

**INSTALLATION OF HOSPITAL WASTE
INCINERATOR
AT Tehsil Head Quarter Hospital, Muridke
District Sheikhpura**



**ENVIRONMENTAL IMPACT ASSESSMENT (EIA)
REPORT**

Prepared by;



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LIST OF ACRONYMS

BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
EA	Environmental Approval
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency – Punjab
EPC	Environmental Protection Council
HW	Hospital Waste
HIV	Human Immunodeficiency Virus
LAA	Land Acquisition Act
MSW	Municipal Solid Wastes
NCS	National Conservation Strategy
NGOs	Non–Government Organizations
NOC	No Objection Certificate
O&M	Operation and Maintenance
OHS	Occupational Health and Safety
PEQS	Punjab Environment Quality Standards
PEPA	Punjab Environment Protection Agency
PEPC	Pakistan Environment Protection Council
PKR	Pak Rupees
PM	Project Manager
PPC	Pakistan Penal Code
PSDP	Public Sector Development Project
PTCL	Pakistan Telecommunication Limited
PTV	Pakistan Television
RAP	Resettlement Action Plan
RNR	Renewable Natural Resources
SPM	Suspended Particulate Matter
VOC	Volatile Organic Compounds

EXECUTIVE SUMMARY

Health care waste management is strongly influenced by cultural, social, and economic circumstances. A well-designed waste management policy, a legislative frame work and plans are essential for handling of medical waste. Medical and research facilities are moving toward the achievement of a healthy and safe environment for employees and communities. Incineration is a thermal process, which destroys the wastes including microorganisms, therefore, the incineration of medical waste including the hospital waste is recommended for a clean environment. This Environment Assessment depicts the environmental and social impacts related with the installation of hospital wastes incineration plant to be installed at THQ Hospital Muridke, district Sheikhpura.

Title and location of the Project

The title of proposed project is “Installation of Hospital Waste Incinerator, at THQ Hospital Muridke.

Location: The proposed project is to be installed within the premises of THQ Hospital Muridke, district Sheikhpura.

Name of the Proponent

The proponent of the project has been designated as followings:

Dr. Ahmad Ammar Asif

Medical Superintendent (MS)

THQ Hospital, Muridke, district Sheikhpura

Name of the Organization Preparing Report

M/S Madiland Pakistan has been entrusted for preparation of EIA report for the proposed project. The corresponding address is; **Head Office:** Plot 16 Sher shah block Garden Town, Lahore Punjab, Tell Office: +92 42-37882967: Email: info@medilandpakistan.com

Brief outline of the Proposal

United Nations Office for Project Services (UNOPS) plans to install the Hospital waste incinerator located at Muridke District. Spanning an area of approximately 3 Kanal, this project is essential for ensuring the safe and efficient hospital waste disposal, improving operational efficiency, and adhering to standards for health safety and environmental compliance. Incinerator Model # i8-200G will be installed comprises a hospital grade incinerator for proper disposal of hospital solid waste material. The incinerator has incineration capacity of 150 kg per hour designed.

The incinerator works with natural gas burners with the option to operate on standby LPG fuel. Combustion gas is re-burned in the post-combustion (secondary) chamber at the temperature range of 1250°C during minimum 2-3 seconds. The incinerator is designed as a packaged unit, having pre-wired electrical connection and fuel pipes in place, making installation easier at site. Waste will be introduced through a manual front-loading system, continuous interval into the incinerator. Incineration is an important method for the treatment and decontamination of biomedical and health-care waste. Incineration is a high-temperature (850°C to 1250°C) dry oxidation process that reduces organic and combustible waste to inorganic, incombustible matter and results in a very significant reduction of waste volume and weight the incineration/ pyrolysis should only be carried out in appropriate plants. The system will be designed to cope with the specific characteristics of hazardous health-care waste.

Project Impacts and Recommendations for their Mitigation

Table 0-1 shows the project impacts; related with construction and operation and accordingly mitigation measures have also been proposed to safeguard the environment and for sustainable development.

Table 0-1: Project Impacts and their Mitigations Measure

Impacts	Magnitude	Recommendation Measure	Responsibility
CONSTRUCTION/INSTALLATION PHASE			
Air Pollution Dust Generation, Gases emissions from vehicles during construction phase	Minor	<ul style="list-style-type: none"> Sprinkling of water at active construction sites and unpaved areas on regular basis especially during dry climatic conditions 	Proponent and its contractor

Impacts	Magnitude	Recommendation Measure	Responsibility
		<ul style="list-style-type: none"> • Periodic maintenance and tuning of all the construction machinery and vehicles 	
Solid waste Construction waste and domestic waste from worker camp	Minor	<ul style="list-style-type: none"> • Conduct separate collection of construction and domestic waste to promote recycling and re-use • Dispose non-recyclable and hazardous waste material properly according to waste management rules 	Proponent and its contractor
Water Quality - Leakage of oil and chemical materials from construction activity - Run-off water from construction area - Wastewater from camp site	Minor	<ul style="list-style-type: none"> • Use of spill prevention trays and impermeable sheets to avoid contamination of the groundwater/surface water • septic tanks will be constructed with cemented wall to prevent the groundwater contamination 	Proponent and its contractor
Noise - Noise caused by construction machinery - Vehicles used for mobilization of construction equipment and workers	Minor	<ul style="list-style-type: none"> • Control noise through control of working hours and selection of less noisy equipment. • Proper maintenance of vehicles and construction equipment 	Proponent and its contractor
OPERATIONAL PHASE			
Air Pollution During operation of incinerator	Minor	<ul style="list-style-type: none"> • Incinerators specifically designed for HCW are used; • Properly trained staff operate the incinerators according to standard operating procedures; 	Plant Operators

Impacts	Magnitude	Recommendation Measure	Responsibility
		<ul style="list-style-type: none"> • Appropriately high (more than 1250°C) temperature will be achieved in the incinerator to avoid dioxin or furan discharge. • The flue gases are properly treated (e.g. with the help of water scrubbers) before their release to the atmosphere. An inbuilt scrubber will be installed. • There is no leakage of gases from the first chamber of the incinerator to avoid any release of dioxins before they can be destroyed in the second chamber. 	
Solid waste Residual and fly ash (about 5-10% of the total waste and as per quality of waste)	Moderate	<ul style="list-style-type: none"> • Proper testing and in compliance with standards before disposal. A scientifically approved pit will be prepared with the incinerator room and ash will be dumped there. 	Plant Operators
Water Quality (250 Liters/Hr for operation)	Moderate	<ul style="list-style-type: none"> • Installation of wastewater treatment facility so any wastewater produced will be treated and in compliance with wastewater standards of PEQS and reused in the facility. 	Plant Operators
Noise Noise from Equipment/ Machinery/Vehicles	Minor	<ul style="list-style-type: none"> • Proper maintenance of equipment and machinery. • Enhanced management to reduce machinery noise and exhaust and its impact on the surrounding environment. • Green belts around the project area, peripheral and internal areas. 	Plant Operators
Work Safety	Minor	<ul style="list-style-type: none"> • Prepare a manual for labor accident prevention including safety education and training 	Plant Operators

Impacts	Magnitude	Recommendation Measure	Responsibility
		<ul style="list-style-type: none"> • Provide workers with appropriate protective equipment • Installing fire extinguishers in fire handling places • Developing firefighting organization and implementing fire drills 	

Proposed Monitoring

The monitoring program is designed to ensure that the requirements of the environmental approval to be awarded by the EPA are met. Monitoring Program (MP) provides important information that allows for more effective planning and an adaptive response based on the assessment of the effectiveness of mitigation measures. The monitoring of various parameters will help to determine the extent to which project construction/operation activities will cause environmental compliance.

Table F-1: Proposed Monitoring Plan

Sr. No.	Monitoring Parameters	Monitoring Mechanism	Frequency	Responsibility
DURING INSTALLATION				
1.	Dust Emissions	Ambient Particulate Matter Monitoring.	Testing will be carried out on quarterly basis.	Proponent and its contractor
2.	Noise Levels	Noise meter	On quarterly basis by a third party	Proponent and its contractor
3.	Gaseous Emissions	Emissions monitoring system. Monitoring of ambient air quality.	Will be carried out on quarterly basis.	Proponent and its contractor
4.	HSE Plan	Health, safety and Environment will be monitored on daily basis	Daily	Proponent and its contractor
DURING OPERATION				
1.	Noise Levels	Noise meter as per PEQS	On quarterly basis by a third party	Proponent and its contractor

Sr. No.	Monitoring Parameters	Monitoring Mechanism	Frequency	Responsibility
2.	Water Quality	Discrete grab sampling and laboratory testing of water sample.	As described by PEQS	Proponent and its contractor
3.	Emissions	Emissions monitoring system. Monitoring of ambient air quality and stack emission from incinerator stack.	Will be carried out on quarterly basis as per PEQS	Proponent and its contractor
4.	Security	Security arrangements will be made	Daily	Proponent and its contractor
5.	HSE Plan	Health, safety and Environmental will be monitored on daily basis	Daily	EHS officer of Project Proponent

Environmental Management Cost

The cost for environmental management and monitoring will be the part of contract of Contractor and Consultants respectively. However, a lump sum amount of Rs. 2.5 million will be allocated by the project proponent as cost for environmental training and monitoring for a period of two years during construction and operation of the project.

Stakeholder Consultations

Stakeholder consultations were held with the inhabitant of the surrounding area. They are quite positive to the project and see the project as waste management and health improvement business and accomplishing towards the positive development in the area at local level. The people observe strong positive impacts regarding the good way of hospital waste management. EIA findings depict that people perceive overall positive social and environmental impacts by the project.

Conclusion

The study was carried out to assess the environmental issues of the installation of Incinerator plant. All the relevant environmental impacts of the study have been identified based on the field survey and accordingly their mitigation measures were proposed in the report. The EIA

was carried out keeping in view the Punjab Environmental Protection Act 1997 (ammended-2012). In the light of the facts obtained from the project baseline study and control measures, it is envisaged that installation and operation of the proposed hospital waste incinerator will be useful for environment and has no adverse social and environmental impacts. The nearby residence communities have no issue with the installation of the project rather it is highly supported project because of present waste management condition, human health and disease risks in area.

1 INTRODUCTION

Hospital waste is becoming a complex issue due to changing technologies and increase in the services that the hospitals perform for the community. Out of the available technology for the final disposal of solid wastes, incineration is best suited for hospital waste as it renders the waste nontoxic, non-hazardous, non-putrescible and reduces the volume of material for ultimate disposal. Medical waste incineration involves the burning of wastes produced by hospitals, veterinary facilities and medical research facilities. These wastes include both infectious medical wastes as well as non-infectious, general housekeeping wastes. The main aims of hospital waste management are:

- Minimizing risk for personnel, general public and environment
- Minimizing the amounts of waste being generated
- Providing for segregation and separation of wastes
- Designation of deposit areas in the wards
- Establishment of safe routes for the transportation of the waste
- Establishment of a safe and proper area for the temporary storage
- Proper waste treatment and disposal
- Compliance with the Hospital Waste Management Rules as prescribed by the EPA.

Under the framework of the Basel Convention on the control of trans-boundary movements of hazardous wastes and their disposal “Technical Guidelines on the environmentally sound management of biomedical and health-care waste” have been published. It is strongly advised to use and apply these guidelines which provide detailed information on the hazards of health-care waste, safe management of health-care waste, the proper segregation and collection of wastes as well as treatment and disposal methods and capacity building. In accordance with the Punjab Environmental Protection Act 2012, the project shall be strictly followed to manage the Hospital waste (Risk and Non-Risk Waste) according to Punjab Hospital Waste Management Rules 2014. These rules shall be followed at all stages i.e. documentation, segregation, collection, transportation, storage, disposal, minimization and reuse. Waste

management plan shall be prepared by the waste management officer for approval by the hospital waste management team and shall be based on internationally recognized environment management standards.

1.1 Waste Management Team

Hospital Waste Management Team shall be established according to Punjab Hospital Waste Management Rules 2014 and members of the hospital waste management team shall be informed in writings of their duties and responsibilities. Hospital waste management team shall hold review meeting once in a month. It shall be ensured that concerned hospital staff member receive adequate training regarding hospital waste management procedures.

The design of the incinerator will be with appropriate emission control technologies and in compliance with regulatory requirements of the Punjab Environmental Quality Standards i.e. flue gases and waste shall be appropriately treated before discharging to the environment.

According to the rules Committees shall be formulate as under;

- a) Hospital Waste Management Team
 - a. Medical Superintendent Chairman
 - b. Heads of all departments of the hospital Member
 - c. Infectious control officer Member
 - d. Chief Pharmacist Member
 - e. Radiology Officer Member
 - f. Senior matron Member
 - g. Head of administration Member
 - h. Hospital engineer Member
 - i. Head of the sanitation staff Member
 - j. Other hospital staff members as the Medical Superintendent may designate Member
 - k. A public representative of the district member Administration nominated by the D.C.O. Member
 - l. A representative of the EPA, Punjab Member

b) Types of health-care waste

- Non-Risk Waste includes paper and cardboard, packaging, food waste, aerosols and others
- Risk Waste means infectious waste, pathological waste, sharps, pharmaceuticals, genotoxic waste, chemical waste and radioactive waste
- infectious health-care waste (hazardous) which is contaminated by any type of pathogens
- Genotoxic waste includes cytotoxic drugs and outdated materials, vomitus, etc.
- Chemical waste includes chemicals from diagnostic and experimental work, cleaning process, housekeeping and disinfecting procedures, mercury and cadmium waste
- Pathological waste (tissues, organs, blood, body parts etc.)
- Sharps means needles, syringes, scalpels, infusion sets, knives, blades or any other item that could cut or puncture
- Radioactive waste means liquid, solid and gaseous waste contaminated with radionuclides
- Pharmaceutical waste (expires or unused pharmaceutical products, surplus drugs, vaccines etc.)

1.2 Purpose of the Report

The proposed project envisages the Installation of Hospital Waste Incinerator and in accordance to the Punjab Environmental Protection and Climate Change Department Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2022, SRO # No.1/EPA/EIA/MISC/21/4214(1)/2022, the project for hospital waste incinerator falls in Schedule –II, Part-G “Waste Storage and Disposal” {Waste Incinerators and autoclaves} for which Environmental Impact Assessment (EIA) report is required for Environmental Approval.

According to the Punjab Environmental Protection Act Section 12, Initial environmental examination, and environmental impact assessment: “No proponent of a project shall commence construction or operation unless he has filed with the

Government Agency designated by Provincial Environmental Protection Agencies, as the case may be, or, where the project is likely to cause an adverse environmental effects an environmental impact assessment, and has obtained from the Government Agency approval in respect thereof.” It is this legal requirement from the Government of Punjab that this Environmental Impact Assessment (EIA) report has been prepared to get Environmental Approval (EA) from the Environmental Protection Agency, Government of Punjab.

This report provides detailed information and facts of project; including especially among others environmental, economic, social, etc., enabling its assessment and justification that the project will meet the requirements of environmentally sustainable practices; both during installation and regular operation stages, the Punjab Environment Quality Standards and the rules and the regulations thereof.

The other relevant regulations and guidelines considered while preparing this EIA report include:

- Policy and procedures for filing, review and approval of environmental assessments.
- Guidelines for the preparation and review of environmental reports.
- Guidelines for public participation.
- Guidelines for sensitive and critical areas.
- Detailed sectoral guidelines

Different environmental aspects like social, physical biological etc and other related features of the project both during installation and its regular occupancy are highlighted in this EIA report. Measures necessary to be adopted to mitigate any environmental impacts on any part of the environment around are also described. All the important information is also provided as described under the format used to help decision makers, EPCCD Punjab in the present case, before issuing the desired Environmental Approval (EA).

1.3 Identification Of Project and Proponent

The proposed project is the installation of Hospital Waste Incinerator by at THQ Hospital, Muridke, District Sheikhpura.

1.4 Details Of Consultants

M/s Madiland Pakistan Pvt Ltd, Lahore, Pakistan.

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1.5 Persons Performing the EIA Study (Team Members)

The EIA study of the proposed project has been conducted according to Environmental Assessment Procedures, 1997, Review of IEE and EIA Regulation 2022 as prescribed by the Federal Environmental Protection Agency (Pak EPA), Government of Pakistan. The study team of M/S Madiland Pakistan which completed the EIA report consists of following experts as mentioned in **Table -1.1**.

Table 1-1: Members Completed EIA Process

Name	Qualification	Status in Project
Mr. Ahtasham Raza	PhD. Scholar (Env. Sciences) M. Phil (Env. Sciences) GC University, Lahore	Project In-charge
Mr. Adnan Sharif	BS (Env. Sciences) Diploma in Environmental Law - Punjab University	Team Leader
Mr. Mehmood Amjad	BS (Hons) Environmental Sciences NFC.IET. Multan	Monitoring In-charge
Iris Earnest	PhD Environmental Sciences GC University, Lahore	Senior Environmentalist
Nimra Shehzadi	MPhil Environmental Science GC University, Lahore	Environmentalist
Mohsin Majeed	BS Environmental Sciences	Environmentalist
Muhammad Irshad	BS Environmental Sciences	Environmentalist

Only the main roles of the team members are given. However, their role was not restricted to these, rather it also includes many other studies in their respective fields in the context of this EIA studies.

1.6 Brief Description of Nature, Size and Location of Project

The proposed project is Installation of Hospital Waste Incinerator by M/s Madiland Pakistan Pvt. Ltd. at THQ hospital Muridke, District Sheikhpura, Punjab.

The incinerator works with natural gas burners with the option to operate on standby LPG fuel as well. The standby fuel arrangement will be done by the firm but the hospital will pay the expenditures of LPG. Combustion gas is re-burned in the post-combustion (secondary) chamber at the temperature of 1250°C. The control panel is fitted with a functional synoptic view showing the operating situation of the whole incinerator and is controlled by Programmable Logic Controller (PLC). The incinerator is designed as a packaged unit, having pre-wired electrical connection and fuel pipes in place, making installation easier at site. Waste will be introduced through a manual front-loading system, continuous interval into the incinerator.

1.7 Objective of the Report

Objectives to conduct this EIA are as following:

- i. A legal binding in accordance to Punjab Environmental Protection Act-2012.
- ii. To identify the potential environmental issues pertaining to the proposed site.
- iii. To evaluate the ability of the site in view of social acceptance and environmental soundness.
- iv. To provide the maximum information to the proponent and other stakeholders about the existing environmental conditions and the implications of the proposed project.
- v. Collection of available data, reports, drawings and other relevant information about area of proposed project.
- vi. Review of applicable existing environmental legislation and Punjab environmental quality standards (PEQS).
- vii. Propose mitigation measures to eliminate or to reduce the negative impacts to an acceptable level.
- viii. Development of well-resourced environmental management and monitoring plans to identify mitigation strategies targeted towards avoidance, minimization and rehabilitation of the impacts.

1.8 Extent of the Study

In compliance with PEPA-2012 requirements, an EIA report has been prepared by consultants. This document covers all environmental impacts, due to proposed project, in and around the project area comprising the physical, ecological and socio-economic

aspects together with identification of the potential positive and negative impacts. Any developmental activities outside the project area and establishment of the other factories outside the project vicinity have not been covered under this EIA study.

1.9 Methodology

The methodology adopted to carry out the EIA study of the proposed project was as follow:

- a) Orientation
- b) Planning of Data Collection
- c) Data Collection
- d) Site Reconnaissance
- e) Analysis of Maps and Plats
- f) Literature Review
- g) Desk Top Research
- h) Public Consultations
- i) Field Studies
- j) Laboratory Analysis
- k) Evaluation of Impacts and their analysis
- l) Categorization of impacts based on their potential environmental significance and prescription of preventive / mitigation measures.

In addition to the evaluation and review of the available records, data and the facts for the previous project, detailed discussions were held with the concerned members of the project management.

Notes and proposals for measures to be taken to mitigate and compensate for any determined/detrimental environmental impacts are contained in the Environmental Management Plan (EMP) as well as a Monitoring Plan, including all parameters that need to be measured and the frequency of monitoring actions. A comprehensive qualitative and quantitative methodology was adopted to conduct this study inter-alia in due compliance with the EIA requirements. The study included collection of both primary and secondary data regarding environmental status and other relevant factors.

This EIA report has been accomplished after carrying out thorough visit to the proposed site and detailed investigation to identify the following Environmental areas of concern:

- 1) To achieve the desired environmental compliance standards; as per the national environmental regulatory requirements; as applicable to the project.
- 2) Plans and activities to prevent/mitigate any potential impacts and the gaps that could probably remain after implementation.
- 3) Any other points/steps to be taken which could be beneficial to mitigate environmental adverse impacts that may accrue both during construction and regular operation of the project.

1.10 Scope of the Study

The purpose of this EIA study is identification of key environmental and social issues which will likely arise during installation and operation of the project along with the assessment of the significant negative impacts and mitigation measures to be adopted for their minimization.

The ultimate goal of this EIA report, among others, is also to produce an Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMP) for the Construction and Operation Stages of the proposed project. Compliance of EMP together with the provisions for mitigation measures for the significant negative impacts will ensure the implementation of this project in an environmentally sustainable manner both at installation as well as Operation stages of the project. The EIA report ensures compliance to all national and local regulations enforced in Pakistan, especially Punjab for such report. While taking into consideration the corporate standards, it was further sought to ensure that the project under reference of this EIA report, is to be developed in a manner that is socially responsible and reflects sound environmental management practices.

This EIA report also discusses the legal and administrative framework within which the EIA has been prepared. A brief project description is included in the EIA report together with a description of the baseline environmental conditions and the actual environmental situation at the proposed site for the project.

The technical section of the report and the environmental baseline situation form the basis for the detailed impact assessment during construction and operation phases of the project.

Based on the findings of this report, an environmental management system has been devised, outlining necessary mitigation and compensation measures together with monitoring practices.

1.11 The Report Structure

This EIA document is structured as follow:

Section–1: Introduction: Containing general information about the project and process of carrying out the study.

Section–2: The Project Description: Describes an overall detail of the works to be done.

Section–3: The Description of the Environment: Gives information on Physical, Biological and Social conditions collected through survey of the Project Area

Section–4: Screening of potential Environmental Impacts and mitigation measures: Identifies various environmental impacts and their preventive actions. This makes the basis of the Environment Management Plan

Section–5: Environmental management and monitoring program: Contains comprehensive prescriptions regarding environmental impacts and their mitigation measures. This also includes institutional arrangements and Environmental Management & Monitoring Plan

Section–6: Stakeholders Consultations: Explains the process of public consultation and disclosure of the project in related stakeholder. It makes this document a legal public document.

Section–7: Mitigation and impact Assessment: It deals with the major potential impacts which could occur during operational phase and how could amendments will be done in design and monitoring for mitigation

Section–8: Emergency Response Plan & Evacuation/Exit Plan: Explains about the arrangements to avoid any natural or anthropogenic emergency

Section –9: Health and Safety Plan: Health and Safety Plan (HASP) provides a general description of the levels of personal protection and safe operating guidelines expected of each employee or subcontractor associated with the environmental services being conducted at the site

Section –10: Conclusion and Recommendation: Concludes the EIA report with some practical recommendation.

2 DESCRIPTION OF THE PROJECT

2.1 Details Of Proposed Project

This section deals with project components, which are the part of construction of the environmentally controlled shed under discussion. It also describes the category of the project, availability of construction, materials, construction time and cost of the project, construction and operation equipment's etc. the information presented in this section is based on project site survey, preliminary design report and construction drawings provided by the client.

2.2 Description of the Project.

The proposed project is Installation of Hospital Waste Incinerator at THQ hospital Muridke, district Sheikhpura. Incineration is an important method for the treatment and decontamination of biomedical and health-care waste. Incineration is a high-temperature (850°C) dry oxidation process that reduces organic and combustible waste to inorganic, incombustible matter and results in a very significant reduction of waste volume and weight. The incineration/pyrolysis should only be carried out in appropriate plants. The system should be designed to cope with the specific characteristics of hazardous health-care waste.

Model: i8-200G

Capacity: up to 200 kgs per hour

Country of Origin: UK

The Incinerator (waste management system) which will comprise a hospital grade incinerator for proper disposal of hospital solid waste material.

2.3 Details Of Proposed Project

2.3.1 Technical Specifications

Table 2-1: Operational Specification:

Combustion Chamber Volume (m3)	1.92m³
Burn Rate (Kg p/h)	Up to 150kgs
Fuel Consumption (Ltrs p/hour)	20-25 ltrs
Time To Temp	45-60 mins
Gas retention Time (Seconds)	2 secs
Loading Method	Top Load
Fuel Options	Light Oil or Gas/LPG

Combustion Chamber Volume (m3)	1.92m³
Electricity Supply	110v or 230v
Control Panel (IP Rating)	IP55
Heat Recovery	Yes
Auto Ash Removal	No
Auto Loader Compatible	Yes
Remote Monitoring	No
Ash Residue	3-5%
Recommended Operational Temperature	850°C

Table 2-2: Physical specifications:

Assembled Dimensions (L/W/H):	3200 x 2100 x 4390 mm
Assembled Weight	6500 kg
Door Size	2040 x 1060 mm
Thermocouples	3
Steel Thickness	4 mm
No. of Burners	3
Refractory Composition	Coretex
Operating Footprint:	31.62 m ²
Cool Touch Cladding	Yes
Viewing Portal	No
Tertiary Air Fan:	No

2.4 Location of the Project

The project is located at grand trunk road of N-5 within the premises of THQ hospital Muridke, district Sheikhpura figure 2-1.

Figure 2-2 to 2-4 showing the layouts and technical drawings of the proposed project.

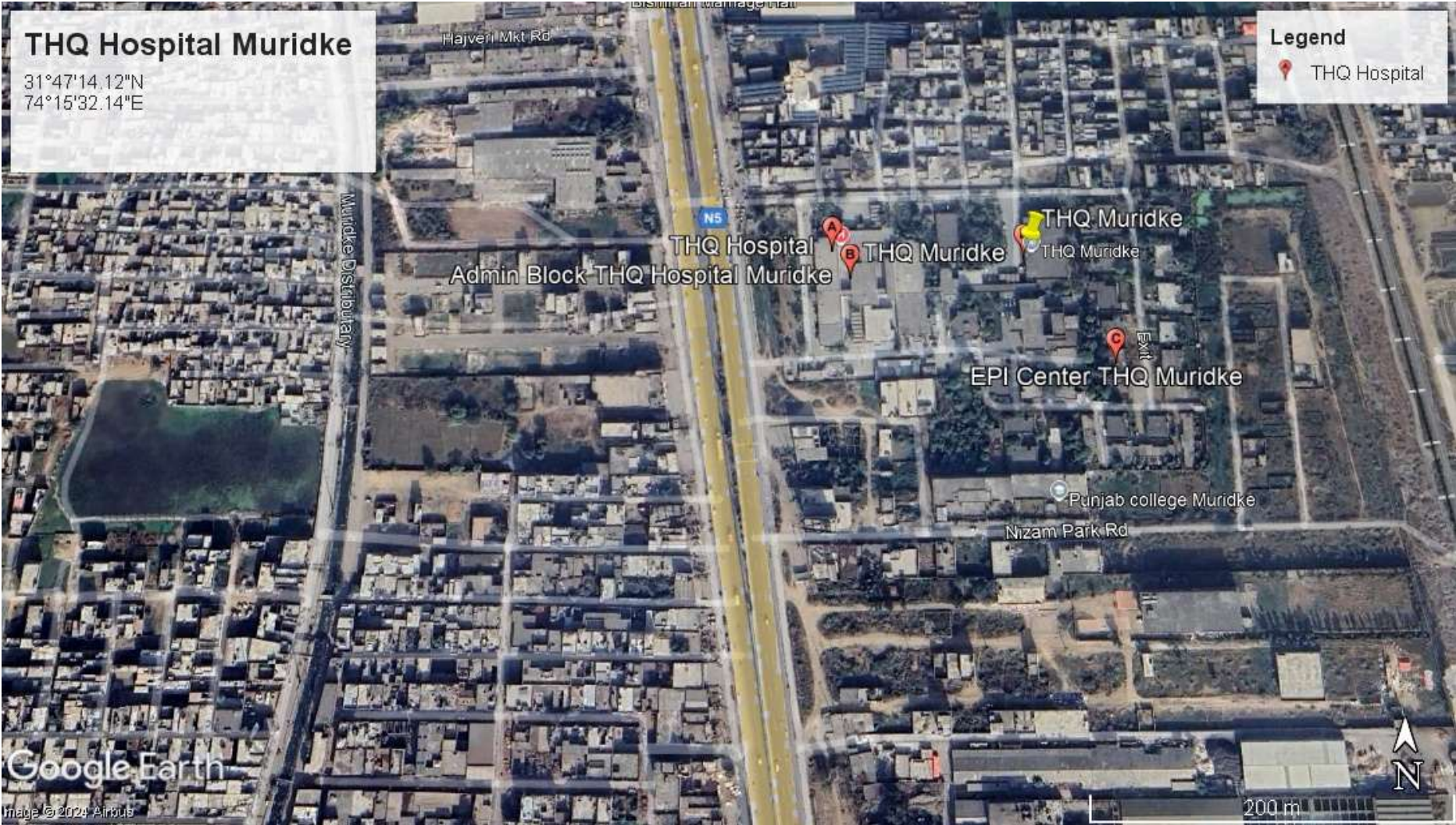


Figure 2-1: THQ Muridke

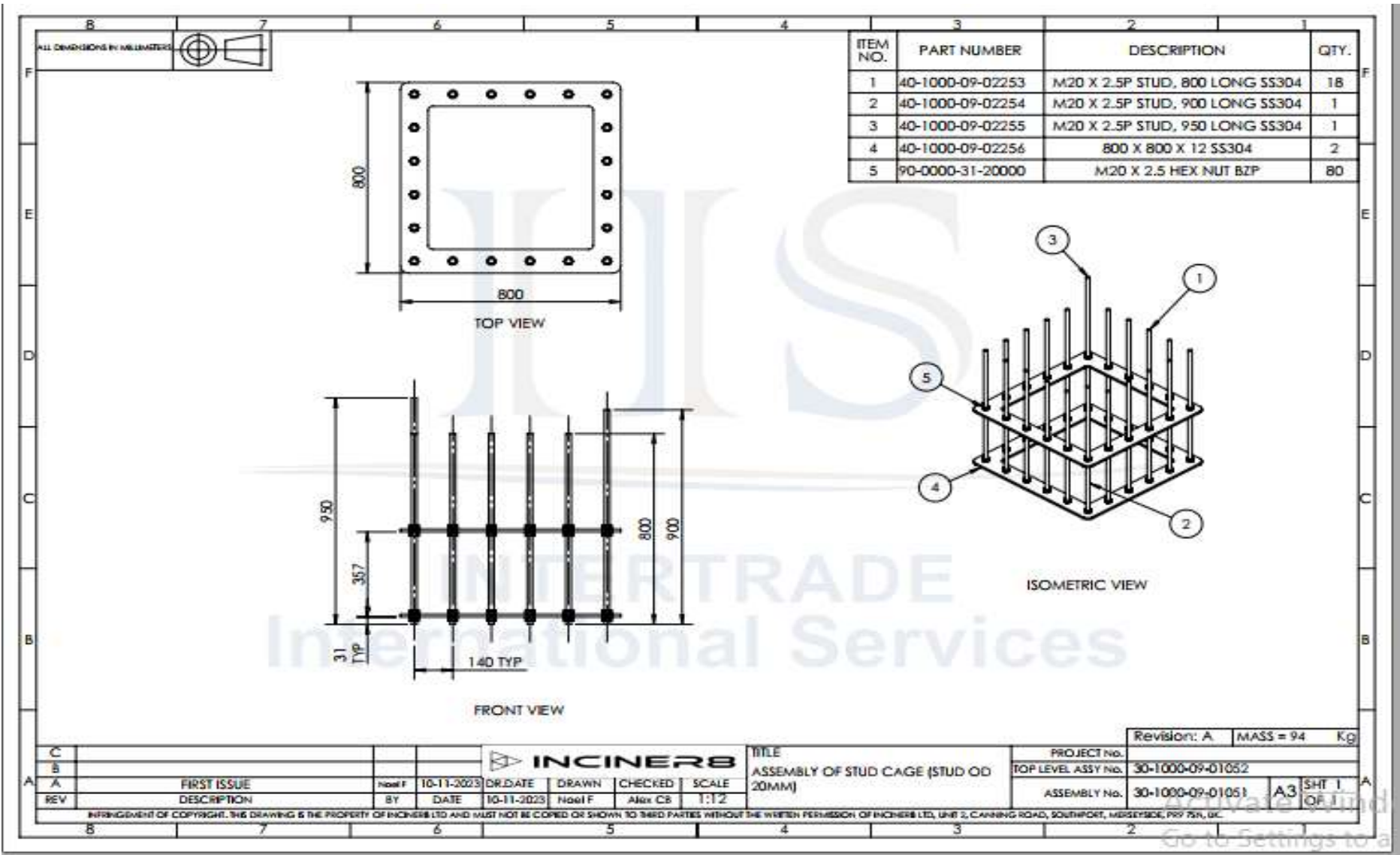


Figure 2-2: Proposed Plan layout of Incinerator i8-200G

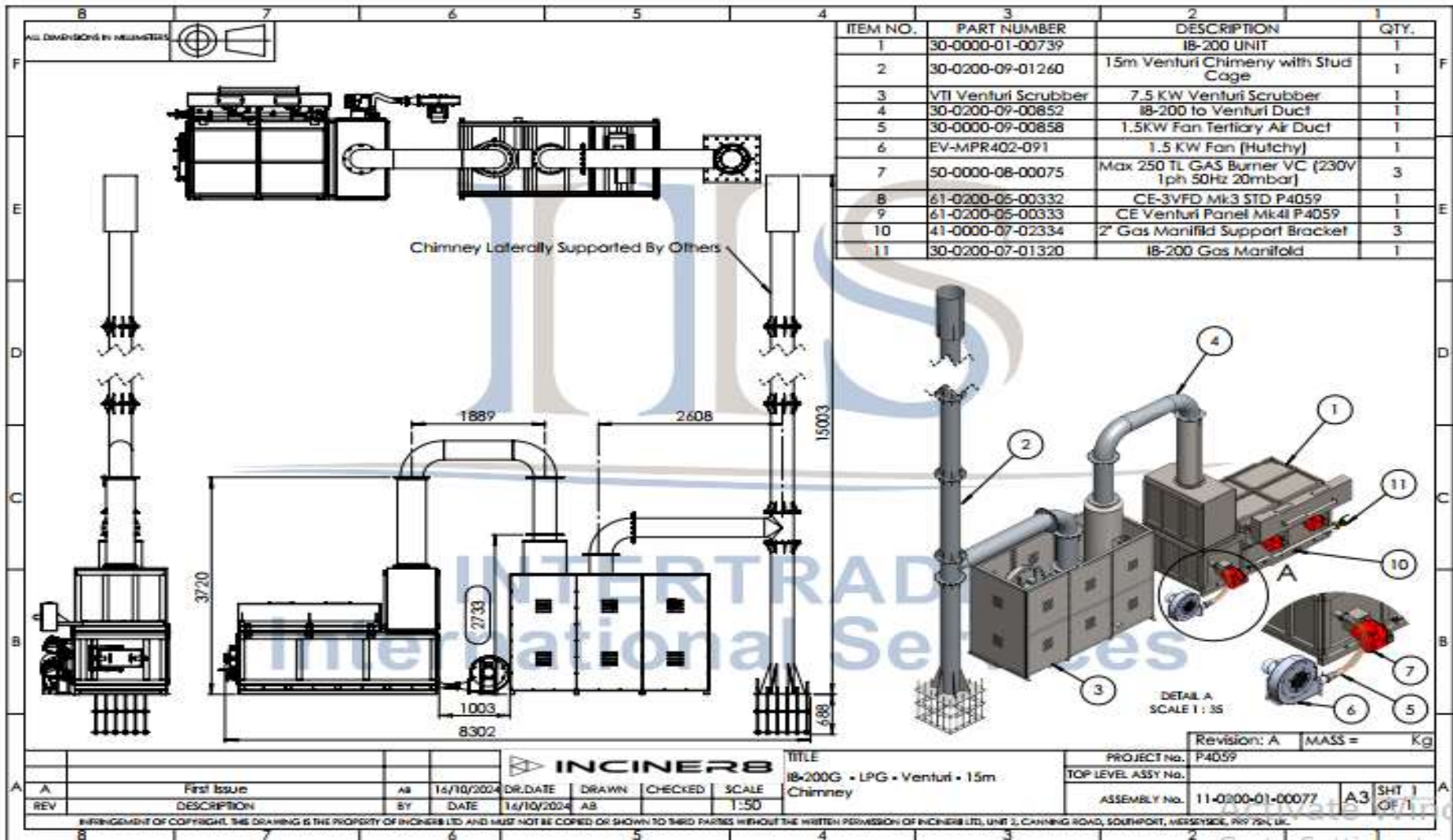


Figure 2-3: Proposed Plan layout of Incinerator i8-200G

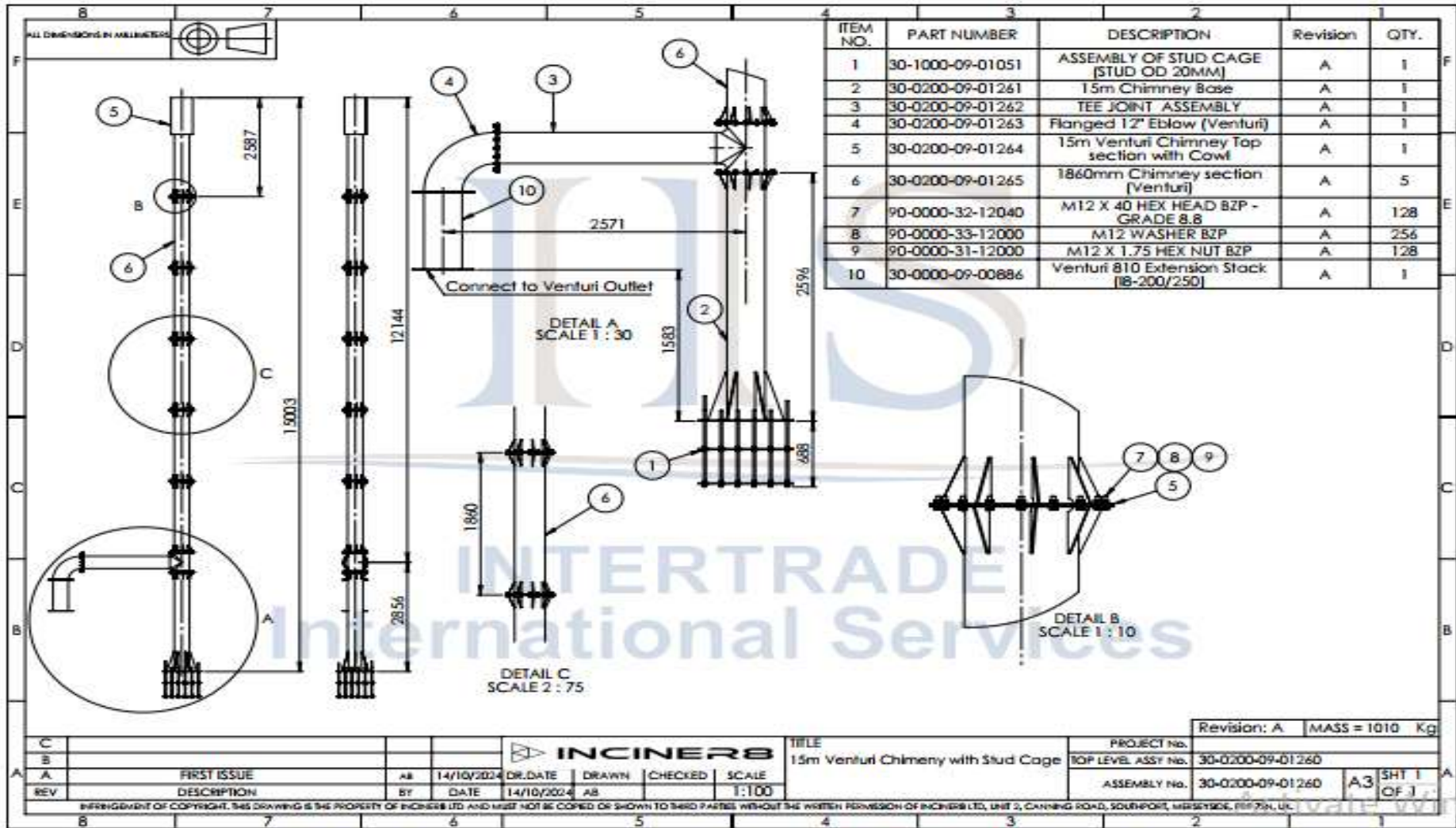


Figure 2-4: Proposed Plan layout of Incinerator i8-200G

2.5 Civil Work Detail

The waste treatment site for hospital waste incineration shall consist of the following / civil work detail. Hospital Waste Incinerator with allied accessories

- Incinerator room / shed
- Waste Storage/ Yellow room
- Trolley/Vehicle Washing Area
- Ash Dumping Pit
- Boundary Wall if necessary
- Drive Way
- Foundation pad/ platform as per manufacturer's standards.
- Furniture for Staff

2.6 Utilities Required for the Project

Following utilities will be part of the proposed incinerator table 2-3.

Table 2-3: Project Utilities

Burning Capacity	Fuel	Water	Electricity supply
150 kg/h	20~25 Liter/hour	200 liters/hour	110v~230v

For handling the waste and operating the incinerator, following equipment (protective and manual tools) will be provided.

Table 2-4: Required Equipment

Sr. #	Description	Quantity
1	Manual ash removal tool	01
2	Manual particulate removal tool from water trough	01
3	Digital Weighing Scale for weighing the waste at site	01
4	Mobile Main Trolley of SS (anti magnetic)	01
5	Pair of leather gloves	02
6	Pair of long safety shoes	01
7	Masks for odour	10 Box
8	Fire extinguisher on mobile trolley 10kg	01
9	Posters for instructions/guidance/protocol etc. in suitable frames	04

2.7 Restoration/Rehabilitation at the End of Project Life

There will be no any matter of rehabilitation as the proposed site is already owned by the project proponent. There will not be any let regarding safety factors as applicable from time to time for such structures on all accounts.

During entire construction period, necessary precautions will be taken to ensure that no damage is done to the basic infrastructures like sewer system, power transmission lines roads, private or public property and daily human life as well. Safety measures will be adopted to avoid any harm to humans, property around, or the environment in the project area. Dust to be generated will be minimized by constant sprinkling of water.

After completion; all construction matrix, debris and garbage will be removed off immediately from the site within the minimum possible time under safe conditions. Any minor spill over of these materials will be cleared adequately. The land, if and where pitted will be adequately levelled. On the whole, the project site and the area in its near vicinity will be made neat and clean.

3 DESCRIPTION OF ENVIRONMENT

3.1 Introduction

This chapter describes the baseline conditions, which cover the existing physical, ecological, and socio-economic environment of the Study Area. Information on these aspects has been derived from the desk study of available data, field visits to the project area as well as information obtained through visits to the Government departments and prevailing environmental laws and environmental quality standards etc.

3.2 General

This chapter describes the environmental social and biological baseline conditions of the project area, and includes sections on the physical environment, the biological environment; and the social, economic and cultural environment. The baseline description is based on data collected at site, and available data collected during stakeholder and institutional consultation and previous studies conducted in the area. The description of the environment is site-specific and includes the information of water quality (surface water and groundwater), topographic condition, ambient air quality, climate of the area, description of ecological habitats, located in the overall environmental study area and socio-economic conditions of the area.

3.3 Physical Environment

3.3.1 Topography

Muridke is bounded by 6 other districts of Pakistani Punjab namely: Lahore, Nankana Sahib, Narowal, Hafizabad, and Gujranwala. Topography of the City is plain. The area is a part of Rechna Doab and consists of Sub-recent sediments brought by spill channel from the Chanab River. There are some old channel levees remnants and old basins filled up with clay materials. The material is probably of Late Pleistocene age derived from mixed calcareous sedimentary and metamorphic rocks of Lower Himalayas.

The district naturally falls into three main divisions:

- (a) The upland or Bar in the North West,
- (b) The low-land along the I-3 river Ravi, and
- (c) Between them the valley of the Deg.

The Ravi skirts its southern boundary all along its length and separates it from. The districts of Montgomery, Lahore and Amritsar (India), The Bar, in its natural condition, is a level prairie, thickly dotted over with a stunted undergrowth of bush jungle. A revolution has taken place since the advent of the canal. The Bar soil proved extremely adaptable to canal irrigation. The Bar tract to the northwest has heavy loam. The eastern fringes from north to south form the river Khadir and have light loam.

3.3.2 Soil

The Bar soil is popularly known as Missie. The worst type of this soil is the sand hillocks met with here and there in all tracts, and known as Tibba. The Missie lands are the most fertile, but these are not fit for rice cultivation, as they absorb moisture. The central portion, which is the Deg valley, has stiff soil. Stiff soil is either Rohi or Kallrathi according to the presence of Jess or more salts (Kallar) in it.

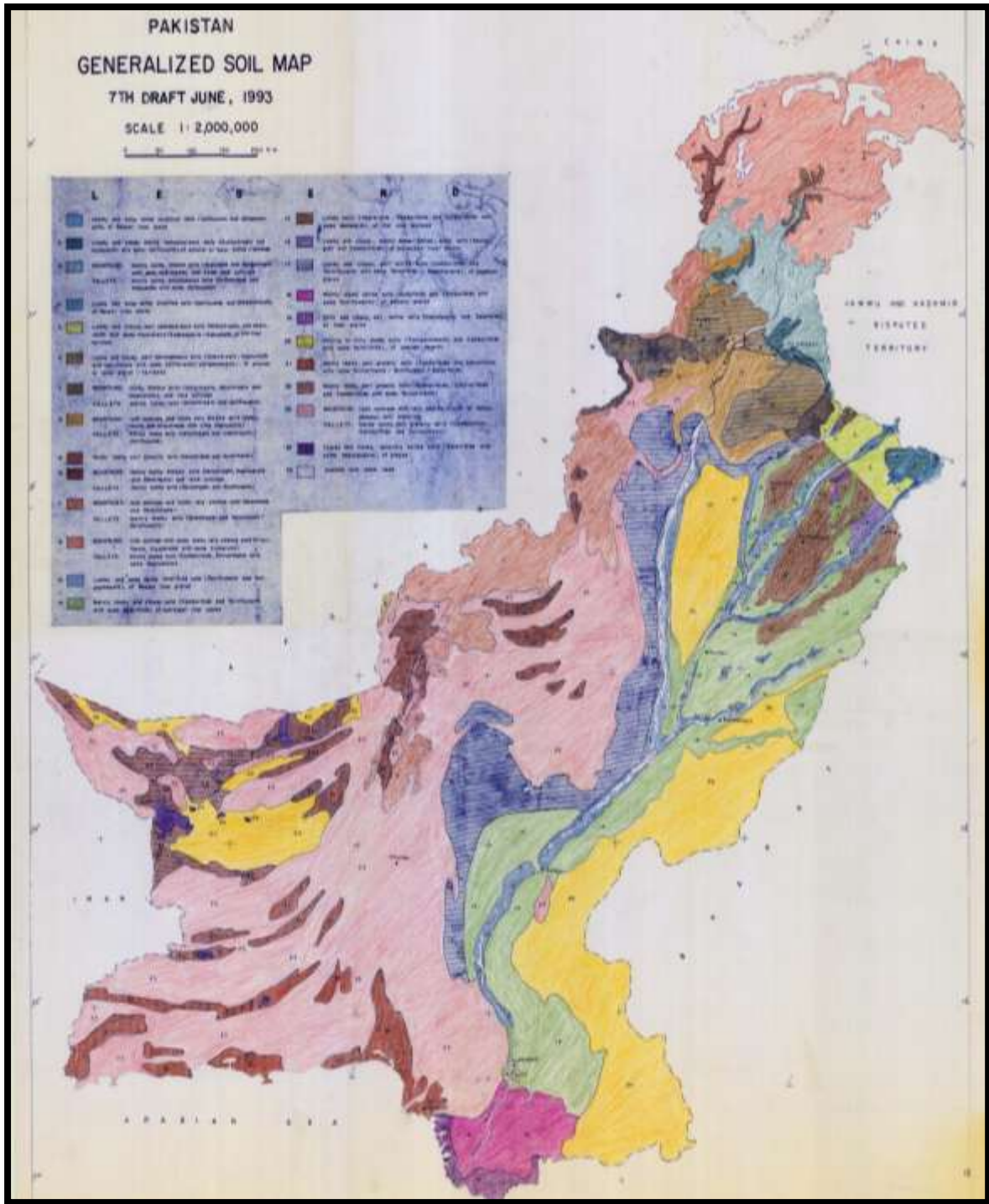


Figure 3-1: Soil Map of Punjab

3.3.3 Seismicity

The Muridke earthquake is a low-magnitude earthquake, but it occurs in a seismically active zone that warrants studies because of the location of some major population centers along this zone.

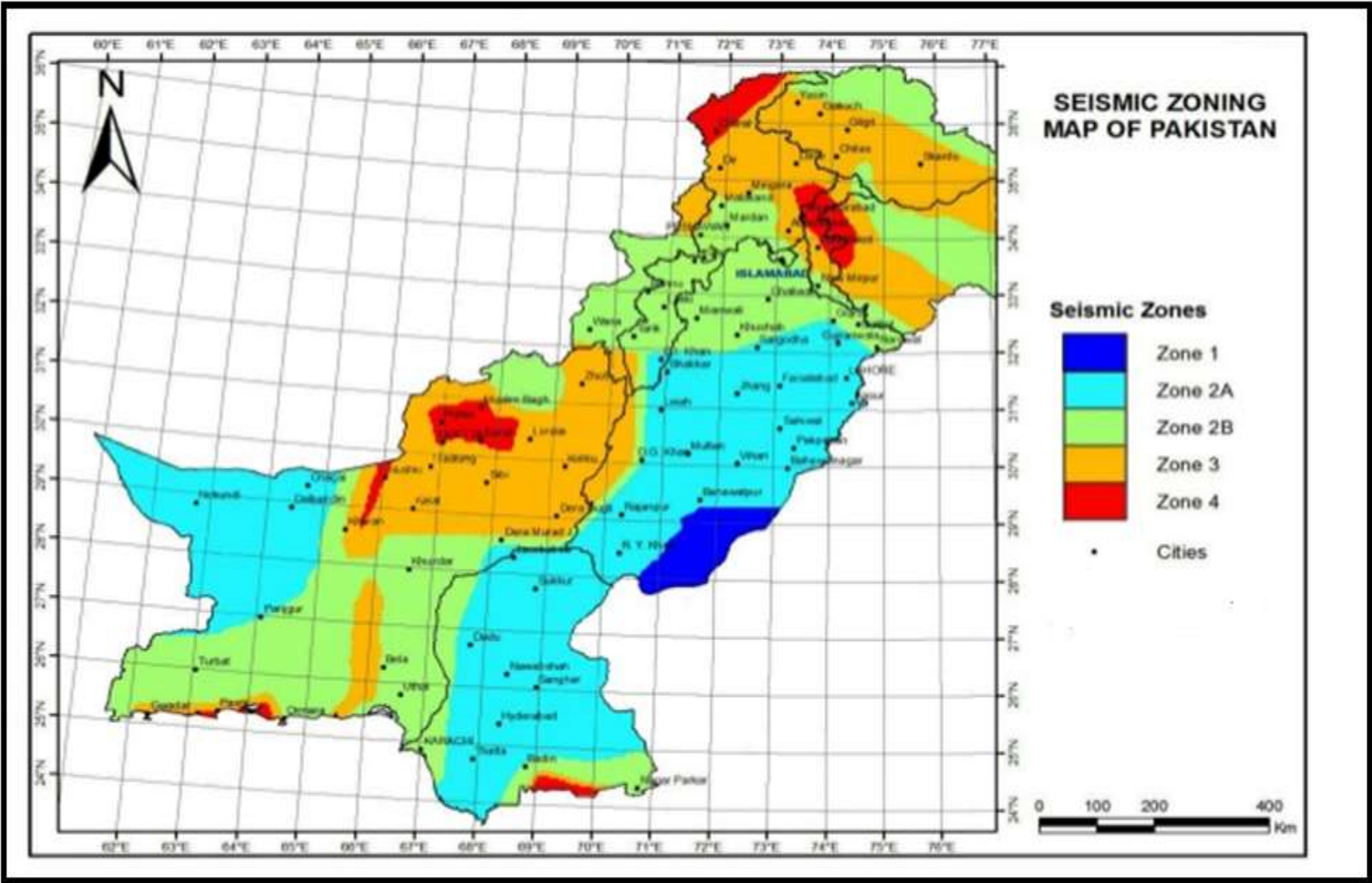


Figure 3-2: Seismic Zoning of Pakistan

3.3.4 Climate and Meteorology

The climate of the district is subject to extreme variations. From the middle of December to the middle of March, the air is very damp, cold and light to moderate rain falls at intervals. The winter rain is followed by a spell of pleasant weather. In April, the temperature rises fast and the two successive months are very hot. Towards the end of June, Monsoon appears. The average rainfall in the district is about 635 mm. The upland or the Bar in the North West, in the natural condition, is a level prairie thickly dotted over with a stunted under-growth of bush jungle.

Table 3-1: Meteorological and Climatic Features

Classification of Climate	Tropical (hot/humid)
Predominant Wind Direction	East/Northeast
Wind intensity	Weak to moderate
Average annual precipitation	>650 mm
Rainy season	July to September
Dry season	October to June
Average annual temperature	19-20 °C
Average summer temperature	36-38 °C
Average winter temperature	6.5-10.5 °C

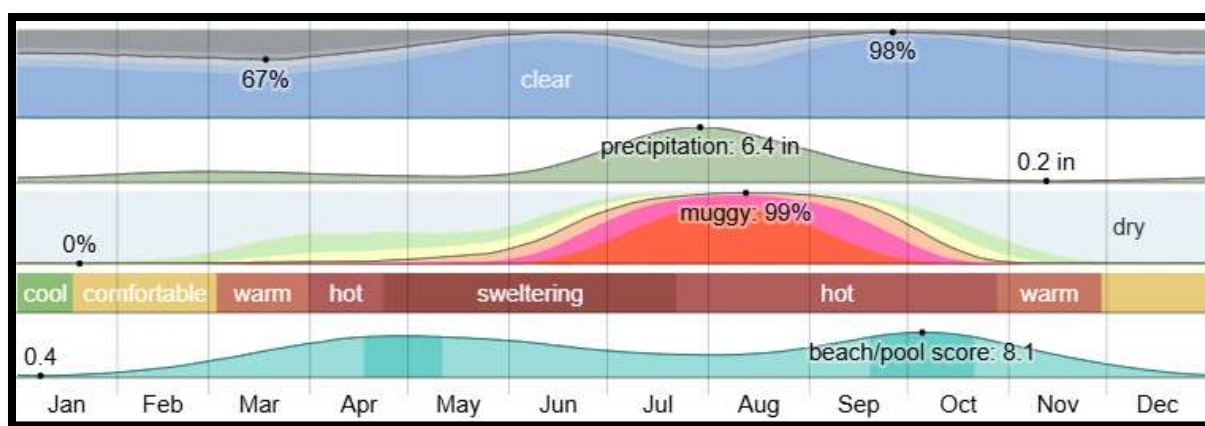


Figure 3-3: Climate in Muridke

3.3.5 Pre-Monsoon Season

Pre-monsoon refers to the period from April to June prior to the setting in of the monsoon. This is the hottest and the driest season, with persistent dry and hot winds. Daytime temperature rises to 40.40 C. The flows in the river begin to rise

simultaneously due to snow-melt water in the high mountains. The water table falls to the maximum depth.

3.3.6 Monsoon Season

Monsoon is the main rainy period, which starts at the beginning of July, reaches its climax in August and gradually, subsides in September. High-intensity Rainfall causes soil erosion which is a function of erosivity and erodibility. The cool monsoon winds followed by heavy showers lower the temperature to great extent. The part of rain percolates into the soil and is conserved in the subsoil and parts add to the groundwater. The conserved moisture in the soils is generally sufficient to rejuvenate the vegetation. All plants grow rapidly and mature towards the end of the season. With the start of monsoon season, the rivers flow at their peak level. The groundwater level is improved toward the end of the season in September and October.

3.3.7 Post-Monsoon Season

Post monsoon season refers to autumn (October-November). The temperature starts falling but the extreme aridity prevents plants to flower early and sets seed toward mid-seasons. Groundwater level rises as a result of infiltration from rainfall.

3.3.8 Rainfall

The rainy period of the year lasts for 9.7 months, from December 27 to October 17, with a sliding 31-day rainfall of at least 0.5 inches. The month with the most rain in Muridke is July, with an average rainfall of 5.8 inches.

The rainless period of the year lasts for 2.3 months, from October 17 to December 27. The month with the least rain in Muridke is November, with an average rainfall of 0.2 inches.

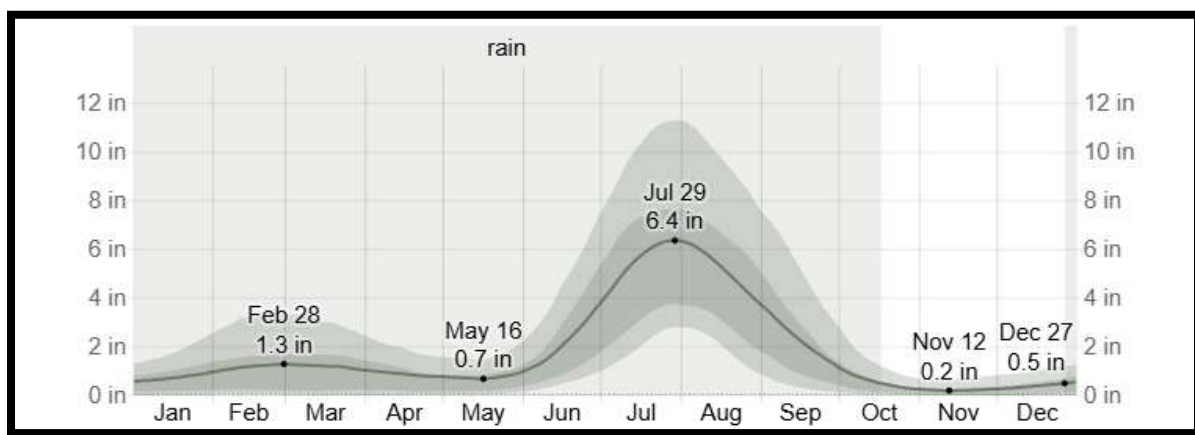


Figure 3-4: Average Monthly Rainfall in Muridke

3.3.9 Temperature

The hot season lasts for 2.8 months, from April 24 to July 19, with an average daily high temperature above 95°F. The hottest month of the year in Muridke is June, with an average high of 102°F and low of 81°F.

The cool season lasts for 2.5 months, from December 6 to February 22, with an average daily high temperature below 72°F. The coldest month of the year in Muridke is January, with an average low of 45°F and high of 65°F.

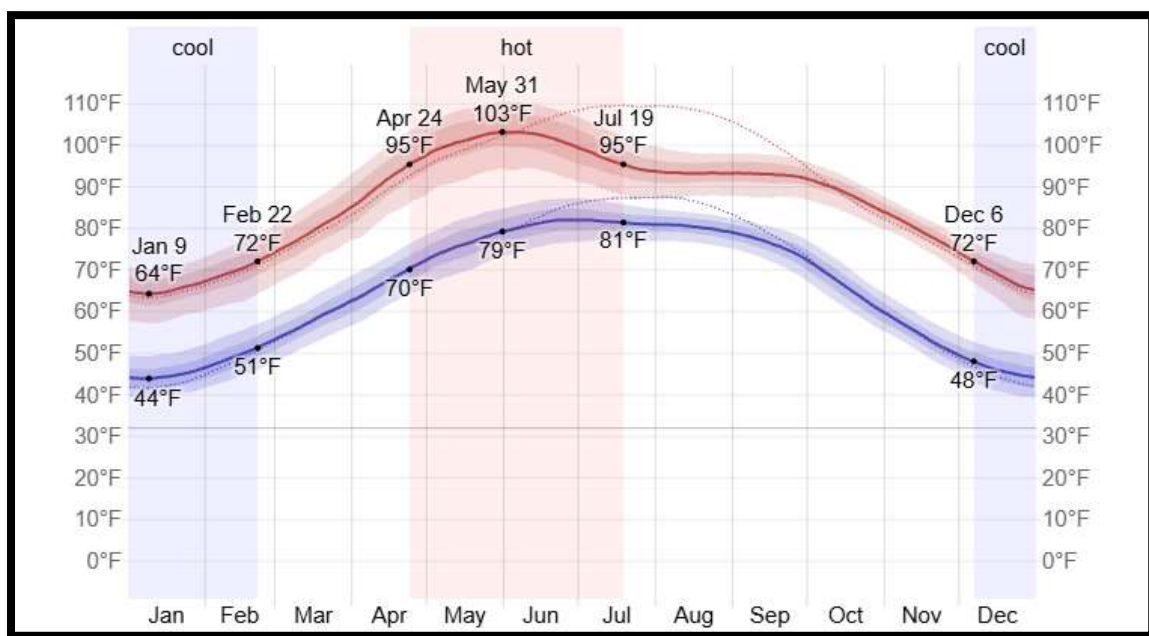


Figure 3-5: Average High and Low Temperature in Muridke

3.3.10 Winter Season

Winter refers to the period from December to January. The lowest temperatures (< 20 C) and cold winds characterize this season. The plants become dormant and most of them dry out. Most of the trees shed their leaves and few remain green or partly green. Sometimes this season becomes severe due to cold Siberian winds. Groundwater level declines in this season due to low flows in the rivers and no or little rains which usually fall in light showers causing little soil erosion.

3.3.11 Spring Season

Spring refers to the period from February to March. Temperatures become pleasant. The mean maximum temperature is 27°C with the highest precipitation of 41.2 mm and relative humidity of 57.6 percent. Some light showers of rain may also fall without generating runoff. The vegetation sprouts again because of conserved moisture from winter and spring rains, if any. The water table starts falling.

3.3.12 Water:

Khan Pur canal is passing through the city, so water is available for crops. Other source of water is underground.

3.3.13 Underground water:

Underground water from a depth of around 150 feet as the first aquifer is harnessed by the locals for human consumption and irrigation on a limited scale. The second aquifer starting at a depth of about 300 feet and downwards contains abundant quantities of water. Both these aquifers are isolated from each by a hard layer of limestone making both the water layers as two separate/independent sources. It is pertinent to mention here that the project does not require any water for its process.

3.3.14 Water Supply

The ground water is sweet in taste and is being recharged from canal passing near city. The water supply is based on ground water and tube wells which are 41 in number. The water supply network covers 33% of the town and serves 40% of the total population.

The distribution system consists of 4 overhead reservoirs of 290,000 gallon capacity. The distribution is made of a looped network which is made of different type of materials including A.C., P.V.C. and GI pipes.

3.3.15 Sewerage System

The sewerage system is only available in 20% of the city area which serve about 30% of population. The total length OS sewer is 30km. The waste water is generally disposed of through open drains to the nearby sewer system, which are not only polluting the environment but also causing many water born diseases. The residential area is expanding continuously on all sides of the town without any proper planning, which have reduced the coverage of facility to approximately.

3.3.16 Ecological Resources

3.3.16.1 Flora

The Bar jungle has almost entirely disappeared owing to colonization and extension of canal irrigation. Jand (*Porsopis Spicigera*) much prized for its firewood and charcoal is becoming a rarity. Karil (*Capparis aphylla*) is commonly met with, but is nowhere bigger than a shrub. Wan (*Salvadora oleoides*) which has also become rare is kept for its shade, which is sometimes very dense. Shislam (*Dalbergia sissoo*),

Kikar (*Acacia arabica*) along canal banks have developed into fine big trees. No abadi is without a rich growth of trees mainly Pipal (*Ficus religiosa*), Bohar (*Ficus bengalensis*) and Sharinh (*Albizia lebbek*). - The Deg valley was never favourable to the growth of trees. Kikar alone flourished to any extent. Lana and Lani shrubs on which camels are fed grow rank in Kallrathi wastes. Lm1a is used in making Sajji. Among grasses, Khhabbal or roots is the commonest grass in the Deg valley. Date trees are rare except near Shahdara, where a few clusters exist.



Pipal (*Ficus religiosa*)



Jand (*Porsopis Spicigera*)



Bohar (*Ficus bengalensis*)



Wan (*Salvadora oleoide*)

3.3.17 Faun

There is very little of wild animal life in the district. Wild boar is met with in the riverain tract. Jackals are common and play havoc with the crops. Hares are everywhere to be found even in the Lana bushes. The district abounds in water-birds, which attract parties of sportsmen from Lahore on holidays. Water-fowls are found everywhere in the Deg valley particularly after good rains. They are more numerous

in the riverain tract along the Ravi. Mallar teal, pachard and pintails are the common varieties. Snipes are found in CIlhambbs. Black partridges are found along the Ravi and grey ones all over the district. Fish is found in abundance in Deg and Hiran Minar tank. The snake requires to be specially noted. The Deg valley is notorious for its poisonous variety-the Karees or the Viper. It is short, thin and of the colour of the earth. It is extremely poisonous and its bite is always fatal. The Muridke vicinity has the worst snakes. Their number and also the venom is said to have diminished since the advent of the canal, but they are numerous enough still to make the tract unsafe in the hot weather .



Jackal



Water-fowls



Desert snake



Hare

3.4 Socio-Economic

3.4.1 Political And Administrative Setup

The key components of organization, planning and management of the municipal infrastructure and services, including capacity, systems and procedures under the Punjab Local Government Ordinance 2001 are as follows:

- Tehsil Nazim/ Administrator
- Tehsil Municipal officer (TMO)
- Tehsil officers (TO) s

3.4.2 Railway Line

The national intercity railway line is passing through the city.

3.4.3 Educational Facilities

The stats for schools operating in the district of Muridke are as below:

Gender	H.Sec	Secondary	Elementary	Primary	Total
Male	7	78	84	443	612
Female	11	71	133	325	540
Total	18	149	217	768	1152

3.4.4 Historical Places

These include

- Hiran Minar
- Sheikhpura Fort
- Shrine of Syed Waris Ali Shah
- Sheikhpura Stadium

3.4.5 Demographic Data

As per 2017 Census of Pakistan, the population of city was recorded as 473,129 with an increase of 68.82% in just 19 years.

District is spread over an area of 3,280 square kilometers comprising of following tehsils:

- Sheikhpura (51 Union Councils)

- Ferozewala (21 Union Councils)
- Muridke (21 Union Councils)
- Sharaqpur (08 Union Councils)
- Safdar Abad (11 Union Councils)

3.5 Screening Of Environmental Impacts & Mitigation Measures

3.5.1 General

This section identifies the potential impacts; related with design, construction and operation of the project on the physical, ecological and socio-economic domains of the environment.

Accordingly, mitigation measures have also been proposed to manage the environment and for sustainable development. Strict environmental management will be observed during the project construction and regular operation phases. Legal requirements of the PEPA and the PEQS will be the rating standard for the activities. Compliance with the EMP and EMTP, as per recommendations in this EIA report will be adhered to with full spirit.

The project proponent is filing with the EPA, written Affidavit and Undertaking on judicial papers, that the project throughout its life will operate under Environmental Management Order. Under these conditions the project at its all stages including from construction to regular operation will go in compliance with the PEQS. The project activities will, therefore, neither adversely affects the population nor the environment around the project site.

3.6 Environmental Problems Due to Installation At Present Location of Project

Environmental problems related to location of the project are mostly in the areas of physical setting, socioeconomic setting, ecological setting and special areas. Field survey revealed that the impacts of the project due to its location are mostly insignificant in nature.

3.7 Project Design Related Environmental Problems

The design of incinerator room has sought to minimize any environmental potential impacts by ensuring that the project should be in according to the environmental standards. Local aesthetic value is another issue to be considered during project design.

3.8 Environmental Problems Associated with Construction

The construction will also sometimes go round the clock, therefore, during all construction activities the followings will be the major pollutants/wastes or project related pollution aspects:

Table 3-2: Project Impacts Associated with Construction

Possible Impact	Impact Magnitude	Proposed Mitigation Measures
Dust emissions likely to occur during the excavation of the top soil and loading and transportation of the construction waste.	Minor/Short Term	<ul style="list-style-type: none"> - Watering all active construction areas when necessary. - Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard. Pave, apply water when necessary, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites. - Sweep daily (with water sweepers) all paved access roads, parking areas and staging areas at construction sites. - Fast growing trees will be planted around the project area to act as a wind breaker to reduce the particulate matter. - Provision of PPEs to workers
Hydrology and water quality degradation due to Storm water runoff from the site and excavation.	Minor/Short Term	<ul style="list-style-type: none"> - V=Construction of septic tank. - The proponent will prepare a hazardous substance control systems and emergency response plans that will include preparations for quick and safe cleanup of accidental spills.
Oil spills from machines to be used on site and vehicles.	Minor/Short Term	<ul style="list-style-type: none"> -The contractor will control the dangers of oil spills during construction by maintaining the machinery in specific areas designed for this purpose hence will not be a

Possible Impact	Impact Magnitude	Proposed Mitigation Measures
		serious impact as a result of the construction.
Noise pollution due to the moving machines (mixers, tippers, communicating workers) and incoming vehicles	Minor/Short Term	<ul style="list-style-type: none"> - Install portable barriers to shield compressors and other small stationary equipment where necessary. - Use quiet equipment (i.e. equipment designed with noise control elements). Install sound barriers for pile driving activity. - Limit pickup trucks and other small equipment, observe a common sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible.
Workers accidents and hazards during construction.	Minor/Long Term but reversible	<ul style="list-style-type: none"> - Provision of appropriate and adequate Personal Protective Equipment (PPE) to employees. - Enforcement and proper use of PPE by all construction workers. - Provision of appropriate tools, equipment and machinery in sound working conditions to employees. - Proper arrangement of lighting to reduce accidents. - Development of clear policies on treatment of injured personnel.

3.9 Environmental Problems Resulting From Project Operation

Environmental problems relating to operation phase are insignificant, which are given in Table - 4.2.

Table 3-3: Project Impacts Associated with Operation

Possible Impact	Impact Magnitude	Proposed Mitigation Measures
Waste Water	Moderate/Long Term	Wastewater will be treated through wastewater treatment plant. Discharge effluents should meet the effluent standards as per PEQs and will reused in the process.
Air and Noise pollution	Minor/Long Term	Proper maintenance of facility equipment and machinery. Wet Scrubbers shall be installed for air emissions.
Solid waste generation (Ash and glass)	Minor/Long Term	The waste will be the ashes which shall be disposed off in environmentally sustainable manner after proper testing.
Occupational accidents and hazards	Minor/Long Term	<ul style="list-style-type: none"> - Proper PPEs will be provided to workers and strictly advised for their usage. - Necessary health and safety rules shall be enforced by the management to ensure that all staff members adhere to these standards and are thus safe. - First Aid kits will be provided and staff members trained in first aid administration.

3.10 Potential Environmental Enhancement Measures

As described above the worth mentioning waste will be effluent and solid waste in the plant in the form of ashes. In order to enhance environment, the following measures will be adopted:

3.10.1 Solid waste & effluent management

Solid wastes are likely to consist of ashes and organic waste from foodstuffs eaten by employees. The proponent will address all waste in the following ways:

- Rain water disposal will be done through adequate system to be provided at all levels of the project building.
- Sewage will be discharged to the main sewerage system; after its treatment through septic tank and also getting the permission from the competent authority.
- Sale of recyclables and reusable materials to minimize waste for disposal.
- Establishing a waste generation and collection register for tracking the disposal of waste.
- All hazardous chemicals will be stored in original containers for ease of identification and handling.
- Information on use and handling of hazardous substances from the manufacturer's hazard data sheets will be obtained and communicated to concerned workers.
- Appropriate PPE will be provided, and usage at all times ensured, to the workers handling hazardous substances.
- An inventory register will be kept and updated as appropriate.

3.10.2 Fire Hazards/ Explosions Mitigation

The risk of fire and explosions emerged to be of paramount concern to the neighbours of the proposed project. The following measures will be put in place to reduce the likelihood of fires and explosions and to considerably manage such situations in case of occurrence;

- Fire extinguishers, fire hydrants and fire alarms will be provided at convenient locations within the facility. These will be regularly inspected and maintained by a reputable fire security company.
- Fire drills will be conducted at least biannually to ensure that workers are conversant with the action to take in the event of fire or explosions.
- Fire awareness materials will be placed in strategic locations within the facility to educate the workers and customers on what to do in the event of fire.
- An elaborate emergency response plan will be developed to address the risks associated with the facility's operations.

- Leak detection devices will also be installed at appropriate areas to warn on leakages that are likely to trigger fires. Workers will be trained on handling accidental spillage of flammable substances that may also trigger fires.
- No smoking signs will be displayed as appropriate and measures taken against those not adhering to this order.

3.10.3 Health and safety

- PPEs will be provided at all stages of project cycle to all workers and it will be ensured they use them at all time.
- A policy on health and safety at the workplace will be developed.
- All the employees shall be trained on safety and health.
- A health and safety audit will be conducted annually as required by the occupational health and safety department.

4 ENVIRONMENTAL MANAGEMENT AND MONITORING PROGRAM

This EMP describes the mitigation and management measures to address the environmental issues during construction, its regular operation and decommissioning phases of the proposed project.

4.1 Objectives Of Environmental Management Plan

The objectives of the EMP are as follow:

- To outline functions and responsibilities of responsible persons.
- To state standards and guidelines, which are required to be achieved in term of environmental legislation.
- To outline mitigation measures and environmental specifications which are required to be implementation for all phase of the project in order to minimize the extant of environmental impacts and to manage environmental impact associated with the proposed project.
- To prevent long term or permanent environmental degradation
- To identify training requirement at various levels.

4.2 Training Schedule

In order to effectively operate the EMP all the staff to be engaged in this activity will be trained extensively. The person to monitor gaseous emissions, PM and noise levels will be extensively trained to handle his job capably. Training program will include use of monitoring instruments, data generation, processing, interpretation, recording and presentation. Training of the workers should be done on quarterly basis.

4.3 Equipment Maintenance Details

The storage facility will have a sizeable inventory of equipment that will be purchased from specialized vendors.

4.4 Environmental Budget

The total cost for the environmental management is estimated as 2.5 million Pak Rupees both during construction and its regular operation. The estimations are as followings;

Table 4-1: Environment Management Cost

Environmental Component	Quantity	Amount (PKR)
(i) Tree Plantation	1200	700,000.0
(ii) Health and Safety Measures and Provision of PPEs	L.S.	500,000.0
(iii) Air and Water Quality & Noise Monitoring	L.S.	800,000.0
(iv) Environmental Trainings	L.S.	500,000.0
Total Environmental Management and Monitoring Cost		2,500,000.0

4.5 Environmental Management Plan

The EMP provides mitigation and management measures for the following phases of the project:

4.5.1 Construction Phase

This section of EMP provides management principles for the construction phase of the project. Environmental actions, procedures and responsibilities as required within the construction phase are specified. These specifications will form part of the contract documentation and therefore, the contractor will be required to comply with the specifications to the satisfaction of the project Manager and Environmental Control Officer, in terms of the construction contract.

4.5.2 Operation and Mitigation Phase

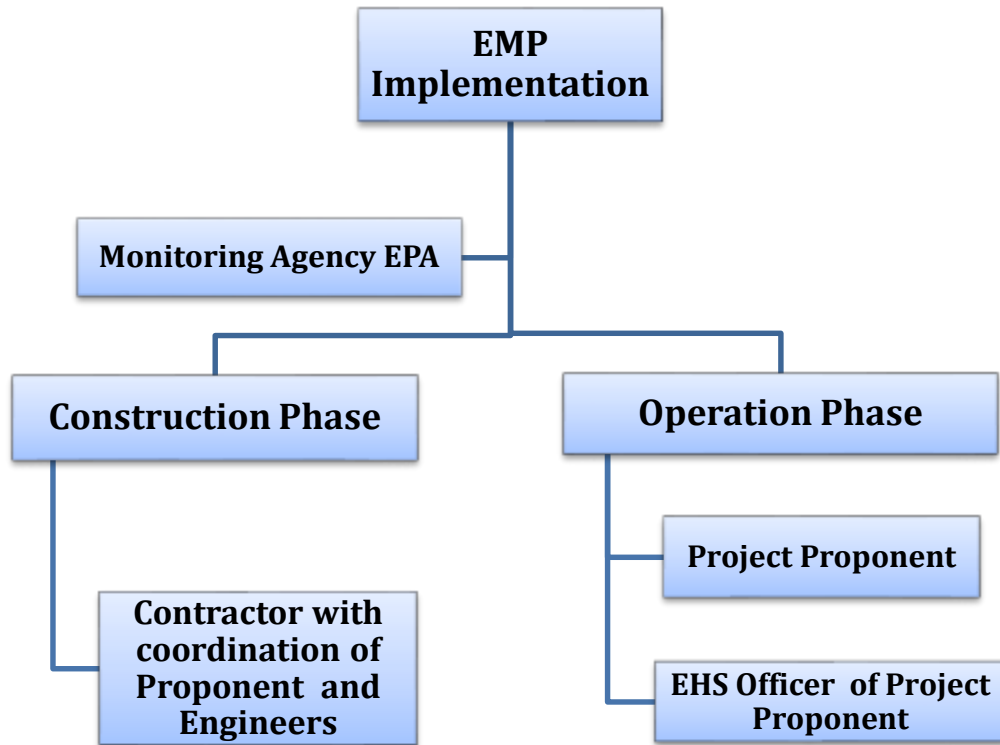
This section of EMP provides management principles for the operation and maintenance phase of the project. Environmental actions, procedure and responsibilities are required from proponent within the operation and maintenance phase are satisfied.

4.5.3 Decommissioning Phase

This section includes principles for the decommissioning phase of the project. This section of the EMP will be required to be revised and updated at the time of decommissioning.

The EMP is a dynamic document which will be updated as required on a continuous basis. Any amendments made, must be submitted to both the Environmental Officer and Project/Plant Manager for approval prior to implementation.

4.5.4 Organogram for implementation Environmental Management Plan (EMP)



Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility Implementation	Monitoring
ENVIRONMENTAL MANAGEMENT PLAN					
Construction Phase					
1.	Air Quality	<ul style="list-style-type: none"> - Compliance with prescribed PEQS to control air pollution 	<ul style="list-style-type: none"> - Necessary measures like sprinkling of water on regular basis especially during dry climatic conditions should be taken to limit pollution from dust and other windblown materials. - Periodic maintenance and management of all the construction machinery and vehicles - Waste burning will not be allowed. 	During Construction Phase by Contractor with coordination of Proponent staff	Proponent
2.	Water Quality	<ul style="list-style-type: none"> - Control of groundwater or surface water pollution from construction activities 	<ul style="list-style-type: none"> - Use of spill prevention trays and impermeable sheets to avoid contamination of the groundwater/surface water - Furthermore, septic tanks will need to be constructed which will be cemented to prevent the groundwater contamination - Proper disposal of waste material on dumping sites to avoid leachate generation and contamination of groundwater/surface water 	During Construction Phase by Contractor with coordination of Proponent staff	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
			<ul style="list-style-type: none"> – Prohibit illegal dumping of waste – The contractor will repair / replace / compensate for any damages caused by the Construction activities to the drinking water source/s. 		
3.	Waste	<ul style="list-style-type: none"> – Proper & safe handling and disposal of construction related waste – Compliance with applicable waste management rules for hazardous and non-hazardous waste disposal – Implementation of waste management plan 	<ul style="list-style-type: none"> – Ensure prevention of inappropriate disposal of waste material. – Conduct separate collection of construction and domestic waste to promote recycling and re-use. – Dispose non-recyclable and hazardous waste material properly according to waste management rules – Proper disposal of waste on agreed site as per agreed method. The area to be leveled and contoured after disposing excess material. No waste or debris will be thrown in the nearest canal water or other water bodies – Contractor will prepare waste management plan related to construction activities; get its approval from site engineer and ensure its full implementation. 	During Construction Phase by Contractor with coordination of Proponent staff	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
4.	Noise	<ul style="list-style-type: none"> - Compliance with prescribed PEQS to control Noise pollution 	<ul style="list-style-type: none"> - The contractor will strictly follow the PEQS for ambient noise - Control noise through control of working hours and selection of less noisy equipment. - Prohibit use of pressure horns - Provision of acoustic enclosures (hood and shrouds) on generator - Proper maintenance of vehicles and construction equipment. - Minimize/avoid unnecessary use of pneumatic drills and other noisy machinery - The personal protective equipment (PPE) will be provided to the construction workers and its usage will be made mandatory 	<p>During Construction Phase by Contractor with coordination of Proponent staff</p>	Proponent
5.	Materials Management	<ul style="list-style-type: none"> - Safe and secure environment for construction workers 	<ul style="list-style-type: none"> - Stockpiles shall not be situated such that they obstruct natural water pathways - Stockpiles shall not exceed 2m in height unless permitted by Concerned Engineer on site - If stockpiles are exposed to windy conditions or heavy rain, they shall be covered either 	<p>During Construction Phase by Contractor with coordination of Proponent staff</p>	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
			<p>depending on the duration of the project.</p> <p>Stockpiles may further be protected by the construction of low brick walls around their bases</p> <ul style="list-style-type: none"> – All substances required for vehicle/ machinery maintenance and repair must be stored in sealed containers until they can be disposed of / removed from the site – Hazardous substances / materials are to be transported in sealed containers or bags – Spraying of insecticide shall not take place under windy conditions 		
6.	Workers Health & Safety	<ul style="list-style-type: none"> – Prevention of any possibility of work site accident /impact on worker's health 	<ul style="list-style-type: none"> – Provision of Personal Protective Equipment to the workers – Provision of first aid box at work site to cope with emergency situation – Safety training to the workers – Safe driving training to the drivers – Adequate safety signs on site – Provide training regarding proper handling and use of chemicals/ paints 	Contractor	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
			<ul style="list-style-type: none"> – Install fire extinguishers at fire handling places – Inspect and ensure that any lifting devices, such as cranes, are appropriate for expected loads – Any loss of public/ private property will be compensated by the contractor – Regular checks should be carried out to ensure a contractor’s is following safe working procedures and practices. 		
7.	Socio-economic Impacts	<ul style="list-style-type: none"> – Prevention of conflicts among locals and make the project socially acceptable – Empowerment of locals to possible extent – Increase in employment and business 	<ul style="list-style-type: none"> – Contractor ‘s activities and movement of staff to be restricted to designated construction areas – The conduct of the construction staff when dealing with the public or other stakeholders shall be in a manner that is polite and courteous all the time – Lighting on the construction site shall be pointed downwards and away from oncoming traffic. – The site must be kept clean to minimize the visual impact of site 	Contractor with coordination of proponent staff	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
		opportunities for locals.	<ul style="list-style-type: none"> – Machinery and vehicles are to be kept in good working order for the duration of the project to minimize noise nuisance to neighbors – Noisy activities must be restricted to the times given in the Project Specification or General Conditions of contract – The Contractor are responsible for ongoing communication with those people that are interested in / affected by the projects – Employ local residents as much as possible – Promote communication between external workers and local people (e.g. join local events). 		
8.	Clearance of site from extra / surplus material and construction equipment	<ul style="list-style-type: none"> – Restoration of site to a similar condition prior to the commencement of the work or to a condition agreed with the 	<ul style="list-style-type: none"> – Timely removal of waste from the site to avoid congestion at work place. – Construction waste should be collected and disposed separately from other waste. – Care will be taken during handling and disposal of waste. 	Contractor	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
		project management and landscaping of the site	<ul style="list-style-type: none"> - Contaminated soil (if generated) due to accidental spills will be removed and transported to suitable site for disposal. - Avoid mixing of hazardous waste with non-hazardous waste. - Safe transportation of construction equipment from the site. - The contractor must ensure that all structure, equipment, materials and facilities used or created on site for/or during construction activities are removed. - Empty/available space will be covered with grassy lawns. - Use of native vegetation as a part of landscape. Ornamental plant species like roses, jasmine, and seasonal flowers can be used in proposed landscaping, which is a common practice in this part. 		
Operational Phase					

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
1.	Air Quality Exhaust flue gases	Compliance With Emission gas standards, Ambient air quality (PEQS) standards, Prevention of air pollution in surrounding area;	<ul style="list-style-type: none"> – Relevant legislative and PEQS design requirements will be adhered to where appropriate. – incinerators specifically designed for HCW are used; – properly trained staff operate the incinerators according to standard operating procedures; – Appropriately high (more than 1250°C) temperature is achieved in the incinerator to avoid dioxin discharge. – the flue gases are properly treated (e.g. with the help of water scrubbers) before their release to the atmosphere; – There is no leakage of gases from the first chamber of the incinerator to avoid any release of dioxins before they can be destroyed in the second chamber. 	EHS officer of Project Proponent	Proponent
2.	Water Quality	– Compliance with Wastewater	– Installation of wastewater treatment plant, so any wastewater produced	EHS officer of Project Proponent	Proponent

Sr. No.	Project Component/ Impact	Targets to be Mitigation/ Preventive Action		Responsibility	
		Achieved		Implementation	Monitoring
		standards of PEQS	complies with wastewater standards of PEQS. – To carry out water analysis periodically.		
3.	Waste	<ul style="list-style-type: none"> – Compliance with waste management rules – Management of waste, especially hazardous waste – Prevention of inappropriate waste disposal 	<ul style="list-style-type: none"> – Proper testing and in compliance with Punjab Hospital Waste Management Rules 2014 before disposal. 	EHS officer of Project Proponent	Proponent
4.	Noise &Vibration. Noise from vehicles	<ul style="list-style-type: none"> – Compliance with prescribed PEQS to control Noise pollution 	<ul style="list-style-type: none"> – Enhanced management to reduce machinery noise and exhaust and its impact on the surrounding environment. – Green belts around the project area, peripheral and internal areas. – Growing of tall tree species, green barrier, can have good noise reduction effect. 	EHS officer of Project Proponent	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
6.	<p>Work environment (including work safety)</p> <ul style="list-style-type: none"> - Labor accidents due to handling heavy loads; working at heights; electric shocks - Diseases caused by air pollutants, water pollutants, and noise from the operation - Fire Hazards 	<p>– Prevention measures against labor accidents and health problems</p>	<ul style="list-style-type: none"> ❖ Labor accidents <ul style="list-style-type: none"> – Prepare a manual for labor accident prevention including safety education and training. – Provide workers with appropriate protective equipment. – Keep lifting devices well maintained and perform maintenance checks as appropriate. – Use equipment that protects against electric shock. ❖ Environment Pollution <ul style="list-style-type: none"> – Observe related standards and provide workers with appropriate facilities. ❖ Fire Hazards <ul style="list-style-type: none"> – Installing fire extinguishers in fire handling places – Developing fire fighting organization and implementing fire drills 	<p>EHS officer of Project Proponent</p>	<p>Proponent</p>

4.6 HOSPITAL WASTE MANAGEMENT PLAN

In Punjab Hospital waste management Rules 2014 a hospital will show the waste disposal points for every ward and departments and sited for storage the central storage facility for risk and non-risk waste.

4.6.1 Waste Segregation

All points of origin of waste will be marked and risk waste shall be separated from non-risk waste at the ward bedside, Operation Theatre, laboratory or any other room where the waste is generated. White bins with same color plastic bags for non-risk waste and yellow bins with same color plastic bag for risk waste shall be installed on each point of waste origin. Notices shall be affixed for their use indicating the things to put in yellow (risk) and white (non-risk) bins.

Syringe cutters and yellow boxes are provided in every department for cutting the syringe needle and when cutter is filled 3/4, it is emptied in a yellow box. Yellow boxes are also stored in risk waste storage room separately.

4.6.2 Waste Collection

The waste bins when filled ¾ are closed and placed in the white and yellow containers placed at designated sites. The workers who collect this waste will be provided with protective gloves, mask, cap, apron and long shoes. The waste bins will be emptied twice daily and containers once a day.

4.6.3 Waste Transportation

In the premises of hospital mobile containers (according to requirements) shall be installed, yellow container for risk waste and white container for non-risk waste. This waste then shall be transported to respective storage room. Transportation routes shall be mentioned on the maps.

4.6.4 Waste Storage

Risk waste shall be stored in storage room. The room will be signed by bio hazard symbol and mentioned that this room has risk waste. Storage room will be separated from the main building and near to the main road or incinerator. For temperature management air conditioner shall be installed in this room and deep freezers will be provided to keep the temperature 3 °C to 8 °C. It is provided with light and water taps for washing purposes. A weighing machine will also be provided in the storage room

for weighing of waste before handing over the team of incinerator. The proper record will be maintained on the register.

4.6.5 Waste Disposal

Finally the waste will be incinerated in specified incinerator by following all the rules and regulations.

4.7 ENVIRONMENTAL MONITORING PROGRAM

Monitoring Program (MP) provides important information that allows for more effective planning and an adaptive response based on the assessment of the effectiveness of mitigation measures. The monitoring of various parameters will help to determine the extent to which project construction/operation activities will cause environmental disturbance. Following is a tentative plan for environmental monitoring;

Table 4-2: Environmental Monitoring Plan

Sr. No.	Monitoring Parameters	Monitoring Mechanism	Frequency	Responsibility
DURING INSTALLATION				
1.	Dust Emissions	Ambient Particulate Matter Monitoring System.	Will be carried out on quarterly basis.	Proponent
2.	Noise Levels	Noise meter	On quarterly basis by a third party	Proponent
3.	Gaseous Emissions	Emissions monitoring system. Monitoring of ambient air quality.	Will be carried out on quarterly basis.	Proponent
4.	HSE Plan	Health, safety and Environmental will be monitored on daily basis	Daily	Proponent
DURING OPERATION				
1.	Noise Levels	Noise meter	On quarterly basis by a third party	Proponent
2.	Water Quality	Discrete grab sampling and laboratory testing of water samples.	As described by SMART	Proponent
3.	Emissions	Emissions monitoring system. Monitoring of ambient air quality and stack emissions	Will be carried out on quarterly basis.	Proponent
4.	Security	Security arrangements will be made	Daily	Proponent
5.	HSE Plan	Health, safety and Environmental will be monitored on daily basis	Daily	EHS officer of Project Proponent

4.8 Monitoring Results

4.8.1 Ambient Particulate Matters Monitoring Report

Table 4-3: Ambient Particulate Matters Monitoring Report

Sr. No	Time Hours	Parameters		Results (Average 24 Hrs)	
		PM _{2.5}	PM ₁₀	PM _{2.5}	PM ₁₀
		Units	Units	(µg/m ³)	(µg/m ³)
1.	09:00 AM	14.23	70.76	23.11 (µg/m ³)	82.32 (µg/m ³)
2.	10:00 AM	32.90	88.65		
3.	11:00 AM	29.41	99.52		
4.	12:00 PM	30.08	95.12		
5.	01:00 PM	15.12	92.52		
6.	02:00 PM	30.96	88.11		
7.	03:00 PM	33.57	85.95		
8.	04:00 PM	20.79	63.75		
9.	05:00 PM	15.72	84.32		
10.	06:00 PM	26.60	74.58		
11.	07:00 PM	32.77	101.46		
12.	08:00 PM	15.11	91.69		
13.	09:00 PM	22.84	73.54		
14.	10:00 PM	22.83	89.47		
15.	11:00 PM	27.64	91.46		
16.	12:00 AM	16.48	70.45		
17.	01:00 AM	21.65	90.42		
18.	02:00 AM	20.56	67.69		
19.	03:00 AM	20.32	69.66		
20.	04:00 AM	15.41	63.39		
21.	05:00 AM	15.46	72.13		
22.	06:00 AM	28.00	88.59		
23.	07:00 AM	11.94	62.41		
24.	08:00 AM	19.22	75.68		
PEQSAA				35(µg/m³)	150(µg/m³)

PEQSAA: Punjab Environmental Quality Standards for Ambient Air

Note:

- Selected measurement units were µg/m³ otherwise stated.
- Quality was assured through self calibration of the instrument.
- The values were representing of monitoring conditions prevailing during the monitoring hours.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report is not valid for court.

4.8.2 Ambient Particulate Matters Monitoring Report

Table 4-4: Ambient Gaseous Monitoring Report

Sr. No	Time Hours	Parameters			
		CO Units (mg/m ³)	NO (µg/m ³)	NO ₂ (µg/m ³)	SO ₂ (µg/m ³)
1.	09:00 A.M	0.64	19.03	23.20	22.42
2.	10:00 A.M	0.72	18.20	25.54	17.52
3.	11:00 A.M	0.47	15.26	20.40	23.26
4.	12:00 P.M	0.43	19.01	19.87	21.46
5.	01:00 P.M	0.20	16.13	24.12	18.83
6.	02:00 P.M	0.54	17.37	19.53	20.94
7.	03:00 P.M	0.26	13.95	22.25	21.92
8.	04:00 PM	0.66	18.23	25.09	23.25
9.	05:00 PM	0.44	18.76	24.62	19.96
10.	06:00 PM	0.46	16.22	20.11	20.40
11.	07:00 PM	0.69	19.47	21.91	21.48
12.	08:00 PM	0.57	19.14	20.48	18.83
13.	09:00 PM	0.66	17.15	23.25	20.23
14.	10:00 PM	0.28	15.64	20.92	16.74
15.	11:00 PM	0.31	15.32	23.74	19.19
16.	12:00 AM	0.44	19.32	19.18	20.52
17.	01:00 AM	0.43	18.61	21.72	18.12
18.	02:00 AM	0.34	18.96	20.35	22.33
19.	03:00 AM	0.26	14.88	25.52	17.02
20.	04:00 AM	0.59	18.99	23.49	19.54
21.	05:00 AM	0.37	17.66	22.57	22.97
22.	06:00 A.M	0.31	14.60	22.31	19.67
23.	07:00 A.M	0.46	15.07	20.88	17.73
24.	08:00 A.M	0.34	18.98	25.78	20.60
Average Concentration		0.45	17.33	22.37	20.21
PEQSAA		05 (24 hr)	40 (24 hr)	80 (24 hr)	120 (24 hr)

PEQSAA: Punjab Environmental Quality Standards for Ambient Air

Note:

- Selected measurement units were mg/m³ and µg/m³ otherwise stated.
- Quality was assured through self calibration of the instrument.
- The values were representing of monitoring conditions prevailing during the monitoring hours.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report is not valid for court.

Table 4-5: Noise Level Monitoring Report

Sr. No.	Monitoring Location	Unit	Minimum	Maximum	Leq
1.	North Side of Plot	dB(A)	56.7	60.9	58.8
2.	South Side of Plot		61.3	66.0	63.65
3.	East side of Plot		58.9	62.5	60.7
4.	West Side of Plot		63.2	66.8	65
PEQS limit : 65-55 dB					

PEQS: Punjab Environmental Quality Standards for Ambient Noise

Leq= Log Equivalent Continuous Sound Level

Note:

- Selected measurement units were dB(A) otherwise stated.
- Quality was assured through self calibration of the instrument.
- The values were representing of monitoring conditions prevailing during the monitoring hours.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report is not valid for court.

4.8.3 Ground Water Analysis Report

Table 4-6: Ground Water Analysis Report

Sr. No.	Parameters	Standard Methods	Units	PDWQS	Results
1.	pH	APHA-4500H+ B	--	6.5-8.5	7.6
2.	Temperature	---	°C	----	16
3.	Taste & Odor	In-house	--	Non Objectionable	Non Objectionable
4.	Color	APHA-2120 B/C	TCU	<15	4
5.	Turbidity	APHA-2130 B	NTU	<5	4
6.	Total Dissolved Solids (TDS)	APHA-2540 C	mg/L	<1000	307
7.	Total Hardness as CaCO ₃	APHA-2340 C	mg/L	<500	168
8.	Nitrate (NO ₃)	APHA-4500NO3 B	mg/L	≤50	2.43
9.	Nitrite (NO ₂)	APHA-4500NO2 B	mg/L	≤3	0.0061
10.	Arsenic (As)	APHA-3500As B	mg/L	≤0.05	N.D.
11.	Nickel (Ni)	ASTM E3047-16	mg/L	≤0.02	N.D.
12.	Antimony (Sb)	APHA-3500Sb B	mg/L	<0.005	N.D.
13.	Chloride (Cl)	APHA-4500Cl- B	mg/L	<250	119
14.	Chlorine	APHA-4500 CL	mg/L	0.5-1.5	0.26
15.	Lead (Pb)	APHA-3500 Pb-B	mg/L	≤0.05	0.007

Sr. No.	Parameters	Standard Methods	Units	PDWQS	Results
16.	Fluoride	APHA-4500F- C	mg/L	≤1.5	0.68
17.	Aluminum	APHA-3500 Al	mg/L	≤0.2	N.D.
18.	Manganese (Mn)	APHA-3500 MN- B	mg/L	≤0.5	N.D.
19.	Cadmium (Cd)	APHA-3500 Cd-B	mg/L	0.01	N.D.
20.	Barium (Ba)	APHA-3500 Ba B	mg/L	0.7	0.18
21.	Mercury (Hg)	APHA-3500 Hg- B	mg/L	≤0.001	N.D.
22.	Copper (Cu)	APHA- 3500 Cu- B	mg/L	2	0.57
23.	Zinc (Zn)	APHA- 3500 Zn B	mg/L	5	2.1
24.	Boron (B)	APHA 4500 B- C	mg/L	0.3	N.D.
25.	Chromium (Cr)	APHA 3500 cr B	mg/L	≤0.05	N.D.
26.	Selenium (Se)	APHA- 3500 Se C	mg/L	0.01	N.D.
27.	Cyanide (CN)	APHA 4500-CN	mg/L	≤0.05	N.D.
28.	E-Coli	APHA:9222 D	Number/100 mL	0 Number/100 mL	0
29.	Total Coliform	APHA:9222 B	Number/100 mL	0 Number/100 mL	0

PDWQS Punjab Drinking Water Quality Standards

N D Not Detected



Monitoring Pictorial view

4.8.4 Tree Plantation Plan

The followings species of the ornamental and other plants will be planted;

Sr. No.	Plant Name	Area	Tentative Quantity
Ornamental Plants			
1	Golden Palm	Lawn Area	150
2	Ribbon Grass	Green belts	150
3	Canna	Green Belt	150
Trees			
4	Shisham	boundary wall of hospital and incinerator area	150
5	Sukh Chain	Around the incinerator area	150
6	Moor Pankh	Generator area	150
7	Jhumka Vail	Transport vehicle area	150

5 STAKEHOLDERS CONSULTATION

The following chapter includes the detailed information of the process and parties that depicts the involvement and consultation of the important stakeholders that is conducted by the Sustainable Environment Consultant. The consultation is carried out to resolve any kind of issues that involved and can be potentially affected by the proposed project. The activity plays an important role in the decision making and the keeps in view the concerns of stakeholders. The parties that are involved in the process are as follows:

- Local government
- Local community
- Affected community (directly and indirectly)
- General public
- Service providers
- Proponents

5.1 Relevant Legislation

5.1.1 Punjab Environmental Protection Act 2012 (Amended Act)

Public consultation is mandated under Punjab’s environmental law. The Provincial Agency, under Regulation 6 of the IEE-EIA Regulations 2000, has issued a set of guidelines of general applicability and sectoral guidelines indicating specific assessment requirements. This includes Guidelines for Public Consultation, 1997 (the ‘Guidelines’), that are summarized below

Table 5-1: Framework of Consultation:

Objectives of public involvement	The main aim is to inform the public regarding the proposed project.
Stakeholders	The important stakeholders involve the local or affected community, proponents and local government
Mechanism	Gathering of the relevant information, listening and reviewing the complaints of stakeholders that leads to the decision making.
Timing and frequency	Should be started during screening of the project
Consultation tools	The important tools involved focus group meetings, workshops or formal and informal interviews.
Important consideration	Objectives of the study, to seek alternatives through consultation, and identification of stakeholders and the required mechanisms.

5.2 Consultation Process

The regular survey and background studies were conducted to identify the stakeholders. People residing nearby was gathered which are likely to be affected, focus group meetings were conducted by the representatives of the villages. They were all briefed about the project whereabouts in the nontechnical and understandable way. Certain issues and suggestion about the project that is included and raised by the locals were filed and recorded.

The consultation with the government officials, welfare organizations, was conducted in the formal way which includes the technical approaches to the project and the verdict of the affected or local community was also kept in view.

5.3 Stake Holders Consultation Technique

The purpose of the consultation is to inform the affected parties about the proposed project and to analyze the knowledge, skills, and resources of the local community. It is important to be aware of how different power relations can distort participation. Following are the certain techniques that are used for consultation.

- Focus group meetings
- Formal and informal interviews with locals

5.4 Stake Holders Involved and Their Roles

The stakeholders or parties involved and the roles played by them are listed in the table below.

Table 5-2: Stakeholders and their Roles

Stakeholders	Roles
Proponent/Responsible Authority	The discussion with the proponent proposed the mitigation measures and alternatives to control any disparity in the project.
Environmental Expert	The consultants from the Sustainable Environment Consultant survey the project site to gather relevant information and to record the local community stance and behaviors regarding the project. And also the evaluation of socio-economic impacts of the project has been done.
Government Departments	The consulted government department includes Environmental protection agency, wildlife, planning, and development. The departments overviewed the proposed projects and its socio-economic impacts.
Local affected communities	The surveys determined the extent of community that could be affected and their verdict about the proposed project.

5.5 Discussed Points

The points that have been kept in view while consulting stakeholders are as follows:

- Activities of the project and their consequences.
- Requirements of the people likely to be affected.
- Mitigation measures or compensation strategies.
- Role of the affected people in the implementation and development of the project.

5.6 Affected And Wider Community

There is no affected community present in the area of the proposed project. Consultant's team has consulted with the inhabitants or neighbouring areas. The remarks of people are positive regarding the project and people foresee positive impacts like employment opportunities, business, development of the area etc.

5.7 Grievance Redress Mechanism

A project-specific grievance redress mechanism (GRM) will be established to receive, evaluate and facilitate the resolution of affected person/s concerns, complaints and grievances about the social and environmental performance at the level of the subproject. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project. A common GRM will be in place for social, environmental, or any other grievances related to the project.

A well-defined grievance redress and resolution mechanism will be established to resolve grievances and complaints in a timely and satisfactory manner. The objective of the grievance redress mechanism is to resolve complaints as quickly as possible and at the local level through a process of conciliation; and if that is not possible, to provide clear and transparent procedures for appeal. All affected persons will be made fully aware of their rights, and the detailed grievance redress procedures will be publicized through an effective public information campaign.

5.7.1 Procedure for Redress of Grievances

Project management unit and project implementation unit will ensure that the GRM is fully disclosed prior to construction: (a) in public consultations and information, education and communication, or social/community preparations, (b) through posters

displayed in the offices of the PMU, PIU, township and ward as well as at strategic places within the main subproject areas (posters to include names and contact details).

The following procedures for grievance redress are proposed:

- Affected person/s (AP/s) will address complaints to the arbitration unit or other designated grievance officers. The unit will organize a meeting with the AP/s to resolve the issue using its traditional methods of conciliation and negotiation; the meeting will be held in a public place and will be open to other members of the public to ensure transparency.
- If within 5 days of lodging the complaint, no understanding or amicable solution can be reached or no response is received from the arbitration unit, the affected person can bring the complaint to the PIU. The PIU will meet with the AP/s to discuss the complaint, and provide a decision within 10 days of receiving the appeal.
- If the AP/s is not satisfied with the decision of the PIU or in the absence of any response, the AP/s can appeal to the PMU. The PMU will provide a decision on the appeal within 10 days.

Safeguard monitoring reports will include the following aspects pertaining to progress on grievances: (a) number of cases registered with the Grievance Redress Committee, level of jurisdiction (first, second, and third tiers), number of hearings held, decisions made, and the status of pending cases; and (b) lists of cases in process and already decided upon may be prepared with details such as name, ID with unique serial number, date of notice, date of application, date of hearing, decisions, remarks, actions taken to resolve issues, and status of grievance (i.e. open ,closed, pending)

5.7.2 Procedure of Filing and Resolving Grievances

Grievances will be logged and resolved in the following steps:

Step 1: Receive and Acknowledge Complaint

Once the PIU receives a complaint, which could be the complainant giving it in person, via letter or email, or through a GFP, an acknowledgment of receipt of the complaint has to be sent to the complainant. PIU will work to understand the cause of the grievance for which the PIU may need to contact the complainant again and obtain details.

Step 2: Investigation

The PIU will be required to complete preliminary investigations within five working days of receiving the complaint and send a response to the complainant documenting the results of their investigations and what the PIU plans to go ahead.

Step 3: Resolution through PIU

PIU have investigated a grievance, it will share with the complainant the proposed course of action to resolve the complaint, should PIU believe any to be necessary. If the complainant considers the grievance to be satisfactorily resolved, the PIU will log the complaint as resolved in their records. In case the grievance remains unresolved it will be reassessed and GRC will have further dialogue with the complainant to discuss if there are any further steps, which may be taken to reach a mutually agreed resolution to the problem.

6 IMPACT ASSESSMENT AND MITIGATION

6.1 Problem And Its Occurrence

On the basis of the findings of the EIA, it is concluded that the project will not pose any adverse impact on the local population and the environment. A proper management plan shall be prepared in case of any accident like;

- Any health hazard to workers/other persons during construction or operation phase.
- Gaseous emissions to the environment.
- Inappropriate waste handling.

As mention above that the project will not pose any adverse impacts to the environment. An assessment of impact during construction and operation phase is given in **Table - 7.1**, which indicates the impact and their magnitude.

Table 6-1: Anticipated Impacts and their magnitude of the Proposed Project

Environmental Components/Activities	Physical Environment												Biological Environment							Social Environment							
	Agricultural Lands	Soil	Housing	Cultural/Religious	Infra structure	Mineral Resources	Downstream River	Flooding	Surface water quality	Ground water quality	Air quality	Noise	Aquatic Ecosystem	Wetland Ecosystem	Terrestrial Ecosystem	Endangered Species	Natural Flora	Wildlife	Disease Vectors	Public Health/Safety	Land Use	Communication	Employment	Community Stability	Cultural and		
Construction Phase																											
Construction Camp	M	L	O	O	O	O	O	O	O	L	LA	LA		O	O	O	O	O	O	L		O	L	O	LB	O	O
	A	A								A				O	O	O	O	O	O	A		O	A			O	O
Incinerator Site	L	L	O	O	O	O	O	O	O	O	LA	LA		O	O	O	O	O	O			O	O	O	LB	O	O
	A	A																									
E&M of Equipment	O	L	O	O	O	O	O	O	O	O	LA	LA		O	O	O	O	O	O			LA	O	O	M	O	O
		A																						B			
Vehicular Movement	O	L	O	O	O	O	O	O	O	L	LA	M		O	O	LA	O	O	O			LA	L	O	O	LA	O
		A								A		A											A				
Operation Phase																											
Solid Waste	L	L	O	O	O	O	O	O	O	L	O	O		O	O	O	O	O	O			LA	O	O	O	O	O
	A	A								A																	
Incinerator operation	O	O	O	O	O	O	O	O	O	O	LA	LA		O	O	O	O	O	O			LA	L	O	O	O	O
																							A				

Environmental Components Components/ Activities	Physical Environment											Biological Environment							Social Environment									
	Agricultural Lands	Soil	Housing	Cultural/Religious	Infra structure	Mineral Resources	Downstream River	Flooding	Surface water quality	Ground water quality	Air quality	Noise	Aquatic Ecosystem	Wetland Ecosystem	Terrestrial Ecosystem	Endangered Species	Natural Flora	Wildlife	Disease Vectors	Public Health/Safety	Land Use	Communication	Employment	Community Stability	Cultural and			
Equipment and Supplies	O	O	O	O	O	O	O	O	O	O	O	LA		O	O	O	O	O	O	O	O	O	O	O	O	M	O	O
Fire Fighting Arrangement	O	O	O	O	O	O	O	O	O	O	O	O		O	O	O	O	O	O	O	O	H	O	L	LB	M	O	
Health and safety	O	O	O	O	O	O	O	O	O	O	O	O		O	O	O	O	O	O	O	H	O	L	LB	M	O		
																					B		B		B			

LA: Low Adverse MA: Medium Adverse HA: High Adverse NA: Not Applicable O: None or Insignificant
 LB: Low Beneficial Medium Beneficial HB: High Beneficial ND: Not Determinable

6.2 Ways of Achieving Mitigation Measures

6.2.1 Changing in Planning and Design

- a) Incinerator facility must be designed to appropriate standards and be properly installed and commissioned by competent persons.
- b) The installation/construction of instruments and the facility will be carried out by an accredited Company.
- c) The materials used for the construction of the filling shed must be non-inflammable material.
- d) The facility must be fitted with adequate safety and monitoring control devices and operated by skilled persons.
- e) Any amendments made, must be submitted to concerned authorities for approval prior to implementation.

6.2.2 Improved Monitoring and Management Practices

There shall be a suitable Programme of monitoring and maintenance. There will be proper firefighting and health and safety plan (Details in Section-6). Any improvement in monitoring and management practices shall be addressed to concerned authorities.

6.2.3 Compensation in Money Terms

There is no compensation in money terms as the land is already owned by the Project Proponent and within the premises of Govt. Teaching Hospital Shahdara.

6.2.4 Replacement, Relocation and Rehabilitation

There will be no any matter of replacement, relocation and rehabilitation as the proposed site is already owned by the project proponent. There will not be any let regarding safety factors as applicable from time to time for such buildings on all accounts.





Table 6-2: Pictorial View of Stakeholder Consultation

7 EMERGENCY RESPONSE PLAN & EVACUATION/EXIT PLAN

7.1 Objective Of Emergency Response Plan

Emergency preparedness helps to minimize the human suffering and economic losses that can result from emergencies. It should be understood that the size and density of projects, as well as their access and location, have a bearing on the degree of planning necessary for emergencies. It is therefore strongly recommended that the constructor ensure that a member of staff on site assist in developing the emergency response plan.

7.2 Scope Of Emergency Response Plan

This plan assesses risk, assign role and responsibilities and give the major steps to be followed in any emergency situation. Its increases understandings of workers and officials in handling different emergency situations which may occur at project area.

7.3 Emergency Situations

Following emergencies may occur at workplaces:

- fire
- fuel spillage
- gas leaks
- Explosions.
- Injury from machinery and equipment.
- Fall, climbing accident.
- emergency as a result of environmental conditions (e.g., heat, cold, wet, snow, wind, lightning, bushfires, floods) emergencies requiring evacuation
- Hazardous substances and chemical spills .
- Internal emergencies such as loss of power or water supply and structural collapse.
- Serious injury events or medical emergencies.
- bomb threats
- Civil disorder or criminal acts such as robberies and shootings.

7.4 General Evacuation Procedure

It is not always necessary to evacuate a unit/plant during an emergency. A power outage, for instance, does not necessarily call for evacuation of a unit. The overall safety must first be evaluated: lighting, hazardous materials, ventilation systems, and other hazardous operations. If the unit can be safely occupied, evacuation is not necessary. In the case of evacuation the workers in the effected zone receive instructions from their supervisor or designated person. As per instruction the workers will immediately leave their places of duty and assemble at the assembly point.

- Area supervisor should roll call the employees to ensure all are out of danger zone.
- On receiving first information of emergency situation the administrative head should contact the Security Officer to ensure that alarm system is activated or not.
- After assessing the emergency situation Security Officer or designated person instruct through telephone to initiated the emergency response procedure and call the responsible personnel at site.
- Administrative Head may also call the external help like fire brigade, police, bomb disposal squad, ambulance etc. and communicate with them.
- Security Officer after consulting the Administrative Head may order the evacuation of workers from affected area.

If evacuation is ordered, follow these procedures:

- Stay calm, do not rush, and do not panic.
- Safely stop your work.
- Gather your personal belongings if it is safe to do so.
- If safe, close your door and window, but do not lock them.
- Use the nearest safe stairs and proceed to the nearest exit. Do not use the elevator.
- Wait for any instructions from emergency responders.
- Do not re-enter the building or work area until you have been instructed to do so by the emergency responders.

7.5 Fire Emergency Response Plan

In the case of fire emergency, following emergency response steps will be followed:

- When any employee notice fire or smoke he must immediately decide if the nature of fire is such that he could take action on his own or verbal call for help.
- If it is considered to be beyond the scope of individual control the alarm should be raised.
- The Security supervisor should immediately reach that area and simultaneously called for the emergency response procedures.
- After the alarm called for fire emergency all the members of fire squad should reach the affected area and take instruction of Fire Master.
- If fire reaches the raised alarm state the members are allowed to leave the area except one guard for the main gate to guide the external Fire Brigade helpers.
- Off-duty key personnel and security staff will also report immediately for duty.
- Equipments will be removed from the affected area.
- The nearest hospital should be informed for possible casualties.
- In addition of firefighting, supervisor should ensure all the flammable articles are removed.

7.6 Special Fire Emergency Response And Fire-Protection Precautions

- **“Joint Code of Practice”** includes fire protection measurements and compliance with the regulations and requirements is to tackle with fire emergency in power generation facility.
- **Fire-Resistant Materials** To ensure the stability of a power generation facility in the event of a fire, the supporting structure and ceilings must be resistant to fire. The characteristic “fire resistant” must be defined in the applicable standards. However, this means that the requirements to be met by fire resistant parts can easily differ from one country to the next, depending on the standards applied. The same holds true for the inspection procedures specified for verification.
- **Fire Compartments** Fire can also spread via the outer facade if windows have been shattered by the heat so it is perfectly appropriate to use fire resistant glazing, Partition walls, ceilings must be fire resistant and made of noncombustible materials.

- **Doorways** should at least be sealed with tightly closing, fire-retardant doors; any other openings required in the walls must be sealed in an equivalent manner.
- **Partition walls** in corridors should reach right up to the structural ceiling.
- **Smoke vents** must be installed at the top of all stairwells; internal stairwells must be equipped with a mechanical, automatically activated ventilation system connected to an emergency power supply. If a fire breaks out, excess pressure must be generated in the stairwells to prevent the ingress of smoke.
- **Ventilation and Air-Conditioning Systems:** Ventilation and air-conditioning systems must be installed in such a way that fire or smoke cannot be transmitted to stairwells and other floors or fire compartments.
- **Fire Fighting** Fire extinguishers, fire-fighting water to every point on floor and an automatic sprinkler system is the most effective protective measure for fighting and controlling a fire.
- **Supportive Services**-One electrician, one mechanic and four general workers (for salvage operations) will be arranged to ensure the necessary services to unaffected areas continue and removal of any equipment etc. which may be affected by the incident.

7.7 Guidelines For Emergency Evacuation

In the event of emergency following steps should be followed:

- Check for any signs of immediate danger like leakage of gas or emissions etc.
- Advise the staff that there could be an emergency through alarming situation,
- Encourage staff to remain calm
- Call emergency phone numbers available at site
- Check that the available exit is clear and free of danger
- Once the room has been cleared, proceed to the assembly area
- In the assembly area, check whether all the staff members reached safely or not.

8 HEALTH AND SAFETY PLAN

8.1 Introduction

This Health and Safety Plan (HASP) provides a general description of the levels of personal protection and safe operating guidelines expected of each employee or subcontractor associated with the environmental services being conducted at the site. HASP Supplements will be generated as necessary to address any additional activities or changes in site conditions which may occur during field operations.

8.2 Health & Safety Rules Of The Site

All site personnel shall adhere to General Safety Rules, during site operations. In addition, the housekeeping and personal hygiene requirements will also be observed.

8.2.1 Housekeeping

During site activities, work areas will be continuously regulated for identification of excess trash and unnecessary debris. Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. At no time will debris or trash be intermingled with waste PPE or contaminated materials.

8.2.2 Smoking, Eating, or Drinking

Smoking, eating and drinking will not be permitted inside any controlled work area (near Incinerator) at any time. The workers will first wash hands and face immediately after leaving controlled work areas (and always prior to eating or drinking).

8.3 Personal Hygiene

The following personal hygiene requirements will be observed:

Water Supply

A water supply meeting the following requirements will be utilized:

Potable Water

An adequate supply of potable water will be available for personnel consumption. Potable water can be provided in the form of water bottles, water coolers, or drinking fountains. Where drinking fountains are not available, individual-use cups will be provided as well as adequate disposal containers. Potable water containers will be properly identified in order to distinguish them from non-potable water sources.

Non-Potable Water

Non-potable water may be used for hand washing and cleaning activities. Non-potable water will not be used for drinking purposes. All containers of non-potable water will be marked with a label stating:

Non-Potable Water

Not Intended for Drinking Water Consumption

Toilet Facilities

A minimum of one toilet will be provided, with separate toilets maintained for each sex except where there are less than 5 total personnel on site. For mobile crews where work activities and locations permit transportation to nearby toilet facilities on-site facilities are not required.

Washing Facilities

Employees will be provided washing facilities (e.g., buckets with water etc.) at each work location. The use of water and hand soap (or similar substance) will required by all employees following exit from the Exclusion Zone, prior to breaks, and at the end of daily work activities.

8.4 Heat And Cold Stress

Heat and cold stress may vary based upon work activities, PPE/clothing selection, geographical locations, and weather conditions. To reduce the potential of developing heat/cold stress, be aware of the signs and symptoms of heat/cold stress and watch fellow employees for signs of heat/cold stress. For additional requirements, refer to Heat Stress, and Cold Stress. Site personnel will be instructed in the identification of a heat stress victim, the first-aid treatment procedures for the victim and the prevention of heat stress will be available.

8.5 Stop Work Authority

All employees have the right and duty to stop work when conditions are unsafe, and to assist in correcting these conditions. Whenever the site person determines that workplace conditions present an uncontrolled risk of injury or illness to employees, immediate resolution with the appropriate supervisor shall be sought. Upon issuing the stop work order, the site person shall implement corrective actions so that operations may be safely resumed. Resumption of safe operations is the primary

objective; however, operations shall not resume until the Safety Professional has concurred that workplace conditions meet acceptable safety standards.

8.6 Personal Protective Equipment

The purpose of personal protective equipment (PPE) is to provide a barrier, which will shield or isolate individuals from the chemical and/or physical hazards that may be encountered during work activities. The PPEs to be provided are as follow:

- Safety Helmets
- Face Masks
- Ear Plugs
- Gloves
- Boots
- Overall etc.

9 CONCLUSION AND RECOMMENDATIONS

Based on the study conducted for Environmental Impact Assessment (EIA) of the project, the following recommendations are made:

- Plantation as far as permissible and within the scope of the project shall be carried out.
- Sustainable development approach through conservation of natural environment is followed.
- Environmental aspects of the project should be well taken care through implementation of the Environmental Management Plan as recommended in this report.
- The project management may adopt “cleaner and greener environment” as its motto and this will make the project more environment friendly.

On the basis of the findings of the EIA, it is concluded that the incineration plant will not pose any adverse impact on the local population and the environment. Therefore, it is recommended that the competent authority may please be issues Environmental Approval for the construction and operation of this project.

10 REFERENCES

- Listed below are some of the documents, reports and other references consulted during the preparation of this report:
- Information and data provided by project proponents;
- Project Pre-feasibility Study Report;
- Technical Design Data related to the project.
- Information gathered through discussions with the project related persons of the project proponent;
- Information collected from the Technical documents of various suppliers of machinery/equipment.
- Punjab Environment Quality Standards for Ambient Air November 2010;
- Punjab Environment Quality Standards Noise Levels November 2010;
- Punjab Environment Quality Standards for Drinking Water November 2010;;
- Pakistan Environmental Protection Act, 1997;
- The Punjab Environmental Protection (Amendment) Act 2011 covers aspects related to:
 - The protection, conservation, rehabilitation and improvement of the environment and the prevention, control of pollution and promotion of sustainable development;
 - Establishing complete regulatory and monitoring bodies, policies, rules, regulations and Punjab environmental quality standards; and
 - To ensure enforcement, the act establishes regulating bodies i.e. Punjab Environmental Protection Council (PEPC) and responsible bodies i.e. Punjab Environmental Protection Agency (Punjab EPA) at Provincial level.
- Environment related Laws in Pakistan and the Province of Punjab;

- Government of Pakistan, Pakistan Environmental Protection Agency, Policy and Procedures for Filing, Review and Approval of Environmental Assessment, 2000;
- Google earth, maps.
- Guidelines for Public Consultations - These guidelines cover:
 - Consultation, involvement and participation of Stakeholders
 - Techniques for public consultation (principles, levels of involvements, tools, building trust)
 - Effective public consultation (planning, stages of EIA where consultation is appropriate)
 - Consensus building and dispute resolution.
- workplace safety and health act 2011
- Land Acquisition Act (LAA) of 1894
- The forest Act 1927
- Pakistan Penal Code, 1860

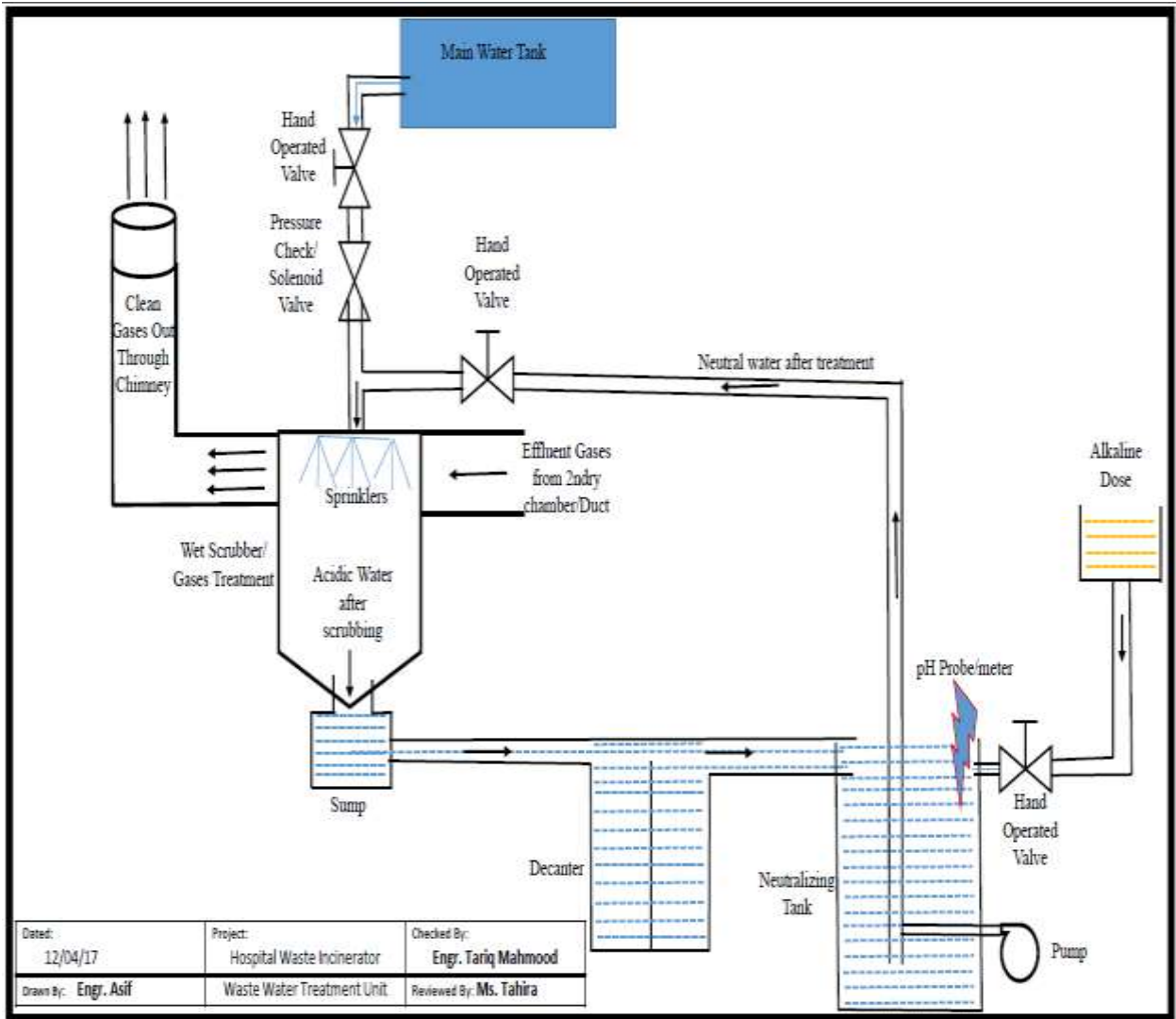
11 TERM OF REFERENCES

- 1 The Consultant is required to carry out an Environment Assessment Study of the Project as required under section 12 of Punjab Environmental Protection Act 1997 (amended 2012).
- 2 The Study should be comprehensive and should cover all aspects which are envisaged under the relevant national and provincials laws & regulations including but not limited to:
- 3 Identification and recommendation for suitable solution/treatment/mitigation measures of emissions and effluents such as waste water and sludge etc in accordance with Punjab Environmental Quality Standards (PEQS).
- 4 Identification and recommendation for suitable solution/treatment/mitigation measures of solvents, oils (tar), hazardous waste, organic compounds, steam, flue gases, particulate matter and chemical compounds harmful for the environment and other substances leading to air, noise, water and soil pollution in accordance with PEQS.
- 5 The Study should be acceptable to the relevant national and/or provincial authorities (relevant authorities) in Punjab.

12 GLOSSARY

Air Quality	Measurement of the pollutants in the air; a description of healthiness and safety of the atmosphere.
Compensation	Includes cash payment, deferred payment, a bond, an insurance policy, stipend, payment in kind, rendition of services, grant of privileges and disturbance money, entitlement to special treatment by government and semi government entities, grant of alternative land, grant of import licenses and business, trade and commercial facilities in addition to the rehabilitation and resettlement of an affected person.
Consultation	Consultation refers to two-way transfer of information or joint discussion between project staff and the affected population. Systematic consultation implies a sustained and rigorous sharing of ideas. Bank experience shows that consultation often yields the best resettlement alternatives, fruitful procedures for continued participation, and independent information on actual conditions for implementation.
Coordinates	Each of a group of numbers used to indicate the position of a point, line, or plane to make impure, pollute
Contaminate	
Disclosure	The action of making new or secret information known
Disruption	Disturbance or problems which interrupt an event, activity, or process.
Environmental Management	Attempt to control human impact on and interaction with the environment in order to preserve natural resources
Evaluation	The making of a judgment about the amount, number, or value of something; assessment.
Genotoxic waste	Waste includes cytotoxic drugs and outdated materials, vomitus, faeces or urine from patients treated with cytotoxic drugs or chemicals and materials such as syringes and vials contaminated from preparation and administration of such drugs.
Geology	A science that studies rocks, layers of soil, etc., in order to learn about the history of the Earth and its life
Ground Water	Aquifers currently being used as a source of drinking water or those capable of supplying a public water system. They have a total dissolved solid content of 10,000 milligrams per liter or less, and are not "exempted aquifers."
Hazardous	Substance or material, which could adversely affect the safety of the public, handlers or carriers during transportation
Household	People residing under one roof, using the same hearth and operating as a single economic unit.

Impact	Effect on someone or something.
Land Acquisition	The process whereby a person is compelled by a public agency to cede all or part of the land a person owns or possesses, to the ownership and possession of that agency, for public purpose in return for compensation.
Mitigation	The action of reducing the severity, seriousness, or painfulness of something.
Non-Risk Waste	Waste includes paper and cardboard, packaging, food waste, aerosols and others.
Occupational Health	Maintenance of the highest degree of physical, mental and social well-being of workers in all occupations by preventing departures from health, controlling risks and the adaptation of work to people, and people to their jobs
Project Area	The area specified by the funding and/or implementing agency according to the Official Gazette Notification and includes the areas within the administrative limits of the Federal or a Provincial Government.
Proponent	A person who advocates a theory, proposal, or course of action.
Rehabilitation	Include all compensatory measures to re-establish; at least lost incomes, livelihoods, living and social systems. It does not include the payment of compensation for required assets.
Resettlement	Means all measures taken to mitigate any and all adverse impacts, resulting due to execution of a project on the livelihood of the project affected persons, their property, and includes compensation, relocation and rehabilitation.
Risk Waste	Risk Waste means infectious waste, pathological waste, sharps, pharmaceuticals, genotoxic waste, chemical waste and radioactive waste.
Social Environment	It includes the culture that the individual was educated or lives in, and the people and institutions with whom they interact.
Scope	The extent of the area or subject matter that something deals with or to which it is relevant
Stakeholders	Include affected persons and communities, proponents, private and public businesses, NGOs, host communities and EPA.
Topography	Details of the surface features of land. It includes the mountains, hills, creeks, and other bumps and lumps on a particular hunk of earth.



Wet Scrubbing System

