

EXECUTIVE SUMMARY

(English)

for

Proposed New Project of Common Bio Medical Waste Treatment Facility (CBMWTF) with Induction Plasma Pyrolysis capacity of 100 kg/hour, Autoclave capacity of 100 Liters/Batch, Shredder capacity of 100 kg/hour and ETP capacity 10 KL/Day

at

V.M. Techno-Soft Pvt. Ltd.

**Part of Khasra No. 116/1 (1 Acre land), Village: Punjipathra,
Tehsil: Tamnar, District: Raigarh, Chhattisgarh**

As per 7(da) of Schedule to EIA Notification dated 14th September, 2006 Category B

EIA Consultant




ENPRO Enviro Tech and Engineers Pvt. Ltd.

**(QCI-NABET Accreditation vide Certificate No.: NABET/EIA/1922/
SA 0125 valid till 12th January, 2022)**

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ENPRO Enviro Tech and Engineers Pvt. Ltd.			
Client	V.M. Techno-Soft Pvt. Ltd.		
Project	Draft Rapid EIA Report		
Report No	EP/REIA/34	Rev.	0
Title	Executive Summary	Date	03-02-2021

EXECUTIVE SUMMARY

1. INTRODUCTION

M/s. **V.M. Techno-Soft Pvt. Ltd.** having its registered office at G-3, Sector-1, Avanti Vihar, Raipur (CG) is a private limited company and promoted by **Mr. Vipin Malik**. Unit is proposing to establish a new common bio medical waste treatment facility at Part of Khasra 116/1 (1 Acre Land), Village Punjipathra, Tehsil: Tamnar, District: Raigarh, Chhattisgarh. The geographical position of the site is at Latitude: 22°4'33.44"N and Longitude: 83°21'1.86"E.

The company is an ISO 9001:2008 and ISO 14001:2015 certified leading company in Raipur in the field of Waste Management services, Training & skill developments, Software Development, GIS, M-CAD & Data Processing service provider in Chhattisgarh. Company have good infrastructure for Data Processing like Online & Offline Data Entry work for govt. & others, Photography work for NREGA, EPIC & other govt. works. The company has its project execution centre located at Raipur, Rajnandgaon, Jagdalpur, Korba, Mandla, Jabalpur & Gwalior.


In order to assess the potential environmental impacts arising due to proposed project activities, promoter has assigned the work of EIA study to M/s. ENPRO Enviro Tech & Engineers Pvt. Ltd. (ENPRO), Surat to prepare Draft EIA Study report for proposed common bio medical waste treatment facility. The proposed project falls under Category B and project activity 7(da) as per EIA notification 2006, as amended time to time. ENPRO Enviro Tech and Engineers Pvt. Ltd. (ENPRO) is NABET Accredited (NABET/EIA/1922/SA 0125 valid till 12th January, 2022) under this sector. ENPRO (Environmental Laboratory) has conducted base line monitoring for the period of **16th October 2020 to 15th January 2021**. Environmental Laboratory is recognized by MoEF & CC also Accredited by NABL. ENPRO Team visited site and carried out ground survey for the various aspects which was covered in EIA Report.

2. PROJECT DESCRIPTION

2.1 Need of the Project

Common Bio-Medical Waste Treatment Facilities (CBMWTFs) offer advantage to health care establishments through more efficient treatment and disposal of BMW and through 'Economies of Scale' (significant decrease in cost of treatment per kilogram). As per the guideline for CBMWTF, one CBWT facility will cover 75 km area and 10000 number of beds. As per present scenario, one common BMW treatment facility at Bilaspur is being operated which is at more than 150 Km away from project site. Considering the number of nursing home and hospitals with beds in Raigarh district of Chhattisgarh and due to unavailability of the facility within the area, it is required to establish new CBMWTF in Raigarh.

Moreover, Raigarh Division of Chhattisgarh consists of approx. 84 HCFs with 1722 Beds. Own management and treatment of these waste is technically as well as economically not viable. Keeping in view of difficulties faced by private Hospitals, Nursing Homes and Clinics in Raigarh region and due to non-availability of other CBMW treatment facility within 75 km radius of project site, there is a need for centralized system for treatment.

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In view of above, Chhattisgarh Environment Conservation Board invited a tender (No: 01/2019-2020/ Chhattisgarh Environment Conservation Board, Naya Raipur (CECB)/2019) for selection of Common Biomedical Waste Treatment Facility Service provider with intention to collect and treat bio medical waste generated in the region same was allotted to M/s. V.M. Techno-Soft Pvt. Ltd. after tendering process.

2.2 Location & Study Area

Proposed project shall be located at Part of Khasra 116/1 (1 Acre Land), Village: Punjipathra, Tehsil: Tamnar, District: Raigarh, Chhattisgarh.


SALIENT FEATURES IN STUDY AREA OF PROPOSED PROJECT

Particulars	Details	Approx. Distance from Project Site
Geographical Co-ordinates	Latitude: 22°4'33.44"N Longitude: 83°21'1.86"E	-
Village /City / Industrial Area	Punjipathra	-
District	Raigarh	-
Nearest Water body	Lake/Dam near Tumidih Kurket River	101 m (W) 7.5 km (W)
Nearest Village	Punjipathra Village	1.4 km (SW)
Nearest Highway	State Highway -01 National Highway-216	350 m (W) 20 km (S)
Nearest Railway station & Railway line	Bhupdeopur Railway Station	14.2 km (SW)
Nearest Airport/ Airbase	OP Jindal Airport (Chiraipani, Chhattishgarh)	15.50 (SE)
Protected Area/ Sanctuaries	Not within study area	-
CRZ applicability	Not within study area	-
Seismic Zone	II	-
Nearest High Flood Level	293 m	1.35 km (SW)
High Tide Line	298 m	1.05 km (SW)
Low Tide Line	295 m	1.13 km (SW)
Project Site Elevation	317 m	-

Note: All the above mentioned distances are aerial distances from the project site.


2.3 Salient Features of the Proposed Project

Proposed Project Capacity:			
Sr. No.	Equipment	Number	Capacity
1	Induction Plasma Pyrolysis	1	100 kg/h
2	Autoclave	1	100 L/batch

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3	Shredder	1	100 kg/h
4	Effluent Treatment Plant	1	10 KLD

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Proposed Capacity of Effluent Treatment Plant	Flow rate: 4.5 KLD Design Capacity: 10 KLD																		
Cost of Proposed Project	Rs. 2.75 crores																		
Allocation for CER Activities	Rs. 5,50,000 for next 5 yrs. for required activities such as: i) Rain Water Harvesting & its maintenance ii) Roof-Top Solar Panel & its maintenance iii) Drinking water facility & its maintenance iv) Digitization of School: Provision of Projectors, Computers, Tablets																		
Estimated Manpower Required	<p>Total Manpower – 25</p> <table border="1"> <thead> <tr> <th>Phase of Project</th> <th>Type of Labour</th> <th>No. of Employees</th> </tr> </thead> <tbody> <tr> <td>During construction</td> <td>Contractual</td> <td rowspan="2">12</td> </tr> <tr> <td>During commissioning</td> <td>Contractual</td> </tr> <tr> <td rowspan="3">During operations</td> <td>Managerial</td> <td>02</td> </tr> <tr> <td>Skilled</td> <td>05</td> </tr> <tr> <td>Un-skilled</td> <td>06</td> </tr> <tr> <td colspan="2" style="text-align: center;">Total</td> <td>25</td> </tr> </tbody> </table> <p>-</p>	Phase of Project	Type of Labour	No. of Employees	During construction	Contractual	12	During commissioning	Contractual	During operations	Managerial	02	Skilled	05	Un-skilled	06	Total		25
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Total		25																	
Area of Land	4062 m ² - for proposed project																		
Area of Green-Belt	1340 m ² (33.0 %)																		
Water Requirement - Total	<p>10 KLD (5.5 KLD Fresh + 4.5 KLD Recycled)</p> <p>Domestic 0.8 KLD Gardening 2.5 KLD Industrial 6.7 KLD</p> <p>Incinerator/Scrubber 4.7 KLD Floor Washing 0.8 KLD Vehicle Washing 1 KLD Solution Preparation 0.1 KLD Steam Generation 0.1 KLD</p>																		
Source of Water -	<p>Recycled 4.5 KLD Fresh 5.5 KLD (from Bore well)</p>																		
Waste water Generation	<p>5.2 KLD</p> <p>Industrial 4.6 KLD Domestic 0.6 KLD</p>																		
Mode of Treatment	Industrial																		


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Domestic	Sent to Effluent Treatment Plant and treated wastewater will be reused for Vehicle washing and incineration scrubber Septic tank followed by soak pit
Power Requirement	Project will consume 150 KVA power
Source of Power Supply	Chhattisgarh Vidyut Vitaran Company Ltd
Emergency Power Supply	1 Nos. D.G. Sets – 150 KVA each
Fuel Requirement	
LDO for DG Set	45 Litres/Hr
Sources of Gaseous Emissions	Incinerator - 100 kg/hr D.G. Sets - 1 nos. – 150 KVA (stand-by)
Air Pollution Control Measures	Quencher cum Packed Bed Scrubber and Venturi Scrubber along with stack height of 30 m
Solid / Hazardous Waste Generation	<ul style="list-style-type: none"> • Ash from incinerator - 500 kg/day • ETP Sludge - 75 kg/day • Plastic Waste after Autoclave and shredding – 500 kg/day • Glass and metallic body implants After Autoclave – 300 kg/day • Metal Sharps after Autoclave and Shredding – As generated • Waste oil – 10 kg/day • Used Batteries – As generated
Solid / Hazardous Waste Disposal Management	<ul style="list-style-type: none"> • Ash from incinerator - Send to TSDF site for secured landfilling • ETP Sludge - Send to TSDF site for secured landfilling or cement co-processing • Plastic Waste after Autoclave and shredding -Send to Authorized Recyclers • Glass and metallic body implants After Autoclave – Sent to foundry for metal recovery / TSDF site • Waste Oil - Send to Authorized Recyclers • Used Batteries – Send to Authorized Recyclers

2.4 Process Description

A. Incineration System (Induction Plasma Pyrolysis)


This is a high temperature thermal process employing combustion of the waste under controlled condition for converting it into inert material and gases. Incinerator i.e. Induction Plasma Pyrolysis is an electrically powered system. It will include below components.

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Incineration through Induction Plasma Pyrolysis (Plasma reactor - Primary chamber)	Burning of bio-medical waste at relevant temperature - degrading of organic waste to syngas.
Post combustion chamber - Secondary chamber	Burning of flue gas up to 1000 °C - 1050°C degrading of inorganic waste.
Quencher	Reduce the concentration and temperature of thermal treated flue gas
Venturi	High pressure ejector ventury unit for liquid quenching treatment of thermal treated exhaust gas
Flue gas treatment media tank	5-7% NAOH water tank lined with isothalic FRP with high pressure pumping unit
Mist eliminator	Post quenching and filtering of exhaust gas and separate mist from gas (demisting).
ID fan	High capacity ID fan for sucking the high quantity of negative pressure generating the whole unit
Gas ducting	Containing passage of gases
Chimney	Discharge the treated gas from the machine to 30 mt above from ground level

BRIEF SPECIFICATIONS OF INDUCTION PLASMA PYROLYSIS

Description	Specification
Capacity	100 kg/hr
Type	Cylindrical Vertical (solid waste feeding)
Volume	3 m ³
MOC (Shell)	SS310 - 10mm Thick
Chamber Pressure	10-20 mm WC
Travel Speed	6.02 mtr/ Hr
Refractory Thickness	100 mm
Flue Gas Velocity	1.3 mtr / Sec
Ash and Residue Separation	Ash Separator with Hot Ash removal screw Conveyor
Gas Leakage Prevention	Unit High Pressure air sealing for Prevent Flue Gas Leakage
Back Pressure Prevention	From Charging Door Compressed Door Mechanism
Explosion Safety Explosion	Davit Arrangement (internal)
Waster Loading Mechanism	Hopper unit with Safety Door
Waste feeding Mechanism	Hydraulic Ram
Feeding Unit	5 HP
Nature / Category of Waste	Incinerable Bio-Medical Waste with Maximum 85% Moisture Content.
Heat Loss fraction	0.05
Design Temperature	1400 °C
Source Of Energy	Electric
Combustion Efficiency	At Least 99 %.

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Temperature resistance (Primary chamber)	1400 °C
Temperature resistance (Secondary Chamber)	1200 °C
Preheating Time	Maximum One Hour.
Temperature in Primary Chamber	Relevant Temperature
Temperature in Secondary Chamber	1050 ± 50 °C
O ₂ Content In Primary Chamber	6 %.
Residence time for flue gas in secondary chamber	2 sec.

(Source: M/s. V.M. Techno-Soft Pvt. Ltd.)

BRIEF SPECIFICATIONS OF SECONDARY CHAMBER

Description	Specification
Type	Cylindrical Statical
Inclination	Vertical 90 or horizontal
Volume	3 m ³
MOC (Shell)	SS 304 or MS 2062 Refractory Lined
Chamber Pressure	10-20 mm WC
Refractory thickness	100 mm
Flue Gas Velocity	1.9 Mtr / Sec
Ash And Residues Separation	Ash Separator with Hot Ash Removal Screw Conveyor
Gas Leakage Prevention Unit	High Pressure Air sealing for Prevent Flue Gas Leakage
Explosion Safety	Explosion Davit Arrangement (Internal) Top With Counter Weight Linked With Plc Control
Retention Time Of Flue	2 - 2.2 Second.


(Source: M/s. V.M. Techno-Soft Pvt. Ltd.)

B. Autoclave

An autoclave is a specialized piece of equipment designed to deliver 121°C temperature under 15 psi pressures to a chamber, with the goal of decontaminating or sterilizing the contents of the chamber. Decontamination is the reduction of contamination to a level where it is no longer a hazard to people or the environment. To ensure safety and quality control, all bio-hazardous materials and items contaminated with potentially infectious agents should be decontaminated before use or disposal. All Bio Medical waste like plastic baggage, syringe, cotton etc. have to sterilize in autoclave as per pollution norms for incinerator plant.

TECHNICAL SPECIFICATIONS OF AUTOCLAVE

Description	Specification
Capacity	100 liter/batch
MOC	SS -304
Model No	NEET AC100
Insulation	Ceramic wool on outer side

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Pressure	2.1 kg/cm ²
Air Emission	Highly Odorous but Non Toxic
Heating Media	By steam generated from Electric heater arrangement
Feeding	Hydraulic System
Safety Instrument	Pressure Gauge and Safety Valve
Temperature	121 to 134 °C
Design Temperature	150 °C
Water Emission	Odorous May Contain Live Micro Organisms at Base
Treatment Effluent	Low Wet Waste 10 % Heavier all Material Acceptance Recognizable

(Source: M/s. V.M. Techno-Soft Pvt. Ltd.)


C. Shredding

Shredding is a process by which waste are de-shaped or cut into smaller pieces so as to make the waste unrecognizable. Shredder has non-corrosive sharp blades capable for shredding of plastic waste, sharps, bottles, needles, tubings, and other general waste. The low speed two shaft systems are effective for shredding hard and solid waste. 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 dis-infection and ensuring non-recycling of the waste materials for medical/ food grade purposes. Shredder is required for cutting small pieces (10-25 mm) of plastic, agro waste, paper in appropriate size as per pollution norms for incinerator plant. In the system 5 blades will be provided of which 3 will be movable and 2 fix blades.

TECHNICAL SPECIFICATIONS OF SHREDDER

Description	Specification
Capacity	100 Kg/Hr.
MODEL No	NEET SDR100
Waste Materials	Biomedical waste
Power	5 HP
Motor	3 Phase 50 Hz 415 VAC
Hopper Size	300 X 400 mm Height
Drive	V belt Pulley drive
Required Space	2 m ² (only machine)
MOC	MS Fabricated
MOC of Blade	W.P.S. Hardened changeable Blade
Control Panel	Dual starter ON/OFF switch
Shredding Size	25 X 50 mm Waste Cutting.
Bearing	SKF/ZKL Ball Bearing
Cutting Blade	5 Nos. (3 movables & 2 fix blade)


(Source: M/s. V.M. Techno-Soft Pvt. Ltd.)

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3. Description of Environment

Baseline environmental status in the study area was studied for the various environmental attributes, as delineated in TOR, between **16th October 2020 to 15th January 2021** at different locations, including the proposed project site. Water, Soil, Noise and Ambient Air Monitoring samples were collected and analysed by NABL Accredited and MoEF&CC recognized laboratory M/s. ENPRO Enviro Tech and Engineers Pvt. Ltd., Surat. All the samples were collected, preserved and analysed as per the standard procedures / methods.


Sr.	Environmental Attributes	Baseline Status
1.	Ambient Air Quality	8 stations - at proposed project site & nearest residential area
	Observation - PM ₁₀ PM _{2.5} SO ₂ NO _x CO NH ₃ HC VOC PAH	56.4 - 94 µg/m ³ 14.9 – 51.0 µg/m ³ 3.6 - 25.3 µg/m ³ 1.3 – 32.0 µg/m ³ Below Detectable Limit (BDL) Below Detectable Limit (BDL) Not Detected (ND) Not Detected (ND) Not Detected (ND)
	Inference	All results (average) were found within NAAQ permissible limits
2.	Meteorological Status	Meteorological data for period of 16th October 2020 to 15th January 2021 was given by NABL approved laboratory M/s. ENPRO Enviro Tech and Engineers Pvt. Ltd., Surat
	Observation	Post monsoon season Pre-dominant wind – NNE to SSW Calm condition– 3.31 % Average wind speed – 1.97 m/s Maximum wind speed – 8.0 m/s Temperature range – 12.1 to 28.6 °C Relative Humidity range – 31 to 85 %
	Inference	<ul style="list-style-type: none"> • Nearest residential area is Punjipathra village which is 1.8 km from proposed project site.
3.	Water Quality	Surface water samples were collected from 9 different sources – 1) Pond water near Tumidih Village 2) Pond water near Padkipahri Village 3) Pond water near Pandripani Village 4) Pond water near Charratagar Village 5) Pajhar Nadi 6) Pond water near Ukariipali Village 7) Pond water near Kachkoba Village 8) Kelo River 9) Kurkut River

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Sr.	Environmental Attributes	Baseline Status
		<p>Ground water samples were collected from 8 different locations –</p> <ol style="list-style-type: none"> 1) Near Project Site (Hand Pump) 2) Barpali Village (Bore Well) 3) Chaidoria Village (Bore Well) 4) Near Amlidih Forest (Bore Well) 5) Padkipahri Village (Bore Well) 6) Tumidih Village (Bore Well) 7) Rabo Village (Bore Well) 8) Gadgaon Village (Bore Well)
	Observation	<p>Surface Water: Surface water samples SW1, SW2, SW3, SW4 and SW6 are pond water, Sample SW5 is Nala water and SW8, SW9 are river water. As water of all samples has colour, BOD and coliform it can't be used for drinking without treatment and disinfection. The reason for this may be presence of many large to small scale steel plants, Ferro Alloy plants etc are found within the study area.</p> <p>Presence of coliform and faecal coliform in all samples may be due to use of these sources by cattle, local residents and mixing of domestic sewage. These water sources need water treatment plant consisting of clarification, sand filter, carbon filter and disinfection treatment before they can be used for domestic purpose. For drinking water purpose, these sources need further treatment such as UF/RO plant.</p> <p>Ground water: Ground water sample analysis results indicate that TDS of all sample points are in desirable limit (<500 mg/L). Major Heavy Metals and Iron in ground water samples is found below detection limit and presence of Aluminum is observed in GW3, GW4, GW6 and GW8 sample points and Magnesium is observed in all ground water samples.</p> <p>Microbiological parameters Coliform and Faecal Coliform are observed below detectable limits in Ground water. Ground water is fit for use as industrial water and for non-direct contact domestic purpose after basic filtration and disinfection treatment.</p>
	Inference	<p>Surface water sources need water treatment plant consisting of clarification, sand filter, carbon filter and disinfection treatment before they can be used for domestic purpose. For drinking water purpose, these sources need further treatment such as UF/RO plant.</p>

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4.	Noise Quality	Noise levels were measured at 8 locations in study area including proposed project site																																											
	Observation	Equivalent noise level of villages varied from 49.5 – 54.2 dB[A] and 38.6 – 43.7 dB[A] during day and night time respectively.																																											
	Inference	All results were within CPCB permissible limits																																											
5.	Soil Quality	Soil samples were collected from 8 locations of study area including proposed project site																																											
	Observation - Physical	Soils are predominantly silt loam. Water Holding Capacity ranged from 10% to 17 %. Sand is ranged from 8 to 17 %. Silt ranged from 55 to 75 %. Clay is ranged from 8 to 36 %.																																											
	Chemical	pH ranged from 5.01 to 7.02 at 25 °C Electrical Conductivity ranged from 0.086 to 0.163 mS/cm. Cation Exchange Capacity ranged from 12.76 to 21.55 meg/100gm soil. Exchangeable Sodium content ranged from 124 to 312 mg/kg soil. Exchangeable Potassium content ranged from 46 to 183 mg/kg soil.																																											
	Inference – Physical & Chemical	The pH of soil samples ranges from Strong acidic to neutral. The cation exchange capacity of the soils is moderate. The soil texture is predominantly Silt loam.																																											
6.	Land Use / Land Cover	Satellite IRS P-6 LISS IV images were obtained from National Remote Sensing Centre (NRSC) Hyderabad. Land use / land cover mapping was carried out for 10 km radius area with proposed project site at centre.																																											
	Observation	- <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Sr. No.</th> <th>LULC Class</th> <th>Area (Ha)</th> <th>Area (%)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Water Bodies</td> <td>3068.31</td> <td>10%</td> </tr> <tr> <td>2</td> <td>Agricultural Fallow</td> <td>11980.44</td> <td>38%</td> </tr> <tr> <td>3</td> <td>Open Scrub</td> <td>1273.13</td> <td>4%</td> </tr> <tr> <td>4</td> <td>BuiltUp</td> <td>2434.13</td> <td>8%</td> </tr> <tr> <td>5</td> <td>Dense scrub</td> <td>981.00</td> <td>3%</td> </tr> <tr> <td>6</td> <td>Road</td> <td>2466.75</td> <td>8%</td> </tr> <tr> <td>7</td> <td>Forest</td> <td>8153.69</td> <td>26%</td> </tr> <tr> <td>8</td> <td>Open Jungle</td> <td>766.75</td> <td>2%</td> </tr> <tr> <td>9</td> <td>Dense Jungle</td> <td>321.00</td> <td>1%</td> </tr> <tr> <td colspan="2">Total</td> <td>31445.19</td> <td>100%</td> </tr> </tbody> </table>	Sr. No.	LULC Class	Area (Ha)	Area (%)	1	Water Bodies	3068.31	10%	2	Agricultural Fallow	11980.44	38%	3	Open Scrub	1273.13	4%	4	BuiltUp	2434.13	8%	5	Dense scrub	981.00	3%	6	Road	2466.75	8%	7	Forest	8153.69	26%	8	Open Jungle	766.75	2%	9	Dense Jungle	321.00	1%	Total		31445.19
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Sr.	Environmental Attributes	Baseline Status
	Inference	It is clearly seen that the area is mostly covered with Agricultural Fallow Land - 38%, which is taken up for cultivation but is temporarily allowed to rest, cropped for one or more season, but not less than one year. Open Scrub - 4%, Dense Scrub – 3%, Open Jungle - 2%, Dense Jungle - 1% and Forest - 26% are the other green areas. Around the agricultural fallow edges, human settlements (built-up area) occupies about 8% of study area. About 10% of the area is covered by water bodies like Kurkut & Kelo river, nala and some ponds.
7.	Ecology and Biodiversity	Study was carried out in core area and in buffer area in a scientific manner and ecological pursuance, validating primary data using secondary data. Biological assessment of study area was done to identify ecologically sensitive areas and to identify the presence of any Rare or Endangered or Endemic or Threatened (REET) species of flora or fauna in the study area.
	Observation:	The proposed project site is a government land with no vegetation cover. Few shrubs and weed species are present here. The entire area is with terrestrial vegetation is without any forest or agriculture land and it was devoid of any ecologically sensitive biological resources. No REET species present in the core zone. No migratory corridors or breeding grounds for faunal species present here. No major faunal species are observed here. The most commonly seen flora in the project site <i>Rauvolfia serpentina</i> are dominant here. <i>Lantana camara</i> , <i>Prosopis juliflora</i> , are sporadically found near the boundary of the proposed project site. Various common types of grasses present near the site are found throughout the region. Mahua trees are spread on range areas as well as near villages and they are the only grown up mature trees of Sal, Bija, etc. are scanty. Herbs layer in the forests are mainly of those species which are tolerant to grazing and sampling. The study area is characterized mainly by shrubs and bushes. At few places mixed forest of shrubs and trees are present.
	Inference	The ratio between abundance and frequency was used to interpret the distribution pattern of distribution pattern of species in the study area is identified as random distribution as the value of A/F ratio is 0.031 . The Shannon indices value of buffer zone is 2.801 indicates good potential diversity within the study area. Population size and Dominance of the species is 6.3% (Very less, which means no individual or few tree

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		species are occur continuously in the study area) and Evenness is around 96.8% (Indicates the species are evenly distributed in core and buffer zones).
8.	Geology	The Raigarh district occupies the south eastern part of the upper Mahanadi valley and the bordering hills in the south and the east. The study is divided into two major physical divisions, namely the plain pediplain and the Hilly Areas. Based on topography and landforms, the main physiographic units identified in the area are low to moderate hill ranges rising in elevation from > 280 to ~600 m above mean sea level (m amsl), especially in the hilly terrain situated near to Punjipathra-Pali-Raigarh areas. The area is characterised by rolling topography and low flat topped hills stretching in to the plains with relatively broader valleys and large spurs from plateaus. The structural hills and denudational hills form the main relief areas. The denudational hills are situated in the basement complex area associated with residual hills, inselbergs etc. with dense forest cover.
	Hydrology	Ground water occurrence, movement and recharge to aquifers are controlled by the degree of weathering, fracture pattern, geomorphological setup, and ground water potential further depends upon the nature of geological formations, geographical setup, incidence of rainfall, recharge and other hydrogeological characters of the aquifer. Ground water occurs in phreatic condition in the weathered zone and under semi-confined to confined condition in the fractured and jointed rock formations. The water bearing fracture zones are generally occurring within a depth of 80m, but deeper potential fractures are also encountered at selective places. Ground water is usually developed by means of dug wells and bore wells. The weathered zones in hard rocks and fluvial alluvium along river/stream courses have been tapped extensively by the dug wells in the area and sustain four to six hours of pumping with yields of over 30 to 100 and even up to 200 m ³ /day at places.
	Inference	As per ground water resource estimation studies carried out by the Central Ground Water Board (CGWB) in collaboration with the Water Resources Department (WRD), Government of Chattisgarh for the year 2009, the Tamnar Tehsil in Raigarh district is in the safe category with a groundwater draft of 875 ham as against the available resource of 3340 ham thus the stage of ground water development in the district is 26%, which denotes a scope for further development.

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9.	Socio-Economic Status	The primary data were collected from the selected number of villages within the 10 km of the study area.
	Observation	A total of 54 villages fall fully or partially in the radial distance of 10 km from the project site M/s V.M.Techno-Soft Private Ltd at at Khasra 116/1 (1 Acre Land), Village Punjipathra, Tehsil: Tamnar, District: Raigarh, Chhattisgarh. All the project area is largely rural covering 52% of villages from Tamnar taluka, 48% Gharghoda and 4% Villages from Raigarh taluka of Raigarh district of Chhattisgarh State. Thus, macro level study has been carried out in the radial distance 10 km for all three talukas of Raigarh district.
	Inference	The project area in the radial distance of 10 km comprises of 100% of the area covering three talukas of Raigarh district. The project area population is 0.2% of Chattishgarh State; and 3.2% of the Raigarh district. The decadal population growth rate of the Project area is second highest comparative to Raigarh district. This shows there is in-migration of the population in Raigarh district for the livelihood.

4. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES


Impact identification matrix has been developed by establishing cause-effect relationship between activities of proposed project and various environmental attributes.

Since the entire treated effluent will be recycled back to the industries for reuse in washing and incineration scrubber, there will be reduction in the groundwater withdrawal. Hence no major impact has been envisaged on the water resources in quantitative terms.

There will be no discharge of waste water into any water body or surface body/land, so there is insignificant effect on surface water and ground water quality.

High pressure drop Venturi Scrubber will be provided for removal of particulate matter and partial acidic gases by absorption with caustic solution, followed by packed bed scrubber for removal of complete acidic gases from flue gas. Modelling of pollutant emission (TSPM, HCL, NO_x) was carried out using AERMODCloud™ Version 18 Rev. 86 to assess incremental ground level concentration within study area. Incremental ground concentration due to proposed project was found **insignificant Negative** in study area.

There shall be an insignificant effect on ecology, biodiversity, geology and hydrogeology aspects. Due to construction of CBMW there is irreversible effect on land use pattern. Excavated soil shall be reused for development of green belt at project site. Project site shall have 33 % green belt cover.


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5. ENVIRONMENTAL MONITORING PROGRAMME

For the proposed project, monitoring activity is mainly envisaged for ambient air quality parameters, water quality, water quality, soil quality, noise levels and to collect data to keep a check on performance of CBMW facility. An effluent quality-monitoring programme will be put in place by the CBMW facility, which includes location of monitoring, frequency of monitoring and specification of parameters to be monitored in line with Central Pollution Control Board (CPCB) guidelines.

ENVIRONMENTAL MONITORING PARAMETERS & FREQUENCY

Sr. No.	Item	Parameters	Frequency & Responsible Party
1.	Ambient Air Quality	Particulate Matter [PM _{2.5}] & [PM ₁₀], Sulphur Dioxide [SO ₂], HCl, Nitrogen Dioxide[NO _x] and Carbon Monoxide [CO], VOC	Quarterly - At project site and at villages in 10 km radius of project site by External Lab - 6 stations
2.	Gaseous Emission from Incinerator Stack	PM, NO _x , HCl, HF, Total Organic Carbon	Quarterly by External Lab
		Dioxin & Furan	Annually by External Lab
		CO, O ₂	Online monitoring (CEMS) connected to CPCB / SPCB server
3.	Work Place Monitoring	PM _{2.5} , PM ₁₀ , SO ₂ , NO _x , Noise, Temperature, Humidity	Quarterly by External Lab Or in-house by EHS Exe./Sr. Chemist
4.	Waste Water	pH, EC, Turbidity, TDS, Calcium, Magnesium, Total Hardness, Total Alkalinity, DO, COD, BOD, Chlorides, Sulphates, Phosphate, Ammonia, Nitrite, Oil & Grease, Bio-assay Test (Heavy Metals, if required)	Monthly by External Lab
		pH, COD, TDS, BOD, Flow	Daily by in-house lab (or online, as per future guideline of CPCB)
		Flow at inlet and outlet	Online monitoring on continuous basis provided with recorder
5.	Hazardous Waste	General Parameters	Annually by External Lab.
6.	Noise	Equivalent Noise Level in dB (A)	Quarterly by External Lab At least 1 hr. continuous
7.	Ground Water	As per IS 10500	Twice in a year (except monsoon) 5 locations in 5 km radius
8.	Soil	pH, EC, Moisture, Organic matter, N, P, K, SO ₄ ⁻² , Cl ⁻ , Ca ⁺² , Mg ⁺² & Na ⁺	Annually

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Sr. No.	Item	Parameters	Frequency & Responsible Party
9.	Greenbelt	Number of plantation (Units), Number of Survived Plants/Trees, Number of Poor Plant/Trees	Throughout Year at regular interval: In-house by EHS Executive & other EMC members
10.	Employee Medical/Health Check-up	As per statutory provision & requirement	Yearly through Approved Medical Officer & Doctor as per OHS Plan

In addition to above table, preventive maintenance plan covering all the equipment's shall be prepared and strictly followed by maintenance staff. All the details shall be maintained in log-book for efficient implementation.

6. ADDITIONAL STUDIES

6.1 Hazard Identification, Risk Assessment and Mitigation Measures

Identification of hazards at the proposed site indicates the characteristics of hazardous wastes that pose potential for an emergency situation. At the proposed V.M. Techno-Soft site, following type of hazardous wastes may be involved during the operation of facility, which can create potential emergency situation in the event of spillage and accidental release of hazardous wastes from the site:


- Wastes produced by hospitals
- Laboratories
- Health care sub centre

These wastes include both infectious ("red bag") medical wastes as well as non-infectious, general housekeeping wastes. The emission factors presented here represent emissions when both types of these wastes are combusted rather than just infectious wastes.

Hospitals, laboratories and health care sub centre and other disinfectants, anti-neoplastic agents, heavy metals (e.g. Mercury), etc. These wastes are hazardous in nature and if properly segregated and managed can be transported to hazardous waste management facility for treatment/ storage/ disposal.

Commonly referred to as Clinical and pathological Wastes and include: isolation wastes (refuse associated with infectious patients), cultures and stocks of infectious agents and associated biological, human blood and blood products, pathological wastes, contaminated sharps, amputated body parts, placenta and others.

Risk Assessment is a structured approach to identifying and understanding the risks associated with Storage and Handling of Hazardous/toxic chemicals. The assessment starts by taking into account an inventory of hazardous chemicals stored, likelihood of leakage/spillage associated with it and selecting the worst case scenario for consequence estimation. **Qualitative Risk**

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Assessment has been carried out by using methodology called HIRA-Hazards Identification & Risk Assessment.

Qualitative Risk Assessment has been carried out for the following areas:

1. Other Operational Activities Carried Out at Site

- Hazardous Solid Waste transportation from generation site to Bio-Medical Waste Treatment Facility (V.M. Techno-Soft) site
- Weighing and Sampling of Waste
- Incineration
- Autoclave
- Shredding

Solid Waste Storage Area & Incinerator Area have been identified the potential for major hazards.

All possible precautionary measures shall be taken on-site and structures to prevent any hazard. Suitable fire extinguishers along with fire and smoke detection alarm system shall be provided at various places in the plant and laboratory.

CBWM staff will be trained for safe handling of ETP chemicals and operation of treatment units. All personnel working at CBWM will be provided with necessary personnel protective equipment (PPEs). Periodical medical check-up shall be done for all employees at least once in a year.

A proper Emergency and Disaster Management Plan shall be in place and shall be accessible to the security staff and all the key personnel. The roles and responsibilities of all the key personnel shall be clearly identified and addressed to the key personnel.


7. PROJECT BENEFITS

Proposed project will help in attaining better hygienic conditions, as Bio-Medical waste shall be disposed of in scientific manner instead of dumping along with solid waste.

The proposed project is expected to yield a positive impact on the socio economic environment. It helps to sustain the development of this area including further development of physical infrastructural facilities. The beneficial impact of proposed project on the civil amenities will be substantial after the commencement of project activities.

The project will lead to direct and indirect employment opportunity. Employment is expected during construction and operation period, waste lifting and other ancillary services. A major part of this labour force will be mainly from local villagers. This project will help in improving income of local villagers who will get direct and indirect employment.

Proposed project will generate 25 direct and indirect employment generation during construction and operation phase.

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8. ENVIRONMENTAL MANAGEMENT PLAN

Guidelines for Management, Operation and Maintenance of plant issued by Central Pollution Control Board (CPCB) will be followed to operate plant effectively and efficiently. Maintenance schedule of plant is planned, considering stand by storage facility, availability of manpower, availability of maintenance tools, safety equipment and other required facilities. Preventive maintenance schedule for plant machineries will be prepared and strictly followed on regular basis for effective and efficient operation of plant. Training will be imparted to plant operating staff as well as waste transporters on regular basis.

Operator shall follow an SOP mentioning operation of bio medical waste facility and also shall inform prescribe authority about occupiers who are not sending segregated Bio Medical waste as per rules. Operator shall maintain all the records for operation of incinerator, shredder and autoclaving.

Occupiers who are giving waste, will be allowed to inspect site and see whether operator is carrying out treatment properly or not. Facility shall supply non-chlorinated plastic coloured bags to authorized occupier if required and shall collect bio-medical waste during holiday period as well.

In case for any reason if it becomes necessary to store waste beyond such a period, the occupier shall be trained to take appropriate measures to ensure that the waste does not adversely affect human health and the environment. Occupier should inform prescribed authority along with the reasons for doing so.

8.1 Environmental Management Cell

The overall management of the project will be looked after by Managing Director. The technical and scientific staff will be appointed under General Manager.

- Qualified and experienced personnel in the field of environment pollution control shall be recruited as a plant in-charge for overall responsibility for plant operation and for looking after Environment, Health and Safety aspects of the plant. Plant in-charge will be responsible for collection, transportation and receipt of waste at site.
- HR Manager, Plant in-charge and Environmental Manager will report to General Manger and will support for better implementation of EMP.
- Environmental Manager who is also responsible for Environment, Health and Safety will look after all statutory compliances associated with plant operation and environmental Manager will be directly reporting to General Manger.
- Lab In-charge will be reporting Environmental Manager and will be responsible for implementation of Environmental Monitoring Plan.
- Plant Operators will be reporting to plant in charge as well as Shift in-charge and will be responsible for operation and maintenance of the facility in each shift of operation.