FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

FOR

PROPOSED SECURED LANDFILL OF INTEGRATED COMMON HAZARDOUS WASTE TREATMENT, STORAGE AND DISPOSAL FACILITY (TSDF)

LOCATION OF THE PROJECT

PLOT NO – 940, 941, 944 AT VILLAGE – KHARPADI, TEHSIL – HASANPUR DISTRICT – AMROHA UTTAR PRADESH

TOR LETTER: 743/PARYA/SEAC/4484/2018, DATED: 9TH MARCH' 19

STUDY PERIOD: OCT. TO DEC.'2018

Baseline Monitoring by NOIDA TESTING LABORATORIES,

(An ISO: 9001: 2008, 14001: 2004 & OSHAS: 18001: 2007 Certified & NABL Accredited *Laboratory) MoEF & CC,* UPPCB & HSPCB Recognized Laboratory)

ADDRESS: GT-20, SECTOR-117, NOIDA, GAUTAM BUDH NAGAR-201301

PROJECT ACTIVITY 7(D)

CATEGORY 'B'

APPLICANT DETAILS

M/S SANGAM MEDISERVE PVT. LTD.

CONSULTANT

SHIVALIK SOLID WASTE MANAGEMENT LTD

QCI/NABETACCREDITED EIA CONSULTANT ORGANIZATION,

ADDRESS:

SCO 20-21, 2ND FLOOR, NEAR HOTEL DOLPHIN, DHAKOLI, ZIRAKPUR PUNJAB-140604

OCTOBER' 2019

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1 INTRODUCTION

1.1 PURPOSE OF THE REPORT

Hazardous waste is mostly generated from industrial activities and, if not handled and managed in safe manner, may cause threat to human health and environment. For safe storage, packaging, transportation, recycling, utilization, treatment, disposal, etc. of hazardous waste in an environmentally sound manner, Ministry of Environment, Forest and Climate Change, Govt. of India has notified Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 (HOWM Rules, 2016) suppressing the earlier Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2008, under the Environment (Protection) Act, 1986. The HOWM Rules, 2016, also lays down the responsibility of occupier of hazardous waste for their safe and environmentally sound management following the waste management hierarchy viz. prevention, minimization, reuse, recycle, recovery, utilization and lastly safe disposal. The hazardous waste can be disposed at captive treatment facility installed by the individual waste generator or at Common Hazardous Waste Treatment, Storage and Disposal Facilities (TSDFs). The common disposal facilities may have only secured land fill (SLF) or incinerator or combination of the both.

M/s Sangam Medi serve Pvt. Ltd. (SMSPL), a company incorporated under companies act, 1956 proposes to setup a Common Hazardous Waste Treatment, Storage and Disposal Facility (TSDF)., which will handle Land fillable waste (DLF) - 36,000 MTA, Landfill after Treatment (LAT) – 24,000 MTA, pre-process the Hazardous waste for Co – Processing - 40,000 MTA and E- waste recycling – 6000 MTA.

The proposed capacity of landfill (Phase-I) will be 7.1 lacs MT of hazardous wastes which will be disposed scientifically at a secured landfill. The present proposal is to serve nearby industrial areas through Integrated Common Hazardous Waste Treatment, Storage and Disposal Facility (ICHW-TSDF).

Environmental Impact Assessment (EIA) serves as useful tool in prediction of potential impacts on the surrounding environment due to developmental project. It helps the project proponent, impact assessment authorities, regulatory agencies and other stakeholders in understanding the project, environmental impacts and mitigation measures, and establishing emission requirements and other measures early in the project cycle. This report describes the project location, baseline environmental scenario, potential impacts of the project on the environment and proposed measures for effective environment management during the project cycle (Environmental Management Plan during construction and operation stage of the project).

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As per EIA Notification 2006, the Project falls under Category **"B" schedule 7 (d**) listed in EIA Notification dated 14th September 2006, under Common Hazardous Waste Treatment, Storage and Disposal Facility (TSDF).

As a part of above process, the application (Form-1 along with Pre-Feasibility Report) was submitted for the proposed Secured Landfill (Phase-I) of Common Hazardous Waste Treatment, Storage and Disposal Facility (TSDF). The project was considered by the State Expert Appraisal Committee (SEAC/SEIAA) in its meeting held on 06-02-2019 and SEIAA in its meeting dated 06-03-2019 for approval of Terms of Reference (ToR). Accordingly, TOR was approved vide letter no/Ref.No. 743/Parya/SEAC/4484/2018 dated 09-03-2019.

1.1 IDENTIFICATION OF THE PROJECT AND PROJECT PROPONENT

As per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 (HOWM Rules, 2016) of Environment Protection Act, 1986, hazardous waste generated by industries has to be collected, transported, treated and disposed in a properly designed TSDF Facility.

M/s Sangam Mediserve Pvt. Ltd. established in March 2013, promoted by professional have been successfully working in the field of waste management as per the statutory guidelines. The facility is proposed to be located near to hub of Industries where all essential facilities such as water, power, fuel, post, telecommunication, bank, etc. available. It is one of the largest industrial area of Uttar Pradesh.

The project proponent is Mr. Hari Om Sharan Dwivedi, Director, M/s Sangam Mediserve Pvt. Ltd. The proposed project shall cater to the requirement of disposal of hazardous waste generated by the Industrial units in Uttar Pradesh.

1.2 SALIENT FEATURES

The salient features of the project are summarized in **Table 1.1**.

TABLE 1-1: SALIENT FEATURES OF THE PROJECT

Sl. No	Parameters	Description
1	Identification of project	Project falls under Category **"B"**. Projects of **activity 7 (d**) as per EIA Notification dated 14thSeptember, 2006.
2	Project Proponent	M/s Sangam Mediserve Pvt. Ltd.
3	Brief description of nature of the project	As per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 as amended, of Environment Protection Act, 1986, the hazardous waste generated by industries has to be collected, transported, treated and disposed in a properly designed TSDF Facility. Under aforesaid Rules, CPCB guidelines have laid down a procedure for collection, storage,

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		transportation and disposal of hazardous wastes. The scientific disposal of landfillable hazardous waste can be done at a secured landfill, which requires proper design and operation according to existing guidelines. The proposal is to utilize the area for setting up of secured landfill.
4	**Salient Features of the Project**	
4.1	Proposed plant capacity	Proposed Capacity of secured landfill: Void space (m^3): **48000** Landfill Capacity, (Tonnes) :**7.1 Lakh** **(Waste density 1.5 mg/m^3)**
4.2	Total Plot Area	Area = 3.867 Ha (38670 Sq. Meters.)
4.3	Location	The project is located at Longitude $78^0$21'03.94" E & Latitude $28^0$27' 55.94"N. Topographically the area is flat terrain and the elevation of the plant site is between 204 - 205 m above Mean Sea Level. Site is locate in Top sheet No – 53L/7
4.4	Water requirement	The daily water demand will be 50 KLD will meet through bore well. Necessary permission from CGWA will be taken for the necessary abstraction of ground water.
4.5	Source of water	Ground water
4.6	Wastewater	Leachate / Effluent from landfill will be treated in the MEE.
4.7	Man Power	During Construction phase, the labors and workers will be hired from nearby villages Construction phase: 40- 50 workmen Operation phase: 60 workmen
4.8	Electricity/ Power requirement	Initially 62.5 KVA power is required. Additionally 100 KVA will be added. Supply source –Paschimanchal Vidyut Vitran Nigam Ltd (PVVNL). In case of power failure, D.G. Set can be used (1 nos 62.5 KVA capacity).
4.9	Alternative site	NIL
4.10	Land form, Land use and land ownership	The project is proposed to be located on agriculture land. Permission for CLU from competent authority is attached in this report as **Annexure-I**
5.0	Conclusion	The estimated cost of the Project is about Rs. 40.00 crores (TSDF Phase-I). Near to NCR maximum no. of industry are established but due to lack of TSDF site in the vicinity, industries are facing problem. M/s Sangam Mediserve Pvt. Ltd. had signed MOU with UP Govt. to develop TSDF. It's an important endeavor to mitigate the degradation of environment in the region.

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1.3 BRIEF DESCRIPTION OF NATURE, SIZE, LOCATION OF THE PROJECT AND ITS IMPORTANCE TO THE COUNTRY

1.3.1 Nature of the project

As per the Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2016 under Environment (Protection) Act, 1986, hazardous waste generated by industries has to be collected, transported, treated and disposed in a properly designed TSDF Facility. Under aforesaid Rules and its amendments, CPCB guidelines have laid down a procedure for collection, storage, transportation and disposal of hazardous wastes. The scientific disposal of landfillable hazardous waste can be done at a secured landfill, which requires proper design and operation according to existing guidelines.

1.3.2 Size of the project

The proposed project is setting up of Common Hazardous secured landfill (phase I) of TSDF (Common Hazardous Waste Treatment, Storage and Disposal Facility). The new landfill Phase-I as proposed would provide capacity of 7.1 Lacs MT for disposal of hazardous waste (assuming a density 1.5 Mg/m^3). This hazardous waste is equivalent to approximately 25 years of land filling at the current rate. The proposed landfill will be staged in cells so that the minimum practical area of waste is exposed, i.e., progressive filling and capping of the landfill ensuring minimization of infiltration of wastes.

Total cost of the proposed secured landfill project is estimated as about Rs.49.02 Crores. (Phase-I- Rs 40 Crores & Phase-II- Rs 9 Crores)

1.3.3 Location of the project

The proposed secured landfill at Common Hazardous Waste Treatment, Storage and Disposal Facility (TSDF) is situated at Plot no. 941, 942 and 944 at Village-Kharpadi, Tehsil-Hasanpur Distt. - Amroha, Uttar Pradesh. The location map of the project site is shown in **Figure 1.1 to 1.5**.

1.3.4 Connectivity

Road link

State Highway is approx.1 Km towards East direction and NH-91 is approx.35.00 Km towards NW direction from the proposed site

Rail link

The nearest railway station is Gajraula Railway Station about 35 km (Aerial distance) from project site towards North east direction. Major railway station is Ghaziabad Railway station at 100 km in North West direction.

Air link

The nearest airport is Indira Gandhi International Airport at Delhi is at 140 km (Aerial) in the South West Direction.

1.3.5 Importance and Benefits of the Project/ Need for the project to Country & Region

Hazardous Waste Management (HWM) is of global significance. The adverse impacts caused due to the indiscriminate disposal of Hazardous Wastes (HWs) are considered as technological disasters. There was no proper secured landfill facility available in India to dispose of Hazardous Waste (HW) till 1997. Very few industries in India, mostly in large scale and a few in medium scale, own proper treatment and disposal facilities (captive facility).

Hazardous Waste generated by the industries can cause environmental pollution and adverse health effects if not handled and managed properly. In order to manage Hazardous Waste (HW) mainly solids, semi-solids, solvents and other industrial wastes which are not covered by the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981, and to enable the authorities to control handling, transport, treatment and disposal of Hazardous Waste (HW) in an environmentally sound manner, The Ministry of Environment & Forests and Climate Change(MoEF& CC) promulgated Hazardous Waste (Management & Handling) Rules on 28 July 1989 under the provisions of the Environment (Protection) Act, 1986. In September 2008, the said Rules were repealed, and new Rules entitled "Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008" (here after referred as HW (M, H & TM) Rules) were notified. These rules were further modified in the year 2016.

As per Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 and its amendment under of Environment (Protection) Act, 1986, hazardous waste generated by industries is required to be collected, transported, treated and disposed in a properly designed TSDF Facility. Under aforesaid Rules and its amendments, CPCB guidelines have laid down a procedure for collection, storage, transportation and disposal of hazardous wastes. The scientific disposal of landfill hazardous waste can be done at a secured landfill, which requires proper design and operation according to existing guidelines

Based on the data provided by the State Pollution Control Boards (SPCBs) and Pollution Control Committees (PCCs), Central Pollution Control Board (CPCB) has compiled state-wise inventory of hazardous waste generating industries and published a document entitled "National Inventory of Hazardous Waste Generating Industries and Hazardous Waste Management in India based on the information received for the year 2016-17. Total landfillable hazardous waste generation in Uttar Pradesh State reported is 53417.4 MT Tonnes a year.

Source: CPCB/MOEF& CC

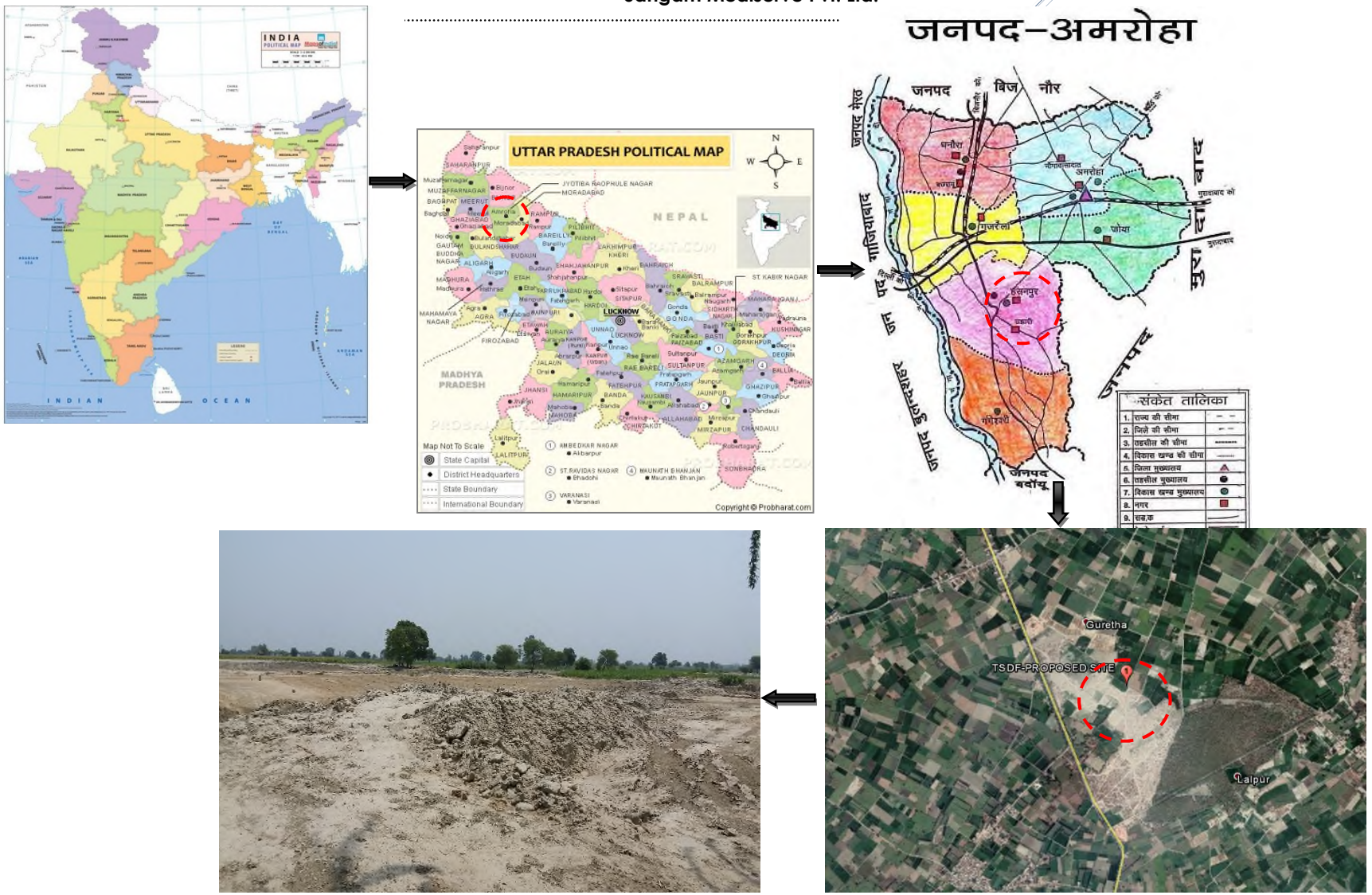

FIGURE 1-1 SHOWING LOCATION OF THE PROPOSED PROJECT SITE

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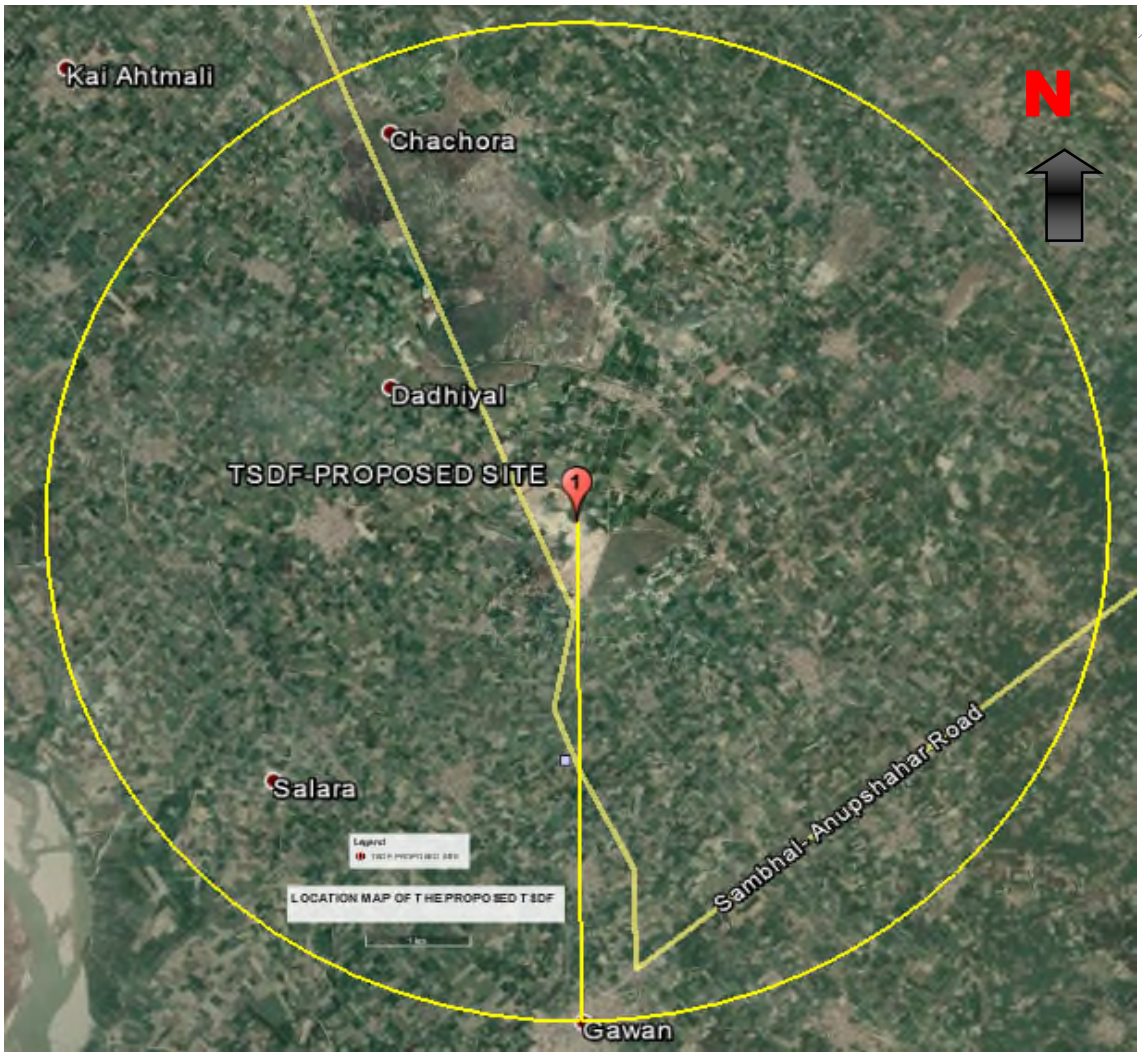

FIGURE 1-2: SHOWING 5 KM LOCATION MAP ON SATELLITE IMAGE

There are three TSDFs, which are in operation in State of Uttar Pradesh, are given in the Table.1.2.

TABLE 1-2: STATUS OF TSDF IN UTTAR PRADESH

SL. NO.	NAME AND LOCATION OF TSDF	SECURED LANDFILL (SLF) CAPACITY IN MTA	TOTAL SLF CAPACITY IN MTA	GENERATION OF LAND FILLABLE HW IN MTA
Uttar Pradesh				
1	TSDF, Kumbhi ,Kanpur	17,500	38,167	53417.4
2	TSDF at Banthar, Unnao	20,667		
3	TSDF at Rooma, Kanpur (filled to capacity & closed	22,000		

1.3.6 Demand –Supply Gap

SMSPL team is having vast experience in the field of waste management in Uttar Pradesh. The Western Uttar Pradesh is having maximum Industries as compared to rest of Uttar Pradesh but in absence of TSDF site in nearby areas, all waste is transported to Kanpur for disposal in secured landfill.

Due to larger distance, more fuel, higher cost of transportation and exposure of hazardous waste for longer period leading to more chances of accident, leakage of HW & damage to environment.

The capacity of Proposed SLF will be approximately 7.1 lacs MT. All others facilities such as infrastructure, laboratory, weigh bridge, vehicle wash etc. will be developed as per CPCB guideline. Establishment of the CHWTSDF site (Common Hazardous Waste treatment storage and disposal facility) is required to have long term solution for hazardous waste management.

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

During Construction phase the labours and workers will be hired from nearby villages. Number of persons required during construction phase is 40-50 and 60 persons is required during operation.

1.4 SCOPE OF THE EIA STUDY/ TOR

The EIA report has been prepared for Proposed Common Hazardous Waste Treatment, Storage and Disposal Facility (TSDF) having Secured Landfill only (Phase-I) which is situated at Village-Kharpadi, Tehsil-Hasanpur, Distt.-Amroha, Uttar Pradesh.

1.5 METHODOLOGY

The EIA study has been conducted as per the applicable rules/guidelines of Ministry of Environment and Forests, Govt. of India including general/sectoral provisions and in accordance to prescribed TOR by SEAC. The EIA study includes, but not necessarily restricted to the following:

(a) Literature Review
(b) Field Studies
(c) Impact assessment and preparation of the EIA/EMP

An outline of the activities carried out in stages A, B, C are briefly described below.

Stage A- Baseline Environment

The study area is up to 10 km radial distance from the proposed project with reference to air, water, soil, noise, socio economic and ecological studies.

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The baseline environmental conditions established using GSI Topo sheets, through literature survey and field investigations. In addition to the above, information on the location of towns/cities, national parks, wildlife sanctuaries and ecologically sensitive areas like tropical forests, important lakes, bio-sphere reserves and sanctuaries within impact area has been furnished.

A review and analysis of the information available with various governmental, educational and other institutions has been carried out for each discipline. Based upon preliminary review of the available data, detailed field work was planned to collect information on the parameters critical to characterize the environment of the area. The baseline environmental studies have been undertaken for Meteorology, Air quality, Noise, Water Quality, Water Use, various aspects to be covered under different disciplines is as follows.

i. **Meteorology**

Following meteorological parameters of the area are measured at the project site. In addition, data was collected from the nearest IMD observatory also for reference.

- Temperature (Dry & Wet)
- Rainfall
- Relative humidity
- Wind speed and direction

ii. **Air Quality**

Ambient Air Quality has been monitored at requisite number of locations considering the prevailing meteorological conditions, topography, nearby villages etc. The parameters for monitoring are PM10 and PM2.5, SO2, NOx and CO. Adequacy of the existing air pollution control measures have been studied.

iii. **Noise**

Noise monitoring survey has been carried out to characterize the noise environment in the study area. The noise levels are measured using high level precision sound level meter at selected number of locations.

iv. **Water**

Surface water samples and Ground water samples within study area were collected and analyzed for physico chemical analysis covering major, minor ions, some important heavy metals.

v. **Land Environment**

Soil samples were collected from the plant site, not only at its immediate vicinity but also in the surrounding villages in a 10 km radial zone. Physico - Chemical properties of the soils were determined. Information on land use pattern in the study area was also collected. Information regarding existing cropping pattern, their types and yield of the crop was collected from various sources. Based on the attenuation factors for dust aerosols and air pollutants, green belt species have been identified.

vi. **Eco System**

Information on eco-system within 10 km radius was collected from the state Agricultural

and Forest departments. The important flora species native to the area is enumerated. A test check survey was also under taken to judge the correctness of the data collected.

vii. **Socio Economic Environment**

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Field surveys were conducted within 10 km radius of the plant and the surrounding impact zone. The parameters selected under socio-economic component were demographic structure of the study area, provision of basic amenities, industries likely to come up in the study area, welfare facilities proposed by the project proponent, safety training and management, community and occupational health hazards. Relevant information was collected from selected villages and analyzed.

Stage B -Assessment of Environmental Impacts of Proposed Project

With the knowledge of baseline conditions in the study area and proposed project activities, impact on the environment have been discussed in detail covering air emissions, discharge of liquid effluents and particulates emission during construction, noise & solid waste generation etc. Assessment of potential damage to terrestrial and aquatic flora and fauna due to air emissions, discharge of effluents, noise pollution, and change in land use pattern, habitat degradation and fragmentation, anthropogenic activities from the proposed project and delineation of guidelines to minimize adverse impacts is done. Assessment of economic benefits arising out of the project has been carried out.

Stage C- Environmental Management Plan

At this stage, it may become apparent that certain mitigation measures are necessary to offset the impacts from the proposed project. Environmental Management Plan and pollution control measures are necessary to meet the requirements of the regulatory agencies. Environmental Management Plan consists of mitigation measures for item-wise activity to be undertaken during construction and operation of the facility including liabilities of environment damages in case of any accident or failure for its entire life cycle to minimize adverse environmental impacts. It also delineates the post project environmental monitoring plan for compliance of various environmental regulations.

EIA Report Based on the TOR approved vide letter no **vide letter Ref. No. 743/Parya/SEAC/4484/2018** and prepared as per Generic Structure of Environmental Impact Assessment Document. The EIA report consists of 12 Chapters.

1.6 Structure of EIA Report:

The generic structure of the report is given below:

Chapter 1: Introduction: This chapter describes the purpose of the report, identification of nature, size and location of the TSDF project (with latitude and longitude) and its proponent, description of site and surrounding environment, location maps, importance of project to the country and region and finally the Scope of the EIA study, as per TOR approved by MOEF.

Chapter 2: Project Description:(Based on the Feasibility Report) This chapter describes the type and need of the TSDF project, magnitude of operation, schedule for approval and implementation, land requirement, Water requirement and flow scheme, technology and process description, site plan, layout of project location, boundary and site.

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Chapter 3: Description of the existing Environment: This chapter describes the study area, period of study, components and methodology, establishment of baseline data for valued environmental components and base maps of all environmental components like meteorology, ambient air quality, ambient noise quality, hydrology and water quality, land use, Soil quality, Ecology, demography, occupational pattern and socioeconomics.

Chapter 4: Anticipated Environmental Impacts and Mitigation Measures: This chapter describes the details of investigated impacts due to TSDF site location, possible accidents, project design and construction, regular operation, measures for minimizing and / or offsetting adverse impacts identified, irreversible and irretrievable commitments of environmental components, assessment of significance of impacts [criteria for determining significance, assigning significance] and mitigation measures.

Chapter 5: Analysis of Alternatives (Technology & Site): This chapter describes the details of the scoping exercise results in need for alternatives.

Chapter 6: **Environmental Monitoring Program**; This chapter include the technical aspects of monitoring the effectiveness of mitigation measures including measurement methodologies, frequency, location, data analysis, reporting schedules, emergency procedures.

Chapter 7: Risk Assessment & Additional Studies: This chapter describes risk assessment and DMP, occupational health and safety, social impact assessment.

Chapter 8: Project Benefits: This chapter describes the benefits coming from the project in terms of improvements in the social infrastructure, employment potential –skilled; semi-skilled and unskilled and other tangible benefits.

Chapter 9: Environmental Cost Benefit Analysis: This chapter describes the environmental benefits of the project

Chapter 10: Environmental Management Plan: This chapter describes the administrative aspects of ensuring that mitigation measures are implemented, and their effectiveness monitored after Environment Clearance of the project.

Chapter 11: Summary and Conclusion: This will constitute the summary of the EIA Report.

Chapter 12: Disclosure of Consultant Engaged: The names of the consultants engaged with their brief resume and nature of consultancy rendered.

The purpose of Environmental Impact Assessment (EIA) is to determine as precisely as possible, within the present limits of knowledge and expertise, the likely environmental impacts of the proposed project. The objective is to establish an environmentally sound TSDF for management of hazardous wastes generated by the Member industries.

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The study area covers an area of 10 km radius around the proposed project site. Baseline environmental quality of the study area has been assessed based on primary and secondary data collected from various sources supplemented by data generated at site during the period Oct. to Dec. 2018.Environmental attributes and frequency of monitoring are outlined in **Table 1-3.**

TABLE 1-3: FREQUENCY OF MONITORING

S.NO.	ENVIRONMENTAL COMPONENT	SAMPLING LOCATIONS	SAMPLING PARAMETERS	SAMPLING PERIOD	SAMPLING FREQUENCY
1	Meteorology	One central location	Temperature, Wind speed, Wind Direction, Rainfall, Relative Humidity, Cloud Cover	3 months	Hourly Daily
2	Ambient Air Quality	09 Locations	PM_{10}, $PM_{2.5}$, SO_2, NO_x, CO, O_3, NH_3, Pb, Ni, As and Benzo Pyrene and Benzene.	Two days per week for 13 weeks	24 hourly
3	Water Quality	06 Ground & 4 Surface	IS: 1050 methods for sampling and testing of industrial effluents & APHA	Grab sampling	Once during Study period
4	Noise	09 locations	Leq	24 hourly composite	Once during Study period
5	Soil	08 locations	Soil profile, Chemical Constituents.	Composite sample	Once during Study period
6	Terrestrial Ecology	Total study Area	Flora and fauna	Field observations	Once in Study period
7	Demography and Socio-Economic aspects	Total study Area	Demographic profile	-	-
8	Land use	Total study Area	Trend of land use change for different categories	-	-

1.7 STATUS OF LITIGATIONS

There are no litigation/ court cases pending against the project as on date.

1.8 REGULATORY REQUIREMENT

The following rules and guidelines are applicable for selection of site, setting up of facility, its design, operation, closure of facility, and monitoring requirements and liability in case of accident or damage.

- Environmental Impact Assessment Notification S.O.1533 (E) dated 14 September 2006;

- Hazardous Waste (Management, Handling & Transboundary Movement) Rules 2008 and renotified as Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 and its amendment

- Gaseous Emission Norms for Common Hazardous Waste Incinerators notified as Environment (Protection) Fifth Amendment Rules, 2008 dated 26 June 2008;

- Norms for DG set, The Noise Pollution (Regulation and Control) Rules, 2000, Effluent Discharge norms, surface/ground water norms and Ambient Air Quality norms.

- General standards for discharge of environmental pollutants Part –A: Effluents notified vide G.S.R. 422 (E) dated 19 May 1993 and published in the Gazette No. 174, dated 19 May 1993 under the Environment (Protection) Act, 1986 and rules made there under, shall also be applicable for disposal of leachate into sewage treatment plant, common effluent treatment plant, inland surface water bodies or coastal areas.

Guidelines applicable for TSDFs:

1. Criteria for Hazardous Waste Landfills (Hazardous Waste Management Series: HAZWAMS/17/2000-01)

2. Manual on Sampling, Analysis and Characterization of Hazardous Wastes (Laboratory Analytical Technique Series: LATS/16/2002-2003);

3. Guidelines for Conducting Environmental Impact Assessment: Site Selection for Common Hazardous Waste Management Facility (Hazardous Waste Management Series: HAZWAMS/25/2003-4);

4. Manual for Design, Construction and Quality Control of Liners and Covers for Hazardous Waste Landfills

5. Guidelines for Common Hazardous Waste Incineration (Hazardous Waste Management Series: HAZWAMS/30/2005-06)

6. Management of Hazardous Waste - Pre-Requisites for Issuing Authorization by SPCB/PCC (Hazardous Waste Management Series: HAZWAMS/31/2005-2006);

7. Management of Hazardous Waste - Guidelines for Proper Functioning and Upkeep of Disposal Sites (Hazardous Waste Management Series: HAZWAMS/32/2005-2006);

8. Management of Hazardous Waste - Guidelines for Transportation of Hazardous waste (Hazardous Waste Management Series: HAZWAMS/33/2005-2006);

9. Guidelines on Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Waste and Penalty, January 2016.

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1.9 COMPLIANCE OF TOR

The Terms of Reference for the EIA study has been prescribed by the SEAC/SEIAA, Lucknow, Ministry of Environment and Forests, Government of India vide letter Ref. No. 743/Parya/SEAC/4484/2018

Table 1.4 gives the compliance of Terms of Reference for proposed secured landfill (Phase-I) of Common Hazardous Waste Treatment, Storage and Disposal Facility (TSDF) at Village-Kharpadi, Tehsil-Hasanpur, Distt.-Amroha, Uttar Pradesh.

TABLE 1-4: COMPLIANCE OF STANDARD TOR

S.NO.	TOR POINTS	REPLY
1.	All pages of technical documents/EIA/EMP etc should be signed by the consultant and project proponent both.	Complied
2.	Copy of all the analysis reports signed by analyst approved by NABL or MOEF&CC shall be annexed with the EIA report and original analysis reports should be presented at the time of presentation.	Complied. EIA report and original analysis reports will be presented at the time of presentation.
3.	MOU signed between the project proponent and the consultant should be submitted.	Agreed. MOU signed between the project proponent and the consultant is enclosed as Annexure-XI in this EIA report.
4.	Reasons for selecting the site with details of alternate sites examined/rejected/ selected on merit with comparative statement and reason/basis for selection. The examination should justify site suitability in terms of environmental damages, resources sustainability associated with selected site as compared to rejected sites. The analysis should include parameters considered along with weightage criteria for short-listing selected site.	Based on the surveys including Topographic, Hydrologic, Geotechnical, Traffic, Environmental, Social, and Public Consultations during the detailed design study proposed site have been reviewed for secured landfilling using above mentioned knock out criteria. Proposed site is selected as it is meeting the siting criteria Details are incorporated in Chapter-5 of this EIA report
5.	Submit the details of the road/rail connectivity along with the likely impacts and mitigative measures.	The details of the road/rail connectivity along with the likely impacts and mitigative measures refer to Section 1.3.4 in Chapter-1 Page no. of this EIA report. The access road to the landfill will not have direct view of the landfill operations, thus not create any negative visual impact. Also refer to Section 4.5 and 4.6 in Chapter-4, Page no. 133 to 136.
6.	Submit the present land use and	The present landuse in and around the

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	permission required for any conversion such as forest, agriculture.	proposed project is given in Chapter-3 in section 3.2 page no 69 to 71. There is no need of any conversion of forest land and agriculture land. As the proposed project is vacant as barren land.
7.	Examine the details of transportation of Hazardous wastes, and its safety in handling.	Refer Section no. 2.9 in Chapter-2., Page no. 27 to 33 of this EIA report.
8.	Examine and submit the details of on line pollutant monitoring.	Online pollutant monitoring will be conducted.
9.	Examine the details of monitoring of Dioxin and Furon.	Not Applicable. This is only for the Secured landfill for disposal of Hazardous waste scientifically.
10.	MoU for disposal of ash through the TSDF.	Not Applicable
11.	MoU for disposal of scrubbing waste water through CETP.	Not Applicable. Waste water generated out of proposed CHWTSDF will be 5 - 10 KLD which will be treated in MEE, Solar Evaporation pond or use in treatment of waste or in the process of compaction of waste. It will be a zero liquid discharge unit.
12.	Examine and submit details of monitoring of water quality around the landfill site.	Details are incorporated in chapter 3, in section no. 3.3, page no. 76 to 86.
13.	Examine and submit details of the odour control measures.	Odour from the proposed project could potentially occur from landfill operations. As stabilized solid wastes from segregated streams would enter the landfill, and the wastes would be covered using daily soil cover, the chances of odour from landfill would be minimized or eliminated. The details of the odour control measures refer to Section no. 2.15 page no. 57 in Chapter-2, and section 10.3.2, page no. 209 in Chapter-10.
14.	Examine and submit details of impact on water body and mitigative measures during rainy season.	Refer to section 4.7, page no. 136-138 in Chapter-4.
15.	Environmental Management Plan should be accompanied with Environmental Monitoring Plan and environmental cost and benefit assessment. Regular monitoring shall be carried out for odour control.	Refer this EIA report in Chapter-10, Table 10.1page no. 212-219 and for Environmental Monitoring Plan refer to section 6.3.1 in Table 6.1, & page no. 165-166 and section 6.6 in Table 6.3 page no. 169 in Chapter-6. Regular monitoring will be carried out for odour control.
16.	Water quality around the landfill site shall be monitored regularly to examine the impact on the ground water.	Water quality around the landfill site has been monitored refer Chapter-3 in this EIA report section no. 3.3, page no. 76 to 86.

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17.	The storage and handling of hazardous wastes shall be as per the Hazardous Waste Management Rules.	The storage and handling of hazardous wastes will done be as per the Hazardous Waste Management Rules. 2016 and details are incorporated in Chapter-02 in section 2.9, page no. 27-34.
18.	Submit details of a comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disaster.	Presented in Chapter-7 in section 7.4 to 7.8, page no. 184-191.
19.	Public hearing to be conducted for the project in accordance with provisions of Environmental Impact Assessment Notification, 2006 and the issues raised by the public should be addressed in the Environmental Management Plan. The Public Hearing should be conducted based on the ToR letter issued by the Ministry and not on the basis of Minutes of the Meeting available on the web-site.	Public Hearing was held on 03.02.2018 at 11:00 pm at Collectorate, Dist. Amroha under the panel headed by Gulab Chandra, Addition District Magistrate (ADM) Amroha, duly appointed Representative of District Magistrate, Amroha and J.P. Morge, Regional Officer, Uttar Pradesh State Pollution Control Board, Lucknow. Minutes of meeting and the issues raised by the public is addressed in Chapter-7 in section 7.1-page no. 171-177.
20.	A detailed draft EIA/EMP report should be prepared in accordance with the above additional TOR and should be submitted to the Ministry in accordance with the Notification.	Complied
21.	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No litigation pending against the project.
22.	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Refer to Table 6.3 in chapter-6. Page no. 169 Budget for Implementation of Environmental Management Plan
23.	Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website "http://moef.nic.in/Manual/Incinerator"	Agreed

* * * * *

2 PROJECT DESCRIPTION

2.1 BACKGROUND

M/s Sangam Mediserve Pvt. Ltd. (SMSPL), a company incorporated under companies act, 1956 proposes to setup Common Hazardous Waste Treatment, Storage and Disposal Facility (TSDF)., with secured landfill to handle Land fillable waste (DLF) - 36,000 MTA, Landfill after Treatment (LAT) – 24,000 MTA, Pre-process the Hazardous waste for Co-Processing - 40,000 MTA and E- waste recycling – 6000 MTA.

The proposed capacity of landfill (Phase-I) will be 7.1 lacs MT of hazardous wastes equivalent to approximately 25 years land filling at the current rate, which will be disposed scientifically at a secured landfill. The proposed facility is to be located near to hub of Industries at Plot no. 941, 942 and 944 at village- Kharpadi Tehsil-Hasanpur Distt - Amroha, Uttar Pradesh, where all essential facilities such as water, power, fuel, post-office, telecommunication, bank, etc. available. It is one of the largest industrial area in the state of Uttar Pradesh

2.2 TYPE OF THE PROJECT

The Proposed project of setting up of Common Hazardous Waste Treatment, Storage and Disposal facilities (TSDFs) with Secured landfill (only) falls under Category B, schedule 7(d) of the EIA notification, dated 14th September, 2006.

2.3 NEED OF THE PROJECT

The planning for hazardous waste management comprises of several aspects ranging from identification and quantification of HW to development, operation and monitoring of TSDF.
As per the Hazardous and other wastes (Management, & Transboundary Movement) Rules, 2016 and its amendment under Environment Protection Act, 1986, hazardous waste generated by industries has to be collected, transported, treated and disposed in a properly designed TSDF facility. Under aforesaid Rules and its amendments, CPCB guidelines have laid down a procedure for collection, storage, transportation and disposal of hazardous wastes. The scientific disposal of landfillable hazardous waste can be done at a secured landfill, which requires proper design and operation and long-term planning according to existing guidelines.
In the State of Utter Pradesh at present there are 4 Common TSDF which includes Two Integrated TSDF (with both SLF& Incinerator), one TSDF with only SLF and One with only Incinerator. As per CPCB's Annual Inventory report of Hazardous Waste for 2016-17, the quantum of hazardous waste generation in UP is 229322.7 MTA out which 53417.4 MTA is disposed in the Common TSDF and 2221.6 MTA is disposed in Captive SLF. The status of disposal of hazardous waste is given in table 2.1 below.
The new landfill Phase as proposed would provide a hazardous landfillable capacity of 7.1 Lacs MT (assuming a density 1.5 Mg/m3). This is hazardous waste is equivalent to approximately 25

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years land filling at the current rate.

2.3.1 Demand for disposal of hazardous waste around the selected site

With the existing rate of generation of hazardous waste, both TSDF with secured landfill shall get filled up to full capacity. Govt. of UP has signed the MOU in the UP-investment summit with M/s Sangam MediservePvt. Ltd. for the development of TSDF. Copy of the MOU is attached as Annexure - III. Planning & setting up of new TSDF is the need of all upcoming Industry. All required infrastructure is available at the selected site

TABLE 2-1: QUANTITY OF HAZARDOUS WASTE DISPOSED IN COMMON TSDF (2016-17)

S.No	Name & Address of the TSDF	Quantity in Stock at the beginning of the Year (MT)		Quantity of Hazardous waste received (MT)			Quantity of Hazardous waste disposed (MT)			Quantity Pre-Processed for utilization (MT)	Quantity in Stock at the end of the Year (MT)	
		Landfillable	Incinerable	For Direct Landfill	For Landfill after treatment	For incineration	Quantity landfilled directly	Quantity landfilled after treatment	Quantity incinerated		Landfillable	Incinerable
1	M/s Bharat Oil & Waste Management Ltd. Gate No. 672, vill. Kumbhi, NH-2, Kanpur Dehat (UP)	463.22	1284.652	8527.0204	5216.04	8496.833	5360.275	8600.62	8600.62	0	36.25	1180.915
2	M/s Uttar Pradesh Waste Management Project (A Div. of Ramky Enviro Engineers Ltd.) Plot No. 672, Sikandra Road, village Kumbhi , tehsil Akbarpur District- Kanpur Dehat	0	49	6417	24039	3668	6417	24039	3661	0	0	55
3	M/s Industrial Infrastructure Services (India) Ltd. UPSIDC, Leather Technology Park Banthar, Unnao	0	0	9218	0	0	9218	0	0	0	0	0
	Total	463.22	1333.652	24162.02	29255.04	12164.833	20995.27	32639.62	12261.62	0	36.25	1235.915

Source -CPCB

2.3.2 Location of the Project

The proposed Common Hazardous Waste Treatment, Storage and Disposal Facility (TSDF) secured landfill (Phase-I) is to be located at Plot no. 941, 942 and 944 at Village-Kharpadi, Tehsil-Hasanpur Distt.-Amroha, Uttar Pradesh which lies between 28°27'55.44"–28°28'05.26" latitudes and 78°21'03.94"–78°21'14.89" longitudes. It is covered by the Survey of India Toposheet No. 53 L/7.Location Map on Survey of India Toposheet, Location Plan are given in Figure 2.1 &2.2. The coordinates of the four corners of the block are as follows:

Pillars	Latitude (N)	Longitude (E)
1	28°27'55.94"	78°21'03.94"

2	28°28'05.26"	78°21'08.65"
3	28°28'04.02"	78°21'14.89"
4	28°27'55.44"	78°21'14.52"

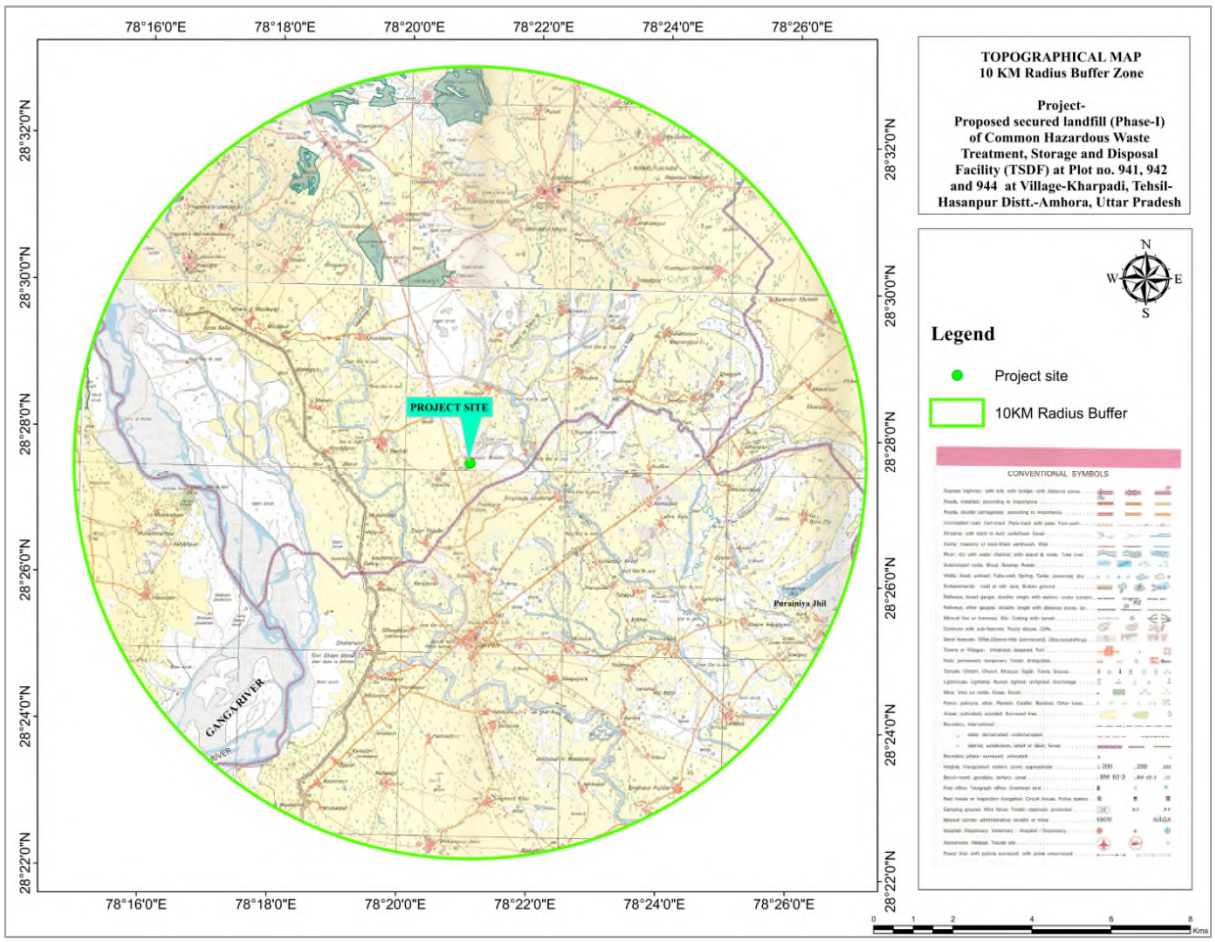

FIGURE 2-1: LOCATION MAP OF THE PROPOSED PROJECT SITE ON SURVEY OF INDIA TOPOSHEET

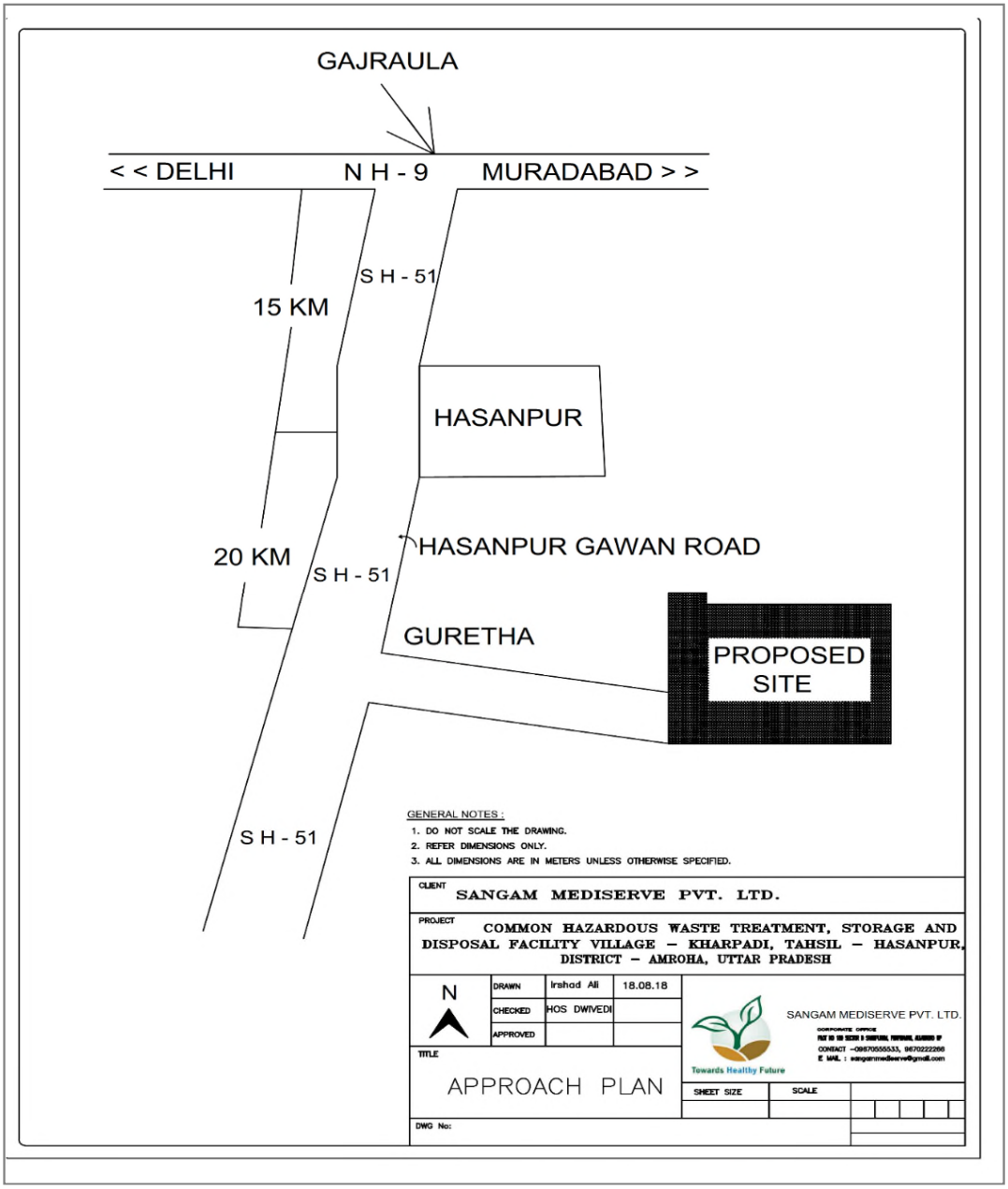

FIGURE 2-2: LOCATION PLAN MAP OF THE PROPOSED PROJECT SECURED LANDFILL SITE

2.3.3 Size or Magnitude of Operationand its Associated Activities

The proposed secured landfill will fallow all CPCB Guideline during construction and Operation. Also Refer section 1.4.2 in Chapter-1 and section 2.1 in Chapter-2.

2.3.4 Land Area Breakup

The detailed breakup of the land required for various activities are given below.

TABLE 2-2: LAND AREA BREAK UP

Sl.No	Utility	Area in Hectares	Area in Sq.m	% of area allocation
1.	Infrastructure	0.3	3000	7.75
2.	Green Belt	1.2761	12761	32.99

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3.	Landfill	2.1735	21735	56.20
4.	Road	0.1177	1174	3.03
Total		**3.867**	**38670**	**100**

2.4 STATUS OF HAZARDOUS WASTE GENERATION

The Hazardous Wastes (Management and Handling) Rules, 1989, notified under the Environment (Protection) Act, 1986 and subsequent amendments as the Hazardous and other wastes (Management, & Transboundary Movement) Rules, 2016 and its amendment, regulate the management of hazardous wastes generated within the country as well as export/import of such wastes. These rules refer to effective management of hazardous waste, mainly solids, semi-solids and other industrial wastes, which do not come under the purview of Water (Prevention and Control of Pollution) Act and Air (Prevention and Control of Pollution) Act and to enable the Authorities to control storage, transportation, treatment and disposal of waste in an environmentally sound manner. Any waste, by any of its physical, chemical, reactive, toxic, flammable, explosive or corrosive characteristics causes danger or is likely to cause danger to health or environment, whether alone or when in contact with other wastes or substances is defined as hazardous. The amendments in the HWM rules were brought to bring greater clarity to the classification of hazardous wastes by linking generation of waste streams to specific industrial processes. Simultaneously, threshold levels for concentration of specified constituents in wastes were laid down to distinguish between hazardous and other wastes.

Waste generation is a dynamic phenomenon depending upon change in products, processes, capacity of production and establishment of new industries. Hence there is a need to periodically update the inventory on hazardous waste generation Sources of hazardous waste streams vary from industry-to-industry depending on its operations. Certain industrial processes are already listed in Schedule 1, which provides generic criteria to classify the wastes as hazardous. The amendments made in the Hazardous Waste Rules, focused attention and distinct categorization based on characterization of waste.

As per published document entitled “National Inventory of Hazardous Waste Generating Industries and Hazardous Waste Management in India for the year 2016-17. At present there are three TSDF sites that are in operational phase in Uttar Pradesh, details have already been given in Ch-1 Table 1.2. And below given is the District wise inventory of hazardous waste generation and mode of disposal compiled & published by CPCB for the year 2016-17.

TABLE 2-3: DISTRICTWISE INVENTORY OF HAZARDOUS WASTE GENERATION AND MODE OF DISPOSAL

S.No.	District	No. of Hazardous Waste Generating Industry	Quantity of Hazardous Waste as per Authorization (MTA)	Quantity of Hazardous Waste as per Annual Return (MTA)	Quantity Disposed in Captive SLF (MT)	Quantity Disposed through Common SLF at TSDF (MT)	Quantity Disposed by Captive Incinerator (MT)	Quantity Disposed Through Common Incinerator at TSDF (MT)	Quantity Co-processed in cement Kiln (MT)	Quantity utilized under Rule 9 (MT)	Quantity sent to recyclers of Schedule-IV Hazardous Wastes (MT)	Captive Utilization (MT)	Quantity of Hazardous Waste stored at occupier premises at the end of the year (MT)
1	Kanpur Nagar	354	9184.05	9184.05	0	7621.13	0	104.1	0	0	1349.62	0	109.2
2	Farrukhabad	21	6.5	6.5	0	5.95	0	0	0	0	0	0.55	0
3	Kanpur Dehat	32	15858.61	14442.415	0	10281.66	11.65	2990.48	0	0	489.41	0	669.215
4	Jhansi	10	245.41	245.41	0	0.9	0	80	0	0	159.21	0	5.3
5	Lalitpur	2	1.104	1.104	0	0	0	0.604	0	0	0	0	0.5
6	Jalaun	3	71.74	71.74	0	60	0	11.5	0	0	0	0	0.24
7	Hamirpur	4	98.88	98.88	0	95.48	0	0	0	0	0	3.4	0
8	Meerut	96	1837.992	1837.992	0	1034.62	0	500	0	0	0	287.025	16.341
9	Bagpat	27	28.172	28.172	0	25.368	0	0	0	0	0	1.82	0.984
10	Muzaffar Nagar	80	2646	2646	0	882	0	6	0	0	0	18	1740
11	Shamli	10	324.7	324.7	0	306	0	13.2	0	0	0	5.5	0
12	Bulandshahar	83	272.881	272.881	0	272.881	0	0	0	0	0	0	0
13	Badaun	2	2.4	2.4	0	2.4	0	0	0	0	0	0	0
14	Agra	49	26.197	26.197	0	18.607	0	0	0	0	6.91	0	0.68
15	Aligarh	16	77.715	77.715	0	73.175	0	0.8	0	0	0	0	3.74
16	Etah	2	0.7	0.7	0	0.525	0	0	0	0	0	0	0.175
17	Kasganj	1	1.2	1.2	0	0.9	0	0	0	0	0	0	0.3
18	Hathras	6	193.44	193.44	0	134.44	0	0	0	0	59	0	0
19	Mathura	104	449.345	449.345	0	404.345	0	0	0	0	45	0	0
20	Gautam Budh Nagar	281	1752.737	1752.773	0	1031.42	0	87.611	0	0	541.967	0	91.774
21	Gautam Budh Nagar (Noida)	147	7210.513	5440.976	0	3009.73	0	1584.89	0	0	430.341	0	416.009
22	Hapur	32	16339.15	10526.15	0	1460.19	0	438	0	0	8616.96	0	11
23	Ghaziabad	357	80291.33	39239.274	0	5696.40	0	1723.852	0	0	30472.1	26.46	1320.459
24	Allahabad	11	5575.677	5575.677	0	475.677	0	0	0	100	0	5000	0
25	Fatehpur	11	2675	2675	0	2675	0	0	0	0	0	0	0
26	Lucknow	21	1611.481	1611.481	0	1602.08	0	0	0	0	9.4	0	0
27	Barabanki	8	355.712	355.712	0	11.712	0	342	0	0	0	2	0
28	Barabanki	8	179.65	179.65	0	150.02	0	0	0	0	6	23.63	0
29	Lakhimpur	9	42.84	42.84	0	0	0	0	0	0	0	42.84	0
30	Raibareli	8	599.917	599.917	0	1.68	0	0	0	0	598.237	0	0
31	Amethi	12	360.16	360.16	0	51.96	0	0	0	0	308.2	0	0
32	Sultanpur	1	1	1	0	0	0	0	0	0	0	1	0
33	Hardoi	11	934.75	934.75	0	869.8	0	0	0	0	61	3.95	0
34	Unnao	90	5299.72	9264.6	0	9218	0	7.5	0	0	38.5	0	0
35	Varanasi	4	48.6	48.6	0	48.6	0	0	0	0	0	0	0
36	Bhadohi	39	29	29	0	29	0	0	0	0	0	0	0
37	Jaunpur	6	31	31	0	27	0	0	0	0	0	4	0
38	Chandauli	10	576.5	576.5	0	6.5	0	0	0	540	0	30	0
39	Faizabad	5	730.77	730.77	0	42.7	0	0	0	0	680.07	8	0
40	Ambedkarnagar	3	47.514	47.514	0	0	0	0	0	0	44.514	3	0
41	Gonda	8	18.233	18.233	0	0.032	0	0	0	0	0	18.201	0
42	Bahraich	6	6.8	6.8	0	3.8	0	0	0	0	0	3	0
43	Basti	3	49.7	49.7	0	0	0	0	0	0	0	49.7	0
44	Sant Kabir nagar	2	3303.96	3303.96	0	0	0	0	0	0	0	3303.96	0
45	Balrampur	4	36.9	36.9	0	0	0	0	0	0	0	36.9	0
46	Firozabad	4	5.24	5.24	0	5.24	0	0	0	0	0	0	0

S.No.	District	No. of Hazardous Waste Generating Industry	Quantity of Hazardous Waste as per Authorization (MTA)	Quantity of Hazardous Waste as per Annual Return (MTA)	Quantity Disposed in Captive SLF (MT)	Quantity Disposed through Common SLF at TSDF (MT)	Quantity Disposed by Captive Incinerator (MT)	Quantity Disposed Through Common Incinerator at TSDF (MT)	Quantity Co-processed in cement Kiln (MT)	Quantity utilized under Rule 9 (MT)	Quantity sent to recyclers of Schedule-IV Hazardous Wastes (MT)	Captive Utilization (MT)	Quantity of Hazardous Waste stored at occupier premises at the end of the year (MT)
47	Etawah	2	0.1	2.2	0	0.2	0	0	0	0	2	0	0
48	Azamgarh	1	2	2	0	0	0	0	0	0	0	2	0
49	Mau	3	3.956	3.956	0	0.085	0	0	0	0	0	3.871	0
50	Deoria	7	44.1	44.1	0	0	0	35.5	0	0	0	8.6	0
51	Gorakhpur	16	763.9	763.9	0	1.2	0	398.7	0	0	364	0	0
52	Kushinagar	5	28.2	28.2	0	1.8	0	0	0	0	0	26.4	0
53	Mahrajganj	2	10.2	10.2	0	6	0	0	0	0	0	4.2	0
54	Amroha	29	5125.77	5125.77	2221.6	290.67	1545.2	0	0	0	0.5	1067.2	0.6
55	Bijnor	27	1536.2	1536.2	0	0	0	9.4	0	0	0	1526.8	0
56	Moradabad	94	31.52	31.52	0	23.2	0	0.2	0	0	0.95	7.35	0
57	Rampur	9	72.312	72.312	0	68.062	0	0	0	0	0.2	4.05	0
58	Sambhal	4	477	477	0	471	0	0	0	0	0	6	0
59	Bareilly	31	1294.547	1294.145	0	992.345	0	0	0	0	120	12.8	169
60	Pilibhit	8	0	3945.2	0	475.1	0	3400	0	0	0	70.1	0
61	Shahjahanpur	24	6505.96	7204.36	0	969.76	0	0	0	0	200	6026.6	8
62	Sonbhadra	17	6634.87	5344.35	0	2100.19	0	0	1000	448.832	1795.32	0	0
63	Mirzapur	22	5204.7	5204.7	0	184.4	0	0	0	20.3	0	5000	0
64	Saharanpur	30	42146.45	42146.45	0	196.45	0	0	0	0	0	41950	0
	Total	**2334**	**229322.7**	**186591.58**	**2221.6**	**53417.4**	**1556.85**	**11734.34**	**1000**	**1109.13**	**46399.4**	**64588.91**	**4563.517**

Source -CPCB

There are 199 registered recyclers in UP including registered units for decontamination of contaminated containers, metal recovery and co-processing in Cement Plants. Table 2.3 shows the capacity and quantum of waste recycled in these units.

TABLE 2-4: NUMBER AND CAPACITY OF RECYCLER IN UP (2016-17)

S.No	Type of Recycling Facilities	No of Facilities authorized for recycling / utilization / Co-processing of HW	Total Authorized Capacity (MTA)	Quantity Recycled/ Utilized/ Co-processed (MT) during the year
A	**Commonly Recyclable HW**			
1	Brass Dross	5	3756.66	2253.95
2	Zinc Bearing Wastes	17	10810.66	4708.95
3	Copper Bearing Waste	12	3940.37	2437.68
4	Spent catalyst containing nickel, cadmium, Zinc, copper, arsenic, vanadium and cobalt	1	197.6	196.6
5	Lead bearing waste including battery waste	103	67576.8	33977.42
6	E-Waste	10	2771.5	1532.393
7	Paint and ink Sludge/residues	0	0	0
8	Used oil	16	26627.02	3949.142
9	Waste Oil	9	2828.496	2388.02
	Total	**173**	**118509.106**	**51444.155**
B	**Utilization of HW under Rule 9**			
1	Recovery of solvents from spent solvents	1	0	0
2	Utilization of pre-processed Used Anode Butt to produce Green Anodes through Anode-Baking Process for use in Aluminium Smelters	1	54491	54491
3	De-contamination of contaminated drums/containers/ barrels	14	512500	110500
4	Utilization of Aluminium Dross generated from refining and casting house of Aluminium smelter units to recover Aluminium Metal	4	20.3	20.3
5	Chrome Bearing Sludge	5	1074.6	1074.6
	Total	**25**	**568085.9**	**166085.9**
C	**Co-Processing in Cement Plants**	**1**	**1000**	**1000**

2.5 ENVIRONMENTAL SETTING OF THE PROJECT

The details of environmental setting of proposed project are given in **Table 2.4.**

TABLE 2-5: DETAILS OF ENVIRONMENTAL SETTING

S.NO.	PARTICULARS	DETAILS	
1	**Location**	Proposed Secured Landfill (Phase-I)	
a	**Plot No.**	941, 942 and 944	
b	**Village**	Kharpadi	
c	**Tehsil**	Hasanpur	
d	**District**	Amroha	
e	**State**	Uttar Pradesh	
f	**Coordinates**	**Latitude**	**Longitude**
	TSDF site	28°27'55.44"–28°28'05.26"	78°21'03.94"–78°21'14.89"
	Toposheet no.	53 L/7	
2	**Elevation**	The ground elevation varied between 204 - 205 m above Mean Sea Level	
3	**Type of the land Within TSDF area**	The project is proposed to be located on agriculture land earmarked for TSDF.	
4	**Nearest major town**	Hasanpur approximately 25 kms (aerial distance) in NE direction. Nearest City & District Headquarters is Amroha approximately 50 kms (aerial distance) in the NW direction.	
5	**Nearest highway**	The nearest State Highway is (SH) at 1km in the west direction and same connected to NH – 24 at Gajraulla about 35 KM.	
6	**Nearest railway Station**	Nearest Railway Station is Gajraula about 35 km (Aerial distance) from project site towards North East direction. Major railway station is Ghaziabad at 100 km in North West direction**.**	
7	**Nearest major Airport**	Indira Gandhi International Airport New Delhi is located at 140 km (Aerial) in the South West Direction.	
8	**Nearest tourist Places**	NIL (within 10 Km)	
9	**Defence installations**	NIL (within 10 Km)	
10	**Archaeologically Listed important Place**	NIL (within 10 Km)	
11	**Ecological sensitive Zones**	Not Applicable	
12	**Reserved/Protected Forest**	Dhenkla (R.F) – 5 Km, N ChuChaura (R.F) – 5.5 Km, NE Rahra (R.F) – 9.5 Km, NE	
13	**Nearest Streams/Rivers**	Mahawa Nadi – 3 km,W Ganga River– 5 km, W	

14	**Socio-economic Factors**	Not Applicable
15	**Seismic zone**	The plant area falls in Seismic zone-III, the area is not prone to subsidence, landslides, erosion, flooding etc

2.6 SITE SELECTION CRITERIA

The proposed site for Secured Landfill Facility at Amroha has been evaluated as per site evaluation criteria given in CPCB guideline series no (HAZWAMS/17/2000-01 & HAZWAMS/25/2002-2003) and observations are presented in the table 2.5. A map showing distances of sensitive parameters as per prescribed norms from the proposed location of secured landfill site is given the fig 2.3

TABLE 2-6: CRITERIA FOR SITE SELECTION AS PER CPCB GUIDELINES

S.No	PARAMETER	CRITERIA	OBSERVATION
1.	Lake or pond	Should not be within 200 m	No water body with in 200
2.	River or stream	Should not be within 100 m	No river within 100 m from the
3.	Flood plain	Should not be within100 years flood plain	No flood plain area.
4.	Highway (State or National)	Should not be within 500 m	No SH and NH in 500 meter
5.	Habitation	Should not be within 500 m	No notified residential area in 500 m.
6.	Public Parks	Should not be within 500 m	No public park
7.	Critical habitat area — area in which one or more endangered species live	Should not be within such area.	No Critical habitat area
8.	Wet lands	Should not be within such area	None within 500 m radius area
9.	Air Port	Should not be within zone around the airport(s)	Nearest airport is IGI airport-app 140km
10.	Water supply	No Water supply well within 500 m	Agriculture land surrounds the site
11.	Coastal regulation area	Should not be within a coastal regulation zone	Not within a coastal regulation zone
12.	Ground water table level	GW table should be > 2m from the base of the landfill	Water level, BGL is more than 5 m

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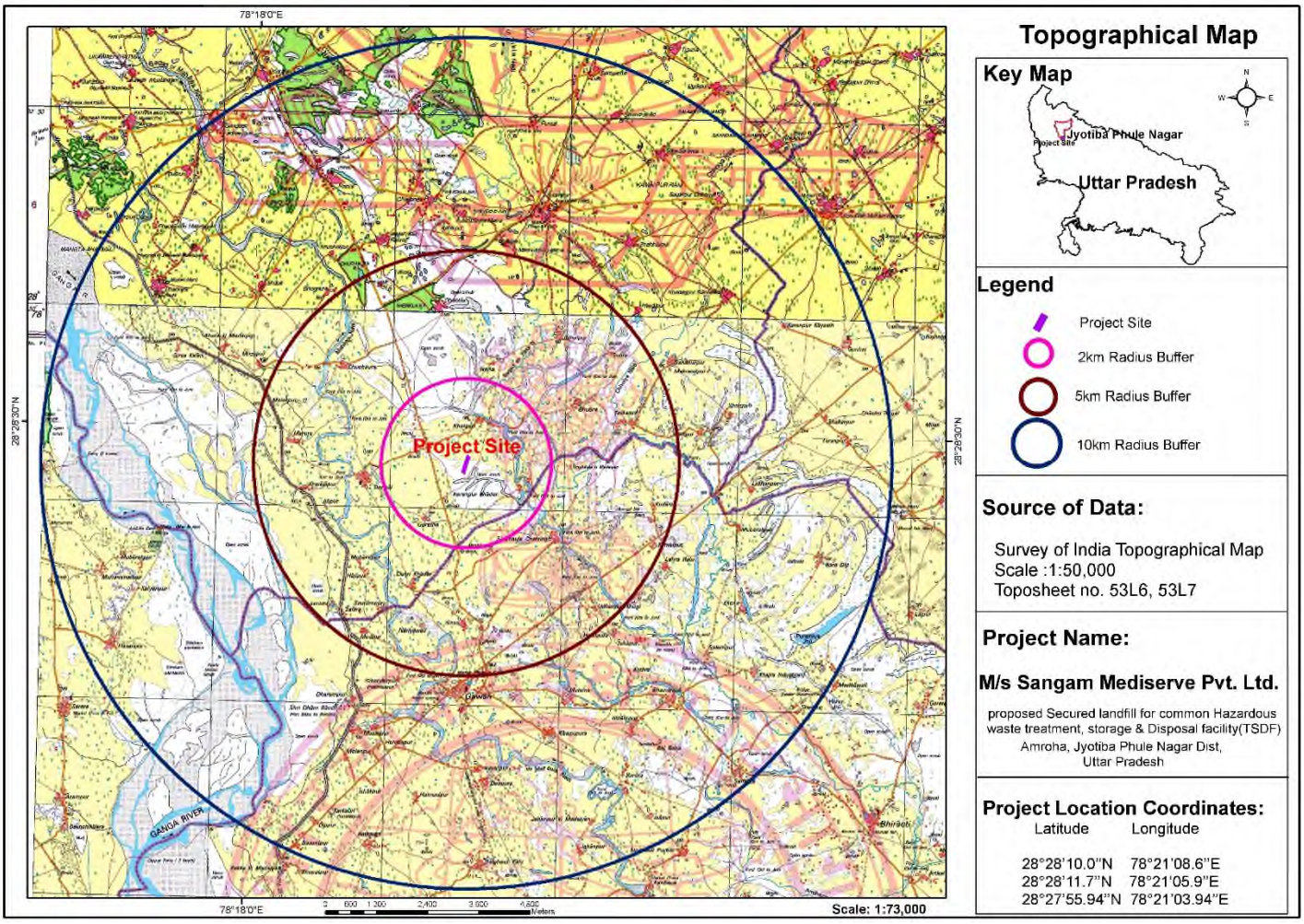

FIGURE 2-3 TOPOGRAPHICAL MAP SHOWING PROJECT LOCATION

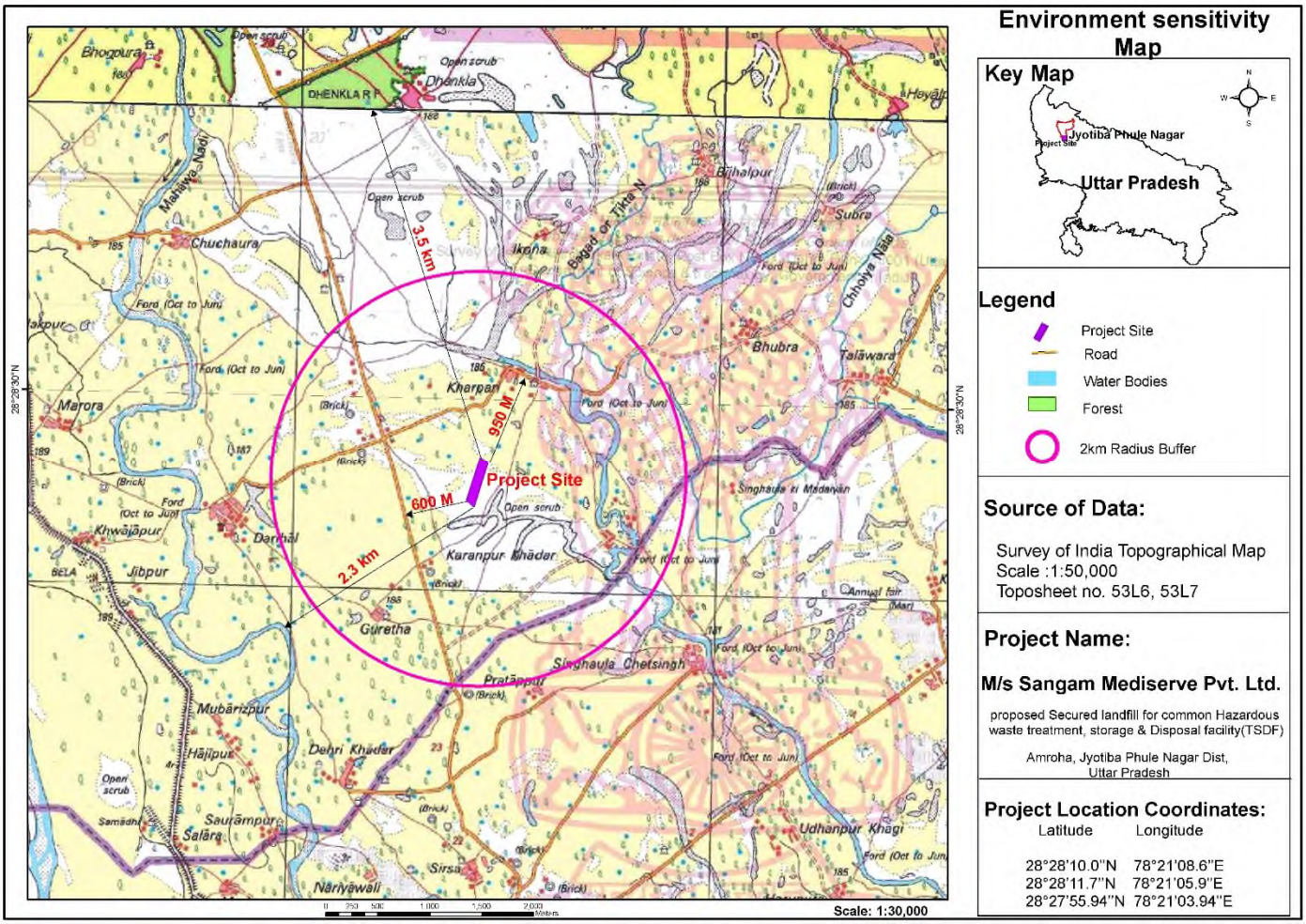

FIGURE 2-4: MAP SHOWING DISTANCE FROM SENSITIVE LOCATIONS

2.7 ALTERNATE SITES

As per the Hazardous and other wastes (Management, & Transboundary Movement) Rules, 2016 and its amendment framed under Environment (Protection) Act, 1986 and in accordance to CPCB guidelines and based on the surveys including Topographic, Hydrologic, Geotechnical, Traffic, Environmental, Social and detailed design study, the selected site has been reviewed for proposed secured landfill facility using above mentioned knock out criteria and among the three selected sites, the site 3 (Alternatives-3) is selected as it is meeting the siting criteria and does not have any R & R issues. The details of siting guidelines are given in Chapter-5.

After analysis of each alternative site and site evaluation based on observation, impacts analysis and their mitigation measures, the overall proposed alternative site-3 has a score of **98 out of 100**, (details are given in Chapter-5), and according to site selection criteria under the rules **HAZWAMS/25/2002-2003**, the selected site at Plot no. 941, 942 and 944 at village- Kharpadi Tehsil-Hasanpur Distt- Amroha, Uttar Pradesh is suitable for the secured landfill development as per "The Criteria for Hazardous Waste Landfills" published by Central Pollution Control Board.

2.8 LAND OWNERSHIP DETAILS:

Land ownership is in the Name of M/s Sangam Mediserve Pvt. Ltd. is already available land deed agreement is enclosed **as Annexure - I**

2.9 TECHNOLOGY AND PROCESS DESCRIPTION FOR HAZARDOUS WASTES DISPOSAL

A typical process flow of operation of TSDF site includes collection and transportation of hazardous waste from member industry in the dedicated authorized vehicle with manifest system to the TSDF site, quantification and characterization of waste, pretreatment as per requirement and disposal into land fill, closure of TSDF monitoring of surrounding environment shown in fig 2.4 below;

The proposed Integrated Waste Management Facility has three principal waste disposal / recycling or recovery facilities such as Hazardous Waste treatment, storage and disposal facility – TSDF, Recycling / Recovery facilities.

For the waste having high calorific value Co-Processing process will be carried out for maximum utilization of waste as fuel and raw material either in the process of boiler, cement industry power plant, steel industry etc. As per the CPCB Guidelines on Co-processing in Cement/ Power / Steel Industry and Guidelines by Central Public Health and Environmental Engineering Organisation (CPHEEO) Ministry of Housing and Urban Affairs, **Usage of Refuse Derived Fuel in Various Industries** issued in October 2018 under the said guideline

ii. Clause 21: Criteria for waste to energy process - (1) Non-recyclable waste having calorific value of 1500 Kcal/kg or more shall not be disposed off in landfills and shall only

be utilised for generating energy either through refuse derived fuel or by giving away as feed stock for preparing refuse derived fuel. (2) High calorific waste shall be used for co-processing in cement or thermal power plants.

iii. Clause 18: Duties of the industrial units located within one hundred km from the refused derived fuel and waste to energy plants based on solid waste state that "All industrial units using fuel and located within one hundred km from a solid waste based refused derived fuel plant shall make arrangements within six months from the date of notification of these rules to replace at least five percent of their fuel requirement by refused derived fuel so produced.

At the proposed TSDF site the waste having high calorific value shall be pre-processed for the co processing.

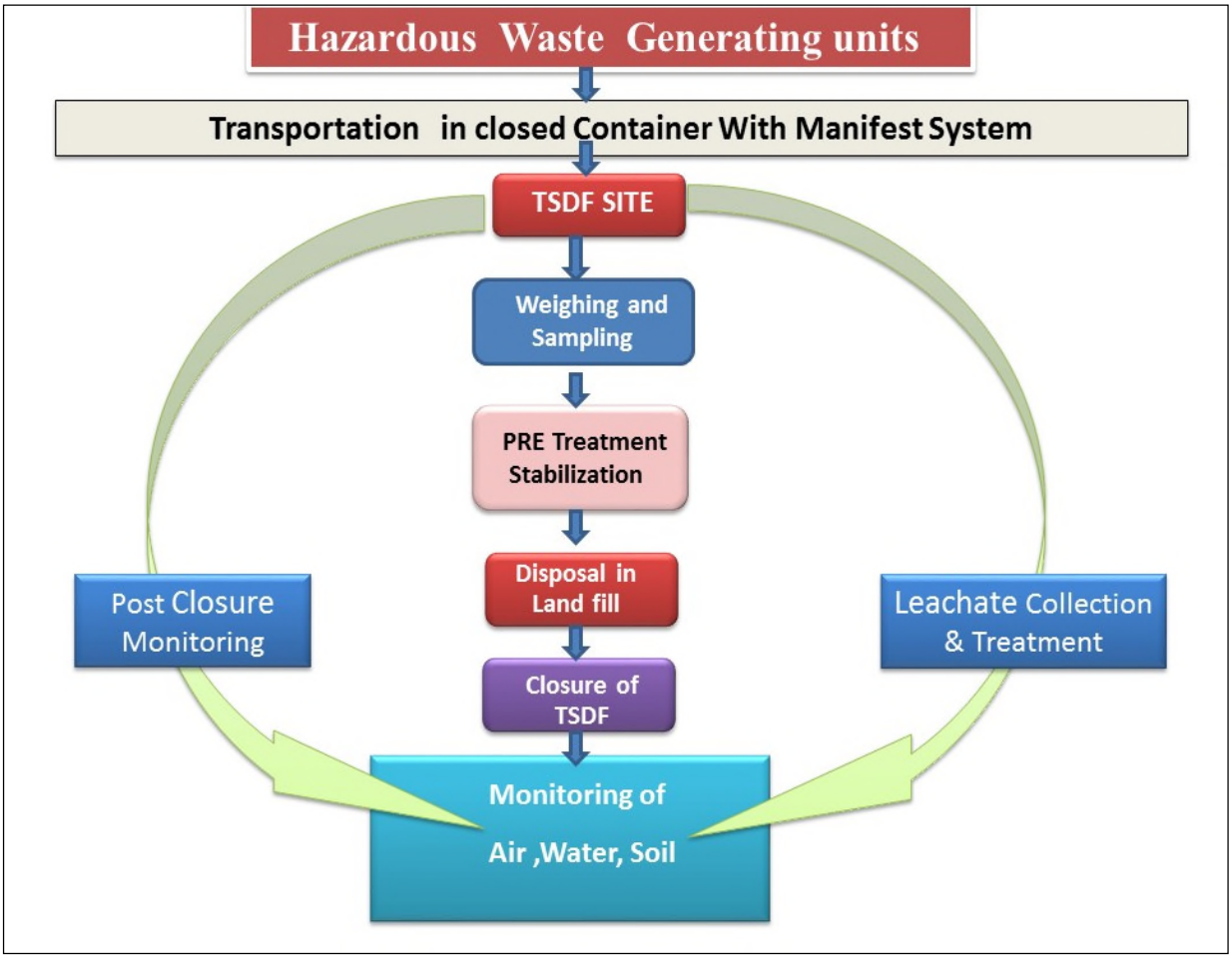

FIGURE 2-5: PROCESS FLOW CHART OF TSDF

A. Transportation of Hazardous Solid Waste from Generation Site to TSDF

Transportation of hazardous waste will be carried out as per ***CPCB GUIDELINES FOR TRANSPORTATION OF HAZARDOUS WASTES Hazardous Waste Management Series: HAZWAMS/33/2005 – 2006*** from member industry having authorization from UPPCB.

The transportation of hazardous waste shall be carried by duly approved/authorized transporter in dedicated vehicles. All the vehicles shall have the nameplate with details of company's name, address, phone no., etc. During transportation, containers shall be closed from all sides and covered from top.

Type of vehicles used will be of relevant capacity with crane mounted containerized collection and loading system, covered having pneumatic loading / unloading arrangements.

Qualified and experienced drivers shall be employed, and they shall be further trained to take care of pollution arising out of emergency and first aid in case of injuries.

B. Manifest System

The manifest system as per Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016; shall be followed. It consists of six copies in different colors. The UPPCB has also introduced an online manifest system for waste acceptance same shall be followed. The manifest system shall contain information regarding:

- Details of waste generator
- Details of waste transporter
- Quantitative and qualitative description of waste materials.
- Consistency of the waste
- Waste category number and characteristics
- Precautionary measures for handling the wastes
- Emergency procedures to be followed.

The 7 copies of the system shall be distributed as outlined below:

Copy number with colour code	Purpose
(1)	(2)
Copy 1 (White)	To be forwarded by the sender to the State Pollution Control Board after signing all the seven copies.
Copy 2 (Yellow)	To be retained by the sender after taking signature on it from the transporter and the rest of the five signed copies to be carried by the transporter.
Copy 3 (Pink)	To be retained by the receiver (actual user or treatment storage and disposal facility operator) after receiving the waste and the remaining four copies are to be duly signed by the receiver.
Copy 4 (Orange)	To be handed over to the transporter by the receiver after accepting waste.
Copy 5 (Green)	To be sent by the receiver to the State Pollution Control Board.
Copy 6 (Blue)	To be sent by the receiver to the sender.
Copy 7 (Grey)	To be sent by the receiver to the State Pollution Control Board of the sender in case the sender is in another State.

C. Weighing and Sampling of Waste

As the dumper/truck enters TSDF site it will pass through weighbridge, samples will be taken from three different locations and a composite sample is made. Once the quick test is passed, truck will be allowed to enter the premises. If any truck does not meet the hazardous solid waste inlet specification, it will be returned to member industry for necessary treatment.

D. Waste Acceptance Criteria

Waste acceptance criteria at the TSDF shall be as per Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. UPPCB would expect this facility to be equipped to handle the following:

- Waste streams described in Schedule – 1 of Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
- Waste described in Schedule – 2 with exceeding concentration limits mentioned thereupon.
- Waste not meeting the criteria mentioned in Schedule – 3, Part C.

In addition to the above we envisage to follow landfill disposal restrictions to enable more effective management of the waste. Waste acceptance criteria into the landfill are given in the Table **2.6.**

TABLE 2 6: WASTE ACCEPTANCE CRITERIA FOR LAND FILLING

Sr No	**Parameters**	**Concentration***
1.	pH	4 to 12
2.	Total Phenols	< 100 mg/L
3.	Arsenic	< 1 mg/L
4.	Lead	< 2 mg/L
5.	Cadmium	< 0.2 mg/L
6.	Chromium VI	< 0.5 mg/L
7.	Copper	< 10 mg/L
8.	Nickel	< 3 mg/L
9.	Mercury	< 0.1 mg/L
10.	Zinc	< 10 mg/L

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11.	Fluoride	< 50 mg/L
12.	Ammonia	< 1000 mg/L
13.	Cyanide	< 2 mg/L
14.	Nitrate	< 30 mg/L
15.	Absorbable Organic Bound Chloride	< 3 mg/L
16.	Water soluble compounds Except salts	< 10 %
Strengths		
	Transversal Strength (Vane Testing)	> 25 KN/m^2
	Unconfined compression Test	> 50 KN/m^2
	Asial Deformation	< 20 %
Degree of Mineralization or Content of Organic Materials (Original Sample)		
1	Annealing Loss of the dry residue at 550 °C	< 20 Wt %
		(For Non-biodegradable waste)
		< 5 Wt %
		(For biodegradable waste)
1	Extractable Lipophilic contents (Oil & Grease)	< 4 Wt %

**** Concentration in water elute test***

At the time of taking membership, the company shall do complete analysis of solid waste and the same sample will be preserved for further physical verification.

As the transporting vehicle arrives at TSDF site, it is weighed and, samples shall be taken from 3 different locations and composite sample is made and analyzed for following quick parameters:

- pH
- PFLT test for moisture content
- TOC
- Ignitability (Flammability)
- Reactivity
- Physical checks: Color, Odour

Only if the sample passes through above quick tests, it will be sent for disposal.

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E. Characteristics of Hazardous waste

The hazardous wastes generated from the industries present in the state are expected to comprise of the following groups:

- ETP sludge (primary),
- Sludge from water treatment plants,
- Discarded containers used for chemicals and hazardous substances,
- Date expired / off specific /discarded chemicals and products,
- Ash from waste incineration,
- Sludge generation from processing of waste water from recovery/ reuse/ recycle,
- Miscellaneous waste like used cotton, gloves, gum boots,
- Contaminated filter / filter bags,
- Contaminate centrifuge bags,
- Spent activated carbon / Spent catalysts,
- Dust / particulate from exhaust / flue gas treatment,
- Sulphur sludge,
- Oil contaminated earth,
- Resin residues,
- Asbestos containing waste
- Sludge from solar ponds
- Alkaline and acidic and paint sludges
- Floor sweeping waste
- Spent resins from DM plant

Depending on the nature of the hazardous waste and its characteristic, various types of treatment and disposal methods i.e landfilling, co-processing etc. have been attributed according to the standards.

- ETP sludges can go to landfill either directly or after stabilization.
- Slag's, asbestos and glass fibers are essentially inorganic in nature and can go to landfill directly or with simple stabilization techniques.
- Spent catalysts and resins would have to be characterized on a case-by-case basis to assess their nature and characteristics. However, the percentage of wastes generated through these sources is likely to be very small as most of it is taken back by the manufacturers.
- Salts will have to be bagged and land filled.

Based on the above compiled information wastes have been classified by their pathway of disposal:

- Wastes going to direct landfill
- Wastes that require stabilization prior to landfill
- Waste having high calorific value shall be pre-processed for co processing,
- Wastes requiring storage until alternate economically viable techniques are made available.

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F. Operational Detail

At TSDF site project consists of hazardous wastes acceptance, their handling, treatment and proper disposal in secured landfill as per CPCB guidelines.

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

- The facility shall operate only during day hours throughout the year.
- The Weigh Bridge at the main entrance will record all movements and weights and receive waste tracking receipt as required by the waste manifest system.
- A waste manifest system shall be developed in accordance with the requirement of the regulatory agencies to cover the transportation of the waste to TSDF and to provide for record of waste manifestation. The manifest system shall include details of the waste generator, waste transporter, quantity of waste, characteristics of waste, description, consistency of waste in terms of physical state and waste category number as per HW (M&H) Rules, 2016.
- Each load of waste arriving at the facility shall be located properly and logged to identify its pathway of treatment/ storage/ disposal.
- As the dumper/truck enters TSDF site it will pass through weighbridge, samples will be taken from three different locations and a composite sample is made. Once the quick test is passed, truck will be allowed to enter the premises. If any truck does not meet the hazardous solid waste inlet specification, it will be returned to member industry for necessary treatment
- Once a waste is received at the site, a sample of waste shall be collected, at the sampling bay/temporary storage facility and shall undergo laboratory analysis based on which its pathway of treatment/ disposal shall be determined.
- If the sample is approved by QA and no further pretreatment is required, the hydraulic dumpers will be sent for unloading in landfill area. The operation of land filling area is cell wise. Wherever stabilization is required, it will be done in stabilization plant.
- Materials Safety Data Sheets (MSDS) for every chemical used or handled at the landfill shall be provided on the premises.
- The landfill will be staged in cells so that the minimum practical area of waste is exposed, and maximum practical area of waste has the final cap in place i.e., progressive filling and capping of the landfill ensuring minimization of infiltration of wastes.
- During monsoon waste area shall be covered with plastic sheet.
- The standpipe forming part of the leachate collection system shall be checked regularly for the presence of leachate. Once leachate is detected it shall be regularly pumped out and transferred to the leachate treatment facility i.e. MEE. The level of leachate in the standpipe shall not be allowed to rise above the level of the leachate collection system.
- Each container of vehicle shall be thoroughly washed prior to send to the industry for collection of wastes. The waste water from washing shall be collected and taken to the leachate treatment facility i.e. MEE

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- Monitoring and auditing of the facility shall be performed on a periodic basic.
- Met-station shall be installed with continuous recording system.
- A security system shall be maintained to avoid trespassing & hazard to public.
- An inventory shall be maintained at the arrival and departure dates of waste loads in and out of the intractable waste storage area.

G. Temporary Storage of Waste

Temporary Storage Facility will be provided primarily to store the wastes upon receipt at the facility until its pathway of waste disposal is determined. The temporary waste storage facility shall keep each shipment of wastes separately and ensure that wastes do not get mixed with each other. This is to ensure that incompatible wastes are kept segregated. Compatible wastes that can be mixed with others and those stored in drums/containers are kept away from incompatible wastes. Incinerable wastes shall not be accepted at this site as the proposed site is Secured landfill facility, however waste with high calorific value shall be accepted for Co -processing in Cement Plant.

Intractable Waste Storage Area - Waste coming to the TSDF that does not meet the criteria for landfill disposal or treatment or incineration would be referred to as intractable wastes. It is proposed to have a suitable storage area for these categories of waste until alternate viable treatment technologies are identified and available.

The Waste storage area will have; -

- ✓ Proper ventilation shall be provided to prevent accumulation of hazardous gases.
- ✓ The floor shall be a concrete slab or other impermeable, non-reactive material properly bunded and graded towards one corner for the collection of accidental spillage and leakage.
- ✓ The storage area shall be built not less than 1m above the 1:100-year flood level to avoid inundation.
- ✓ Bunding and/or drains shall be provided around the storage area to avoid storm water entering this area.
- ✓ Fire control equipment shall be installed, appropriate to the characteristics of the waste and as the situation demands.

H. Waste Stabilization

Waste stabilization is designed to convert industrial wastes in the form of liquids, semi-solids or reactive solids into low leachable materials that can be deposited into a secure landfill. The stabilization operation will be carried out for all waste that requires this to minimize their contaminant leaching potential. This will change the nature of these wastes to a less hazardous category. Stabilization involves the immobilization of leachable materials by fixation as non-reactive solids. The treated wastes shall be assessed for compatibility with other wastes before being landfill and for compatibility with the HDPE and the pipe network.

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The term stabilization covers several mechanisms including:

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

Typical reagents that would be used for the stabilization process include cement, lime, fly ash, bentonite clay, saw dust and other. Where required sodium silicate solution would be used as an additive binding agent. The reagent to be used for stabilization shall be decided depending upon the type of the waste to be stabilized, price and availability. These regents shall generally be stored in sufficient quantities.

The Infrastructure proposed for the stabilization unit would include:

- ➢ Storage facilities for regents
- ➢ Tanks/Drums for storage of reagents as required
- ➢ Stabilization bins for mixing the wastes
- ➢ Earth moving equipment for movement of wastes and mixing.
- ➢ Place for curing the treated waste
- ➢ Trucks for hauling the wastes.

Treatment facility utilizes a range of techniques and processes designed to change the physical, chemical or biological characteristics of the waste. This may include changing the composition to neutralize the waste, to recover energy or natural resources from the waste, to render the waste non-hazardous or less hazardous, safer to transport, store, or dispose of or to reduce its volume. Typical operations at Stabilization unit are as follows:

- ➢ Waste receives
- ➢ Reagent addition
- ➢ Mixing
- ➢ Curing
- ➢ Analysis of the stabilized wastes
- ➢ Approval by the laboratory for disposal
- ➢ Transfer of the waste materials to the truck
- ➢ Disposal in the secured landfill

Application criteria: A study of the waste characteristics carried out as an integral part of the project indicates the following applicability to the process described below in Table 2.7.

TABLE 2-7: STABILIZATION MECHANISM BASED ON WASTE CHARACTERISTICS

Mechanism	Applicability

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Immobilization / Chemical Fixation	➢ Heavy metal and metal plating sludge ➢ Copper-chromium-arsenic wood preservative wastes ➢ Mercury waste ➢ Bag house dust ➢ Tannery wastes ➢ Spent catalysts ➢ Others
Solidification	➢ Effluent treatment plant sludge ➢ Oil and paint sludge ➢ Bitumen wastes ➢ Textile industry sludge ➢ Wool scouring slurries ➢ Others
Encapsulation	➢ Aluminum powder ➢ Asbestos ➢ Filer aids ➢ Others

I. Ground Water Sampling and Analysis

The TSDF will provide monitoring wells at the site for ground water monitoring. (In upstream and at the downstream of TSDF site). The monitoring parameters will be as per the guidelines given by the CPCB. The TSDF will have laboratory facility for analysis of bore well water. Monitoring is to be done once in a month.

J. Leachate Management System

Leachate collection and removal shall be provided at the base of each landfill cell above the geo-membrane in two layers viz., the primary and the secondary liners. The primary liner shall serve as leachate collection and removal system, while the secondary liner shall serve as leak detection system and a signal of potential liabilities in terms of environmental pollution. Leachate shall be collected by a network of lateral and header pipes embedded in a drainage layer, all of which shall eventually drain into a leachate collection sump. The collected leachate shall be pumped from leachate wells to tankers and transferred to MEE plant

K. Gaseous Emission Management

Landfill gas is generated as a product of waste biodegradation or because presence of VOC in the waste. Gas generation shall be minimized by avoiding disposal of biodegradable/ organic waste. The company shall provide air vents at the capped portion of the land fill. The company shall also carry out regular monitoring of these

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vents for VOC & H2C.

L. Closure and post closure maintenance details for closed cells including vegetative stabilization:

The TSDF will provide coverage system as per CPCB criteria for entire landfill. The design details are given in fig 2.6 below. The final cover system at the top of landfill will be designed in such a way that it will enhance surface drainage and prevent infiltration of water and supports surface vegetation. The closed portion will be given proper landscape. Gas vent system shall be provided. After closure of the land fill monitoring shall be carried out as per prescribed norms.

M. Surface Water Drainage System

The storm water drainage system shall be provided at the site to prevent surface water /rainwater runoff does not drain into waste from surrounding area and there is no waterlogging or ponding at landfill site. TSDF shall provide storage shade for hazardous waste during monsoon period. In rainy season, the main operational site shall be kept covered by tarpaulin with separate rain water collection system. The surface water generated during rainy season will be collected through storm water system and it will be discharged to well laid drainage system of industrial area. The storm water drainage is shown in the layout plan.

2.10 PRE-PROCESSING FOR CO PROCESSING

The disposal of hazardous wastes creates major economic and environmental problems. One productive use of hazardous wastes is to blend them into fuel, which mitigates damage to the environment by recycling waste into fuel and reducing fossil-fuel consumption. Operations personnel face a daunting task of efficiently blending hazardous waste into fuel, while simultaneously maintaining environmental regulatory requirements.
There are three types of waste which can be considered

1. Solid
2. Semi-Solid/ Free Flowing Tarry Waste
3. Liquid

Choice of Wastes: Waste need to be segregated and prepared based on calorific values only
Note: Compatibility Criteria must be considered in all stages at recipe Preparation Points.

Developing Alternative Fuel Preparation Facility

Alternative fuel platforms can be developed with in a area of 25 x 50 m as below:

"S" Type Alternative Fuel Preparation Facility	"L"Type Alternative fuel preparation Facility

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- **'L' Type Alternative Fuels Area:**

'L' Type Alternative Fuels are basically Liquid Type Incinerable Waste which are more than 2500 Kcal.

- Common Neutralization Tank to maintain pH level 7
- 25 KL Mixing Tank with Cooling Coil and External Jacket to control the heat for Exothermic Liquid Waste
- 25 KL Mixing Tank for the Non-Exothermic Liquid Waste
- Agitator set up made by Stainless Steel
- Pump

- **'S' Type Alternative Fuels Area:**

'S' Type Alternative Fuels are basically Solid Type Incinerable Waste which are more than 2500 Kcal

- Common Neutralization Tank to maintain pH level 7
- Mixing pit of 5 x 5 m
- Jaw mixer for premixing of the solid and semisolid Waste.
- Blender

Solid blend is prepared through mixing in an appropriate quantity of solid/ semi solid waste with binders. The first step of preparing solid blend is to selection of waste. The solid substitute fuel includes Paint Sludge, Oily Filter Cake, Spent Carbon, Organic segregation of waste according to their pH & calorific value helps in it. Source materials for waste, Tarry waste, Biomass, Resin, Distillation Residues, Grease, ETP sludge, and alumina sludge etc. Assortment of waste is done according blending norms. A general waste selection criterion for high calorific value fuel is Low moisture content, High LOI & TOC, High calorific value, Good compressibility, Less ash content, Nontoxic, Less pollutant, Sustainable combustion.
After selection, waste is mixed with binders. Some common binders which can be used for blending are rice husk, press mud, bagasse, saw dust, scrape of coconut, coal dust, lime, silicates, epoxy resins, fly ash etc. Binders should have following properties are Easily available, Cheap in cost, produce strong final agglomerates, permanently bond particles, withstand the rigors of storage, handling, packaging & shipping.

The addition of strength increasing additives such as latex, pulp from the pulp & paper industries, paper, cardboard, acrylic copolymers, starch, starch derivatives, vinyl derivatives, cellulose, cellulose derivatives, peat moss etc.; plasticizers to improve the adherence & plasticity; inorganic components like bentonite or other types of clay, and cement are optional components to provide different characteristics to the blended product.
Final Solid Waste Mix must contain 90% of Waste and 10% Binders

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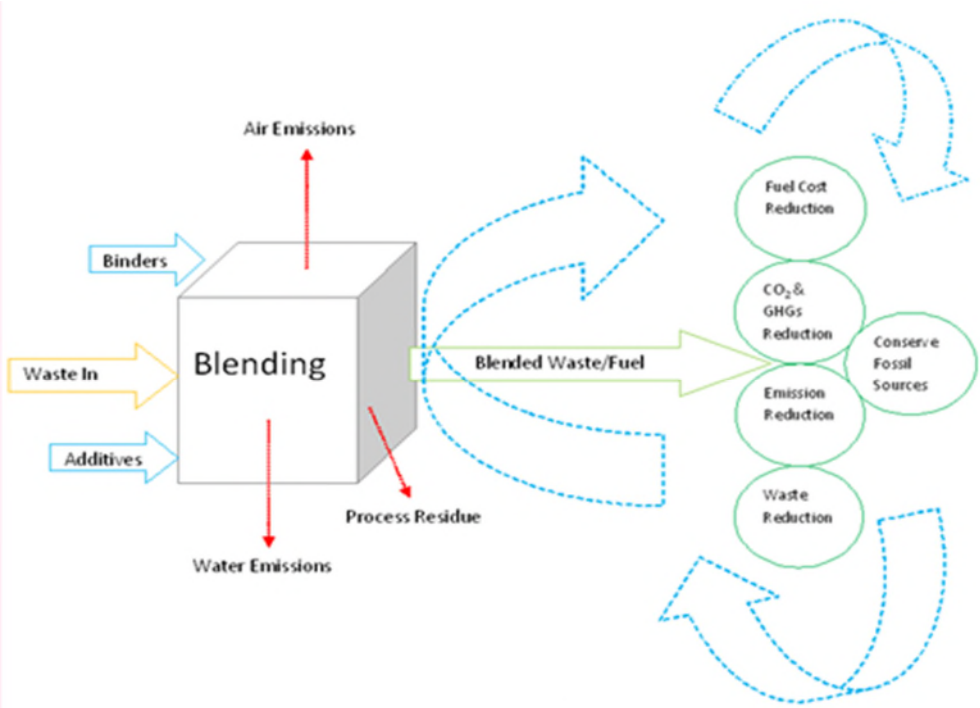
- Belt Conveyer
- 25 Kg's of Double Lined HDPE Bags for packing the solid waste mix
- Mixing Pit of 3 x 3 m **'SS' Type Alternative Fuels Area:**

'SS' (Semi Solid) Type Alternative Fuels are basically mix of Solid, Liquid and Tarry Waste Types of Incinerable Waste which are more than 2500 Kcal.

Any type of Incinerable Waste can be mixed based on the compatibility.
Emissions could be reduced when burning waste fuel versus coal. Blending waste into fuel is the only option that produces a positive effect for society; that is, it turns a nonproductive form of waste disposal into a productive form of waste disposal. This approach has the added benefit of avoiding fossil-fuel consumption. The waste professionals seek to blend wastes into fuel as efficiently as possible without violating regulatory body's guidelines. Waste fuel burns cleaner than coal; higher emissions are allowed when burning fossil fuel.

Strong oxidizers are generally incompatible with many organic substances because of the potential for dangerous reactions. Chlorates, perchlorates, and other strong oxidizers are potentially incompatible with alcohols, halogenated hydrocarbons, other reactive organic compounds and solvents, and other flammable and combustible wastes. The potential consequences of mixing such incompatible materials are fire, explosion, or violent reaction. Volatile Organic Carbons are easily escaped to atmosphere.



Blending Unit and its Environmental Features

Common Impact on Environment:

Under the requirement of Kyto Protocol GHGs can be reduced; replacement of conventional

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fuel may be one option to reduce GHGs. Minerals also can be recovered and re-used.

Environmental Issues:

There are large number of contaminants and components in waste that might be present in waste. There are few common emissions from waste blending operations.

Air Emission:

It is common to identify organic substances during blending operation, create particulate emission simply thru' handling various wastes. Issues such as Particulate Matter, Odour, VOCs, NOx, SOx, HCl, H2S, NH3, Amine and Cyanide. PAHs are relatively difficult to break down, but when they are separated epoxides are formed which attack DNA and which may cause the development of cancer.

Water Emissions:

Blending Unit create declare an emission of Total Nitrogen, TOC, Total Phosphorous, and Chloride to Water and an emission of CO_2, NH_3 and Particulate Matter into Air. The next most common emissions are probably copper and zinc which also factors in Plant and Animal Metabolism. Nickel and other Toxic metals are also present in the effluent. The principal organic contaminant BTEX (Benzene, Toluene, Ethyl Benzene, Xylenes) and Dichloromethane also appear in aqueous wash water of blending unit.

Waste and Contamination of Land

Contamination of land has caused major problems in the blending of waste which led severe contamination of land and in some cases with persistent organic pollutants.

Fugitive Emissions

Fugitive Emissions are also arising from blending area.

Particulate Emission

Blending Unit handling powders and wastes giving rise to dusts often have particulate emission to atmosphere.

Noise Emission

Noise and/or Vibration typically detectable beyond the Blending Shed.

Emission Occurring due to Accidents:

Accident risk is inherent when dealing with waste and hazardous waste. Wastes are heterogeneous in nature and or often aggressive to blending equipment. Any failure in the handling of the waste from the process of characterization and checking of wastes, to the operational control reactions and the mixing of the wastes, will significantly increase the risk from unwanted reactions.

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2.11 LANDFILL LAYOUT

A landfill site will comprise of the area in which the waste will be filled as well as additional area for support facilities. The area in which the waste is to be filled shall comprise of 5 separate landfill cell with each cell accommodating a group of compatible waste. Within each unit work will proceed in phases with only a part of the area under active operation. The additional facility at site includes, access roads, weigh bridge, equipment, office space, temporary waste storage area, surface water drainage system, landfill leachate management facility, monitoring site of well, fencing and green belt along the periphery. The layout plan for the proposed project is shown in Fig no 2.5

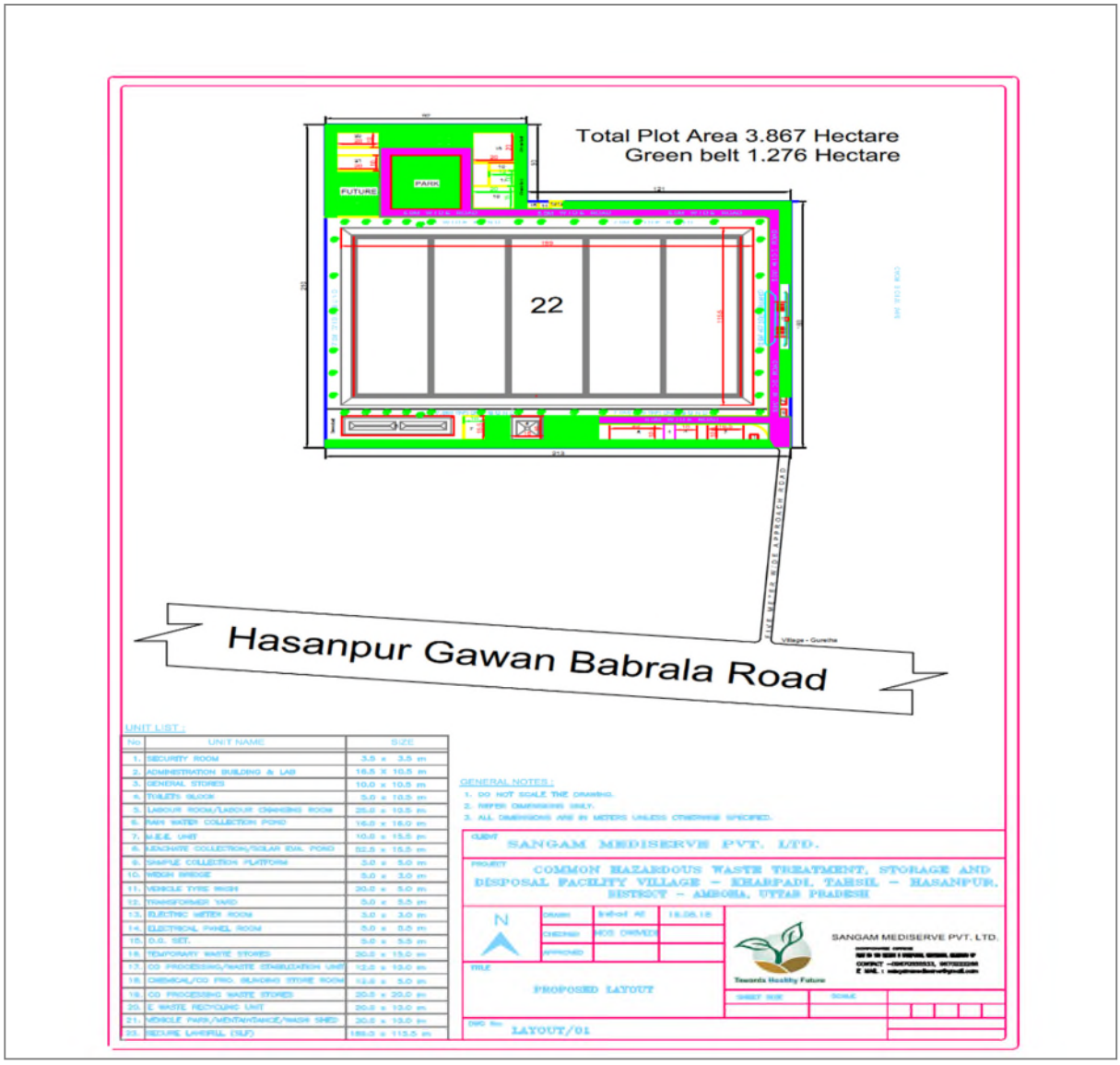

FIGURE 2-6: LAYOUT PLAN OF TSDF

2.12 DESIGN DETAILS OF TSDF LAND FILL

The secured landfill site shall be developed in accordance to CPCB guidelines having double layered liner system.as shown in Fig 2.6

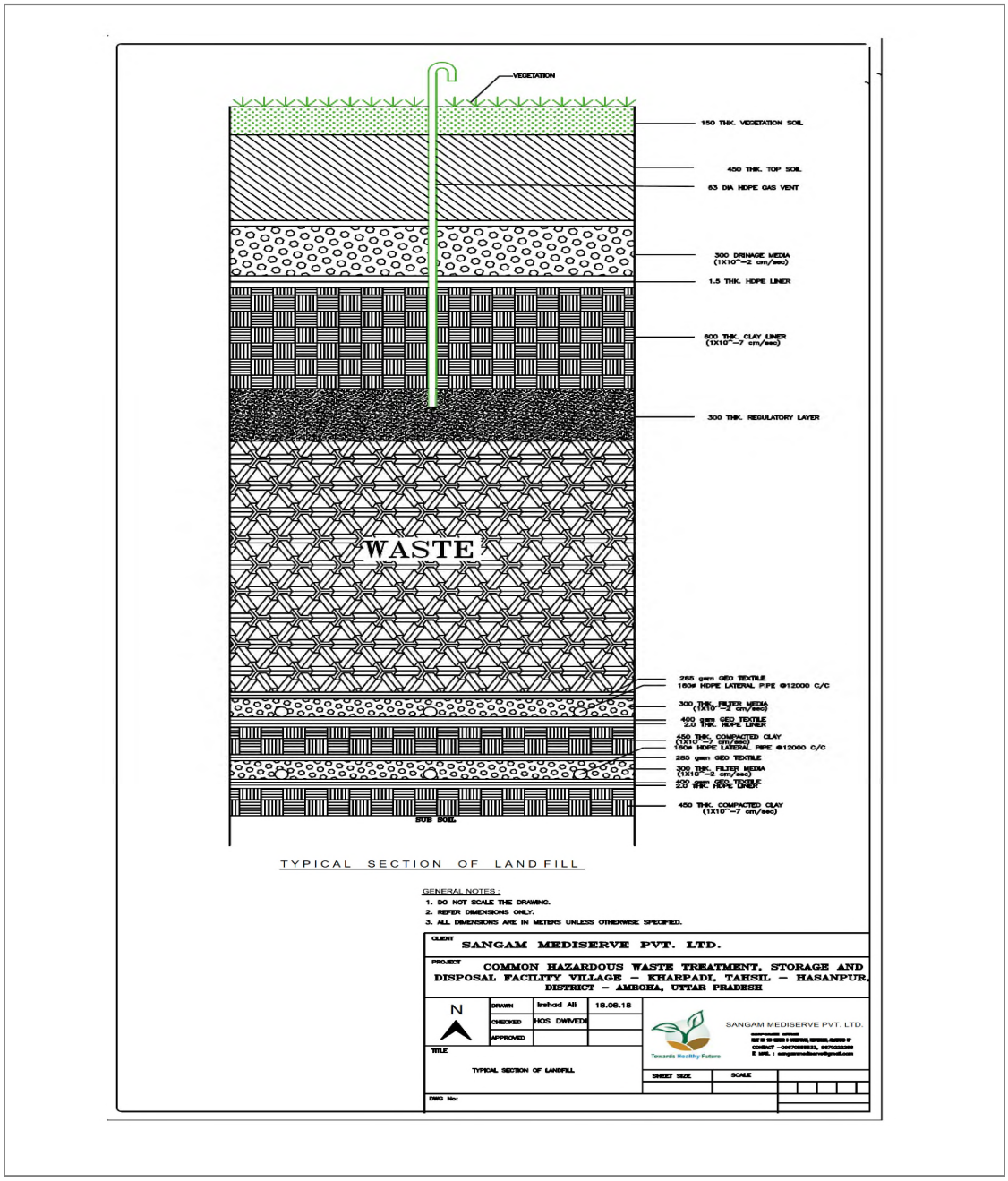

FIGURE 2-7: TYPICAL CROSS SECTION PLAN FOR PHASE I OF PROPOSED LANDFILL

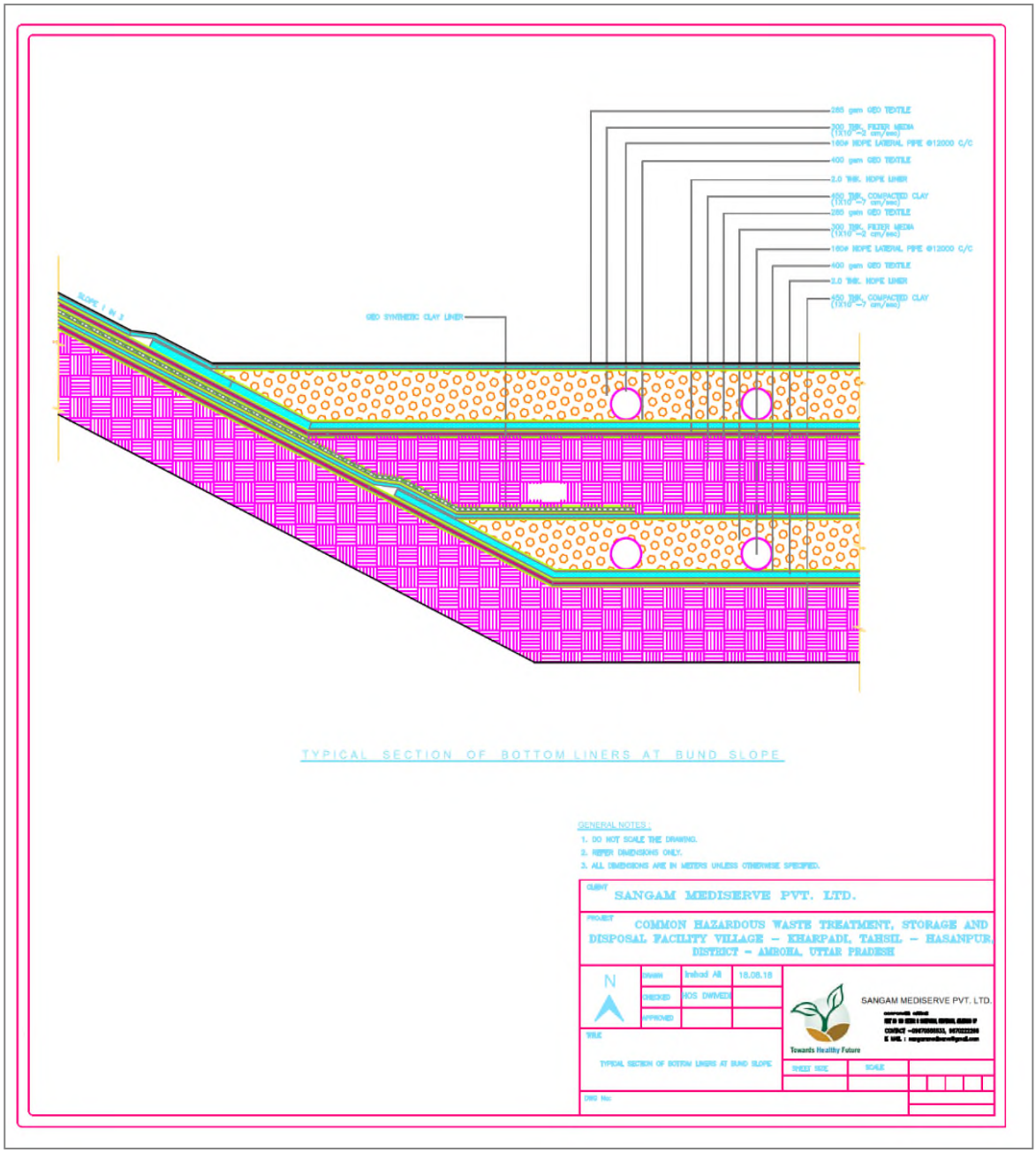

FIGURE 2-8: TROPICAL LAYOUT PLAN FOR PHASE I OF PROPOSED LANDFILL

2.12.1 Laying of Secured Landfill Cell

The landfill will be designed and constructed as a secure facility to contain the waste material and any leachate, which is formed by the entrapped moisture or by infiltration of rainfall. To meet these requirements the base of the landfill has been designed as an engineered liner constructed prior to the placement of waste and an engineered capping over the surface after completion of filling to minimise the infiltration of rainfall.

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

A. **Clay Liner**:

Clays consists of a varying proportions of hydrated aluminum silicates (e.g. kaolnite, bentonite, illite and montmorillonite) which, when properly compacted, form a soil mass with a very low hydraulic conductivity. The clay material for use as the liner at this landfill have been analysed and permeability testing carried out to ascertain its low permeability. Design permeability of the clay liner has been fixed at 10^{-09} m/s and with availability of clay liner, we will be able to achieve better results than the design values. Placement of clay liner shall be most critical interms of its efficiency of functioning. Clay should be placed in layers not exceeding 200-mm and shall be compacted to attain the required permeability. The clay layer after attaining the 0.45m thickness should be then checked for its permeability. Further to this, clay shall be kept moist to ensure that it does not dry up and cause cracks to the lining system. To ensure this we intend to keep the clay for the purpose at +4% wet of optimum moisture content.

B.**Synthetic Liners:**

Various synthetic flexible membrane liners have been considered for use as the primary

liner at the proposed landfill. Both Poly-Vinyl Chloride (PVC) and High – Density Polyethylene (HDPE) liners are generally suitable for this landfill.

Tensile strength is a fundamental design consideration in order to assess the ability of the liner to resist uniaxial and biaxial strains, which occurs in the landfill. Another stress strain consideration is the coefficient of thermal expansion.

Considering various membrane properties it is decided to use HDPE liner with appropriate thickness as primary liner for the base of the landfill. HDPE was selected for the following reasons:

- Adequate strength to withstand mechanical strength during construction, placement and operations.
- Acceptable weathering performance.
- Superior physical properties under chemical and environmental exposure to wastes
- Capability to withstand the seaming process.

The hydraulic conductivity of HDPE is of the order of 0.5 * 10^{-16} m/sec, which is effectively impermeable. Construction of the seam welding process shall be subjected to strict QA/QC measures to ensure the integrity of the liner.

C.Leachate Collection/ Treatment and Disposal:

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

Leachate shall be collected by a network of lateral and header pipes embedded in a drainage layer, all of which shall eventually drain into a leachate collection sump. The collected leachate shall be transferred to a leachate treatment system. Leachate, thus collected shall be transferred to forced evaporation system and the residue after decanting shall be subjected back to the landfilling process.

The leachate collection system in an engineered landfill takes the form of an under-drain beneath the waste material it is required to ensure there is no more than a limited head of pressure above the base liner to cause leakage of liquid from the base of the landfill. The design maximum pressure head in the proposed landfill shall be limited to 300mm.

Drainage is affected by a layer of about 300mm thick of graded sand/gravel having a high permeability. Within this layer a network of HDPE pipes are placed to collect leachate and conduct it quickly to the collection sump for removal from landfill. The pipes are typically perforated only over the upper half to allow the leachate to enter the pipe and thereafter to

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be contained within the pipe network system. The layout of the pipe network generally includes sufficient redundancy to ensure that if a blockage occurs somewhere in the network the leachate simply backs-up a little then flows into the system a little further up-gradient. Two layers of the leachate collection system shall be provided one over the other. Slotting area of the pipe shall be done only on the top 120^{o} portion of the pipe and to an extent of 100 cm^2 per running meter of the pipe.

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

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

The pipe shall have sufficient strength to withstand the load imposed by the overlying waste and the earth moving activities associated with the placement and the compaction of the waste (Min 6 Kg/ Sq.cm). The main pipe (headers) feeding leachate to the sump shall have the capability to be cleaned out in case of clogging. However, the design shall include sufficient redundancy of pipe work to ensure alternative drainage paths are available in the event of localized clogging of any part of the system. Leachate treatment plant design is discussed in the subsequent section.

Secure Landfill is the final placement area for landfillable hazardous wastes which are treated or wastes does not require treatment. Waste directly or after treatment will be disposed in the landfill as per the laboratory advice. Waste will be spread in the landfill using heavy earth machinery and then compacted using vibro compactor. At the end of the landfill operations 10 – 15 cm soil cover is placed as a daily cover. During rainy season a flexible geo-membrane cover shall be placed over the uncapped area of the landfill minimise infiltration of rainfall into the landfill, the rain water shall be diverted to join the surface water drains. At the end of the total landfill operations the final capping shall be done using composite liner with clay and synthetic geo-membrane, with vegetative soil cover grass cover. At the end of the total landfill operations the final capping shall be done using composite liner with clay and synthetic geo-membrane, with vegetative soil cover grass cover.

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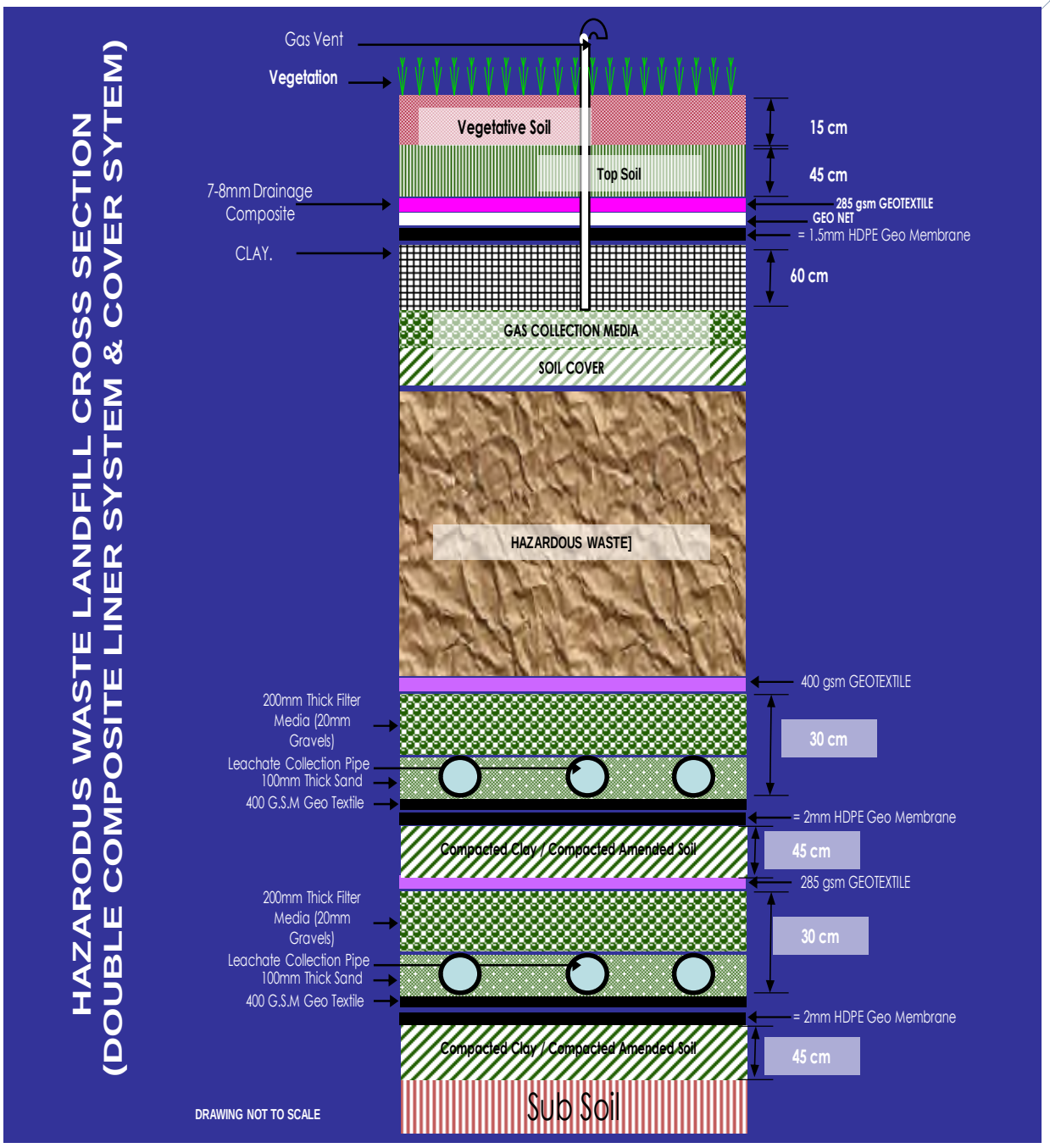

FIGURE 2-9 LANDFILL CROSS SECTION

D.Drainage of surface run-off

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

E.Wastewater Treatment Plan

Leachates Collected from Secure Landfill and other wastewater including vehicle and container washing, leachates generated at treatment, recycling plants are treated together (excluding domestic wastewater). Leachate from the landfill and all other places of generation like storage sheds, vehicle wash, wheel wash etc., will be pumped to a MEE plant The dry residue from the MEEwill be handled as a solid waste and will be disposed in the landfill.

F.Major Repair and Replacement Plan

Major repairs and replacements shall be taken up depending on the extent of ware and tare of the equipment. If the equipment is in repairable condition without disturbing the integrity of the equipment it shall be repaired and if it disturbs the system the equipment shall be replaced.

G.Closure& Post Closure Phase

Closure of the facility include, final capping of the all the landfill cells, and other infrastructure except facilities for leachate handling and disposal, continuation of facilities for post-closure monitoring, remediation preparedness and security of the facility.

I Landfill Capping

Capping of the landfill shall be by placing a composite liner on top of the waste i.e., comprising of a thick clay line and a synthetic geo-membrane for prevention of infiltration of rainfall into the landfill. Vegetation soil shall be placed over the liner material. A well planted grass cover shall be maintained over the vegetation soil to protect the soil from erosion and to provide better aesthetics of the landfill. The capping shall be done as per the CPCB guidelines. The cross section of the landfill cap is provided in the previous section.

II Post-closure monitoring

Post-closure monitoring of the landfill will be done primarily as a compliance requirement in addition to social responsibility, this also provides an early warning towards possible adverse impacts on human health and the environment.

The post-closure program of monitoring for water quality in the groundwater and surface

waters down gradient of the TSDF will be similar to that established for the operational stage of the facility. The frequency of monitoring may be varied from time to time depending on changing circumstances. There is no need for post-closure monitoring of air quality, noise or visual effects during the post-closure period however this need will be reviewed periodically and should any aspects warrant further monitoring they will be included in the program.

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Monitoring frequency of groundwater shall be monthly for the first 5 years during post closure and shall be reduced to quarterly for the next 5 years and subsequently to half-yearly for the rest of the post closure monitoring period. Parameters of analysis shall be the same as during the operational phase of the landfill, as indicated earlier

2.13 PUBLIC HEALTH MONITORING

The value of public health studies in seeking to establish whether a site or facility has caused significant adverse health effects is well known.

A three-stage health-monitoring program is proposed:

- To monitor the health of workers within the landfill to identify any adverse health effects, and
- To periodically obtain feedback from local doctors regarding any potential indicators of adverse health effects due to environmental causes in the communities surrounding, and particularly down-stream of the landfill.
- By organising health camps on a regular basis

2.13.1 Occupational Health

Medical Checkup:

All the employees shall be required to undergo a medical checkup before joining the facility. Medical checkup will be conducted monthly and the health conditions monitored.

First Aid Facilities:

All the first aid facilities required to immediately mitigate emergency situations shall be made available at the facility and at all critical locations of the facility like the treatment plant, landfill, etc.

Nutritional Feed Plan:

During routine medical checkup a nutritional feed plan shall be provided to each employee recommending them for proper nutrition.

2.14 LABORATORY FACILITIES

A well-advanced laboratory shall be established to carry out comprehensive analysis of hazardous wastes, finger print analysis and Treatability studies to decide on the disposal path way as per the waste acceptance criteria.

TABLE 2.6 LABORATORY INFRASTRUCTURE -LIST OF EQUIPMENT

S.No	Parameters	Instruments Required for Testing
1	pH	pH meter-Ion selective electrode
2	VOC & PCB/PCT	Gas Chromatograph
3	TOC	TOC Analyser

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4	CaO, SiO2, Al2O3, Fe2O3, SO3 (in Ash) & Heavy Metals	Inductive Couple Plasma Spectrophotometer
		Atomic Absorption Spectrophotometer
5	Cl & S	CHNS & Cl Analyser
6	F	UV Visible Spectrophotometer
7	Br, I	Titrimetric Method
8	CV	Bomb calorimeter
9	Ash	Gravimetric Method
10	Viscosity	Viscometer
11	Flash Point	Flash Point Analyser

Analysis Plan

Detailed analytical requirements for comprehensive analysis of the waste to be performed prior to acceptance of the waste from the generator and fingerprinting analysis to be performed to confirm the waste. Detailed list of parameters to be analysed for comprehensive analysis and fingerprinting analysis is presented as **Table 2.8** and **Table – 2.9** respectively.

TABLE 2-7COMPREHENSIVE ANALYSIS REQUIREMENTS FOR HAZARDOUS WASTES – GENERATOR /TSDF OPERATOR

Method of Analysis	**Comprehensive Analysis to be submitted by the Generators of Hazardous Wastes**
Physical Analysis	Physical State of the waste (liquid / slurry / sludge / Semi-solid / solid: inorganic, organic, metallic)
	Description of different phases of the wastes (in cases of solid wastes slurries and sludge) contained in aqueous / non-aqueous liquids / solutions
	Colour and Texture
	Whether the waste is multi-layered (Yes/No)? If yes, quantify each layer
	Specific Gravity
	Viscosity
	Calorific Value
USEPA, SW-846; Method 1010 and 1020	Flash Point
	% Moisture content loss on ignition at 105˚C
	% Organic content loss on ignition at 550 ˚C
USEPA, SW-846; Method 9095	Paint Filter Liquid Test (PFLT)

Method of Analysis	**Comprehensive Analysis to be submitted by the Generators of Hazardous Wastes**
Chemical Analysis	
USEPA, SW-846; Methods 9040, 9041 and 9045	pH
Method of Analysis	**Comprehensive Analysis to be submitted by the Generators of Hazardous Wastes**
Inorganic Parameters Analysis	
USEPA; SW-846; Vol. 1C Part II; Test Method to determine HCN released from Wastes	Reactive Cyanide (ppm)
USEPA; SW-846; Vol. 1C Part II; Test Method to determine H_2S released from wastes	Reactive Sulfide (ppm)
USEPA; SW-846; 9010, 9011, 9012	Sulphur (elemental)
USEPA; SW-846; Vol. 1A, 1B, 1C and Vol. 2	Concentration of In-organics [as per Schedule 2 of HW (M&H) Rules, 1989, as amended].
Organic Parameters Analysis	Oil & Grease
	Extractable Organic (in special cases only)
	% Carbon
	% Nitrogen
	% Sulphur
	% Hydrogen
USEPA; SW-846; Vol. 1A, 1B, 1C and Vol. 2	Concentration of individual organics [as per Schedule 2 of HW (M&H) Rules, 1989, as amended]
USEPA; SW-846; Method 1311, 1330	Toxicity Characteristics Leaching Procedure (For the parameters identified in **Section 2, Annexure -III** and the listed parameters as presented in Method 1311 of SW 846; USEPA)

TABLE 2-8: FINGERPRINT ANALYSIS REQUIREMENTS FOR HAZARDOUS WASTES - TSD FACILITIES

Method of Analysis	**Fingerprint Analysis by the Operators of TSD Facilities**
Physical Analysis	Physical State of the waste (liquid/slurry/sludge/semi-solid/solid: inorganic/organic/metallic)

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	Identification of different phases of the wastes (in cases of solid wastes contained in aqueous/non-aqueous liquids/solutions for slurries and sludge)
	Colour& Textures
	Whether the waste is multi-layered (yes/no)? If yes, quantify each layer
	Specific Gravity
	Viscosity
USEPA, SW-846; Method 1010 and 1020	Flash Point
	Loss on ignition at 105˚ C
	Loss on ignition at 650˚ C
USEPA, SW-846; Method 9095	Paint Filter Liquid Test (PFLT)
USEPA, SW-846; Method 9096	Liquid Release Test (LRT)
Chemical Analysis	
USEPA, SW-846; Method 9040, 9041 and 9045	pH
USEPA, SW-846; Vol. 1C Part II; Test Method to determine HCN released from Wastes	Reactive Cyanide (ppm)
USEPA, SW-846; Vol. 1C Part II; Test Method to determine H_2S released from Wastes	Reactive Sulfide (ppm)

There will be a Chief Chemist and a Senior Chemist who are assisted by chemists / analysts. The number of chemists shall be determined based on the work load. Qualifications shall be Ph.D / M.Sc in Chemistry for Chief Chemist / Senior Chemist where as B.Sc having Chemistry as a subject for Chemist / Analyst.

2.15 ENVIRONMENT MANAGEMENT PLAN / MITIGATION MEASURES

In the proposed Secured Landfill Project of Common Hazardous Waste Treatment, Storage and Disposal Facility (ICHWTSDF), A comprehensive environmental management plan (EMP) / mitigation measures will be followed through out the construction, operational and restoration phases of the ICHWTSDF development to meet the environmental standards.

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The EMP / mitigation plan will address the management strategies for the following environmental issues:

- Air Quality
- Noise Environment
- Water Quality
- Visual amenity
- Traffic
- Litter and Pest Control
- Landfill Gas
- Flora and Fauna

Air Quality

To comply with the regulatory requirements the following mitigative measures are envisaged to keep the work place and surrounding environment clean and healthy:

- Providing world class air pollution control system as described in the later chapter.
- Maintaining and/or re-establishing a grass cover on areas where there is no on-going activity.
- Frequent watering of unsealed roads and stock pile areas cover material.
- Providing and ensuring the use of vehicle wash area for outgoing vehicles used in landfill operations.
- Repair and relaying of blacktop road within the site boundary.
- Using dust control sprays during loading and unloading operations.
- Ceasing dust generating activities during high wind operations.
- Minimizing working distances for internal waste transport.
- Installation of a met station and dust gauges to provide ongoing monitoring of air quality on site.
- Periodical monitoring of ambient air quality for all relevant parameters as specified earlier.
- Odour control by rapid stabilization and burial of odorous wastes.

Noise Environment

Operations of the facility are not expected to generate significant noise in the surrounding areas. However, the establishment of green belt around the site will automatically reduce the impacts of the slight amount of noise generated from the generator and such other areas. Suitable personal protective equipment will be provided to the staff working in the noise generating areas if any.

Water Quality

Surface Water:

There will be no impact on the surface water quality during construction phase of the

facility. During operations of the facility all necessary precautions and provisions as indicated below shall be undertaken to ensure that existing quality of surface water bodies in the region. No impacts on surface water quality are envisaged during restoration phase of the project.

Mitigative measures proposed to be implemented to ensure protection of surface water quality include:

Clean Water Diversion: Clean water will be diverted by network of open drains running along the facility, while ensuring that the drains are not in the disturbed area of the site leading to excess sediment. The sediment basin will be provided to settle all the suspended particles before releasing any excess water from the facility.

- Proper Leachate Management: Proper care will be taken to ensure that all waters coming in contact with wastes shall be considered as leachate and will be treated as disposed off accordingly.
- Ensuring that there is no movement of wastes through the bunds.
- Treating the rainwater on the un-bunded area of the active cells as leachate.
- Periodical monitoring.

Ground Water:

The main control and prevention of contamination will be an appropriate leachate collection system within the composite liner. This will intercept any leachate generated in the landfill. Contaminated water from other points will be collected through a network of drainage lines which will be connected to the leachate collection sump. Mitigative measures proposed to ensure protection of groundwater include:

- Appropriate leachate collection system
- Double composite liner system installed as base liner
- Suitable drainage systems at all other locations within the site
- Emergency procedures to cleanup spillages as early as possible
- Appropriate capping system to minimize leachate generation.
- Periodical monitoring.

Landscape and Visual Amenity

The various measures proposed to mitigate the potential visual impacts include:

- Landscaping and revegetation to ensure that final landform is compatible with existing landscape of the surrounding areas.
- Development of wood-lot green belt will mask the landfill activities from the surrounding settlement areas and approach roads shall not be visible to the surrounding areas.
- The access road to the landfill will not have direct view of the landfill operations, thus not create any negative visual impact.

Traffic Management

The proposed operations will result in a small increase in the frequency of truck movements

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on the local roads.

Litter and Pest Control

While this is unlikely as proved in the earlier hazardous waste management facilities, litter generation in the proposed facility is expected to be low as this is typically operated under controlled conditions and with high quantities of hazardous wastes compared to the domestic garbage. Further to mitigate such possibility the following measures are proposed:

- Collection of stray and other kind of light materials before placement into the landfill.
- Providing litter fences on the downwind side of the active cells.
- Green-belt development to serve as litter screen.

Pest control will likewise be unlikely and only a minor activity as waste to be disposed of in the landfill and may contain very small quantity of putrescible material resulting in fewer problems related to pests. Further as mitigative measures the following are proposed:

- Putrescible matter would be removed to separate section of the landfill and will be properly covered with soil immediately.
- The supply source of the fill will be checked to ensure putrescible materials are not included into the waste streams.

Landfill Gas Control

Due to the inert nature of the industrial wastes the gas generation potential is very low as the microbial degradation which is absent owing to low organic materials and would further be retarded by the salty wastes placed in the landfill. However, gas monitoring will be carried out prior to placement of cap and (if required) adequately sized gas removal system will be incorporated into the capping system.

Odour Suppression

Odour from the proposed project could potentially occur from landfill operations. As stabilized solid wastes from segregated streams would enter the landfill, and the wastes would be covered using daily soil cover, the chances of odour from landfill would be minimized or eliminated.

Waste Water Generation

Waste water generated out of proposed CHWTSDF will be 5 - 10 KLD which will be treated in MEE, or use in treatment of waste or in the process of compaction of waste. It will be a zero liquid discharge unit.

Solid / Hazardous waste Generation

MEE residue will dispose in the premises and record will be available and same quantity will

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be approx. 5- 10 MTA. Used oil will be generated from DG set. It will be sold to Authorized vendor. MSW waste will dispose as per rule. Laboratory liquid waste will be store in one pit and dispose through MEE or Solar evaporation pond.

Flora and Fauna

The present flora and fauna of the area are not considered to be significantly affected by the proposed development. The proposed development will provide an opportunity for a significant improvement to the visual amenity of the area with the development of green belt of vegetation surrounding the site.

2.15 ASSESSMENT OF NEW & UNTESTED TECHNOLOGY FOR THE RISK OF TECHNOLOGICAL FAILURE

The proposed project Secured Landfill (Phase-I) will be at Plot no. 941, 942 and 944 at village- Kharpadi Tehsil-Hasanpur Distt ¬- Amroha, Uttar Pradesh. The secured landfill will be developed and operated as per "The Criteria for Hazardous Waste Landfills" published by Central Pollution Control Board.

The proposed capacity of landfill (Phase-I) will be 7.1 lacs MT of hazardous wastes which will be disposed scientific at a secured landfill. The present proposal is to serve nearby industrial area through Integrated Common Hazardous Waste Treatment, Storage and Disposal Facility (ICHW-TSDF), which will handle Land fillable waste (DLF) - 36,000 MTA, Landfill after Treatment (LAT) – 24,000 MTA, pre-processing of Hazardous waste for Co – Processing - 40,000 MTA and E- waste recycling – 6000 MTA.

The proposed site and above-mentioned methodology / technologies will be used is one of the best and proven technologies; hence, no other alternative technology has been analyzed. The details are given in above section 2.8, 2.9 & 2.10 respectively.

As per the Hazardous And Other Waste (Management, Handling and Transboundary Movement) Rules, 2016 under Environment (Protection) Act, 1986 and CPCB guidelines and based on the surveys including Topographic, Hydrologic, Geotechnical, Traffic, Environmental, Social, and Public Consultations during the detailed design study proposed three alternatives have been reviewed for secured landfilling of the proposed project using above mentioned knock out criteria and among the three selected sites, the site 3 (Alternatives-3) is selected as it is meeting the siting criteria and does not have any R & R issues. The details of the three sites with respect to siting guidelines are given in Chapter-5.

After analysis of each alternatives site and site evaluation based on observation, impacts analysis and their mitigation measures, the overall the proposed alternative site-3 has a scoreof**98 out of 100**, (details are given in Chapter-5) and according to site selection criteria under the rules **HAZWAMS/25/2002-2003**, site is suitable for the secured landfill development.

So, the proposed project Secured Landfill (Phase-I) will be at Plot no. 941, 942 and 944 at village- Kharpadi Tehsil-Hasanpur Distt ¬- Amroha, Uttar Pradesh will be developed and

operated as per "The Criteria for Hazardous Waste Landfills" published by Central Pollution Control Board.

Resource optimization/Recycling and reuse

Recycling of plastic waste after decontamination will be done through authorized recyclers.

2.16 PROPOSED MONITORING SYSTEM

The proposed monitoring system for assessment of Water, socio-economic, traffic and visual impacts is detailed in the table below.

TABLE 2-9: PROPOSED MONITORING SYSTEM FOR WATER QUALITY EFFECT

Attribute	*Parameters*	*Location*	*Frequency*
Surface Water	pH, TDS, TSS, Alkalinity, Hardness, Sulfates, Fluoride, Zn, Pb, Cd, Mn, Fe, Hg and Cr.	To be decided based on field conditions	Quarterly
Ground water	pH, TDS, Alkalinity, Hardness, Sulfates, Fluoride, Nitrates, Na, K, Zn, Pb, Cd, Mn, Fe, Hg, and Cr	Monitoring bore wells up-stream and down-stream of the facility (around 6 in number)	Monthly
Leachate and Waste Water	pH, TDS, TSS, Alkalinity, Hardness, Fluorides, Na, K, Sulfates, Zn, Pb, Cd, Mn, Fe, Hg and Cr	Leachate from the landfill and waste water generated in the facility	Monthly

Further parameters could be added to this list of monitoring parameters depending on the wastes being handled and suspects to be leaching and joining groundwater.

TABLE 2-10: PROPOSED MONITORING FOR SOCIO-ECONOMIC, TRAFFIC AND VISUAL IMPACTS

Attribute	*Parameter*	*Location*	*Frequency*
Socio-Economic	Noise Habitat Survey, External roads, Traffic and drainage	To be located based on field conditions	Quarterly around the site, annually elsewhere or as requested.
Visibility	Visual Assessment (Photographs and Physical)	Around the Project Site	Half yearly

TABLE 2-11: PROPOSED MONITORING SYSTEM FOR AIR QUALITY EFFECTS

Attribute	*Parameters*	*Location*	*Frequency*
Ambient Air Quality	SO_2, NO_X, SPM, RPM, and Pb and other to be decided	Project Site three locations and others to be decided on a case to case basis	Monthly – 48 Hours continuous
Meteorological	Temperature, wind direction and speed, humidity, rainfall	Project Site	Continuous

2.17 INFRASTRUCTURE FACILITIES

The following site infrastructure shall be provided at the proposed land fill facility;

- Site Entrance and fencing
- Administrative and Site Control Offices
- Access Roads
- Waste inspection and Sampling Facility
- Laboratory
- Waste storage & pretreatment storage shed.
- Secured landfill area. Capacity 7 lac MT
- MEE plant 20 KL/day (10x 10 KL /day)
- Equipment Workshops and Garages
- Signs and Directions
- Water Supply
- Lighting
- Vehicle Cleaning Facility
- Fire Fighting Equipment.

Fuel Requirement

For DG set approx 50 to 80 liter per day HSD (DG will be standby arrangement) and for transportation of waste HSD will be as per requirement. HSD will purchase from local market as per requirement.

Water Requirement

Approx 50 KLD water will be abstract from ground. For the same will be taken necessary permission from CGWB.

Power Requirement

62.5 KVA of power generation is required, which will be sourced from Paschimanchal Vidyut Vitran Nigam Ltd (PVVNL). Additionally, 100 KVA shall be added in future. In case of power failure, D.G. Set can be used (1 nos 62.5 KVA capacity).

Man Power Requirement

During Construction phase the labours and workers will be hired from nearby villages.

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Number of persons required during construction phase is 40-50 and 60 nos is required during operation.

Material Requirement

The various materials that will be used in the facility are synthetic liner, clay, drainage media, pipes and chemicals like lime clay etc.

Green Belt

The TSDF will developed green belt all around surrounding i.e. 33 % of the total land i.e. 12762 M^2

2.18 Proposed Project Schedule

Likely date of start of construction & likely date of completion.

Construction activity will be started after obtaining Environmental Clearance from SEAC/ SEIAA, Lucknow, Uttar Pradesh.

2.19 Total Project Cost

Total cost of the proposed secured landfill project is estimated as about Rs.49.02 Crores. (4902 Lakhs **(Phase-I-4000 Lakh / 40 Crores) &**Phase-II- Rs 900 Lakh/ 9 Crores)

* * * * *

3 DESCRIPTION OF THE ENVIRONMENT

3.1 INTRODUCTION

This chapter describes the existing environmental status of the study area with reference to the prominent environmental attributes. The study covers the core zone and buffer zone of 10-km radius around the project site.

3.1.1 STUDY AREA

The study area of proposed secured landfill (Phase-I) of Common Hazardous Waste Treatment, Storage and Disposal Facility (TSDF) is situated at Plot no. 941, 942 and 944 at Village-Kharpadi, Tehsil-Hasanpur Distt.-Amroha, Uttar Pradesh which lies between 28°27'55.44"–28°28'05.26" latitudes and 78°21'03.94"–78°21'14.89" longitudes. It is covered by the Survey of India Toposheet No. 53 L/7. The nearest railway station is Gajraula Railway Station about 35 km (Aerial distance) from project site towards North east direction. Major railway station is Ghaziabad Railway station at a distance of 100 km in North West direction.

The relevant information and data (both primary & secondary) were collected in core as well as buffer zone (10 km distance from the proposed project site) during Pre - Monsoon Season (Oct. to Dec., 2018) in accordance with the guidelines for preparation of EIA studies. Studies on various components of environment have been conducted in the "Study Area" covering 10 km radius, centering the proposed project Area. The study area has been divided in two zones, namely, "Core Zone" and "Buffer Zone". The Core Zone is the plot area where Secured land fill site will be located. In order to establish the present environmental scenario, various environmental factors such as topography and drainage, meteorology, air, water, soil, noise, flora, fauna and socio-economics etc. have been studied in the study area.

3.1.2 PERIOD OF STUDY:

Data generation with respect to air, water, soil quality, noise status, meteorology etc. was carried out by ***Noida Testing Laboratories, (An ISO: 9001: 2008, 14001 : 2004 & OSHAS : 18001: 2007 Certified & NABL Accredited Laboratory) MoEF & CC*** (Ministry of Environment, Forest & Climate Change), UPPCB & HSPCB Recognized Laboratory) All the field studies for baseline data generation were carried out during Oct-Dec 2018.

3.1.3 COMPONENTS & METHODOLOGY

Baseline study is conducted in order to identify the changes to the natural and socioeconomic environments, or any potential impact and to have a thorough understanding of the nature of those existing environments prior to commencement of the proposed development/ construction activities, it is necessary to study the present scenario of the area by collecting information on the following parameters / components:

1. Land Environment
2. Soil Environment

3. Water Environment
4. Biological Environment
5. Meteorology
6. Air Environment
7. Noise Environment
8. Socio-economic Environment

Land, soil, water, air and noise constitute the physical environment, agricultural crops, flora and fauna constitute the biological environment of the study area and these are discussed in the following sections of this chapter.

3.2 LAND ENVIRONMENT

3.2.1 TOPOGRAPHY

The climate of the district is similar to other districts of the state situated at the base of Himalaya which becomes hot in summer and dry & cold in winter. Ganga, Baha & Krishna are the main rivers of the district. The district has almost monotonous plain with no distinct features except some sand ridges, river valleys and shallow depressions. The maximum and minimum height from sea level are 182.00 mamsl to 208.00 mamsl. (**Study area 72 -155 m amsl** (**Figure 3.1)**

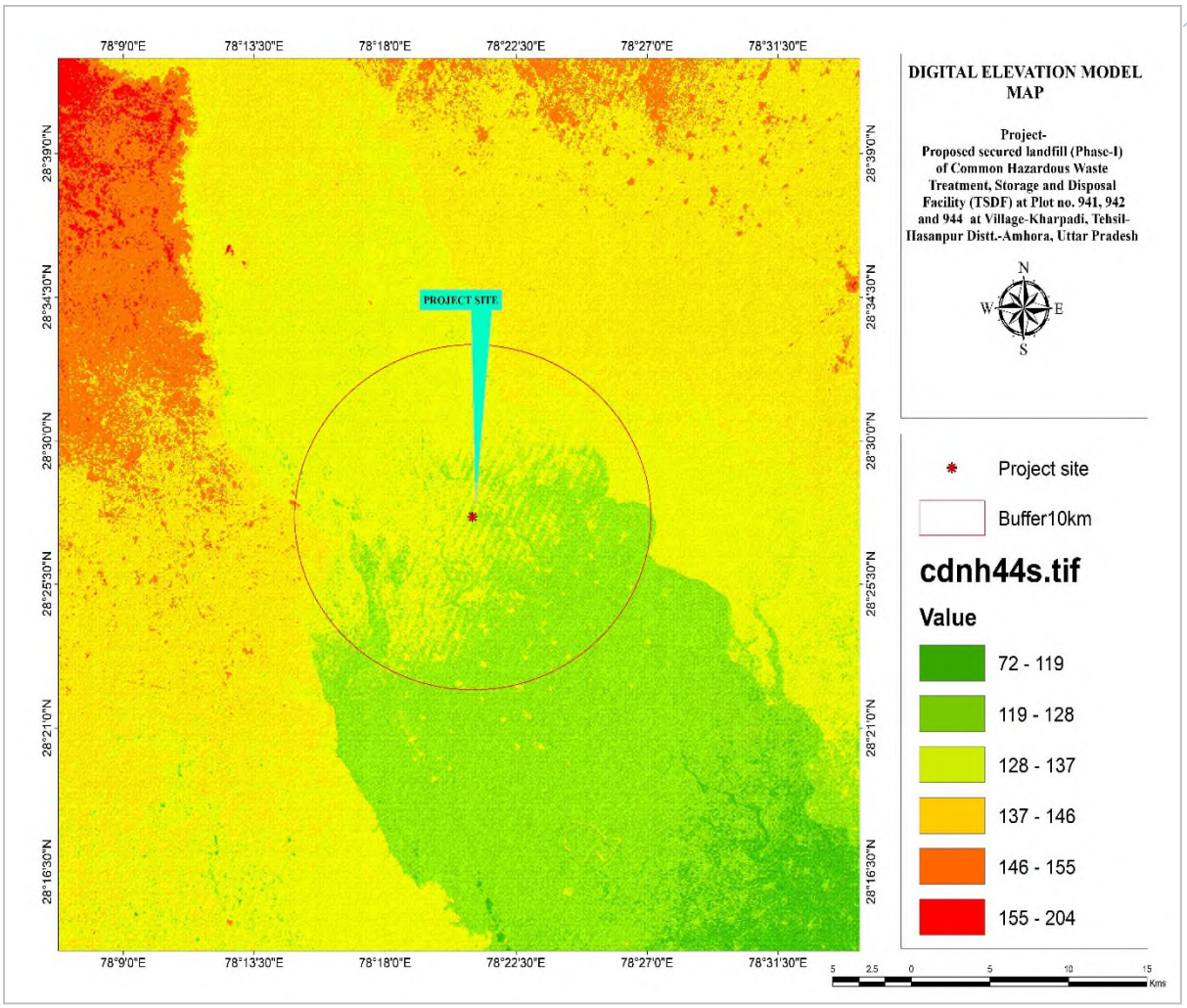

FIGURE 3-1: DIGITAL ELEVATION MODEL MAP OF THE STUDY AREA

3.2.2 DRAINAGE

The drainage in the region is controlled to a large extent by the Ganga River (approx. 5 km to the West), Mahawa Nadi (approx 2.5 km in West) and their tributaries as well as some Nala Chhoiya Nala (approx. 4 km in the North East) & Bagad or Tikta N (approx 2.75 Km in NE), which generally are seasonal in nature. (**Figure 3.2)** There are several water bodies present the study area of the project. The above figure also indicates the drainage from the proposed TSDF site is towards South -East side, however the water bodies are non-perineal in the nature.

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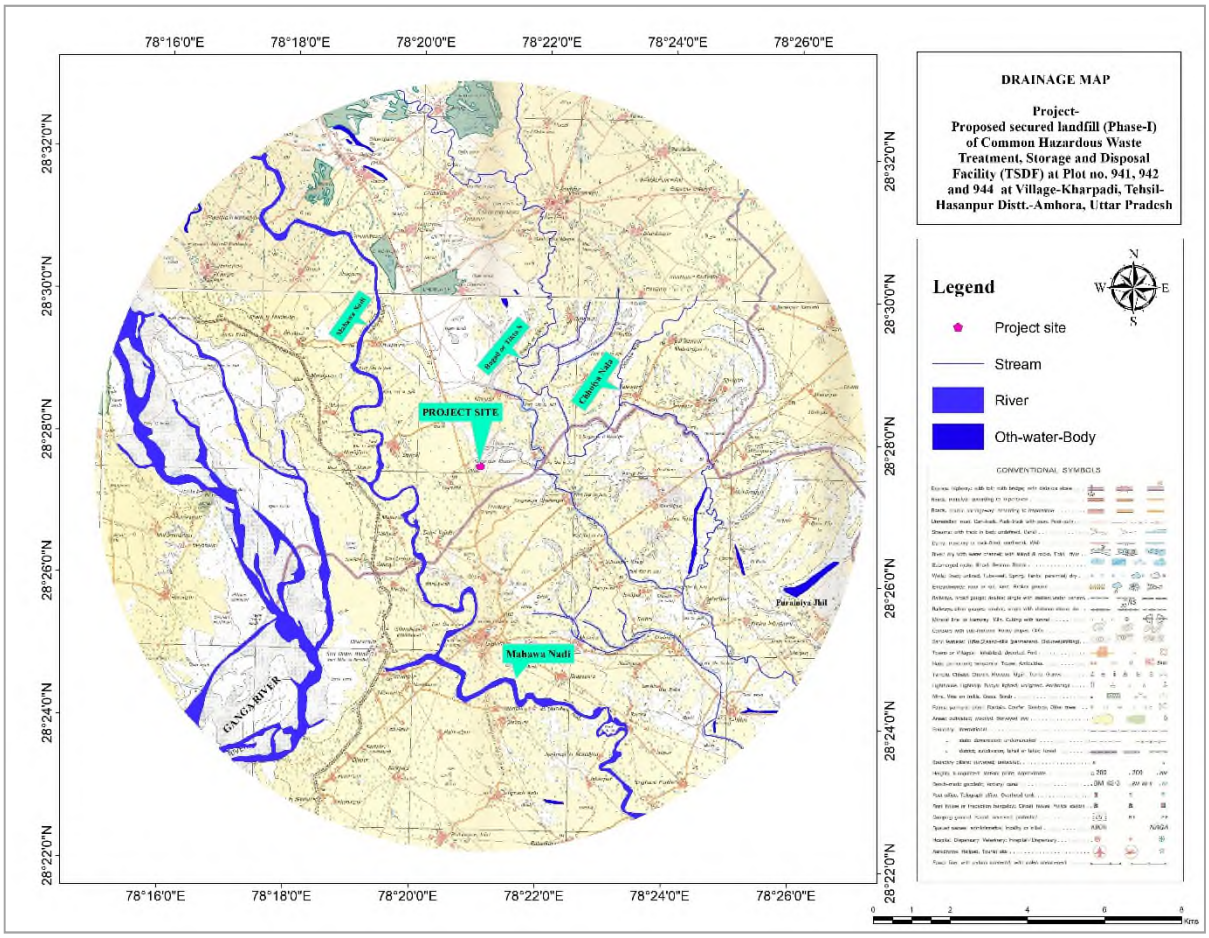


FIGURE 3-2: DRAINAGE MAP OF THE STUDY AREA

3.2.3 GEOLOGY

The study area occupied by younger alluvium in the district can be delineated all along in the flood plains of Ganga. The flood plain can be further differentiated in to two geomorphic units. The newer flood plain occupies along the river channel and its adjacent area of terrace which are subjected to periodic flooding. These are consists of sand, silt and silty sand with minor clays and form the flood plain of river. Over all, this is narrow zone along the river channel and gets flood regularly during rainy season. The older flood plain of river Ganga can be delineated over a few kilometers, locally it is known as Khader. Adjacent to river Ganga, the order flood plain is more conspicuous and wider in the eastern side as compared to western side. The zone is characterised by the presence of fluvial land forms such as meander scars, cut off meanders and paleochannels etc. The sediments are fine grained sand and silt with thin clay horizons. The zone can be separated from older alluvium by the presence of natural levees, sand dunes has occurred in the Dhanaura, Bacchrawa **and Hasanpur area of the district.** It occupies the entire upland or interfluvial area occurring between the major drainage. The soils are silty, clayey and sandy in varying proportions.

3.2.4 HYDROLOGY

The project area underlain by unconsolidated sediments of quaternary age comprising sand,

silt, clay along with occasional kankar. The ground water occurs in the granular sediments within the zone of saturation under water table conditions in the shallow aquifer and in deeper aquifer below 150 m depth, occurs under semi-confined to confined conditions. On regional scale a single aquifer group extending down to 180 mbgl is existing. The exploratory drilling done by CGWB in the district and adjacent district 10 (Moradabad) down to a depth of 450 mbgl indicate that the first aquifer group may extend down to 215 mbgl below 215 m a thick clay bed is existing. The change in the sediment facies occur in depth range of 388-400 mbgl and sediments may belong to one system. The sediments below 400 m may belong to different depositional environment. The aquifer system behaves as unconfined to semi confined depending upon the presence of clay beds. The aquifer materials are fine to medium grained & get coarser with depth. Also, gravel is encountered at few places. The presence of clay beds of variable thickness is dominantly confined to areas close to major drainage system namely Ganga.

3.2.5 LAND USE PATTERN

The land use relates to the human activity or economic function associated with a specific piece of land, while the term land cover relates to the type of feature present on the surface of the earth (Lillesand and Kiefer, 2000). Land use/ Land cover (LULC) maps are presently being developed for various purposes. Moreover it is being used for planning and management activities. Since the industrialization is taken place, LULC changes has been studied such as deforestation, urban sprawl, etc. In the LULC mapping the use of multi-spectral bands and panchromatic band are being widely used since the emergence of satellite imageries in early 1970s. More recently, high spatial and spectral resolution satellite imageries such as quick bird sensors with spatial resolution of 0.50 meters are being utilized for more detail LULC mapping. Therefore, the satellite remote sensing technology has been widely accepted for rapid resource assessment and monitoring, particularly in the Developing World. National Aeronautical and Space Administration (NASA) of USA has made most significant contributions with satellite based remote sensing techniques. Identification and periodic surveillance of land uses and vegetation covers, in the vicinity of any developmental activity is one of the most important components for an environmental impact assessment, which would help determine the impact of the project development activity on the land use pattern.

Data Products Used

Remote Sensing Data

The details of primary data in the form of digital data for interpretation and analysis of the study area within 10 km from the project site was generated from the IRS P6 LISS-IV MX digital FCC (False Color Composite) has been used for preparation of Land use/ Land cover thematic map of study area.

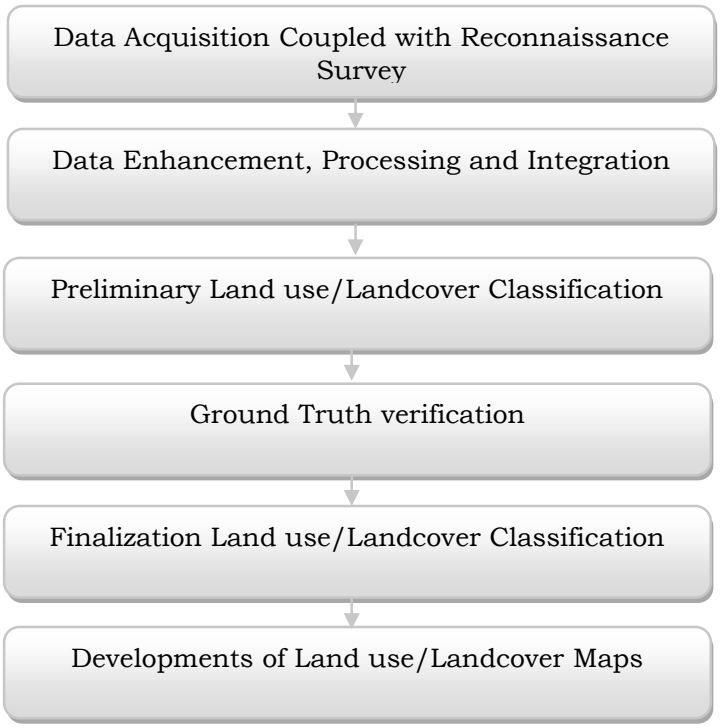
IRS P6 LISS-IV MX digital FCC Satellite image is shown in Figure 3.3 below.

Survey of India Toposheet

In addition Survey of India (SOI) toposheet 53 L/3, 53 L/6 & 53 L/8 with 1:50,000 scale were used for the preparation of base and drainage maps.

Methodology

For the preparation of Landuse/landcover map the methodology adopted is shown in flow chart given below.



Preliminary / primary data collection of the study area

- Data from NRSC Hyderabad

Secondary data collection from authorized bodies

- Google Map
- Layout
- Cadastral / Khasra map
- GPS Coordinates of Plant Boundary

Processing of satellite data using ERDAS Imagine 9.2 and to prepare the Land use & Land cover maps (e.g. Forest, agriculture, settlements, wasteland, water bodies etc.) by digital image processing (DIP) technique.

- Enhancement of the Satellite Imagery
- Base Map layer creation (Roads, Railway, Village Names and others

Secondary data etc.)

- Data analysis and Classification using Digital interpretation techniques.
- Ground Truth studies or field verification
- Error fixing / Reclassification
- Final Map Generation

Land Use & Land Cover Classes

These are the following LULC Classes: -

Water Bodies, Crop land, Fallow Land, Human Settlement, Industrial Area, Mine Quarry, Scrub Land, Plantation, Railway Line, Road Network, Forest Land, Stony Waste Land, Open Land etc. as per NRSC Guide Line.

Definitions of LULC Classes

(Reference- National Remote Sensing Centre Guideline)

Agriculture Land: These are the lands primarily used for farming and for production of food, fiber, and other commercial and horticultural crops. It includes land under crops (Irrigated and non-irrigated, Fallow, Plantation etc.)

Crop Land: These are the areas with standing crop as on date of satellite overpass. Cropped areas appear in bright red to red in color with varying shape and size in a contiguous to noncontiguous pattern. Three cropping seasons exist in India viz., Kharif (June/July-September/October), Rabi (November-December-February-march) and Zaid (April-May).

Fallow Land: These are the lands, which are taken up for cultivation but are temporarily allowed to rest, un-cropped for one or more seasons.

Fallow land is categorized in two classes which Current Fallow and Long Fallow.

Current Fallow Land: These are the cropland areas, which are un-cropped during the agriculture year under consideration as on the date of satellite overpass.

Long Fallow Land: These are the croplands areas, which are un-cropped for Two to Four agriculture Years from the base year.

Land Use / Land Cover Interpretation:

The study area mainly comprises of Agriculture land which covers 85.36% of land, Forest land / Vegetation occupies 5.33% and Barren/Waste/Scrub/Sand land which covers 6.48 % of total land of buffer zone. Thus, other classes occupy only 3 % of the area. Major part of the study area i.e. 26874.8 Ha. of land is covered by Agriculture land. 0.99 % of the total study area is under Settlement/Built-up land and 1.80% is occupied by the water body in the study area.

The land use & land cover details of the buffer zone is given Table - 3.1

TABLE 3-1: LAND USE PATTERN OF THE STUDY AREA

Sl.No	Classification/Legend	Area in Sq.km	Percent (%)
1	Agriculture Land	26874.8	85.36
2	Forest Land/Vegetation	1679.6	5.33
3	Barren/Unculturable/Scrub/Sand/Waste Land	2045.09	6.48
4	Settlement/ Built-up Land	312.22	0.99
5	Water Body	569.34	1.80

The land use land cover (LULC) map for the study area is given in ***Fig. No. 3.1.***

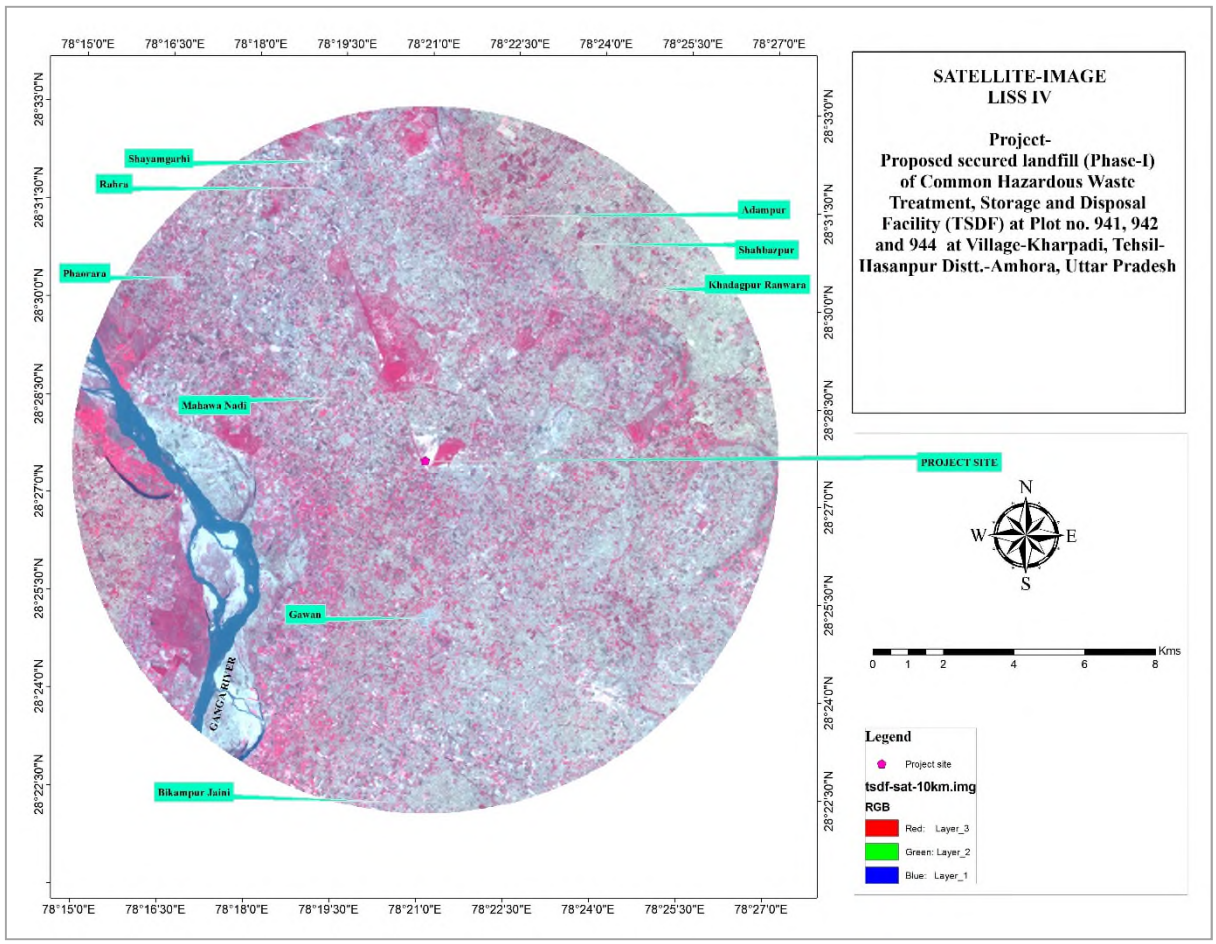


FIGURE 3-3: SATELLITE IMAGE OF THE STUDY AREA

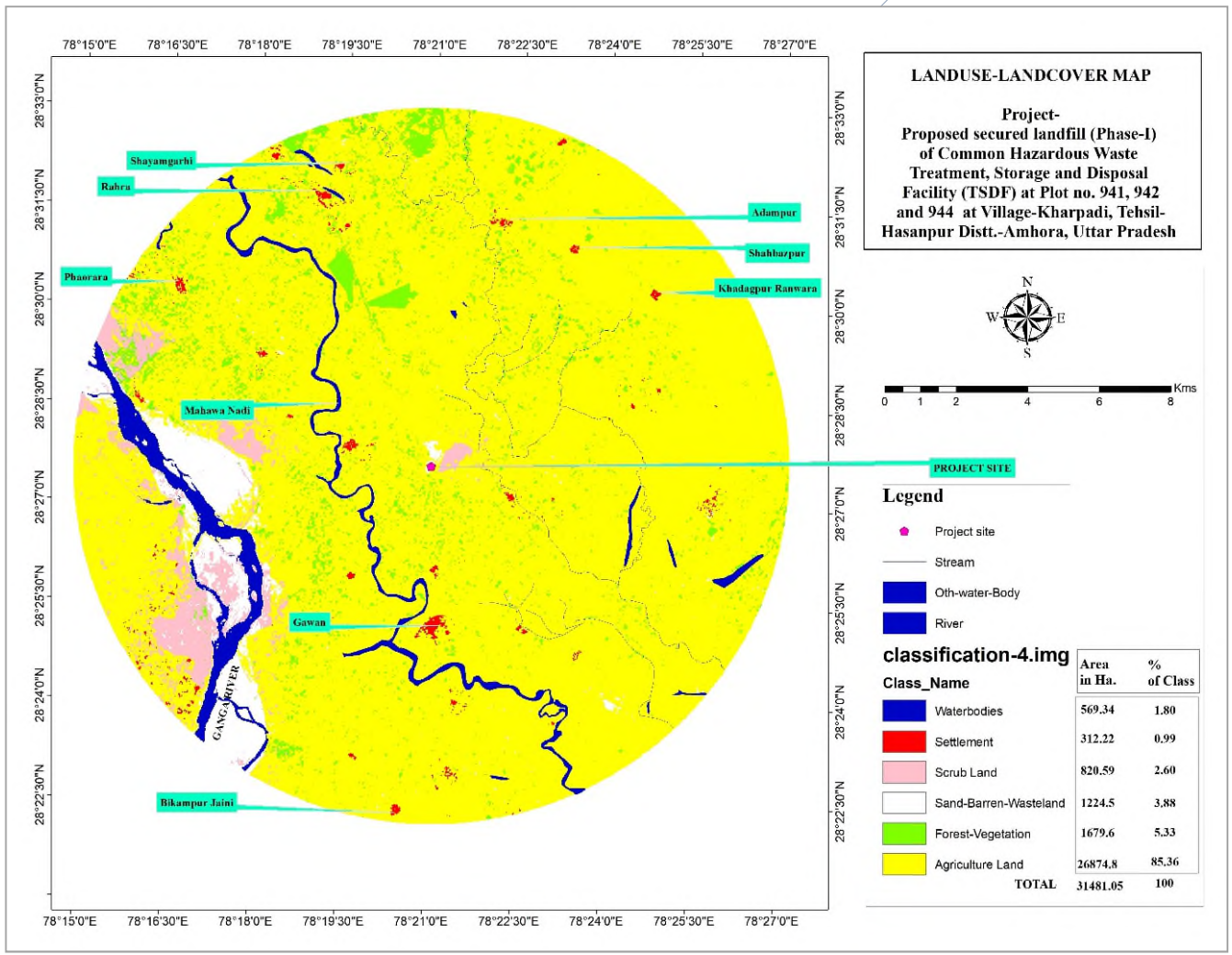


FIGURE 3-4: LANDUSE LANDCOVER MAP OF THE STUDY AREA

3.2.6 SOIL ENVIRONMENT, LOCATION & RESULTS

The soils of the district can be classified into two major groups based on its texture & composition characteristics.

1. Khader and low land soil

2. Upland or Bangar soil.

1. Khader and or Low Land Soil:

This type of soil is found in low lying land and along the river courses like Ganga & sot. These soils are characterised by generally ash grey to brownish grey on the surface and their texture is some time silty loamy and sometime sandy. The clay contents are low.

2. Upland or Bangar Soil:

These soils occur in upland tract of older alluvium. The soil profile is generally mature, showing good development and alleviation of clay. It can be sub-grouped depending upon its topography, occurrence and textural nature into sandy soil, clayey soils and loamy soil.

Soil samples from 5 locations covering a radius of 10 km. were collected and analyzed. The study was designed to assess the existing soil quality around the proposed site. The soil sampling locations have been shown in the **Table 3.2** and **Figure 3.5**.

TABLE 3-2: SOIL SAMPLING STATIONS

Station No.	Location	Distance from Plant (in km)	Direction
S1	Project Site (Industrial Area)	---	---
S2	Guretha	1.0 Km.	SW
S3	Partapur	1.35 Km.	SE
S4	Sirsa	2.75 Km.	S
S5	Khwajpur	3.5 Km.	W
S6	Chuchaura	4.0 Km.	NW
S7	Bhubra	3.70 Km.	NE
S8	Singhanla Ki Madaiyan	2.75 Km.	NE

Composite sampling of soil up to root depth (15 cm) was carried out at each location. The value of important physical and chemical parameters has been given in Table 3.3.

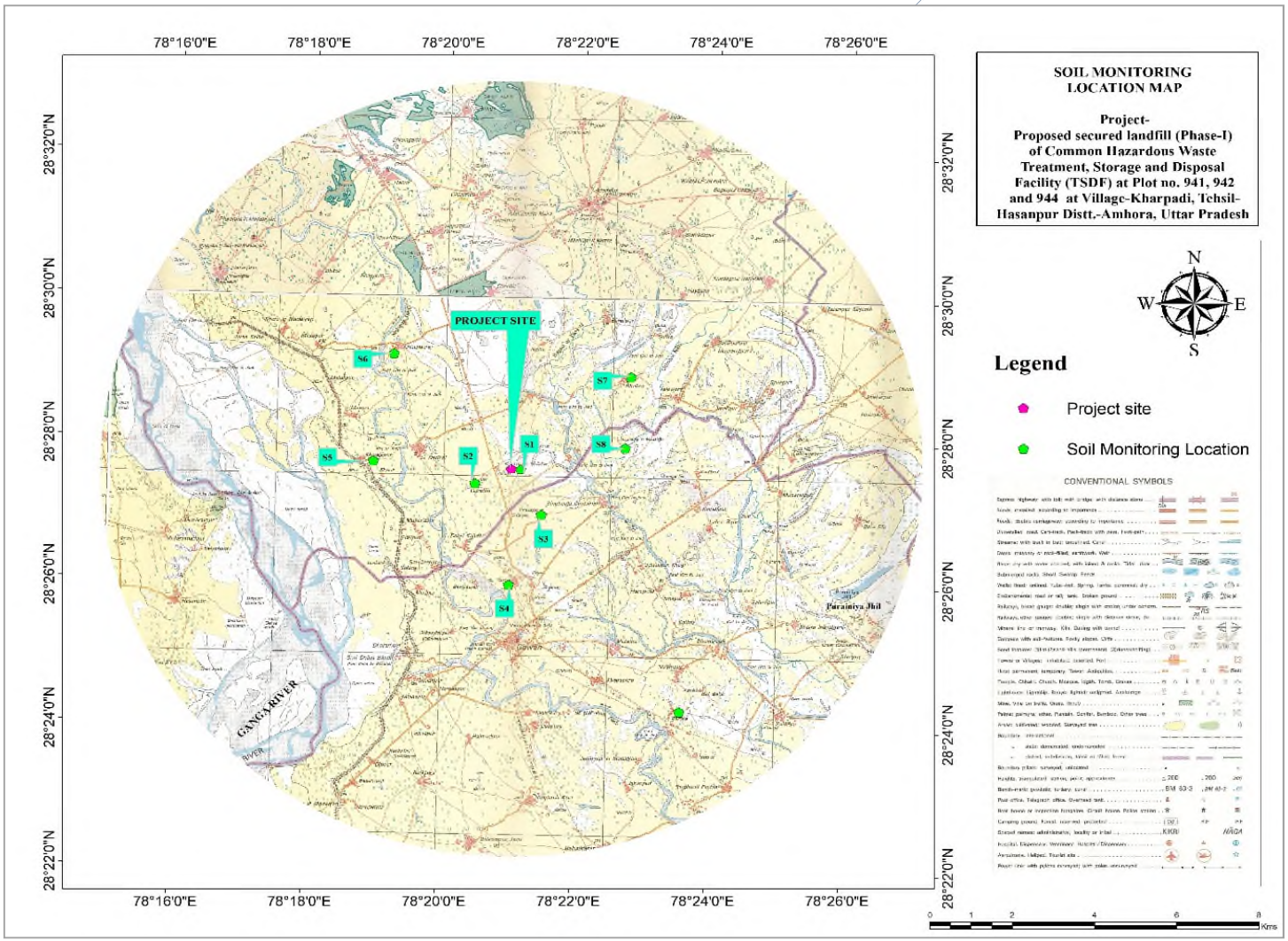


FIGURE 3-5: SOIL MONITORING LOCATION MAP OF THE STUDY

TABLE 3-3: SOIL QUALITY RESULTS

Sr. No.	Parameters		Test Method	Sampling Locations / Results							
				SQ1	SQ2	SQ3	SQ4	SQ5	SQ6	SQ7	SQ8
1.	pH		IS:2720 (Part-26)	7.23	7.21	7.20	7.21	7.22	7.18	7.20	7.21
2.	Conductivity (µmhos/cm)		IS:2720 (Part-21)	372.00	371.00	375.00	370.00	369.00	344.00	370.00	371.00
3.	Sodium (as Na)(mg/kg)		STP/SOIL	50.38	50.39	50.35	51.35	50.35	53.50	50.34	50.36
4.	Water holding capacity (%)		STP/SOIL	30.00	31.00	30.00	32.00	30.00	34.10	30.00	30.00
5.	Potassium (as K) (mg/kg)		STP/SOIL	238.51	237.50	236.55	234.48	235.48	238.60	234.50	235.52
6.	Texture	Sand (% by mass)		68.00	68.00	65.00	67.00	67.00	62.00	67.00	68.00
		Clay (% by mass)		18.00	17.00	19.00	19.00	17.00	15.00	18.00	18.00
		Silt (% by mass)		14.00	15.00	16.00	14.00	16.00	23.00	15.00	14.00
7.	Calcium (as Ca)(mg/kg)		STP/SOIL	146.00	145.00	145.00	145.00	142.00	150.00	146.00	148.00
8.	Magnesium (as Mg) (mg/kg)		STP/SOIL	64.71	64.72	64.71	64.58	63.58	54.60	63.70	63.72
9.	SAR		STP/SOIL	1.00	1.00	1.00	1.00	1.00	1.05	1.00	1.00
10.	CEC (meq/100gm)		STP/SOIL	2.15	2.08	2.12	2.15	2.12	2.88	2.13	2.15
11.	Available Phosphorus (as P), (mg/kg)		STP/SOIL	11.74	11.75	12.74	11.75	11.75	15.10	11.73	11.71
12.	Organic carbon (%)		STP/SOIL	0.42	0.40	0.41	0.40	0.41	0.51	0.44	0.42
13.	Porosity (% by mass)		STP/SOIL	41.00	39.00	40.00	40.00	40.00	48.70	40.00	40.00

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14.	Permeability (cm/hr)	STP/SOIL	1.88	1.84	1.85	1.86	1.84	1.96	1.88	1.85
15.	Bulk Density (kg/cm^3)	STP/SOIL	1.18	1.14	1.18	1.19	1.21	1.28	1.16	1.14
16.	TKN%	STP/SOIL	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02

The values of pH are in range of 7.18– 7.23 mg/l. The Conductivity were found in the range of 344.0 – 375 (µmhos/cm). Sodium were found to be in the range of 50.34 – 53.50 (mg/kg), Calcium were found in the range of 142.0 – 150.0 (mg/kg) and Magnesium were found in the range of 54.60 – 64.72 (mg/kg).

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3.3 WATER ENVIRONMENT

3.3.1 SURFACE WATER REGIME

The surface water resources within the study area primarily consist River Ganga at a distance (approx. 5 km to the West), Mahawa Nadi (approx 2.5 km in West) and their tributaries as well as some Nala Chhoiya Nala (approx. 4 km in the North East) & Bagad or Tikta N (approx 2.75 Km in NE), which generally are seasonal in nature. (**Figure 3.2)**. There are several water bodies present within the study area of the project.

3.3.2 GROUND WATER REGIME

The study area has a very good aquifer source. The entire command area falls on River Ganga. Ground water from Hand pumps, Open dug wells and Tube wells is abstracted for both irrigation purposes as well as for meeting various domestic needs. Drinking water requirement is principally met from borewells & Tube wells. The details are described in sec 3.2.4 under hydrology.

3.3.3 WATER QUALITY

The objective of the baseline water quality program was to determine pre project water quality conditions and the nature and extent of present impacts. Five ground water samples and two surface water samples were analyzed. Grab samples were collected during the month of October 2018 and brought to the laboratory for testing and analysis. The analysis has been carried out according to the IS standards such as IS: 3025, APHA and IS 10500:2012. The sampling locations have been shown in **Table 3.4** and **Figure 3.6**.

TABLE 3-4: WATER SAMPLING STATIONS

Station No.	Location	Distance from Plant (in km)	Direction
GW1	Guretha	1.0 Km.	SW
GW2	Partapur	1.35 Km.	SE
GW3	Sirsa	2.75 Km.	S
GW4	Khwajpur	3.5 Km.	W
GW5	Chuchaura	4.0 Km.	NW
GW6	Bhubra	3.70 Km.	NE
GW7	Singhanla ki Madaiyan	2.75 Km.	NE
SW1	River Ganga	5.0 Km.	SW
SW2	River Mahawa Nadi	1.35 Km.	SE

The findings of the analysis have been reported in **Table 3.5, 3.6, 3.7 & Table 3.8**. Brief description of the findings of water analysis has been given below:

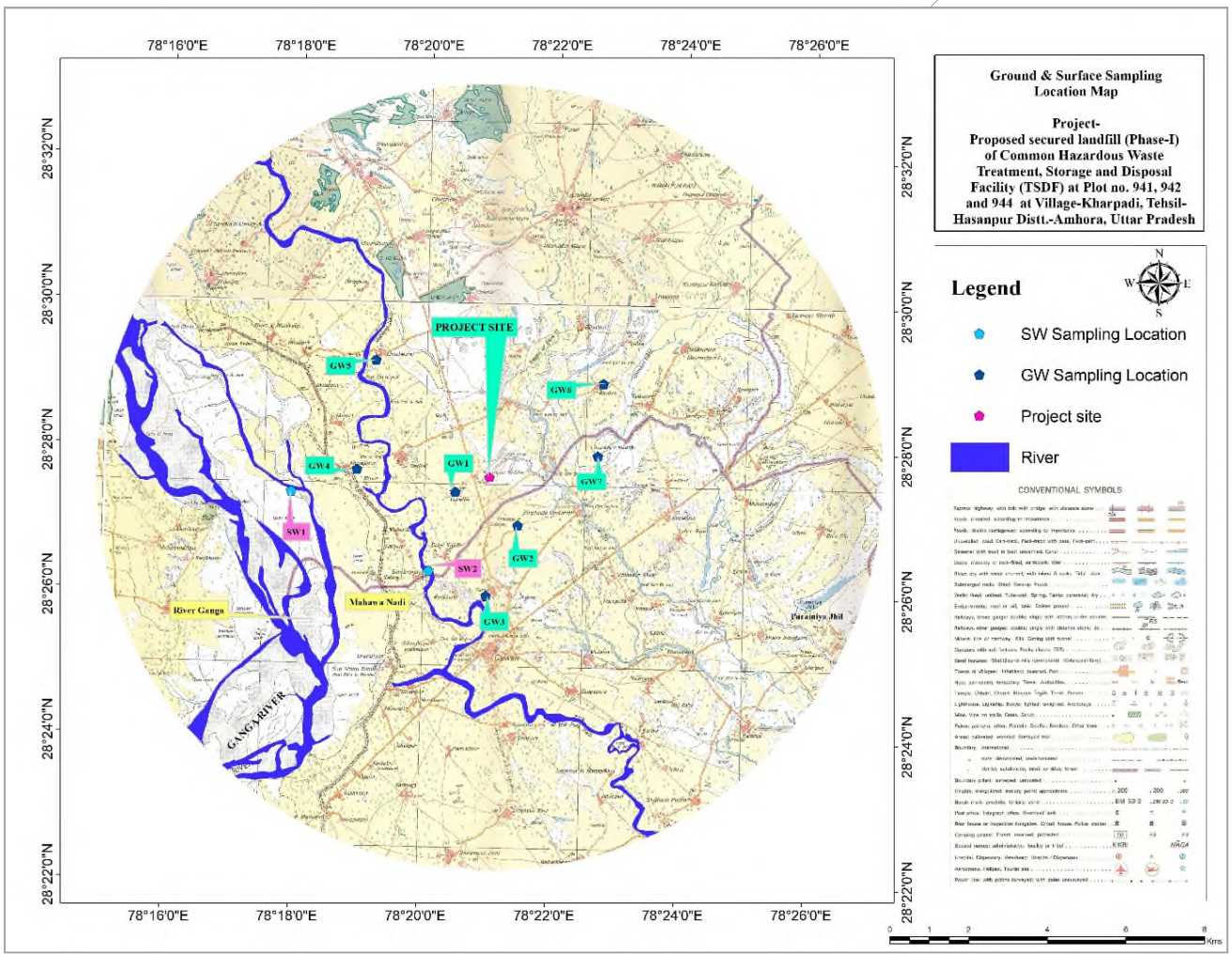

FIGURE 3-6: GROUND WATER-SURFACE WATER SAMPLING LOCATION MAP OF THE STUDY AREA

TABLE 3-5: GROUND WATER QUALITY IN STUDY AREA

ORGANOLEPTIC & PHYSICAL PARAMETERS

Sr. No.	Characteristics	Unit	IS:10500 Standards	GW1	GW2	GW3	GW4	GW5	GW6	GW7	Requirement (Acceptable Limit)	Permissible Limit in absence of alternate source
1	Colour	Hazen Unit	IS-3025(P-04)	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	5	15
2	Odour	--	IS-3025(P-05)	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	--	IS-3025(P-07 & 08)	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	-
4	Turbidity	NTU	IS-3025(P-1)	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	1	5
5	PH Value	-	IS-3025(P-04)	7.62	7.54	7.27	7.12	7.23	7.50	7.05	6.5-8.5	-
6	Total Dissolved solids (TDS)	mg/l	IS-3025(P-16)	610	625	692	714	580	618	594	600	2000

UO: Un-Objectionable, Ag-Agreeable, NR-No Relaxation

TABLE 3-6: GROUND WATER QUALITY IN STUDY AREA

Chemical Parameters

S.NO.	Parameter	Test method	Result							Unit	Requirement (Acceptable Limit)	Permissible Limit in absence of alternate source
			GW-1	GW-2	GW-3	GW-4	GW-5	GW-6	GW-7			
1.	Aluminium (as Al)	IS: 3025 (P- 55)	<0.01	<0.01	<1.00	<0.01	<0.01	<0.01	<0.01	mg/l	0.03	0.2
2.	Total Ammonia	IS: 3025 (P- 34)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	mg/l	0.5	No Relaxation
3.	Anionic Detergents (as MBAS)	Annex K of IS-13428	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	mg/l	0.2	1.0
4.	Barium (as Ba)	IS: 15302	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	mg/l	0.7	No Relaxation
5.	Boron (as B)	IS: 3025 (P- 57)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	mg/l	0.5	1.0
6.	Calcium (as Ca)	IS: 3025 (P- 40)	80.0	84.0	74.0	80.0	68.0	92.0	85.0	mg/l	75	200
7.	Chloramines (as Cl_2)	IS: 3025 (P- 26)	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	mg/l	4.0	No Relaxation
8.	Chloride (as Cl)	IS: 3025 (P- 32)	121.60	128.50	95.60	98.10	102.50	118.20	109.60	mg/l	250	1000
9.	Copper (as Cu)	IS : 3025 (P-42)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/l	0.05	1.5
10.	Fluoride (as F)	IS: 3025 (P-60)	0.22	0.62	0.62	0.74	0.62	0.75	0.71	mg/l	1.0	1.5
11.	Free Residual Chlorine	IS: 3025 (P-26)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	mg/l	0.2	1.0

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S.NO.	Parameter	Test method	Result							Unit	Requirement (Acceptable Limit)	Permissible Limit in absence of alternate source
			GW-1	GW-2	GW-3	GW-4	GW-5	GW-6	GW-7			
											To be applicable only when water is chlorinated. Tested at consumer end. When protection against viral infection is required, it should be minimum 0.5 mg/l.	
12.	Total Iron (as Fe)	IS: 3025(P-53)	0.70	0.87	<0.5	<0.5	<0.5	<0.5	<0.5	mg/l	0.3	No Relaxation
13.	Magnesium (as Mg)	IS: 3025 (P-46)	26.40	32.60	16.20	23.50	19.80	25.10	21.80	mg/l	30	100
14.	Manganese (as Mn)	IS: 3025 (P-59)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	mg/l	0.1	0.3
15.	Mineral Oil	Clause 6 of IS: 3025	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	mg/l	0.5	No Relaxation
16.	Nitrate (as NO_3)	IS: 3025 (P- 34)	10.50	12.80	12.40	15.80	12.60	16.20	14.80	mg/l	45	No Relaxation
17.	Selenium (as Se)	IS: 3025 (P- 56)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	0.01	No Relaxation
18.	Silver (as Ag)	Annex J IS: 13428	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/l	0.1	No Relaxation
19.	Sulphate (as SO_4)	IS: 3025 (P- 24)	72.80	78.40	76.80	82.60	70.80	87.50	80.20	mg/l	200	400
20.	Sulphide (as H_2S)	IS-3025 (P-29)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/l	0.05	No Relaxation
21.	Alkalinity (as Ca CO_3)	IS: 3025 (P- 23)	252.0	232.0	215.0	232.0	210.0	254.0	235.0	mg/l	200	600
22.	Total Hardness (as $CaCO_3$)	IS: 3025 (P- 21)	308.2	210.0	160.0	201.0	180.0	212.0	216.0	mg/l	200	600

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S.NO.	Parameter	Test method	Result							Unit	Requirement (Acceptable Limit)	Permissible Limit in absence of alternate source
			GW-1	GW-2	GW-3	GW-4	GW-5	GW-6	GW-7			
23.	Zinc (as Zn)	IS: 3025 (P- 49)	0.30	0.32	0.30	0.35	0.28	0.32	0.31	mg/l		15
24.	Phenolic Compound as (C_6H_5OH)	IS: 3025 (P- 43)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	mg/l	0.001	0.002

TABLE 3-7: PARAMETERS CONCERNING TOXIC SUBSTANCES:

S.NO.	Parameter	Test method	Result							Unit	Requirement (Acceptable Limit)	Permissible Limit in absence of alternate source
			GW-1	GW-2	GW-3	GW-4	GW-5	GW-6	GW-7			
1.	Cadmium (as Cd)	IS-3025(P-41)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	0.003	No Relaxation
2.	Cyanide (as CN)	IS-3025(P-27)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	0.05	No Relaxation
3.	Lead (as Pb)	IS-3025(P-47)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	0.01	No Relaxation
4.	Mercury (as Hg)	IS-3025(P-48)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	0.001	No Relaxation
5.	Molybdenum (Mo)	IS-3025(P-2)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/l	0.07	No Relaxation
6.	Nickel (as Ni)	IS-3025(P-54)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	0.02	No Relaxation
7.	Poly nuclear Aromatic Hydro Carbons	IS-3025(P-37)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	0.0001	No Relaxation
8.	Poly chlorinated biphenyl	IS-3025(P-52)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/l	0.0005	No Relaxation
9.	Total Arsenic (as As)	IS-3025(P-37)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	0.01	0.05
10.	Total Chromium (as Cr)	IS-3025(P-52)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/l	0.05	No Relaxation

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TABLE 3-8: BIOLOGICAL PARAMETERS

Sr. No.	Parameter	Test Method	Results							Requirements as per IS-10500:2012
			GW-1	GW-2	GW-3	GW-4	GW-5	GW-6	GW-7	
1.	*Escherichia coli*	IS-1622	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent/ 100ml
2.	*Coliform Bacteria*	IS-1622	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent/ 100ml

3.3.3.1 GROUND WATER QUALITY

All the water samples were bearing an agreeable taste. The colour of all the water samples was found to be <1 Hazen unit. Odour of all the water was un-objectionable.

The values of pH are in range of 7.05– 7.62 mg/l. The water samples were found to be free from contaminations due to Fluoride and Boron. The dissolved solids level in the water samples were found in the range of 580.0 – 714.0 mg/l., Chlorides were found to be in the range of 95.60– 128.50 mg/l. & Sulphate were found in the range of 70.80– 87.50 mg/l. which is very much in the acceptable & permissible limits of IS 10500:2012. The maximum dissolved solids were found at Khwajpur.

Total hardness values in the range of 160.0 – 308.2 mg/l. Total Alkalinity values were in the range of 210.0– 254.0 mg/l. Both these values are not within the acceptable limit of IS 10500:2012.

The values of Iron are in range of <0.5– 0.87 mg/l. which are more than permissible limit and values for Zinc are in range of 0.28– 0.35 mg/l. The values of magnesium are in range of 16.20 – 32.60 mg/l.

Almost all the parameters have been found to be within the permissible limits prescribed under the IS: 10500:2012 for drinking water.

The ground water quality report is shown in **Table 3.5 to 3.9**

3.3.3.2 SURFACE WATER QUALITY

The surface water quality report is shown in **Table 3.9.** The surface water can be best used for Irrigation purposes.

TABLE 3-9: SURFACE WATER QUALITY RESULTS

Sr. No.	Characteristics	Unit	IS:10500 Standards	SAMPLE CODE		IS 2296 – 1982 Inland surface water Stds.				
				SW1- R.Ganga	SW2 Mahawa Nadi	A	B	C	D	E
1	pH value	--	IS:3025 (Part-11)	7.21	7.84	6.5 – 8.5				
2	Temperature	^{0}c	IS:3025 (Part-9)	22.0	22.0	-	-	-	-	-
3	Turbidity	NTU	IS:3025 (Part-10)	12.10	10.20	-	-	-	-	-
4	Conductivity	µmho/cm	IS:3025 (Part-14)	540	514	-	-	-	1000	2250
5	Sulphates as SO4	mg/l	IS:3025 (Part-24)	38.1	23.6	400	-	400	-	1000
6	Nitrates as No_3	mg/l	IS:3025 (Part-34)	22.00	19.40	20	-	50	-	-
7	Total hardness (as CaCO3)	mg/l	IS:3025 (Part-21)	125.0	112.0	-	-	-	-	-
8	Chlorides as Cl	mg/l	IS:3025 (Part-32)	98.00	139.03	250	-	600	-	600
9	Flourides as F	mg/l	APHA4500F	0.58	0.76	1.5	1.5	1.5	-	-
10	COD (as O2)	mg/l	APHA5220B	BDL	36.0	-	-	-	-	-
11	Iron as Fe	mg/l	IS:3025 (Part-53)	12.1	14.6	0.3	-	50	-	-
12	Dissolve oxygen	mg/l	IS:3025 (Part-38)	5.6	4.2	6	5	4	4	-
13	Total Dissolved solids	mg/l	IS:3025 (Part-16)	342.0	328.0	500	-	1500	-	2100
14	BOD (3 DAYS AT 27^o C)	mg/l	IS:3025 (Part-44)	BDL	8.4	2	3	3	-	-
15	Calcium as Ca	mg/l	IS:3025 (Part-40)	34.80	31.44	80.10	-	-	-	-
16	Magnesium as Mg	mg/l	IS:3025 (Part-46)	10.21	11.63	24.28	-	-	-	-
17	Arsenic as As	mg/l	IS:3025 (Part-37)	BDL	BDL	0.05	0.2	0.2	-	-
18	Lead as Pb	mg/l	IS:3025 (Part-47)	BDL	BDL	0.1	-	0.1	-	-
19	Copper as Cu	mg/l	IS:3025 (Part-42)	BDL	BDL	1.5	-	1.5	-	-
20	Zinc as Zn	mg/l	IS:3025 (Part-49)	1.52	1.84	15	-	15	-	-
21	Manganese as Mn	mg/l	IS:3025 (Part-59)	BDL	BDL	0.5	-	-	-	-

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Sr. No.	Characteristics	Unit	IS:10500 Standards	SAMPLE CODE		IS 2296 – 1982 Inland surface water Stds.				
				SW1- R.Ganga	SW2 Mahawa Nadi	A	B	C	D	E
22	Total Chromium as	mg/l	IS:3025 (Part-52)	BDL	BDL	0.05	0.05	0.05	-	-
23	Sodium as Na	mg/l	IS:3025 (Part-45)	46.1	44.6	-	-	-	-	-
24	Potassium as K	mg/l	IS:3025 (Part-45)	2.5	2.8	-	-	-	-	-
25	Total Alkalinity as CaCo3	mg/l	IS:3025 (Part-23)	143.4	198.2	-	-	-	-	-
26	Phosphate (As P)	mg/l	IS:3025 (Part-31)	0.214	0.203	-	-	-	-	-
27	Nitrite (NO2)	mg/l	IS:3025 (Part-34)	BDL	BDL	20	-	50	-	-
28	Total Suspended Solid	mg/l	IS:3025 (Part-17)	6.10	4.50	-	-	-	-	-
29	Faecal Coliform	IS-1622	1.5×10^3no./ 100 ml	2.5×10^3no./ 100 ml	2.8×10^3no./ 100 ml	-	-	-	-	-
30	Total Coliform	IS-1622	2.0×10^3 no./ 100 ml	3.8×10^3 no./100 ml	3.6×10^3 no./100 ml	50	500	5000	-	-

A – Drinking water without conventional treatment but after disinfection
B – Outdoor bathing (organized)
C – Drinking water source with conventional treatment followed by disinfection
D – Propagation of wild life, fisheries
E – Irrigation, industrial, cooling, controlled waste disposal

3.4 BIOLOGICAL ENVIRONMENT

The term biological environment would cover the prevalence of all living forms such as plants and animals both in terrestrial and aquatic in the study area. Living forms cover a very wide spectrum of species and even a small area may have thousands of species if all bacteria, protozoa, worms, insects, plants, animals and birds are to be included. In the present study, higher taxa (trees, small trees, shrubs, under shrubs, climbers and grasses) and fauna (mammals, birds and aquatic) are covered. River Ganga is flowing 5.0 km. away from project site (Flowing NW to SW). The Study area for the proposed project is of 10 km for the study of Biological Environment.

The basic purpose to exploring the biological environment under Environmental Impact Assessment (EIA) is to assist in the decision-making process and to ensure that the project options under consideration are bio-environmental-friendly. EIA identifies ways of improving project environmentally by preventing, minimizing, mitigating or compensating for adverse impacts before construction and after construction phase. The present study on the floral assessment of the proposed project is based on field survey of the area supported by secondary data from various governmental and non-governmental sources.

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The Study area for the proposed plant is of 10 km for the study of Biological Environment. The topography of the study area is plain to rather hilly. Small irrigation canals are present throughout the study area. The study area is dominated by agricultural fields.
The details of most common trees, shrubs and grass species found in the area are as under –

3.4.1 FLORA

The study area is an intensively cultivated agricultural area and natural vegetation occurs in scattered patches mostly on vacant plots around agricultural fields and on wasteland. The natural vegetation of the study area conforms to the 'open scrub' type. Majority of the species growing at the site show xerophytes adaptations as revealed by spinaceous outgrowth and thick leaves.

3.4.2 VEGETATION PROFILE OF THE PROPOSED PROJECT SITE AND STUDY AREA

A few common plants were observed on slopes of drains and along the edge of the roads. The most common trees found in the area are *Azadirachta indica, Dalbergia sissoo, Zizyphus xylopyra, Bombax ceib), Albizzia lebbe, Prosopis cineraria, and Acacia arabica.* The list of plant species recorded in the study area are given in Table 3.10.

TABLE 3-10: LIST OF VEGETATION IN THE STUDY AREA

Sl.No.	Scientific Name	Common Name	Family
1.	*Acacia catechu*	Khair	Leguminoceae
2.	*Acacia leucophloea*	Khejda	Mimosease
3.	*Adina cordifolia*	Haldu	Rubiaceae
4.	*Alangium salvifolium*	Akol	Cornaceae
5.	*Albizzia odoratissima*	Chinva	Leguminoesae
6.	*Albizzia lebbek*	Shiras (Kala)	Leguminosae
7.	*Ailanthus excelsa*	Aradu	Simarubacese
8.	*Anogeissus latifolis*	Dhavada	Combretaeae
9.	*Anogeissus pendula*	Kalthi Dhoonk	Combretaceae
10.	*Anthocephalus indicus*	Kadam	Rubiaceae
11.	*Balanites aegyptica*	-	Simarubiaeae
12.	*Bauhinia racemosa*	-	Leguminoesae
13.	*Bauhinia variegat*	Kachnar	Leguminosae
14.	*Bombax ceiba*	Sepal	Malvaceae
15.	*Bridelia retusa*	Kaljhadia	Euphorbiaecae
16.	*Cordia dichotoma*	Gundi	Boraginaceae
17.	*Crataeva raligiosa*	Barna	Cappidaceae
18.	*Dalbergia penniculata*	Dhoban	Papilionaceae
19.	*Dalbergia sissoo*	Shisam	Leguminosae
20.	*Delonix elata*	Sandesra	Leguminosae
21.	*Delonix regia*	Gulmohar	Leguminoesae
22.	*Dichrostachys cineria*	Goya	Leguminoesae
23.	*Diospyros cardifolia*	Bistendu	Ebenaceae
24.	*Diospyros melanoxylon*	Tendu	Ebenaceae
25.	*Dolichandrone falcata*	Mindla	Bignoniaceae

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Sl.No.	Scientific Name	Common Name	Family
26.	*Ehretia Leavis*	Tambolya	Boraginaceae
27.	*Elaeodendron glauccum*	-	Celastraoeae
28.	*Erythrina indica*	Gadhapalash	Leguminoesae
29.	*Feronia limonia*	Ket	Lythraceae
30.	*Ficus hispida*	Katumber	Moraceae
31.	*Ficus religiosa*	Peepal	Moraceae
32.	*Ficus rumphii*	Paras peepal	Moraceae
33.	*Flacourtia indica*	Kakon	Bixaceae
34.	*Gardenia turgida*	Chamkarr	Rubiaceae
35.	*Grewia tiliaefolis*	Daman	Liliaceae
36.	*Kydia calicyna*	Kapasia	Malvaceae
37.	*Lagerstroemia parviflora*	Kalsadariya	Lythraceae
38.	*Lannea coromandelica*	Gurjan	Ananardiaceae
39.	*Mallotus philippinesis*	Rohini, Roli	Euphorbiaceae
40.	*Maytenus emarginata*	Kakeda	Celastraceae
41.	*Melia azaderach*	Bakayan	Meliaceae
42.	*Miginga concanensis*	Sejna	Moringaceae
43.	*Milingtenia hortensis*	Akash Neem	Bigneniceae
44.	*Miliusa tomentosa*	Kari umbia	Anonaceae
45.	*Mimusops hexandra*	Rain Rewarni	Sapotaceea
46.	*Mitragyna parvifolia*	Kalam	Rubiaceae
47.	*Murraya paniculata*	Kamini, Kunti	Rutaceae
48.	*Opuntia medica*	Naganithor	Caetaceae
49.	*Ougenia oojenensis*	Tensa	Papillionaceae
50.	*Parkinsonia aculeate*	Burvan	Caesalpinacae
51.	*Pithecolobium dulce*	Jangal, Jalebi	Leguminoesae
52.	*Polyalthai longifolia*	Ashok	Anonaceae
53.	*Pongamia Pinnata*	Karanj	Lequmineceae
54.	*Prosopis cineraria*	Khejdi	Mimosease
55.	*Prosopis juliflora*	Vilayati Babul	Leguminosae
56.	*Salvadora oleoides*	Jal	Salvadoraceae
57.	*Salvadora persica*	Jal, Khair	Salvadoraceae
58.	*Sapindus emarginatus*	Aretha	Sapindaceae
59.	*Scherebera swietenodes*	Morva	Oleaceae
60.	*Schleichera oleosa*	Kusum	Sapindaceae
61.	*Soymida febrifuga*	Roin	Maliaceae
62.	*Stereospermum suaveolens*	Phadar	Bignoniaceae
63.	*Sterculia urens*	Kadaya	Sterculiaceae
64.	*Tamarix dioca*	-	Tamarlcaoeae
65.	*Tecomella undulata*	Roheda	Bignoniaceae
66.	*Terminalia tomentosa*	Sadad	Combretaceae
67.	*Toona ciliate*	Tun	Meliaceae
68.	*Wrightia tinctoria*	Revarna	Apecynanceae
69.	*Wrightia tomentosa*	-	Apecynanceae
70.	*Ziziphus xylopyrus*	Ghatbor	Rhamnaceae

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TABLE 3-11: LIST OF HERBS AND SHRUBS IN THE STUDY AREA

Sr. No.	Scientific Name	Common Name	Family
Herbs and Shrubs			
71.	*Abutilon ramosum*	Peethariya	Malvaceae
72.	*Acacia jacquemontii*	Boli	Mimosaceae
73.	*Achyranthes aspera*	Andii zada	Amarantaceae
74.	*Aerua psendo tomientosa*	Bui	Amaranthaceae
75.	*lepidagathis trinervis*	Untakteli	Acanthaceae
76.	*Leptadenia Pyrotechnica*	Kheempara	Asclepiadaceae
77.	*Lycium europaeum*	Morli	Solanaceae
78.	*Millettia auriculata*	Dujni	Papilionaceae
79.	*Mimosa rubicaulis*	Zeenznee	Mimoseae
80.	*Mollugo cerviana*	Chidio ka Dhania	Aizoaceae
81.	*Mucuna prurita*	Kevch	Leguminosae
82.	*Nyctanthes arbo tristis*	Sphed	Oleaceae
83.	*Oxalis corniculata*	Thipti	Oxiliadaceae
84.	*Periploca aphylla*	Kheenee	Asclepiadaceae
85.	*Rhus mysorensis*	Dasran	Anacardiaceae
86.	*Securinega leucopyrus*	Kelspariva	Euphorbiaceae
87.	*Tamarix dioica*	Zau	Tamaricaceae
88.	*Tephrosia hookeriana*	Basuni	Papilienaceae
89.	*Thespesia lampas*	Bnkapas	Malvaceae
90.	*Viscum orientale*	Gudbel	Laranthaceae

3.4.3 FAUNAL RESOURCES

The domestic animals observed in the study area are mainly mammals, as listed in the **Table 3.12**. In absence of natural forests in the study area as shown in satellite imaginary and also confirmed by Forest Department, Jyotiba Phule Nagar District, no wild animals are found in the study area. A list of Birds, Reptiles, Amphibians and Rodents based on information gathered from local enquiries and Forest department is presented in **Table 3.12** & **Table 3.13**.

TABLE 3-12: LIST OF DOMESTIC FAUNA OBSERVED IN THE STUDY AREA

Zoological Name	Common Name	WPA 1972	IUCN list
Bos indicus	Cow		
Bubalus bubalis	Buffalo		
Canis familiaris	Dog		
Capra hircus	Goat		
Equus caballus	Horse		

Equus hermionus	Ass		
Felis domesticus	Cat		
Ovis aries	Sheep		
Sus scrofa	Pig	Schedule III	LC

(Source: Field survey)

TABLE 3-13: LIST OF BIRDS, REPTILES, AMPHIBIANS AND RODENTS OBSERVED IN STUDY AREA

BIRDS			
Scientific Name	**Common Name**	**WPA 1972**	**IUCN list**
Alcedo atthis	Common Kingfisher	Schedule IV	**LC**
Cucculus micropterus	Indian Cuckoo	Schedule IV	**LC**
Eudynomys scolopacea	Asi an Koel	Schedule IV	
Corvus splendens	House Crow	Schedule V	**LC**
Prinia hodgsonii	Grey-breasted Prinia	Schedule IV	**LC**
Columba livia	Rock Pigeon	Schedule IV	**LC**
Spilopelia suratensis	Spotted Dove	Schedule IV	**LC**
Pycnonotus jocosus	Red-whiskered Bulbul	Schedule IV	**LC**
Ploceus philippinus	Baya Weaver	Schedule IV	**LC**
REPTILES			
Scientific Name	**Common Name**	**WPA 1972**	**IUCN list**
Calotes versicolor	Garden lizard		
Varanus flavescens	Monitor lizards	Schedule II	**LC**
AMPHIBIAN			
Scientific Name	**Common Name**	**WPA 1972**	**IUCN list**

Bufo melanostictus	Toad		**LC**
Euphlyctis cyanophlyctis	Frog		**LC**
Hoplobatrachus tigerinus	Frog		**LC**
RODENTS			
Bandicota indica	Greater Bandicoot rat	Schedule V	LC
Mus musculus	House rat	Schedule V	LC
Rattus rattus	Black rat	Schedule V	LC
Ratufa indica	Squirrel	Schedule II	LC

(Source: Field survey & Secondary data) (LC: least concern, VU: vulnerable)

3.4.4 NATIONAL PARKS/WILDLIFE SANCTUARY / RESERVE FOREST

The **Figure 3.7** gives the location of National Parks and Sanctuaries in Uttar Pradesh. There are no environmentally sensitive components such as National Park, Wildlife Sanctuary, Elephant / Tiger Reserve, migratory routes of fauna and wet land present within 10 Km radius of plant site.

FIGURE 3-7:NATIONAL PARKS AND SANCTUARIES OF UTTAR PRADESH

3.4.5 ENDANGERED SPECIES

With reference to the list of endangered species prepared by Botanical Survey of India (BSI) and Zoological Survey of India (ZSI), Ministry of Environment and Forests, Government of

India, none of the species present in the study area belonged to the 'endangered' category.

3.5 CLIMATOLOGY AND METEOROLOGY

Meteorological parameters play a vital role in dispersion of the pollutants, once it is discharged in to the atmosphere. The micro-meteorological data monitoring was carried out at a centralized location of the study area. The meteorological data were collected continuously for 24-hours during the entire study period during Oct. – Dec'2018. All the parameters such as: wind speed, wind direction, ambient temperature and relative humidity have been recorded on hourly basis.

Meteorological Data (30 years avg.)

The meteorological parameters play a vital role in transport and dispersion of pollutants in the atmosphere. Historical meteorological data were obtained from climatological tables pertaining to Meerut (as the nearest representative IMD station) for the period 1974-1990 and is summarized in in **Table 3.14.**

TABLE 3-14: METEOROLOGICAL DATA OF (PERIOD 1974-1990)

Month	Temperature (deg C) daily		Relative Humidity	Rainfall	Wind speed	Pre-dominant wind direction	Cloud cover	Barometric Pressure.
	Max	Min	%	In mm	Kmph	From	Octas	hpa
January	22.1	6.4	78	16.5	5.9	W, NW	0.2	992.0
February	24.1	8.9	72	14.7	8.0	W,NW	0.2	989.6
March	29.7	13.6	62	18.9	8.2	W,NW	0.2	989.9
April	36.2	19.7	45	6.5	8.0	W,NW	0.2	982.9
May	39.2	23.7	43	19.0	7.9	W,NW	0.1	978.9
June	39.0	26.0	60	61.2	9.3	W,NW	0.4	974.8
July	34.1	25.4	80	259.6	7.1	E	1.2	974.3
August	32.8	24.7	84	322.6	6.6	E	1.5	976.1
September	33.8	23.0	77	139.9	5.9	E	0.7	980.5
October	33.3	17.8	66	15.2	4.4	W.NW	0.1	986.2
November	28.9	11.6	70	4.3	4.4	W, NW	0.1	990.4
December	23.8	6.8	75	14.6	5.0	W,NW	0.2	992.2

3.5.1 IMD DATA

- Temperature

December and January constitutes winter months with daily mean minimum temperature around 6.4^{o}C and daily mean maximum temperature around 25.8^{o}C. May and June is the hottest month with daily mean maximum temperature around 43.7^{o}C and daily mean minimum temperature around 19.2^{o}C.

- **Relative Humidity**

The air is generally dry in the region except during monsoon. May are driest with avg. relative humidity 43%. The maximum humidity during rainy season is 84%.

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- **Rainfall**

The annual total rainfall is 893 mm. Over 80% of the total annual rainfall is received during the monsoon period between June to September.

- **Wind Direction and Speed**

The wind speed was mostly between 4.4 – 9.3 km/hour for all the months. The wind speed during summer season was mostly between 7.9 – 9.3 km/hr while during rainy season, it was between 5.9–7.1 km/hr and in winter months wind speed ranges between 4.4 – 5.9 km/hr. The predominant wind direction is from west and northwest. During winter season the wind flows towards west and north west.

3.5.2 SITE SPECIFIC DATA

A fully instrumented continuous recording meteorological observatory is established and operated within the project site in order to measure the following parameters: - ambient temperature, wind speed and direction. The brief details of instruments, parameter and frequency are presented in **Table 3.15**.

TABLE 3-15: INSTRUMENTS, PARAMETERS AND FREQUENCY OF METEOROLOGICAL MONITORING AT SITE

S.No.	Parameters	Instruments	Frequency
1	Wind Speed	Automatic Weather station (Virtual Electronics Company)	Continuous Automatic 1 hourly Average
2	Wind Direction		
3	Ambient Temperature at 10m		

The aforesaid meteorological parameters were being observed in the field over a period of about 3-months starting from Oct. to Dec. 2018. The meteorological data recorded at site is given in **Table 3.16**.

TABLE 3-16: RECORDED AVERAGE METEOROLOGICAL DATA AT SITE

MONTH/ TIME	TEMPERATURE (DEG		RELATIVE		WIND SPEED	PREDOMINANT
	MAX	MIN	MAX	MIN	RANGE	(FROM)
OCT 2018	38	17	67	49	0.5 TO 5.7	WNW, WNW, NW
NOV 2018	32	9.0	73	50		
DEC 2018	29	4.6	76	52		

(Source-World Weather on line.com)

- **Temperature**

The maximum reading was found to be 38 ºC during October 2018 and the minimum was found to be 4.6 ºC during December 2018.

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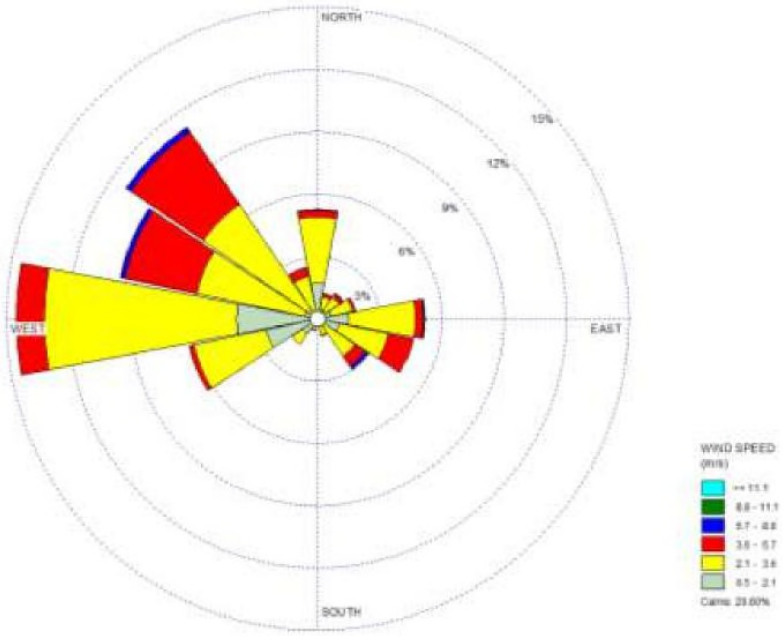

FIGURE 3-8: PERIODIC WIND ROSE DIAGRAM (OCT. - DEC.'2018)

3.6 AMBIENT AIR QUALITY

Ambient air quality measurements are essential to provide a description of the existing conditions, to provide a baseline against which changes can be measured and to assist in the determination of potential impacts of the proposed project on air quality conditions. Ambient background measurements were done during the period Oct. – Dec'2018 at 8 locations spread over, in the 10 km radius around the proposed unit. The locations have been shown in **Figure 3.9** and also outlined in **Table 3.17**.

TABLE 3-17: AMBIENT AIR QUALITY MONITORING STATIONS

Station No.	Location	Distance from Plant (in km)	Direction
AQ1	Project Site (Industrial Area)	---	---
AQ2	Guretha	1.0 Km.	SW
AQ3	Partapur	1.35 Km.	SE
AQ4	Sirsa	2.75 Km.	S
AQ5	Khwajpur	3.5 Km.	W
AQ6	Chuchaura	4.0 Km.	NW
AQ7	Bhubra	3.70 Km.	NE
AQ8	Singhanla Ki Madaiyan	2.75 Km.	NE

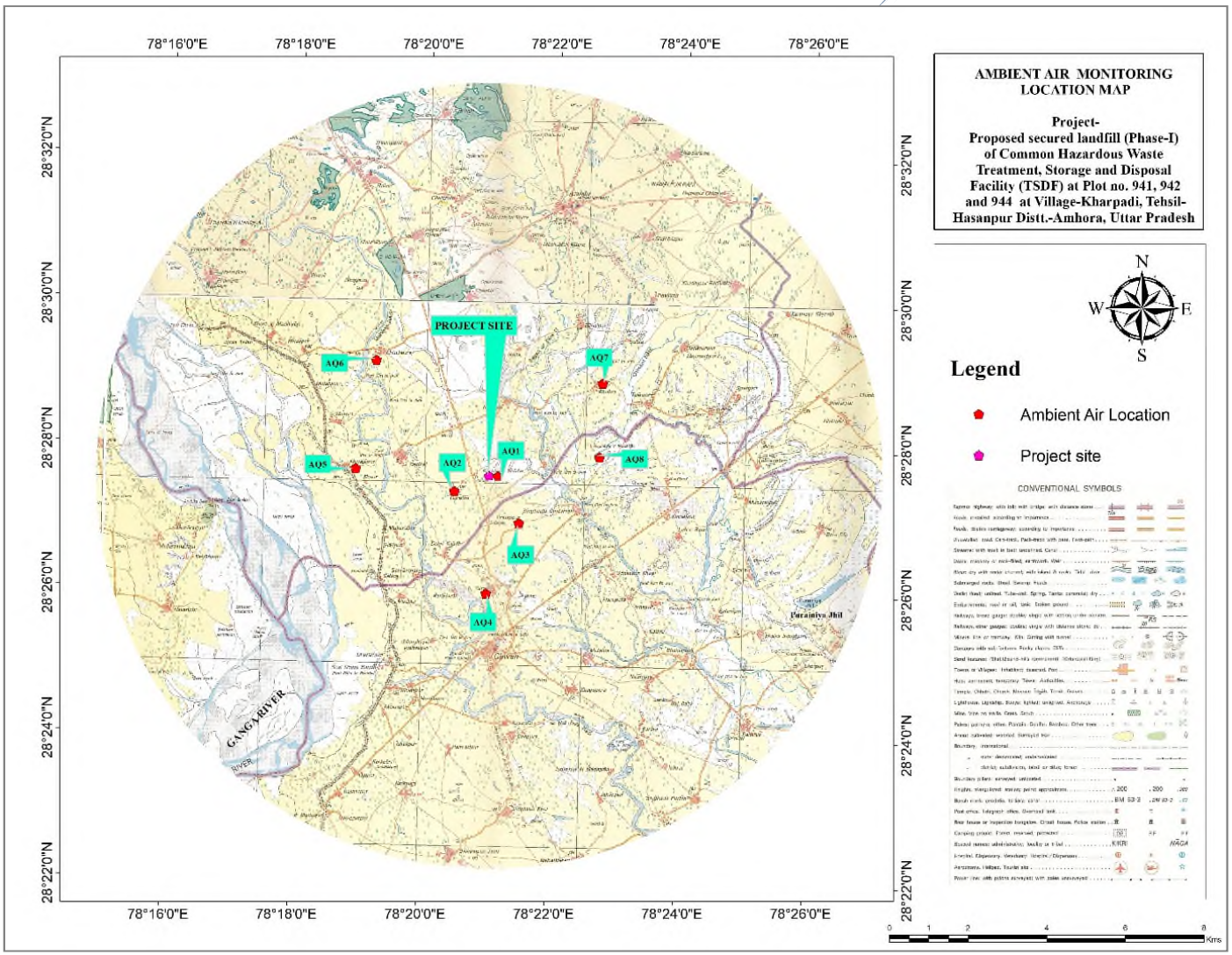

FIGURE 3-9: AMBIENT AIR MONITORING LOCATION MAP

The air quality assessment involved the determination of ambient levels of Respirable Particulates, PM_{10} (<10µm), $PM_{2.5}$, Sulphur dioxide gas, oxides of Nitrogen gas & Carbon Monoxide.

Ambient air samples were collected by Respirable Dust Samplers (RDS) fitted with Low Volume Sampling (LVS) attachments for gaseous sampling. Composite samples were collected on 24-hourly basis and brought to the laboratory for analysis. Sample collection and analysis have been strictly carried out according to the Bureau of Indian Standards guidelines; IS: 5182 series.

3.6.1 METHODS OF MONITORING

Sampling and analysis of Ambient Air samples were carried out with reference to the Standards developed by Bureau of Indian Standards IS: 5182 series. Brief methods of monitoring have been outlined in **Table 3.18.**

TABLE 3-18: AMBIENT AIR QUALITY MONITORING METHODOLOGY

Parameters	Methodology
PM_{10}	Gravimetric method by use of Respirable Dust Sampler as per IS: 5182 (Part – 23), 2006
$PM_{2.5}$	Gravimetric method by use of Fine Particulate Sampler as per CPCB Guidelines & USEPA, 2006
SO_2	Chemical analysis by absorption of gases in *Sodium Tetra-Chloro Mercurate* followed by colorimetric estimation using p-Rosaniline hydrochloride and Formaldehyde as per IS: 5182 (Part – 2), 1969
NO_2	Chemical analysis by absorption of gases in dilute sodium hydroxide and then estimated colorimetrically with *sulphanilamide* and *N (1-Nephthyle) Ethylene diamine Dihydrochloride* and *Hydrogen Peroxide* as per IS: 5182 (Part – 6), 1975

3.6.1.1 Particulate Matter

A. PM_{10}

Air is drawn through a size-selective inlet and through a 20.3 X 25.4 cm (8 X 10 in) filter at a flow rate, which is typically 1.13 m^3/min. Particles with aerodynamic diameter less than the cut-point of the inlet are collected, by the filter. The mass of these particles is determined by the difference in filter weights prior to and after sampling. The concentration of PM10 in the designated size range is calculated by dividing the weight gain of the filter by the volume of air sampled.

B. $PM_{2.5}$

Air is drawn through a size-selective inlet and through a specially designed WINS (Well Impact Ninty-Six) impactor at a flow rate, which is typically 1.0 m^3/hr. Particles with aerodynamic diameter less than 10 micro grams but greater than 2.5 microns are trapped in WINS Impactor and particles having size less than 2.5 microns bounce and collected at 46 mm Teflon filter paper at the base. The mass of these particles is determined by the

difference in filter weights prior to and after sampling. The concentration of $PM_{2.5}$ in the designated size range is calculated by dividing the weight gain of the filter by the volume of air sampled.

3.6.1.2 Sulphur Dioxide

Sulphur dioxide gas in ambient air was monitored in accordance to IS: 5182 Part – II. The gas was bubbled in *sodium tetra-chloromercurate* solution at the rate of about 1.0 lpm till 24 hours. The sample was taken to the laboratory and analyzed colorimetrically by addition of *p-Rosaniline hydrochloride* and *Formaldehyde* solution.

3.6.1.3 Nitrogen Oxides

Nitrogen oxides in the ambient air were monitored in accordance to IS 5182 Part – VI. The air sample was bubbled to dissolve in dilute sodium hydroxide solution at the rate of 1.0 lpm for about 24 hours. Then the sample was taken to the laboratory and estimated colorimetrically with addition of *sulphanilamide*, *N (1-Nephthyle) Ethylene diamine Dihydrochloride* and *Hydrogen Peroxide*.

3.6.2 RESULTS AND DISCUSSIONS

The summary of the monitoring results have been presented in **Table 3.19** and the detail monitoring results are enclosed at **Annexure IX.**

TABLE 3-19: SUMMARY OF AMBIENT AIR QUALITY MONITORING RESULTS
(Study Period : Oct. – Dec.'2018)

S.No.	Sampling Location		Parameters				
			PM_{10} ($\mu g/m^3$)	PM2.5 ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	CO (mg/m^3)
1.	AQ-1	Mean	79.46	52.33	8.00	8.00	2.00
		Maximum	89.59	60.39	8.94	19.64	0.59
		Minimum	70.84	46.38	5.23	7.62	0.37
		98th Percentile	89.12	60.01	8.57	18.19	0.59
2.	AQ-2	Mean	74.96	49.45	7.84	16.89	0.62
		Maximum	82.87	55.62	10.25	20.85	0.89
		Minimum	70.36	45.36	6.30	13.95	0.41
		98th Percentile	81.53	54.82	10.07	20.22	0.89
3.	AQ-3	Mean	75.79	47.71	7.66	17.22	0.56
		Maximum	80.85	50.85	9.82	19.55	0.64
		Minimum	71.21	42.90	6.28	13.15	0.42
		98th Percentile	80.85	50.72	9.73	19.46	0.64
4.	AQ-4	Mean	71.62	41.29	7.73	17.55	0.64
		Maximum	79.43	49.55	11.11	19.60	0.79
		Minimum	64.78	36.41	6.33	15.55	0.51

		98th Percentile	78.51	48.96	10.72	19.53	0.78
5.	**AQ-5**	**Mean**	73.63	42.00	14.37	18.46	0.70
		Maximum	81.82	47.67	17.22	24.78	0.89
		Minimum	65.71	37.26	10.23	12.84	0.55
		98th Percentile	81.41	47.46	16.92	23.55	0.88
6.	**AQ-6**	**Mean**	61.89	34.69	7.67	16.31	0.68
		Maximum	69.22	38.96	10.15	18.74	0.83
		Minimum	55.37	30.87	6.15	14.22	0.52
		98th Percentile	68.59	38.77	9.99	18.56	0.83
7.	**AQ-7**	**Mean**	68.36	39.71	8.32	16.63	0.72
		Maximum	72.31	47.18	10.55	19.63	0.90
		Minimum	61.99	34.90	7.12	12.12	0.62
		98th Percentile	72.22	45.51	10.41	19.39	0.88
8.	**AQ-8**	**Mean**	68.58	39.12	6.85	17.35	0.64
		Maximum	76.51	44.37	8.45	19.95	0.81
		Minimum	61.35	34.25	5.96	14.45	0.55
		98th Percentile	76.11	44.37	8.39	19.91	0.79
NAAQS, For 24 hourly monitoring (except CO for Eight hour)			**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2.0 mg/m3**

- **Particulate Matters**

(i) Respirable Suspended Particulate Matters (PM_{10})

The maximum 24 hourly concentration of RPM was found to be 89.59 µg/m3 at Project Site due to agricultural activity while the minimum concentration was recorded to be 55.37 µg/m3 at Chuchaura. The 98 percentile values were found in the range of 68.59 – 89.12 µg/m3.

(ii) Fine Particulate Matters ($PM_{2.5}$)

The maximum 24 hourly concentration of $PM_{2.5}$ was found to be 60.39 µg/m3 at Project Site while the minimum concentration was recorded to be 30.87 µg/m3 at Chuchaura. The 98 percentile values were found in the range of 38.77 – 60.01 µg/m3.

- **Sulphur Dioxide (SO_2)**

The 24 hour maximum concentration of SO_2 was found to be 17.22 µg/m3 at Khwajpur, while the minimum concentration was recorded to be 5.23 µg/m3 at project site. The 98 percentile values were found in the range of 8.39– 16.92 µg/m3.

Thus, all the values have been found to be far below the prescribed norms of 80 µg/m3 for Residential, Rural and Other areas.

- **Oxides of Nitrogen (NOX)**

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The maximum concentration of NOx was found to be 24.78 µg/m3 at Khwajpur, while the minimum concentration was recorded to be 7.62 µg/m3 at project site. The 98 percentile values were found in the range of 18.19 – 23.55 µg/m3.
Thus, all the values have been found to be far below the prescribed norms prescribed in the National Ambient Air Quality Standards of 80 µg/m3 Residential, Rural and Other areas.

- **Carbon Monoxide (CO)**

The maximum concentration of CO was found to be 0.90 mg/m3 at Ranipur, while the minimum concentration was recorded to be 0.37 mg/m3 at project site. The 98 percentile values were found in the range of 0.59 – 0.89 mg/m3.

Thus, all the values have been found to be far below the prescribed norms prescribed in the National Ambient Air Quality Standards of 4 mg/m3 (4000 µg/m3) for Industrial, Residential, Rural and Other areas.

3.7 NOISE

Noise level readings were recorded at eight locations spread over, in the 5 km radius centering the proposed unit. The monitoring locations have been shown in **Figure 3.10** and outlined in **Table 3.20**.

TABLE 3-20: AMBIENT NOISE MONITORING STATIONS

Station No.	Location	Distance from Plant (in km)	Direction
NQ1	Project Site (Industrial Area)	---	---
NQ2	Guretha	1.0 Km.	SW
NQ3	Partapur	1.35 Km.	SE
NQ4	Sirsa	2.75 Km.	S
NQ5	Khwajpur	3.5 Km.	W
NQ6	Chuchaura	4.0 Km.	NW
NQ7	Bhubra	3.70 Km.	NE
NQ8	Singhanla Ki Madaiyan	2.75 Km.	NE

Observation of Ambient Noise Quality

Noise levels were recorded by the use of a digital noise level meter. The instrument was calibrated before and after each set of readings.
The maximum daytime Leq was found at Chuchaura (NQ6) i.e. 54.3 dB (A) and maximum

night-time Leq was also found at Chuchaura (NQ6) i.e. 36.7 dB (A). The maximum values may be attributed towards the nearby commercial activities and traffic movements. The minimum value for day time and night time was found at Khwajpur i.e. 47.4 and 32.5 dB (A) at village **Partapur**. The monitoring data have been presented in Table 3.20 below.

Ambient noise level of the study area is within the prescribed National Ambient Noise Quality Standard for respective residential, commercial and induatrial category at all the monitored locations.

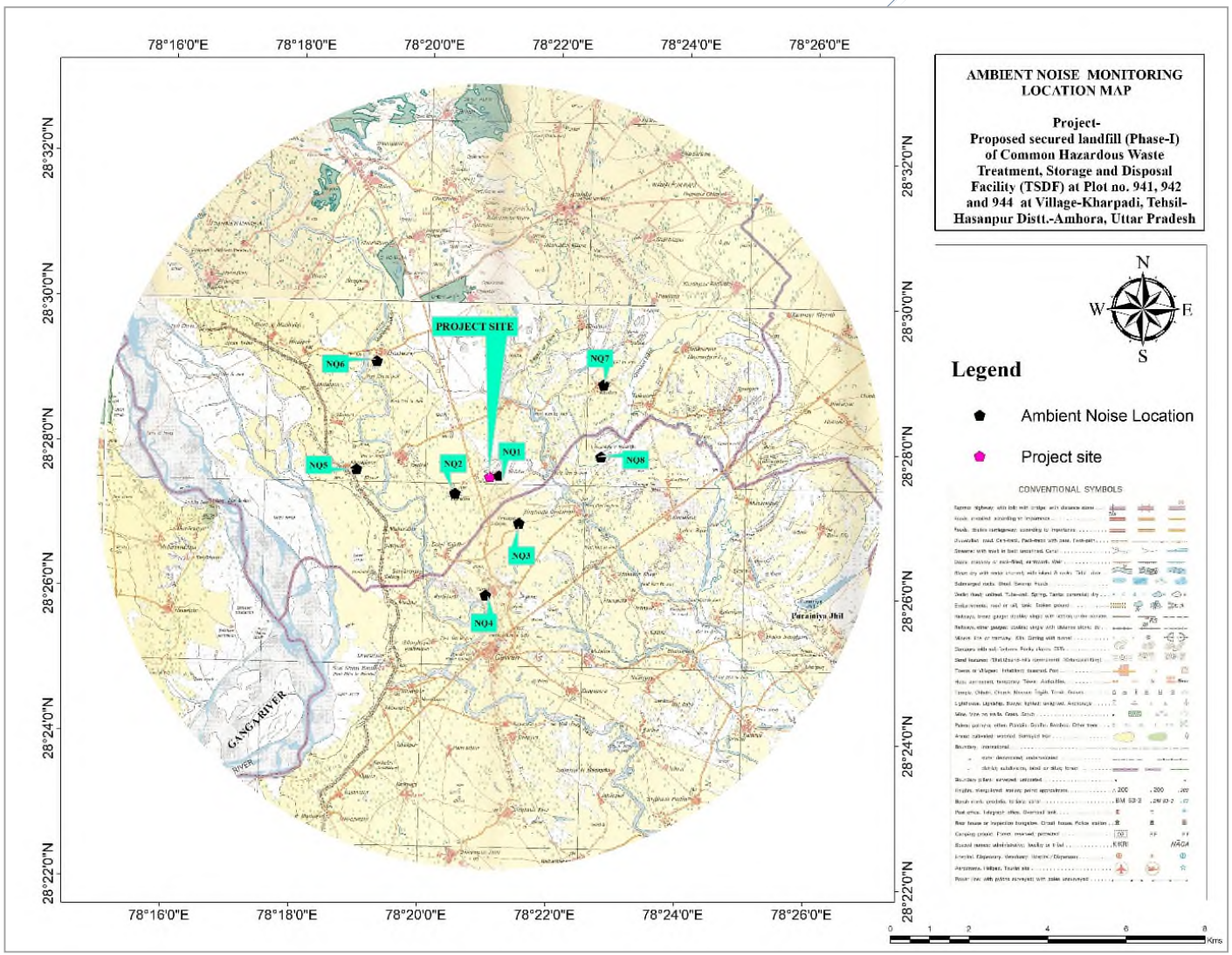

FIGURE 3-10: AMBIENT NOISE MONITORING LOCATION MAP

TABLE 3-21: AMBIENT NOISE RESULTS (LOCATION WISE)

TEST RESULT AT PROJECT SITE (NQ1)						
S. No	**Test Parameters**	**Results**	**Units**	**Requirement (as per CPCB Guidelines Limits in dB (A) Leq**		
1.	EQUIVALENT NOISE LEVEL (6.0 AM TO 10.0 PM)	52.1	dB(A)	Category of Area/ Zone	Day Time	Night Time
				Industrial Area	75	70
2.	EQUIVALENT NOISE LEVEL (10.0 PM TO 6.0 AM)	36.8	dB(A)	Commercial Area	65	55
				Residential Area	55	45
				Silence Zone	50	40
TEST RESULT AT GURETHA (NQ2)						
S. No	**Test Parameters**	**Results**	**Units**	**Requirement (as per CPCB Guidelines Limits in dB (A) Leq**		
1.	EQUIVALENT NOISE LEVEL (6.0 AM TO 10.0 PM)	52.5	dB(A)	Category of Area/ Zone	Day Time	Night Time
				Industrial Area	75	70
2.	EQUIVALENT NOISE LEVEL (10.0 PM TO 6.0 AM)	34.2	dB(A)	Commercial Area	65	55
				Residential Area	55	45
				Silence Zone	50	40
TEST RESULT AT PARTAPUR (NQ3)						
S. No	**Test Parameters**	**Results**	**Units**	**Requirement (as per CPCB Guidelines Limits in dB (A) Leq**		
1.	EQUIVALENT NOISE LEVEL (6.0 AM TO 10.0 PM)	50.8	dB(A)	Category of Area/ Zone	Day Time	Night Time
				Industrial Area	75	70
2.	EQUIVALENT NOISE LEVEL (10.0 PM TO 6.0 AM)	32.5	dB(A)	Commercial Area	65	55
				Residential Area	55	45
				Silence Zone	50	40
TEST RESULT AT SIRSA (NQ4)						
S. No	**Test Parameters**	**Results**	**Units**	**Requirement (as per CPCB Guidelines Limits in dB (A) Leq**		
	EQUIVALENT NOISE		dB(A)	Category of Area/ Zone	Day Time	Night Time

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1.	LEVEL (6.0 AM TO 10.0 PM)	53.1		Industrial Area	75	70
2.	EQUIVALENT NOISE LEVEL (10.0 PM TO 6.0 AM)	34.6	dB(A)	Commercial Area	65	55
				Residential Area	55	45
				Silence Zone	50	40

TEST RESULT AT KHWAJPUR (NQ5)

S. No	Test Parameters	Results	Units	Requirement (as per CPCB Guidelines Limits in dB (A) Leq		
1.	EQUIVALENT NOISE LEVEL (6.0 AM TO 10.0 PM)	47.4	dB(A)	Category of Area/ Zone	Day Time	Night Time
				Industrial Area	75	70
2.	EQUIVALENT NOISE LEVEL (10.0 PM TO 6.0 AM)	34.1	dB(A)	Commercial Area	65	55
				Residential Area	55	45
				Silence Zone	50	40

TEST RESULT AT Chuchaura (NQ6)

S. No	Test Parameters	Results	Units	Requirement (as per CPCB Guidelines Limits in dB (A) Leq		
1.	EQUIVALENT NOISE LEVEL (6.0 AM TO 10.0 PM)	54.3	dB(A)	Category of Area/ Zone	Day Time	Night Time
				Industrial Area	75	70
2.	EQUIVALENT NOISE LEVEL (10.0 PM TO 6.0 AM)	36.7	dB(A)	Commercial Area	65	55
				Residential Area	55	45
				Silence Zone	50	40

TEST RESULT AT Bhubra (NQ7)

S. No	Test Parameters	Results	Units	Requirement (as per CPCB Guidelines Limits in dB (A) Leq		
1.	EQUIVALENT NOISE LEVEL (6.0 AM TO 10.0 PM)	51.4	dB(A)	Category of Area/ Zone	Day Time	Night Time
				Industrial Area	75	70
2.	EQUIVALENT NOISE LEVEL (10.0 PM TO 6.0 AM)	34.2	dB(A)	Commercial Area	65	55
				Residential Area	55	45
				Silence Zone	50	40

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TEST RESULT AT Singhanla ki Madaiyan (NQ8)						
S. No	**Test Parameters**	**Results**	**Units**	**Requirement (as per CPCB Guidelines Limits in dB (A) Leq**		
1.	EQUIVALENT NOISE LEVEL (6.0 AM TO 10.0 PM)	48.2	dB(A)	Category of Area/ Zone	Day Time	Night Time
				Industrial Area	75	70
2.	EQUIVALENT NOISE LEVEL (10.0 PM TO 6.0 AM)	33.8	dB(A)	Commercial Area	65	55
				Residential Area	55	45
				Silence Zone	50	40

3.8 DEMOGRAPHY & SOCIO-ECONOMIC PROFILE

Socio-economic study of an area enables to assess the socio-economic conditions and living standards of that area and it also helps in predicting the impact on the future of the economic conditions of the study area, due to progressive growth of industrialization. The socio-economy of the study area is influenced by commercial and industrial activities in the surrounding. Growth of socio-economic condition of the area has been identified in the last decade.

Demography is one of the important indicators of environmental health of an area. It includes population, number of households, literacy, population density, etc. In order to assess the demographic features of the area, census data of J P Nagar (Jyotiba Phule Nagar) district, in Uttar Pradesh State for the year 2011 was compiled and placed in the form of tabulation and graphical presentation.

3.8.1 METHODOLOGY

The Demographic profile has been studied through primary surveys and secondary data. Proper care and wattage will be given to the local people in employment and providing other amenities. Namely data was collected from local villages. Accordingly; both qualitative and quantitative data was analyzed from secondary sources. Primary Census Abstract 2011 is the main source of secondary data. Collection and evaluation of baseline data for various socio-economic parameters in and around the proposed sites has been done (within 10 km radius of the study area from the lease boundary). Village, within the study area are being identified from survey of India Toposheet. Fig 3.10 is showing the location of villages falling within10 km radius of boundary.

On the basis of a preliminary reconnaissance survey, a questionnaire was developed to make it suitable to fulfill the objectives of the study. The data collected during the above survey was analyzed to evaluate the prevailing socio-economic profile of the area.

As per the Primary Census Abstract of 2011, the total population of the study area recorded as 75764 persons of fifty (49) revenue villages in Hasanpur Tehsil of Jyotiba Phule Nagar District.

Total number of Households was also observed as 13245 in the 10-km radial study area. Male-female wise total population was also recorded as 39735 males and 36029 females respectively.

With the implementation of the proposed project the occupational status of the people in this area will improve. Employment opportunity will increase, and it makes more people engaged in industrial activity.

Demographic Profile of the study area (10km) of the project TSDF Amroha Tehsil Hasanpur, District Amroha, Uttar Pradesh: Table 3.22 to 3.25

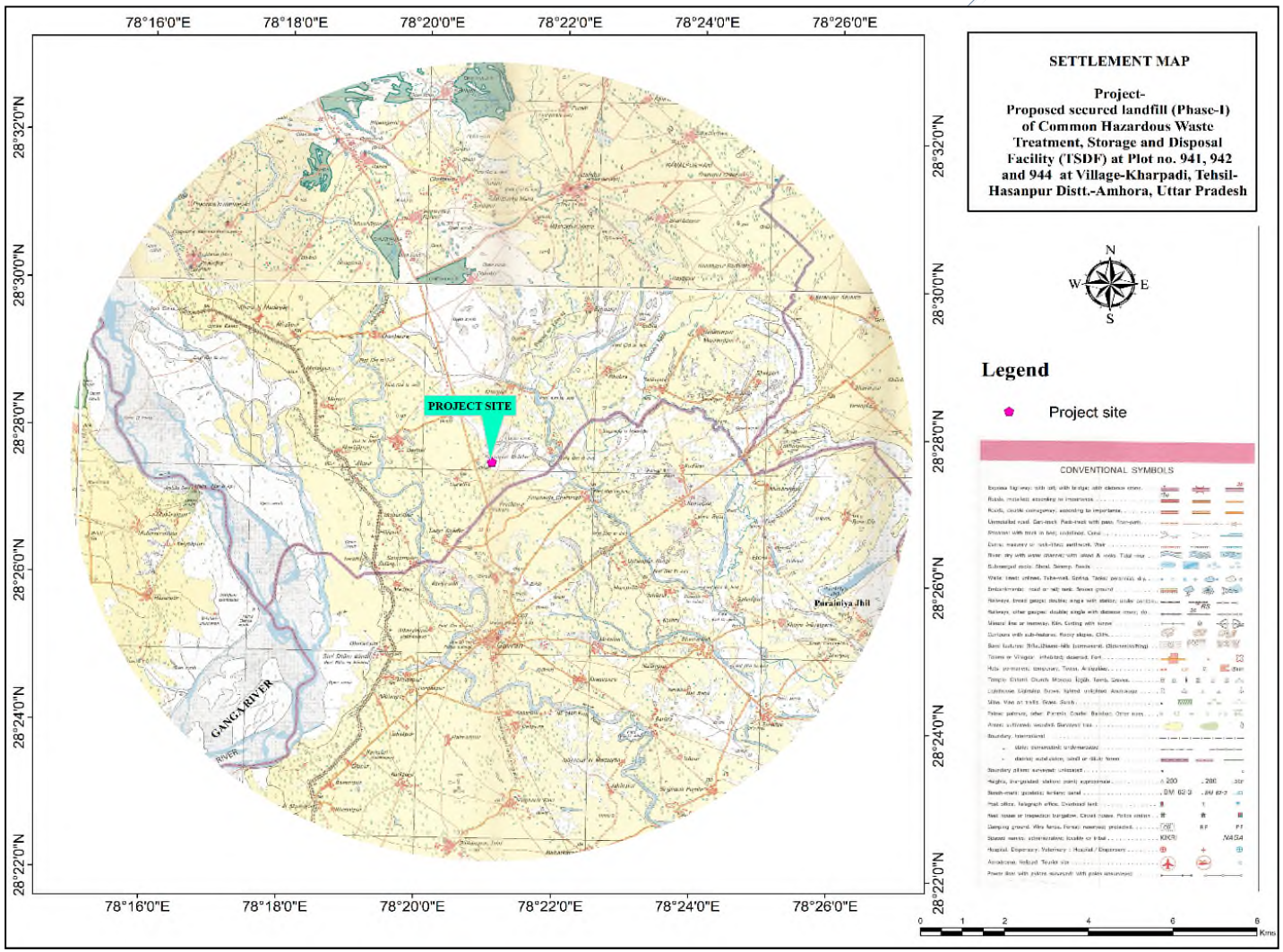

FIGURE 3-11: PROJECT / SETTLEMENT LOCATION MAP

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TABLE 3-22: **TOTAL POPULATION WITHIN 10 KM RADIUS FROM THE PROJECT SITE**

Name of Village	No. of House hold	Total Population	Total Male Population	Total Female Population	Schedule Caste Population	Schedule Caste Male Population	Schedule Caste Female Population	Schedule Tribe Population	Schedule Tribe Male Population	Schedule Tribe Female Population
Sikandarpur Jhabu	0	0	0	0	/.k/,	0	0	0	0	0
Bagadpur Chhoiya	125	703	369	334	2	2	0	0	0	0
Adampur	1868	10695	5577	5118	1413	724	689	0	0	0
Sehbazpur Thola	598	3343	1756	1587	599	298	301	0	0	0
Damgara	264	1415	741	674	19	10	9	0	0	0
Chakferi	576	3283	1744	1539	65	32	33	0	0	0
Rahra	845	4568	2398	2170	1020	541	479	0	0	0
Rahrai	499	3001	1581	1420	432	241	191	0	0	0
Dhakela	204	1270	669	601	123	61	62	0	0	0
Ikona	116	656	355	301	291	152	139	0	0	0
Kharpari	375	2105	1117	988	568	294	274	0	0	0
Bhoobra	307	1711	899	812	393	207	186	0	0	0
Beejhalpur	441	2324	1184	1140	119	68	51	0	0	0
Soobra	166	995	519	476	0	0	0	0	0	0
Kharagrani	400	2428	1256	1172	636	336	300	0	0	0
Bahadarpur Missar	403	2353	1236	1117	162	84	78	0	0	0
Bhawli	452	2583	1380	1203	635	344	291	0	0	0

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Chachora	521	2944	1535	1409	1238	649	589	0	0	0
Kai Ahtmali	0	0	0	0	0	0	0	0	0	0
Kaimustkam	269	1568	802	766	535	277	258	0	0	0
Sirsa Kala Mustkam	314	1632	883	749	535	284	251	0	0	0
Sirsa Kalan Ahtmali	72	373	187	186	0	0	0	0	0	0
Sikandarpur Jhabu	106	513	268	245	446	228	218	0	0	0
Mirzapur Janoobi	0	0	0	0	0	0	0	0	0	0
Malakpur Ahtmali	184	996	539	457	0	0	0	0	0	0
Malakpur Mustehkam	0	0	0	0	0	0	0	0	0	0
Doulatpur Janoobi	303	1882	1028	854	262	141	121	0	0	0
Marora	118	741	359	382	4	2	2	0	0	0
Khwajepur Ahatmali	150	893	452	441	14	8	6	0	0	0
Jeevpur Mustehkam	0	0	0	0	0	0	0	0	0	0
Hasanpur Mustehkam	0	0	0	0	0	0	0	0	0	0
Hasanpur Ahatmali	0	0	0	0	0	0	0	0	0	0
Ibrahimpur Chak	114	722	366	356	622	317	305	0	0	0
Salara	129	750	385	365	281	141	140	0	0	0
Hazipur Khadar	0	0	0	0	0	0	0	0	0	0
Ibrahimpur Khadar	0	0	0	0	0	0	0	0	0	0
Jeevpur Ahtmali	197	1158	587	571	107	48	59	0	0	0

Mubarizpur	637	3808	2006	1802	1094	580	514	0	0	0
Dadhiyal	256	1478	779	699	196	106	90	0	0	0
Guretha	438	2474	1294	1180	158	77	81	0	0	0
Dehri Khadar	0	0	0	0	0	0	0	0	0	0
Lalpur	245	1345	689	656	36	19	17	0	0	0
Karanpur Khadar	318	2000	1083	917	236	128	108	0	0	0
Talavra	361	2010	1088	922	312	172	140	0	0	0
Imratpur	166	1103	580	523	152	77	75	0	0	0
Pitambar	0	0	0	0	0	0	0	0	0	0
Pura	116	656	355	301	291	152	139	0	0	0
Mohammadpur Bangar	151	961	505	456	0	0	0	0	0	0
Beejhalpur	441	2324	1184	1140	119	68	51	0	0	0

TABLE 3-23: **POPULATION LITERATE / ILLITERATE AND WORKERS POPULATION WITHIN 10 KM RADIUS FROM THE PROJECT SITE**

Name of Village	Population Literates	Population Male Literates	Population Female Literates	Total Illiterate's Population	Total Illiterate's Male Population	Total Illiterate's Female Population	Total Main Worker Population	Total Main Worker Male Population	Total Main Worker Female Population	Total Main Cultivator Population
Sikandarpur Jhabu	0	0	0	0	0	0	0	0	0	0
Bagadpur Chhoiya	311	204	107	392	165	227	96	88	8	83

Adampur	4223	2846	1377	6472	2731	3741	3652	2624	1028	1924
Sehbazpur Thola	1463	1009	454	1880	747	1133	992	711	281	543
Damgara	551	377	174	864	364	500	238	225	13	212
Chakferi	1183	845	338	2100	899	1201	1056	773	283	346
Rahra	2197	1399	798	2371	999	1372	990	921	69	432
Rahrai	1282	897	385	1719	684	1035	718	695	23	367
Dhakela	472	322	150	798	347	451	281	275	6	250
Ikona	285	184	101	371	171	200	119	104	15	89
Kharpari	948	667	281	1157	450	707	516	497	19	461
Bhoobra	730	501	229	981	398	583	338	318	20	297
Beejhalpur	864	570	294	1460	614	846	567	544	23	438
Soobra	373	255	118	622	264	358	195	183	12	171
Kharagrani	842	569	273	1586	687	899	604	526	78	324
Bahadarpur Missar	956	609	347	1397	627	770	561	516	45	502
Bhawli	966	686	280	1617	694	923	500	484	16	441
Chachora	1272	857	415	1672	678	994	842	649	193	687

Kai Ahtmali	0	0	0	0	0	0	0	0	0	0
Kaimustkam	538	393	145	1030	409	621	386	335	51	369
Sirsa Kala Mustkam	783	504	279	849	379	470	360	340	20	333
Sirsa Kalan Ahtmali	188	104	84	185	83	102	85	82	3	76
Sikandarpur Jhabu	197	134	63	316	134	182	129	118	11	119
Mirzapur Janoobi	0	0	0	0	0	0	0	0	0	0
Malakpur Ahtmali	306	241	65	690	298	392	234	226	8	227
Malakpur Mustehkam	0	0	0	0	0	0	0	0	0	0
Doulatpur Janoobi	632	463	169	1250	565	685	533	498	35	495
Marora	244	171	73	497	188	309	169	167	2	165
Khwajepur Ahatmali	423	260	163	470	192	278	245	215	30	226
Jeevpur Mustehkam	0	0	0	0	0	0	0	0	0	0
Hasanpur Mustehkam	0	0	0	0	0	0	0	0	0	0
Hasanpur Ahatmali	0	0	0	0	0	0	0	0	0	0
Ibrahimpur Chak	87	67	20	635	299	336	200	161	39	150

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Salara	271	192	79	479	193	286	169	167	2	160
Hazipur Khadar	0	0	0	0	0	0	0	0	0	0
Ibrahimpur Khadar	0	0	0	0	0	0	0	0	0	0
Jeevpur Ahtmali	399	281	118	759	306	453	300	240	60	286
Mubarizpur	1895	1238	657	1913	768	1145	1360	911	449	910
Dadhiyal	536	377	159	942	402	540	403	352	51	302
Guretha	955	717	238	1519	577	942	549	519	30	486
Dehri Khadar	0	0	0	0	0	0	0	0	0	0
Lalpur	525	327	198	820	362	458	350	331	19	258
Karanpur Khadar	735	537	198	1265	546	719	445	386	59	234
Talavra	662	487	175	1348	601	747	908	572	336	400
Imratpur	435	262	173	668	318	350	254	226	28	134
Pitambar	0	0	0	0	0	0	0	0	0	0
Pura	285	184	101	371	171	200	119	104	15	89
Mohammadpur Bangar	542	338	204	419	167	252	398	258	140	360
Beejhalpur	864	570	294	1460	614	846	567	544	23	438

TABLE 3-24: WORKERS POPULATION WITHIN 10 KM RADIUS FROM THE PROJECT SITE

Name of Village	Main Male Cultivator Population	Main Female Cultivator Population	Total Main Agriculture Population	Total Main Male Agriculture Population	Total Main Female Agriculture Population	Total Main Household Population	Total Main Male Household Population	Total Main Female Household Population	Total Main Other Population	Total Main Male Other Population
Sikandarpur Jhabu	0	0	0	0	0	0	0	0	0	0
Bagadpur Chhoiya	77	6	2	2	0	4	4	0	7	5
Adampur	1561	363	721	490	231	111	50	61	896	523
Sehbazpur Thola	456	87	317	188	129	72	25	47	60	42
Damgara	209	3	19	9	10	1	1	0	6	6
Chakferi	335	11	689	420	269	5	5	0	16	13
Rahra	412	20	177	157	20	26	26	0	355	326
Rahrai	361	6	280	266	14	26	26	0	45	42
Dhakela	247	3	22	21	1	0	0	0	9	7
Ikona	81	8	20	19	1	2	1	1	8	3
Kharpari	451	10	25	23	2	7	7	0	23	16
Bhoobra	280	17	24	22	2	0	0	0	17	16
Beejhalpur	430	8	106	95	11	13	13	0	10	6
Soobra	164	7	6	6	0	2	1	1	16	12
Kharagrani	320	4	171	167	4	4	3	1	105	36

Bahadarpur Missar	469	33	55	43	12	1	1	0	3	3
Bhawli	434	7	21	20	1	5	4	1	33	26
Chachora	528	159	111	86	25	29	24	5	15	11
Kai Ahtmali	0	0	0	0	0	0	0	0	0	0
Kaimustkam	322	47	6	6	0	3	3	0	8	4
Sirsa Kala Mustkam	317	16	12	12	0	2	2	0	13	9
Sirsa Kalan Ahtmali	73	3	5	5	0	0	0	0	4	4
Sikandarpur Jhabu	112	7	4	4	0	0	0	0	6	2
Mirzapur Janoobi	0	0	0	0	0	0	0	0	0	0
Malakpur Ahtmali	219	8	6	6	0	0	0	0	1	1
Malakpur Mustehkam	0	0	0	0	0	0	0	0	0	0
Doulatpur Janoobi	469	26	16	13	3	6	4	2	16	12
Marora	163	2	2	2	0	0	0	0	2	2
Khwajepur Ahatmali	200	26	3	2	1	1	1	0	15	12
Jeevpur Mustehkam	0	0	0	0	0	0	0	0	0	0
Hasanpur Mustehkam	0	0	0	0	0	0	0	0	0	0
Hasanpur Ahatmali	0	0	0	0	0	0	0	0	0	0
Ibrahimpur Chak	114	36	49	46	3	0	0	0	1	1
Salara	159	1	0	0	0	0	0	0	9	8
Hazipur Khadar	0	0	0	0	0	0	0	0	0	0

Ibrahimpur Khadar	0	0	0	0	0	0	0	0	0	0
Jeevpur Ahtmali	230	56	8	6	2	1	1	0	5	3
Mubarizpur	734	176	60	42	18	15	6	9	375	129
Dadhiyal	262	40	55	50	5	0	0	0	46	40
Guretha	464	22	34	31	3	10	10	0	19	14
Dehri Khadar	0	0	0	0	0	0	0	0	0	0
Lalpur	254	4	75	64	11	2	1	1	15	12
Karanpur Khadar	205	29	153	149	4	25	11	14	33	21
Talavra	366	34	476	193	283	16	2	14	16	11
Imratpur	120	14	78	75	3	12	6	6	30	25
Pitambar	0	0	0	0	0	0	0	0	0	0
Pura	81	8	20	19	1	2	1	1	8	3
Mohammadpur Bangar	227	133	0	0	0	3	2	1	35	29
Beejhalpur	430	8	106	95	11	13	13	0	10	6

TABLE 3-25 :WORKERS AND ILLITERATES POPULATION WITHIN 10 KM RADIUS FROM THE PROJECT SITE

Name of Village	Total Main Female Other Population	Total Worker Population	Total Worker Male Population	Total Worker Female Population	Total Non-Worker Population	Total Non-Worker Male Population	Total Non-Worker Female Population	Marginal Worker Population	Marginal Male Worker Population	Marginal Female Worker Population
Sikandarpur Jhabu	0	0	0	0	0	0	0	0	0	0

Bagadpur Chhoiya	2	190	174	16	513	195	318	94	86	8
Adampur	373	4652	2995	1657	6043	2582	3461	1000	371	629
Sehbazpur Thola	18	1286	850	436	2057	906	1151	294	139	155
Damgara	0	507	327	180	908	414	494	269	102	167
Chakferi	3	1196	843	353	2087	901	1186	140	70	70
Rahra	29	1338	1154	184	3230	1244	1986	348	233	115
Rahrai	3	852	761	91	2149	820	1329	134	66	68
Dhakela	2	290	282	8	980	387	593	9	7	2
Ikona	5	136	115	21	520	240	280	17	11	6
Kharpari	7	654	552	102	1451	565	886	138	55	83
Bhoobra	1	787	409	378	924	490	434	449	91	358
Beejhalpur	4	853	577	276	1471	607	864	286	33	253
Soobra	4	536	292	244	459	227	232	341	109	232
Kharagrani	69	804	610	194	1624	646	978	200	84	116
Bahadarpur Missar	0	751	552	199	1602	684	918	190	36	154
Bhawli	7	963	644	319	1620	736	884	463	160	303
Chachora	4	969	715	254	1975	820	1155	127	66	61
Kai Ahtmali	0	0	0	0	0	0	0	0	0	0
Kaimustkam	4	626	387	239	942	415	527	240	52	188
Sirsa Kala Mustkam	4	707	429	278	925	454	471	347	89	258

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Sirsa Kalan Ahtmali	0	205	105	100	168	82	86	120	23	97
Sikandarpur Jhabu	4	187	123	64	326	145	181	58	5	53
Mirzapur Janoobi	0	0	0	0	0	0	0	0	0	0
Malakpur Ahtmali	0	317	233	84	679	306	373	83	7	76
Malakpur Mustehkam	0	0	0	0	0	0	0	0	0	0
Doulatpur Janoobi	4	1104	585	519	778	443	335	571	87	484
Marora	0	170	168	2	571	191	380	1	1	0
Khwajepur Ahatmali	3	698	362	336	195	90	105	453	147	306
Jeevpur Mustehkam	0	0	0	0	0	0	0	0	0	0
Hasanpur Mustehkam	0	0	0	0	0	0	0	0	0	0
Hasanpur Ahatmali	0	0	0	0	0	0	0	0	0	0
Ibrahimpur Chak	0	206	164	42	516	202	314	6	3	3
Salara	1	180	176	4	570	209	361	11	9	2
Hazipur Khadar	0	0	0	0	0	0	0	0	0	0
Ibrahimpur Khadar	0	0	0	0	0	0	0	0	0	0
Jeevpur Ahtmali	2	484	304	180	674	283	391	184	64	120
Mubarizpur	246	2143	1228	915	1665	778	887	783	317	466
Dadhiyal	6	681	417	264	797	362	435	278	65	213
Guretha	5	1040	606	434	1434	688	746	491	87	404

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Dehri Khadar	0	0	0	0	0	0	0	0	0	0
Lalpur	3	560	360	200	785	329	456	210	29	181
Karanpur Khadar	12	825	530	295	1175	553	622	380	144	236
Talavra	5	1239	669	570	771	419	352	331	97	234
Imratpur	5	290	260	30	813	320	493	36	34	2
Pitambar	0	0	0	0	0	0	0	0	0	0
Pura	5	136	115	21	520	240	280	17	11	6
Mohammadpur Bangar	6	419	270	149	542	235	307	21	12	9
Beejhalpur	4	853	577	276	1471	607	864	286	33	253

Number of the Villages	Total Household	Total Population	Male	Female	SC Population	ST Population	No of literate	Total worker	Main Worker	Marginal Worker	Non worker
SUM TOTAL of 49 Villages	13245	75764	39735	36029		0	30420	29350	20428	9406	45930

The above table present the demographic detail of the 49 villages located within 10 km radius of the project area in Tehsil Hasanpur, District Amroha, Uttar Pradesh.

3.8.2 Base line data

- **Population**

Hasanpur Tehsil of Jyotiba Phule Nagar d*i*strict has **total population of 595,917** as per the Census 2011. Out of which 312,423 are males while 283,494 are females. In 2011 there were total 101,012 families residing in Hasanpur Tehsil. The **Average Sex Ratio of Hasanpur Tehsil is 907**.

As per Census 2011 out of total population, 14.4% people lives in urban areas while 85.6% lives in the rural areas. The average literacy rate in urban areas is 61.4% while that in the rural areas is 57.5%. Also the Sex Ratio of Urban areas in Hasanpur Tehsil is 917 while that of rural areas is 906.

The Scheduled Caste (SC) population is 106,204, out of which 55,701 are males and 50,503 females. The Scheduled Tribe (ST) population is 112, out of which 62 are males and 50 females. The total Scheduled Tribes population is very less.

- **Literacy**

Average literacy rate of Hasanpur Tehsil in 2011 were 58.04% in which, male and female literacy were 70.1% and 44.75% respectively. Total literate in Hasanpur Tehsil were 284,174 of which male and female were 179,948 and 104,226 respectively.

- **Sex Ratio**

The Sex Ratio of Hasanpur Tehsil is 907. Thus for every 1000 men there were 907 females in Hasanpur Tehsil. Also as per Census 2011, the Child Sex Ratio was 908 which is greater than Average Sex Ratio (907) of Hasanpur Tehsil.

- **Working Population**

In Hasanpur Tehsil out of total population, 201,010 were engaged in work activities. 71.4% of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 28.6% were involved in Marginal activity providing livelihood for less than 6 months. Of 201,010 workers engaged in Main Work, 79,712 were cultivators (owner or co-owner) while 25,859 was an Agricultural laborer.

Sex Ratio

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The Sex Ratio of the study area is a numeric relationship between females and males of the area and bears paramount importance in the present day scenario where the un-ethnic pre determination of sex and killing of female fetus during pregnancy is practiced by unscrupulous medical practitioners against the rule of the law of the country. It is evident that by contrast the practice of female feticide is not prevalent in the study area.

As per the Census Records of 2011, the study area is falling in Jyotiba Phule Nagar District of Uttar Pradesh State. The Sex Ratio' was observed as 910 females per 1000 males in the District. The same was recorded as907 females for every 1000 males in the study area. The male-female wise population distribution in the villages covered under study area is depicted by graphical representation shown in Figure 3.12.

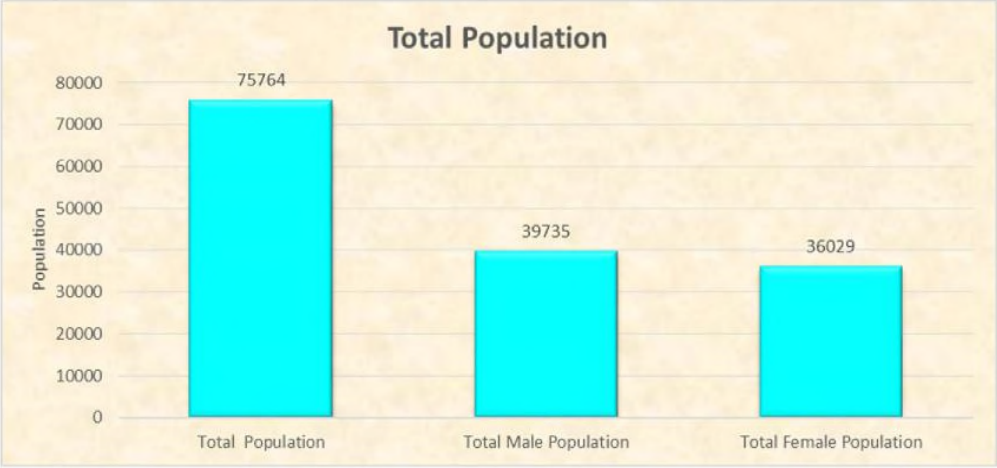

FIGURE 3-12: MALE-FEMALE WISE POPULATION DISTRIBUTION

Scheduled Caste & Scheduled Tribe Population

On the basis of the Caste-wise population distribution of the ***'Scheduled Caste'*** population (13115) consisting of 6868 males and 6247 females respectively in the study area accounts for 17.31% to the total population (75764) of the study area. ***'Scheduled Tribe'*** population was observed Nil in our study area. It implies that the rest 82.69% of the total population belongs to the General category. Male-Female wise distribution of **SC** population in the study area villages is graphically represented in **Figure 3.13**

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FIGURE 3-13: SC POPULATION IN STUDY AREA

Literacy Rate in our Study area

Literacy level is quantifiable indicator to assess the development status of an area or region. The statistics of literate and illiterate male and female population is presented in **Table 3.22**. Total literates population was recorded as 30420 persons (40.15%) in the study area. It is evident from **Table 3.22**, that Male-Female wise literates are recorded as 20,644 & 9776 persons respectively, implies that the *'Literacy Rate'* is 40.15% with male and female percentage being 67.86 & 32.14 % respectively. The total illiterate's population was recorded as 45344 persons (59.90%) in the study area. Male-female wise illiterates were 19091 (42.10%) and 26253 (57.89 %) respectively. The Male-Female wise graphical presentation of literates & illiterates population in study area villages is given in **Figure 3.14**

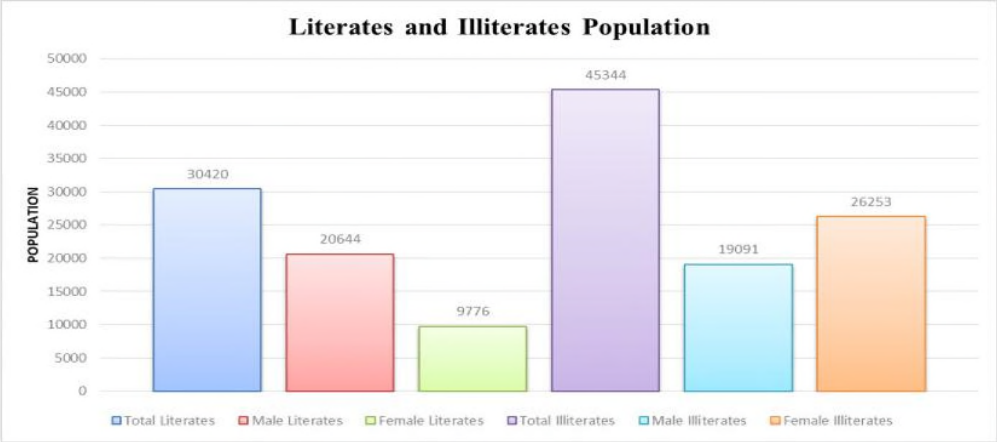

FIGURE 3-14: MALE-FEMALE WISE DISTRIBUTION OF LITERATES & ILLITERATES

Workers Scenario

Occupational pattern of the concerned study area are recorded to assess skills of people. Occupational pattern also helps in identifying dominating economic activity in the area. The statistics of main workers and marginal workers with further break-up into category as casual, agricultural, households and other activities is shown in **Table 3.22 & 3.23.**

In the study area the Main and Marginal Workers are 20428 (26.96%) and 9406 (12.41%) respectively of the total population (75764) while the remaining 45930 (60.62%) constitutes non-workers. Thus it implies that in study area the semi-skilled and non-skilled work-force required for the project is aplenty. Graphical representation of Workers Scenario is given below as **Figure 3.15**. Distribution of work participation rate of the study area population is shown in Table 3.22 to 3.24 as follows;

Occupation Class	2011
Main Workers	2042

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Male	1688
Female	3543
Marginal Workers	**9406**
Male	3035
Female	6371
Non-Workers	**4593**
Male	1981
Female	2611
Total Population	**7576**

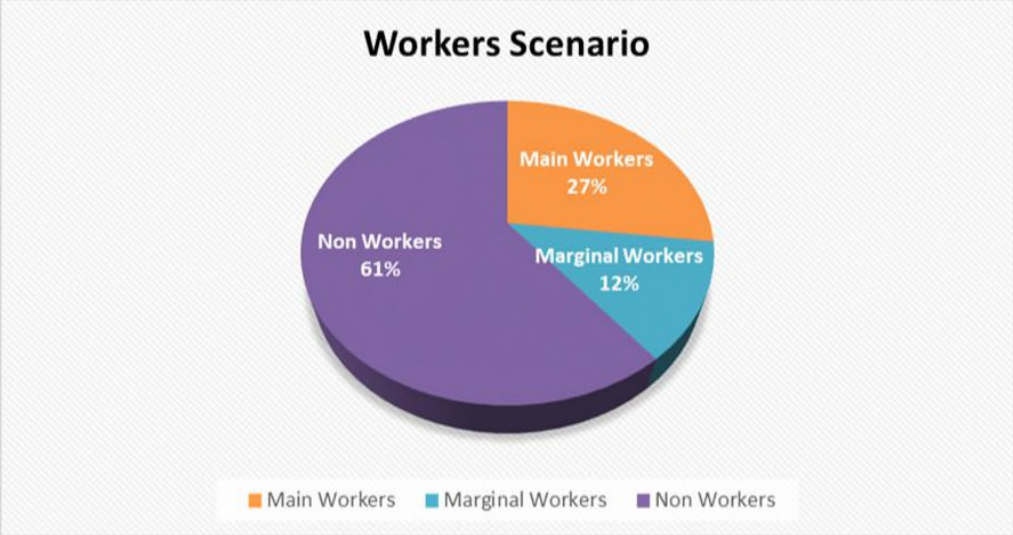

FIGURE 3-15: WORKER SCENARIO

Main Workers: The Main Workers were observed as 20428 persons (26.96%) to the total population of the study area and its composition is made-up of Casual laborers as 13784 (67.47%), Agricultural workers 3934 (19.25%), Household workers 419 (2.05%) and other workers as 2291 (11.21%) respectively. Composition of Main workers is shown below as Figure 3.16.

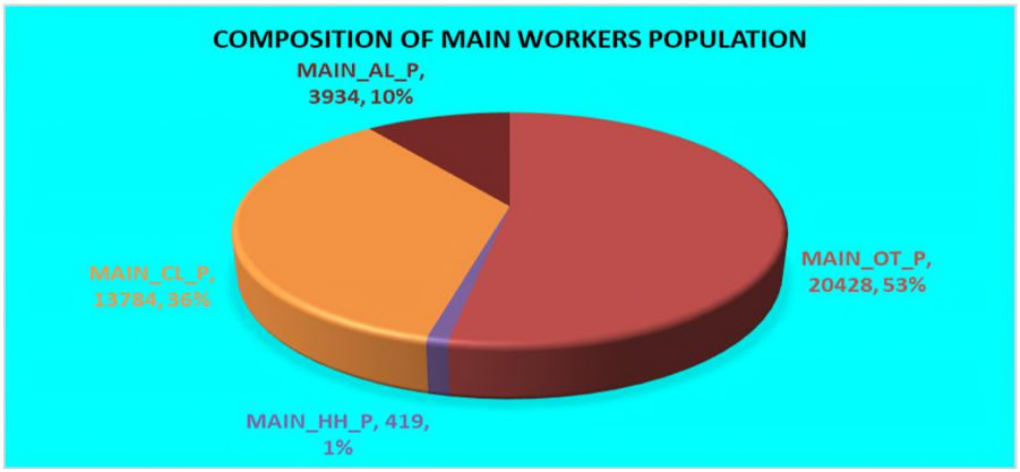

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FIGURE 3-16: COMPOSITION OF MAIN WORKERS POPULATION

Marginal Workers:

The total marginal workers are observed as 9406 which constitute 12.41% of the total population (75764) comprise of Marginal Casual Laborers 3416 (36.31%), Marginal Agricultural Laborers 4569 (48.57%), Households Marginal Laborers 453 (4.81%) and Marginal Other Workers were also observed as 968 (10.29%) of the total marginal workers respectively. Composition of Marginal workers is shown in **Figure 3.17** as follows:-

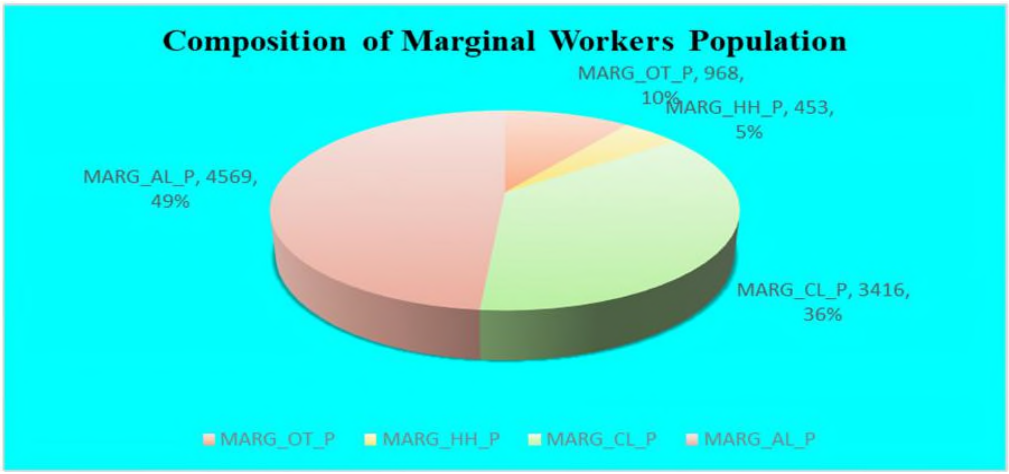

FIGURE 3-17: COMPOSITION OF MARGINAL WORKERS POPULATION

Non-Workers:

The total Non-workers population was observed as 45930 which constitute 60.62 % to the total population (75764). Male-female wise Non-workers population was recorded as 19815 Males (43.14%) and 26115 Females (56.86%) respectively. Details about Total Non-workers in the study area are tabulated in Table 3.24. Graphical representation of Non-Workers population is shown in Figure 3.18 as follows;

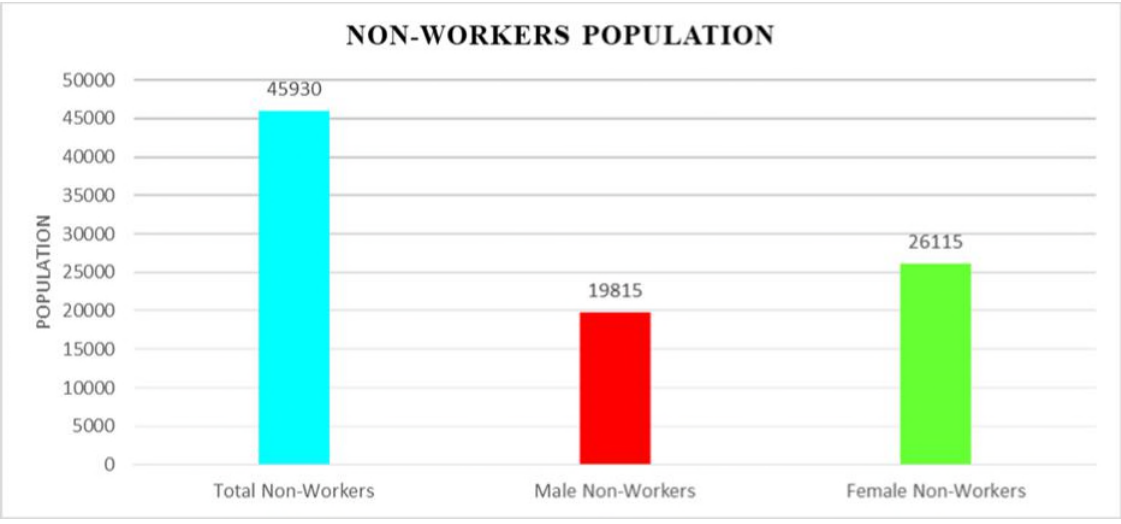

FIGURE 3-18: COMPOSITION OF NON-WORKER

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E

Economic Structure The majority of people in rural sector are cultivators & agricultural labors which indicates dominant agricultural economy. A small section of people is engaged as workers in household industries. But in urban sector the existing scenario is completely reversed as most of the people there are engaged in non-agricultural activity especially in local hotels/restaurants and as drivers some people also operates their vans/jeeps/cars as tourist vehicle. Annual income helps in identifying families below poverty line. During the survey income of a household through all possible sources was recorded. Agriculture and allied activities were reported to be the major source of income followed by non-farm wage labor, business, government service and private service. The other important sources of income include government pension and income from selling of fodder.

Social Composition

From the baseline data it is found that the majority of population in these villages follows the Muslim religion with sizable portion of Hindus. There are also a very small number of Christian's communities. Hindi is the most widely spoken language. Local person also speaks Urdu with other languages. The languages of Uttar Pradesh generally belong to two zones in the Indo-Aryan languages, Central and East. Hindi is the state's official language (Urdu is co-official).

Employment

It is envisaged that the project would hire the services of a large number of skilled and unskilled labour during construction, operations and restoration phase of the project. Further to this, there shall be a small amount of indirect employment opportunities created in lieu of establishment of this facility. To the extent possible and depending on the availability of skilled and unskilled labour shall be hired from the local community creating a direct benefit.

Basic Infrastructure Facilities (Amenities) Availability

A review of Basic infrastructure facilities available in the study area has been done on the basis of the Field survey and information given in Census Records of 2011 for the study area inhabited villages lying in Jyotiba Phule Nagar District of Uttar Pradesh. The study area and Tehsil Hasanpur has a good level of infrastructure facilities and amenities like education, medical (health), drinking water, power supply (Electrification), and transport & communication network. Study area environment is predominantly rural and Agriculture is the main occupation of the study area.

Education Facilities

As per the Census Records of India 2001, there are a total Thirty (72) revenue villages including one town named Gajraula (NP) of Jyotiba Phule Nagar District of Uttar Pradesh State i.e. Thirty (29) villages of Dhanaura tehsil, Four (04) villages of Amroha tehsil & Thirty Nine (39) villages of Hasanpur tehsil respectively. The educational facilities have been further strengthened now and a number of private public schools and colleges are also functioning in the vicinity of the study area. Besides, there are Engineering and Medical

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colleges available close to the vicinity of the study area and in Towns/District. There are also Government Colleges facilities exist in the towns/District of the study area. Higher educational facilities are available in Towns/District in the area. There is considerable improvement in educational facility. The villages/towns have no such facilities can reach within 5.0 to 10.0-km range.

Medical Facilities

The medical facilities are provided by different agencies like Govt., Private individuals and voluntary organizations in the study area and the nearest town. Almost all villages are having medical facilities either at door or within <5.0 or 5.0 to10.0-km range. Overall study area villages are well served by all type of medical facilities.

Potable Water Facilities

Drinking water facilities are available in all villages in the study area. The study area has good potable water facilities. Most of the villages (100% villages) have hand pumps as potable water facility. Canal water is not available in the study area. In majority of the villages in the study area, hand pumps are commonly observed in the study area. River water facility is available in many villages of the study area.

Communication Facilities

Apart from P&T services, transport is the main communication linkage in the study area. The area has poor rail and road network, passes from the area. The northern railway line also passes across the district HQ and most of the villages availing this facility through the nearest railway station. No villages have navigable waterways facility in the study area. The villages in the study area which do not have such facility can reach within 5 to 10-km range. Mainly seven (07) towns named Bachhraon (MB), Gajraula (NP), Joya (NP), Amroha (MB), Hasanpur (MB), Brajghat (MB) and Bulghat, are available within the distance range of 05 to 25-kms from the villages of the study area.

Banking Facility

The study area has almost all the schedule commercial banks with ATM facility at urban areas and the district HQ.

Power Supply

As far as conditions of power supply are concerned, it is fairly satisfactory. Many villages have power supply for domestic as well as agricultural purposes in Hasanpur Tehsil. However, some villages also have power connections for operating mechanism such as tube wells, thresher machines and saw cutting machines etc.

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Infrastructure

The entire study region has been very well connected with roads to the main town and district head quarter. The entire study area has been very well connected to the district head quarter and block. Most of the villages have access to telephone systems. Almost all the villages have been provided with facilities of mobile telephones. Post offices are available in almost all the villages of the study area.

Drinking Water

The entire study area has access to drinking water facilities. Hand pumps, tube wells, dug wells are commonly used for drinking water. The drinking water quality has been found to be satisfactory in the study area.

Place of Historical or Archaeological Interest

No place of Historical or Archaeological importance exists near the proposed project area. The district Jyotiba Phule Nagar is popularly known by the simultaneous existence of two religious places i.e. Dargah of Hazrat Vilayat Shah and pilgrim centre of Basudeo. Hazrat Vilayat Shah was born in Arab during 1236 and settled to this place in the year 1272. By tradition, it is believed that even snakes and scorpions became poison-less while they rattled around this place. The temple of Shri Basudeo ji is primitive one and historical legends trace it since the period of "Ibne Batuta". This is one of the sacred places of worship of Meera ji. During the month of August/September devotees from various places visit the place. This pilgrim centre is unique example of national unity and religious harmony.

Social Impact Assessment & Conclusion:

Amroha is emerging as an industrial hub of Uttar Pradesh and due to this a huge amount of hazardous waste has been generated each day and it is growing by the time. So, the TSDF facility will serve more in future to maintain the environmental and social balance of our society.

The project has provided a direct job opportunity to the locals as both technical and non-technical workers. Right now, there are workers from local village and town. With the growth of other industries in this area the workload and scope of job opportunity is increasing by day. A major part of this labour force is mainly from local villagers who are expected to engage themselves both in agriculture and project activities. This enhances their income and lead to overall economic growth of the area. The following socio-economic changes are expected due to project activities:

- The project has a positive impact towards income generation.
- The employment shall be in the form of skilled, semiskilled as well as unskilled workers.

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- A new working culture is emerging here because of local people are involved in the project. Previously these people were facing lack of job opportunity and had to survive on only agriculture.
- There will be positive effect on livelihood of people living in this area. It creates a great impact on education and literacy. Because a fixed income helps to lead a better life and give a better future for next generation too.
- With this project many other businesses has been started like transportation. It is indirectly created employment for many people. According to this to provide the need of outsiders those who come here regularly some small shops (Tea Stall, Rice hotel) also established.
- Like this way a cumulative positive social impact is created through the project.
- Not only income generation it is created a better environment to live through treat, store, or dispose of the waste properly.
- Proposed project will be help in effective management of hazardous waste and will also help in avoiding environmental pollution and adverse health effects due to its improper handing & disposal.

Rehabilitation & Resettlement (R&R) Action Plan

Rehabilitation & Resettlement (R&R) Action Plan is not applicable to proposed project as it is located in well-developed industrial area.

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4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 INTRODUCTION

Environmental impacts are defined as any change to the environment, whether adverse or beneficial, wholly or partially resulting from project's environmental aspects. Environmental aspects selected for further study should be large enough for meaningful examination and small enough to be easily understood. Environmental aspects could include activities that occur during normal, abnormal and emergency operations.

The environmental baseline scenario as detailed in Chapter 3 and the proposed Common Treatment Storage Disposal Facility with Secured landfill for hazardous waste described in Chapter 2, it is attempted to assess the likely impact and its extent on various environmental parameters in this chapter. The parameters, which are relevant within the context, are as detailed below.

The likely effects are discussed on various environmental descriptors, namely:

- Land use/Landcover (LU/LC
- Ambient Air quality (AQ)
- Noise levels vibration (NV)
- Water resources
- Ground Water (GW)
- Surface Water (SW)
- Soil (S)
- Ecology & Biodiversity (EB)
- Socio economic (SE)
- Occupational health, community Health and safety (OH/CH &S)

Impacts due to proposed project activity have been divided according to the temporal scale into 'Impacts during Construction Phase' & 'Impacts during Operation Phase'. The impacts on different environmental parameters, due to the proposed secured landfill (Phase-I) of ***Common Hazardous Waste Treatment, Storage and Disposal Facility (TSDF),*** project, will be due to various activities carried out during construction phase & operation phase; Construction activity spreads over pre-construction, machinery installation and commissioning stages and ends with the induction of manpower and start-up. During operation phase of the proposed project, the impacts will be mostly permanent and irreversible in nature.

Numerous adverse impacts occur from facility operations. These impacts can be accidents infrastructure damage (e.g., damage to access roads by heavy vehicles) pollution of the local environment (such as contamination of groundwater and/or aquifers by leakage and residual soil contamination during landfill usage, as well as after landfill closure) off-gassing of methane or VOC generated by decaying wastes.

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4.2 IMPACT ASSESSMENT METHODOLOGY

To carry out the impact assessment of the Common Hazardous Waste Treatment storage and disposal Facility for proposed Secured Landfill (TSDF Phase I), the methodology adopted for impact assessment is such that the whole project is divided into major activities and for each activity adverse or positive impact is identified and divided into the following sections hereunder.

- ❖ Identification of landfill activities
- ❖ Impact Prediction, evaluation due to these activities and its mitigation measures
- ❖ Impact analysis i.e. consequence/Score analysis

4.3 IDENTIFICATION OF LANDFILL ACTIVITIES

Environmental impacts have been identified based on an assessment of environmental aspects associated with the proposed project of Secured Landfill of TSDF Phase-I. The symbol '–' indicates an adverse impact, '+' indicates a beneficial impact and '+/–' indicates both positive and negative and '**N**' indicates not applicable.

4.4 IMPACTS PREDICTION/EVALUATION AND ITS MITIGATION MEASURES

For prediction of impact environment due to the proposed project for Secured Landfill activities, there are several scientific techniques and methodologies which are adopted. Mathematical models are useful tools (where applicable) to quantitatively describe the cause and effect relationships between sources of pollution and different components of environment. In cases where it is not possible to identify and validate a model for a situation, predictions have been arrived at based on logical reasoning / consultation / extrapolation or overlay methods. In any case, for each component of the environment, the methods used to arrive at the likely impacts are required to be described.

Evaluation is an absolute term used for assessment and prediction by means of numerical expression or value. Assessment is the process of identifying and interpreting the environmental consequences of the significant actions. Prediction is a way of mapping the environmental consequences of the significant actions. Significant action depicts direct adverse changes caused by the action and its effect on health of biota including flora, fauna and man, socio-economic conditions, landforms and resources, physical and cultural heritage properties and quality of bio-physical surroundings. In most cases the predictions consist of indicating merely whether there will be degradation, no change, or enhancement of environmental quality. An impact indicator is a parameter that provides a measure (in at least some qualitative or numerical sense) of the significance and magnitude of the impact. In India, indicators are available in the form of primary and biological water quality criteria, and national ambient standards for noise and air.

Predictions of biological environmental components are often uncertain, because their response to environmental stress cannot be predicted in absolute terms. The impacts of the proposed project on the environment have been considered based on the information

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provided by the proponents and data collected at the site. Primary impacts are those, which are attributed directly by the project while secondary impacts are those, which are indirectly induced and typically include the associated investments and changed pattern of social and economic activities by the proposed action.

The construction and operation phase of the proposed project comprises various activities each of which have been considered to assess the impact on one or another environmental parameter.

Construction phase comprises of site cleaning, topographical survey (if any) machinery installation etc. whereas establishment phases mainly consist of civil works such as earth moving, leveling of land and approach roads. Machinery installation and commissioning involve activities like fabrication work, cutting, welding and other facilities, lying of cables and pipelines etc. It involves testing of plant for any type of leakages and designed capacity.

Construction phase works include site clearance, site formation, building works, infrastructure provision and Landfill Cell development activities. The impacts due to construction activities are short term and are limited to the construction phase. The impacts will be mainly on-air quality, water quality, soil quality and socio-economics.

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TABLE 4-1: IMPACT IDENTIFICATION

S. No.	Project Activities	Potential Impact areas									Remarks
		Landuse/ Landcover (LU/LC)	Air Quality (AQ)	Noise and Vibration (NV)	Surface Water (SW)	Ground Water (GW)	Soil (S)	Ecology & Bio-diversity (EB)	Socio-Economic (SE)	Occupational Health, Community Health & Safety (OH / CH&S)	
1	**Site Selection**										
1.1	Land lease (Already allotted for Common Hazardous Waste Treatment Storage & Disposal Facility.	—	N	N	N	N	N	N	+	N	LU: Land use change during the proposed expansion of secured landfill in Phase-I. SE: Employment shall be generated to nearby surrounding villagers
2	**Preparation of Site**										
2.1	Present proposal is to utilize the area for setting up of phase-I of secured landfill	—	—	—	N	N	—	N	+	—	LC: Change in land cover; AQ / NV: air emissions, noise and vibration from vehicles, processing equipment and road laying equipment; S: soil erosion; SE: employment generation for Local people; OH: risk of occupational injuries
2.3	Excavation and paving of site	—	—	—	N	N	—	N	+	—	LC: Change in land cover due to excavation; AQ/NV: air emission and noise due excavation operations; S: removal of topsoil; SE: Temporary job creation for excavation and site preparation work; OH:
3	**For setting up of Proposed Secured Landfill Facility i.e. for landfill, storages.**										
3.1	Civil works such as preparation of landfill cell, construction of administrative building,	N	N	N	N	N	—	N	+	N	SE: creation of new economic activities.

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3.2	Heavy equipment operations for preparation of cell.	N	—	—	N	N	—	—	+	+/—	AQ/NV: air emission and noise due construction & operational machinery set up work; S:Only if any spillage; EB: Terrestrial ecology because of noise and vibrations; SE: Local employment generation; OH: Hazard due to accident
3.3	Workforce accommodation & sanitation	N	N	N	N	N	–	N	+	N	SE : If soak pit is not designed properly; soil might be contaminated
3.4	Fuel storage	N	N	N	N	—	–	N	N	—	GW: Ground water might be contaminated due to spillage of hazardous wastes & chemicals; S: Soil might be contaminated due to spillage if any; OH: Occupational risk might be occurred due to handling of material.
3.5	Use of raw water for project development facility (construction) & operational facility	N	N	N	N	N	N	N	N	N	The daily water demand will be 50 KLD will meet through bore well. Necessary permission from CGWA will be taken for the necessary abstraction of ground water. And also treated by suitable method.
3.6	Operation of DG set	N	—	—	N	N	–	N	N	N	AQ/NV: Air and Noise emission due to operation of DG set; S: possibility of soil contamination due to spillage of diesel or oil.
3.7	Circulating and cementing	N	N	N	N	—	–	N	+	N	GW/S: Ground water and soil contamination might be possible due to leakage during circulating and cementing; SE: temporary employment generation
4	**Operation and maintenance of CHWTS & Disposal Facility**										
4.1	Transportation of Wastes to facility from member industries	N	—	—	N	N	N	N	+/—	+/—	AQ: Emissions due to traffic movement NQ: Minor Noise & Vibration OHS: Fire & Road accidents, aesthetic and human interest; SE: disturbance in existing traffic pattern.

4.2	Storage/Stabilization of Hazardous waste etc.	N	—	N	N	N	–	N	N	—	AQ: fugitive emission; S: Soil contamination might be possible due to improper disposal of solid and Hazardous waste; OH/OH&S: Risk to community health due to spillage in surrounding area if not stored properly
4.3	Waste material handling and in boundary transport	N	—	N	N	N	N	N	N	—	AQ: Air quality might be delineated due to internal transportation of waste to respective facility OHS: temporary, acute, chronic health effects to the workers involved (if not trained properly)
4.4	Storage, handling and disposal of waste water and Leachate.	N	N	N	N	—	–	N	N	—	GW: Ground water contamination might be possible; S: If disposal of waste water not properly handled, soil contamination might be possible. OH/OH&S: Risk to community health due to breakage of liner system or spillage in surrounding area if not stored/treated

Due to the proposed project, TSDF Phase-I for Secured Landfill of Common Hazardous Waste Treatment Storage & Disposal Facility, after preliminary study and identification, environmental indices that are likely to be impacted are listed. Impact activities that are required to be assessed shall be based on subjective/objective criteria. The types of identified potential impact for the various components of the environment, i.e. air, noise, water, land and socio-economic are explained above in **Table No.-4.1.**

4.5 IMPACT ON AIR ENVIRONMEN

Construction Phase

During construction phase, the sources of emission will include site clearing, vehicles movement, hauling of materials, base course surfacing and moving of vehicles. Motor vehicle transportation (to, from and around the site) particularly the traffic on unpaved surface at the site, material movement into the site will introduce particulates. The construction works associated with the proposed development are broadly given below.

Emissions are expected to result in temporary degradation of air quality, affecting construction employees in the working environment. However, dust generation and SPM rise in the ambient air will be coarse and will settle within a short distance close to the construction sites. Hence, dust and other emissions are unlikely to spread sufficiently to affect the surroundings of the construction site.

Exhaust emissions from vehicles and equipment deployed during the construction phase is also likely to result in marginal increase in the levels of SO_2, NO_x, PM, CO and un-burnt hydrocarbons. The impact of such activities would be temporary and restricted to the construction phase. The impact is generally confined to the project area and is expected to be negligible outside the plant boundaries.

Mitigation Measures Proposed – Air Quality

For the proposed project site levelling and grading will be carried out, where ever possible to maintain the natural elevations they will not be disturbed, only levelling activity will be carried out for providing roads, sewage network, storm water system, and places required for providing buildings for administrative, plant shed erection, landfill cells, leachate collection places, etc. According to the engineering assessment; most of the excavated material shall be reused within the project boundary. The movement of cut and fill material will be limited.

Most of the construction dust will be generated from the movement of construction vehicles on unpaved roads. Unloading and removal of soil material shall also act as a potential source for dust nuisance. The control measures proposed to be taken up are given below.

- Dust suppression measures proposed will be regular water sprinkling on main haul roads in the project area, this activity will be carried out at least twice a day, if need arises frequency will be increased on windy days, in this way around 50% reduction on the dust contribution from the exposed surface will be achieved.

- The duration of stockpiling will be as short as possible as most of the material will be used as backfill material for the open cut trenches for road development.

- Temporary tin sheets of sufficient height (3m) will be erected around the site of dust generation or all around the project site as barrier for dust control.

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▪ Tree plantations around the project boundary will be initiated at the early stages by Plantation of 2 to 3 years old saplings, regular watering will be done, so that the area will be moist for most part of the day.

▪ To reduce the dust movement from civil construction site to the neighbour-hood the external part of the building (administration, canteen, etc) will be covered by plastic sheets.

▪ Given the implementation of proper control measures for dust suppression, no adverse impacts are expected and compliance with the Ambient Air Quality is achieved at ASR's (Air Pollution Sensitive Receivers) at all time.

Impacts during Operation Phase

During operation phase anticipated impact on ambient air quality due to proposed project activities at TSDF site depends on the magnitude of handling of hazardous waste, storage, stabilization and transportation of wastes.

During operation period of Secured Landfill site, the background contamination of ambient air around the site area is due to transportation activity. The particulate matter is likely to increase to the very limited extent as the transportation shall be carried out in closed vehicle. The loading/unloading operation of industrial waste shall be carried in shed at TSDF site. Some additional emission of gaseous and particulate matter due to Secured Land Filling operation of industrial hazardous waste is expected which will be controlled by compaction covering of waste with inert material.

Vehicular movements within the project area (TSDF Site) will add marginally to NOx and CO concentration. Emissions of particulate matter may be higher within the active TSDF operational areas due to handling of hazardous wastes during transportation and processing (stabilization). However, out site the TSDF area in the buffer zone, it is not likely to be affected significantly. Carbon dioxide a greenhouse gas will be emitted by diesel operated trucks and earth moving machinery.

Emission from other activities like construction machinery fueled by diesel and from mobile source will be in the form of PM_{10}, VOC, CO, NOx and SO_2.

Mitigation Measures:

Development of greenbelt, plantation work in the TSDF site will contribute in a positive manner towards mitigation of greenhouse gases. Global warming is a global concern and hence, the company will be undertaking all possible measures to minimize the CO2 emissions. These include regular maintenance of all fossil fuel-based machinery and equipment and ensuring their emissions within limit. It will be ensured that all vehicles are having their "Pollution Under Control" (PUC) certificates. The vehicles and machinery will be maintained periodically as per manufacturer specification to ensure optimum fuel utilization.

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The specific pollution issues pertaining to proposed project activities are as follows:

1)Material handling by heavy equipment/machinery will release large amounts of dust if no action is taken for suppressing it at source, while the immediate effects will be poor visibility but intake of dust through inhalation and oral route can have health impacts at the secondary stage.

2)Transport vehicles The transportation of hazardous waste shall be carried out by the authorized person in dedicated vehicles in closed containers thereby minimizing the risk of spillage & air/odour pollution. However, the movement of vehicle will generate dust and gaseous emission while plying on paved/unpaved roads. The loading and unloading of hazardous waste during transport operations are anticipated to add to the air pollution in core/buffer zone if appropriate control measures like spraying of water are not adopted.

3)Secured Landfill during operation part of the Secured land fill, to minimize the odour and gases generation, daily it will be covered with soil/ash and during rainy period with temporary cover (HDPE/Plastic sheets).

Dust suppression

The following stringent measures will be taken to control dust pollution.

- Water sprinkling is an effective way to keep dust under control. Sprinklers can also be employed to deliver continuous moisture in dust prone areas.
- Reducing the speed of a vehicle to 20 km/hr. can reduce emissions by a large extent.
- Other care shall be taken to keep all material storages adequately covered and contained so that they are not exposed to situations, where winds on site could lead to dust/particulate emissions. Fabrics and plastics for covering piles of soils and debris is an effective means to reduce fugitive dust from the material stores/warehouses.
- Regular maintenance of vehicles and machinery should be carried out
- Ambient air quality monitoring shall be carried out during construction phase. If monitored parameters are above the prescribed limits, suitable control measures must be taken.
- Spills of dirt or dusty materials shall be cleaned up promptly so that the spilled materials do not become a source of fugitive emission.
- Spilled concrete slurries or liquid wastes shall be contained/ cleaned up immediately before they can infiltrate into the soil/ ground or runoff in nearby areas.

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Fugitive Emissions:

Due to the proposed project activities fugitive emission will be generated which is due to spreading of waste at landfill.

Mitigation measures

Fugitive emission is controlled through water/leachate spray. In landfill facility, leachate comes out in the form of liquid waste and is evaporated in the MEE facility. For emission of landfill gases, vent is provided in landfill and monitoring of these vents will also be carried out. Only D.G. set is used in emergency.

4.6 WATER REGIME

4.6.1 Water Demand

The daily water demand will be 50 KLD for domestic use, in laboratory and for vehicle washings.

4.6.2 Source of water

Water requirement will be met through bore well. Necessary permission from CGWA will be taken for the necessary abstraction of ground water.

4.6.3 Surface water Impact

No impact on surface water resources is anticipated both during the construction and operational phase of the project as there shall not any discharge of waste water during construction/operation period. There are no surface water resources or perennial river body near the proposed site. The drainage map given in chapter 3 shows the direction of slope towards south east which increases the distance from river Ganga.

4.6.4 Ground water Impact

No impact on Ground water resources is anticipated during both construction as well as operational phase of the project considering the implementation of the project as per CPCB guidelines having approved design of SLF & landfill cell. In case of any damage /rapture of liner system, contamination of soil and ground water below the SLF shall be possible. There shall be also provision of installation of piezometric well to regularly monitor the ground water quality for early detection of contamination if any and take immediate measures for remediation.

4.6.5 Impact on Water Quality

Construction Phase & Operation Phase

The water demand of the project which is mostly for domestic purpose, for vehicle washing and, in the laboratory, will be met through groundwater. To minimize the water consumption; water saving options will be planned.

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- Improve energy efficiency of operations
- Installation of flow restrictors on water supply line
- Dry sweeping of all areas before mopping/washing.
- Eliminate leaks of the pipelines
- Storm water harvesting
- Rain water holding tanks
- Recycling of water, etc.

4.6.6 Water Impacts Mitigation Measures

Leachate collected from Secured Landfill and other wastewater including vehicle and container washing, recycling plants will be treated together (excluding domestic wastewater). Leachate from the landfill and all other places of generation like storage sheds, vehicle wash, and wheel wash etc., will be sent to MEE of 20 KL (10+10)/ day capacity, the dry sludge from MEE will be handled as a solid waste and will be disposed in the landfill.

Management Measures

❖ Washing in Laboratory, leachate generated from landfill, and waste water will be treated in MEE.

❖ The salt generated from MEE will be disposed at landfill.

❖ The condensate water generated from MEE will be used for maintaining greenery if meets the required quality.

❖ The domestic wastewater will be sent to septic tank followed by soak pit.

❖ During monsoon SLF are will be covered with plastic sheets to avoid percolation of rain water in hazardous waste & generation of leachate.

However, the lining and draining system consisting of sand, gravel etc. are to be properly laid to avoid to any accidental contamination at the site and downstream. Therefore, proper barrier systems like impermeable liners, gravity slope and gravel packed channels as suggested will be constructed for natural flow of leachate and contact water. The leachate generated will be collected in an underground sump from where it can be pumped out to the treatment unit. Thus, the chances of ground water contamination can be avoided.

Adequate drainage system requiring channelization of runoff water will be made to avoid water logging within plant site and contamination of surface and ground water.

As detailed above double liner system in accordance to CPCB guideline shall be laid in Secured land fill to prevent contamination of ground water. Piezometric monitoring well shall be installed at U/s & D/s of SLF to monitor any contamination.

In case of rapture of liner system, the monitoring well shall give early warning and remedial measures can be initiated. As per MoEF regulations screw funds are required to be

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maintained to meet expenses to be incurred due to accidents, rapture of liner system etc.

4.6.7 Rain Water Harvesting and Strom Water Management

Project Management will make proper utilization of rainwater by harvesting by appropriate rain water-harvesting mechanism. Roof water will be collected by adopting proper treatment, the collected water will be used for various uses (dust suppression, floor washings, toiler flushing, greenbelt, etc.).

Rainwater from surface areas will be harvested by construction of check dams all along the storm water drainage network at a definite pitch. Based on the rainfall intensity of the plant area, storm water drainage system will be designed. Strom water drainage system consists of well-designed network of open surface drains with check dams at appropriate distances to improve the infiltration efficiency of the rain water into ground so that all the storm water is efficiently drained off without any water logging.

4.7 NOISE LEVEL IMPACT AND MANAGEMENT

4.7.1 Impact due to noise

Noise is unwanted and unpleasant sound, which causes distraction, disturbance and annoyance. Continuous exposure to high level of noise can impair human hearing power.

The Major source of noise in proposed project will be from unloading of Hazardous waste, E-Waste, DG set, Stabilization of Hazardous waste, etc.

Construction activities are likely to produce noise up to some considerable extent. During construction phase of the project activity, there will be noise generation from earth moving equipment and material handling traffic. The noise generation level will be confined within the surrounding area of construction site. There will be short term, localized and reversible impact on ambient noise levels during the construction activities.

In operation activities, frequent vehicular movement for loading/unloading of industrial waste and other transport are cause of adverse effect on noise environment. Adequate noise control measures such as mufflers, silencers at the air inlet/outlet, anti-vibration pad for equipment with high vibration, earmuff and earplugs to the operators, etc. shall be provided. Housing/casing shall provide for all noise generating machines. However, green belt will help to reduce noise. The adverse impact on occupationally exposed workers is not envisaged, as they will be providing with noise protection devices.

<u>Noise Mitigation Measure</u>

Adequate measures for noise control, at the design stage shall be taken such as keeping high noise generating equipment's like pumps, motors, etc., on anti-vibration pads, closed rooms and regular maintenance as suggested by the manufacturer. Some of the mitigation measures proposed for noise will include the following:

- Regular maintenance of the transport vehicles and other machineries to maintain the low noise levels.

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- Plant and equipment will be designed to ensure that noise generated is limited to CPCB norms.
- Equipment will be provided with noise control measures such as acoustic insulation etc, to ensure noise abatement.
- Personnel Protective Equipments (PPE) like ear plugs/muffs is to be given to all the workers at site.
- Noise level specification of the various Equipments as per the Occupational Safety and Health Association (OSHA) standards.
- Development of greenbelt all along the boundary and along the roads within the project

4.8 SOCIO - ECONOMIC IMPACTS

The proposed project activity will generate primary and secondary jobs during the construction and operation. This will increase the employment opportunity. Secondary jobs shall also bound to be generated to provide day-to-day needs and services to the work force. This will also temporarily increase the demand for essential daily utilities in the local market. The activities would also result in an increase in local skill levels through exposure to activities.

Social impacts like property price depreciation represent an external 'cost' of waste disposal and treatment facilities. Property values are affected by their proximity to a new landfill. The other adverse impact includes stress arising from fear to risk to health, etc. However, because of such projects, there would be employment generation, business generation, infrastructure development, etc.

The proposed project is expected to create beneficial impact on the local socio-economic environment and long-term solution for the management of hazardous waste.

4.8.1 Public Health

During construction period, periodic checkups of all the employees shall be done regularly.

Workers will be provided with basic amenities like safe water supply, low cost sanitation facilities, first aid, required personal protective equipment, etc. Otherwise, there could be an increase in diseases related to personal hygiene.

4.9 ECOLOGY AND BIODIVERSITY

There is no notified/protected ecologically sensitive area including national park, sanctuary, Elephant/Tiger reserves existing in the study area. There are no known rare, endangered or ecologically significant animal and plant species. Except for a few wild species of plants and grasses and a few animals that are very commonly spotted in any rural environment, the study area does not have any endangered or endemic species of animals. Due to the development of green belt at the project vicinity the impact on the ecology will be minimal.

The site of proposed project (TSDF Phase-I) for Secured Landfill is located on barren land, there will not be any cutting of the trees at the site. During construction phase, due to

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generation of fugitive dust emission there will be slight impact on natural vegetation of the surrounding area. Emission shall be within limit by incorporating EMP provisions. Therefore, the adverse impact over any of the ecological components of the environment is negligible.

The necessary environmental protection measures will be planned under EMP e.g. air pollution control systems designed to take care of even emergency releases of the gaseous pollutants like PM, SO_2 and NO_x regular environmental surveillance, etc; so as not to have any short-term or cumulative effect on the crops and the natural vegetation of the area.

The details of Flora/Fauna species and the wildlife habitat in the area covering 10 km radius have been collected to determine the existence of rare and/ or endangered species. There is no reserved forest, national park or sanctuary within 10 km radius of the plant.

The predicted impact on surrounding ecology is not very significant.

4.9.1 Aesthetic Environment

The proposed facility is to be developed on with good landscape and plantation. Increase in fugitive emission due to very limited construction activities and increase in the vehicular movement due to the proposed activity may have minimal adverse impact on the visual quality. However, this impact can be minimized with implementation of environment management plan. Since there is no discharge of effluent to any water body, there is no adverse impact in the visual water quality. Adverse impacts are minimized with adoption of various EMP measures taken by the facility on the aesthetic environment.

4.10 OCCUPATIONAL HEALTH AND RISK TO SURROUNDING COMMUNITY

Site preparation and operation of Secured Landfill Facility involve many occupational health hazards to the workers at site.

Noise generated during Setting up and the development of Common Hazardous Waste Treatment, Storage and Disposal Facility, Hazardous Waste Treatment (stabilization) Storage & Disposal including, Waste Receipt, Characterization and storage may affect the workers and staff members.

Handling, transportation, storage, disposal and transportation of hazardous wastes, chemicals, fuel etc. may cause health hazard if not handled properly.

Mitigation Measures

- All employees will first undergo medical checks-up organized by the HR Department before hiring is done. All people who have a satisfactory health condition will be hired and the facility for free medical checkups will be given to all employees every 3 months.
- First aid facilities will be placed at the premises to treat basic injuries. If the case is beyond first aid, then the person will be taken to the nearest hospital for further treatment and consultation.

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All necessary pre-cautions will be taken to monitor restriction at work period. All substances and products will be in the restriction list at the premises. All necessary signboards will be put up at the required places through-out the facility.

- During proposed activities, Proper PPE will be provided to site workers and staff members.
- Site preparation work will be carried out during day time only
- Acoustic enclosures will be provided to DG sets and other noise generating equipment.

4.11 PREDICTION OF IMPACTS ON LAND ENVIRONMENT

Environmental Impacts on land environment have been classified primarily into two broad aspects, i.e. direct impacts on the soil and land in the area and impacts on the flora and fauna of the area. Land environment in the area has potential for contamination arising out of solid waste stored on to the landfill area. The leachate generated from the land fill area will be collected in the leachate holding tank and the leachate will be treated in MEE. Thus, there will be no contamination of the soil due to the wastewater generated and hence the impacts due to the proposed facility on the land environment will be negligible. To address the impacts on flora and fauna, it has been observed that there are no endangered species in the project area and green belt will be developed along the boundary and adjacent to roads. Under CER activities adjacent open lands, parks, etc will be improved by plantation.

Potential impacts on land environment due to the identified activities are given below:

- Change in Land Use Pattern
- Change in people 's activity due to changed land-use
- Nuisance effect

As the project site is on barren land / non-agriculture land (provided (3.867 ha.) so impact on land use shall be of no significance.

However, positive impact will be there as project proponent will provide the employment to the workers from nearby villages (Construction phase -40-50 Operation phase-60 workmen), which will further affect (positively) the occupational structure of the Area.

<u>Mitigation Measures</u>

Necessary efforts will be made during preparation of site to minimize disruption of current land use to the extent possible;

Proper restoration of site will be carried out to bring the physical terrain, soils and vegetation, as closely possible, to their original condition;

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4.12 IMPACT ON SOIL AND GEOLOGY

Construction Phase

The impacts would be degradation of soil or change in its structure due to compaction and erosion during site preparation activities and plying of trucks during construction and operational phase.

Top soil Contamination

During site preparation the topsoil will be removal of from the project site and the approach road, which contains most of the nutrients and organisms that give soil productivity. This will in turn result in minor changes of topsoil structure. However, the project design will consider the preservation of the top soil and its subsequent use during the restoration of the site. Despite this the fertility of the soil at the site area will be affected.

Impacts on geology primarily relate to the loss of, and damage to, geological, paleontological and physiographic features. Impact on soil owing to the project construction activity includes soil erosion, compaction, physical and chemical desegregations and pollution of soil in case of spillage of waste on land.

Operation Phase

During the operational phase, there is a probability of accidental spillage of hazardous waste on the routes through which hazardous waste would be transported and its adjoining areas if a vehicle carrying hazardous waste meets with an accident. Due to sandy nature of soil having higher porosity thereby higher infiltration rate possibility of greater contamination of soil at larger depth level is possible in case accidental spillage of hazardous waste requiring immediate cleanup operation. Since the hazardous waste shall be stored at the site in a shed having leakproof flooring, there is less possibility that due to accidental spillage soil can be contaminated. Landfills gas production and migration may lead to changes in soil temperature.

Mitigation Measures

During the operational phase of hazardous landfill if there is a possibility of contamination risk due to damage of liners of the landfill at the site. As the Landfill will be constructed by complying the CPCB norms on siting criteria, Liner system and design of landfill Cell, there will be no impact on soil quality.

Management of spilling of contaminants such as oil from equipment, cement usage for stabilization, hazardous waste during transportation, fuel/chemicals spillage and etc. on the soil; shall be carried out by cleanup operations

4.12.1 PREDICTED IMPACTS OF THE LANDFILL

The project has proposed secured scientific landfill which comprises Govt. of India Regulations and Hazardous Wastes (Management & Handling) Rules 1989 and its subsequent amendments in 2000, 2003, 2008, 2009 and 2016 as the Hazardous Wastes &

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Other (Management, Handling and Trans-boundary Movement) Rules with containment measures,

- Composite bottom liner to prevent Leachate percolation
- Landfill gas management system
- Rodent control
- Dust control, etc.

There shall be no loss of carbon sequestration because of the proposed activity since the area is almost barren. Development of a thick greenbelt all long the boundary of the site will more than compensate for the loss. As there are no rare or endangered or endemic or threatened (REET) species, the proposed project will not pose any problem to any REET species. Hence, the impact of the project on biota is negligible.

4.13 IMPACT ANALYSIS (SCORE ANALYSIS)

4.13.1 CRITERIA FOR RATING THE IMPACTS

Criteria for rating the impacts are the following

The magnitude of each impact has been rated on the scale of 1 to 5

- Very High Impact = 5
- High Impact = 4
- Moderate Impact = 3
- Less Impact = 2
- Very Less Impact = 1

For importance of each impact, area has been rated on the scale of 1 to 3

- Very Important = 3
- Moderately Important = 2
- Less important = 1

Ranking Criteria

Keeping in view, six major activities having an impact on the environment and considering seven major impact areas (as shown in Tables 4.2.) the criteria for overall ranking of the secured landfill facility is developed as follows: -

Total Score, if

- **Above 600** The Secured Landfill Facility is having Very High Adverse Impact
- **300 - 600** The Secured Landfill Facility is having Moderate Adverse Impact
- **100 - 300** The Secured Landfill Facility is having Less Adverse Impact
- **Below 100** The Secured Landfill Facility is having Very Less Adverse Impact

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Based on the criteria for rating the impacts, the weighted impacts are given as shown in below. **Table 4.2 and Table 4.3** In this weighted impact table the entries are presented in the form x(y), where x denotes the magnitude of the impact and y denotes the importance of the impact while T denotes the impact rating.

Discussion: The weighted impact without mitigation measures due to the proposed facility are quantified as 223 and, the weighted impact with mitigation measures due to the proposed facility are quantified as 163. After implementation of all the mitigation measures the project can be considered as non – polluting project on the basis of rating criteria.

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TABLE 4-2: MITIGATION MEASURES WITHOUT WEIGHTED IMPACTS (MATRICE METHOD)

S.NO.	POTENTIAL IMPACT AREA	CONSTRUCTION PHASE						OPERATION PHASE									CLOSURE/POST CLOSURE			TOTAL
		Site Preparation			Proposed Secured Landfill of TSDF Phase-I			Transportation of Wastes to Facility From Member Industries			Waste Material Handling			Landfilling			Post Closure			
		X	Y	T	X	Y	T	X	Y	T	X	Y	T	X	Y	T	X	Y	T	
1	Air	4	2	8	3	2	6	4	3	12	4	3	12	3	3	9	2	2	4	
2	Water	2	2	4	1	1	1	1	1	1	1	1	1	4	3	12	2	2	4	
3	Land	3	2	6	1	1	1	1	3	3	1	1	1	4	2	8	2	2	4	
4	Noise	4	3	12	4	3	12	3	3	9	2	2	4	2	1	2	1	2	2	
5	Vegetation	1	1	1	1	2	2	1	1	1	1	1	1	4	3	12	3	2	6	
6	Socio Economic	1	1	1	1	2	2	3	3	9	1	1	1	3	3	9	1	2	2	
7	Aesthetic Value	3	2	6	3	2	6	3	3	9	3	1	3	4	3	12		2	2	
	TOTAL			38			30			44			23			64			24	223

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TABLE 4-3: MITIGATION MEASURES WITH WEIGHTED IMPACTS (MATRICE METHOD)

S.NO.	POTENTIAL IMPACT AREA	CONSTRUCTION PHASE						OPERATION PHASE									CLOSURE/POST CLOSURE			TOTAL
		Site Preparation			Proposed Secured Landfill of TSDF Phase-I			Transportation of Wastes To Facility From Member Industries			Waste Material Handling			Landfilling			Post Closure			
		X	Y	T	X	Y	T	X	Y	T	X	Y	T	X	Y	T	X	Y	T	
1	Air	2	2	4	1	2	2	2	3	6	1	3	3	3	3	9	2	2	4	
2	Water	2	2	4	1	1	1	1	1	1	1	1	1	4	3	12	2	2	4	
3	Land	3	2	6	1	1	1	1	3	3	1	1	1	4	2	8	2	2	4	
4	Noise	2	3	6	2	2	4	2	3	6	1	2	2	2	1	2	1	2	2	
5	Vegetation	1	1	1	1	2	2	1	1	1	1	1	1	4	3	12	3	2	6	
6	Socio-Economic	1	1	1	1	2	2	1	3	3	1	1	1	3	3	9	1	2	2	
7	Aesthetic Value	2	2	4	2	2	4	2	3	6	2	1	2	4	3	12	1	2	2	
	Total			**22**			**16**			**26**			**11**			**64**			**24**	**163**

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5 ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITES)

5.1 INTRODUCTION

The proposed project Secured Landfill (Phase-I) will be at Plot no. 941, 942 and 944 at village- Kharpadi, Tehsil-Hasanpur, Distt Amroha, Uttar Pradesh. The secured landfill will be developed and operated as per "The Criteria for Hazardous Waste Landfills" published by Central Pollution Control Board, Delhi.

The proposed capacity of landfill (Phase-I) will be 7.1 lacs MT of hazardous wastes which will be disposed scientific at a secured landfill. The present proposal is to serve nearby industrial area through Integrated Common Hazardous Waste Treatment, Storage and Disposal Facility (ICHW-TSDF), which will handle Land fillable waste (DLF) - 36,000 MTA, Landfill after Treatment (LAT) – 24,000 MTA, pre-process the Hazardous waste for Co – Processing- 40,000 MTA and E- waste recycling – 6000 MTA.

As per the Hazardous and other Wastes (Management and Transboundary Movement) Rules, 2016 and its amendment under Environment (Protection) Act, 1986, hazardous waste generated by industries has to be collected, transported, treated and disposed in a properly designed TSDF Facility. Under aforesaid rules and its amendments, CPCB guidelines have laid down a procedure for collection, storage, transportation and disposal of hazardous wastes. The scientific disposal of landfill hazardous waste can be done at a secured landfill, which requires proper design and operation according to existing guidelines.

The proposed Integrated Waste Management Facility has three principal waste disposal / recycling or recovery facilities such as Hazardous Waste treatment, storage and disposal facility – TSDF, Recycling / Recovery facilities. In addition to the above, there shall be temporary and long-term storages for interim storage and for intractable/ in-compatible wastes respectively. Supporting infrastructure like wastewater and leachate treatment plant, other pollution abatement units, laboratory, utilities, waste collection and transportation system, workshop for plant machinery, automobile and electrical maintenance etc., shall be provided. Administrative infrastructure required for operations of the facility shall also be provided at the facility.

On receipt of wastes at the Facility, incoming hazardous wastes or potentially hazardous wastes shall first be analysed to enable classification of wastes and for identification of its pathway of recycling, treatment/ disposal. Those wastes that are suitable for direct disposal into the landfill shall be directly sent to the landfill. Wastes requiring treatment prior to landfill disposal shall be processed at the treatment plant (stabilization unit) and then sent for the designated purpose after confirmation analysis. Wastes that have potential reuse options after processing shall be given the highest priority and such wastes shall be processed accordingly.

Leachate generated in the landfills, effluents generated at the treatment plant, effluents

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generated in storage areas, laboratory and other operations shall be sent to the effluent treatment plant and MEE. Any solid wastes generated during the treatment process shall be reprocessed as solid hazardous wastes and sent for landfill. The domestic effluents are sent to the septic tank followed by a soak pit or dispersion trench. The canteen wastes, and other green wastes will be composted using vermin composting technique.

5.2 ALTERNATIVE FOR SITE SELECTION

As per the Hazardous and other Wastes (Management and Transboundary Movement) Rules, 2016 and its amendment under Environment (Protection) Act, 1986 and CPCB guidelines, location of Project for secured landfilling for disposal of Industrial waste / Hazardous waste through Integrated Common Hazardous Waste Treatment, Storage and Disposal Facility (ICHW-TSDF) has already been identified during detailed design by analysis through technical, economic, social and environmental considerations. Various alternatives are considered during environmental & social screening exercise to minimize the impacts on existing environment etc.

In the process of detailed design, three alternatives have been reviewed to arrive at the preferred project design. In arriving at the preferred option, a consideration has been made to technical, economic, proven successful previous use, aesthetic, environmental and social aspects of the alternatives.

5.2.1 REJECTION OR KNOCK OUT CRITERIA

For establishing a common facility for treatment, storage, disposal and recycling facilities of hazardous waste CPCB has issued **Guidelines for conducting Environmental Impact Assessment: Site selection for Common Hazardous waste Management facility criteria (HAZWAMS/25/2002-2003).**

Under this Criteria, following areas must be excluded or rejected:

- Areas with unstable geological features like unstable or weak soils; organic soil, soft clay or clay-sand mixtures, soils that lose strength with compaction or with wetting, clays with a shrink-swell character, sand subjected to subsidence and hydraulic influence.
- Subsidence: e.g. owing to subsurface mines, water, oil or gas withdrawal or solution prone subsurface.
- Wet lands.
- Historical migration zones.
- Flood prone areas.
- Area with 500 m from water supply zone and within 200 m from property line.
- Natural depression and valleys where water contamination is likely.
- Areas of ground water recharge and extremely high water table zone.
- Unique habitation areas, close to national parks with scenic beauty and formerly used landfills.
- Areas with high population, unique archaeological, historical, paleontogical and

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religious interests.

- Agricultural and forests lands and existing dump sites.
- Atmospheric conditions that would prevent safe disposal of an accidental release.
- Major natural hazards, e.g. volcanic activity, seismic disturbance, etc
- Sensitive locations, e.g. storing flammable or explosive materials, airports.
- An unfavorable local hydro-geological situation e.g. springs or drinking water well within very close proximity to the chosen area.
- Extremely bad access i.e. no existing access roads to the selected site which may involve.
- long distance more than 5 km from main roads.
- Great differences in altitude between the area of waste collection and the selected site.

5.2.2 Compliance of the Site with Site Selection Criteria

Based on the surveys including Topographic, Hydrologic, Geotechnical, Traffic, Environmental, Social, and Public Consultations during the detailed design study proposed three alternatives have been reviewed for secured landfilling of the proposed project using above mentioned knock out criteria and among the three selected sites, the site 3 (Alternatives-3) is selected as it is meeting the siting criteria and does not have any R & R issues. The details of the three sites with respect to siting guidelines are given in **Table 5.1.**

Detail investigations were evaluated for site 3 as per site evaluation criteria given in Guidelines for conducting Environmental Impact Assessment: Site selection for Common Hazardous waste Management facility criteria (HAZWAMS/25/2002-2003) and presented in **Table 5.2.** The site 3 has a weightage of **98** on a scale of 100 and it is falling in between good and ideal class based on various site-specific evaluation studies.

- Site specific information: proximity to the waste source, slope of site, topography, accessibility, meteorology, etc.
- Hydro geology /geology, ground water table fluctuation, ground water directions, ground water quality, depth of hard rock, soil type, geo technical features, etc.
- Socio-economic features, land use, demography, transportation impact etc.

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6 ENVIRONMENTAL MONITORING PROGRAMME

6.1 INTRODUCTION

Environment Monitoring of the project environment is of utmost importance and has legal requirements. Regular monitoring of the environment helps in assessing the benefits of implementation of environment management plan. Proposed Project will adopt an effective monitoring plan with proper schedule as a step forward to ensure better environment management practices. An environmental monitoring program is important as it provides useful information and helps to the effectiveness of mitigation measures such as:

- Assist in detecting the development of any unwanted environmental situation, and thus, provides opportunities for adopting appropriate control measures, and
- Define the responsibilities of the project proponents, contractors and environmental monitors and provides means of effectively communicating environmental issues among them.
- Define monitoring mechanism and identify monitoring parameters.
- Evaluate the performance and effectiveness of mitigation measures proposed in the Environment Management Plan (EMP) and suggest improvements in management plan, if required,
- Identify training requirement at various levels.

6.1.1 NEED FOR ENVIRONMENTAL MONITORING

a. Verify and support compliance with applicable Central & State environmental laws, regulations, permits, authorization, consent to operate, protocols and orders.
b. Establish baselines and characterize trends in the physical, chemical, and biological condition of environmental media / matrix.
c. Identify potential environmental problems and evaluate the need for remedial actions or measures to mitigate the problems.
d. Detect, characterize, and report unplanned releases.
e. Evaluate the effectiveness leachate treatment and control, and pollution abatement programs.
f. Determine compliance with commitments made in environmental impact statements, Form V – environmental statements, assessments
g. EMS- ISO: 14001, safety analysis reports, or other official documents or for due diligence.

Objectives of Environmental Monitoring Program

- To evaluate the performance of mitigation measures proposed in the EMP.

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- To evaluate the adequacy of Environmental Impact Assessment
- To suggest improvements in management plan, if required
- To enhance environmental quality.
- To implement and manage the mitigative measures defined in EMP.
- To undertake compliance monitoring of the proposed project operation.

6.2 MONITORING PROGRAMME

During the Land filling operations, environmental monitoring of the following parameters shall be carried out;

- Air quality,
- Water & waste water quality
- Noise Level
- Green belt development plan; and
- Socioeconomic aspects

This would be attained by collection of samples of water, ambient air and work zone environment and analyzing the samples by prescribed methods. The ambient air quality may be monitored at four to five locations, with one at the proposed project as the center point and the remaining three at 120^{o} to each other in down wind direction.

To evaluate the effectiveness of environmental management programme, regular monitoring of important environmental parameters will be taken up to find out any deterioration in environmental quality. Monitoring of the proposed project will be regularly conducted. The schedule, duration & parameters to be monitored are given in **Table 6.1.**

6.2.1 Monitoring / Reporting Schedule

The monitoring and Reporting to the statutory authorities shall done in accordance to the CPCB guidelines. The monitoring program will have three phases

1. Construction phase
2. Operation phase
3. Post Closure phase

1. Construction Phase

The proposed Phase I of secured landfill at ***Common Hazardous Waste Treatment, Storage and Disposal Facility (TSDF)*** the major construction activities involved in setting up the unit are construction of sheds for treatment units, stores, administrative blocks, canteen etc., major components in the industry are secured landfill, Co – processing unit diesel generator, and other civil, mechanical and electrical equipment. The construction activities require clearing of vegetation, mobilization of construction material and equipment. The construction activities are expected to last for few months. During construction stage of secured landfill at every stage quality of construction will be monitored viz. base preparation, liners quality, drainage layers,

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leachate collection system, storm water management system, gas vent systems, etc. The generic environmental measures that need to be undertaken during project construction stage shall be in accordance to the EC conditions. Six monthly compliance report shall be submitted to the Pollution Control Board and RO, MoEF & CC.

2. Operation Phase

During operational stage period air emissions from DG set, landfill if any, wastewater characteristics, etc. as per prescribed protocol for TSDF shall be monitored. The following attributes which merit regular monitoring based on the environmental setting and nature of project activities are listed below:

- Point Source emissions and ambient air quality in nearby villages;
- Groundwater Levels and ground water quality;
- Water & wastewater quality & quantity;
- Solid waste characterization (leachate treatment plant & Septic tank/soak pit sludge);
- Soil quality;
- Noise levels (equipment and machinery noise levels, occupational exposures and ambient noise levels); and
- Ecological preservation and a forestation.

3. Post Operational Phase

Post-closure monitoring of the landfill will be done primarily as a compliance requirement in addition to social responsibility; this also provides an early warning towards possible adverse impacts on human health and the environment. The post-closure program of monitoring for water quality in the ground water and surface waters down gradient of the landfill will be like that established for the operational stage of the facility. The frequency of monitoring shall in accordance to the Statutory norms prescribed by the Pollution Control Board & MoEF & CC.

The environmental monitoring (Operation Phase and Post operation phase) must be done as per the schedule summarized in **Table 6.1.**

TABLE 6-1: MONITORING SCHEDULE FOR ENVIRONMENTAL PARAMETERS

S.No.	Particulars	Duration of Sampling	Important Monitoring Parameters
1	Air Pollution and Meteorology		
	Air Quality		
	A. Ambient Air Quality Monitoring at Project Site		

	-	24 hours twice in a week	Respirable Particulate Matter (PM_{10}), Fine particulate ($PM_{2.5}$) Sulphur dioxide (SO_2), Oxides of nitrogen (NOx), Carbon Monoxide (CO), Ozone (O_3), Ammonia (NH_3), Lead (Pb), Nickel (Ni), Arsenic (As), Benzo Pyrine (BaP), Benzene (C_2H_2), VOC, Ammonia (NH_3), Hydrogen Sulphide (H_2S)
	B. Ambient Air Quality Monitoring around the Project Site		
	-	Quarterly	PM_{10}, $PM_{2.5}$, SO_2, NOx and VOC,HC
	C.Meteorology		
	Meteorological data	Continuous Monitoring	Wind speed, direction, temperature, relative humidity and rainfall
	D. Landfill of Gas Vent	Quarterly	VOC, H_2S
2.	Water Environment		
	A.Leachate		
	-	Once in a quarter	pH, COD,TDS,TSS, Sulphate,Chlorides
	B. Ground Water		
	-	Monthly & Quarterly	pH, Colour, TDS, TSS, Conductivity, Turbidity, TOC, Sulphates,Chlorides, Color, Total Hardness (as $CaCO_3$), Total Alkalinity (as $CaCO_3$), TKL, Chlorides (as Cl), Nitrate, (as NO_3), Fluoride, Lead (as Pb), Cadmium (as Cd), Copper (Cu), total Chromium (as Cr), Mercury (as Hg),Nickel (as Ni), Cyanide (as CN), Manganese (as Mn), Iron (as Fe), Zinc (as Zn), BOD, COD, and Pesticides (Organo Chlorine, Organo Nitrogen, Synthetic Pyrethrold, Carbamates)
	C. Surface Water		
	-	Half yearly	pH, Colour, TDS, TSS,Conductivity, Turbidity, TOC, Sulphates,Chlorides, Color, Total Hardness (as $CaCO_3$), Total Alkalinity (as $CaCO_3$),TKL, Chlorides (as Cl), Nitrate, (as NO_3), Fluoride, Lead (as Pb), Cadmium (as Cd), Copper (Cu), total Chromium (as Cr), Mercury (as Hg),Nickel (as Ni), Cyanide (as CN), Manganese (as Mn), Iron (as Fe), Zinc (as Zn),

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			BOD, COD, and Pesticides (Organo Chlorine, Organo Nitrogen, Synthetic Pyrethrold, Carbamates)
3	Noise Environment		
	Noise	Once a month near the noise generating equipment	Noise level in dB(A)leq
4.	Soil Environment		
	Soil at project site	Once in six months at various location	Analysis of pH, TDS, Conductivity, TOC, Fluoride, Lead (as Pb), Cadmium (as Cd), Copper (Cu), Total Chromium (as Cr), Mercury (as Hg), Nickel (as Ni), Cyanide (as CN),Manganese (as Mn), Arsenic (as As), Zinc (as Zn), Poly Aromatic Hydrocarbon (as PAH)
	In surrounding area	Yearly	Analysis of pH, TDS, Conductivity, TOC, Fluoride, Lead (as Pb), Cadmium (as Cd), Copper (Cu), Total Chromium (as Cr), Mercury (as Hg), Nickel (as Ni), Cyanide (as CN), Manganese (as Mn), Arsenic (as As), Zinc (as Zn), Poly Aromatic Hydrocarbon (as PAH)

6.3 ENVIRONMENTAL MANAGEMENT CELL

A well-established EMD (Environment Management Department) exists in Sangam Mediserve Pvt. Ltd. (SMSPL), SMSPL established in March 2013, by professional. SMSPL have successfully working in the field of waste management as per the statutory guidelines. The facility is located near to hub of Industries where all essential facilities such as water, power, fuel, post, telecommunication, bank, etc. available.

The Environmental Management System is established in SMSPL by having a policy- "Necessary Environmental protection by land filling, treatment, storage & disposal facilities. Reclamation and green belt development as per plan and prevention of pollution" for protection of environment. SMSPL has an Environment division at corporate level viz., Corporate Environment Cell, which functions between the management and various industrial and service units. Environment Cell functions with well-defined policy and guidelines and comply with the orders/directions of statutory authorities. Organizational structure will be as below.

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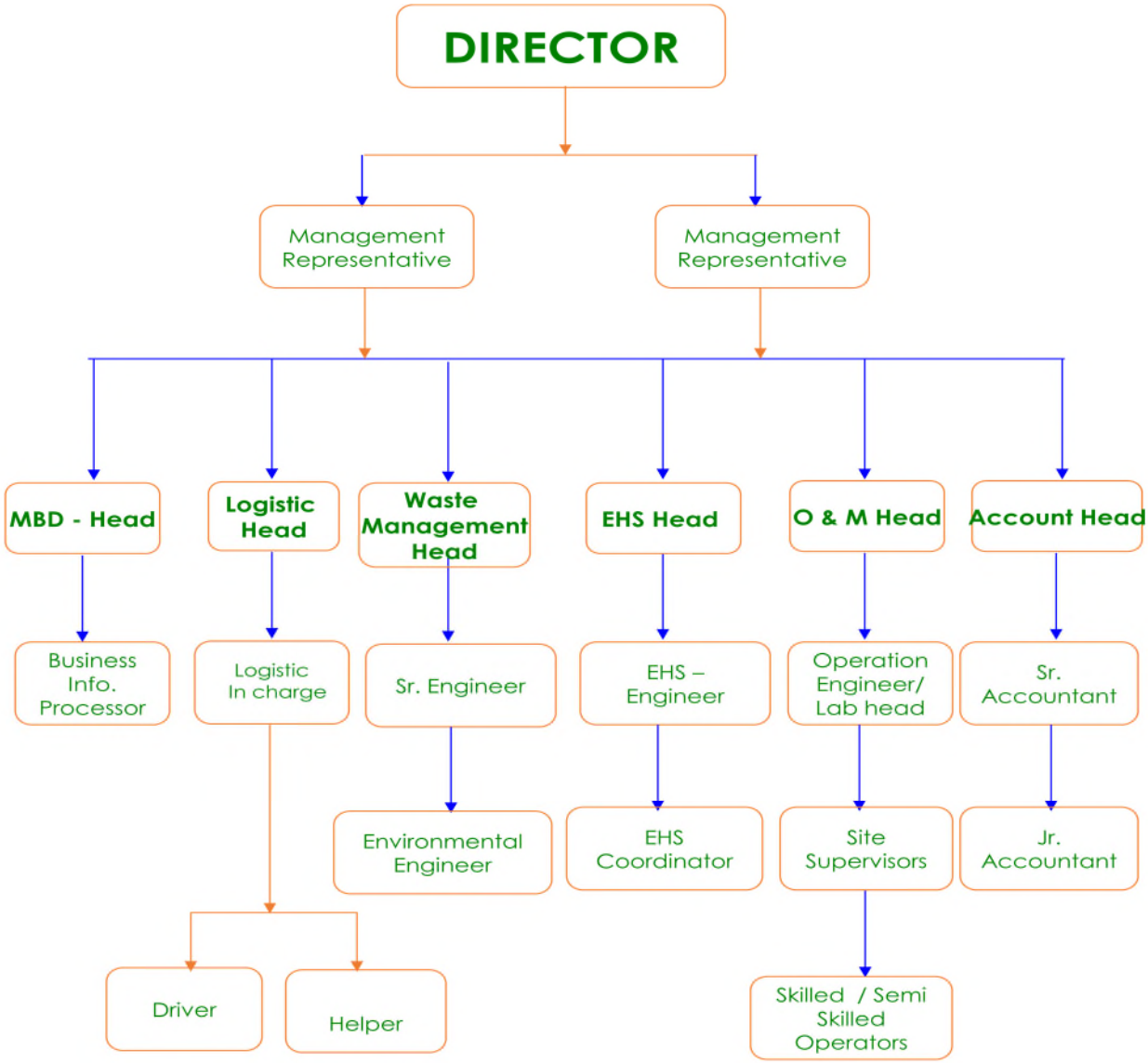
FIGURE 6-1: HIERARCHICAL STRUCTURE OF SMSPL CORPORATE AND UNIT LEVEL ENVIRONMENTAL DEPARTMENT



6.4 LABORATORY FACILITIES

M/s. **SMSPL** will have their own laboratory equipped with analytical facilities at proposed TSDF site. The site will have well equipped laboratory for sampling and analysis of solid wastes, air and leachate etc. In addition to that M/s. **SMSPL** will have also quality control laboratory equipped with sophisticated equipment. The TSDF will develop administrative building cum lab, site control office with latest equipment like computers, mobile & computerized weigh bridge, Sampling Stations, printers, Xerox machine, etc.

In case the monitored results of environment pollution shall be found to exceed the prescribed limits, remedial actions shall be taken. Proposed Instruments list for laboratory is given in Table **6.2.**

TABLE 6-2: EQUIPMENT NEEDED FOR ENVIRONMENTAL MONITORING

Name of the Equipment	No of Instruments
Weather Station, which can record wind speed, wind direction Temperature, Relative Humidity (Automatic or manual),	**1**
Respirable Dust samplers	**3**
Fine Dust samplers	**3**
Portable Flue Gas Combustion Analyzer	**1**
Portable Noise level meter (Dosimeter)	**1**
Portable Wastewater Analysis Kit	**1**
BOD Incubator	**1**
COD Digester with colorimeter	**2**
Electronic Balance	**1**
Spectro photo meter	**1**
Hot Air Oven	**1**
Laboratory Water Distillation and demineralization unit	**2**
General glass ware and laboratory chemicals, etc	
MoEF & CC approved parties will be monitoring at regular intervals	

6.5 ENVIRONMENTAL MANAGEMENT PLAN

Before the commission of the TSDF plant the Environment, Management Cell will be formed to take care of environmental issues including plantation. The total fiscal estimation for EMP is indicated to be Rs.21 lakhs/annum; details are given in Table no. 6.3.

TABLE 6-3: BUDGET OF IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT PLAN

S.NO	Title	Capital Cost (Rs) Crores	Recurring Cost (Rs) lakhs/annum
1.	Leachate collection system, MEE (Multi effect Evaporator) Septic tank/Soak pit, etc.	**2.5**	**5**
2.	Gas collection, odor management, etc.	**1.0**	**5**
3.	Noise Control measures – Acoustic enclosures for DG set, Noise barriers for pumps, solar system etc.	**0.20**	**2**
4.	Landscaping, Greenbelt development	**1.0**	**2**
5.	Rainwater harvesting, storm water drains	**1.0**	**1**
6.	Ambient Air quality monitoring, Laboratory equipment's, etc.	**3.0**	**2**
7.	Third party monitoring, energy audit, environmental audit, training programs, etc	**0.5**	**2**
8.	Environmental control measures during construction stage, Miscellaneous works	**1.0**	**2**
Total		**10.2**	**21**

6.6 CORPORATE ENVIRONMENT RESPONSIBILITY (CER)

Total cost of the proposed secured landfill project is estimated as about Rs.49.02 Crores. (4902 Lakhs (**Phase-I-4000 Lakh / 40 Crores)** Phase-II- Rs 900 Lakh/ 9 Crores)

An amount of Rs. 80Lakhs (2% of project cost i.e. Rs. 4000 Lakhs phase -I) will be incurred towards Corporate Environment Responsibility. All the above amount will be spent in phase wise manner in consultation with local administration after assessing the local needs. Details are given in Table no. 6.4.

TABLE 6-4: CER (CORPORATE ENVIRONMENT RESPONSIBILITY)

S.No.	Description	Amount to be spent		Total Rs. in Lakhs
		First Year	Second Year	
		Rs.in Lakhs	Rs. in Lakhs	
1	**Employment** (Vocational Training for Skill development for self-employment like technical trades, Sewing, Pickle making, Craft for youth of nearby villages)	15.0	5.0	**20.0**
2	**Health Camp**	10.0	5.0	**15.0**

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	(Health, Eye etc. check up camp will be organized for villagers)			
3	**Educational Facility** (Distribution of School dress, books, Furniture, water cooler etc.)	10.0	5.0	**15.0**
4	**Community Development** (Solar lights in adjacent villages, community toilets)	10.0	5.0	**15.0**
5	**Green Belt Development** Roadside plantation	10.0	5.0	**15.0**
Total		55.0	25.0	**80.0**

6.7 REPORTING SCHEDULES OF THE MONITORING DATA

The statutory reporting of environmental performance with reference to the EMP shall be undertaken. The environmental monitoring cell shall co-ordinate all monitoring program at site and data thus generated shall be regularly furnished to the State regulatory agencies. The frequency of reporting shall be as per ***"Protocol for Performance Evaluation and Monitoring of the Common Hazardous Waste Treatment Storage and Disposal Facilities"*** published by CPCB on quarterly basis to the local state PCB officials and to Regional office of MoEF & CC. The Environmental Audit reports shall be prepared for the entire year of operations and shall be regularly submitted to regulatory authorities.

6.8 PUBLIC HEALTH MONITORING

The value of Public Health studies in seeking to establish whether a site or facility has caused significant adverse health effects is well known. In this situation the results form a public health study may not fulfill the primary objective of such a program, which is to detect health changes before the manifestation of adverse health effects. However, three-stage health monitoring program is proposed.

- Monitor the health of workers within the project site to identify adverse health effects,
- Periodically obtain feedback from local doctors regarding any potential indicators of adverse health effects due to environmental cause in the communities surrounding, and particularly downstream of the landfill.
- By organizing health camps on a regular basis.

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7 ADDITIONAL STUDIES

As per generic structure of the EIA/EMP report prescribed in EIA Notification dated 14.09.2006, this chapter is to comprise of risk assessment & disaster management, as well as public consultation.

7.1 PUBLIC HEARING / CONSULTATION

"Public Consultation" or "Public Hearing" refers to the process by which the concerns of local affected persons and others who have plausible stake in the environmental impacts of the project or activity are ascertained with a view to considering all the material concerns in the project or activity design as appropriate.

In view of the above and as compliance to TOR issued by the State Expert Appraisal Committee SEIAA, Lucknow, U.P. vide letter Ref. No. 743/Parya/SEAC/4484/2018 dated 09-03-2019, Public hearing for the proposed TSDF project has been conducted on 13.09.2019 at Collectorate office, Amroha, Uttar Pradesh. Detail Proceedings of the Public Hearing is enclosed as **Annexure – X.**

Public Hearing Notice in Local Newspapers (03.08.2019) by UPSPCB, Lucknow;

7.1.1 MINUTES OF PUBLIC HEARING

Public Hearing was held on 13.09.2019 at 11:00 pm at Collectorate, Distt. Amroha under the panel headed by Gulab Chandra, Addition District Magistrate (ADM) Amroha, duly appointed Representative of District Magistrate, Amroha and J.P. Morge, Regional Officer, Uttar Pradesh State Pollution Control Board, Lucknow.

Summary of Minutes of Public Hearing is as under;

1. Sri Chatrapal Singh, resident of Kharpadi, Hasanpur, Dist. Amroha, raised question that we are resident of near about project site. Will we get any employment opportunity?
It was informed by environmental consultant that employment opportunity will be given to local person on first priority basis nearby project site.

2. Sri Santosh Kumar Saini, resident of Kharpadi, Hasanpur, Dist. Amroha, enquired that unemployment is too much in this region and employment opportunity should be given to the local resident.
It was informed by environmental consultant that employment opportunity will be provided to local person on first priority basis nearby project site.

3. Sri Rakesh Kumar Saini, resident of village Guretha, Hasanpur, Dist. Amroha, asked will any development work be done nearby Villages.
Environmental Consultant of the project explained that that 2% of total cost of the project has been allocated for Corporate Environment Responsibility (CER) by project proponent

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which will be spend as per local needs. The project proponent assured that facilities for school children will be provided such as distribution of School dress, Books, Furniture, Water cooler etc. and will plant the trees in the area.

4. Sri Rashid Ali, resident of Hasanpur, Dist. Amroha asked what development work will be implemented in this region.

It was informed by environmental consultant that project proponent will implement Green Belt Development Program along road side tree plantation for improvement of better environment. Apart from this other facility will also be provided as per their needs in the villages.

5. Sri Bantilal, resident of Village Kharpadi, Hasanpur, Dist. Amroha asked will any employment opportunity provided by the Company / Project proponent.

The project proponent has informed that employment opportunity will be provided on the basis of skills and also assured that they will extend the employment on priority to the local peoples nearby project site. Subject to this, J.P. Maurya, Regional Officer, Uttar Pradesh State Pollution Control Board, Bijnor. U.P. is also assured that preference will be given to local residents nearby Villages.

It was informed to general public that copies of statutory clearances will be displayed on Board outside project premises.

Even after the above objection during the public hearing in presence of the Additional District Magistrate, Amroha, has given full time to the public community to present his views or objections but no objections received. After which the Additional District Magistrate, Amroha, was informed or exposed to the public community about the importance of this project that hazardous waste, E-waste which will emanate or originate from the industries which cannot cure or recycle only will be disposed through the process of this unit. The Additional District Magistrate, Amroha, was informed that the Government is trying to establish such type of unit in this area. So that the environment can be protected and employment can be generated to more and more local people. Regarding the proposed project/unit, the Additional District Magistrate, Amroha, has asked present people to give your suggestion / objection against this project in which all farmers and local people of the area was agreed and raised his voice to set up the proposed project/unit.

7.1.2 PUBLIC HEARING COMMITMENTS WITH TIME BOUND ACTION PLAN AND FUND PROVISION

For the issues raised during public hearing for the proposed project, following commitments with time bound action and fund provision has been made by project authorities;

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TABLE 7-1: PUBLIC HEARING COMMITMENTS WITH TIME BOUND ACTION PLAN

S. No.	Name of the Person	Issues Raised	Reply by Project Proponent	Action Plan	Budgetary provision
1.	Sri Chatrapal Singh, resident of Kharpadi, Hasanpur, Dist. Amroha.	He raised question that we are resident of nearby project site. Will we get employment opportunity? Complaint is attached as Annexure x with MoM of Public Hearing.	It was informed by environmental consultant that employment opportunity will be given to local Villagers on first priority basis nearby project site.	Company committed to provide 40-50 nos. of employment during construction phase and 60 nos. direct/indirect employment during operation phase in the proposed project and preference will be given to Local Villagers. **Vocational Training Center** for providing training to youths on self-employment.	**Rs. 20.0 lakhs** allotted under CER budget
2.	Sri Santosh Kumar Saini, resident of Kharpadi, Hasanpur, Dist. Amroha.	He inquired that unemployment is too much in this region and employment opportunity should be given to the local Villagers.	It was informed by environmental consultant that employment opportunity will be given to local Villagers on first priority basis nearby project site.	Company committed to provide 40-50 nos. of employment during construction phase and 60 nos. direct/indirect employment during operation phase in the proposed project and preference will be given to	

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				Local Villagers.	
3.	Sri Rakesh Kumar Saini, resident of village Guretha, Hasanpur, Dist. Amroha,	He asked what will any development work be done nearby Villages.	Environmental Consultant of the project explained that 2% of total cost of the project has been allocated for Corporate Environment Responsibility (CER) by project proponent which will be spend as per local needs.	The project proponent assured that facilities for school children will be provided such as distribution of School dress, books, Furniture, water cooler etc. and will plant the trees in the area.	**Rs. 15.0 lakhs** allotted under CER budget
4.	Sri Rashid Ali, resident of Hasanpur, Dist. Amroha.	He asked that what development work will be implemented in this region.	It was informed by environmental consultant that project proponent will implement Green Belt Development Program along road side tree plantation for improvement of better environment. Apart from this other facility will also be provided as per their needs in the villages. Solar lights in adjacent villages, community toilets.	The Project proponent assured that they will plant the trees in the area to control the pollution.	**Rs. 1.0 Crores** of Greenbelt development allotted under EMP budget. Other than EMP budget an amount of Rs. 10 Lakhs for Environment care under CER budget also allotted by PP in which they will plant the trees in communities, **Rs.** **15.0 lakhs** allotted under CER budget providing solar

					power/lights and community toilets to the villagers.
5.	Sri Bantilal, resident of Village Kharpadi, Hasanpur, Dist. Amroha.	He asked that will any employment opportunity provided by the Company / Project proponent.	The project proponent has informed that employment opportunity will be provided on the basis of skills and also assured that they will extend the employment on priority to the local peoples nearby project site. Subject to this, J.P. Morge, Regional Officer, Uttar Pradesh State Pollution Control Board, Bijnor. U.P. is also assured that preference will be given to local residents nearby Villages.	The Project proponent assured that they will provide job opportunity on the basis of skills.	

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7.1.3 PUBLIC HEARING PHOTOGRAPHS

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7.2 RISK ANALYSIS & DISASTER MANAGEMENT PLAN

Hazard Identification is a critical step in Risk Analysis. A classical definition of hazard states that hazard is in fact the characteristic of system/plant/process that presents potential for an accident. Hence all the components of a system/plant/process need to be thoroughly examined to assess their potential for initiating or propagating an unplanned event/sequence of events, which can be termed as an accident.

In Risk Analysis terminology, a hazard is something with the potential to cause harm. Hence the Hazard Identification step is an exercise that seeks to identify what can go wrong at the major hazard installation or process in such a way that people may be harmed. The output of this step is a list of events that need to be passed on to later steps for further analysis.

Risk analysis deals with identification and computation of consequence and risks. Risk analysis follows an extensive hazard analysis. This requires a thorough knowledge of probability of failure, possible accident scenario, vulnerability of population to exposure etc. Much of this information is difficult to get or generate. Consequently, the risk analysis is often confined to maximum credible accident scenarios. It provides basis for preparation of on-site and off-site emergency plan and to incorporate safety measures.

Secured Land Filling (SLF) and allied activities as a part of the Common Hazardous Waste Treatment, Storage and Disposal facilities (TSDFs), are associated with several potential hazards to both the employees and the public. A worker in a TSDF site should be able to work under conditions, which are adequately safe and healthy. At the same time, the environmental conditions should be such as not to impair his working efficiency. This is possible only when there is adequate safety in TSDF site.

The objective of the Risk Analysis study is to identify vulnerable zones, major risk contributing events, understand the nature of risk posed to nearby areas and form a basis for the Emergency Response Disaster Management Plan (ERDMP). In addition, the Risk Analysis is also necessary to ensure compliance to statutory rules and regulations. Risk assessment methodology is given in **Figure7-1** below-

Steps of the risk analysis is as follows-

- Identification of Hazards and Selection of Scenarios
- Effects and Consequence Calculations
- Risk Summation (Risk calculation)
- Risk assessment (using an acceptability criteria)
- Risk Mitigation Measures

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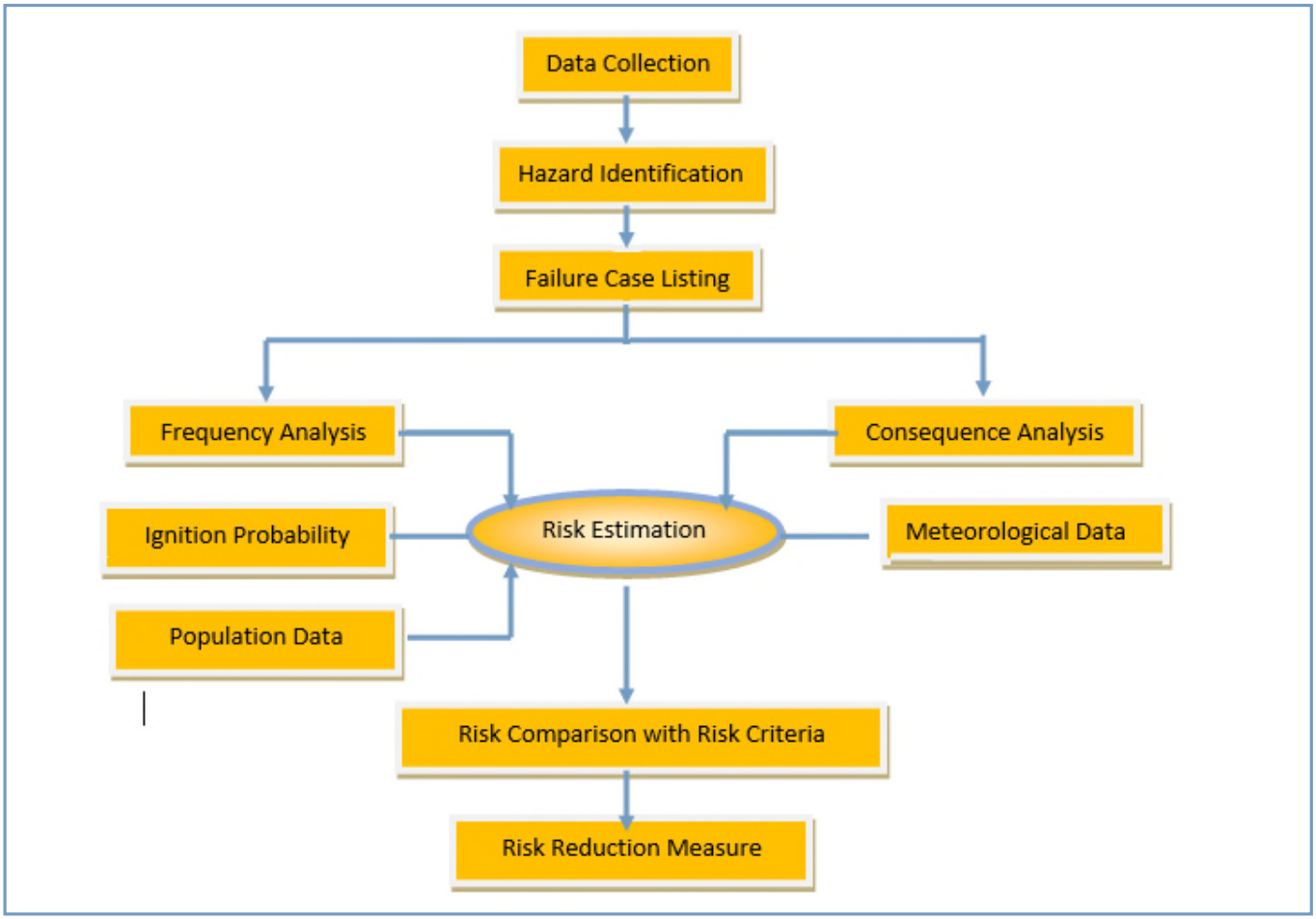

FIGURE 7-1: RISK ANALYSIS METHODOLOGY

7.2.1 HAZARD IDENTIFICATION

Identification of hazards in the proposed project of TSDF which is Secured Land Filling (SLF) and allied activities as a part of the Common Hazardous Waste Treatment, Storage and Disposal facilities (TSDFs) is of primary significance of the analysis, and quantification of risk hazard indicates the characteristics of hazardous wastes that pose potential for an emergency in the event of spillage and accidental release of hazardous wastes from the landfill site.

All the components of a system/plant/process need to be thoroughly examined to assess their potential for initiating or propagating an unplanned event/sequence of events, which can be termed as an accident.

Explosive wastes in form of explosive solid and explosive liquid.

1. Flammable wastes
2. Corrosive Wastes
3. Reactive wastes
4. Toxic wastes

Flammable wastes containing solvent residue, can form explosive mixture with air, and heating may cause pressure rise with risk of bursting and explosion (however in case of SLF

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explosion probability is very less as highly reactive materials and pressure vessels are not there) Some time vapour may be heavier than air and spreads along with the ground, narcotic in high concentrations,gives off toxic or irritant fumes in a fire.

Various type of organic hazardous wastes, paint wastes, waste oil,etc are flammable in nature and can catch fire if getting source of ignition. There will be release of toxic fume at the time of burring in the event of fire.

7.2.2 Other Hazard and Control

Human Health Risk from TSDF Site

Toxic medical wastes and e-wastes managed and disposed at the proposed TSDF can release constituents of concern (CoCs) as vapors or particles to the air. wind-blown erosion of disposed hazardous waste or as leachate to the ground water. Hazardous wastes managed in barrels or tanks can release COCs into the atmosphere via volatilization. During the operation of TSDF site, wastes may be entered into the environment though the following sources:

- Emission of particulate matters due to windblown erosion of disposed wastes;
- Volatization of organic liquid wastes;
- Infiltration of leachate into ground and subsequently contamination of ground water in an unlikely event of damage to liner system of TSDF site;
- Spillage of contaminated run off from the TSDF site during heavy rains;

Risk Mitigation Measures for Proposed project of TSDF

Risk mitigation measures have been described for the proposed TSDF site as given below:

Collection and Transportation of Hazardous Wastes

Following requirements pertaining to the transportation of hazardous wastes shall be ensured:

- Vehicle used for transportation shall be in accordance with the provisions under the Motor Vehicles Act, 1988, and rules made there under.
- Transporter shall possess requisite copies of the certificate (valid authorization obtained from the UP PCB for transportation of wastes by the waste generator and operator of a facility) for transportation of hazardous waste.
- Transporter shall have valid “Pollution under Control Certificate” (PUCC) during the transportation of HW and shall be properly displayed.
- Vehicles shall be painted preferably in blue colour with white strip of 15 to 30 cm width running centrally all over the body to facilitate easy identification.
- Vehicle shall be fitted with mechanical handling equipment for safe handling and transportation of wastes. The words "HAZARDOUS WASTE" shall be displayed on all sides of the vehicle in Gujarati language, Hindi, and English.
- Name of the transporter shall be displayed.
- Emergency phone numbers and TREM Card as per HWM Rule as amended shall be displayed properly.

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

Storage area (Storage Shed)

- Flammable, ignitable, reactive and non-compatible wastes should be stored separately and never should be stored in the same storage shed however in this case no such waste will be accepted .
- Storage area may consist of different sheds for storing different kinds of hazardous wastes and sheds should be provided with suitable openings.
- Storage area should be designed to withstand the load of waste stocked and any damage from the hazardous waste spillage.
- Loading and unloading of wastes in storage sheds should only be done under the supervision of the well trained and experienced staff.
- The storage and handling should have at least two openings/ routes to escape in the event of any fire in the area.
- Doors and approaches of the storage area should be of suitable sizes for entry of fork lift and fire fighting equipment;
- The exhaust of the vehicles used for the purpose of handling, lifting and transportation within the facility such as forklifts or trucks should be fitted with the approved type of spark arrester.
- In order to have appropriate measures to prevent percolation of spills, leaks etc. to the soil and ground water, the storage area should be provided with concrete floor or steel sheet depending on the characteristics of waste handled and the floor must be structurally sound and chemically compatible with wastes.
- All the storage yards should be provided with proper peripheral drainage system connected with the sump so as to collect any accidental spills in roads or within the storage yards as well as accidental flow due to fire fighting.

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Storage Drums/Containers

- The container shall be made or lined with the suitable material, which will not react with, or in other words compatible with the hazardous wastes proposed to be stored.
- The stacking of drums in the storage area should be restricted to three high on pallets (wooden frames). Necessary precautionary measures should be taken so as to avoid stack collapse. However, for waste having flash point less than 65.5^0 C, the drums should not be stacked more than one height.
- No drums should be opened in the storage sheds for sampling etc. and such activity should be done in designated places out side the storage areas;
- Drums containing wastes stored in the storage area should be labeled properly indicating mainly type, quantity, characteristics, source and date of storing etc.

Spillage/Leakage Control Measures

- The storage areas should be inspected daily for detecting any signs of leaks or deterioration if any. Leaking or deteriorated containers should be removed and ensured that such contents are transferred to a sound container.
- In case of spills/leaks/dry adsorbents/cotton should be used for cleaning instead of water.
- Proper slope with collection pits be provided in the storage area so as to collect the spills/leakages.
- Storage areas should be provided with adequate number of spill kits at suitable locations. The spill kits should be provided with compatible sorbent material in adequate quantity.

Fire Protection System

The fire protection system shall comprise of:

- Fire detection and alarm system for waste storage area
- Fire Fighting system shall comprises of following major equipment and systems;
- Electric driven main fire pumps with emergency power from standby Diesel Genset for hydrant network serving of hydrants and hose reels;
- All necessary pump controls complete with all accessories for the above-mentioned pumps;
- All necessary sign-posting for the water-hydrant ring system including brackets, complete with accessories;
- All electrical rooms will be provided with clean agent automatic fire extinguisher systems
- Complete addressable analogue fire detection system with heat and smoke detectors for various plant area including storages with necessary cabling, interface panels, controllers, sounders, manual call points, sirens, response indicators, and all necessary hardware and accessories; and
- All necessary electrical equipment, such as LV switch-gear, LV motors, LV power and control cables, control panels with alarm, PBB and interlocks, necessary DC systems,

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push button stations, cable trays and accessories, cabling, glands lugs, earthing and lightning protection conforming to relevant electrical specifications.

Miscellaneous risk Mitigation Measures

- Smoking shall be prohibited in and around the storage areas;
- Good housekeeping needs to be maintained around the storage areas.
- Signboards showing precautionary measures to be taken, in case of normal and emergency situations should be displayed at appropriate locations.
- To the extent possible, manual operations within storage area are to be avoided. In case of manual operation, proper precautions need to be taken, particularly during loading/unloading of liquid hazardous waste in drums.
- A system for inspection of storage area to check the conditions of the containers, spillages, leakages etc. should be established and proper records should be maintained.
- The project proponent and contractors to develop a strategy for effective communication with local people
- The wastes containing volatile solvents or other low vapor pressure chemicals should be adequately protected from direct exposure to sunlight and adequate ventilation should be provided.
- Storage sites should have adequate & prompt emergency response equipment systems for the hazardous waste stored on-site. This should include firefighting arrangement based on the risk assessment, spill management, evacuation and first aid.
- Immediately on receipt of the hazardous waste, it should be analyzed and depending upon its characteristics and storage & disposal should be finalized.
- Only persons authorized to enter and trained in hazardous waste handling procedures should have access to the hazardous waste storage areas.
- Mock drill for onsite emergency should be conducted regularly and records maintained.
- The construction team/developer shall effectively follow the suggestions made in the EMP and/or any other environmental measures so as not to damage the environment of the project area.

- The project proponent must keep themselves updated with respect to applicable laws and take appropriate actions in case the provisions in some regulations undergo change.

Display of Necessary Information at TSDF Site

Necessary information containing the following elements shall be displayed at the site.

- Waste type (ignitable, toxic, reactive, etc)
- Approximately quantity of each type of wastes
- Generation location of waste storage area

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- Evacuation point

A. General Recommendations

- All precautions will be taken to attend any emergency due to handling, storage and disposal of such hazardous wastes.
- Safety measures such as fire fighting system facility already working at TSDF site will be provided during the emergency.
- Proper handling of hazardous chemical, hazardous wastes, regular cleaning & proper placement of material will be maintained during operational phase.

7.3 DISASTER MANAGEMENT PLAN (DMP)

The objective of disaster management plan is to localize a disaster and to the maximum extent possible contain it to minimize the impact on life, the environment and property. The disaster management plan may be broadly divided into following steps as given in Figure below-

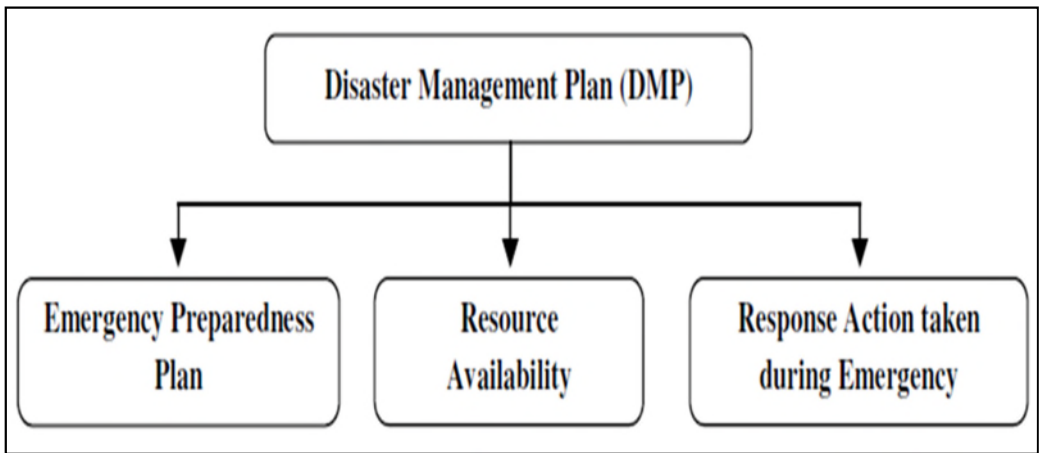

FIGURE 7-2: STEPS FOR DMP

7.3.1 Objectives of DMP

- Minimization of the risks to lives and safety of proposed TSDF operators on-site and of the neighboring community.
- Coordination for appropriate and effective actions with outside regulatory agencies during and after their involvement in on-site emergencies.
- Containing and minimizing environmental damage, to surroundings, and to site property, and equipment, which could occur from emergency or accidental situations beyond the normal operations of the TSDF.
- Maintaining effective trained personnel capable of performing the established emergency response procedures when it is required.

The risk involved during the hazardous waste transportation, storage and disposal site will involve hazardous consequences due to the toxicity of the waste, flammability of the waste or explosively of the waste.

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Priority in Emergency Handling

The general order of priority for involving measures during the course of emergency would be as follows:

- Safeguard life
- Safeguard environment
- Safeguard property

Classification of emergencies

Emergency is a general term implying hazardous situation both inside and outside the plant/installation premises. Thus, the emergencies termed "onsite" when it confines itself within the plant/installation even though it may require external help and "off-site" when emergency extends beyond its premises. It is to be understood here, that if an emergency occurs inside the proposed of TSDF and could not be controlled properly and timely, it may lead to an "off-site" emergency.

The main objectives of emergency management system are the following;

- Identification, control and containment of the hazardous situation.
- Minimizing the impact of event/accident prevention of damage to Men, Materials and Property

To achieve the above stated objectives of emergency planning, the critical elements are*:*

- An early detection of an emergency and careful planning
- Co-ordination and response organization structure along with efficient trained personnel
- Availability of resources for handling emergencies
- Appropriate emergency response actions
- Effective notification and communication facilities
- Regular review and updating of the ERP
- Proper training of the concerned personnel

The emergencies at the proposed TSDF can be broadly classified into three levels:

Level 1: The emergency, which is containable within the factory premises. Emergency may be due to spillage of liquid or solid hazardous wastes, small fire in flammable hazardous wastes, etc. which can come under this category.

Level 2: The emergency, which is containable within the factory premises. Emergency may due to fire in flammable hazardous wastes, filling of water in disposal pit due to heavy rain, etc. which can come under this category.

Level 3: An incident at the proposed of TSDF may occur, causing a severe hazard or a large area which poses an extreme threat to life or property. Breakage in slope and liner system due to de-settlement/earth quake, subsequently contamination of soil and ground water.

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7.4 LEGAL AUTHORITY AND RESPONSIBILITY

On-site/ Off site emergency planning

Although, the provisions of the Hazardous Chemicals Rules, Section 41 B(4) of the Factories Act, 1948 (as amended) requires that every occupier is to draw up an on-site emergency plan with detailed disaster control measures and to educate the workers employed. The obligation of an occupier of hazardous chemicals installation to prepare an emergency plan is also stipulated in Rule 13 of the 'Manufacture, Storage and Import of Hazardous Chemicals Rule, 1989 and subsequent amendments. In case of TSDF operation with Secured landfill facility, there is no storage of chemicals which would fall under the purview of above notification except diesel for DG set, the requirement is in very little quantity.

However, the **Guidelines on Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Waste and Penalty** published by CPCB in 2016 has provision for imposing penalty for any accidental spillage of hazardous waste or release of toxic waste due to breakage of liner system. The operator of the TSDF has to undertake;

a) Liability for taking up immediate Emergency Response Plan Measures
b) Liability for assessment of contamination.
c) Liability for Remediation of Contaminated sites
d) Compensation Liability

The operator of the facility has to keep provision for maintaining Corpus Fund and take Public liability Insurance Policy to meet the Compensation Liability.

7.5 ORGANIZATION STRUCTURE OF EMERGENCY MANAGEMENT SYSTEM

The management structure includes the following personnel's;

- ❖ Chief Emergency Controller
- ❖ Site Main Controller
- ❖ Incident Controller
- ❖ Key Personnel's
- ❖ Essential Workers

The following are earmarked in the plant

- ❖ Assembly points
- ❖ Emergency control center
- ❖ Firefighting arrangements
- ❖ Medical facilities
- ❖ Other arrangements

In case of an emergency, the On-site Emergency Plan of the proposed project of TSDF will come into action. Effective on-site emergency plan requires that in the event of an accident, nominated functionaries be given specific responsibilities, often separate from their day-to-day activities.

The emergency organization follows the usual pattern of the hierarchy. The senior-most

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functionary available during an emergency at the proposed of TSDF takes charge as Chief Emergency Coordinator (CEC) and will locate himself at the designated Primary Command Post. The senior most functionaries for each emergency service will act as coordinator and shall report at the Primary Command Post unless otherwise instructed by the Chief Coordinator.

The senior most persons in the shift will be designated as the Site Incident Controller (SIC). The SIC will take charge of the incident site and take the overall command. He shall be supported by other key persons representing various emergency services. Key persons are personnel available at the site on round the clock basis. It is to be appreciated that the key persons remain the front-lin3 fighters. The role of various coordinators is to assess the situation from time to time, take appropriate decisions in consultation with the CEC and to provide timely resources to the key persons to fight the emergency.

TABLE 7-2: AUTHORITIES AND RESPONSIBILITY

1	Incident Controller	For the safe shut down of Plant. To review & assess the actions. Provide information to other Plants.
2	Fire & Safety	For the supply of P.P.E., F.F.E. etc.
3	Medical Officer	For the medical treatment & hospitalization
4	Security	For Visitors, manpower Movement, traffic control, firefighting, rescue operations.
5	Pers. & admn.	Evacuation of persons/causalities, outside shelter, information to the relatives of injured person, welfare of in plant affected persons, information to local authorities, statutory authorities, records of affected persons, press etc.
6	Environment	Environment monitoring /Controlling / safe disposal
7	Maintenance	For safe shut down of plant. Availability of Utilities, electrical isolation etc.
8	Stores	Availability of Engg. Spares, PPE etc.

7.5.1 EMERGENCY RESPONSE PROCEDURES

The following possible accident scenarios may occur in a hazardous waste landfill (TSDF):

- Road accident during transportation of Hazardous waste
- Slope Failure of landfill
- Water accumulation at landfill due to heavy rain
- Breakage of Liner due to de-settlement of landfill pit.
- Fire at flammable hazardous waste disposal site

The Command Post is to be promptly established at safest place at the proposed TSDF Site. It shall be the nearest office/place having communication facilities to be manned continuously.

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The response planning are as follows:

- ❖ Initial Notification of Release
- ❖ Establishment and Staffing of Command Post
- ❖ Formulation of Response Objectives and Strategy at the incident site
- ❖ Ensuring Health and Safety at Incident Scenes
- ❖ Evacuation
- ❖ Fire Response
- ❖ Health Care
- ❖ Personal Protection
- ❖ Public Relations
- ❖ Documentation and Investigative Follow-up
- ❖ Training

The accident scenarios for planning response procedures and carrying out mock drill should be considered based on the risk analysis study.

Initial Notification of Releases

In the event of emergency, alarm will be raised in control room. Otherwise, any person noticing a fire, explosion or the release of hazardous materials should shout “spillage” or "Fire and. He will also inform the control room on the nearest telephone and the panel officer will inform SIC.

Action by Individual Employee in case of Emergency

- ❖ Do immediately inform the control room.
- ❖ Do act to control the incident as per the instructions
- ❖ Do reach the assembly point.
- ❖ Do not get panicky or spread rumors.

7.5.2 ESTABLISHMENT AND STAFFING OF COMMAND POST

- ✓ Quickly establish a command post near the scene of incident. The minimum that is necessary is a continuously manned communication system close to the incident site.
- ✓ It is the responsibility of the response personnel at the Command Post to restrict the entry or movement of people into the Hazard zone. The first step of a response action must be restriction of access to the leakage site and other hazardous areas.
- ✓ Security and access control at Command Post and Primary Command Post need to be provided.

Formulation of Response Objectives and Strategy at the Incident Site

- ✓ It is the responsibility of the CEC to decide on the appropriate response strategy specific to the situation prevailing. It is important to assess each incident before taking action.
- ✓ CEC in consultation with the Site Incident Controller will formulate realistic response objectives. The assessment should be based on resource requirement i.e. trained personnel and protective gear.

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- ✓ Upon completion of the incident assessment, command personnel will be in a better position to determine whether their response strategy should be defensive or offensive in nature. A defensive posture is best taken when intervention may not favorably affect the outcome of the incident, or is likely to place emergency response personnel in significant danger, and/or may possibly cause more harm than good. An offensive posture (i.e., one requiring response personnel to work well within the boundaries of hazard zones) is best taken when intervention is likely to result in a favorable outcome without exposing personnel to undue danger and without causing new and potentially more severe problems

7.5.3 COMMUNICATION SYSTEM & ACTION ON THE SITE

Communication System

- ❖ Any person noticing an emergency should be able to raise or cause to be raised the first-floor level emergency alarm. All employees must be trained to operate such emergency alarms. There should be an adequate number of points from which the alarm can be raised either directly, by activating an audible warning of individual signal or message to a preliminary manned location. This has the advantage of permitting the earliest possible action to be taken to control the situation, which in turn may avoid the development of a major emergency. All such points must be distinctively marked and known to all employees.

- ❖ The alarm should be audible in every part of the plant. In areas of high noise level, it may be advantageous to provide an alternative to an audible alarm e.g. flashing lights. Alarm systems vary and will depend on the size of works. On small sites a simple alarm system should be suffice which provide the means whereby the persons hearing the incident can warn others of the danger and summon assistance. On large sites a staged warning system may be more appropriate. The person discovering the incident should warn all those in the vicinity who should either evacuate or take other immediate action according to the predetermined plan. Automatic alarms may be appropriate on some sites. To communicate disaster hooter will be useful for proposed project of TSDF area and public in surrounding area.
- ❖ The alarm should alert the site controller who should assess the situation and implement appropriate emergency procedures.
- ❖ Separate alarms may be necessary to warn of different types of emergency such as fire and the beginning of the emergency as different procedure may be required. Care must be taken, however to avoid a multiplicity of alarms which would cause confusion. In case of total electricity failure and the alarms, telephones and intercom system not working, help of runners/messengers shall be taken. One (or more) big bell (independent power) and magnetic telephones with fire and emergency services may also be useful.
- ❖ Public address system or internal telephones throughout the proposed TSDF will be use full for quick communication. The alarm system should be checked periodically to test efficiency.

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Declaring the Major Emergency

The declaration of major emergency puts many agencies on action and the running system may be disturbed which may be very costly at times or the consequences may be serious, therefore such declaration should not be decided on whims or immature judgment or without proper thought. Because of scale of activity which will be activated after the declaration of major emergency. A person should be selected on the basis that their knowledge and experience equips them to recognize the fact of a major emergency or the potential for it. Such nominated persons will advise the Crises Controller, declare the emergency and it will be declared accordingly through him.

The joint decision to declare major emergency may be taken but it should be as early as possible and without wasting the time.

Telephone Message

After hearing the emergency alarm and emergency declaration or even while fast receiving the emergency message on phone, a telephone operator (or Communication Officer) must play an important role. He should be precise sharp, attentive and quick in receiving and noting the message and then for immediate subsequent action of further communication.

Communication of Emergency

There should be an effective system to communicate emergency

a) Inside the proposed TSDF i.e. to the workers including key personnel and essential workers, on duty and inside during normal working hours
b) To the key personnel and essential workers not on duty and outside during normal working hours.
c) To the outside emergency services and the government authorities and
d) To the neighboring firms and the public in the vicinity. Key points are suggested below:

Communication to outside Emergency Services and Authorities

- Once the declaration is made, it is essential that the outside emergency services if they have not already been called in, be informed in the shortest possible time. Liaison at local level will help to determine the best means of achieving this, for example, direct line or automatic alarm to the fire brigade or by any emergency system. Predetermined code words to indicate the scale and type of the emergency may be useful.
- The emergency must be immediately communicated to the Government Authorities such as local Factory Inspectorate, Collectorate, Police and District Emergency Authority.
- The statutory information to above authorities must be supplied beforehand so that they can be well prepared to operate their offsite emergency control (contingent) plan. As per their advice to consultation, onsite plan should be modified and updated

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7.5.4 Statutory Communications

Under the statutory provisions, information is required to be given to the following:

- ❖ The workers
- ❖ The public and neighboring firms
- ❖ Distract Emergency Authority.
- ❖ Factory Inspectorate

Services and control

Public Address System

Public Address System will be installed at selected points in the plant, which shall be used for announcement/ information to be given.

Telephones

Adequate facility for internal telephones to be installed in the different offices in the proposed TSDF shall be used to communicate any emergency to personnel. Emergency telephone numbers of responsible persons to be maintained with each department and emergency control centers. A list of all external authorities, their address and telephone nos. will be maintained.

Fire Fighting Equipment

Fire extinguishers depending upon the type of fire shall be used. List of location & type of fire extinguisher will be maintained with each department. A quarterly check for extinguisher shall be done and recorded.

Mock Drill

For reviewing and assessing the level of emergency preparedness, mock drills will be conducted once in six months. Simulating the covered emergencies and will maintain records of the trails.

Review & Revision

All accidents/emergency situations shall be recorded in accident report. This shall be produced in the Safety Committee meeting to review & revise the emergency preparedness and response.

7.6 SOCIAL IMPACT ASSESSMENT. R&R ACTION PLANS

Public relations strategy has been developed to select employment avenues for local population; provide training to local people and later employing them in the plant as per their skill and job knowledge, purchase local goods and services; encourage local entrepreneurship around the plant, encourage women's participation in environmental conservation measures and create awareness about environmental health and pollution.

Impact during Construction

- ***Impact on Demography*** ---

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The peak workforce strength during construction would rise-up to 100 persons. Though the technical persons and skilled labors would by and large, be imported from outside the study area, bulk of the labor force would comprise of unskilled and semi-skilled workers, a substantial number of whom would presumably be recruited from the surrounding areas itself. Since majority of the unskilled workforce would be from surrounding areas, they would settle in the villages.

Therefore, the demographic scenario including population, sex-ratio, literacy level etc. would undergo certain local changes within a limited peripheral zone. The overall impact over the study area would be marginal.

- ***Impact on Socioeconomic*** ---

Establishment of TSDF Secured landfill project invariably results in socioeconomic changes. The influx of material and money lends to change the economic status of the community. Markets, workshops and commercial centers would develop in the area.

Establishment of the proposed TSDF phase-I project will involve a substantial unskilled labor force. Since most of the unskilled labor force will be from nearby village, unplanned and haphazard development of slums would not be significant. However, labour camps with provision of basic amenities of water supply and sanitation etc. would be provided which would go long way in curbing the degradation of the physical and aesthetic environment.

- ***Project Affected Persons (PAP)*** ---

There will not be any project affected person, due to the fact that the entire land required for the proposed project is vacant / barren land and owned by project proponent.

- ***Rehabilitation and Resettlement Programme*** ---

As mentioned earlier the land belongs to the project proponent, rehabilitation or resettlement problem do not exist.

Impact during Operation

- ***Impact on Demographic Pattern*** ---

The proposed Secured landfill project will generate employment opportunities both in direct and indirect manner. In direct mode people will get additional jobs in proposed TSDF project and in indirect mode people will be appointed as company authorized dealers & sellers. The total Contractor's manpower approx. 60 Nos. including, Managerial Staff, Technical Staffs and labours will be employed / engaged during TSDF operation.

Moreover, a sizeable number of service class people who are directly connected with the operating personnel of the plant, e.g. house servants, washer man, barbers, shopkeepers etc. will flow in from the neighboring areas. As the plant and its ancillary facilities act as an active nucleus of activity, a shift of population towards this center will also occur within the study area. This would result in an alteration of the local demographic pattern. The literacy level of people and their families involved in the operation of the plant would certainly enhance the overall literacy rate within the study area. The population density in the peripheral zone will also tend to rise, though very marginally.

- ***Impact on Socioeconomic*** ----

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This project will definitely alter the simple and quiet rural nature of the locality, which exists today.

As there will be flow of financial and material resources, there remains a large possibility of growth of population in the business, trade, commerce and service sector. Thus, a simple rural community may be transformed into a semi-urban complex within a short time frame. Such impacts are inevitable, that could also be felt in case of the proposed project; however, these would be attempted to be controlled and minimized by ensuring suitable human management, stable working conditions, security and the provision of adequate compensation.

- ***Growth Dynamics and Stress Areas*** .

It has been observed that people always have a propensity to settle at locations where civic amenities as transportation, postal service, educational institutions, drinking water, market, medical treatment, electricity etc. are easily available within a short distance, as well as the working place being within a reasonable distance.

Therefore, some migrated people would settle in the peripheral zone / proximate of the proposed project site.

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8 PROJECT BENEFITS

8.1 INTRODUCTION

As per the Hazardous and other wastes (Management, & Transboundary Movement) Rules, 2016 and its amendment made under Environment Protection Act, 1986, hazardous waste generated by industries has to be collected, transported, treated and disposed in a properly designed TSDF Facility.

Establishment of Secured landfill as a part of Common Hazardous Waste Treatment, Storage and Disposal facility would minimize the risk involved in hazardous waste management by way of transportation and waste movement through manifest and regular monitoring of such facility would be better and feasible as compared to captive facilities by individual industries. These factors as well as a strong desire to come up as a single window solution provider for waste management issues have led SMSPL to embark setting up this Common Hazardous Waste Treatment, Storage and Disposal facility (TSDF), apart from achieving other social objectives.

8.2 BENEFITS OF HAZARDOUS WASTE MANAGEMENT

The main benefits of the proposed project are

- The proposed Secured landfill project will lead to better management of hazardous waste as compare to captive facility in terms of economics and administrative control.
- The proposed scientific disposal of hazardous waste will provide additional benefit of green and clean Environment.
- It reduces the number of hazardous waste dump sites in the area and eliminates the pollution potential.
- Prevention of natural resource contamination thereby improving overall environmental status of the region.
- Landfills minimize the natural impact of solid waste on the environment by the following mechanics:

    - Isolation of inert waste through containment
    - Elimination of polluting pathways

8.3 RECYCLE, REUSE AND UTILIZATION FOR COPROCESSING

As per Hazardous and other wastes (Management, & Transboundary Movement) Rules, 2016, there is lot of emphasis on reuse, recycling, recovery, pre-processing, utilisation
Including co-processing of hazardous wastes

Many substances in hazardous wastes have value. Scientists have developed ways ofrecycling many wastes, so they can be used again. Almost all materials are recyclable. However, in

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some more energy will be expended in recovery than the recovered value warrants. The two broad ways of processing hazardous waste are waste reuse and waste recycling.

8.3.1 Waste Reuse

In some cases, waste material can be used as a raw material with very little processing. Transfer of the waste "as is" without reprocessing, to another facility is known as waste reuse or waste exchange. Unwanted materials of commence such as outdated chemicals or untested materials not meeting the high-quality control requirements of purchasing industry, can be reused without processing. Process wastes such as cardboard for making paper pulp, copper or other metal salt solutions for metal recovery, oils that can be used as fuels. This includes a variety of other materials that can be reused as industrial feed stocks. Central public health and Environmental Engineering Organization (CPHEEO) Ministry of Housing and Urban affair in September 2018 advise Non-recyclable waste having calorific value of 1500 Kcal/kg or more shall not be disposed of on landfills and shall only be utilized for generating energy either through refuse derived fuel or by giving away as feed stock for preparing refuse derived fuel and advise “All industrial units using fuel and located within one hundred km from a solid waste based refused derived fuel plant shall make arrangements within six months from the date of notification of these rules to replace at least five percent of their fuel requirement by refused derived fuel so produced.

8.3.2 Waste Recycling

Recycling differs from reuse in that the waste must first be treated before it can be used in a manufacturing process. When a transfer of waste "as is" is not possible, reprocessing the waste for material recovery is known as recycling. For example, bag house dust from scrap steel processors, containing up to 25 per cent zinc oxide, can be combined with waste sulphuric acid to make galvaniser's pickle acid. The spent pickle liquor containing 8-10 percent zinc sulphate and some iron salts is then usable, as fertilizer in agricultural fields. Use of waste organic solvents is the best example of recycling waste.

Benefits from Recycling Facilities: Recycling is the process of making or manufacturing new products from a product that has originally served its purpose. If these used products are disposed off in an appropriate, environmentally friendly way, the process of recycling has been set in motion. In the proposed project the following recycling shall be promoted through registered recyclers .

- Used Oil Recycling
- Spent Solvents Recycling
- Alternate Fuel and Raw material facility
- Waste Plastic Recycling
- Waste Paper Recycling

8.4 IMPROVEMENT IN THE PHYSICAL INFRASTRUCTURE

The proposed Secured landfill project invariably results in socioeconomic changes in the surrounding areas of the project in terms of improvement in infrastructure, employment generation, medical facilities, literacy improvement etc. The influx of material and money

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lends to change the economic status of the community. Markets, workshops and commercial centers would develop in the area. The following physical infrastructure facilities will improve due to proposed project.

- Road Transport facilities
- Housing facilities
- Water supply and sanitation
- Power

8.5 IMPROVEMENT IN THE SOCIAL INFRASTRUCTURE

The proposed project will provide indirect and direct employment opportunity to the local villagers. Employment is expected during construction and operation period, waste lifting and other ancillary services. Employment in these sectors will be temporary or contractual and involvement of unskilled labour will be more. A major part of this labour force will be mainly from local villagers who are expected to engage themselves both in agriculture and project activities. This will enhance their income and lead to overall economic growth of the area.
The following changes are expected to take place in socio-economic development with this proposed project.

- The project is going to have positive impact on daily income through this proposed project.
- Due to the **Corporate Environment Responsibility (CER) Activities** by project authorities, the socio-economic status of the area will be improved.
- This project will help in the development of social infrastructures in the long run such as educational facilities, banking facilities, medical facilities, plantation and community facilities etc.

8.6 EMPLOYMENT POTENTIAL –SKILLED; SEMI-SKILLED AND UNSKILLED

SMSPL is offering huge employment potential to the surrounding peoples and technocrats. Besides direct employment, there is possibility of creation of indirect employment opportunities due to working of Secured Landfill as a part of Common Hazardous Waste Treatment, Storage and Disposal facilities.

Now, with the establishment of TSDF phase-I proposed, there will be employment opportunities for about 40-50 persons (Construction phase) and about 60 persons (Operational phase). In general, the project is to have positive environmental impacts by collecting and disposing the hazardous waste in the scientific manner that will reduce the future health hazard. Overall, this will have positive impact on socio-economic profile of the area.

8.7 CORPORATE ENVIRONMENT RESPONSIBILITY (CER) ACTIVITIES

An amount of Rs. 80.00 Lakhs (2% of total project cost i.e. Rs. 4000 Lakhs in Phase-I)) will be incurred towards Corporate Environment Responsibility. All the above amount will be spend in phase wise manner as detailed under;

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8.8 GREEN BELT DEVELOPMENT

Free space will be provided for plantation purpose and the right saplings will be planted to provide ambience to the people working at the facility and keeping in mind the environmental benefits of these plants. The project site TSDF will developed green belt all around surrounding i.e. 33 % of the total land i.e. 12762 M^2

The green belt will be developed along plot boundaries using varieties of plant species suitable to local environment. Species type will be based on soil characteristics and other related aspects to mitigate pollution effects due to noise, odour, dust etc. The major advantage of green belt is development of buffer zone and visual barrier for surrounding locality.

Green belt will be also helpful for reducing the soil erosion, suppress dust generation and enhancing the aesthetic value of the area. As a compensatory measure, green belt shall be developed in the minimum 20 meter strip of land encircling the site.

8.9 OTHER TANGIBLE BENEFITS

The proposed Secured landfill project will also add to the state govt. treasury in terms of revenue from royalties, excise duty, etc.

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9 ENVIRONMENTAL COST AND BENEFIT ANALYSIS

Environmental cost and benefit analysis can inform an assessment of sustainability in two key ways. In a general sense, applying a rigorous analytical environmental cost and benefit analysis framework can help ensure that a sustainability assessment clearly describes and accounts for different economic, social, and environmental impacts in a way that addresses analytic concerns such as double counting and the treatment of varying time frames. The environmental cost and benefit analysis framework can also help identify areas where other types of analysis may be complementary.

SMSPL shall be operating common TSDF and doing Environment Management through Hazardous waste treatment and disposal, so all activities, process and operation is concerned with Environment management and improvement. The funds earmarked for environment protection measures shall be maintained in a separate account. Also, separate corpus fund shall be kept in accordance to the "Guidelines on Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Waste and Penalty" issued by CPCB also insurance policy shall be taken to cover the cost of Penalty. There shall be no diversion of these funds for any other purpose.

Compare to individual industry managing hazardous waste of their own including in captive facility, the common facility for proposed project will have environmental benefit in terms of proper land filling, appropriate leachate collection and treatment & disposal in the appropriately lined landfill system as per guidelines of CPCB.

The proposed project is a Common Hazardous Waste Treatment, Storage and Disposal facilities (TSDFs), which will create employment including skilled as well as semi-skilled staff directly or indirectly. During Construction phase, the labours and workers will be hired from nearby villages. Number of persons required during construction phase is 40-50 and during operation 60. The project will generate a fair amount of direct, indirect and induced employment in the study region. The local economy will receive a boost due to employee spending and services generated by applicant. The company will also undertake various proposed CER activities and provide helping hand in the development of the nearby villages by arranging regular medical checkup camp for the employees.

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10 ENVIRONMENT MANAGEMENT PLAN

10.1 BACKGROUND

Environmental Management Plan or programme (EMP) that seeks to achieve a required end state and describes how activities that have or could have an adverse impact on the environment, will be mitigated, controlled, and monitored.

The EMP will address the environmental impacts during the design, construction and operational phases of a project. Due regard must be given to environmental protection during the entire project. To achieve this a number of environmental specifications/recommendations are made. These are aimed at ensuring that the contractor maintains adequate control over the project to:

- ❖ Minimize the extent of impact during construction.
- ❖ Ensure appropriate restoration of areas affected by construction.
- ❖ Prevent long term environmental degradation.

Environmental Management Plan (EMP) is required to construct and operate the site as per the Environmental Regulations and to achieve sustainable development of the region. Considering the nature of industries in the region, waste generated, the proposed project of TSDF Site is in the free enterprising zone/industrial estate, Amroha where all the infrastructure facilities are available.

Considering the following aspects, the EMP for proposed project construction and operation, has been are prepared;

- ❖ Construction of the Secured landfill site
- ❖ Operation of the Secured landfill site
- ❖ Air pollution control
- ❖ Monitoring and control
- ❖ Transportation

OBJECTIVES

The EMP has the following objectives:

- Identifying those construction activities that may have a detrimental impact on the environment;
- Detailing the mitigation measures that will need to be taken, and the procedures for their implementation;
- Establishing the reporting system to be undertaken during the construction.

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- To handle hazardous waste as per the Hazardous & other Waste (Management, Handling and Transboundary Movement) Rules, 2016 and subsequent amendments.
- Collection, transportation, treatment and disposal of hazardous waste generated by member industries in environmentally sound manner.
- Construction, operation and post closure maintenance of the site without any environmental impact to the surroundings area.
- Monitoring and control of the facility operations.
- To protect from the accidental hazards
- Continuously development and management of hazardous waste in the area
- Continuously to provide good working conditions for employee.
- To provide funds (budgeting & allocation) for EMP.

The EMP also serves to highlight specific requirements that will be monitored during the development and should the environmental impacts not have been satisfactory prevented or mitigated; corrective action will have to be taken. The EMP should, therefore, be a guideline that will assist in minimizing the potential environmental impact of activities.

Detailed study was carried out for operational phase aspect, impact and their mitigation measure. Appropriate control measures have been incorporated in the process system to minimize impact on environment and to have smooth operation at the site

SMSPL will depute competent team members for construction and operation of the site. The activities at the site will be controlled by Unit Head. All the construction activities will be coordinated by Management representative (Projects) of **SMSPL**. A site Waste Management Engineer will supervise the construction activities and later on, the operations.

Monitoring and control of the facility will be under Quality Department. The site will have a Laboratory to analyze all the essential parameters. Major analysis like Comprehensive Analysis of the Wastes, Ground Water Analysis, and Soil Analysis etc will be done at the lab, which is NABL Accredited.

As disposal of waste takes place at the cell of phase-I of the landfill. Once sufficient waste is disposed, coverage will be provided. All efforts will be taken to minimize leachate generation. During monsoon period, extra care will be taken to prevent entry of water to the waste disposed. Temporary coverage will be provided during monsoon.

10.2 SECURED LANDFILL

For Management of hazardous wastes generated from member industries and to avoid damage to the environment and health of the people in general, as per the Hazardous & other Waste (Management, Handling and Transboundary Movement) Rules, 2016 of Environment

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Protection Act, 1986, the hazardous waste generated by industries will continue to be collected, transported, treated and disposed in a properly designed TSDF Facility.

The different components of HWMS are given below;

- Collection
- Transportation
- Analysis of Hazardous waste
- Treatment
- Storage and Handling
- Disposal

10.2.1 COLLECTION SYSTEM

Manifest system will be used for collection and transportation of wastes. For transportation of hazardous waste from members industries, it will be collected by dedicated vehicles (Hydraulic). The transportation vehicles for waste will continue to be hook loaders or hydraulic dumpers so that manual exposure will be avoided.

10.2.2 TRANSPORTATION

Transportation of hazardous waste will continue to be done as per CPCB Guidelines. All the vehicles will continue to be with the nameplate with details of company's name, address, phone no., etc. During transportation containers will be closed from all sides and covered from top to prevent spillage or dusting. The drivers will be imparted training. The containers/dumpers will be marked with the name of TSDF.

10.2.3 ANALYSIS OF HAZARDOUS WASTE

As the dumper enters SMSPL weighbridge, samples will be taken from three different locations and a composite sample will be made. Once the quick test is passed, truck will be allowed to enter the premises. If any truck does not meet the Hazardous solid waste inlet specification, it will be returned to member industry for necessary treatment.

10.2.4 STORAGE

As different wastes will be received from member industries and their characteristics will be also different, SMSPL has created sufficient storage godowns. SMSPL will provide storage shade on operational cell during monsoon period. The main operational site will be kept covered by tarpaulin with separate rain water collection system during monsoon.

10.2.5 HANDLING

Handling of Hazardous Waste will be carried out with utmost care. As the waste will be transported through hydraulic dumpers, manual handling will be avoided. Moreover, the persons employed at the site will be using Personal Protective Equipments like Gum Boots, Gloves, Goggles, Dust Mask and Helmet etc. All the waste handling like spreading,

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compaction, coverage will be carried out with the help of machinery like JCB / Bulldozer.

10.2.6 DISPOSAL

The site operations will be carried out in a phased manner. Operating area of the landfill will be clearly earmarked and the wastes cleared by Quality Control Department will be only disposed off at this area. The hydraulic dumpers will be dumping waste mechanically. Once sufficient waste is disposed in the operational area, JCB or Bull Dozer will be used for spreading and compaction of the waste. The waste which are not meeting the quick tests, are subjected to appropriate treatment before disposal.

The operation of the site will be carried out only during day time.

10.2.7 MEMBER UNITS

- All the member units will have to give the details of the waste generated and the copy of Authorization from UPPCB. Each waste category sample to be given to SMSPL for comprehensive analysis.
- Members units are to ensure that wastes are stored properly and loaded to the dumpers without spillage.
- Manifest system for waste disposal and records shall be maintained
- Appropriate treatment charges shall be charged.
- In case of any accident during transportation, necessary measures shall be taken to prevent any contamination of environmental.

Detailed Environment Management Plan is given below;

10.3 ENVIRONMENT MANAGEMENT PLAN (EMP) AND MITIGATION MEASURES

10.3.1 EMP During Construction Phase

During the construction phase of the proposed project of Secured landfill phase-I of TSDF, environmental impact can be attributed during the site preparation, civil works, erection and mechanical fabrication, waste disposal, waste recycling, welding etc and provision of civic amenities to the construction work team. However, the environmental impact during construction phase is temporary.

The construction shall be undertaken on open land area of phase-I portion of land. The topography of the site is plain. Thus, there is no change in land use and no destruction of flora from the construction area is involved. The Environmental Management Plan for construction phase is described below;

- ❖ During site preparation, the materials shall be stacked at safe place.
- ❖ To prevent soil erosion, temporary bunds will be provided
- ❖ The excavated soil will be stored at the premises for utilization during coverage

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- ❖ To control the nuisance created by excavation, leveling and transportation activities, water sprinkling will be carried out.
- ❖ Safety equipment such as ear plugs, ear muffs, helmet and safety goggles etc. will be provided to workers according to the requirement.

Air Quality Mitigation Measure

For the proposed project site leveling and grading will be carried out if required, where ever possible to maintain the natural elevations they will not be disturbed, only leveling activity will be carried out for providing roads, sewage network, storm water system, and places required for construction of sheds and administrative buildings.

According to the engineering assessment, most of the excavated muds generated during construction activities will be reused within the project site for leveling during road formation, bunds construction around the land fill site, etc. The excess if any will be given to local contractors for disposal in low lying areas, road construction use, etc.
During construction period most of the dust will be generated from the movement of construction vehicles on unpaved roads. Unloading and removal of soil material shall also act as a potential source for dust nuisance. The control measures proposed to be taken up are given below.

- Frequent watering / Water sprinkling of unsealed roads / haul roads in the project area will be done, this activity will be carried out at least twice a day, if need arises frequency will be increased on windy days, in this way around 50% reduction on the dust contribution from the exposed surface will be achieved.
- Water sprinkling of unsealed roads and stock pile areas cover material.
- The duration of stockpiling of excavated mud will be as short as possible as most of the material will be used as backfill material for the open cut trenches for road development
- Temporary tin sheets of sufficient height (3m) will be erected around the site of dust generation or all around the project site as barrier for dust control.
- Tree plantations around the project boundary will be initiated at the early stages by plantation of 2 to 3 years old saplings using drip irrigation or by regular watering so that the area will be moist for most part of the day.
- All vehicles carrying raw materials will be instructed to cover with tarpaulin / plastic sheet, unloading and loading activity will be stopped during windy period.
- To reduce the dust movement from civil construction site to the neighborhood the external part of the construction activity will be covered by plastic sheets.

Water Quality Mitigation Measure

During site development necessary precautions will be taken,

- There will be no impact on the surface water quality during construction phase of

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the facility

- During site development necessary precautions will be taken, so that the runoff water from the site gets collected to working pit and if any over flow is, will be diverted to nearby greenbelt / plantation area.
- During construction activity all the equipment's washed water will be diverted to working pit to arrest the suspended solids if any and the settled water will be reused for construction purposes, and for sprinkling on roads to control the dust emission, etc.
- The domestic wastewater generated from temporary toilets used by the work force will be diverted to septic tank followed by soak pit. Therefore, impact on water quality due to proposed unit would be insignificant.

Noise Mitigation Measures

- Noise generating equipment will be used during day time for brief period of its requirement.
- Proper enclosures will be used for reduction in noise levels, where ever possible the noise generating equipment will be kept away from the human habituation.
- Temporary tin sheets of sufficient height (3m) will be erected around the noise generating activity or all around the project site as barrier for minimizing the noise travel to surrounding areas. Therefore, impact on noise environment due to proposed project would be insignificant.
- All vehicles entering into the project will be informed to maintain speed limits, and not blow horns unless it is required.
- Personal protective equipment like earmuffs, helmets covering ears would be provided to the workers working near noise generating equipment and would see that workers use the protective gadgets regularly.

Solid Waste Mitigation Measures

The solid waste generated during construction period being predominantly inert in nature, construction and demolition waste does not create chemical or biochemical pollution. However maximum effort would be made to reuse and recycle them. The most of the solid waste material will be used for filing/ leveling. of low-laying areas, as road construction material, if any excess given to local contractors for lifting and dumping in low lying areas. All attempts would be made to stick to the following measures.

- All construction waste shall be stored within the site itself. A proper screen will be provided so that the waste does not get scattered.
- Attempts will be made to keep the waste segregated into different heaps as far as possible so that their further gradation and reuse is facilitated.
- Materials, which can be reused for purpose of construction, leveling, making roads/ pavement will also be kept in separate heaps from those which are to be sold or land filled.

The use of the construction material basically depends on their separation and conditions of

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the separated material. A majority of these materials are durable and therefore, have a high potential for reuse. It would, however, be desirable to have quality standards for the recycled materials. Construction waste can be used in the following manner.

- Reuse of bricks, tiles, stone slabs, timber, piping railings etc. to the extent possible and depending upon their conditions.
- Sale/ auction of materials which cannot be used at the site due to design constraint
- Plastics, broken glass, scrap metal, used cement bags, etc., can be sent for recycling in the industries
- Rubble/ brick bats can be used for building activity, such as leveling, under coat of lanes where the traffic does not constitute heavy moving loads.
- Larger unusable pieces can be sent for filing up low laying areas.
- Fine material such as sand, dust, etc., can be used as cover material
- The unearthed soil can be used for leveling as well as for lawn development
- The broken pieces of the flooring material can be used for leveling in the building or can be disposed off
- The unused or remaining paints/varnishes/wood can either be reused or can be disposed.

Ecological Aspects

During construction period, there could be clearing of vegetation in order to prepare the site for construction. However, the present flora and fauna of the area are not considered to be significantly affected by the proposed development. The top soil from the construction area will collected and will be stored separately and will be used for greenbelt development. A comprehensive green belt program will be planned to improve the ecological condition of the region. The proposed development will provide an opportunity for a significant improvement to the visual amenity of the area with the development of green belt of vegetation surrounding the site.

Site Security

Adequate security management would be made to ensure that the local inhabitants and the stray cattle are not exposed to the potential hazards of construction activities. Round the clock security personnel will be appointed to restrict entry of unwanted people to the site.

10.3.2 EMP DURING OPERATIONAL PHASE

In the proposed Secured Landfill Project of Common Hazardous Waste Treatment, Storage and Disposal Facility (CHW-TSDF), A comprehensive environmental management plan (EMP) / mitigation measures will be followed through out the operational and restoration phases of the CHW-TSDF development to meet the environmental standards. During project implementation period, appropriate control measures will be incorporated in the process system to minimize impact on environment and to have smooth operation at the site. To minimize leachate / effluent generation and dust control at source. The specific control

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measures related to air emissions, liquid effluent discharges, noise generation, solid waste disposal etc. The EMP / mitigation plan will address the management strategies for the following environmental issues:

Air Quality Management

The main activities from the proposed project which cause air pollution are as follows:

- DG set stack emissions
- Dust particulates due to movement of vehicles
- Temperature &Odour from hazardous waste.
- Dust, Odour& Gas generation from secured landfill

To comply with the regulatory requirements the following mitigative measures will be employed for the air pollution control to keep the work place and surrounding environment clean and healthy:

- Maintaining and/or re-establishing a grass cover on areas where there is no on-going activity.
- DG set will be provided with a stack height meeting MOEF Guidelines for proper dispersion of sulfur dioxide and oxides of nitrogen.
- Providing and ensuring the use of vehicle wash area for out going vehicles used in landfill operations.
- Repair and relaying of blacktop road within the site boundary.
- Periodical monitoring of ambient air quality for all relevant parameters as specified earlier.
- Speed restriction will be followed within the project and speed breakers will be provided at entry and exit points
- Gas management system in secured landfill will be provided
- Green belt will be provided along the internal roads and plant boundary
- Odour control by rapid stabilization and disposal of odorous wastes.

Odour Suppression

Odour from the proposed project could potentially occur from landfill operations. As stabilized solid wastes from segregated streams would enter the landfill, and the wastes would be covered using daily soil cover, the chances of odour from landfill would be minimized or eliminated.

The mitigation measures proposed to minimize and control odor are as follows.

- Covering the landfill area under operation daily with layer of earth, clay or a similar material.
- Covering by using heavy duty hessian, plastics and foams odor can be minimized.
- Covered dedicated vehicles carrying waste while transportation.

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Landfill Gas Management

The hazardous waste shall be disposed after stabilization and pretreatment to meet the required standard before disposal into landfill thus the gas generation potential is very low as the microbial degradation which is absent owing to low organic materials. However, gas monitoring will be carried out prior to placement of cap and (if required) adequately sized gas removal system will be incorporated into the capping system.

Noise Mitigation Measures

Operations of the facility are not expected to generate significant noise in the surrounding areas. However, the establishment of green belt around the site will automatically reduce the impacts of the slight amount of noise generated from the generator and such other areas. Suitable personal protective equipment will be provided to the staff working in the noise generating areas if any.

The main sources of noise generation is due to movement of vehicles carrying waste, all vehicle (drivers) entering into the project will be informed to maintain speed limits, and not blow horns unless it is required. Necessary speed controlling bumps will be placed near weighbridge and entrance of the site.

The other areas where noise generation is anticipated is DG set room, necessary personal protective equipment like earmuffs, helmets covering ears would be provided to the workers working near noise generating equipment and would see that workers use the protective gadgets regularly. Regular maintenance of the equipment will be carried out as per the schedule given by suppliers. The noise pollution management measures proposed is given below.

Water Quality Mitigation Measures

Surface Water:

During operations of the facility all necessary precautions and provisions as indicated below shall be undertaken to ensure that existing quality of surface water bodies in the region. No impacts on surface water quality are envisaged during closure phase of the project.

Mitigative measures proposed to be implemented to ensure protection of surface water quality include:

Clean Water Diversion: Clean water will be diverted by network of open drains running along the facility, while ensuring that the drains are not in the disturbed area of the site leading to excess sediment. The sediment basin will be provided to settle all the suspended particles before releasing any excess water from the facility.

- Proper Leachate Management:
- Periodical monitoring.

Ground Water:

The main control and prevention of contamination will be an appropriate leachate collection

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system within the composite liner. This will intercept any leachate generated in the landfill. Contaminated water from other points will be collected through a network of drainage lines which will be connected to the leachate collection sump. Mitigative measures proposed to ensure protection of groundwater include:

- Appropriate leachate collection system
- Double composite liner system installed as base liner
- Suitable drainage systems at all other locations within the site
- Emergency procedures to cleanup spillages as early as possible
- Appropriate capping system to minimize leachate generation.
- Periodical monitoring.

Solid Waste Disposal

The solid residue from MEE plant will be sent to secured land fill.

Leachate / Effluent generation

The leachate generated from landfill will be collected into leachate collection wells and sent to MEE plant for treatment.

All efforts will be taken to minimize leachate generation. To prevent water entry to the operation area of the landfill, temporary coverage with tarpaulin will be provided during monsoon season. During heavy rains, the waste will be temporarily stored.

Landscape and Visual Amenity

The various measures proposed to mitigate the potential visual impacts include:

- Landscaping and revegetation to ensure that final landform is compatible with existing landscape of the surrounding areas.
- Development of wood-lot green belt will mask the landfill activities from the surrounding settlement areas and approach roads shall not be visible to the surrounding areas.
- The access road to the landfill will not have direct view of the landfill operations, thus not create any negative visual impact.

Traffic Management

The proposed operations will result in a small increase in the frequency of truck movements on the local roads.

Occupational Health & Safety

Periodic health checkup for early detection and control of disease. Provide regular training for workers in their respective fields.

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TABLE 10-1: ENVIRONMENT MANAGEMENT PLAN

DISCIPLINE	ENVIRONMENTAL HAZARD	MITIGATION MEASURES AND ACTION PLAN	ADMINISTRATIVE ASPECT		MONITORING PARAMETERS
			Implementation	Monitoring	
SECURED LANDFILL FACILITY					
Loading the hazardous waste in dumper	Fugitive emission	Coverage of the dumper to prevent dusting	Site Incharge/Site Engineer		PM_{10} & $PM_{2.5}$ in Ambient air.
	Spillage of waste on the floor	-Avoid spillages by careful handling of the solid waste. -Clean the floor regularly and collect the waste & dispose in landfill	Site Incharge/Site Engineer		Soil & Ground water
	Leakages/spillages during transportation	inspection of the dumpers and ensuring that there is no leakage / spillage	Site Incharge/Site Engineer		Air quality parameter
	Health impacts on the workers.	Usage of Hydraulic dumpers/hook loaders to prevent manual handling Usage of PPEs by all employees Medical check up – pre employment and routine	EHS officer		Occupational health
Temporary storage of Hazardous waste	Leachate generation	Collection of leachate and treatment	Site Incharge/Site Engineer	QA/Chemist	Measurement of material handling, inspections and reports
TRANSPORTATION					
Transportation of waste	Littering the waste on the road	-Inspect the dumpers and ensure that there is no leakage/spillage from the vehicle. -Loaded dumpers/trucks with waste should be fully covered. -Impart training to the drivers. -Dumpers/ trucks should be leak proof.	Site Incharge/Site Engineer		Air quality parameter
	Disposal of waste at	Manifest System	Site Incharge/Site		Soil & Ground water

	non designated place.		Engineer		quality paraments
	Contamination of the tyres of vehicles entering landfill area.	After loading/ unloading the waste, tyres should be washed and washed water shall be sent to treatment.			Soil quality parameters
FINAL DISPOSAL					
Final disposal of the hazardous waste into secured landfill facility.	Violent reaction/ fire	-Strictly to follow the acceptance criteria. -Check the reactivity of the wastes prior to disposal -Properly designed leachate collection wells. -Daily monitoring of levels in the wells. -Transfer of leachate from the wells to storage for treatment.	Site Incharge/Site Engineer		Air, Ground & Soil quality paraments
	Excessive leachate generation in monsoon season	-Cover the sub-cells of the facility with tarpaulin to prevent entry of rain water -close monitoring of the site round-the-clock during monsoon	Site Incharge/Site Engineer		
	Blowing away of the waste dust with the wind	-Spray water during summer season -Cover the waste layer with fresh soil and compact it.	Site Incharge/Site Engineer		
	Disposal of waste at the wrong place in the premises leachate handling	-Provide indicators and sign boards for systematic operation. -Properly designed leachate collection wells. -Daily monitoring of levels in the wells. -Transfer of leachate from the wells to storage for treatment.	Site Incharge/Site Engineer		
MONITORING ACTIVITY (Monitoring activity should continue even after closure of the facility)					
Water Quality	-Ground water pollution	-Monitoring groundwater at upstream and downstream of the site	Site Incharge	QA/Chemist	Water quality parameters

	-Contamination of ground water	-Groundwater monitoring surrounding the site as per pre designed plan -Proper barrier systems like impermeable liners, gravity slope and gravel packed channels are constructed for natural flow of leachate and contact water. -The leachate generated has to be collected in a tank from where it can be pumped out to the treatment unit. Thus the chances of ground water contamination can be minimised.			
Air Quality	Air pollution (Fugitive, Dust and gaseous emissions)	-Ambient Air Monitoring for various parameters at the site and surroundings -Water Dumpers, sprinklers are deployed for water spraying. -Tree plantation around the facility area and along the roads. -Respirable dust samples are collected and analyzed periodically to ensure that the dust concentration limit is contained within the allowable limits	Site Incharge	QA/Chemist	Air quality parameters
Soil Quality	Soil pollution (Project site will undergo a major transformation during land filling. The waste is to be compacted in layers with proper sloping. Contamination of soil	-Soil sampling from various locations and analysis. -After land filling is complete, the liner system consisting of soil cover, HDPE liner and vegetative cover shall be immediately constructed to avoid any contamination of soil.	Site Incharge	QA/Chemist	Soil quality parameters

	is possible if the lining system is improper. Also littering of the waste while transportation to the disposal facility, blowing of waste particles due to wind shall lead to soil contamination. Spillage of leachate during pumping also will lead to soil pollution localized)				
NOISE	Noise pollution (Noise levels during construction phase will be high during operational phase due to instrumental work, increased truck movement, earth movers etc.	-These negative impacts are short term. -Equipment to be kept and maintained in proper condition to keep the nois level within 75 dB(A). -Workers will be provided with necessary protective equipment e.g. ear plug, earmuffs. -Provision of green belt and plantation would further help in attenuating noise.	Site Incharge	QA	Noise Level
TRAFFIC	Traffic Impacts	The proposed operations will result in a small increase in the frequency of truck movements on the local roads. As there is no much traffic overcrowding is expected and the impact will be insignificant.	Site Incharge	QA	Verification by observation
SOCIO-	Socio-Economic	-The site is selected for the disposal of	Site Incharge	EHS officer	

ECONOMIC	Impacts	hazardous wastes at village- Kharpadi Tehsil-Hasanpur Distt - Amroha, Uttar Pradesh, is not having any visible adverse impact on human population as well as live stock as this site is excluded from any agriculture, forest, ecological sensitive, or animal grazing land. Moreover, the site is barren land and approved by CPCB for that purpose. -With TSDF phase-I for Secured landfill proposed, there will be additional employment opportunities for about 40-50 persons (Construction phase) and about 60 persons (Operational phase). In general, the project is to have positive environmental impacts by collecting and disposing the hazardous waste in the scientific manner, this will reduce the future health hazard.			
FIRE AND SAFETY	Accidents/disasters related to fire and safety	- Disaster management plan (DMP) is in place. - A well-laid fire fighting system and fire extinguishers will be installed as per fire safety norms. - Regular fire safety training will be conducted during operation. - Road/Fire Safety Week/National Safety Day/ Safety Week Celebrations will be conducted to improve the safety consciousness.	Site Incharge	EHS officer	Daily inspections of the TSDF site workings as per the statute will be carried out by Agent, Management representative/TSDF site incharge/Officer/Supervisor/Engineer and other statutory Officials.
HEALTH AND SAFETY	Injury	- Pre placement and Periodical medical examination of the TSDF site workers.	Site Incharge	EHS officer	Examination records, training records.

		- Use of personal protective equipment. - SMSPL will conduct/ provide health monitoring program for the employees. It will focus especially on workers who are handling the hazardous waste. - All the employees shall be required to undergo a medical checkup before joining the facility. Medical checkup will be conducted on a monthly basis and the health conditions monitored - During routine medical checkup a nutritional feed plan shall be provided to each employee recommending them for proper nutrition. - All the first aid facilities required to immediately mitigate emergency situations shall be made available at the facility and at all critical locations of the facility like the treatment plant, landfill, etc.			
IMPACT ON AGRICULTURE AND LIVESTOCK	No Impact	The area is a barren land without significant vegetation. Hence no impact on the agriculture is envisaged.	-	-	-

STORM WATER	-	- SMSPL is providing coverage system with storm water collection and drainage for the utilized area as per the CPCB guidelines. -The top coverage system is provided with proper liner system including HDPE liner, the rainwater is taken care of properly. -The rainwater is going through the drainage system without any contamination.	Site Incharge	QA	Precaution is taken that no contanimated water goes to the drainage system
GREEN BELT		-Adequate green belt will be provided by SMSPL	Site Incharge/Site	contractors	Inventory of trees,
		- around the existing site. -TSDF will developed green belt all around surrounding i.e. 33 % of the total land i.e. 12762 M^2.-Green belt will be properly maintained resulting in formation of a thick canopy of trees around the project site.	Engineer	(CONSTRUCTION/O &M)	verification by observation.
OPERATION, MAINTENANCE AND CLOSURE OF THE FACILITY	Contamination of Environment	The site will be operated, maintained and closure of the facility will be done as per approved plan by SPCB and in accordance with guidelines published by CPCB.	Site Incharge/Site Engineer	Contractors (CONSTRUCTION/O &M)	Verification by Observation.
POST CLOSURE PHASE	Ambient air quality	-Monitoring of ambient air quality for various parameters	Site Incharge	QA/Chemist	Air Quality/Quarterly
	Emission from landfill vents	-Monitoring of vents for HCs / VOCs, monthly	Site Incharge	QA/Chemist	Air Quality/Quarterly
	Leachate generation	-Sampling and analysis of leachate for various parameters, monthly -Treatment of generated leachate in Multiple	Site Incharge	QA/Chemist	Leachate Characteristic/Quarterly

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		Effect Evaporator			
	Groundwater monitoring	Monitoring of groundwater	Site Incharge	QA/Chemist	Groundwater analysis once in a month, upstream and downstream
	Soil contamination	Monitoring of soil samples	Site Incharge	QA/Chemist	Soil quality parameters/ Quarterly
	Stability of the landfill	Regular inspection and maintenance of the coverage system	Site Incharge/ Site Engineer	contractors (construction/o&m)	Verification by Observation

The total fiscal estimation for EMP is indicated to be Rs. 21 lakhs/annum; details are given in Table no. 6.3. in Chapter-6.

10.4 HAZARDOUS WASTE MINIMIZATION

SMSPL will adopt waste minimization practices to conserve resources and energy. One of the major aspects in the hazardous waste minimization is that it should be tackled at the generators' end. Once waste is generated, it is to be either recovered and reused; or treated and disposed off. SMSPL will work out recycling options of various hazardous wastes generated by the industries, so that some of the wastes can be utilized for various purposes like cement kilns.

10.5 SOCIO ECONOMIC DEVELOPMENT ACTIVITIES UNDER CEP

Corporate Environmental Policy (CEP), also known as Corporate Environment Responsibility (CER), is a form of corporate self-regulation integrated into a business model. Ideally, CEP policy would function as a built-in, self-regulating mechanism whereby business would monitor and ensure its support to ethical standards and international norms. Consequently, business would adopt responsibility for the impact of its activities on the environment, consumers, employees, Communities, Stakeholders and all other members of the public sector. CEP focused businesses would proactively promote the public interest by encouraging community growth and development, and voluntarily eliminating practices that harm the public sector, regardless of legality

The activities under Corporate Environment Responsibility shall be undertaken in consultation with local administration and stakeholders.

10.6 OCCUPATIONAL HEALTH MANAGEMENT

Medical Checkup:

All the employees shall be required to undergo a medical checkup before joining the facility. Medical checkup will be conducted on a monthly basis and the health conditions monitored

First Aid Facilities:

All the first aid facilities required to immediately mitigate emergency situations shall be made available at the facility and at all critical locations of the facility like the treatment plant, landfill, etc.

10.7 Fire Protection System

The fire protection system will protect the entire site area from fire hazards happening accidentally. This fire protection system comprises of a ground level water storage tank to store the anticipated requirement of water. One electric motor driven pump and one diesel high pressure pumps will be provided to pump the water to a high-pressure header from where the water is distributed to various high pressure hydrants provided at selected locations. Necessary fire hoses terminated with spouts will be kept ready at each hydrant location to facilitate firefighting. The header also caters to a multi fire system to automatically sprinkle water through sprinklers provided.

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10.8 ENVIRONMENTAL MANAGEMENT CELL

The Environmental Cell will be headed by the Management Representative followed by other officers and technicians. The department is the nodal agency to co-ordinate and provides necessary services on environmental issues during operation of the project. This environmental group is responsible for implementation of environmental management plan, interaction with the environmental regulatory agencies, reviewing draft policy and planning. This department interacts with State Pollution Control Board and other environment regulatory agencies. The department also interacts with local people to understand their problems and to formulate appropriate community development plan. The major duties and responsibilities of Environmental Management Cell shall be as given below:

- To implement the environmental management plan,
- To assure regulatory compliance with all relevant rules and regulations,
- To ensure regular operation and maintenance of pollution control devices,
- To minimize environmental impacts of operations as by strict adherence to the EMP,
- To initiate environmental monitoring as per approved schedule
- Review and interpretation of monitored results and corrective measures in case monitored results are above the specified limit
- Maintain documentation of good environmental practices and applicable environmental laws as ready reference
- Maintain environmental related records
- Coordination with regulatory agencies, external consultants

10.9 RECORD KEEPING AND REPORTING

Record keeping and reporting of performance is an important management tool for ensuring sustainable operation. Records should be maintained for regulatory, monitoring and operational issues. Typical record keeping requirements for the TSDF is summarized in **Table 10.2 below** :-

TABLE 10-2: RECORD KEEPING PARTICULARS

Parameter Particulars	Parameter
Solid Waste Handling and Disposal	▪ Daily quantity of waste receive ▪ Daily quantity sent to landfill
Waste water	▪ Daily quantities of treated effluent disposed ▪ Quantity and point of usage of treated wastewater ▪ Treated wastewater quality
Regulatory Licenses (Environmental)	▪ Environmental Permits / Consents from UPPCB
Monitoring and Survey	▪ Records of all monitoring carried out as per the finalized monitoring protocol
Accident reporting	▪ Date and time of the accident

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	▪ Sequence of events leading to accident ▪ Chemical datasheet assessing effect of accident on health and environment ▪ Emergency measure taken ▪ Step to prevent recurrence of such events
Other	▪ Log book of compliance ▪ Employee environmental, health and safety records ▪ Equipment inspection and calibration records, where applicable ▪ Vehicle maintenance and inspection records

10.10 ACTION PLAN FOR COMPLYING PERFORMANCE EVALUATION & MONITORING OF TSDF

The detailed action plans for complying performance evaluation and monitoring of TSDF facility is given below under **Table 10.3.**

TABLE 10-3: ACTION PLAN FOR MONITORING TSDF

Section	Applicable Rule	Compliance
4.1	Basic Information to be provided by the operator of the facility	The basic information as per the Format given in HAZWAMS/…./2010-2011 dated May 24, 2010, Annexure-III will be provided to SPCB/CPCB before the start of operation of the facility as one time exercise. In case if there is any change in the activity of the proposed facility, updated information will be provided to SPCB/CPCB
4.2	Periodic information to be prepared and submitted on quarterly basis by the operator of the facility collection centre to the general public	Periodic information as per the format given HAZWAMS/…./2010-2011 dated May 24, 2010,Annexure-IV will be provided to SPCB/CPCB on quarterly basis within 15 days of the end of the quarter
5.2	Uniformity in monitoring of soil, ground & surface water, ambient air quality, gaseous emissions from vents provided to the already capped landfills, a monitoring protocol is to be followed	To have Uniformity in monitoring of soil, ground & surface water, ambient air quality, gaseous emissions from vents provided to the already capped landfills, a monitoring protocol suggested in HAZWAMS/…./2010-2011 dated May 24, 2010, Annexure-V will be followed and will be provided to SPCB/CPCB as per Consent conditions
5.4	Storage of Incompatible wastes in the TSDF	While storing and mixing incompatible wastes general criteria suggested as guideline in HAZWAMS/…./2010-2011 dated May 24, 2010, Annexure-VII will be followed

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5.6	Online tracking system for movement of hazardous waste	Measures will be taken to put in place online tracking system for movement of the hazardous waste from generators to the final disposal facility
5.7	Strengthening and upgrading laboratories, Accreditation as per EPA, 1986, obtaining ISO 17025 through NABL system	A fully-fledged laboratory having sufficient equipment for monitoring and analysis of all required parameters will be established in the facility. Funds will be provided for regular upgradation of the laboratory. Will apply for accreditation as per EPA, 1986 and will strive to obtain ISO 17025 through NABL system

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11 SUMMARY AND CONCLUSION

11.1 INTRODUCTION

M/s Sangam Medi serve Pvt. Ltd. was established in March 2013 and has been successfully working in the field of waste management as per the statutory guidelines. The proposed facility is located near hub of Industries where all essential facilities such as water, power, fuel, post, telecommunication n, bank, etc. available. It is one of the largest industrial area of Uttar Pradesh.

The project proponent is Mr. Hari Om Sharan Dwivedi, Director, M/s Sangam Mediserve Pvt. Ltd. The proposed project shall cater to the requirement of disposal of hazardous waste generated by the Industrial units in Uttar Pradesh.

M/s Sangam Medi serve Pvt. Ltd (SMSPL), a company incorporated under companies act, 1956. A proposed Common Hazardous Waste Treatment, Storage and Disposal Facility (TSDF)., which will handle Land fillable waste (LFW) - 36,000 MTA, Landfill after Treatment (LAT) – 24,000 MTA, Hazardous waste Co – Processing - 40,000 MTA and E- waste recycling – 6000 MTA.

The proposal is to serve nearby industrial areas through Integrated Common Hazardous Waste Treatment, Storage and Disposal Facility (ICHW-TSDF). The proposed capacity of the landfill (Phase-I) is 7.1 lacs MT hazardous wastes which will be disposed scientifically at a secured landfill.

As per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 under Environment Protection Act, 1986, hazardous waste generated by industries should be collected, transported, treated and disposed in a properly designed Treatment, Storage and Disposal Facility (TSDF) for hazardous waste.

As per EIA Notification 2006, the Project falls under Category **"B" schedule 7 (d**) listed in EIA Notification dated 14th September 2006 and subsequent amendments dated 1st December, 2009 & 4th April, 2011.

As a part of above process, the application (Form-1 along with Pre-Feasibility Report) was submitted for the proposed Secured Landfill (Phase-I) of Common Hazardous Waste Treatment, Storage and Disposal Facility (TSDF). The project was considered by the State Expert Appraisal Committee (SEAC/SEIAA) in its meeting held on 06-02-2019 and SEIAA in its meeting dated 06-03-2019 for approval of Terms of Reference (ToR). Accordingly, TOR was approved vide letter no/Ref. No. 743/Parya/SEAC/4484/2018 dated 09-03-2019.

11.2 PROJECT CAPACITY DETAILS

The proposed project is for secured landfill (Phase I) of TSDF (Common Hazardous Waste Treatment, Storage and Disposal Facility). The new landfill Phase-I as proposed would provide capacity of 7.1 Lacs MT for disposal of hazardous waste (assuming a density 1.5 Mg/m^3).

Land Details

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The project is located at 28°27'55.94"N and 78°21'03.94"E, Kharpadi, Tehsil-Hasanpur Distt.-Amroha, Uttar Pradesh.

S.No.	Tehsil	Village	Plot/Khata No.	Area	Ownership
1.	Hasanpur	Kharpadi	941, 942 and 944	3.867 Ha (38670 Sq. Meters.)	M/s Sangam Mediserve Pvt. Ltd. (SMSPL)

Water Requirement

The total water requirement for the facility is 50 KLD will be abstract from proposed bore well/Ground located at Site. For the same will be taken necessary permission from CGWB.

Power Requirement

The power requirement is 62.5 KVA, which will be sourced from Paschimanchal Vidyut Vitran Nigam Ltd (PVVNL). In case of power failure, 1 D.G. Set of 62.5 KVA capacity can be used.

Required Manpower

During Construction phase the labours and workers will be hired from nearby villages. Number of persons required during construction phase is 40-50 and 60 nos. is required during operation.

Project Cost

The estimated cost of the Project is approximately Rs. 40 crores.

11.3 PROCESS DESCRIPTION FOR HAZARDOUS WASTES DISPOSAL

A typical process flow of operation of TSDF site includes collection and transportation of hazardous waste from member industry in the dedicated authorized vehicle with manifest system to the TSDF site, quantification and characterization of waste, pretreatment as per requirement and disposal into land fill, closure of TSDF. Monitoring of surrounding environment Shown in fig 11.1 given below;

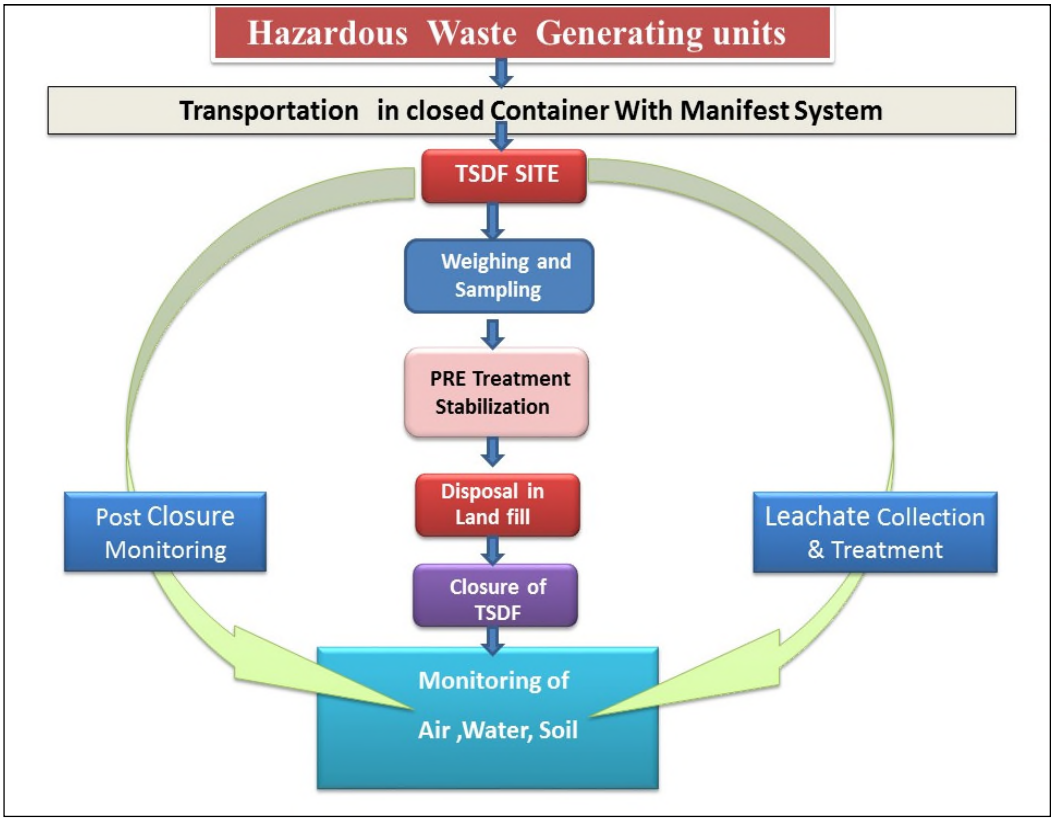

FIGURE 11-1: PROCESS FLOW CHART OF TSDF

A. TRANSPORTATION OF HAZARDOUS SOLID WASTE FROM GENERATION SITE TO TSDF

Transportation of hazardous solid waste is carried out as per guidelines of CPCB. The transportation of hazardous waste is carried by duly approved/authorized transporter in dedicated vehicles. All the vehicles shall have the nameplate with details of company's name, address, phone no., etc. During transportation, containers shall be closed from all sides and covered from top.

Type of vehicles used is of relevant capacity with crane mounted containerized collection and loading system, covered having pneumatic loading / unloading arrangements.

Qualified and experienced drivers are employed and they are further trained to take care of pollution arising out of emergency and first aid in case of injuries.

B. MANIFEST SYSTEM

The manifest system as per Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016; is followed. It consists of seven copies in different colors.

The 6 copies of the system are distributed as outlined below:

i. Waste Generator shall retain one copy (1)
ii. Generator to the state PCB. (1)
iii. Transporter (1)

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iv. Operator to transporter (1)
v. Operator to PCB (1)
vi. Operator (1)
vii. Operator to Generator (1)

C. TEMPORARY STORAGE OF WASTE

Temporary Storage Facility will be provided primarily to store the wastes upon receipt at the facility until its pathway of waste disposal is determined. The temporary waste storage facility shall keep each shipment of wastes separately and ensure that wastes do not get mixed with each other. This is to ensure that incompatible wastes are kept segregated. Compatible wastes that can be mixed with others and those stored in drums/containers are kept away from incompatible wastes. Incinerable wastes shall not be accepted at this site as the proposed site is Secured landfill facility, however waste with high calorific value shall be accepted for Co - processing in Cement Plant.

Intractable Waste Storage Area - Waste coming to the TSDF that does not meet the criteria for landfill disposal or treatment would be referred to as intractable wastes. It is proposed to have a suitable storage area for these categories of waste until alternate viable treatment technologies are identified and available.

The Waste storage area will have; -

- ✓ Proper ventilation shall be provided to prevent accumulation of hazardous gases.
- ✓ The floor shall be a concrete slab or other impermeable, non-reactive material properly bunded and graded towards one corner for the collection of accidental spillage and leakage.
- ✓ The storage area shall be built not less than 1m above the 1:100-year flood level to avoid inundation.
- ✓ Bunding and/or drains shall be provided around the storage area to avoid storm water entering this area.
- ✓ Fire control equipment shall be installed, appropriate to the characteristics of the waste and as the situation demands.

D. WASTE STABILIZATION

Waste stabilization is designed to convert industrial wastes in the form of liquids, semi-solids or reactive solids into low leachable materials that can be deposited into a secure landfill. The stabilization operation will be carried out for all waste that requires this to minimize their contaminant leaching potential. This will change the nature of these wastes to a less hazardous category. Stabilization involves the immobilization of leachable materials by fixation as non-reactive solids. The treated wastes shall be assessed for compatibility with other wastes before being landfill and for compatibility with the HDPE and the pipe network.

E. GROUND WATER SAMPLING AND ANALYSIS

The TSDF will provide monitoring wells at the site for ground water monitoring. (In upstream

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and at the downstream of TSDF site). The monitoring parameters will be as per the guidelines given by the CPCB. The TSDF will have laboratory facility for analysis of bore well water. Monitoring is to be done once in a month.

F. LEACHATE MANAGEMENT SYSTEM

Leachate collection and removal shall be provided at the base of each landfill cell above the geo-membrane in two layers viz., the primary and the secondary liners. The primary liner shall serve as leachate collection and removal system, while the secondary liner shall serve as leak detection system and a signal of potential liabilities in terms of environmental pollution. Leachate shall be collected by a network of lateral and header pipes embedded in a drainage layer, all of which shall eventually drain into a leachate collection sump. The collected leachate shall be pumped from leachate wells to tankers and transferred to MEE plant.

G. GASEOUS EMISSION MANAGEMENT

Landfill gas is generated as a product of waste biodegradation or because presence of VOC in the waste. Gas generation shall be minimized by avoiding disposal of biodegradable/ organic waste. The company shall provide air vents at the capped portion of the land fill. The company shall also carry out regular monitoring of these vents for VOC & HC though external party.

H. CLOSURE AND POST CLOSURE MAINTENANCE DETAILS FOR CLOSED CELLS INCLUDING VEGETATIVE STABILIZATION:

The Site Manager will provide coverage system as per CPCB criteria for entire landfill. The final cover system at the top of landfill will be designed in such a way that it will enhance surface drainage and prevent infiltration of water and supports surface vegetation. The closed portion will be given proper landscape. Gas vent system shall be provided. After closure of the land fill monitoring shall be carried out as per prescribed norms.

I. SURFACE WATER DRAINAGE SYSTEM

The storm water drainage system shall be provided at the site to prevent surface water /rainwater runoff does not drain into waste from surrounding area and there is no waterlogging or ponding at landfill site. TSDF shall provide storage shade for hazardous waste during monsoon period. In rainy season, the main operational site shall be kept covered by tarpaulin with separate rain water collection system. The surface water generated during rainy season will be collected through storm water system and it is discharged to well laid drainage system of industrial area. The storm water drainage is shown in the layout plan.

11.4 LANDFILL LAYOUT

A landfill site comprise of the area in which the waste is filled as well as additional area for support facilities. The area in which the waste is to be filled shall comprise of separate landfill cell with each cell accommodating a group of compatible waste. Within each unit work will proceed in phases with only a part of the area under active operation. The additional facility at site includes, access roads, weigh bridge, equipment, office space, temporary waste storage

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area, surface water drainage system, landfill leachate management facility, monitoring site of well, fencing and green belt along the periphery.

11.5 BASELINE ENVIRONMENTAL STATUS

The baseline study of the existing environmental conditions of the project site and of its close vicinity has been established with respect to physical, biological and socio- economic environment. The air quality of the area meets the prescribed National Ambient Air Quality Standards. The background noise levels were also found well within the standards.

The **quality of ground water** was assessed by taking samples and analyzed as per CPCB guidelines. The ground water quality was also found well within the standards.

It is envisaged that no surface water body is existing in the 500m radius of the project area.

No forest land is falling in the study area. In addition to that there is no sensitive ecosystem in the vicinity. No rehabilitation and resettlement issue is emerging with the selected project site.

I. Air & Water

At proposed TSDF site, fugitive emission & odour will be generated while spreading waste at land fill will be controlled through covering the waste with inert material, water spray in landfill facility.

For emission of landfill gases, vent will be provided in Landfill (capped cells) and monitoring of these vents will be carried out.

Emissions from DG set containing PM, SO2 and NOX within permissible limit will be let-out through stack.

Leachate coming out in the form of liquid waste will be evaporated in the MEE facility.

II. Solid & Hazardous Waste Generations and Disposal System

As this is a Hazardous Solid Waste Disposal Facility, there is no hazardous waste generation from land filling facility. However, the residue from MEE after treatment of leachate is disposed in the landfill.

The waste from laboratory generated from remaining samples of hazardous waste is disposed after appropriate treatment.

Spillage of waste during transportation & during unloading operation is prevented not to contaminate soil/ land.

III. Noise level and control system

The source of noise pollution at site is vehicles, D.G. set etc. Preventive maintenance is carried out to reduce noise generation at source to the permissible limit. However, at place where noise levels can exceed the permissible limit, Ear plugs is provided to those working in such area.

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IV. Details of Greenbelt

Total 12762 sq.mtr land area is available at the site; out of this area about 33% area is covered as green belt and other forms of greenery.

11.6 BUDGETARY PROVISION FOR EMP

The project management has made budgetary provision for environmental protection and safety measures. Cost towards environmental mitigation measures allocated for recurring cost Rs. 21 lakhs/annum.

TABLE 11-1: BUDGET OF IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT PLAN

S.NO	Title	Capital Cost (Rs) Crores	Recurring Cost (Rs) Lakhs/ annum
1.	Leachate collection system, MEE (Multi effect Evaporator) Septic tank/Soak pit, etc	2.5	5
2.	Gas collection, odor management, etc	1.0	5
3.	Noise Control measures – Acoustic enclosures for DG set, Noise barriers for pumps, solar system etc	0.20	2
4.	Landscaping, Greenbelt development	1.0	2
5.	Rainwater harvesting, storm water drains	1.0	1
6.	Ambient Air quality monitoring, Laboratory equipments, etc	3.0	2
7.	Third party monitoring, energy audit, environmental audit, training programs, etc	0.5	2
8.	Environmental control measures during construction stage, Miscellaneous works	1.0	2
Total		**10.2**	**21**

11.7 RISK ASSESSMENT AND MITIGATION MEASURES

Various impacts identified in the study area due to project activities, some negative and some positive. The impacts are caused by the construction activities as well as by the handling, treatment and disposal of hazardous waste during the operation phases. Various impacts identified are mitigated by proper preventive & control measures to prevent further deterioration of environment.

We further commit to ensure the compliances as follows:

A. To take care of waste gases, waste water, noise and solid waste as per guidelines of MOEF,

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CPCB and UPPCB.

B. To additionally expand and develop green area inside the factory premises.

C. To encourage water conservation through water re-use and re-cycling.

D. To provide qualified safety officer to build an emergency preparedness and to implement suitable measures to prevent and control an accident hazard.

E. To organize frequent mock drill exercises to check the preparedness towards emergency.

F. To comply with the various regulations issued by MOEF, CPCB and UPPCB in respect of Collection, Transportation, Storage and Disposal of hazardous waste.

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Dwivedi.

12 DISCLOSURE OF CONSULTANTS

M/s Shivalik Solid Waste Management Ltd. accredated consultant has been engaged to conduct Environmental Impact Assessment study of the proposed new project of secured landfill phase-I TSDF Project. The project is to be developed by M/s Sangam Mediserve Pvt. Ltd. (SMSPL),

Name of the Consultancy Company	M/s Shivalik Solid Waste Management Ltd.
Address	Registered Office: Village-Majra, P.O. Dabhota, Tehsil Nalagarh, Distt. Solan, Himachal Pradesh - 174101 Phone/Telefax: 01795-260427, 260227 Zirakpur Office: SCO 20-21, 2nd Floor, Near Hotel Dolphin, Baltana, Zirakpur Punjab- 140604 Phone/Telefax : 01762 – 509496
E-mail Address	infoshivalikeia@gmail.com
Website	www.sswml.net
Nature of Services	Treatment, Storage & Disposal Facility, EIA Consultancy, Environmental, Health & Safety Auditing, EMS, Environmental Monitoring & Laboratory Analytical Services, Waste water Management, Energy Audit Greens Concept Development, etc.

Shivalik Solid Waste Management Limited (SSWML), Nalagarh is offering high quality technical services in the field of EIA, Environment, Health & Safety (EHS), and Environmental Monitoring & Laboratory Analytical Services etc.

SSWML is supported by distinguished professionals, engineers, scientists etc. SSWML professionals have excellent experience in executing EIA and other environmental projects.

Environmental Monitoring work was carried out by Noida Testing Laboratories, (An ISO: 9001: 2008, 14001: 2004 & OSHAS: 18001: 2007 Certified & NABL Accredited Laboratory) MoEF & CC (Ministry of Environment, Forest & Climate Change), UPPCB & HSPCB Recognized Laboratory).

Following experts are associated with SSWML for EIA and Environmental projects.

Declaration by Experts contributing to the Draft EIA of Proposed secured Landfill for Common Hazardous waste treatment, storage and disposal facility (TSDF) at Amroha, Uttar Pradesh by M/s. Sangam Mediserve, Pvt. Ltd.

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I hereby certify that I was the part of EIA team for above mentioned project along with the following members who has engaged to develop the above mentioned EIA project.

EIA Coordinator: Mrs Daksha Gupta

Name: Mrs Daksha Gupta

Signature: 

Period of involvement: Feb'2019-till date

TABLE 12-1: KEY PERSONNEL/EXPERTS ASSOCIATED WITH THE STUDY

S. No.	Functional Areas	Name of the Expert/s	Involvement (Period & Task**)
1.	AP*	Daksha Gupta	Visited site and written the sections on air pollution control management. Period of Involvement: Feb' 2019 –till date
2.	WP*	Daksha Gupta	Period of Involvement: Feb' 2019 –till date Visited site and written the sections on water pollution control management
3.	SHW*	Ashok Sharma	Period of Involvement: Feb' 2019 –till date Visited site and written the sections on solid wastes generation and management
4.	SE*	Sayantani Chatterjee	Period of Involvement: Feb'' 2019 –till date Visited site and written the sections on socio-economic scenario and CSR Plan.
5.	EB*	S.Brahma Shivani Dutt	Period of Involvement: Feb' 2019 –till date. On the basis of collected information about flora and fauna from Forest dept and checked during field visit Data interpretation was done under the guidance of approved FAE-A category.

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S. No.	Functional Areas	Name of the Expert/s	Involvement (Period & Task**)
6.	HG*	Yamesh Sharma	Provided guidance on Hydrology aspects of the EIA Report.
7.	GEO*	Subhash Chander Sharma	Provided guidance on Geology and geomorphologic analysis based on secondary data.
8.	SC*	S. Brahma	Interpretation of baseline data of soil analysis and its interpretation along with field observation. Preparation of draft report considering impact and mitigation on Soil as per guide line
9.	AQ*	Daksha Gupta	As there is no source emission & very little Fugitive emission. No Air Quality Modelling was required. Period of Involvement: Feb' 2019 –till date
10.	NV*	Viney Kurakula	Period of Involvement: Feb' 2019 –till date Visited site and written the sections on noise pollution control and management
11.	LU*	Viney Kurakula	Period of Involvement: Feb'2019 –till date Written land use section Prepared land use maps, contours and drainage maps based on satellite imagery
12.	RH*	Ashok Sharma	Written the section on Risk Analysis, Mitigation Measures and DMP.

TABLE 12-2 KEY PERSONNEL/FAA/TM ASSOCIATED WITH THE STUDY

S. No.	Functional Areas	Name of the TM/FAA	Involvement (Period & Task**)
1.	AP*	Shivani Dutt (TM)	Assisted approved FAE Period of Involvement: during study period Tasks: Assisted FAE Site visit, checking air quality data, evaluation of results of Ambient Air Quality Monitoring (AAQM), and contribution to EIA

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S. No.	Functional Areas	Name of the TM/FAA	Involvement (Period & Task**)
			documentation& compilation of report.
2.	SE*	Sunita Dhirta (TM)	Assisted approved FAE in data compilation of Socio-economic data.
3.	SHW*	Dr. Ranjana Sharma (TM)	Assisted approved FAE Period of Involvement: during study period Assisted approved FAE Site Visit, Identification of solid and Hazardous Wastes generated, designs for temporary storage facilities for hazardous wastes, mitigation measures for management of hazardous waste, contribution to the EIA documentation.
4.	SC*	Dr. Ranjana Sharma (TM)	Assisted approved FAE Period of Involvement: during study period Tasks: Assisted FAE Site visit, checking SC data, evaluation of results.

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Hari om Shanker Dwivedi.