage and disposal facility.	Incineration
	(f)Chemical Liquid Waste: Liquid waste generated due to use of chemicals in production, Silver X-ray film developing liquid, discarded Formalin,	Separate collection system leading to effluent treatment system	After resource recovery, the chemical liquid waste shall be pre-treated before mixing with other wastewater. The combined discharge shall conform to the discharge norms	Not accepted at the CBWTF

Category	Type of Waste	Type of Bag/ Container	Treatment and Disposal options (as per BMW Rules, 2016)	Treatment / Disposal
	infected secretions			
	(g)Discarded linen, mattresses, beddings contaminated with blood or body fluid.	Non-chlorinated yellow plastic bags or suitable packing material	Non- chlorinated chemical disinfection followed by incineration/Plasma Pyrolysis/ for energy recovery.	Incineration
	(h)Microbiology, Biotechnology and other clinical laboratory waste: Blood bags Lab cultures, stocks or specimens of micro-organisms, live or attenuated vaccines, human and animal cell cultures used in research, industrial laboratories, residual toxins, dishes and devices used for cultures.	Autoclave safe plastic bags or containers	Pre-treat to sterilize with non-chlorinated chemicals on-site as per National AIDS Control Organisation or World Health Organisation guidelines thereafter for Incineration.	Incineration
Red	Contaminated Waste (Recyclable) Wastes generated from disposable items such as tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes (without needles	Red coloured non-chlorinated plastic bags or containers	Autoclaving/microwaving/hydro claving followed by shredding or mutilation Treated waste to be sent to registered or authorized recyclers or for energy recovery	Autoclave
White (Translucent)	Waste sharps including Metals: Needles,	Puncture proof, Leak proof,	Autoclaving/Dry Heat Sterilization followed by shredding/mutilation/	Autoclave

Category	Type of Waste	Type of Bag/ Container	Treatment and Disposal options (as per BMW Rules, 2016)	Treatment / Disposal
	syringes with fixed needles, needles from needle tip cutter or burner, scalpels, blades, or any other contaminated sharp object that may cause puncture and cuts. This includes both used, discarded and Contaminated metal sharps	tamper proof containers	encapsulation in metal container or cement concrete, combination of shredding cum autoclaving, and sent for final disposal to iron foundries or sanitary landfill or designated concrete waste sharp pit.	
Blue	(a)Glassware: Broken or discarded and contaminated glass including medicine vials and ampoules except those contaminated with cytotoxic wastes.	Cardboard boxes with blue coloured marking	Disinfection by soaking the washed glass waste after cleaning with detergent and Sodium Hypochlorite treatment/autoclaving/ microwaving and then sent for recycling.	Autoclave
	(b)Metallic Body Implants	Cardboard boxes with blue coloured marking		

3.5.4.2 Collection and Transportation

Collection and transportation shall be done in accordance with the BMW Management Rules 2016. In brief, BMW shall be collected from each healthcare establishment on a regular basis. It is the duty of the operator to transport BMW from the premises of HCUs to any offsite treatment facility. Only the vehicles complying as per the existing rules shall be to carry secured load, clearly marked with the name and address of the waste carrier and bio-hazard sign. BMW shall be transported through designated route, with color coded, covered and leak proof trolleys to avoid spillage on road.

3.5.4.3 Bio-Medical Waste Incineration

A common incinerator will be used for incineration of all incinerable hazardous and biomedical waste coming to the facility.

3.5.4.4 Autoclave

The primary purpose of autoclave is to sterilize/disinfect the waste with steam. MoEF&CC has stipulated a temperature of 120°C with 15 psi pressure and 60 min duration to ensure distribution of temperature. At this temperature and pressure, microorganisms are completely destroyed and thus render the wastes infection free. The dis-infected waste shall then be segregated into HDPE, PP, rubber, latex, glass and metal. The segregated materials shall then be shredded completing the process of disinfection and ensuring non-recycling of the waste materials for medical / food grade purposes. All the process control conditions will be as per the applicable bio medical rules.

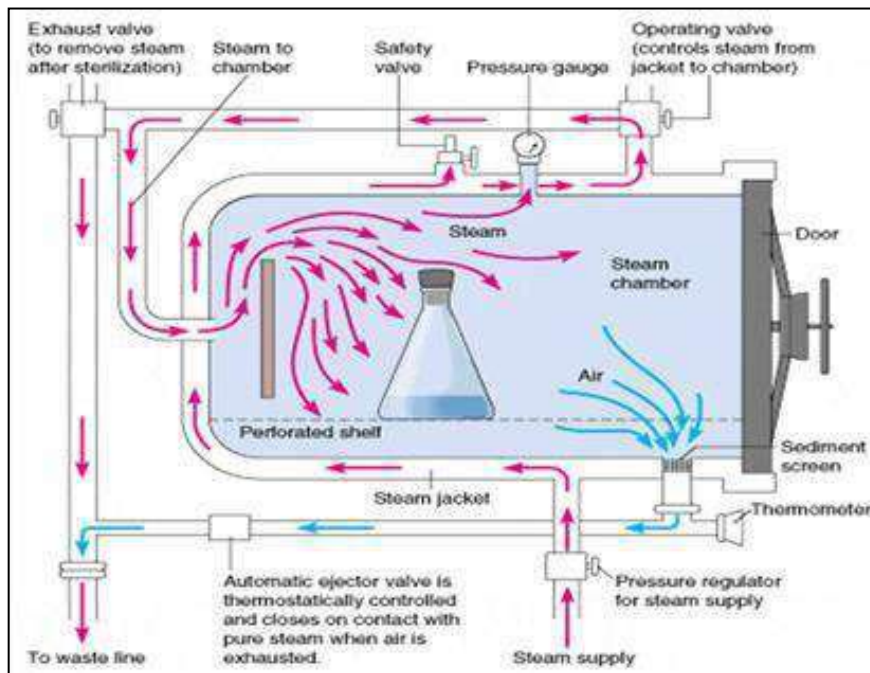
Autoclave Features

A vacuum type (programmable) autoclave which can operate at all the specifications mentioned by MoEF&CC with a capacity to handle 3 TPD is proposed. The autoclave shall have continuous and automatic recording of temperature, pressure, date, time and batch of loading. Every batch shall be monitored with a strip chart recorder and once in a month the spore validation test and/or spore monitoring shall be done. The key features of the proposed autoclave are given in **Table 13**. The schematic of typical autoclave sterilization process is given in **Figure 6**.

Table 13: Proposed Features of Autoclave

Type	Vacuum Type, automatic with documentation
Capacity	3 TPD
Temperature	120°C
Pressure	15 psi
Time	60 min
Automation	PLC with MMI (Man-Machine Interface)
Documentation/ Recording	Computerized recording

Figure 6: Schematic of Autoclave Sterilization Process



3.5.4.5 Shredder

A mechanical shredder with a capacity of 300 Kg/h to make the bio-medical waste unrecognizable shall be installed. The shredder shall be properly designed and covered to avoid spillage and dust generation. The hopper and cutting chamber of the shredder shall be designed to accommodate the waste bag full of bio-medical waste. The shredder blades are highly resistant and able to shred waste sharps, syringes, scalpels, glass vials, blades, plastics, catheters, broken ampoules, intravenous sets/ bottles, blood bags, gloves, bandages etc. The shredder blades shall be of non-corrosive and hardened steel.

The shredder shall be designed and mounted in such a way that it doesn't generate much noise and vibration. If hopper lid or door of collection box is opened, the shredder shall stop automatically providing safety to the operator. In case of shock-loading (non-shreddable material in the hopper), there shall be a mechanism to automatically stop the shredder to avoid any emergency/accident. In case of overload or jamming, the shredders shall have mechanism of reverse motion of shaft.

The shredder shall have low rotational speed (maximum 50 rpm) to ensure better gripping and cutting of bio-medical waste. The discharge height (from discharge point to ground level) shall be sufficient enough (minimum 3 feet) to accommodate the containers for collection of shredded material to avoid spillage.

3.5.5 Recycling Facilities

The recycling facilities proposed for the site are

- E-waste dismantling facility
- Alternative fuel and raw material facility
- Waste plastic recycling
- Waste paper recycling
- Waste Oil /Used Oil recovery
- Spent solvent recovery
- Aluminium dross reprocessing
- Drum recycling

3.5.5.1 E- waste dismantling facility

The assessment of E-waste recycling sector in India indicates that E-waste trade starts from the formal dismantling sector and moves to informal recycling sector. There are no large-scale organized E-waste recycling facilities in India at present except a few in some states of India. Hence, this will be an opportunity to serve the industries by handling their E-waste. The proposed project aims at recycling and disposal of WEEE waste with proper environmental compliance.

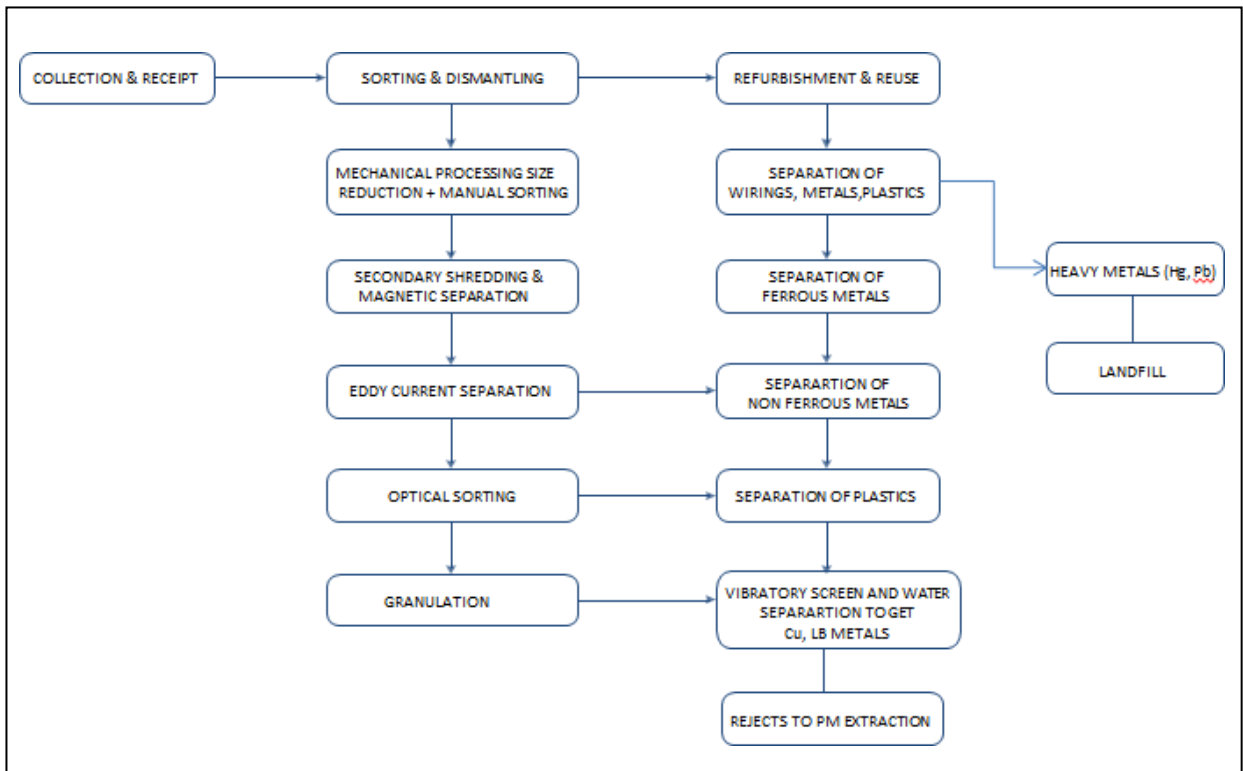
The facility will accept the following waste:

- Computer scrap containing main frame computers, personal computers, keyboards, monitors without the glass tube, printers, faxes, etc.
- Home appliances containing videos, TV sets without the glass tube, record players, CD players, hair dryers, toasters, vacuum cleaners, radios, coffee makers, micro wave ovens, etc.
- Handheld tools like drilling machines, grinding machines, etc. Small electric motors.
- Aluminium material containing cast items, extrusions, profiles, sheets, window frames, etc.
- Electric scrap containing contactors, relays, main breakers, fuses, contact bars, switches, instruments, etc.
- Electronic and telegraphic scrap containing electro mechanical switchboards/relays, computerized switchboards, printed circuit boards, etc.

Process Description

Upon client's request, project management shall arrange a suitable and secured transport to collect the material from his premises. The collection and transportation of E-waste shall be carried out as per the manifest system whereby the transporter shall be required to carry a document (four copies) prepared by the sender as per Form-6, EWM Rules 2016. The process involved in the proposed integrated E-waste management facility is basically physical destruction and shredding to downsize. The steps of proposed process are described in following paragraphs and the process flow sheet is given in **Figure 7**.

Figure 7: Proposed Flow Chart for E-Waste processing



- When the E-waste items arrive at the recycling plant, the first step involves sorting all the items manually. After hand sorting, the next step involves a labour-intensive process of manual dismantling. The E-waste items are taken apart to retrieve all the parts and then categorized into core materials and components. The dismantled items are then separated into various categories into parts that can be re-used or continue the recycling processes.
- After sorting and dismantling, some of the components are subjected for refurbishment and reuse.
- Items that cannot be dismantled efficiently are shredded together with the other dismantled parts to pieces less than 2 inches in diameter. It is done in preparation for further categorization of the finer E-waste pieces.
- The finer E-waste particles are evenly spread out through an automated shaking process on a conveyor belt which is broken down further. At this stage, dust is extracted and discarded in a way that it does not degrade the environment.
- An over-band magnet is used to remove all the magnetic materials including steel and iron from the E-waste debris.
- The sixth step is the separation of metals and non-metallic components. Copper, aluminum, and brass are separated from the debris to only leave behind non-metallic materials. The metals are either sold as raw materials or re-used for fresh manufacture.
- Air-based optical sorting technique is used to separate the light materials from the heavier ones.

- As the last step, plastic content is separated from glass by use of water. One separated, all the materials retrieved can then be resold as raw materials for re-use. The products sold include plastic, glass, copper, iron, steel, shredded circuit boards and valuable metal mix.
- Heavy metals such as mercury and lead will be disposed in the landfill.
- **After dismantling and downsizing, the waste will be sent to E-Waste recycling facility.**

3.5.5.2 Alternative Fuel and Raw Material Facility

The ideal way of handling and disposal of hazardous waste is to look for options such as reuse, recycle/recovery. In line with this concept, AFRF is meant to pre-process the waste at TSDF to make it directly suitable to utilize in cement kilns either as raw material or fuel. In view of the potential for reuse of hazardous waste, the proposed project envisages to set up an AFRF in its proposal.

Process description

The first step is pre-processing of waste. The waste suitable for co-processing shall be directed to AFR facility for pre-processing like blending / mixing / calorific value enriching etc., which will homogenize the wastes received from different industries and bring the pre-processed waste characteristics in line with concentration limits as prescribed by CPCB. There are three types of wastes that are to be processed:

Solid Wastes

- The potential solid wastes that can be converted as alternate fuels suitable for co-processing in cement plants are taken into a mixer / blender. A solid blend is prepared by adding some additives to adjust all relevant parameters.
- The segregation of waste according to their pH and calorific value helps in the preparation of solid blend. Source materials for solid substitute fuels include paint sludge, oily filter cake, spent carbon, organic waste, tarry waste, biomass, resin, distillation residues, grease etc. A general waste selection criterion for high calorific value fuel is- Low moisture content, high loss of ignition and total organic carbon, high calorific value, good compressibility, less ash content, non-toxic, less polluting, sustain combustion etc.
- After selection, the waste is mixed with binders. Some common binders which can be used for blending are rice husk, press mud, bagasse, saw dust, scrape of coconut, coal dust, lime, silicates, epoxy resins, fly ash etc. Binders should have properties such as easily available, cost-effective, produce strong final agglomerates, permanently bond particles, withstand the rigors of storage, handling, packaging and shipping.
- The addition of strength increasing additives such as latex, pulp from the pulp and paper industries, paper, cardboard, acrylic copolymers, starch, starch derivatives, vinyl derivatives, cellulose, cellulose derivatives, peat moss etc. plasticizers to improve the adherence and plasticity; inorganic components like bentonite or

other types of clay, and cement are optional components to provide different characteristics to the blended product. Final pre-processed waste mix may contain 90% of waste and 10% binders.

Methodology

- In general, incinerable wastes are received in drums, containers and occasionally in bags or bulk. A cart dumper shall be used for loading of the waste into the blender which is placed at elevated location. Typically, mechanical mixer or a solid material blender shall be used for mixing / blending the waste. The outlet of the blender shall be opened into a container placed below the blender.
- The laboratory advises the type of wastes that can be mixed and / or various reagents / additives that are required to be added to make final blend to get the prescribed standards for co-processing in cement plants.
- Samples shall be taken after the blending process and subjected for confirmation from the lab as per acceptability criteria otherwise the process will be continued to fine tune to get the whole matrix reaches to the acceptable criteria. Then the waste will be unloaded, packed and sent to cement plants.

Liquid Wastes

In general, liquid wastes are received in drums or tankers. The wastes after necessary pre-quality check will be stored in the day tanks as per their compatibility. The suitable and compatible wastes are taken into a reaction vessel (typically 5 KL capacity) which is equipped with necessary blending arrangements for mixing and homogenization of various reagents and wastes. Fine tuning will be done for achieving necessary characteristics as desired, for the co-processing requirements for cement plants.

Semisolid / Tarry Wastes

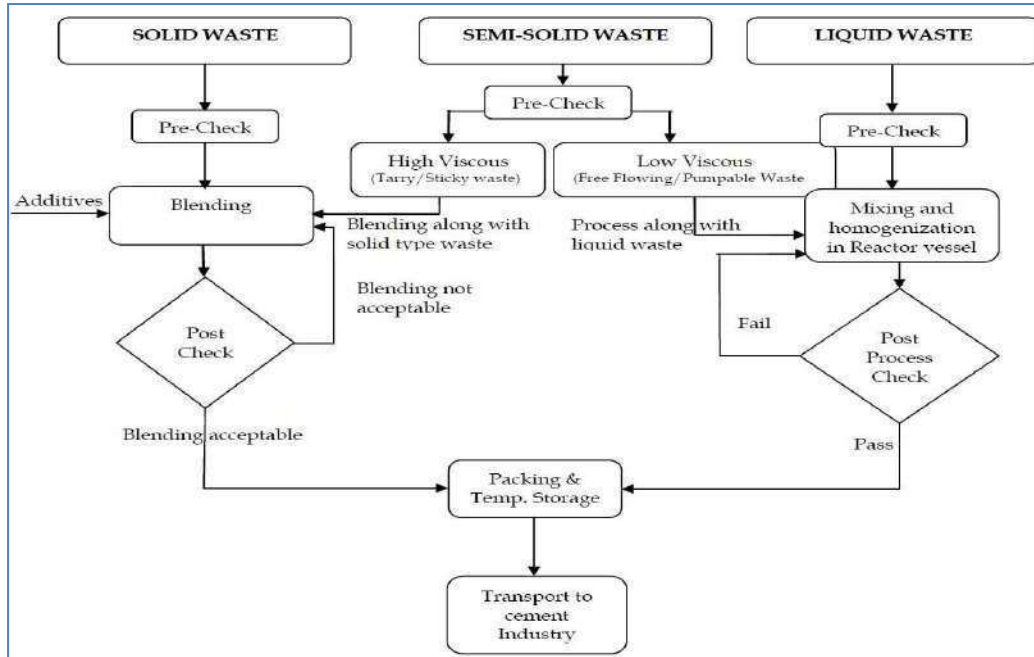
Certain wastes are neither liquids nor solids but they are in semisolid state called as sludge. Based on the viscosity of the waste, we can categorize them as free flowing sludge, heavy sludge etc. In addition, certain wastes are tarry or sticky in nature and sometimes it is difficult to remove from the drum.

Semisolid wastes are handled in two ways depending on the physical characteristics and viscosity.

- a. The wastes which are free flowing or pump able in nature are processed as per liquid type wastes
- b. The wastes which are heavy sludge, sticky/tarry type wastes are processed as per solid type wastes.

A flow chart showing the processes involved for all three types of wastes suitable for co-processing is given below in **Figure 8**.

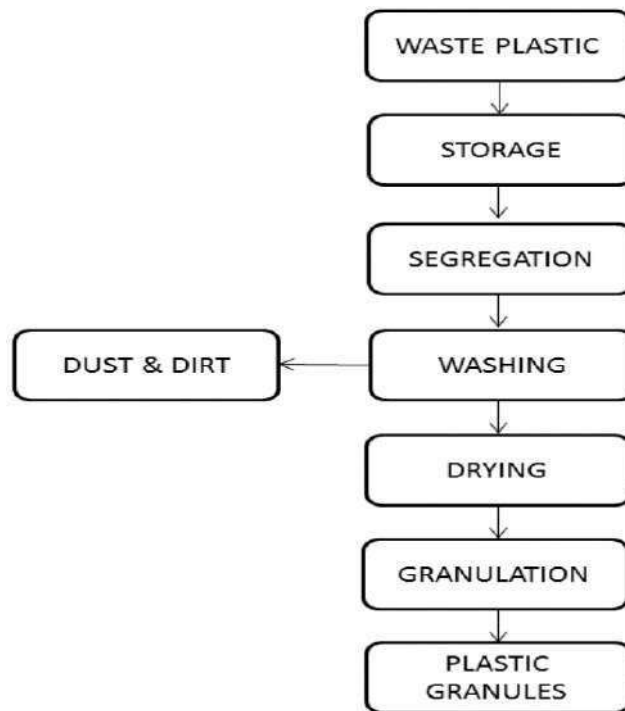
Figure 8: Flow chart showing co-processing for all three types of wastes



3.5.5.3 Waste Plastic Recycling

A plastic recycling plant uses seven steps to turn plastic trash into recycled plastic. The process flow sheet of waste plastic recycling is given in **Figure 9**. Following is a brief explanation of recycling:

Figure 9: Process flow sheet of plastic recycling



- **Segregation:** The plastic shall be segregated manually into two major components i.e. dirty plastic not suitable for granulation and plastic that can be used for granulation.
- **Mechanized cleaning:** Mechanized cleaning is done with some cleaning agents to remove any types of hazardous substances in the drum. The cleaned drums can be re-used or further processing can be done based on the requirement.
- **Chopping:** The washed drums are chopped into flakes for further processing.
- **Drying:** The plastic flakes are dried in a tumble dryer.
- **Melting:** The dried flakes are fed into an extruder, where heat and pressure melt the plastic. Different types of plastics melt at different temperatures.
- **Filtering:** The molten plastic is forced through a fine screen to remove any contaminants that slipped through the washing process. The molten plastic is then formed into strands
- **Pelletizing:** The strands are cooled in water and chopped into uniform pellets. Manufacturing companies buy them from recyclers to make new products.

3.5.5.4 Waste Paper Recycling

Waste paper recycling is the process of recovering waste paper and remaking it into new paper products. There are three categories of paper that can be used as feedstock for making recycled paper:

- **Mill broke:** Paper trimmings and other paper scrap from the manufacture of paper, and is recycled internally in a paper mill.
- **Pre-consumer waste:** Material which left the paper mill but discarded before it was ready for consumer use.
- **Post-consumer waste:** Post-consumer waste are the material discarded after consumer use such as old magazines, old newspaper, office wastes, old telephone directories, residential mixed paper, industrial packaging, waste multi-wall cement paper bags.

Processing of waste paper for recycling

ICWF focuses on recovering waste paper and sending to paper manufacturing industry. It is proposed to carryout waste paper processing in the following steps:

- **Waste Paper Collection:** Collection of waste paper material shall be done through special color-coded recycling bins (segregated directly at Generator's premises). However, at some locations all kinds of papers may be collected in a single bin.
- **Manual Segregation:** The waste paper (newspaper, office stationary, packaging paper, card boards) collected is segregated according to variety/thickness of paper.
- **Compaction and Baling:** The waste paper is manually fed to the Baling press. It is Equipment which utilizes Hydraulic pressure on the loose paper in an enclosed chamber to compact them into Bales. The bale weight can be varied from 40–60 kg, making them very convenient to handle manually.

- **Transportation:** Transportation of bales to paper mills and other paper related product manufacturing units. The schematic of waste paper recycling is given in **Figure 10**.

Figure 10: Schematic of Wastepaper Recycling



3.5.5.5 Used oil/Waste oil recovery

Used oil is termed as hazardous. Lube oil does not wear out with use it only gets contaminated with water, carbon and fuel etc. that means used oil when it is ready for rejection can be re-used. The methods of disposal being followed are dumping, burning or reprocessing. The used/waste oil generated is not easily biologically degradable. Burning is not desirable for the following reasons:

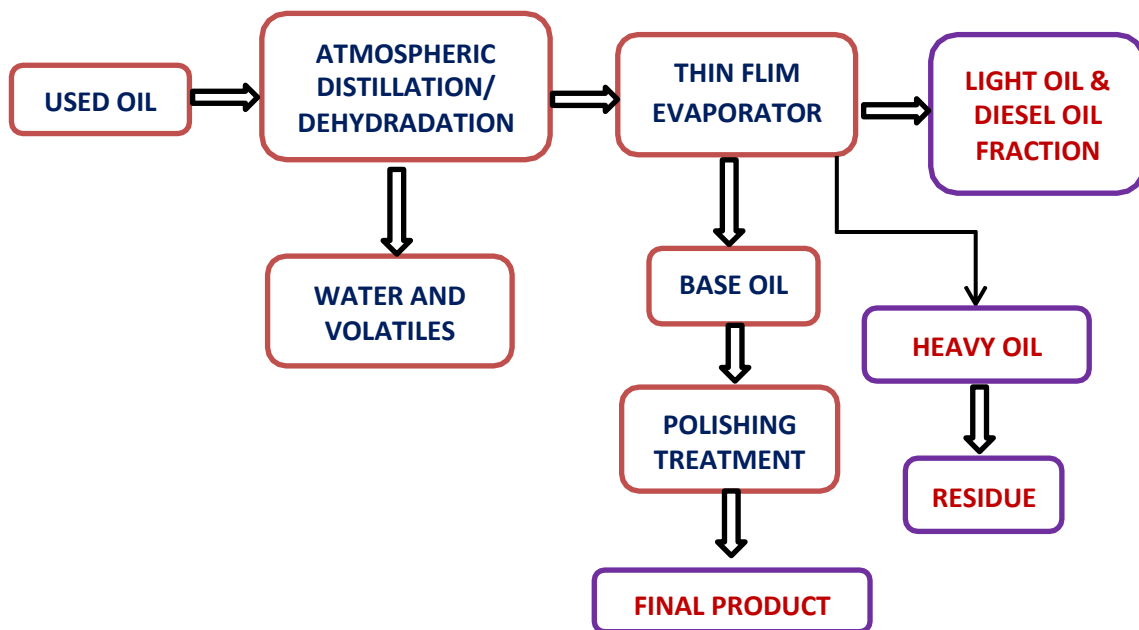
- Waste fuel oil contains substantial quantity of water that will prevent proper burning of fuel and lead to generation of carbon monoxide.
- The used oil (used lubricants, transformer oils etc.), may contain chemicals, metallic compounds, Polychlorinated Biphenyl (PCBs) etc. which when burned will release gas to the atmosphere.
- Other option is repressing. But improper reprocessing methods can lead to generation of waste which is even more hazardous than used / waste Oil.
- Therefore, reprocessing should be allowed only with approved methods. Reprocessing is not only a solution for disposal of waste but it will have tremendous economic advantage.

Process description

The proposed modular used oil recycling plant is a complete skid mounted facility ready for immediate installation. These proposed modular units are particularly advisable for small recycling capacities. They fulfill the requirement of environment friendly technology of short path thin evaporation as proposed by CPCB for granting consent to recyclers, re-refiners of used oil. Agitated thin film evaporator, through the short path distillation unit is used to separate the heavy base oil without fouling of the process equipment with coke. The residue obtained after the fractionation is a brown carbon-free viscous oil that can be sold as a lubricant for the heavier applications such as heavy gear lubricant/sugar mill compounds/open gear lubricant or any other application where a heavy viscous lubricant

would be required. Used oils are separated by a simple procedure of settling followed by dehydration, thin film evaporation and short path distillation. The fractionated base oils obtained from this process would be treated with activated clay to yield light colored base oil fit for re-use in lubricating oils. The proposed system is designed to obtain high quality base oil. The schematic of waste/ used oil recycling is shown in **Figure 11**.

Figure 11: Treatment scheme for waste/used oil recycling



3.5.5.6 Spent solvent recycling

A solvent recovery system is a process system that takes effluent and extracts useful solvents and raw materials back out of the process waste stream. The recovery of solvents from effluent can be achieved with a variety of technologies. A common recovery method is solvent distillation systems, but liquid-liquid extraction, absorption systems, film evaporation, crystallization, and membrane separation can also be used, depending on the application.

Storage of spent solvents

- The waste solvents shall be received in drums (MS/Plastic) and stored in sheds which will be provided with garland drains, fire hydrant system, lined flooring etc.
- The drums shall be stacked as per the best practices. The leakages shall be avoided at any point of time.
- A separate storage shed is proposed adjacent to the facility to store the drums.
- The stacking of drums shall be in such a manner that mixing of solvent drums shall be avoided to a maximum extent.

Recovery of spent solvents

Fractional distillation process is the most suitable for the recovery of most of the spent solvents which can be either a batch or continuous operation.

Some of the solvents proposed to be separated are: Toluene, Xylene, Cyclohexane, Acetone, Methyl isobutyl ketone, Methanol, Isopropyl, alcohol, Methylene Dichloride, Tetra Hydro Furan, Ethyl Acetate, Iso Propyl Ether, Dimethyl formamide, Butyl acetate, Methyl Acetate, Butanol, Benzene, Ethanol, Methyl Ethyl Ketone etc.

Process description

Pre-Treatment and Filtration

The spent solvent is subjected for pre-treatment such as neutralization in a reactor followed by layer separation & filtration through leaf filter / micron filter for removal of any solids. Flow chart for Spent Solvent recovery is shown in **Figure 12**.

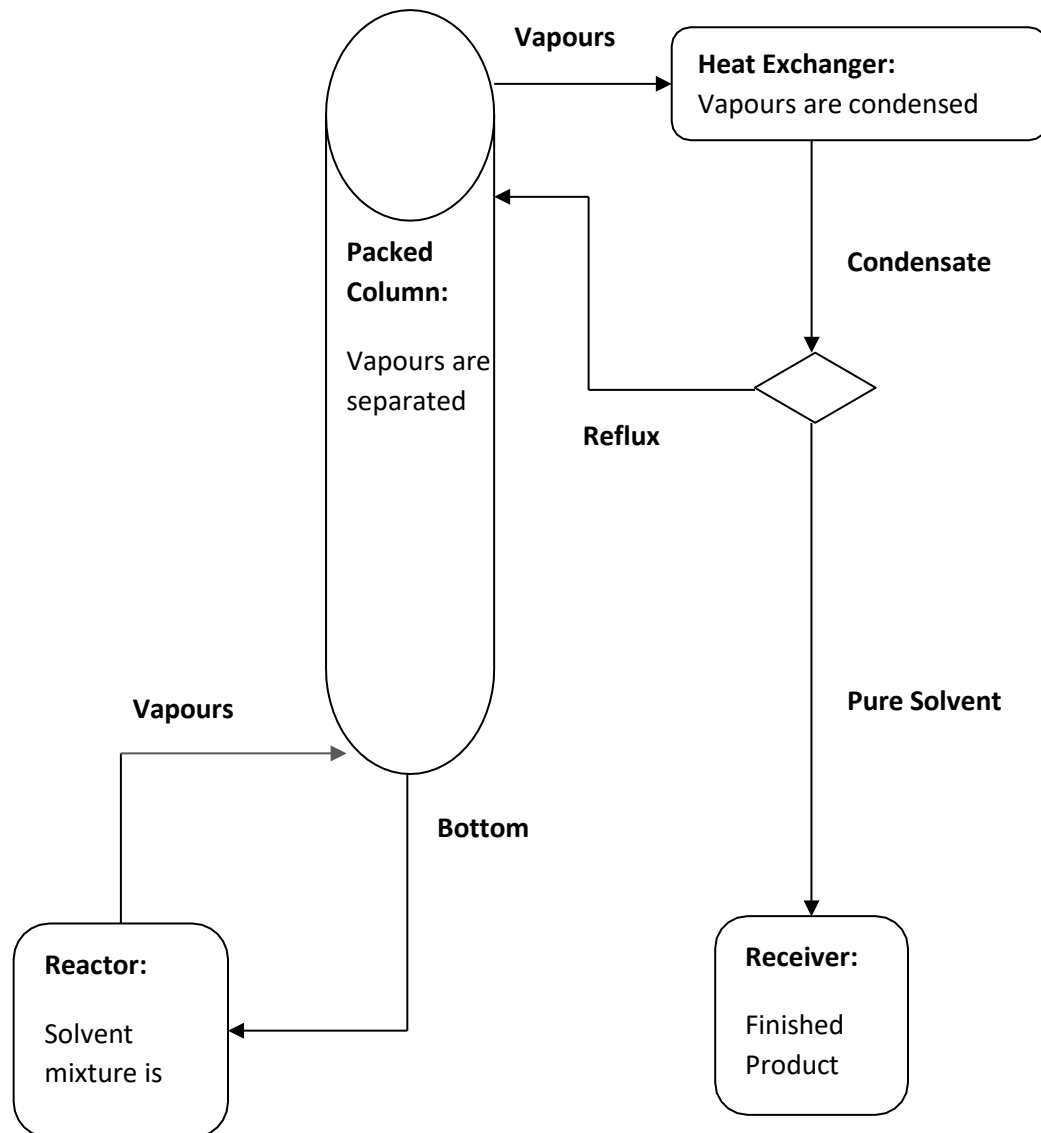
Distillation

The pre-treated solvent mixture is taken for distillation. This distillation can be a batch or continuous operation. The solvent mixture is heated indirectly by steam and the distillation column will be under total reflux for a specific period. Fractionation of solvent takes place with solvent / water as the case may be, separated initially under atmospheric pressure and later under vacuum (if required). Distilled solvents are analyzed, stored and recycled, liquid effluent, mostly condensate, will be recycled back into the system and solid residue sent for landfill/ Incineration. Solvent recycling is accomplished by a distillation process that includes the following steps:

1. A distillation vessel processes waste solvent solution on either a batch or continuous basis.
2. A heated jacket injects heat into the waste solvent by conductive thermal transfer.
3. The vessel may be operated under vacuum, which lowers the boiling temperature of the solvent.
4. When the waste solvent reaches its boiling point, the solvent changes phase from liquid to a vapor.
5. Distillation column packed with structured packing is used to separate vapors of different volatility.
6. The clean solvent vapor is passed through a main condenser and any fugitive vapors will be handled by vent condenser (5⁰C) containing both a condensing and a sub-cooling section. In the condenser, the solvent changes back to a liquid and is cooled back to ambient temperature.

7. The recovered product is passed through product cooler supplied with chilled water (5°C) to bring it to ambient temperature so as to minimize any evaporation losses.
8. The solid contaminants do not undergo a vapor phase, but stay behind to be discharged out of the drain port.

Figure 12: Process Flow Chart for Solvent Distillation



3.5.5.7 Aluminum dross reprocessing

The dross residues are generated from separation of metal or cross reprocessing is categorized as Hazardous waste at S. No. 12 and 72 of Schedule II of HOWM Rules, 2016, due to the presence of nitrogen as nitrate and fluoride, which are required to be disposed in authorized disposal facility in accordance with authorization condition, when not utilized as resource recovery.

The generated dross residues can be processed to produce alum. The production of alum by hydrometallurgical processing mainly includes unit operations like leaching, solid liquid separation, crystallization and centrifugation. The solid waste generated from the process may be washed with water prior to sending to Landfill ICHWTSDF and washed water may be re-used in the process in case of further recovery of resources in the waste.

3.6 Raw Material Required along with Estimated Quantity, likely Source, Marketing Area of Final Products, Mode of Transport of Raw Material and Finished Product.

The proposed project is ICHWTSDF meant for treatment, storage and disposal of various types of wastes generated from various sources. Hence there are no major raw materials required for the proposed activities. However, small quantities of chemicals such as cement, lime, fly ash, bentonite clay, saw dust and others required for waste stabilization will be procured from local market as per the requirement and stored in the stores room.

3.7 Resource Optimization/Recycling and Reuse Envisaged in the Project, if any, should be briefly outlined.

The proposed facilities are mainly based on the concept of material recovery and reuse of waste collected from various sources. The recyclable materials such as paper, plastic, E-waste, lead from used lead acid batteries, etc. will be sold to the authorized agencies for further use.

3.8 Availability of Water its Source, Energy/Power Requirement and Source be given

The, source of water for the proposed project is bore wells/ tankers/canals/ lakes. The detailed breakup of water required for various activities and wastewater generation is given in **Table 14**.

Table 14: Water requirement and wastewater generation details

Sr. No.	Process description	Fresh	Treated	Total	Effluent	Remark
1	Secured landfill / Landfill after treatment	0	10	10	2	Leachate generated will be treated in LTP & reused for spraying on landfill or disposed through incinerator (spray dryer)
2	Incinerator	27	10	37	9.5	-
3	E-waste, plastic, paper, lead & drum recycling facility etc.	5	0	5	1.5	Sent to ETP for treatment and the treated water will be re-used as required
4	Boiler, Solvent recovery, waste/used oil recovery / spent oil recovery facility	30	0	30	11	
5	Aluminum Dross Reprocessing	4	0	4	1.5	Sent to ETP for treatment

Sr. No.	Process description	Fresh	Treated	Total	Effluent	Remark
6	Floor wash, Wheel wash	0	1	1	1	Sent to ETP for treatment and the treated water will be re-used as required
Sub total		66	21	87	26.5	
7	Domestic consumption (wash rooms, maintenance etc.)	5	0	5	5	Sent to soak pit/treated in STP
8	Greenbelt	8	0	8	0	
Sub total		13	0	13	5	
Total		79	21	100	31.5	

The power required for the project will be sourced from state electricity board. The details of power requirement are given in **Table 15**.

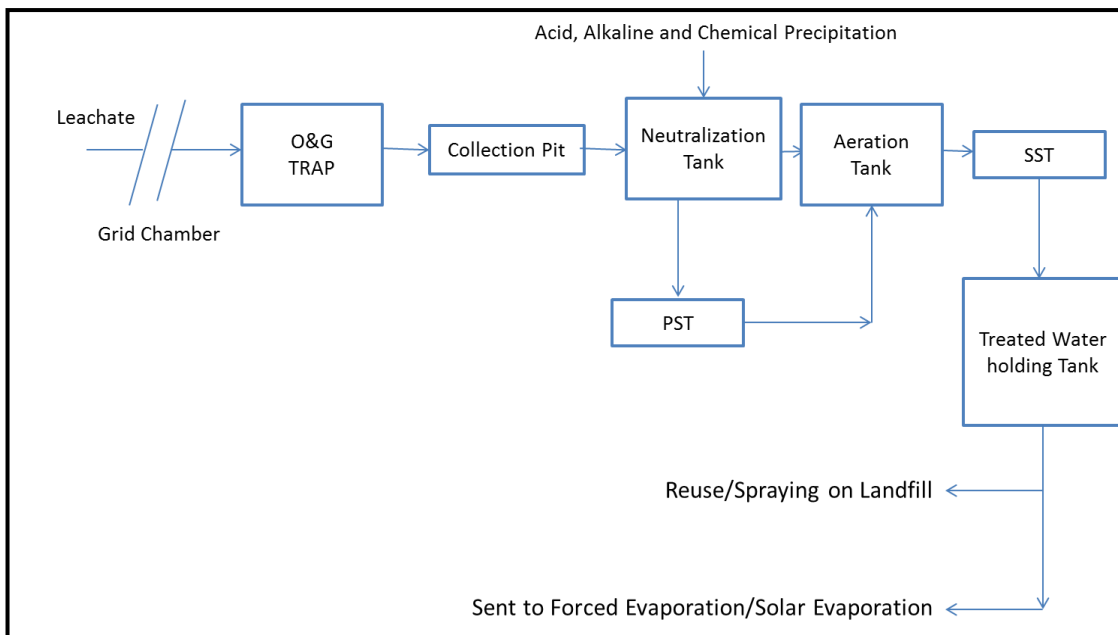
Table 15: Power Requirement Details

Details	kVA	Remarks
Power required	375	Sourced from state electricity board
DG set	2x 250 kVA	One operation and one standby (Used as an emergency power backup)
HSD Fuel for DG set/Incinerator	106 liters /hr	To be purchased from local dealers

3.9 Quantity of Wastes to be Generated (Liquid and Solid) and Scheme for their Management/Disposal.

3.9.1 Liquid waste

Figure 13: Schematic diagram of Leachate Treatment Plant

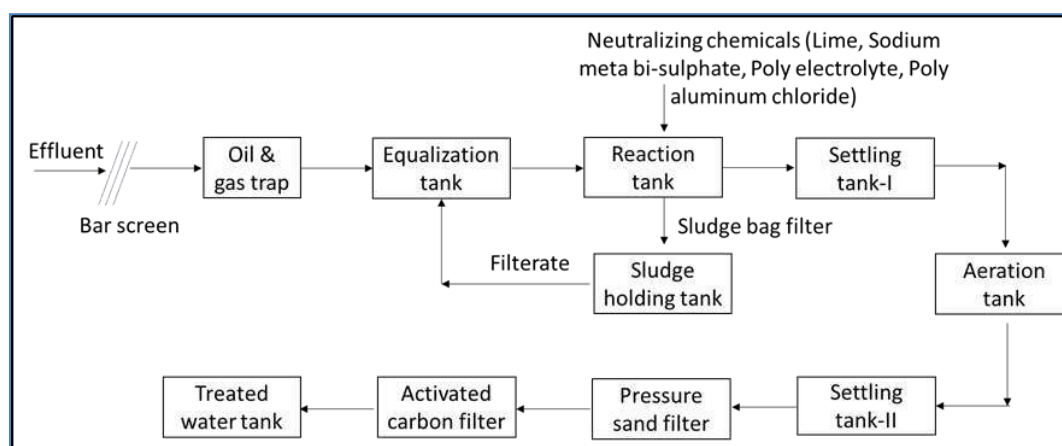


Leachate Collection/ Treatment and Disposal

The collected leachate will be sent to grid chamber thereafter sent to Oil & Gas trap, from where it will be further conveyed to collection pit. The leachate is then treated with acid/alkali/chemical precipitation in the neutralization tank. After treatment, it will be further sent to primary settling tank and then to aeration chamber. The leachate will be further sent to secondary settling tank and finally to treated water holding tank. Treated leachate will be finally reused as sprayer on the landfill or sent for forced evaporation/Solar evaporation. The schematic diagram of Leachate Treatment Plant (LTP) is given in **Figure 13**.

Wastewater/ Effluent Treatment Plant

The wastewater generated from scrubbing, floor washing and other facilities will be treated in WWTP before it is recycled back to the process. The treated water shall be reused for circulation into the scrubber. Briefly, the treatment system consists of cooling tank, pressure sand filter and activated carbon filter assembly followed by neutralization before recirculation into the scrubber. A schematic of the proposed WWTP is given in **Figure 14**.

Figure 14: Schematic diagram of the proposed WWTP

Domestic wastewater

The domestic wastewater will be collected separately and sent to septic tank followed by soak pit or treated in STP. On the whole, a zero liquid discharge system will be followed.

3.9.2 Solid waste

The proposed project is an ICHWTSDRF with treatment, storage and disposal of various wastes. In the proposed project, the solid waste generated is incineration ash which would be generated from incineration of hazardous and biomedical waste. The details of solid waste generated and disposal methods are proposed is given in **Table 16**.

Table 16: Details of Solid Waste Generated

S. No	Description	Quantity	Remarks
1	Ash from incinerator	40.0 TPD	Sent to Landfill
2	Sludge from Waste/used oil	5.4 TPD	Sent to the used oil recovery facility
3	Waste oil from DG set	2 LPD	
4	Sludge from ETP	1.5 KLD	Sent to landfill and
5	Municipal solid waste	15 kg/day	Sent to nearest municipal bin

3.10 Schematic Representation of the Feasibility Drawing for EIA Purpose

For the development of proposed project, site screening, pre-feasibility report, environmental impact assessment (EIA) and environmental management plan (EMP) studies, etc. are required for obtaining environmental clearance and consent for establishment from statutory authorities.

- Submission of Form-1, Prefeasibility report, draft ToR for appraisal to the concerned authority (MoEF&CC)
- Obtaining official Terms of Reference from MoEF&CC
- Base data collection for one season, EIA report preparation compliance with ToR
- Obtaining EC from MoEF&CC
- Submission of CFE application to SPCB
- Obtaining CFE from SPCB

4 Site Analysis

4.1 Connectivity

The site is situated at IGC under PIPDIC, Karaikal and is well connected by village & industrial roads; National Highway NH-32 (Chennai, Karaikal, Tutticorin) is located 1.3 km (E) from the site. State Highway SH-67 connecting SH-65 and Nagapattinam town is located 0.65 km (SW) from the site. Polagam village is located 0.6 km (NE) from the site. The nearest town is Karaikal town 6.2 km (N). The nearest railway station is Thirumalairayanpattinam railway station at a distance of 3.1 km (NE). The nearest airport is Thanjavur airport 77- km (W) from the site.

4.2 Land form, Land Use and Land Ownership

Pondicherry Industrial Promotion Development and Investment Corporation Limited (PIPDIC), a Government of Pondicherry undertaking has allotted the land to Karaikal Waste Management Project for establishment of ICHWTSDF at IGC, Karaikal. The land allotment letter from PIPDIC Ltd. (A Govt. of Puducherry Undertaking) to ReSL (Formerly REEL) is attached - Ltr. No. F.31-334/Dev/2018/1123/1631 Dated 27.08.2018 as **Annexure 2**.

4.3 Topography (Along with Map)

The region is a monotonous peneplain with elevation no more than five meters above mean sea level at any point. Covered completely by a thick mantle of alluvium of variable thickness, lie of the region is flat having a gentle slope towards the Bay of Bengal in the east. The proposed site has undulated topography with the elevation range 2 m to 5 m amsl. The topographical map of the study area (2 km) is shown in **Figure 15**.

4.4 Existing Land Use Pattern (agriculture, non-agriculture, forest, water bodies (including area under CRZ)), shortest distances from the periphery of the project to periphery of the forests, national park, wildlife sanctuary, eco sensitive areas, water bodies (distance from the HFL of the river), CRZ. In case of notified industrial area, a copy of the gazette notification should be given.

The proposed facility is situated within the IGC under PIPDIC. The distance between the project site and some eco-sensitive areas are given below:

- State boundary 0.035 km (N)
- Puravadayinar River is located at 0.6 km (S)
- NH-32 is at 1.3 km E
- Bay of Bengal is located 3.7 km (E) from the site.

And sensitive features around 15 km radius of the proposed site area shown in **Figure 16**

Figure 15: Topo map showing 2 Km of the study area

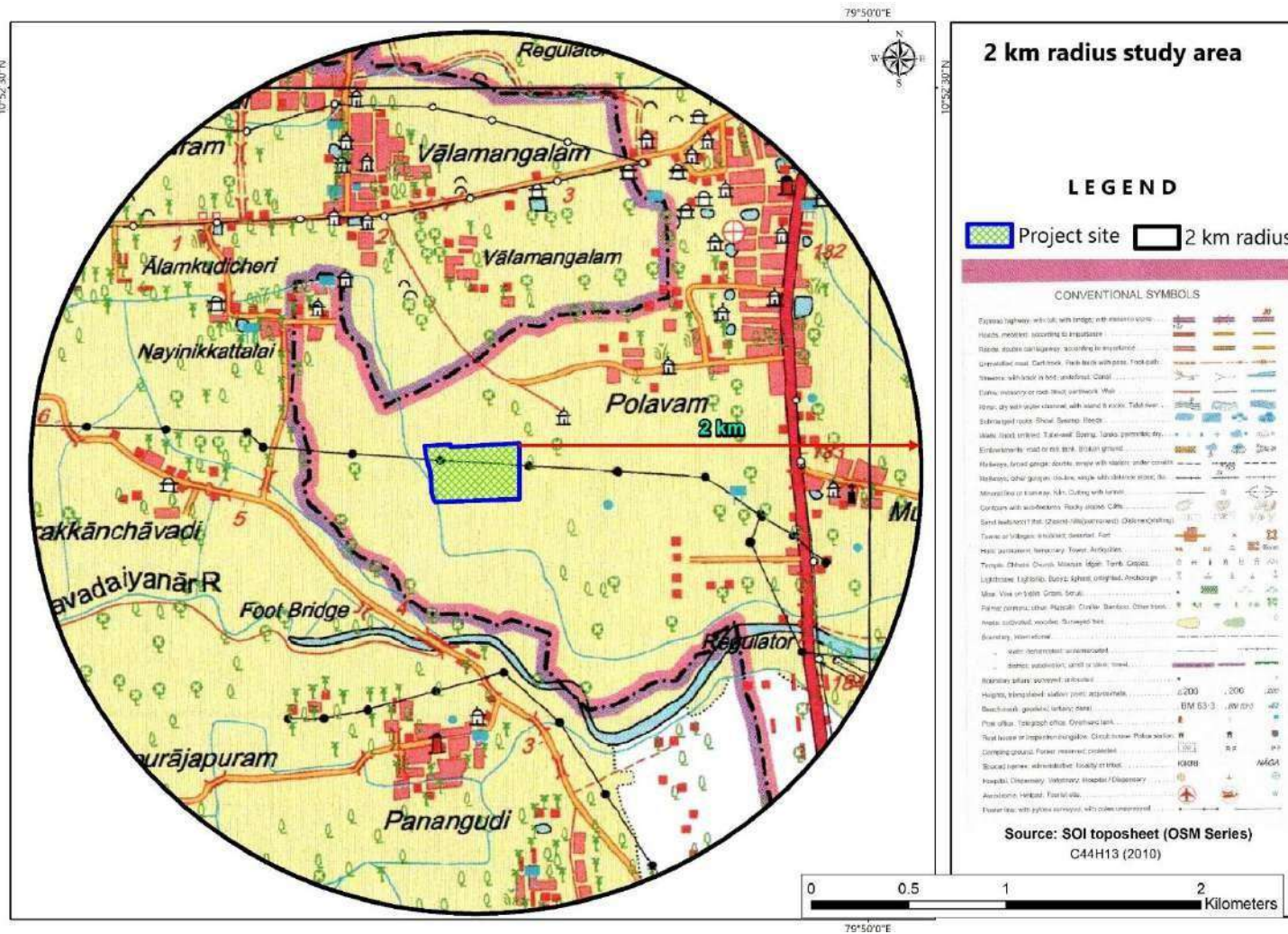


Figure 16: Eco-sensitive areas near the proposed site

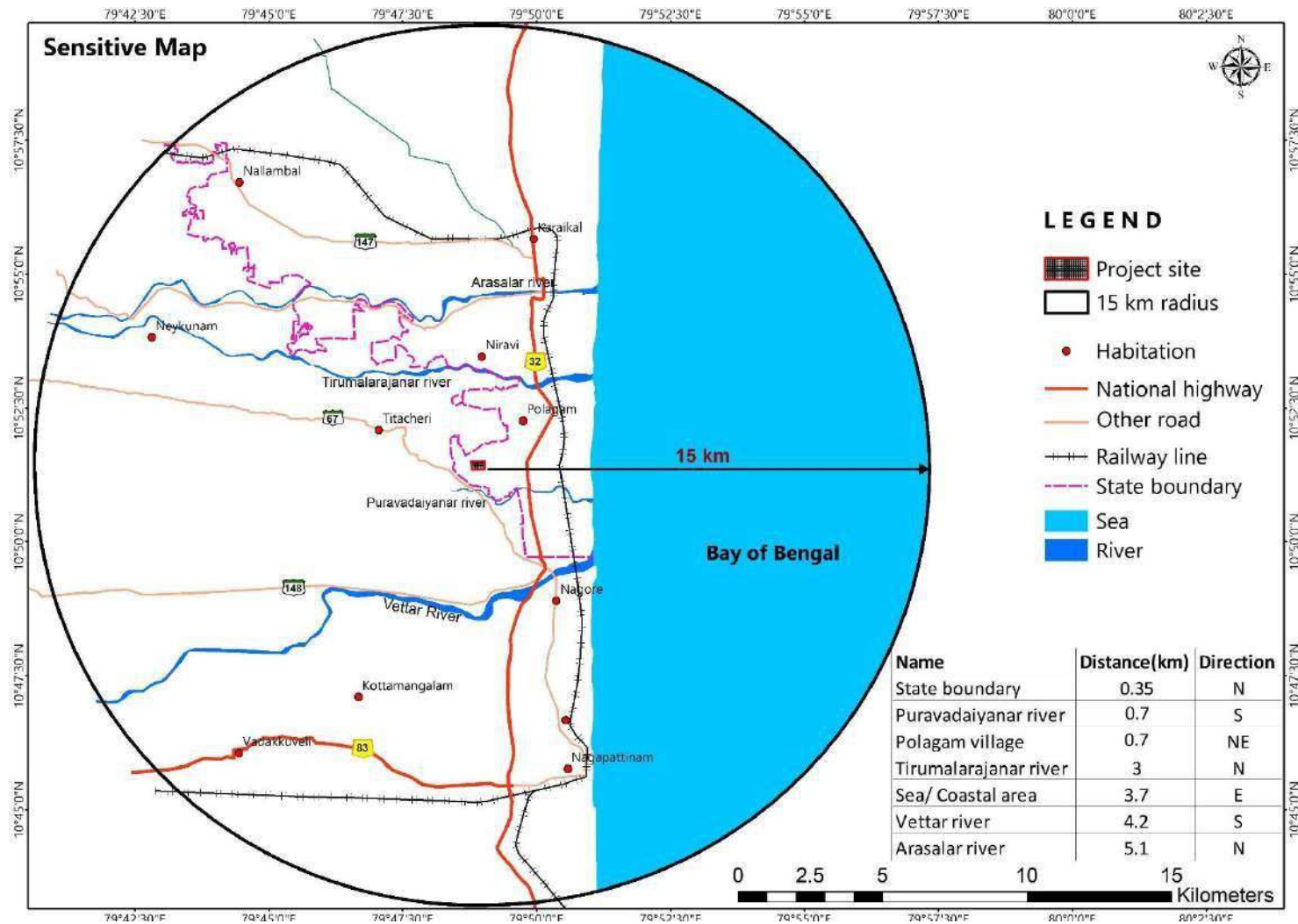
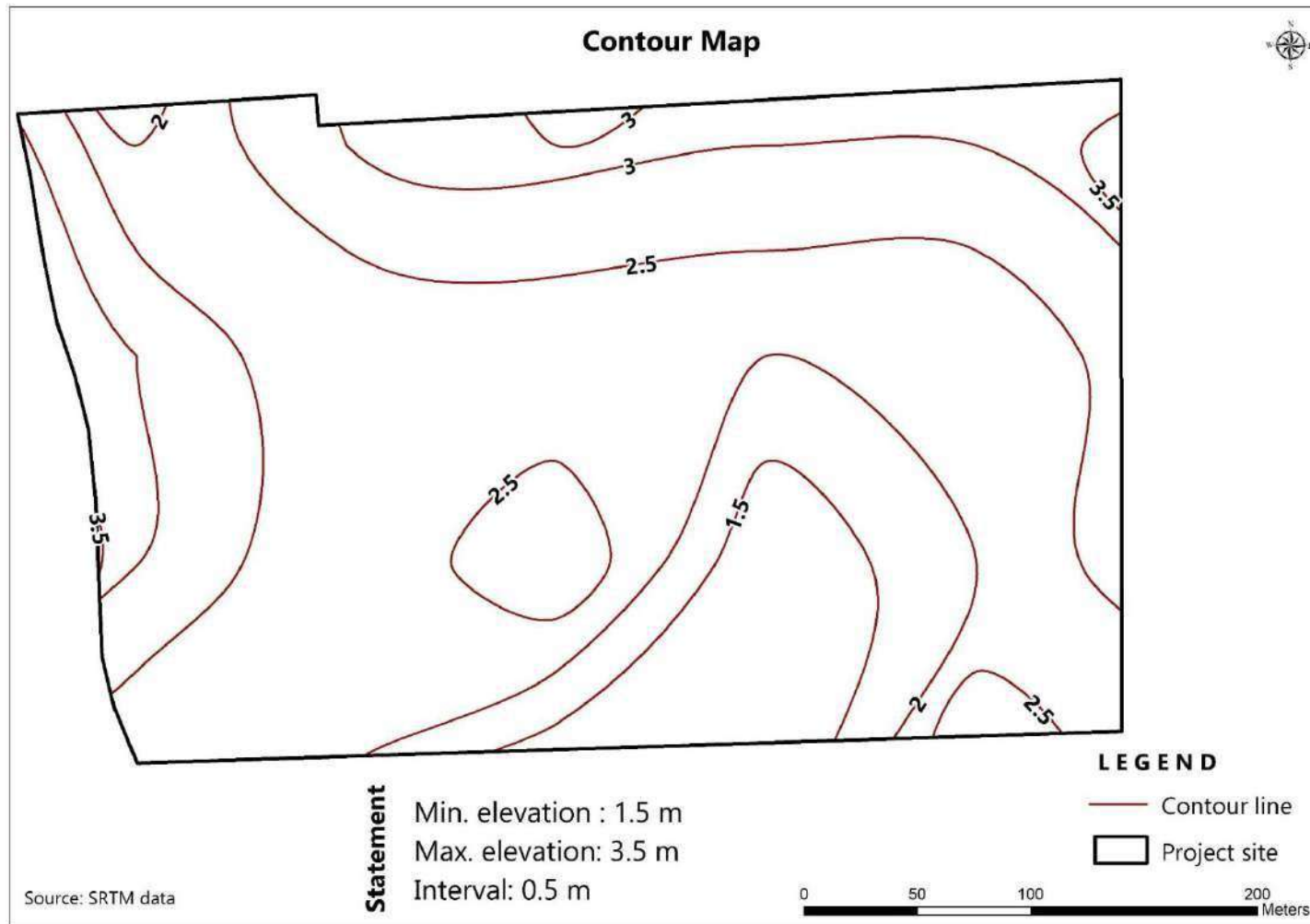


Figure 17: Contour map of the site



4.5 Existing Infrastructure

There is no existing infrastructure in the land allocated for proposed project. Required infrastructure like roads, industrial sheds, buildings, drainage, storm water drains etc. will be developed after obtaining necessary approvals.

4.6 Soil Classification

Soil types are of red and alluvial soil. The red soil will be varying from brown to light brown color, while alluvial soil persists mostly in pale yellow color. The soil texture is mainly clayey, silty and sandy loam type. The topographical elevation of the project site ranges from 2 to 4 m, while it's in the range of 0 to 10 m, within 10 km radius; of the project site. The land is slopping towards east- towards sea.

4.7 Climatic Data from Secondary Sources

The climatological data for the proposed project is acquired for the duration of 1981 to 2010 from nearest IMD location Nagapattinam and the duration from 2011 to 2021 from World weather for Nagapattinam location, are presented in **Table 17** and **Table 18** respectively.

Table 17: Meteorological Data (1981 to 2010)

Nagapattinam, Lat: 10° 46' N & Lon: 79° 51' E, MSL 9 m											
Month	Temperature °C				Humidity %		Rainfall		Mean Wind speed kmph	Pre dominant direction	
	Mean Min	Mean Max	Highest	Lowest	8.30 Hrs	17.30 Hrs	Monthly mm	No of rainy days		1 st	2 nd
Jan	22.5	29	30.1	19.4	84	72	56.4	2.7	9.6	NE	NW
Feb	23	30	31.7	19.6	82	69	13.1	0.9	8.8	NE	NW
Mar	24.5	31.6	34.6	20.9	81	70	16.7	0.8	8.8	SE	NE
Apr	26.6	33.5	37.6	23.5	77	71	33.2	1.2	10	SE	S
May	27.4	36.2	40	24	73	69	42.6	2.5	12.4	SW	S
Jun	26.9	36.7	39.5	24.3	68	65	40.3	2.1	13.5	SW	W
Jul	26.4	36.1	38.7	23.4	69	65	47.1	3.2	12.6	W	S
Aug	25.9	35.5	37.9	23.1	72	66	82.9	4.2	12.3	W	SW
Sep	25.6	34.2	36.8	23	76	71	92.2	5	10.2	W	SW
Oct	25.1	32	35.1	22.8	83	76	252.3	9.8	7.8	NW	SW
Nov	24	29.8	32.4	21.5	87	79	444.1	13.1	8.5	NE	NW
Dec	23	29	30.8	20.1	86	76	245.4	8.4	10.2	NE	N

Source: GOI, Ministry of Earth Sciences, IMD, Climatological Tables - 1981-2010

Table 18: Meteorological Data (2011 to 2021)

IMD Station: Nagapattinam					
Month	Average Temperature (°C)		Average Humidity	Average Rain fall	No of rainy days
	Min	Max	(%)	mm	
Jan	24	27	77	80.2	3
Feb	24	28	74	21.9	1
Mar	26	31	72	44.4	2
Apr	28	33	72	46.3	2
May	29	34	70	71.2	4
Jun	29	33	66	64.1	5
Jul	28	32	67	95.1	3
Aug	27	32	71	185.6	8
Sep	27	31	73	194.1	7
Oct	27	31	75	391.1	12
Nov	26	29	79	473.1	13
Dec	25	28	79	306.9	8

Source: World weather: Monthly average weather data for 2011 to 2021

4.8 Social Infrastructure Available

Social infrastructure facilities like Hospitals, Schools, Colleges, Banks etc., are available in the nearby villages. Government General Hospital, Karaikal town is located 3.5 km (N) away from site.

5 Planning Brief

5.1 Planning Concept (Type of Industries, Facilities, transportation, etc.) Town and Country Planning/ Development Authority Classification

The proposed project is meant for treatment, storage and disposal of various wastes generated from industries, HCUs, commercial establishments, etc. The project is going to be established within the Growth Centre. Following are the type of industries existing in and around Polagam, Karaikal district:

- Chemical, fertilizers, asbestos, granite industries.
- Production of iron and steel including other ferrous alloys, steel rolling etc
- Electrical, electronic and automobile industries
- Production /formulation of drugs/pharmaceuticals.
- Agro based, food processing and horticulture industries
- Electroplating, lead acid batteries recycling units, etc. Production, use and formulation of pesticides including stock-piles.

5.2 Population Projection

Population Projections for the Karaikal district.

Table 19: Population Projections

Year	Population	Male Population	Female Population
2001	58664	31294	27370
2011	71141	37305	33836
2021	87746	46012	41733
2031	108226	56751	51473
2041	133487	69997	63487
2051	164644	86335	78305
Decadal Population Growth rate			2.12
Annual Population Growth Rate			0.21
Source: District Primary Census statistics of Raigad, Maharashtra-2011			

The above projections are done by using “Arithmetic Growth Change method” to understand the changes in population trends until the year 2051. Since, the recent Census (2021) has not been conducted, the projections are based on 2011 statistics for Karaikal district.

The percent change from one period to another is calculated from the below formula:

$$PR = (V_{Present} - V_{Past}) / V_{Past} * 100$$

Where,

PR = Percent Rate

V_{Present} = Present Population

V_{Past} = Past Population

The annual percentage growth rate is simply the Percent Growth divided by N, the number of Years.

$$PR = (V_{Present} - V_{Past}) / V_{Past} * 100 / N$$

Where,

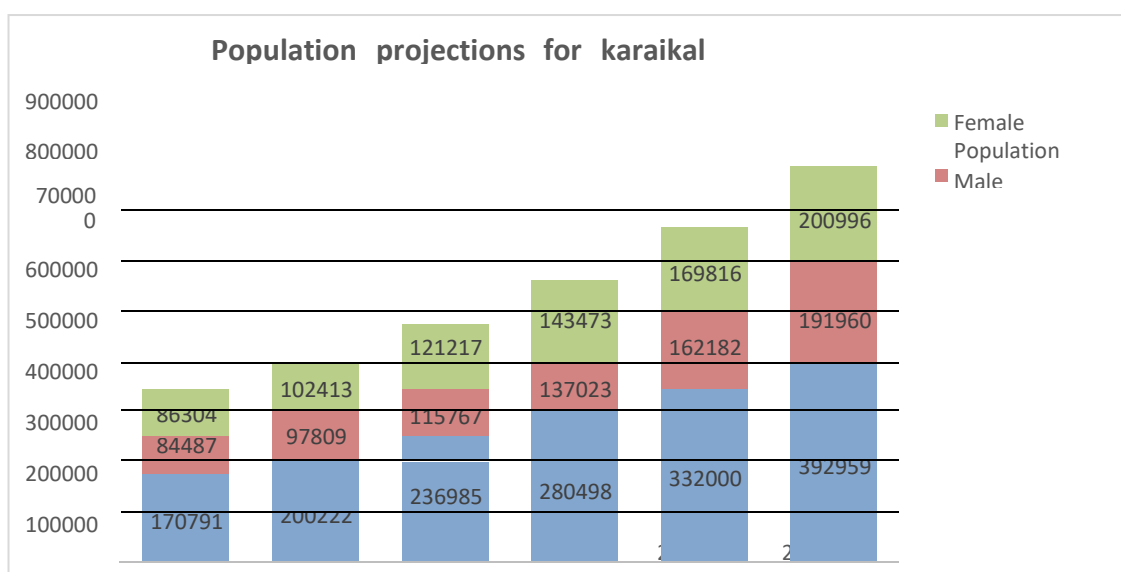
PR = Percent Rate

V_{Present} = Present Population

V_{Past} = Past Population

N = Total number of Years

Figure 18: Graphical representation of Population Projections



5.3 Land Use Planning (Breakup along with Greenbelt etc.).

The total area allocated for proposed recycling facilities is around 27.0 acres (10.92ha.).

The detailed land breakup of total area is given in **Table 18**.

Table 20: Land area statement

Sr. No.	Particular	Area (Sq.m)
1	Area of facility	46202.00
2	Road area	16779.00
3	Greenbelt	36058.00
4	Misc. area	10230.00
Total area of project		109269.00

5.4 Assessment of Infrastructure Demand (Physical & Social)

There will be a minimum influx of people to the area due to the proposed project, as the major manpower will be employed from the nearby villages. Hence the infrastructure available is sufficient to accommodate the demand.

5.5 Amenities/Facilities

All the amenities/facilities like security room, administrative building, R&D building, vehicle maintenance shed, weigh bridge, electrical utility area, toilet block, etc., are proposed for ICHWTSDRF.

6. Proposed Infrastructure

6.1 Industrial Area (Processing Area)

The proposed project is to establish an ICHWTSDRF within Growth Centre, Polagam, Karaikal. All required infrastructure like sheds for treatment facilities, administration, stores, laboratory, roads, storm water drains, landfill, and leachate treatment system etc. will be provided as per the requirement.

6.2 Residential area (Non-processing Area)

No residential area is proposed within the project site.

6.3 Greenbelt

A 10 m wide greenbelt will be developed all around the periphery of the project site. One row of plants along the road, in open areas and on completed cells of landfill to meet MoEF&CC guidelines. The list of plants species for greenbelt development is given in **Table 19**.

Table 21: List of Plant Species for Greenbelt Development

S. No.	Botanical Name	Family	Common	S/T*	Habitat	Ht (mt)
1	<i>Albizia lebbek</i>	Mimoseae	Siris tree	T	Tree	20
2	<i>Azadirachta indica</i>	Meliaceae	Neem Tree	T	Tree	20
3	<i>Bambusa vulgaris</i>	Poaceae	Bamboo	T	Shrub	20
4	<i>Balanties roxburghii</i>	Balanitaceae	Dessert date	T	Tree	9
5	<i>Bauhinia purpurea</i>	Caesalpinaceae	Butterfly tree	T	Tree	7
6	<i>Calophyllum inophyllum</i> Linn	Clusiaceae	Alexandrian laurel	T	Tree	18
7	<i>Chrysopogon zizanioides</i>	Poaceae	Vetiver grass		Shrub	2
8	<i>Citrus limon</i>	Rutaceae	Lime of India	T	Shrub	3
9	<i>Curcuma longa</i>	Zingiberaceae	Turmeric		Shrub	2
10	<i>Erythrina variegata</i>	Fabaceae	Indian coral tree	T	Tree	10
11	<i>Ficus gibbosa</i> Blume	Moraceae	Dye Fig	T	Tree	10
12	<i>Madhuca longifolia</i>	Sapotaceae	Butter tree	T	Tree	15
13	<i>Millingtonia hortensis</i>	Bignoniaceae	Indian corktree	S	Tree	10
14	<i>Mangifera indica</i>	Anacardiaceae	Mango Tree	S	Tree	15
15	<i>Nerium indicum</i>	Apocynaceae	Pink Oleander	T	Shrub	5
16	<i>Phoenix sylvestris</i>	Arecaceae	Wild datepalm	T	Tree	10
17	<i>Polythia longifolia</i>	Anonaceae	Ashoka tree	T	Tree	20
18	<i>Syzygium cumini</i>	Myrtaceae	Black Plum	T	Tree	20

Note: *S/T= Sensitive/Tolerant (to air pollution)

(Source: Guidelines for developments of green belts, CPCB, 2000)

6.4 Social Infrastructure

Social infrastructure facilities like Hospitals, Schools, Colleges, Banks etc., are available in the nearby villages. Government General Hospital, at Karaikal town is located 3.5 km (N) away from site.

6.5 Connectivity (Traffic and Transportation Road/Rail/Metro/Water ways etc.)

The site is situated in Growth Centre, Karaikal and is well connected by village & industrial roads; National Highway NH-32 (Chennai, Karaikal, and Tutticorin) is located 1.3 km (E) from the site. State Highway SH-67 connecting SH-65 and Nagapattinam town is located 0.65 km (SW) from the site. Polagam village is located 0.6 km (NE) from the site. The nearest town is Karaikal town 6.2 km (N). The nearest railway station is Tirumalairayanpattinam railway station at a distance of 3.1 km (NE). The nearest airport is Thanjavur airport 77- km (W) from the site.

6.6 Drinking Water Management (Source & Supply of Water)

The drinking water required for the proposed project will be sourced from lakes / canals/ bore wells / tanks

6.7 Sewerage System

The domestic wastewater generated from the proposed project will be sent to septic tank followed by soak pit. The wastewater from other activities along with leachate are collected separately and treated in Leachate /wastewater treatment plant and reused for dust suppression and spraying on landfill.

6.8 Industrial Waste Management

The proposed project is an ICHWTSDRF having treatment, storage and disposal of various wastes as the major activities. In the proposed project, the solid waste is generated mainly from the incineration of hazardous waste. The industrial waste (fly ash) generated will be disposed in landfill and used as daily soil cover. Sludge generated from other activities like AFRF will be disposed into the incinerator.

6.9 Solid waste management

Domestic solid waste generated from the existing and proposed activities will be sent to the nearest municipal bin for further disposal.

6.10 Power requirement & supply/ source.

The power required for the existing and proposed expansion activities will be sourced from state electricity board. DG sets will be used for emergency power backup during power failure.

7 Rehabilitation and Resettlement (R&R) Plan

7.1 Policy to be adopted (Central/State) in respect of the project affected persons including home oustees and landless laborers (a brief outline to be given)

The proposed project is going to be established within the Growth Centre, Karaikal. Hence, no rehabilitation and resettlement is envisaged.

8 Project Schedule & Cost Estimates

8.1 Likely date of start of construction and likely date of completion (Time schedule for the project should be given).

As per the initial estimate, around 6 months is required for implementation of the project from the starting date i.e. from the date of receiving all the statutory clearances from concerned departments of state and central government.

8.2 Estimated project cost along with analysis in terms of economic viability of the project.

The capital cost for the proposed project is estimated to be around Rs. 35 Crores. The capital cost allocated for EMP is around Rs.3.5 Crores with a recurring cost of Rs. 0.35 Crores/annum.

After examining the environmental, commercial and financial feasibility of the proposed project and based on earlier experiences, it may be inferred that the project may have positive viability.

9 Analysis of Proposal (Final Recommendations)

9.1 Financial and social benefits with special emphasis on the benefit to the local people including tribal population if any, in the area.

The industries, commercial establishments and HCUs which generate solid waste cannot afford to treat and dispose them scientifically, meeting MoEF&CC guidelines. An integrated common hazardous waste treatment and disposal facility is therefore required near the source of generation to solve environmental related issues. Hence the proposed project will be beneficial to the waste generators and helps in environmental protection.

The establishment of a captive hazardous waste treatment facility by individual industries or bio-medical waste treatment facility by HCUs is expensive and not techno-economically feasible, hence ICHWTSDF will be an environmentally safe disposal facility for hazardous and bio-medical waste.

Further, the proposed project will have a positive impact on the socio-economic conditions of the people. Due to the proposed project, employment options to the locals will be increased which will improve their livelihood.

Site evaluation report of the proposed site located at
Industrial Growth Centre, Karaikal, by
Pondicherry Industrial Promotion Development and Investment Corporation

Name of the village: Polagam

District: Karaikal

State/UT: Pondichery

Coordinates: 10°51'26.04"N 79°48'54.29"E

Features of the site

- The site is situated in Industrial Growth Centre under Pondicherry Industrial Promotion Development and Investment Corporation (PIPDIC).
- The site connected with Village& Industrial road and NH-32 is located 1.3 Km E.
- The land use pattern of the site is industrial area\ Scrub Land.
- Polagam Village is located 0.7km North-East from the site.
- Major soil observed in the study area is alluvial& Coastal soil.
- Bay of Bengal is located 3.3 Km E from the site.

Rejection or Knock-Out Criteria

(As per DOCUMENT SERIES HAZWAMS/25/2003-2004, Guidelines for Conducting Environmental Impact Assessment: SiteSelection for Common Hazardous Waste Management Facility by Central Pollution Control Board & MoEF)

Identification Location		
Sl. No	Criteria	Answer Y / N
1	Existing or planned drinking water protection and catchment areas	N,
2	High flood prone areas	N, there is no river within 500 m of the site and major river Tirumalarajanar which is located, around 3 km far from the site
3	Areas with unstable ground	N

4	Closer than 200 meters to populated areas	N, Polagam Village is located towards north east at 700 m distance from the site.
5	Closer than 200 meters to river boundaries	N, Puravadaiyanar river is located 700 m South- from the site.
6	Close to National Parks, Monuments, Forests with large No. of flora and fauna, historical, religious and other important cultural places 500 m	N
7	Existing use of site (Agricultural/Forest/Old dump site)	Scrub bushes in the Industrial layout
REMARKS		
Site is suitable for detailed EIA study (Y/N)		Y

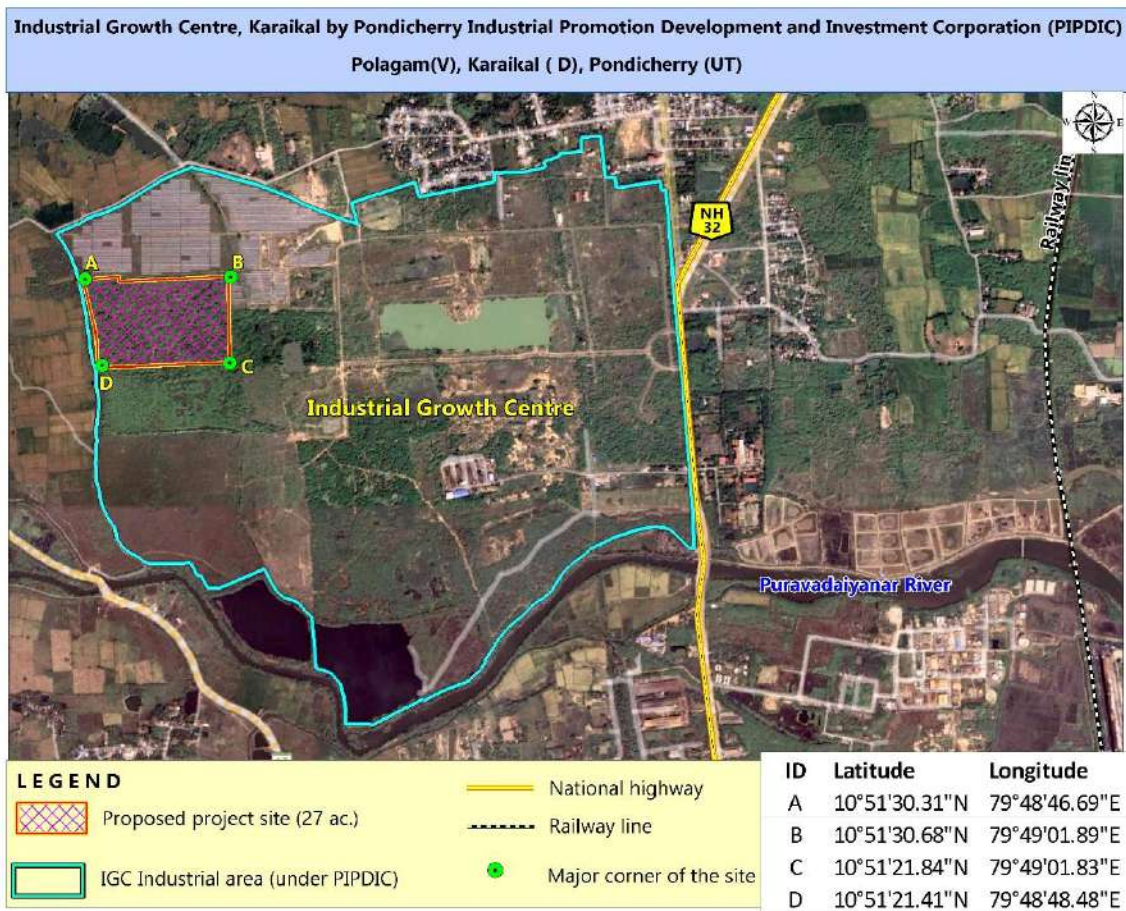
Location Criteria

(As per Hazardous Waste Management Series: HAZWAMS/17/2000-01, Criteria for Hazardous Waste Landfills by Central Pollution Control Board and Ministry of Environment & Forests on February 2001)

	Parameter	Criteria	Observation
1.	Lake or pond (Distance from SW body)	Should not be within 200 m	A lake located is located 700 m S from the site and one Canals is inside the site
2.	River	Should not be within 100 m	No river presented within 100 m from the site, Puravadaiyanar river 700 m S from the site. It is flowing towards east w.r.t site.
3.	Flood plain	Should not be within 100 year flood plain	No-same as Knock-out-criteria No.2
4.	High way – State or National	Should not be within 500 m	NH-32 located at 1.3 km Km E from the site. SH-67 located at 0.7 km SW from the site
5.	Habitation – Notified habituated area	Should not be within 500 m	Polagam Village is located 700 m NE from the site.
6.	Public Parks	Should not be within 500 m	There are no public parks within 500 m
7.	Critical habitat area – area in which one or more endangered species live	Not suitable	No

8.	Reserved Forest area	Not suitable	No
9.	Wet lands	Not suitable	No
10.	Airport	Should not be within zone around the airport(s)	No Airport located within 50 Km from the site. Thanjavur Airport is located 77 km SW from the site.
11.	Water supply	No Water supply well within 500 m	Few Bore wells are present within the industrial area
12.	Coastal Regulation Area	Not suitable	No
13.	Ground Water Table level	GW table should be >2m from the base of the landfill	Ground water levels in study area ranges from 2 -5 m bgl
14.	Presence of monuments / religious structures	Not suitable	No

Proposed ICHWTSDRF with major corner co-ordinates superimpose on Industrial Growth Centre, Karaikal by Pondicherry Industrial Promotion Development and Investment Corporation



Industrial Layout of Industrial Growth Centre by Pondicherry Industrial Promotion Development and Investment Corporation (PIPDIC)

TOTAL BOUNDARY AREA 248.903 HECTARES

AREAS NOT ALLOTTED TO PIPDIC IN HECTARES

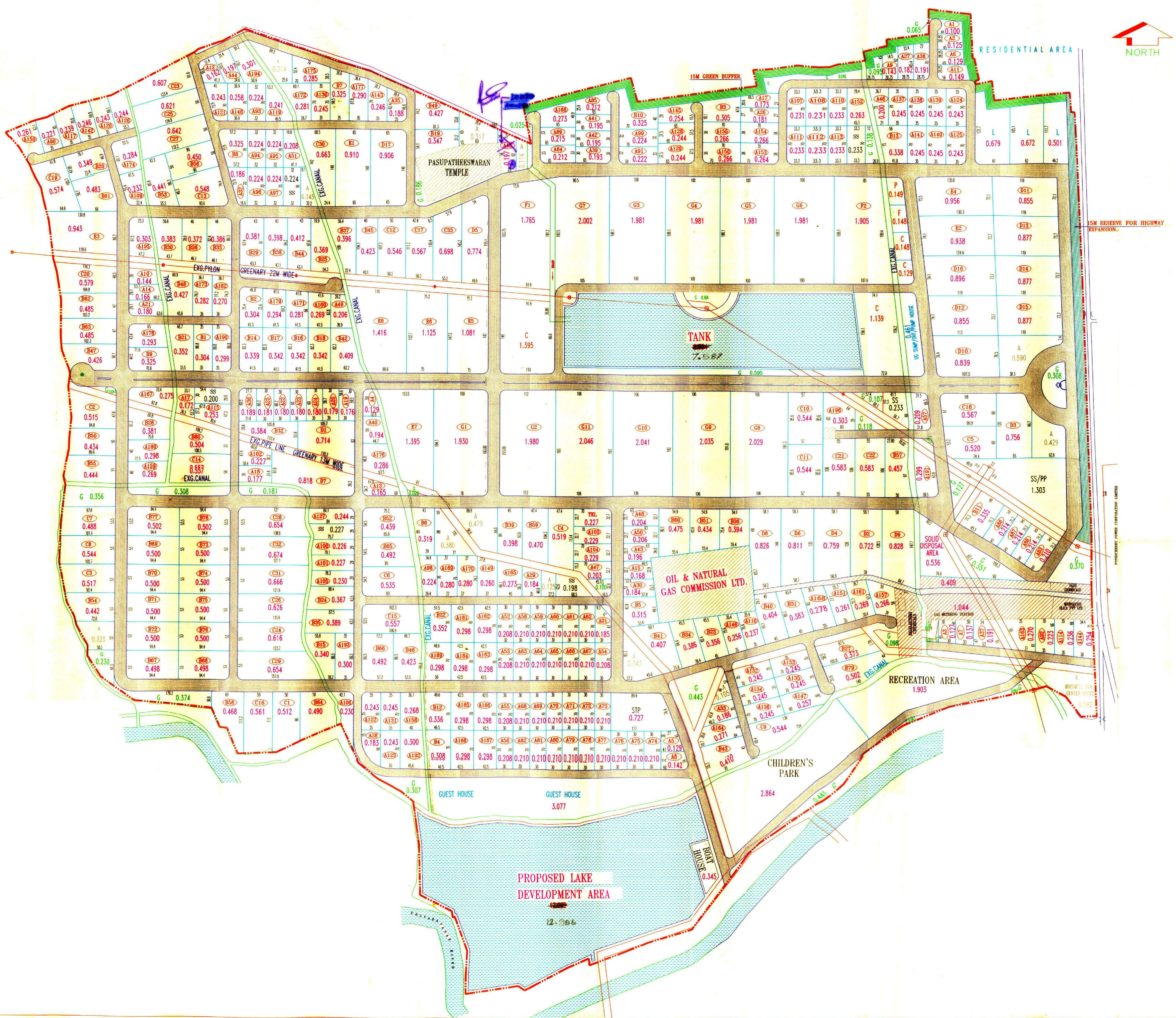
- VASU CHEMICALS 0.128
- VASU CHEMICALS BACKSIDE AREA 0.409
- RAJALAKSHMI CHEMICALS 0.516
- GAS METERING STATION 1.044
- MEENAKSHI SILICA PVT LTD. 0.275
- PASUPATHEESWARAN TEMPLE 1.067
- OIL & NATURAL GAS COMMISSION 2.172
- OIL & NATURAL GAS COMMISSION ROAD 0.577
- CHILDREN'S BURIAL GROUND 0.040

7.615 HECTARES

RESERVE AREA FOR HIGHWAY

- HIGHWAY EXTENSION RESERVE 1.387

7.615



PIPDIC AREA 241.288

LAND USE ANALYSIS	AREA IN HECTARES	TOTAL AREA IN HECTARES	PERCENTAGE	CUMULATIVE PERCENTAGE	CUMULATIVE PERCENTAGE
PIPDIC AREA	241.288	241.288	100.00	100.00	100.00
TANK AREA	6.984			2.894	9.994
EXISTING AREA	12.662			4.999	9.994
PROPOSED AREA	4.723	24.114	1.557	1.557	1.557
EXG. CANAL AREA	0.345		0.143		
OPEN AND GREEN AREA	5.894		2.443		
GREENARY AROUND LAKES	1.413		0.586		
ROAD GREENARY	2.740		1.138		
PIPING	3.379		1.400		
PYLON	3.804	21.997	1.577	9.116	9.116
CHILDREN'S PARK	2.864		1.187		
RECREATION	1.903		0.789		
AMENITIES	4.243		1.758		
AMENITIES	2.811	10.248	1.165	4.322	4.322
COMMERCIAL	0.149		0.062		
POLICE STATION	0.148		0.061		
FIRE STATION	3.077		1.275		
RESIDENTIAL					
ROAD AND UTILITIES					
UTILITIES	0.727		0.301		
STP BUILDING	0.536		0.222		
SOLID WASTE DISPOSAL AREA	2.648	4.599	1.097	1.906	1.906
SUB STATION	0.461		0.191		
UHR + UGR	0.227		0.094		
TELECOMMUNICATION	34.048	34.048	14.111	14.111	14.111
ROAD AREA	1.852	1.852	0.768	0.768	0.768
TRANSPORT	97.038				
LOGISTICS					
PILOT AREA	144.250	144.250	59.783	59.783	59.783

REV	DESCRIPTION	DATE	SIGN
a	PRELIMINARY	05.08.99	
b	FOR APPROVAL	21.08.99	
c	FOR APPROVAL	04.11.99	

mahindra ACRES
MAHINDRA ACRES CONSULTING ENGINEERS LTD.
 CHENNAI

DRAWN : V.A	05.08.99
CHECKED : D.E/D.S	05.08.99
APPROVED : B.S	05.08.99

PROJECT TITLE
 SETTING UP OF GROWTH CENTER AT POLAGAM IN KARAikal

LOCATION KARAIKAL, PONDICHERRY.

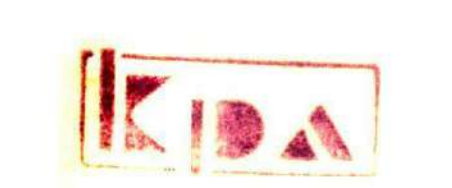
DRAWING TITLE

PARCELLATION
 Plot No. 45 may be deleted and read as Amenity

PONDICHERRY INDUSTRIAL PROMOTION DEVELOPMENT & INVESTMENT CORPN. LTD.
 #60, ROMAIN ROLLAND STREET, PONDICHERRY-605 001

OFFICER(WORKS)	<i>[Signature]</i>
MANAGER(DEV)	<i>[Signature]</i>
GENERAL MANAGER(DEV)	<i>[Signature]</i>
MANAGING DIRECTOR	<i>[Signature]</i>
PROJ. N°	JOB N° P-514
SCALE	1:2500
CHECK SCALE (print may be photo-reduced)	0 10mm 50mm
DRAWING N°	MACE-514-CO-006

TREES SHOULD BE PLANTED IN THE AVAILABLE OPEN SPACES



Layout Plan prepared internally vide No. 710 dated 09/12/2000

Land Allotment Letter with year of establishment of industrial Growth Centre

Fax : 0413-2336842
Tele : PIPDIC
P.B.No. : 190

Phone : 2335116, 2334064, 2334606
2338491, 2333938, 2337031
Email : info@pipdic.com
Website: www.pipdic.com



**PONDICHERRY INDUSTRIAL PROMOTION DEVELOPMENT AND
INVESTMENT CORPORATION LTD.,**
(A GOVERNMENT OF PUDUCHERRY UNDERTAKING)

Regd. Office : 60, Romain Rolland Street,

Puducherry - 605 001.

No. F.34-123/613/2020/Constn/ **3975**

Date : **25 APR 2022**

To

M/s. Tamilnadu Waste Management Limited,
13th Floor, Ramky Grandiose,
Ramky Towers , Gachibowli,
Hyderabad -500032.

Sirs,

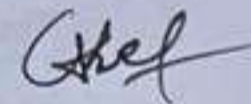
Sub: PIPDIC-Constn-Allotment of undeveloped land at Industrial
Growth Center, Polagam, Karaikal- Details furnished – Reg.

Ref: (i) Allotment order No.F.31-454/Dev/2022/1245/3845,
dated 21.01.2022

(ii) Your letter No. TNWML/PIPDIC/2022/04/20-01,
dated 20.04.2022.

With reference to the subject cited above, it is to inform that the allotted land of 27 acres at Industrial Growth Centre, Polagam, Karaikal to your company was acquired in the year 1998 and established as Industrial Growth Centre in the year 2002 for setting up of all categories of industries.

Yours faithfully,



(A.SURESH RAJ)
General Manager (Admn)

Land allotment letter with plot number

PIPDIC Ltd.,

ANNEXURE

The following plot Nos. in the un-developed phase at Industrial Growth Centre, Polagam, Karaikal are allotted to M/s. TamilNadu Waste Management Limited.

“ B-44pt., B-38, B-29, B-33, B-26, B-30, A-195, E-3, C-20, B-62, A-10, A-14, A-21, B-48, A-173, A-162, B-2, A-179, A-171Pt., B-63, B-47 Pt., A-178, B-9Pt., B-21 Pt., B-1 Pt., A-190 Pt., B-14 Pt., B-17 Pt., & B-16 Pt.”

Yours faithfully,
For and on behalf of PIPDIC Ltd,



(A. SURESHRA)
General Manager (Admn.)



प्रारूप आई आर
Form I
[See Regulation 16(1)]
निगमन का प्रमाण - पत्र

CERTIFICATE OF INCORPORATION

ता ११:..... का स.....
No. 39702 of 20 02 - 2003

मैं एतद्वारा प्रमाणित करता हूँ कि आज.....

कम्पनी अधिनियम, 1956 के अधीन निगमित की गई है यह कम्पनी परिसीमित है।

I hereby certify that **TAMILNADU WASTE MANAGEMENT LIMITED**

is this day incorporated under the Companies Act, 1956 * (and that the Company is limited.)

मैंे हस्ताक्षर से आज ता..... को दिया गया।

Given under my hand at **HYDERABAD** this **THIRD**
OCTOBER **TWO**
day of..... Two thousand and.....
(ELEVENTH ASVINA, 1924 SAKA)

CIN - U74140AP2002PLC39702

Seal
जे.एस.सी. - 1
J.S.C - 1



(S. V. RAJGOPAL)
कम्पनियों का रजिस्ट्रार
Registrar of Companies
Asst. Andhra Pradesh
Hyderabad.

* TO BE OMITTED IN RESPECT OF LIMITED COMPANY



सत्यमेव जयते

GOVERNMENT OF INDIA
MINISTRY OF CORPORATE AFFAIRS

Office of the Registrar of Companies

2nd Floor, Corporate Bhawan, GSI Post Tattiannaram, Bandlaguda, Nagole, Hyderabad, Telangana, India, 500068

Certificate of Incorporation pursuant to change of name
[Pursuant to rule 29 of the Companies (Incorporation) Rules, 2014]

Corporate Identification Number (CIN): U74140TG2002PLC039702

I hereby certify that the name of the company has been changed from TAMILNADU WASTE MANAGEMENT LIMITED to RAMKY INDUSTRIAL WASTE MANAGEMENT SOLUTIONS LIMITED with effect from the date of this certificate and that the company is limited by shares.

Company was originally incorporated with the name Tamilnadu Waste Management Limited.

Given under my hand at Hyderabad this Sixteenth day of November two thousand twenty-one.

Digitally signed by DS REGISTRAR OF COMPANIES HYDERABAD 2
DN: c=IN, postalCode=500068, o=HYDERABAD, ou=REGISTRAR OF COMPANIES HYDERABAD, cn=DS REGISTRAR OF COMPANIES HYDERABAD 2
Reason: I am the issuer and integrity of this document
Date: 2021.11.16 16:48:18 +05'30'

V E JOSEKUTTY

Registrar of Companies

RoC - Hyderabad

Mailing Address as per record available in Registrar of Companies office:

RAMKY INDUSTRIAL WASTE MANAGEMENT SOLUTIONS LIMITED

13th Floor, Ramky Grandiose, Ramky Towers, Gachibowli, Hyderabad, Hyderabad, Telangana, India, 500032





सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF CORPORATE AFFAIRS

Office of the Registrar of Companies

2nd Floor, Corporate Bhawan, GSI Post Tattiannaram, Bandlaguda, Nagole, Hyderabad, Telangana, India, 500068

Certificate of Incorporation pursuant to change of name
[Pursuant to rule 29 of the Companies (Incorporation) Rules, 2014]

Corporate Identification Number (CIN): U74140TG2002PLC039702

I hereby certify that the name of the company has been changed from RAMKY INDUSTRIAL WASTE MANAGEMENT SOLUTIONS LIMITED to RE SUSTAINABILITY IWM SOLUTIONS LIMITED with effect from the date of this certificate and that the company is limited by shares.

Company was originally incorporated with the name RAMKY INDUSTRIAL WASTE MANAGEMENT SOLUTIONS LIMITED.

Given under my hand at Hyderabad this Twenty fifth day of April two thousand twenty-two.



C JAYA KUMAR

Registrar of Companies

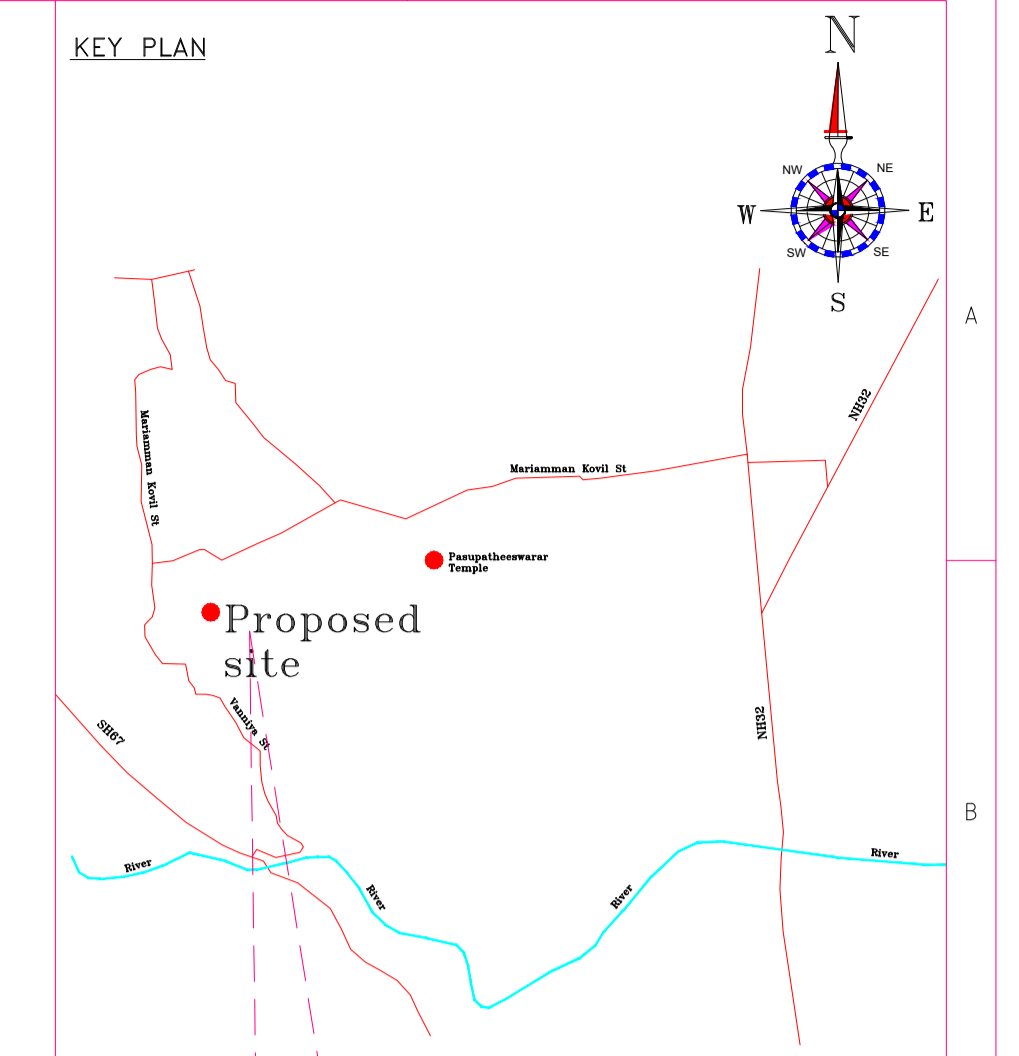
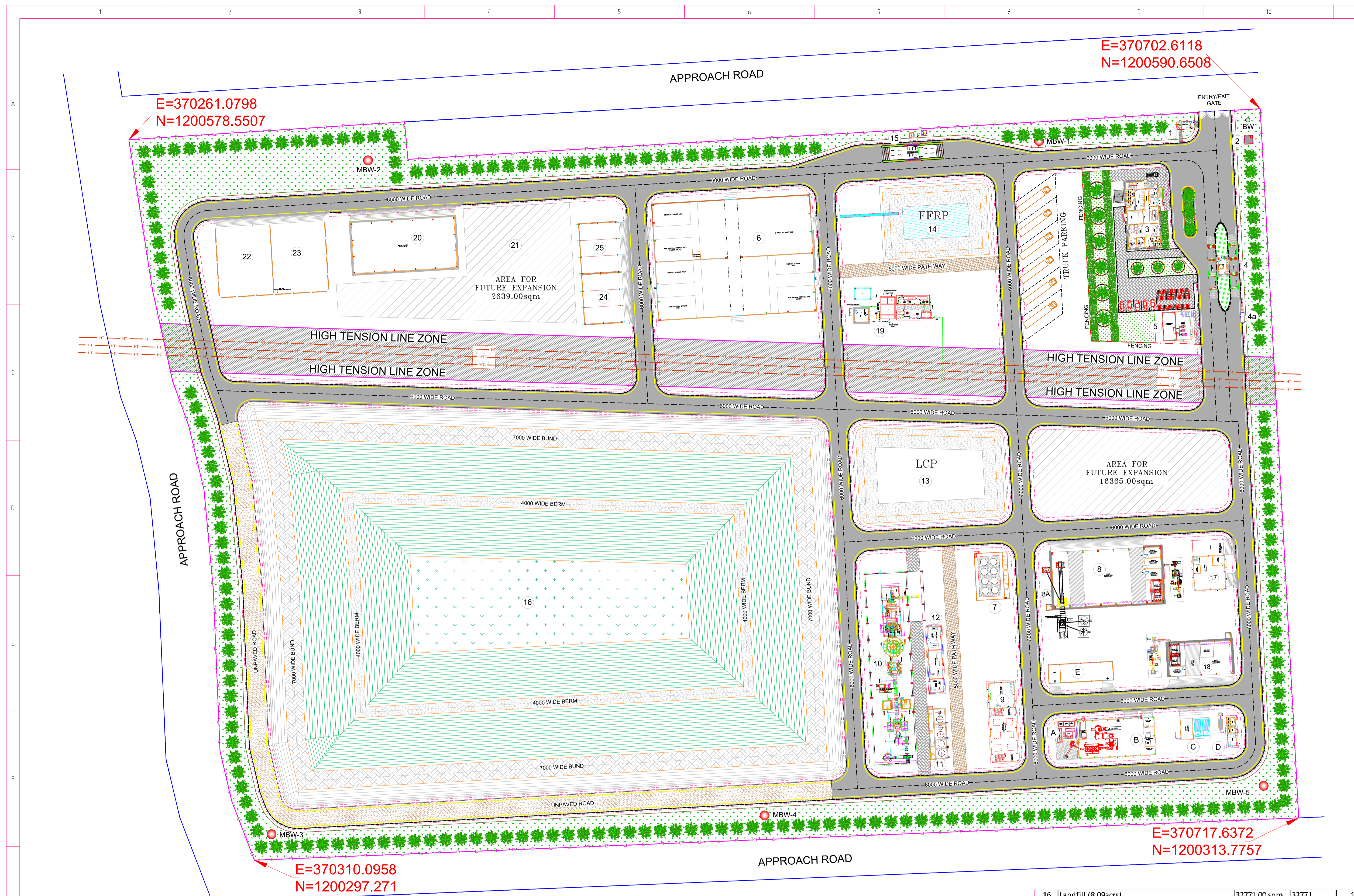
RoC - Hyderabad

Mailing Address as per record available in Registrar of Companies office:

RE SUSTAINABILITY IWM SOLUTIONS LIMITED

13th Floor, Ramky Grandiose, Ramky Towers, Gachibowli, Hyderabad, Hyderabad, Telangana, India, 500032





FOR SUBMISSION

This document should not be relied on or used in circumstances other than those for which it was originally prepared and for which Re Sustainability Ltd. was commissioned. Re Sustainability Ltd. accepts no responsibility for this document to any other party other than the person by whom it was commissioned.

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1. ALL DIMENSIONS IN MILLIMETERS, LEVELS & COORDINATES IN METERS UNLESS OTHERWISE STATED.
 2. THE COORDINATES INDICATED IN THE DRAWING IS TO BE VERIFIED PROPERLY BEFORE EXECUTION.
 3. DO NOT SCALE DRAWING. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
 4. ANY DISCREPANCIES NOTED SHALL BE BROUGHT TO THE NOTICE OF THE ARCHITECT PRIOR TO EXECUTION.

The responsibility of control, check and verification of accuracy, correctness, completeness, integration and full compliance of contract provisions in respect of design analysis and drawings rests with the design consultants and the contractor.

PROPOSER: Re Sustainability IWM Solutions Ltd.
 Aurobindo Galaxy Tower,
 11th Floor, Block-B
 Hitech City Rd, opp. IKEA,
 Hyderabad, Telangana 500081

PROJECT TITLE: INTEGRATED COMMON HAZARDOUS WASTE TREATMENT, STORAGE, DISPOSAL AND RECYCLING FACILITY

DRAWING TITLE: MASTER LAYOUT

DRAWING NO : IWM-PPIDC-KARAIKAL-ML-100

SHEET	A1, 1 OF 1	SCALE	AS SHOWN
REV:	DESCRIPTION	DRN.	DGN. CHK. APP. DATE
RO	FOR SUBMISSION	RK	HARI HARI EK 01.08.22

Sr.no.	Description of Unit	Dimension	Area in sqm	Qty.	
1	Security & Visitor Room cum Toilet	6.00 x 3.00 m	18	1	
2	Underground Sump	3.00 x 3.00 m	9	1	
3	Admin cum Lab, Electrical Panel Room, Canteen	25.86 x 12.85m	332.3	1	
4	Weigh Bridge Control Room & Weigh Bridge Platform (50 Tons capacity)	3.40 x 6.40 m	21.76	1	
4a	Sample collection platform	4.25 x 1.76 m	7.48	1	
5	Fire Hydrant Pump Room & Tank	10.96 x 12.23 m	134.04	1	
6	E waste, Paper, Plastic, Metal, Drum Processing	61.92 x 45.70 m	2829.744	1	
7	Tank Farm Solvent Recovery Facility	18.40 x 12.90 m	237.36	1	
8	Waste stabilisation shed, Temporary waste store	42.92 x 21.90 m	939.95	1	
8A	Mechanised Waste stabilisation shed	-	-	1	
9	Solvent Recovery and used oil Recycling Facility	31.00 x 10.23 m	317.13	1	
10	Incinerator Shed (500KG/Hr)	75.30 x 23.00 m	1731.9	1	
11	Tank Farm Incinerator Plant	20.00 x 6.85 m	137	1	
12	PCC/PLC/MCC Building	25.90 x 5.46 m	141.414	1	
13	Leachate Collection Pond & SEP	2175.00 sqm	2175.00 sqm	1	
14	First Flush Retention Pond	1267.00 sqm	1267	1	
15	Vehicle Tyre wash	24.00 x 6.66 m	159.84	1	
16	Landfill (8.09acrs)		32771.00 sqm	32771	1
17	General Stores & Vehicle maintenance Shed	19.69 X 12.50 m	246.13	1	
18	AFRF Shed	24.90 x 13.00 m	323.7	1	
19	Area for LTP		720.00 sqm	720	1
20	Special waste storage shed				
21	Waste storage shed	55.92 X 20 m	1118.4	1	
22	Intractable waste store	43 X 28.5 m	1225.48	1	
23	Temporary waste store				
24	Aluminium Dross Processing Facility	20.00 X 15.00 m	300	1	
25	Incinerable Waste Storage Shed	20.00 x 15.00 m	300	1	
A	ETP for BMW	50 sqm	50	1	
B	BMW Processing Shed	15.00 x 30.00m	450	1	
C	Vehicle wash & Parking	130 sqm	130	1	
D	Workers washrooms & Rest rooms	3.46 x 11.40 m	39.444	1	
E	Waste Storage shed	25.46 x 7.46 m	189.93	1	
Area of Facility				46202.00	
32	Road area		16779		
33	Greenbelt area		36058		
34	Misc. Area		10230		
Total area of project				109269.00	

TENTATIVE MASTER LAYOUT
 SCALE- 1:750

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