EXECUTIVE SUMMARY

For

Proposed Expansion Project of Common Bio Medical Waste Treatment Facility (CBMWTF) Consisting of Incineration System having Capacity of (250 kg/Hr * 3 nos.), Autoclave having Capacity of (175 Litres/Batch * 1 nos. & 450 Litres/Batch * 2 nos.) and Shredder having Capacity of (250 kg/Hr * 6 nos.)

At

P. H. No. - 20, Kh. No. - 70/(1, 2, 5), Near Siltara Industrial Estate, Village - Siltara, Dharsiwa, Dist. - Raipur, Chhattisgarh

Plot Area- 6230 m^2
ToR LETTER NO: OL/EC/MIN/RAIPUR/1417-A dated 05/01/2021
Baseline Monitoring done by M/s. ENPRO Enviro Tech & Engineers Pvt. Ltd.
NABL Certificate No. TC-5885
Monitoring Period: 1st March 2021 to 31st May 2021
Project Category: 7 (da) - "B"

BIO MEDICAL WASTE MANAGEMENT

Applicant:

SMS WATERGRACE ENVIROPROTECT PVT. LTD.

P. H. No. - 20, Kh. No. – 70/(1, 2, 5), Near Siltara Industrial Estate, Village - Siltara, Dharsiwa, Dist. - Raipur, Chhattisgarh, INDIA
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ENPRO Enviro Tech & Engineers Pvt. Ltd.

(QCI-NABET ACCREDITATION NO. NABET/EIA/1922/SA 0125)
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EIA NUMBER: EP/REIA/28
SUBMISSION - JULY 2021

1. INTRODUCTION

M/s. SMS WATERGRACE ENVIROPROTECT PVT. LTD. is promoted by SMS Limited who is one of the largest Infrastructure Developments as well as Environment & Clean Energy Projects providing company. It is having its registered office at IT Park, 20 S.T.P.I, Gayatri Nagar, Parsodi, Nagpur – 440 020, Maharashtra, India.

Unit has established their existing Common Bio Medical Waste Treatment Facility near industrial area "IGC Siltara" in the year 2016. Exact location of the project site is at P. H. No. - 20, Kh. No. - 70/(1, 2, 5), Near Siltara Industrial Estate, Village - Siltara, Dharsiwa, Dist. - Raipur (Chhattisgarh). Existing facility has 250 kg/Hr capacity Incinerator with Primary and Secondary chambers, 175 Liters capacity Autoclave facility and 250 kg/Hr Shredder. The facility is covering about 20000 nos. of beds from Durg, Rajnandgaon, Bemetara, Raipur, Dhamtari, Mahasamund, Balodabazar regions.

2. PROJECT DESCRIPTION

2.1 Need of the Project

Ministry of Environment, Forests & Climate Change (MoEF & CC), Govt. of India has notified the Bio-Medical Waste Management Rules in 2016. In accordance to the rule, every occupier of a Health Care Establishment (HCE) shall either set up requisite bio-medical waste treatment facilities on site or ensure requisite treatment of the bio-medical waste at an approved Common Biomedical Waste Treatment Facility. No untreated bio-medical waste shall be kept stored beyond a period of 48 hours.

Raipur is the capital and largest city of the Indian state of Chhattisgarh. City has a widely diverse population from all over the country.

Chhattisgarh has the largest concentration of schedule tribes (STs) in the country. As a result, the city of Raipur has a fair share of its population belonging to schedule tribes. Besides the native population, the city has a significant number of migrants from other parts of the country owing to its multidisciplinary functional characteristics.

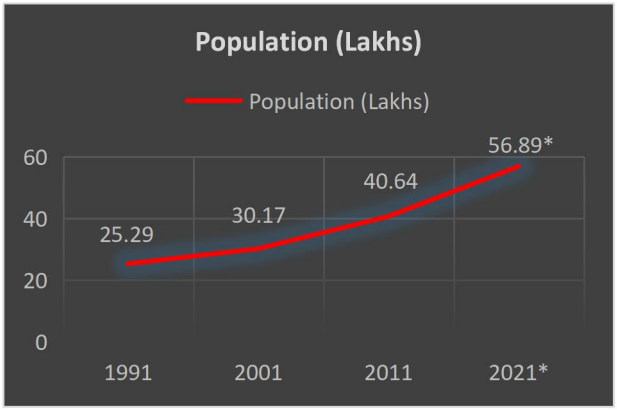
The connectivity of Raipur helped it to develop as the wholesale market and logistic hub for the adjoining states. Raipur also provides for higher order social infrastructure facilities in education and health for the entire state. These roles and functions have made Raipur a very active and high potential developing city.

In the year 2003, 26 villages were brought under RMC. These villages had a population of 88139 as per 2001 census and were added as 16 Wards under RMC. The growth rate for projecting the population of these villages for the year 2003 has been taken at 2.01% (The growth rate for Rural Population between 1991-2001). The average annual growth rates of Raipur city between 1991-2021 is given as under based on Census data.

AVERAGE ANNUAL GROWTH RATES OF RAIPUR CITY

Year	Population	Annual Growth rate
1991	25.29 Lakhs	-
2001	30.17 Lakhs	19.29 %
2011	40.64 Lakhs	34.7 %
2021*	56.89 Lakhs*	40 %

*-Projected Based on previous annual growth rate.



TREND OF WASTE RECEIPT AT EXISTING TREATMENT FACILITY FROM 2017 TO 2020

Sr. No.	Year	Waste Received (MT)
1	2017	11
2	2018	1043
3	2019	1045
4	2020	1875

(Source: SMS Water Grace Enviroprotect Pvt. Ltd.)

With respect to same, unit has received In-Principle letter from Chhattisgarh Environmental Conservation Board (Chhattisgarh Paryavaran Sanrakshan Mandal) on dated 18th February, 2020. In addition to this, there is continuous increase in biomedical waste and COVID-19 waste quantity due to pandemic situation. This is resulting into continuous operation of facility and preventive maintenance activities are also hampering.

Based on above need and considering reduced efficiency of existing incinerator; unit is now proposing to expand the capacity of existing CBMWT facility. This facility will cater and treat BMW from nearby household units, offices and factories as well.

2.2 Location & Study Area

The project activities will be carried out within existing site located at P. H. No. - 20, Kh. No. - 70/(1, 2, 5), Near Siltara Industrial Estate, Village - Siltara, Dharsiwa, Dist. - Raipur (Chhattisgarh). Geographical co-ordinates of the project site are 21°23'6.15"N, 81 °39'29.25"E.

EXACT SITE LOCATION OF PROPOSED PROJECT OF EXPANSION

SALIENT FEATURES OF THE PROJECT SITE

Particulars	Details	Approx. Distance from Project Site
Geographical Co-ordinates	Latitude: 21°23'6.15"N, Longitude: 81 °39'29.25"E	-
Village / City / Industrial Area	Near Siltara Industrial Estate	0.3 Km in South
District	Raipur	15 Km in South
Nearest Human Settlement	Chaorda Village	1.3 Km in NE direction
Nearest Water body	Kharun River	3.34 Km in West
Nearest Highway	NH-30	0.94 Km in East
Nearest Railway station & Railway line	Raipur Railway Station	15 Km in South
Nearest Airport	Raipur	23 Km in SE direction
Protected Area / Sanctuaries / Ecologically Sensitive Area	None	-
CRZ applicability	No	-
Densely Populated Area	Raipur	15 Km in South
Seismic Zone	II (Low Damage Risk Zone)	-
Nearest High Flood Level	260 m	2.76 km
High Tide Line	261 m	2.92 km
Low Tide Line	262 m	2.93 km
Elevation	274 m	-

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

2.3 Salient Features of the Proposed Project

Proposed Project Capacity:

Sr. No.	Equipment	Existing		Equipment	Proposed Additional	
		Number	Capacity		Number	Capacity
1	Incinerator	1	250 kg/hr	Incinerator	2	250 kg/hr
2	Autoclave	1	175 Liter/Batch	Autoclave	2	450 Liter/Batch
3	Shredder	2	250 kg/hr	Shredder	4	250 kg/hr
4	Chemical Disinfection unit	1	500 Kg/hr	Chemical Disinfection unit	1	2000 kg/hr

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Effluent Treatment Plant	Existing Capacity of ETP: 20 KLD Proposed Actual Flow: 22.7 KLD Proposed Design Capacity of ETP: 25 KLD
Cost of Proposed Project	Rs. 2.75 Crores
Allocation for CER Activities	Rs. 5,50,000 (2% of the Total Project cost 2.75 Crores) for next 5 yrs for following activities in Siltara Primary School : -

Place: Siltara Primary School		
Year	**Type of Requirement**	**Total Amount**
2022	Plantation activity within school	10000
	Books for Library	10000
2023	Rainwater Harvesting facility	65000
2024	RO filters for Drinking water facility	30000
	Provision of Bench & Tables	60000
2025	Solar Panel Installation at school	200000
2026	Digitization of School: Computer, Internet connectivity & Projector set	175000
	Total	**550000**

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Estimated Manpower Required	The Proposed project will generate direct and indirect employment during construction and operation phase. Unit is having an existing manpower of 60 employees (Direct and indirect) and due to proposed expansion, it is estimated that, additional 70 people (20 on

	permanent basis + 50 temporary basis) will be given employment.		
Area of Land	Total Land Area is 6230 m^2. Proposed expansion will be carried out within existing premises only.		
Area of Green-Belt	Total area for green belt development: 2493m^2 (40% of total area) ➢ Green belt within premises: 2056 m^2 (33% of total area) ➢ Green belt within 5 km radius of the study area: 437 m^2 (7% of total area) **Note:** Unit will develop green belt in 437 m^2 area within 5 km radius of the study area as there is no sufficient space available within the existing plant premises.		
Water Requirement (in KLD)	**Existing**	**Proposed**	**Total**
Domestic	0.5	1.5	2
Gardening	0.7	8	8.7
Industrial	13.6	31.5	45.1
Total	**14.8**	**41**	**55.8**
Source of Water	Chhattisgarh Ispat Bhumi Limited (CIBL)		
Total Water Requirement	55.8 KLD		
Fresh Water Requirement	35.8 KLD		
Recycled Water Requirement	20 KLD		
Waste water Generation (in KLD)	**Existing**	**Proposed**	**Total**
Industrial	6.1	16	22.7
Domestic	0	1	1
Total	**6.1**	**17**	**23.7**
Mode of Treatment Industrial	Sent to Effluent Treatment Plant and treated wastewater will be reused for Vehicle washing and incineration, scrubber within plant premises.		
Domestic	Sent to Sewage Treatment Plant and treated waste water will be reused fr gardening.		
Power Requirement	Existing: 100 KVA Proposed: 150 KVA Total: 250 KVA		
Source of Power Supply	Chhattisgarh State Power Distribution Company Limited		
Emergency Power Supply	D.G. Set Existing: 100 KVA (1 nos.) Proposed: 100 KVA (1 nos.) Total: 100 KVA each (2 nos.)		

Fuel Requirement DG Set Each Incinerator Each	 LDO/Diesel - 30 Liters/Hr each LDO/Diesel - 5 kg/hr each
Sources of Gaseous Emissions	Common stack of Incinerator 1 & 2 Height: 30 m Diameter: 0.8 m Stack of Incinerator 3 Height: 30 m Diameter: 0.8 m Stack of DG set (2 nos.) Height: 3 m Diameter: 125 mm
Air Pollution Control Measures	APC system of each Incinerator will consist of Gas Quencher, Ventury Scrubber, Polishing scrubber along with 30 m stack. Note: Incinerator 1 & 2 will have a common stack of 30 m height.
Solid / Hazardous Waste Generation	Incineration ash – 1000 kg/day ETP Sludge – 200 kg/day Plastic Waste after Autoclave and shredding – 2200 kg/day Glass and metallic body implants After Autoclave – 1250 kg/day Metal Sharps after Autoclave and Shredding – 150 kg/day Waste oil – As generated Used batteries – As generated **Non-Hazardous waste** STP Sludge - As generated
Solid / Hazardous Waste Disposal Management	Incineration ash – Sent to TSDF for landfilling ETP Sludge – Sent to TSDF Plastic Waste after Autoclave and shredding –Sent to authorized recyclers/in-house plastic dana recycling unit Glass and metallic body implants After Autoclave – Sent to authorized recycler Metal Sharps after Autoclave and Shredding –Sent to foundry for metal recovery / TSDF Waste oil – shall be send to authorized recycler Used batteries – shall be send to authorized recycler STP Sludge - Reused as manure in gardening

2.4 Process Description

A. Incineration Plant

In the incineration plant, stationary installed primary combustion chamber will be operated in presence of air where 800°C (± 50°C) temperature is maintained. The temperature will be maintained by controlling excess air and by support of fuel such as LDO/Diesel through temperature controller. The flue gas from the primary chamber is taken to post combustion chamber where flue gas temperature is elevated to 1050 °C ± 50 °C and provided minimum 2 seconds retention time to achieve destruction of toxic organic compounds. In case of Expired cytotoxic drugs and items contaminated with cytotoxic drugs, same shall be incinerated at temperature >1200 C. Bottom ash having TOC less than 3% or LOI less than 5% is collected in solid form from the bottom of the furnace. Flue gas from the secondary combustion chamber is then taken to Air Pollution Control System to achieve the flue gas disposal norms before it is vented to atmosphere.

Proposed Incineration Plant will be designed for following condition:

Capacity:-
Existing: 250 kg/Hr x 1 Nos.
Proposed Additional: 250 kg/Hr x 2 Nos.

Average GCV of waste: 2750 kcal/kg
Thermal Capacity of Incinerator: 250 x 2750 = 5500000 kcal/hr each

Further process description and Technical Specifications of Incinerator are provided in EIA report**.**

B. Autoclave

The primary purpose of autoclave is to sterilize / disinfect the waste with steam. Microorganisms which contribute to infection do not survive beyond 80 °C. However, as a precaution Bio-Medical Waste (Management & Handling) Rules, 2016 has stipulated a temperature of 121 °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 disinfected 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. It is proposed to install Horizontal rectangular autoclave, single hinge door Autoclave.

Design Capacity:

Existing: 175 litre/batch x 1 Nos.
Proposed Additional: 450 litre/batch. x 2 Nos.

Further description and Technical Specifications of Autoclave are provided in EIA report**.**

C. Shredding

Medical waste that is subjected to an autoclave is often also subjected to a compaction process, such as shredding, after treatment so that it is no longer recognizable and cannot be re-used for other purposes. The compaction process reduces the volume of the treated waste significantly. After treatment and compaction, the treated waste is combined with general waste and disposed to landfill. Waste that is treated using an autoclave is still recognizable after treatment, and therefore must be shredded after treatment to allow for disposal with general waste. Shredder is equipped with hopper of adequate size to accept the material to be shredded. The hopper is also provided with a lid, which can be locked during operation. The hopper is well designed to take care of volume and weight of the material. The hopper directs the materials to the cutting chamber. The shredded waste is then packed in a black-coloured HDPE bags.

Design Capacity:

Existing: 250 kg/hr x 2 Nos.
Proposed Additional: 250 kg/hr x 4 Nos.

Further process description and Technical Specifications of Shredder are provided in EIA report**.**

D. Chemical Disinfection Unit

Chemical treatment using at least 1-2 % of Sodium Hypochlorite having 30% residual chlorine for 20 min or any other equivalent chemical reagent that should demonstrate $\log 10^4$ reduction efficient from microorganism.

Design Capacity:

Existing: 500 kg/hr x 1 Nos.
Proposed Additional: 2000 kg/hr x 1 Nos.

Further process description and Technical Specifications of Chemical Disinfection Unit are provided in EIA report**.**

3. Description of Environment

Baseline environmental status in the study area was studied for the various environmental attributes, as delineated in TOR, between **1st March 2021 to 31st May 2021** at different locations, including the project site. The water (surface and ground), soil, air and noise samples have been collected and analyzed by NABL accredited laboratory ENPRO Enviro Tech and Engineers Pvt. Ltd. (Environmental Laboratories). All the samples were collected, preserved and analyzed as per the standard procedures / methods.

Sr.	Environmental Attributes	Baseline Status
1.	**Ambient Air Quality**	8 stations - at project site & within the study area
	Observation - PM_{10} $PM_{2.5}$ SO_2 NO_X CO NH_3 HC VOC PAH	59 - 108 µg/m^3 28 - 66 µg/m^3 3 - 17.1 µg/m^3 10.2 - 24.3 µg/m^3 Below Detection Limit (BDL) Below Detection Limit (BDL) Below Detection Limit (BDL) Below Detection Limit (BDL) Below Detection Limit (BDL)
	Inference	All results (average) were found within NAAQ permissible limits.
2.	**Meteorological Status**	Meteorological data for period of **1st March 2021 to 31st May 2021** was collected by NABL accredited laboratory ENPRO Enviro Tech and Engineers Pvt. Ltd. (Environmental Laboratories).
	Observation	Winter season Pre-dominant wind – W-SW to E-NE Calm condition– 1.59 % Average wind speed – 2.41 m/s Maximum wind speed – 8.4 m/s Temperature range – 14.3 °C to 43.7 °C Relative Humidity range – 12.7 % to 96.7 %.
	Inference	Nearest residential area is Chaorda Village which is 1.3 km away from project site.
3.	**Water Quality**	Surface water samples were collected from 7 different sources – 1) Lake in Sondra 2) Kharun River Location 1 3) Lake in Dharsiwa 4) Lake in Mandhar 5) Lake in Bhimbhori 6) Lake in Kapsada 7) Kharun River Location 2 Ground water samples were collected from 7 different locations – 1) Charoda 2) Siltara 3) Munrethi 4) Sondra 5) Dharsiva 6) Urla 7) Deroi
	Observation	**Surface Water**: Surface water of all samples has BOD except sampling site 5 (Lake in Bhimbhori) and also

Sr.	Environmental Attributes	Baseline Status
		the presence of coliform, which makes it unsuitable for drinking purpose. Presence of coliform and in all samples may be due to domestic activity carried out near river bank and lakes. 8) **Ground water**: Ground water sample analysis results indicate that TDS of all sample points are within desirable limit (<500 mg/L) except Munrethi and Sondra locations where TDS levels are 745 mg/l and 845 mg/l respectively. Presence of BOD and COD has been observed in all samples. Microbiological parameters Coliform and Fecal Coliform are observed <2 in Ground water. However, due to project activities there will be no significant impact on any of the above sources of water because unit has proposed ZLD scheme for treatment of effluent. ZLD scheme will enable possibilities of reusing treated water which will reduce fresh water demand. The requirement of fresh water will be provided by Chhattisgarh Ispat Bhumi Limited (CIBL).
	Inference	Surface water is advisable to use for drinking purpose after Conventional water treatment and disinfection treatment. However, it can be use in household activities after conventional treatment only. Ground water requires RO treatment for drinking purpose. However, Ground water is fit for non-direct contact domestic purpose after basic filtration treatment.
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 43.6 - 72.3 dB [A] and 35.7 - 65.8 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 & Chemical	pH ranged from 6.87 to 7.52 at 25 °C Electrical Conductivity ranged from 0.136 to 0.425 mS/cm. Exchangeable Sodium content ranged from 82.5 to 216 mg/kg soil. Exchangeable Potassium content ranged from 74 to 142

<table>
<tr><th>Sr.</th><th>Environmental Attributes</th><th>Baseline Status</th></tr>
<tr><td></td><td></td><td>mg/kg soil.</td></tr>
<tr><td></td><td>Inference – Physical & Chemical</td><td>The pH of all soil samples is observed neutral. The cation exchange capacity of the soils is moderate. The calcium magnesium ratios of the samples reflect Calcium (low). The Exchangeable Potassium of the soil is low. The soil texture is predominantly Sandy</td></tr>
<tr><td>6.</td><td>Land Use / Land Cover</td><td>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.</td></tr>
<tr><td></td><td>Observation</td><td>-
<table>
<tr><th>SL No</th><th>LULC_Class</th><th>Area (Ha)</th><th>Area (%)</th></tr>
<tr><td>1</td><td>Water Bodies</td><td>3568.31</td><td>11%</td></tr>
<tr><td>2</td><td>Agricultural Fallow</td><td>12880.44</td><td>41%</td></tr>
<tr><td>3</td><td>Built Up</td><td>4034.13</td><td>13%</td></tr>
<tr><td>4</td><td>Industrial area</td><td>958.00</td><td>3%</td></tr>
<tr><td>5</td><td>Road</td><td>4166.75</td><td>13%</td></tr>
<tr><td>6</td><td>Open scrub</td><td>4912.00</td><td>16%</td></tr>
<tr><td>7</td><td>Railways</td><td>1166.75</td><td>4%</td></tr>
<tr><td colspan="2">Total</td><td>31686.38</td><td>100%</td></tr>
</table>
-</td></tr>
<tr><td></td><td>Inference</td><td>The area is mostly covered with Agricultural Fallow Land 41% and Open scrub around 16 % respectively of the total area.which is taken up for cultivation but is temporarily allowed to rest, cropped for one or more season, but not less than one year. Thus, total cultivable land is 41 %.The Industrial area is with 3 %, Other class is Roads within the study area 13%, Around the Agricultural Fallow edges the Settlement (Built-up area) is located and occupies around 13 %, and Railways around 4% of the total study area. It is an area of human habitation developed due to non-agricultural use and that has a cover of buildings, transport and communication, utilities in association with water, vegetation and vacant lands. The Proposed expansion project is near Industrial area land and does not have any significant impact on the surrounding villages and habitation. The water bodies cover 11% of the total area. The major water bodies cover Kharun river, Khulhana Nala, Chokara Nala flowing from S to N</td></tr>
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Sr.	Environmental Attributes	Baseline Status
7.	**Ecology and Biodiversity**	Biological assessment of the site was done to identify whether there are any rare, endangered, endemic, threatened (REET) species of flora or fauna within the project site, core zone (upto project site boundary) and buffer zone (proposed site boundary to 10 km radius). The study also designed to identify impacts and suggest suitable mitigation measures.
	Observation	The project site consists of few Trees, shrubs and few ornamental species planted by management under greenbelt. 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. Buffer zone is mostly with human habitations and agricultural fields. The water bodies cover Kharun river, Khulhana Nala, Chokara Nala flowing from S to N. Most of the region is covered with agricultural land and villages. Hence, vegetative survey mainly conducted near roadside, Pond side and near agricultural areas. There are no endangered and endemic plants present in the buffer and core zones. There are few medicinal, timber / fuel wood, fodder and other socio-economic purposes. The faunal composition was also estimated based on the direct and indirect evidences. There are no reserve forests in the study area. But few plantations and protected forests with fairly dense scrub and open scrub forests are present here.
	Inference	The ratio between abundance and frequency was used to interpret the distribution pattern of species (Whitford, 1949). Distribution pattern of species in the study area is identified as **random distribution** as the value of A/F ratio is **0.039.** The Shannon indices value of buffer zone is **2.794** indicates **moderate diversity** within the study area. Population size and Dominance of the species is **6.4%** (Very less domination, which means no individual or few tree species are occurred continuously in the study area) and Evenness is around **96.2%** (Indicates the species are evenly distributed in core and buffer zones).
8.	**Geology**	Proterozoic sedimentary province of Raipur Group constitutes the major geology of the Raipur district, comprising the study area. Raipur Group comprises three cycles of argillite-carbonate sequence each cycle

Sr.	Environmental Attributes	Baseline Status
		starting with a carbonate followed by argillite at places with lenticular arenaceous rocks denoting regressive phase of the sea. Undeformed and unmetamorphosed sedimentary sequence of rocks belonging to Chhattisgarh Supergroup of Meso- to Neo Proterozoic age (2000-900 million years) occupy the northeastern and mid-eastern part of Raipur district.Raipur Group is classified into Charmuria, Gunderdehi and Chandi formations. Charmuria Formation is dominantly a carbonate facies and is represented by cherty limestone, dark grey, chertiferous and argillaceous limestone and purple phosphatic limestone. Gunderdehi Formation is dominantly a calcareous- argillite litho facies. It comprises calcareous, highly friable, purple shale associated with imperistent stromatolytic limestone bands, and intra-formational arenite. It comprises stromatolytic limestone and dolomitic limestone with ferruginous and glauconitic sandstone
	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. The limestones, shales, dolomites and sandstones belonging to the Chhattisgarh Supergroup of Proterozoic age form the main aquifer systems in the area. Ground water occurs in phreatic condition in the weathered mantle of these rocks, which extends up to a depth of 25 m below ground level (m bgl). The caverns formed in limestones and dolomites holds good amount of ground water which are limited mostly to around 80 meters. Charmuria limestone and Gunderdehi shale are not very good yielding. Cavernous limestone of Chandi formations forms good aquifers in the district. The alluvium blanket along the major rivers also form good repository of ground water. Under ground water exploration programme Central Ground Water Board (CGWB) has drilled 128 bore wells in them Raipur district, which includes study area, ranging in depth from 30 to 304 m and giving high yields up to 40 liters per second (lps). The

Sr.	Environmental Attributes	Baseline Status
		transmissivity of the Chhattisgarh formation ranges from 1.00 to 1108 m^2/day and specific capacity ranges between 2 and 20 lpm/m of draw down and storativity ranges from 0.003 to 0.000224. The transmissivity value of Chandi Formation varies from 2.2 to 110 m^2/day, whereas Tarenga Formation has transmissivity values ranging from 9.6 to 166 m^2/day. The limestone and shale of Charmuria and Gunderdehi Formations have very low transmissivity values varying from 1 to 2.5m^2/day. The yield of wells in granite complex ranges from negligible to 10 lps with the average value around 2 to 5 lps, but its occurrence in the district is minimal (CGWB, 2013). Moderate to thin cover of alluvium occurs along Karun River and its stream courses. The unconsolidated formation of Quaternary age comprising fluvial alluvium, clay silt, laterite etc form thin and extensive unconfined aquifers in several isolated patches and near river and its stream courses with thickness up to ~20 mbgl. The alluvium cover has primary porosity where phreatic aquifer is developed. The yields generally vary from > 1.0 to 5.0 lps.
	Inference	Behaviour of ground water level is essentially controlled by physiography, lithology and rainfall. There is general decline and rise of water during pre- and post-monsoon seasons. The rises are due to the general buildup of water levels in response to rains, and declines are due to erratic monsoon, less recharge (due to urbanization), and exploitation of groundwater resources. During the field surveys in the study area well inventory of representative dug / borewells were undertaken, the depth to water levels in the villages covering the study area varied from 2.0 to ~10.0 meters below ground level (m bgl). The dug wells usually show phreatic, and the borewells indicate semi-confined conditions. 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 Dharsiwa Block in Raipur District is in the safe category with a groundwater draft of 6512 ham as against the available resource of 9545 ham, and the stage of ground water development is 68 %, which

Sr.	Environmental Attributes	Baseline Status
		denotes a scope for further development.
9.	**Socio-Economic Status**	Data was collected through secondary sources like Census 2011 & Government department and Primary sources like field visit & interactions with villagers. Socio-economic survey was conducted in nearby sample villages like Siltara, Charoda, Sondra, Munrethi etc. In the 10 km of the study area.
	Observation	There are total 29 villages & 2 towns falling within study area of 10 km radius. Total Household within study area is 38482 and Total Population is 179144. Total Male population is 93100 and female population is 86044. Among 29 villages & 2 towns falling within study area of 10 km radius, litracy rate was found to be 65 %. out of total 179144 people, 118150 people is literate and rest 60994 people is illiterate.It has been noticed that almost 37 % of population of study area are workers and rest 63% are non workers. Among total workers, 85% are main workers and rest 15% are Marginal Workers for all villages in study area taken together.
	Inference	The villages within the 5 km and 10 km from the project sites shows that amenities like presence of Government Primary Schools, availability of untreated tap water, Telephones, Public Bus Services, Power Supply for domestic and commercial use are present in the villages.Total Proportion of agricultural labour & labour for agricultural activities/business are gradually diminishing, while the number of non-agricultural labourers, particularly in construction sector, casual workers and others engaged in service sector is increasing steadily day by day.There are many industries like steel industry, florishing mines and infrastructural industry are present.According to data and primary survey within study area, Primary schools, Anganwadi are available in most villages. However, Middle, Secondary and Senior Secondary Schools are also available in densely populated villages depending on population size.Villages in the study area have access to primary health sub-centre or clinics within an average distance of 3-5 km. Govt Hospitals & Private Doctors of almost all disciplines/ specialists, medical facilities are available at Dharsiwa and Siltara.

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, incineration scrubber etc. within plant premises, there will be reduction in the fresh water requirement. 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.

Incineration furnace will be operated as per CPCB guideline for bio medical waste incineration and it will be ensured that complete destruction of organic and toxic compounds to basic elements occur. APC system of rotary incinerator will consist of Gas Quencher, Ventury Scrubber, Polishing Scrubber,ID fan and Stack of 30 m height. Modelling of pollutant emission (TSPM, HCL, NO_X) was carried out using AERMODCloudTM Version 18.3 Rev. 111 to assess incremental ground level concentration within study area. Incremental ground concentration due to proposed project was found insignificant in study area.

There shall be an insignificant effect on ecology, biodiversity, geology and hydrogeology aspects. Excavated soil will be reused at site for elevating level of the plot and will be also used for plantation, As unit is existing, it does not have sufficient space to develop 40% green belt within premises. However, unit has proposed to develop green belt in 2056 m2 area within plant premises which is 33 % of the total plot area. Remaining 437 m2 green belt shall be developed in 5 km radius of the study area to cover total 40 % green belt development. Impact identification matrix has been developed which indicates insignificant negative impact on environmental attributes due to proposed project activities. Necessary precautions will be carried out to control odour.

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 / Attribute	Parameters	Frequency & Responsible Party
1.	Ambient Air quality	Particulate Matter [$PM_{2.5}$] & [PM_{10}], Sulphur Dioxide [SO_2], HCl, Nitrogen Dioxide[NOx] and Carbon Monoxide [CO] , VOC	Once in 3 months at project site and at Villages within 10 KM radius (Min 3 stations) By External Lab
2.	Process Gas Emission from Stack (Incineration)	PM, HCl, NOx	Once in 3 months By External Lab
		HF, Total Organic Carbon	Once in 3 Months By External Lab
		Dioxin & Furan	Once in a year By External Lab
3.	Emission from Stack (Incineration)	CO, O2 (Or as added in future by CPCB)	Online monitoring (CEMS) connected to CPCB / SPCB server
4.	Work Place Monitoring	$PM_{2.5}$, PM_{10}, SO_2, NO_X, Noise, Temperature, Humidity.	Once in 3 Months by External Lab. Or In house by EHS Exe./ Sr. Chemist
5.	Ground Water	As per IS 10500	Twice in a year (except monsoon)
6.	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 internal lab (Or On line as per future guideline of CPCB)
		Flow at inlet and outlet	On line monitoring on continuous basis provided with recorder
7.	Noise	Equivalent Noise Level - dB (A) (At least 1 hr. continuous)	Once in 3 Months by external lab
8.	Soil	pH, EC, Moisture, Organic matter, N, P, K, $SO4^{-2}$, Cl^{-}, Ca^{+2}, Mg^{+2} & Na^{+}	Once in a year
9.	Hazardous Waste	General Parameters	Once in a year by External Lab.
10.	Greenbelt	Number of Plantation	Throughout Year at regular

		(Unit), Number of Survived Plants/Trees, Number of Poor Plant/Trees	interval: In House by EHS Executive & other EMC members
11.	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 expansion site indicates the characteristics of hazardous wastes that pose potential for an emergency situation. All the components of proposed expansion of Bio Waste management shall be thoroughly examined to assess their potential for initiating or propagating an unplanned event/sequence of events, which can be termed as an accident or emergency.

At the proposed expansion of SMS Watergrace Enviroprotect Pvt. Ltd. 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,
- Veterinary facilities,
- Medical research facilities.

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, veterinary facilities, and medical research facilities and other chemicals, alcohols, disinfectants, anti-neoplastic agents, heavy metals (e.g. Mercury), etc. are received to the facility. 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 which includes: 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 Assessment has been carried out for the following areas:

1. Other Operational Activities Carried Out at Site

- Biomedical Waste transportation from generation site to Bio-Medical Waste Treatment Facility (SMS Watergrace Envirotech Pvt. Ltd.) site
- Weighing and Sampling of Waste
- Incineration activity
- Autoclaving activity
- Shredding
- Cleaning of sludge
- Working/ cleaning over compartment

Working near DG room & Maintenance work (Electrical) 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 CBMW 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 expansion 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 of expansion is predicted to yield a positive impact on the socio-economic setting. It helps to sustain the event of the world together with any development of physical infrastructural facilities. The useful impact of projecd project on the civic amenities are substantial once the commencement of project activities.

Proposed expansion project will generate direct employment. During construction and operation phase, it will need skilled, semi-skilled and unskilled workers which will be sourced

from the local area. Unit is having an existing manpower of 60 employees (Direct and indirect) and due to proposed expansion, it is estimated that, additional 70 people (20 on permanent basis + 50 temporary basis) will be given employment.

There will be indirect employment due to facility due to need of various plant consumables such as plastic bags and its distribution, generation of recyclable materials such as disinfected plastics and glass. There will be temporary employment generation during plant construction and installation work.

Moreover, The management proposes to spend Rs. 550000 (2% of the Total Project cost 2.75 Crores) towards social development activities in upcoming 5 years. Based on socio economic survey and based on quality of life in the vicinity, following activities are proposed to be carry out as CER funding.

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

Occupiers who are giving waste, is 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.