



Auditing, PMC & Monitoring Services for a CHWTSDF in the State of Goa

INCEPTION REPORT

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Submitted to,
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PROJECT SUMMARY

At present, Goa state does not have CHWTSDF. The Hazardous Waste generated in the State is sent to other states for treatment. As per the study done by SMS Envocare, there are 18 Industrial Estates and 861 industries (approx.) generating nearly 80,000 MTPA of Haz Waste. Hence GWMC took an initiative to setup an CHWTSDF in Goa. MoEFCC has provided an EC for setting 25000 MTPA Haz Waste plant in Pissurlem Village Satari Taluka of North Goa District. M/s. SMS Envocare Ltd., has been appointed as the operator of the CHWTSDF under a PPP scheme. GWMC invited RFPs No GWMC/Tech/78/2017-18 dated 23 march 2018, from reputed technical Consultants for rendering PMC support for the project.

M/s. Paradigm Environmental Strategies Pvt. Ltd. has been appointed as Consultant for carrying out the Project Management Consultancy and Auditing services (PMC) and is be responsible for Concept to Commissioning of the project starting from reviewing the existing documents to successful implementation to monitoring of the operation of CHWTSDF vide their LOI GWMC/Tech/78/2018-19/369 dated 20 June 2018 and executed an agreement dated 25 July 2018.

This inception report covers the Objectives, detailed scope of work, Methodology, Time line for deliverables, Progress so far and Way forward.

I.INTRODUCTION

1.1. Background

Goa covers an area of 3702 square kilometers and comprises of two districts viz North Goa and South Goa. Boundaries of Goa State are defined in the North Terekhol River which separates it from Maharashtra, East and South by Karnataka State and West by Arabian Sea. Goa lies in Western Coast of India.

Goa, for the purpose of revenue administration is divided into two districts viz. North and South Goa with headquarters at Panaji and Margao respectively. The entire State comprises of 11 talukas. Administratively the state of Goa is organized into two districts North Goa comprising of six talukas with a total area of 1736 sq. kms. & South Goa comprising of five talukas with an area of 1966 sq. kms. In all there are 383 Villages of which 233 are in North Goa district and 150 South Goa district.

Goa has seen a steady growth of industries in the recent years. Government of Goa, while encouraging industrial growth, is also conscious about the Environmental impacts of the industries. Thus, the Governments efforts have been targeted to ensure better compliance to environmental laws and encouraging industries which are low polluting in nature. While the problem of effluent and air pollution can be controlled through readily available & comparatively low cost in-plant treatment technologies, Hazardous waste generated needs treatment and disposal which cannot be undertaken at individual industry level, as this will result in creating pollution hot spots at multiple locations.

The State of Goa has 861 Hazardous Waste generating industries. Presently there is no Common Hazardous Waste Treatment Storage and Disposal Facility (CHWTSDF) within Goa State. Industries here are required to dispose their Hazardous Waste in other nearby States which poses following problems:

- Objections are raised by other States on being used as “dumping” ground
- Uneconomical due to high transport cost



Figure 1: Map of Goa in India

- Hazards during long distance transportation

In view of the same, Government of Goa is taking steps to establish common facilities for treatment and disposal of Hazardous Waste. In order to support the government initiative, Goa Industries Environment Management Association (GIEMA) took active interest and approached Government of Goa to locate a CHWTSDf in Goa.

Goa Industrial Development Corporation (GIDC) has allotted the requisite plot at #5, Pissurlem Industrial Estate Phase I, Sattari, Pissurlem, a notified Industrial Estate. The total plot area allotted is 77,574 sq.m which includes a green belt area of 20,320 sq.m which is as per the 15% norms. The proposed facility has a Secure Landfill of capacity 25,000 TPA for direct landfill and a 1.5 Ton/hour for incineration of incinerable waste.

The project has secured the necessary clearance mandated under the EIA Notification S.O. No 1533 dated 14th Sep 2006 and its subsequent amendments as the proposed project is falling under Project / Activity 7 (d) Common Hazardous Waste Treatment, Storage and Disposal Facility (CHWTSDFs), Category “A” (All Integrated facilities having Incineration and landfill or Incineration alone) and requires environmental clearance from Expert Appraisal Committee, at MOEFCC, Delhi vide F No 10-17/2016-1A-III dated 1st August 2017

1.2. Objectives of the Study

The main objectives of the assignment are as follows:

- a. Audit all the design and construction parameters for the Entire Project with analysis of the type of incoming waste, its composition, nature of storage, processing and disposal.
- b. monitor the incoming waste, its unloading and storage mechanism, processing techniques and disposal methods.
- c. provide adequate consultancy services to GWMC and the State of Goa in allied areas of legal ratifications, social awareness, systems and technology etc.

1.3. Scope of the Assignment

The Scope of services that shall be provided during the course of this assignment are as follows:

Output 1: Planning stage

- a. Review geological, hydrogeological, geotechnical and topographical surveys
- b. To analyse the waste Inventorisation of the hazardous waste in the State of Goa including characterization and current disposal mechanism unit wise
- c. Review the hazardous waste transportation and storage plans compliance to Hazardous

and Other Wastes (Management and Transboundary Movement) Rules 2016 and good management practice

- d. Suggest measures for effective 5 R's concept
- e. Review and recommend for approval of the engineering designs, detailed cost estimates and implementation in compliance with Hazardous and Other Wastes (Management and Transboundary Movement) Rules 2016 and recommendations of the Environment Clearance as well as scope of concession
- f. Ensure compliance to the scope of work of the operator of the facility regarding statutory/mandatory provisions in respect of labor laws, taxes/award of works to contractor and the Hazardous and Other Waste (Management and Transboundary Movement) Rules 2016
- g. Review the staffing pattern shall be submitted for the project
- h. Web design should enable online monitoring of hazardous waste from end to end
- i. Recommend tariff for HW generating units for website maintenance

Output-2: Implementation Stage

- a. Ensure quality control during construction, establishment of onsite lab by contractor, in accordance with specifications
- b. Train the implementing team in Inhouse quality testing as needed
- c. Suggesting modifications, if any, due to site conditions and submit the recommendations along with cost implication to GWMC for approval
- d. Ensure regular and timely flow of tasks as per **PERT/CPM chart and suggest counter measure for contingencies.**, record delays under force majeure
- e. Evaluation of work done, certification of bills in accordance with the design, quality etc. and compliance to the Hazardous and Other Waste (Management and Transboundary Movement) Rules 2016 and maintain necessary computerized measurement records of CTPD and other site records which are to be made available to GWMC for verification/authentication
- f. Complete administration and management of contract till expiry of the contract period
- g. Coordination with statutory agencies like SPCB or other departments etc. when needed
- h. Compile all relevant contractual/ legal documents/ guarantees/ warrantees/ compensations/ penalties as appropriate during the term of the project.

Output-3: Completion of Construction Stage

- a. Submit all the statutory project documents to GWMC for obtaining "Completion/Occupancy Certificate" whenever required
- b. Review, authenticate and submit "As Built Drawings" prepared by the Contractor at an appropriate scale indicating the details of project facilities to GWMC.
- c. Evaluation of work and final bill submitted by the contractor, certify and recommend as per the terms and conditions of contract agreement of work on its completion and issuing completion certificates for the completed works, to enable GWMC to record completion

of the works.

- d. Assist in obtaining statutory approval/approvals of GSPCB/MOEF with respect to the completed works
- e. Prepare asset register of the entire facility on completion and prepare documentation/operation manual and records for GWMC
- f. Prescribe and certify adherence to maintenance schedules and list of consumables to be kept in inventory from time to time
- g. Prescribe monitoring committee, monitoring schedule and biannual monitoring meeting.

Output-4: Operation and Maintenance of Project Facilities

- a. Review the O & M and ensure that the contractor/s operate/s and maintain/s the Project Facilities in accordance with the SOP
- b. Review the data regarding the Hazardous Waste received, landfilled, incinerated and recycled and recommend methods and ways for reducing waste to be incinerated and landfilled
- c. Support GWMC in complying with the Authorities especially the State Pollution Control Board and the Hazardous and Other Wastes (Management and Transboundary Movement) Rules 2016.
- d. The Project Management Consultant shall with due diligence ensure that the contractor/s carry out all necessary and periodical Tests and maintain proper record of such Tests and remedial measures taken to cure the defects or deficiencies, if any, indicated by the Test results.
- e. Witness, review and approve Tests to ascertain compliance and acceptance with O&M Requirements.
- f. Ensure that the operator adheres to ISO 9001, ISO 14001 and OHSAS 18001 standards.
- g. Suggest Systemic changes based on analysis and evaluation of data.
 - Propose infrastructure and systems including route mapping, timings etc., required to deliver improvements, monitoring mechanisms and operational performance criteria with penalties and incentives to the existing eco-system.
 - Propose draft guidelines for the deletions, improvements, enhancements and fresh processes to be brought into play, and guidelines for their implementation including social behavioral change and behavioral change of promoters and owners of industrial units generating Hazardous Waste.

II.APPROACH & METHODOLOGY

This section details the approach and methodology that is proposed to be adopted for accomplishing this.

Figure 2: Methodology and Deliverables

Work Streams	Key Tasks	Deliverables
Kick of meeting	✓ Resource mobilization ✓ Identifying the concerned stakeholders ✓ Collecting data from the concerned stakeholders	Inception Report
Waste inventorization, DPR review, Validation of TSDF design/drawings. Waste logistics plan, Quality Assurance Plan, Procurement planning	✓ Review of the existing baseline data, Engineering design, drawings, detailed report and implementation schedule ✓ Review of BOQ and detailed cost estimates ✓ Revalidate the waste inventory, gap analysis ✓ Establish real-time dashboard for waste tracking ✓ Recommend lab protocol and facilities for QA ✓ Transportation and storage plans ✓ Plan of special vehicles, vendor selection ✓ Validation of final execution drawings ✓ Recommend gate fee for various waste	Approval of Good for Construction Implementation schedule Inventory report Logistic plan
Project Management Consultancy Monitoring, verification, reporting	✓ Witness, review and approve tests to ascertain compliance ✓ Modification of design, drawings wrt the site condition ✓ Verification and certification of Bills ✓ Review and approve as-built drawings ✓ Commissioning of CHWTSDF facility ✓ Preparation of HWM Policy complying to HWM rules ✓ Recommend the establishment of site lab for QA ✓ Establishment of Operation manuals, laboratory trainings, template and checklists ✓ Develop point estimates, carry out Pareto analysis for implementation of 4 R's and impart training to the generators and thereby recommend policy changes	SOP preparation and Monthly reporting
Operation & Maintenance	✓ Verify and monitor waste receipts, treatment and disposal ✓ Ensure maintenance of updated dashboard on real-time basis ✓ Ensure that operator adheres to ISO & OHSAS	Daily monitoring

Figure 3: Methodology and Deliverables

2.1 Implementation Schedule

The following time shall be adhered to during the implementation of the contract. The agreement date is reckoned as the “Zero date” for this contract

Stages	Milestone	No Later than
1	Submission of Inception Report	0.5 month from Zero day
2	Inventorisation of Hazardous waste data of Goa State	6 months from zero day
3	Review of DPR and recommendations for proposed CHWTSDF	2.5 months from zero day
4	Review of the design calculations /drawings	1 month from submissions of review and recommendations report
5	Project Management Consultancy on the progress of the setting up of the project and the operations	As per the progress of the setting up of the project this will be a monthly review after the construction of the facility commences.
6	Monthly monitoring report of construction and operations of the facility as per bar chart agreed.	Monthly
7	Commissioning of facility in all aspects of transportation and disposal	After submission of the commissioning report.
8	Monthly monitoring report of operations for 3 years after commencement of the operations	Monthly after commissioning of the facility and commencement of operations.

Table 1: Implementation Schedule

III. GOA STATE HAZARDOUS WASTE SCENARIO

The following section describes the status of Haz Waste generation within the State of Goa. The data is obtained from the GSPCB for the year 2016-2017. The latest data is awaited.

3.1 Industry profile

Out of the 3602 working industrial units covered under consent mechanism 912 units are found to be generators of hazardous wastes as defined under the Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016”.

Goa currently has over 8,535 small scale industrial units, 157 large and medium scale industries employing over 60,000 people. The State has established 20 industrial estates; some of them are among the best in the country. The industrial activities encompass about 50 sub sectors which include tourism, pharmaceuticals, electrical and automobile accessories etc.



Figure 4: Map showing Industrial Estates

3.2 Hazardous Waste Profile

The Haz Waste generation is also increasing in proportion to the industrial growth. The lack of a dedicated CHWTSDf facility within the State is posing immense pressure on the industries in complying with the HW Rules 2016.

The DPR prepared by the operator M/s. SMS Envocare Ltd., in 2016 indicates that there exist 20 industrial estates in Goa and 861 Hazardous Waste generating industries which together generates about ~80,000 MTPA of industrial Hazardous waste every year. The present status of generation and management of hazardous waste in the State of Goa is as shown in the chart below:

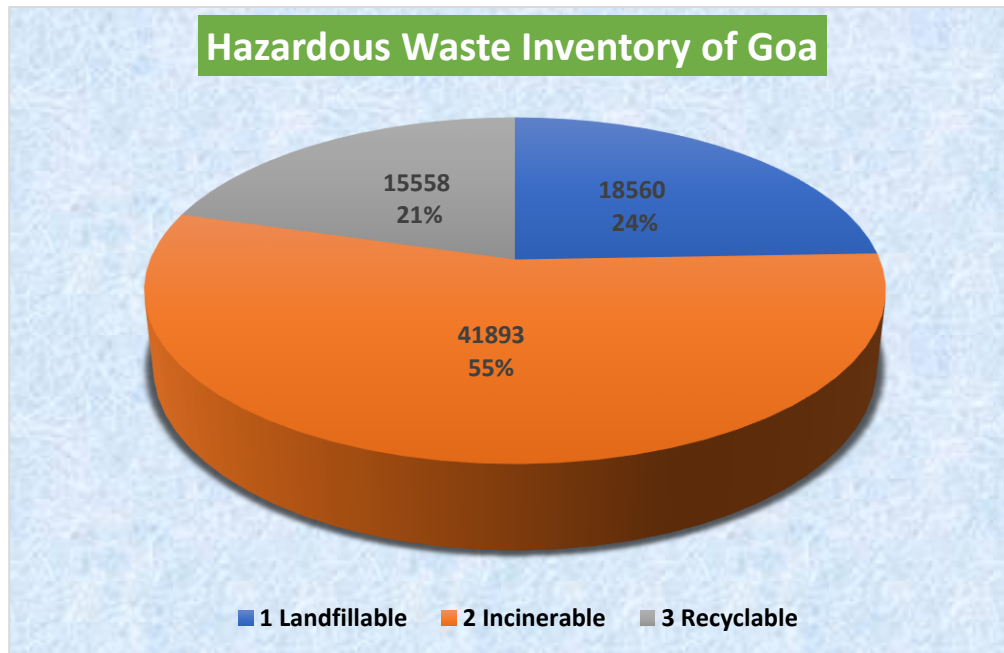


Figure 5: Hazardous waste Treatment distribution in million Tons per Annum (As per DPR)

The data needs reconciliation and validation in active collaboration and support of GSPCB and generating industries represented by GIEMA

IV. LEGAL COMPLIANCES

The CHWTSDf project has obtained the following clearances

- i. Environmental Clearance dated 1st Aug 2017, F.No. 10-17/2016-IA-III, Ref: 1A/GA/MIS/49446/2016 dated 9th March 2017
- ii. Consent to Establish (The Water Act 1974)
- iii. Consent to Establish (The Air Act 1981)

4.1 Salient features of the EC

The operating conditions of the EC is highlighted below:

The EC review dated 1st Aug 2017, F.No. 10-17/2016-IA-III, Ref: 1A/GA/MIS/49446/2016 dated 9th March 2017 Plot No. 5, Pissurlem Industrial Estate Phase-I, Pissurlem Village sattari Taluka, District North Goa by M/s. SMS Envocare Limited.

- a. Direct landfill: 25000 TPA
- b. Incineration: 1.5 Ton/Hr
- c. Total Plot area: 77,574 Sqm.
- d. Two tiered green belt of 10 m width all around plot
- e. Total water requirement: 205 cum/d from Goa Industrial Development Corporation Goa
- f. Wastewater generation: 85 cum/d
- g. ETP treatment: Screening > O&G Trap > Equalization tank > 1^o settling tank > Aeration tank > 2^o settling tank clarifier > PSF & ACF filter > MEE unit > Final treated water tank > Recycle within plant. Effluent will be fully recycled within plant
- h. Power requirement: 250 KVA from Goa state Electricity Board
- i. DG set: 320 KVA DG set for emergency use
- j. ESZ: The Madei wildlife sanctuary is 1.2 km to North-East and the Bondla Wildlife sanctuary is 6.5 km to SW
- k. Estimated Project cost: Rs. 98 Crores
- l. Employment generation: Construction phase: ~ 65 workmen and Operation phase: 27 workmen

Part A: Specific conditions

- Air pollution control devices: Gas quencher, treatment with mixture of hydrated lime and activated powder for adsorption of partial acidity and VOCs; bag filter/ESP for removal of particulate matter; ventury scrubber followed by packed bed scrubber with caustic circulation to neutralize the acidic vapours in flue gas; and demister column for arresting water carry over will be provided to the incinerator. Online pollutant monitoring shall be provided as per CPCB guidelines for monitoring particulate matter, SO₂, NO_x and CO from the incinerator stack. The periodical monitoring of Dioxins and Furans in the stack emissions shall be carried out.

- Incinerator shall be designed as per CPCB guidelines. Energy shall be recovered from incinerator.
- Sufficient number of Piezometer wells shall be installed in and around the project site to monitor the ground water quality in consultation with the SPCB/CPCB. Trend analysis of ground water quality shall be carried out each season and information shall be submitted to the SPCB and the Regional office of MoEF&CC
- Spill control measures for various chemical periodically Ground water/ Soil monitoring to check contamination
- Leachate arising from premises should be collected and treated in the ETP followed by RO. RO rejects shall be evaporated in MEE. Toxicity Characteristic Leaching Procedure (TCLP) test to be performed on leachates.
- Gas generated in SLF to be collected monitored & flared.
- Pre-medical check to be carried out at employment and record maintained.
- Emergency plan consultation with SPCB/CPCB to minimise hazards to human health/environment fires/explosions, accidental release of hazardous emission to air, water, land
- Rain water harvesting shall be provided
- Noise level <78 db
- EC to be display on website
- Funds earmarked for environment protocol kept in separate account
- Statutory clearance – Diesel storage controller of explosions, Fire department, Civil aviation, Forest Conservation Activity 1972 etc.
- Authorisation/ clearance should be obtained under
 - o Water Act 1974
 - o Air Act 1981
 - o The EP Act 1986
 - o Public Liability Act 1991
 - o EIA notification 2006
- Information should be disseminated in Two local newspapers one in vernacular copy , clearance letter to be on SMS website
- Status of compliance to stipulated EC including results of monitored data should be displayed on website and updated periodically and also be sent to RO of MoEF&CC, Zonal office of CPCB, SPCB
- SPM, RSPM, SO_x, NO_x (Ambient level as well as stack emissions or critical sectoral parameter indicated for the project shall be monitored and displayed at a convenient location near main gate.

V. PROGRESS

Ecoparadigm received the letter of Acceptance over mail by GWMC on 20th July 2018. The bank guarantee was obtained on 4th August 2018.

A kick of meeting was held on August 6th, 2018 at GWMC office and discussions were carried out with the Managing Director, GWMC and Asst Manager GWMC. Meeting was held with GIEMA representative on 7th August 2018 to understand the roles of Industrial estates and its members , status land lease agreement of GIEMA and IDC and MOU (between GIEMA and SMS), SMS Envirocare (roles and responsibilities) in the presence of GWMC Authority.

Meeting was carried out with Mr Sanjiv Joglekar, Environmental Engineer - GSPCB, Panaji to discuss about EC, Inventorisation, CFE, CFO and Manifest system.

A project office and guest house has been identified close to the TSDF location. A joint meeting was carried out the President GIEMA and SMSEL on 28th August 2018. GIEMA was briefed about the data requirements from member Industries and also from the Operator SMSEL.

A preliminary checklist of basic data required were shared with SMS, GIEMA, GWMC and GSPCB. The status of the same is depicted in table below. GIEMA assured Ecoparadigm of all support and agreed to inform the member stakeholder to render necessary support and cooperation.

PRELIMINARY REVIEW

The draft inception report was presented to the stakeholders comprising of GWMC, GSPCB, GIEMA and SMS Envocare. The following were discussed and SMSEL was asked to consider them in the planning.

- a. Adequate Reception area, Monsoon storage area, Pre-treatment area and Raw material storage for pre-treatment
- b. Ensure containment for inbound liquid & semi-liquid bulk waste
- c. Validate the Transport routing system from Industry to facility
- d. Prepare Emergency plans for
 - Soil storage area
 - Liner storage area
 - Pipes storage area
 - Intractable / Incompatible storage area
- e. Validate SLF design, Incineration design including air, noise pollution equipments
- f. Leachate collection system, Leachate Management system
- g. Incorporate Storm water, Quarantine, leachate storage system
- h. Validation of Overhead Tanks
- i. Validation of air pollution measurement and commencement of measurement

- j. Identify adequate Borewells and monitor the Borewells surrounding the area and inside the facility.
- k. Preparation of Demo SLF in planning
- l. Evaluation of fire safety plant, chemicals risks, explosions, gas leakages
- m. Identification of clay borrow area, and clay modification if necessary
- n. Adequacy of existing electrical grid infrastructure, provision of DG sets and Diesel storage area
- j. Obtaining specifications of the existing SWM plan, architectural finishing details and other amenities available
- k. Preparation of Operational safety manuals
- o. Preparation of Training manuals

Inventory Study

As mentioned earlier TSDF at Goa is being sent to other nearby states for its disposal. There is no CHWTSDF facility present in the state of Goa. Presently Goa generates ~80,000 MT of Hazardous waste annually. Of the total waste, the type of Hazardous Waste which is generated in maximum quantity is the used spent oil. This falls under category 5.1 of the schedule I of Hazardous Waste.

Following desk study was carried out using the base data provided by GWMC:

- a. A study was carried out on classifying the HW generated via industries into HWM rules 2016 categories. This analysis further provides required treatment technology for appropriate treatment of review categories.
- b. For all the categories of HWM rules, appropriate analytical procedure was identified and the same is annexed in Annexure 1
- c. As per the DPR, there are total 18 Industrial Estates covering ~861 industries. Whereas, in our review of the DPR, it was observed to be 811 industries.
- d. The industry inventory of DPR was reviewed and classified all the industries into 18 Industrial Estates. It was observed that industries from Mumbai is included in the inventory.
- e. Further the industry inventory was classified into District wise and Taluka wise, this was done to identify the distance between the Industrial Estates and HWM facility. From this study, it was observed that Corlim Industrial Estate which caters to 75 industries located in Tiswadi Taluk of North Goa district produces about 44,341 MTPA HW out of Total Hazardous Waste generated. The distance of Corlim Industrial Estate to TSDF facility is about 25 Km
- f. The average distance was calculated between the Industrial Estates of North Goa and South Goa to TSDF facility of which 31 km and 56 km respectively.
- g. The HW transport vehicles study was carried out (Vendors, Specifications, additional fittings) and the same is annexed in Annexure 2
- h. In view of the HW Policy 2016, a study was carried out to form the legal requirements for intermediate storage, packing, collection and transport.

- i. A Generalized Questionnaire was prepared for performing reconnaissance survey at Generators level.

VI. WAY FORWARD

In continuation to the study carried out in previous section. Following is the tentative schedule until the year end:

Sl. No	Description	Start Date	End Date	Remarks
1	Updating inventory based on questionnaire circulated through GSPCB	30-08-2018	8-09-2018	GSPCB/Industry support/GWMC
2	Review of the CFE and CFO's of all the industries	30-08-2018	14-09-2018	GSPCB/GWMC
3	Carry out VED analysis and reconnaissance survey of all industries	15-09-2018	15-10-2018	GSPCB/Industry support/GWMC
4	Survey of roads from generators to the TSDF facility	15-09-2018	15-10-2018	
5	Review of the Topographical, Geotechnical and soil testing reports of the TSDF.	01-09-2018	07-09-2018	SMS to submit investigation report from geological/ hydro geo consultant
6	Review of the designs, drawings, BOQ and estimates required for construction. Shall be released in stages in conformance to implementation schedule	5-09-2018	30-09-2018	SMS to submit design calculations for all components
7	Laboratory equipments, layout, procedure	15-09-2018	30-09-2018	SMS to submit
8	Review of Quality assurance Protocol for implementation	15-09-2018	30-09-2018	SMS to submit
9	Finalisation of Implementation schedule	25-09-2018	30-09-2018	SMS to submit
10	Review the facilities at site lab and establish	10-09-2018	30-09-2018	SMS
11	Finalisation of procurement, inspection schedule	3-10-2018	15-10-2018	SMS to submit

The Report provides overview of the progress achieved so far and the assignments to be completed with the scheduled timeframe. The draft report was presented on 29th August 2018 and the minutes have been recorded. In addition to our scope of work, a detailed inventorisation study of ~861 Hazardous Waste generating Industries will be conducted with the support of GSPCB, GIEMA, GWMC and SMS Envocare.