INSTALLATION OF INCINERATOR IN FEDERAL GENERAL HOSPITAL (FGH) LOCATED AT NIH ROAD, CHAK SHAHZAD ISLAMABAD

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT

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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
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
Pak EPA	Pakistan 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 FGH Islamabad.

Title and Location of the Project

The title of the proposed project is Installation of Incinerator in Federal General Hospital (FGH).

Location: The proposed project is located within the premises of Federal General Hospital (FGH) Located at NIH Road, Chak Shahzad, Islamabad, figure 0-1.

Figure 0-1: Location Map of FGH Islamabad

Brief outline of the Proposal

United Nations Office for Project Services (UNOPS) through a financial grant plans to install the hospital waste incinerator located at Federal General Hospital, NIH Road, Chak Shahzad Islamabad. 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 will have incineration capacity of 150 kg per hour.

The incinerator works with natural gas burners with the option to operate on standby LPG fuel. Combustion gas will 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	• Sprinkling of water at active construction sites and unpaved areas on regular basis especially during dry climatic conditions • Periodic maintenance and tuning of all the construction machinery and vehicles	Proponent and its contractor
Solid waste Construction waste and domestic waste from worker camps	Minor	• 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	• Use of spill prevention trays and impermeable sheets to avoid contamination of the groundwater/surface water • septic tanks should 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	• 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	• Incinerators specifically designed for hospital waste and no other commercial activities will be carried out.	Plant Operators

Impacts	Magnitude	Recommendation Measure	Responsibility
		• Properly trained staff operate the incinerators according to standard operating procedures; • High (more than 1250°C) temperature will be achieved in the incinerator to avoid dioxin or furan discharge. • The flue gases will be properly treated (e.g. through wet 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. • Wet scrubbing system (based on the water treatment) will be installed for stack gases treatment.	
Solid waste Residual and fly ash (about 5-10% of the total waste and as per quality of waste)	Moderate	• Proper testing and in compliance with standards before disposal. A scientifically secured ash disposal pit will be prepared near the incinerator room.	Plant Operators
Water Quality (250 Liters/Hr for operation) during full capacity	Moderate	• Installation of wastewater treatment facility so any wastewater produced will be treated and in compliance with wastewater standards of NEQS and reused in the facility.	Plant Operators
Noise Noise from Equipment/ Machinery/Vehicles	Minor	• 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	• Prepare a manual for labor accident prevention including safety education and training • Provide workers with appropriate protective equipment	Plant Operators

Impacts	Magnitude	Recommendation Measure	Responsibility
		• 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 0-2: 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 NEQS	On quarterly basis by a third party	Proponent and its contractor
2.	Water Quality	Discrete grab sampling and laboratory testing of water sample.	As described by NEQS	Proponent and its contractor
3.	Emissions	Emissions monitoring system. Monitoring of ambient air quality and stack	Will be carried out on quarterly basis as per NEQS	Proponent and its contractor

Sr. No.	Monitoring Parameters	Monitoring Mechanism	Frequency	Responsibility
		emission from incinerator stack.		
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 six months 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 Pakistan Environmental Protection Act 1997, 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 complicated 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 hospital 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.

1.1 Waste Management Team

Hospital Waste Management Team shall be established according to Hospital Waste Management Rules 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 National Environmental Quality Standards (NEQS) 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, Islamabad	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 FGH,Islamabad. In accordance to the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2000, SRO # 339 (1)/2000, the project for hospital waste incinerator falls in Schedule –II, Part-G "Waste Disposal" {Waste disposal and/or storage of hazardous or toxic wastes (including landfill sites, incineration of hospital toxic waste) for which Environmental Impact Assessment (EIA) report is required for Environmental Approval.

According to the Pakistan 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 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 Pakistan 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 Pakistan 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, EPA, Islamabad in the present case, before issuing the desired Environmental Approval (EA).

1.3 Brief Description of Nature, Size And Location Of Project

The incinerator will work with natural gas burners with the option to operate on standby LPG fuel as well. Combustion gas will 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.

1.4 Objective Of the Report

Objectives to conduct this EIA are as following:

- A legal binding in accordance to Pakistan Environmental Protection Act-1997.
- To identify the potential environmental issues pertaining to the proposed site.
- To evaluate the ability of the site in view of social acceptance and environmental soundness.

- To provide the maximum information to the proponent and other stakeholders about the existing environmental conditions and the implications of the proposed project.
- Collection of available data, reports, drawings and other relevant information about area of proposed project.
- Review of applicable existing environmental legislation and national environmental quality standards (NEQS).
- Propose mitigation measures to eliminate or to reduce the negative impacts to an acceptable level.
- Development of well-resourced environmental management and monitoring plans to identify mitigation strategies targeted towards avoidance, minimization and rehabilitation of the impacts.

1.5 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

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.

1.6 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 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.

1.7 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 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORKS

2.1 General

This section deals with the existing environmental policy as well as legal and administrative framework related to carry out Environmental Impact Assessment (EIA). All the pertinent environmental policies and guidelines of Pak-EPA and legal frameworks have been duly conferred in this section. In addition, the roles and responsibility of the proponent as well as the Environmental Protection Agency Pakistan (Pak-EPA) have been discussed in this section.

2.2 Policy Framework

The Ministry of Climate Change is the responsible authority for policy making on environmental protection in Pakistan.

2.2.1 National Conservation Strategy (NCS), 1992

The Pakistan National Conservation Strategy (NCS) that was approved by the federal cabinet in March, 1992 is the principal policy document on environmental issues in the country (EUAD/IUCN, 1992). The NCS outlines for the country's primary approach towards encouraging sustainable development, conserving natural resources, and improving efficiency in the use and management of resources. The NCS has 68 specific programs in 14 core areas in which policy intervention is considered crucial for the preservation of Pakistan's natural and physical environment.

2.2.2 National Environment Policy, 2005

In March, 2005, the Government of Pakistan (GoP) launched its National Environmental Policy, which provides an overarching framework for addressing the environmental issues. Section 5 of the policy commits for integration of environment into development planning as instrument for achieving the objectives of National Environmental Policy. It further states in clause (b) of subsection 5.1 that EIA related provisions of Environmental Protection Act, 1997, will be diligently enforced for all development projects. It also provides broad guidelines to the federal government, provincial governments, federally administered territories and local governments to address their environmental concerns and to ensure effective management of their environmental resources. With reference to housing and shelter, it includes measures such as the provision of water supply and waste management in notified slums,

upgrading living standards in rural dwellings, in addition to the development of master plans for city towns and rural settlements.

2.2.3 National Resettlement Policy, 2002

In March, 2002 Pakistan Environmental Protection Agency (Pak-EPA), GoP has issued its National Resettlement Policy, which explains the basis for compensation, rehabilitation.

2.2.4 National Water Policy

The National Water Policy aims at efficient management and conservation of existing water resources, optimal development of potential water resources, steps to minimize time and cost overruns in completion of water sector projects, equitable water distribution in various areas and canal commands, measures to reverse rapidly declining groundwater levels in low- recharge areas, increased groundwater exploitation in high-recharge areas, effective drainage interventions to maximize crop production, improved flood control and protective measures, steps to ensure acceptable and safe quality of water, minimization of salt build-up and other environmental hazards in irrigated areas, institutional reforms to make the managing organizations more dynamic and responsive.

2.2.5 National Climate Change Policy, 2012

The National Climate Change Policy was approved by the Federal Cabinet on 26th September, 2012. With an overall goal, 'to ensure that climate change is mainstreamed in the economically and socially vulnerable sectors of the economy and to steer Pakistan towards climate resilient development', the policy puts forward comprehensive policy objectives of sustained economic growth, integration of climate change into inter-related national policies, pro-poor gender sensitive adaptation and cost-effective mitigation, water, food and energy security, DRR, effective decision making and coordination, creating awareness, building capacities, and conservation of natural resources and long term sustainability. It also seeks effective use of financial opportunities, and public and private sector investment in adaptation measures.

This policy emphasis the need of taking necessary measures to integrate climate change concerns into Initial Environmental Examination and Environmental Impact Assessment (IEE/EIA) processes; it further reinforce the need to ensure that IEE/EIA

and other mechanisms are strictly observed in all development projects, particularly infrastructure projects, by the concerned agencies.

2.2.6 The Labour Policy, 2010

The Labour Policy envisages a harmonious working relationship between workers and employers for improving the performance and efficiency of the industry. The rights and obligations based approach to labour issues is being followed also in accordance with the Constitution of the Islamic Republic of Pakistan.

2.3 Legal Framework

GoP has promulgated laws/acts, regulations and standards for the protection, conservation, rehabilitation and improvement of the environment. In addition to this, GoP has also developed environmental assessment procedures governing developmental projects. Following are the excerpts of these laws and procedures relevant to the proposed project.

2.3.1 Pakistan Environmental Protection Act, 1997

Pakistan Environmental Protection Act (PEPA) was promulgated on December 06, 1997 by repealing the Pakistan Environmental Protection Ordinance, 1983. It provides the framework for implementation of the NCS, 1992, establishment of provincial sustainable development funds, protection and conservation of species, conservation of renewable resources, and establishment of Environmental Tribunals, appointment of Environmental Magistrates, Initial Environmental Examinations (IEE), and Environmental Impact Assessments (EIA). Section 12 of the Act stresses the need to carry out EIA/IEE study prior to construction or operation of a project.

2.3.2 Pakistan Environmental Protection Agency (Review of IEE/EIA) Regulations, 2000

These regulations provide lists of the projects requiring IEE and EIA. They also briefly describe the preparation and review of environmental reports.

2.3.3 Pakistan Environmental Assessment Procedures, 1997

Pakistan Environmental Assessment Procedures (1997) is, in fact, a compendium, which contains the following sets of statistics and information significant to the proposed project.

2.3.3.1 Policy and Procedures for Filing, Review and Approval of Environmental Assessment Reports

It refers to environmental policy and administrative procedures to be followed for filing of environmental examination/assessment reports by the proponents and their review and authorization by the concerned environmental protection agencies.

2.3.3.2 Guidelines for the Preparation and Review of Environmental Reports

These guidelines are developed to facilitate both the proponents and decision makers to formulate reports (inclusive of all the information contained therein) and carry out their review so as to take cognizant decisions.

2.3.3.3 Guidelines for Public Consultation

These guidelines deal with possible approaches to public consultation and techniques for designing an effective the programme of consultation that involves all major stakeholders and ensures that their concerns are incorporated in any impact assessment study.

2.3.4 National Environmental Quality Standards (NEQS), 2010

Pakistan Environmental Protection Council (PEPC) first approved these standards in 1993. They were later revised in 1995, 2000 and 2010. They endow information on the permissible limits for discharges of municipal and industrial effluent parameters and industrial gaseous emissions in order to regulate environmental pollution. The National Environmental Quality Standards (NEQS), 2010 are available at official website of Pak-EPA.

2.4 Other Relevant Laws

2.4.1 Federal Local Government Ordinance, 2001

Environmental protection is federalized subject under Federal Local Government Ordinance (LGO), 2001. Despite any specific provisions, every local government may execute functions conferred by or under the Federal LGO, 2001 and in performance of such functions may implement such powers, which are necessary and appropriate. Until different provisions, rules, regulations or byelaws are made, the local governments may exercise such powers as are specified in the Sixth Schedule of Federal LGO, 2001. Environmental protection is sequential at 48 of the Sixth Schedule.

2.4.2 Islamabad Capital Territory Local Government Act, 2015

This act was formulated to rationalize and reorganize the local government system in the Federal Capital. Whereas it is expedient to establish an elected local government system to devolve political, administrative, and financial responsibility and authority to the elected representatives of the local governments; to promote good governance, effective delivery of services and transparent decision making through institutionalized participation of the people at local level; and, to deal with ancillary matters.

The Government may provide guidelines and render advice to a local government for achieving the objectives of Government policy and for promoting economic, social and environmental security of the Capital Territory.

The mayor leads the Metropolitan Corporation Islamabad (MCI); its functions include urban planning, road maintenance, environment control, building control, water supply, sanitation and other municipal services for the Islamabad Capital Territory. The mayor also chairs the Capital Development Authority (CDA), its scope is mainly confined to estate management, sector developments and project executions.

2.4.3 Land Acquisition Act, 1894 (Including Later Amendments)

The primary law for acquisition of land for public purposes in Pakistan is the "Land Acquisition Act, 1894". The Land Acquisition Act, 1894, is a "law for the acquisition of land needed for public purposes and for companies and for determining the amount of compensation to be paid on account of such acquisition". This act deals with the procurement of private properties for public purposes. There are 55 sections in this act mainly dealing with area notifications, surveys, acquisition, compensation, appointment awards, dispute resolution, penalties and exemptions.

2.4.4 Standard Operating Procedure (SOP) for Management of Sanitation Services in Islamabad 2008

The Capital Development Authority (CDA) has the responsibility for the overall planning, provision and supervision of public health services, covering adequate sanitation and garbage disposal within the territorial limits of the Islamabad Capital Territory (ICT). It shall apply to waste generators (residential, commercial, hospital / clinical / hazardous / industrial, debris, green/ garden waste etc.) and waste/sanitation service providers (collection, storage, transportation & disposal) or Standard Operating Procedure (SOP) for Management of Sanitation Services in Islamabad or

any person / agency who is directly / indirectly involved in solid waste management business.

2.4.5 Ban on (Manufacturing, Import, Sale, Purchase, Storage and Usage) Polythene Bags Regulations), 2019 in ICT

According to the Ban on (Manufacturing, Import, Sale, Purchase, Storage and Usage) Polythene Bag Regulations 2019, there is a complete ban on making, buying or selling, and using single-use polythene bags in the ICT. However, permission has been granted for the use of large-sized polythene bags for dustbins and waste disposal. Under the law, the organisations wishing to use polythene flat bags will have to pay a Rs 10,000 fee. While any manufacturer, importer or wholesaler found supplying polythene bags will be fined a sum ranging from Rs 50,000 to Rs 500,000. A shopkeeper or hawker violating the regulation will be fined Rs 10,000 for the first time. The fine may go up to Rs 50,000 for repeated violations.

2.4.6 Pakistan Occupational Health and Safety Act, 2018

The main objective of this act is to provide for a balanced and nationally consistent framework to secure the health and safety of workers and workplaces by: (1) protecting workers and other persons against harm to their health, safety and welfare through the elimination or minimization of risks arising from work or from specified types of substances or plant; (2) providing for fair and effective workplace representation, consultation, Co-operation and issue resolution in relation to work health and safety; (3) encouraging unions and employer organizations to take a constructive role in promoting improvements in health and safety practices at work and assisting persons conducting businesses or undertakings and workers to achieve a healthier and safer working environment; (4) promoting the provision of advice, information, education and training in relation to work health and safety; (5) securing compliance with this Act through effective and appropriate compliance and enforcement measures; (6) ensuring appropriate scrutiny and review of actions taken by persons exercising powers and performing functions under this Act; (7) providing a framework for continuous improvement and progressively higher standards of health and safety at work and (8) Maintaining and strengthening the national harmonization of laws relating to work health and safety and to facilitate a consistent national approach to work health and safety in this jurisdiction.

2.4.7 Guideline for Solid Waste Management, 2005

Guidelines for Solid Waste Management have been issued as a draft by the Pakistan Environmental Protection Agency in coordination with JICA and UNDP. These guidelines explain the waste generation, discharge and composition. These guidelines will strictly be followed for safe handling and disposal of waste generated during construction and operational stages of the project.

2.4.8 Factories Act, 1934

This law governs the employment of labour, working hours, working conditions and facilities to be provided in the workplace. The Act deals primarily with matters related to labour relations, working conditions and health and safety in the work place. Sections 14 to 33 of the act specifically cover all the issues related to the work environment of labourers. This will be applicable during the construction and operational stages of the project. Contravention to any of the provisions of this act will lead to penalty against the concerned person.

2.4.9 Employment of Child Act, 1991

This Act prohibits the employment of children under fourteen year in any of the proposed project activities.

2.4.10 Pakistan Penal Code, 1860

This states the penalties for violations concerning pollution of air, water bodies and land.

2.4.11 The Islamabad Wildlife (Protection, Preservation, Conservation & Management) Ordinance, 1979

This act provides for the protection, preservation, conservation and management of wildlife in the Islamabad Capital Territory. This act defines the wildlife sanctuary, game reserves, protected areas and national parks. It also defines the rules and responsibilities of the relevant authorities and the relevant personnel to protect the ecological resources. It also describes the penalties and punishments on offenses against the sections given in the act.

2.4.12 Cutting of Trees (Prohibition) Act, 1975

This act forbids cutting of trees without acquiescence of the Forest Department.

2.4.13 National Disaster Management Act, 2010

National Disaster Management Act, 2010 was passed by Parliament of Pakistan in 2010. The Act applies to whole Pakistan including tribal areas of FATA. The Act was passed in backdrop of 2010 Floods in Pakistan and strengthens Disaster Management system. This act is applicable to the proposed project in case of the disaster. The proposed project will require special consideration of disaster and risk management strategies as per the Act.

2.4.14 National Clean Air Act, 2000

The Clean Air Act legislation aims to control vehicular emissions, pollution from industry and indoor air pollution in rural and urban areas. This act will trigger if vehicles and machinery used for construction activities emanates air pollutants above the permissible limit.

2.4.15 Building Code of Pakistan (Seismic Provisions-2007)

Building Code of Pakistan (Seismic Provisions-2007), established after devastating earthquake of 2005, prescribe the minimum requirements for the earthquake design and construction of buildings and building-like structures and/or their components subjected to earthquake ground motions. This Code is applicable to the subject project as it includes the formation of structures.

2.4.16 Islamabad Capital Territory Building Control Regulations, 2020

According to these regulations, only such types of buildings/structures can be constructed in Islamabad Capital Territory plots, which are in accordance with the Master Plan / Functional Plan / these regulations and/or as described in the terms and conditions of allotment of respective plot(s). Any construction that does not conform to the Building & Zoning Regulation shall be liable to be demolished at the risk and cost of owner/allottee /occupant after giving 15 days' notice. This Code is applicable to the subject project as involves construction of structures.

2.4.17 The Antiquities Act, 1975

The protection of cultural resources in Pakistan is ensured by the Antiquities Act of 1975. Antiquities have been defined in the Act as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments etc. The act is designed to protect antiquities from destruction, theft, negligence, unlawful excavation, trade and export. The law prohibits new construction in the proximity

(200 ft) of a protected antiquity and empowers the Government of Pakistan to prohibit excavation in any area, which may contain articles of archaeological significance.

2.5 Administrative Framework

2.5.1 Public Works Department (PWD)

The implementing agency of the proposed project is Public Works Department (PWD). The management of PWD will ensure that all the proposed measures are effectively implemented at the design, construction and operational stages of the project.

2.5.2 Environmental Protection Agency, Pakistan

Pakistan Environmental Protection Council is the apex inter-ministerial and multi-stakeholders decision-making body, which is headed by Prime Minister. While Pakistan Environmental Protection Agency is meant for the putting into practice of environmental laws in Pakistan. They have vicarious powers to provincial environmental protection agencies for review, approval and monitoring of environmental examination/assessment projects. Pak-EPA will be liable for reviewing the report, issuing environmental approval and overall/broad based monitoring of the proposed project actions.

2.5.3 The Capital Development Authority (CDA) Islamabad

The Capital Development Authority (CDA) is a public benefit corporation responsible for providing municipal services in Islamabad Capital Territory. The CDA was established on 14th June, 1960 by executive order entitled Pakistan Capital Regulation. As of 2016, most of CDA's municipal services and departments have been transferred to the newly created Islamabad Metropolitan Corporation, although CDA is still in charge of estate management, project execution and sector developments.

3 DESCRIPTION OF THE PROJECT

3.1 General

This section deals with project components which are the part of the storage facility, incineration details and methodology and its related activity. It also describes the category of the project, availability of construction materials, construction time and cost of the project, construction and operation equipment etc. The information presented in this section is based on project site survey, preliminary design report and construction drawings provided by the client.

3.2 Type And Category of the Project

In accordance to the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2000, the project for hospital waste incinerator falls in Schedule-II, Part-G "Waste Disposal" {Waste disposal and/or storage of hazardous or toxic wastes (including landfill sites, incineration of hospital toxic waste)} for which Environmental Impact Assessment (EIA) report is required for Environmental Approval. Therefore, to fulfil the legal requirements of the Section-12 of the Pakistan Environment Protection Act the client is required to submit the EIA report in the Environmental Protection Agency, Government of the Punjab, Lahore to obtain the required Environmental Approval (EA).

3.3 Objectives Of Project

The objective of the proposed project is minimizing the hospital waste by incineration in environmentally sound manner and minimizing the risk for personnel, general public health and environment. The hospital waste is a special type of waste produced in small quantities carrying a high potential of infection and injury. Inadequate and improper handling may have serious public health consequences and a significant impact on the environment. Along with the capacity building sessions of doctors and the hospital staff regarding waste handling there is also a need of improvement in Infrastructure, therefore, incineration is the best option to install.

3.4 Alternatives Considered and Reasons for Their Rejection

The management of medical waste is an evolving area of waste management with improvements being sought to reduce the toxicity and risk associated with the

handling of medical waste. In this section, alternatives to the installing an incinerator are discussed including the "No Project Option".

3.4.1 No Project Option

The "No Project Option" alternative would mean that the incinerator should not be installed. This also means that the hospital waste will be continued to remain untreated. It is a common observation that hospitals generate large amounts of waste that falls into different categories in which about 85% is general, non-hazardous waste comparable to domestic waste. The remaining 15% is considered hazardous material that may be infectious, toxic or radioactive. Improper disposal of medical wastes, especially hazardous may lead to significant impacts on human health as well as on environment.

This option is unacceptable when one considers the problems associated with the old or ongoing operations to treat hospital waste and the associated health effects. The hospital hazardous and infectious waste without proper disposal measures will generate various diseases that will be a big threat to human health and the environment. Additionally, the current methods of medical waste management are not consistent with the hospital's waste management rules.

3.4.2 Alternative (Non-incineration) Treatment Methods

The increased awareness of the adverse environmental and health impacts of incineration and increasing availability of alternative non-incineration technologies have led to a concerned by the urbanized and developed. Non-incineration treatment technologies can be categorized based on the fundamental processes used to decontaminate waste. The four basic processes are:

1 Thermal processes

2 Chemical processes

3 Irradiative processes

4 Biological processes

The majority of non-incineration technologies employ the first two processes listed above and are supplemented by mechanical processes.

3.4.2.1 Thermal Processes

Thermal processes rely on heat (thermal energy) to destroy pathogens in the waste. This category can be subdivided into low-heat, medium-heat, and high-heat thermal processes. This further sub-classification is necessary because physical and chemical mechanisms that take place in thermal processes are significantly different at medium and high temperatures.

Weaknesses

Significant Environmental Impacts

- Odours related to process
- Potential release of toxic chemicals
- Emissions and wastewater from scrubbers, may emit protein waste
- Disposal of ash from processing
- Huge mass

Disadvantages

The following wastes should not be treated using this method:

- Volatile and semi-volatile organic compounds
- Bulk chemotherapeutic wastes
- Mercury, Other hazardous chemical wastes
- Radiological wastes

3.4.2.2 Chemical Based Technologies

Hospitals and other health care facilities have used chemical agents routinely for decades, in applications ranging from disinfecting reusable instruments to general cleaning of work surfaces. When applied to medical waste treatment, the main problem is how to ensure contact between the chemical and infectious waste with a high enough concentration and sufficient exposure time to achieve proper levels of disinfection. Chemical-based disinfection technologies generally incorporate internal shredding and mixing to resolve the problem of contact and exposure. To maintain the proper concentration, chemical technologies must be able to replenish chemicals lost through volatilization, decomposition, adsorption on waste surfaces, and interaction with microorganisms. Other factors such as pH, temperature, and the

presence of other chemicals that may interfere with the disinfection process should also be considered. Depending on the nature of the chemicals, occupational exposures of workers to concentrations in the air and through skin contact may be a concern. Since many chemical-based technologies release substantial quantities of liquid effluent or wastewater into the sewer, the releases must comply with limits set in effluent discharge standards. In addition, it is important to determine what the long-term environmental consequences of those releases might be.

Weaknesses

Significant Environmental Impacts

- Worker exposure to effects of chemicals
- Release of pathogens through aerosol formation
- Spills and leakage of chemicals
- Toxic by-products released in wastewater
- Noise levels from any mechanical equipment used
- Offensive odours

Disadvantages

- Grinding required waste unrecognizable.
- Large metal objects may damage internal shredders.

The following wastes should not be treated using this method:

- Volatile and semi-volatile organic compounds,
- Chemotherapeutic wastes,
- Mercury, other hazardous chemical wastes, and
- Radiological wastes

3.4.2.3 Irradiation Technologies

When electromagnetic radiation has high enough energy to knock out electrons from their atomic orbits, it is referred to as ionizing radiation; examples are x-rays and gamma rays. Non-ionizing radiation, such as microwaves and visible light, do not have sufficient energy to remove electrons. If ionizing radiation interacts with a cell, its main target is the DNA in the nucleus. At sufficiently high doses of ionizing radiation, extensive damage is done to DNA leading to cell death. The ionizing

radiation also creates so-called free radicals that cause further damage by reacting with macromolecules in the cell (e.g., proteins, enzymes, etc.). Ionizing radiation can be obtained using radioactive materials, such as Cobalt-60, that emit high speed gamma rays. UV-C or ultraviolet radiation in the C range (253.7 nm), also known as germicidal or shortwave UV, is another kind of ionizing radiation and can destroy cells under the proper conditions. UV-C can be generated using special lamps and had been employed as a supplement to alternative treatment technologies to inactivate aerosolized pathogens from shredders and other mechanical devices. Another technique for producing ionizing radiation is to use an "electron gun" from which a beam of high-energy electrons is propelled at high speed to strike against a target. When energy is applied to a material (called a cathode) with loosely bound electrons, a stream of electrons is released.

The electron beam can be focused using electric and magnetic fields to cause it to bombard a target (called the anode). The energy of the electrons measured in electron volts (eV) is determined by the voltage difference between the cathode and anode, and by the current.

If infectious waste is in the path of the beam, the electron shower destroys microorganisms by chemical dissociation, the rupture of cell walls, and destruction of DNA and other macromolecules. As e-beams strike metals in the waste, x-rays may also be produced. These x-rays also interact with molecules causing chemical bonds to break. The e-beam converts some oxygen in air into ozone, which it has disinfecting and deodorizing properties. The high energy electrons, together with x-rays, free radicals, and ozone, destroy viruses, fungi, bacteria, parasites, spores, and other microorganisms, as well as odours in the waste.

Weaknesses

Significant Environmental Impacts

- Potential worker exposure to radiation
- Potential release of ozone gas

Disadvantages

Electron beam technologies are highly automated and computer controlled. These technologies require shredders or other mechanical device in the post-processing stage to render the waste unrecognizable and reduce waste volume.

The following wastes should not be treated in e-beam units:

- Volatile and semi-volatile organic compounds,

- Chemotherapeutic wastes,
- Mercury, other hazardous chemical wastes, and
- Radiological wastes

3.4.2.4 Biological Processes

Biological processes employ enzyme mixtures to decontaminate medical waste. The resulting sludge is put through an extruder used to remove water for sewage disposal. The technology is suited for large applications (10 tons/day) and is also being developed for use in the agricultural sector to break down animal waste.

The system has a delivery hopper, grinder with high efficiency particulate air (HEPA) filter, reaction chamber tank where waste is exposed to a solution of enzymes and a separator where the slurry is separated into liquid and solid waste streams. The liquid is sent to the sewer and solid waste is send to a landfill (the solids from animal waste may be recycled as compost). The technology requires regulation of temperature, pH, enzyme level, and other variables. The unit is being designed for a regional medical waste treatment centre.

Weaknesses

Significant Environmental Impacts

- Disposal of liquid and solid wastes

Disadvantages

- The technology is suited for large applications (10 tons/day) and mostly effective for animal and organic waste.

3.4.2.5 Mechanical Processes

Mechanical processes such as shredding, grinding, hammer mill processing, mixing, agitation, liquid-solid separation, conveying (using augers, rams, or conveyor belts) and compaction, supplement other treatment processes. Mechanical destruction can render the waste unrecognizable and is used to destroy needles and syringes so as to minimize injuries or to render them unusable. In the case of thermal or chemical-based processes, mechanical devices such as shredders and mixers can also improve the rate of heat transfer or expose more surfaces to chemical disinfectants. Mechanical processes can add significantly to the level of maintenance required.

A mechanical process is supplementary and cannot be considered a treatment process on its own. Unless shredders hammer mills, and other mechanical destruction processes are an integral part of a closed treatment system, they are usually not used

before the waste is decontaminated as workers would be exposed to pathogens released to the environment by mechanical destruction. If mechanical processes are part of a system, the technology is designed in such a way that the air in and from the mechanical process is disinfected before being released to the surroundings. It is especially important for air to be drawn into the mechanical process (away from the inlet) when waste is being fed. This is often done using a draft fan which maintains a negative pressure in the mechanical processing chamber; air taken from the mechanical process passes through the disinfection chamber or through a high efficiency particulate air (HEPA) filter before being released to the environment.

Shredders, grinders, and hammer mills are commonly used size reduction equipment. Other terms, such as granulators, particlizers, and cutters, are also used. In general, size reduction is accomplished by shearing the material between two surfaces (as in shredders) or by impact against a solid surface (as in hammer mills). A screen is usually added to control the size of particles that exit the device. Sometimes, a ram is used to push the waste through the shredder or grinder.

Weaknesses

Significant Environmental Impacts

- Worker exposure to pathogens
- Exposure to elevated noise levels
- Offensive odours
- Not aesthetically pleasing

Disadvantages

- Mechanical processes can add significantly to the level of maintenance required.

Most of the alternative methods to incineration presented above have one or two disadvantages when compared to incineration.

- They are significantly more expensive
- They require additional mechanical equipment such as shredders to render the waste unrecognizable and reduce volume
- They have limitations in the type of waste that can be burned e.g. cytotoxic, pathological and chemotherapeutic waste.

3.4.3 A New Site or Contractors/Third Party Services

If the project is not taken up at all then all the funds, efforts and inconvenience will be saved and these will become available for diversion to other projects of the proponent. No more land will be required and no disturbance will be caused at the proposed site to people through project construction process. Further the recurring cost of the maintenance of the project along with enhanced operational cost will be saved. At this time, it is not feasible for the Hospital to depend on a third party for incineration services as most of the hospitals within reasonable proximity do not have incinerator. Additionally, there is no other known medical waste treatment facility offering service in FGH Islamabad.

Weaknesses

On-site incineration is an increasingly important alternative for the treatment and disposal of hospital waste. Incineration of waste is affordable and feasible on site. The heat recovered from on-site hospital incinerator is used for preheating of waste to be burnt and production of electricity for hospital.

3.4.4 Project Installation at the Proposed Site with No Alteration

In viewing the above methods, the best solution to ensure an efficient and state of the art disposal of medical waste, incineration in environmentally sustainable way, is the on-site incineration of waste. The incineration process can be applied to almost all medical waste types, including pathological waste, and the process reduces the volume of the waste by up to 90%. So there is no reason left behind the rejection of project and the selected site is preferable for establishment of proposed project.

Incinerator will be installed at that site which will be cost effective and most suitable for waste transportation and its disposal. Additionally, that site will not pose severe adverse impacts on the human health and environment. In this regard FGH Islamabad is considered most appropriate site.

3.5 Location And Site Layout of the Project

The project site is located at NIH Road, Chak Shahzad Islamabad. Location map is given below in **Figure - 3.1.**

Figure 3-1: Project Site Location

3.6 Land Use

Currently, land for the proposed project exists in the vicinity of the FGH Islamabad, as illustrated in the above **figure-3.1**

3.7 Vegetation Around the Site

Around 500 meter of the project site no vegetation exist which can be affected by the project.

3.8 Cost And Magnitude of Operation

The project cost has been estimated about PKR 2.5 Million. The quantities have been worked out from the design drawings and project feasibility. The rates for cost estimates are based on construction work, contractor cost, and cost of the raw materials with 10% escalation for the year 2025.

3.9 Schedule of Implementation

It is planned that the following schedule of project implementation will be adhered to, this is subject to the conditions that everything goes according to planning and no serious bottlenecks are encountered. The implementation stages of the project activity include:

1st Stage: The stage–1 comprises the onsite contouring studies and soil investigations.

2nd Stage: The stage –2 comprises the following task:

i. Laying of foundations excavation and commencement of erection work.

ii. Start of civil, electrical and mechanical work.

iii. Development of basic infrastructure.

iv. Fitting of instrumentation.

3rd Stage: The stage –3 comprises the following task:

i. Equipment erection completion.

ii. Completion of the basic infrastructures water supply system, electricity supply etc.

4th Stage: The last stage will be Commencement of regular operation.

3.10 Description of the Project

Incineration is an important method for the treatment and decontamination of biomedical and health-care waste. Incineration is 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 should be designed to cope with the specific characteristics of hazardous health-care waste. The technical specification of the equipment to be installed are as followings:

Model: i8-200G

Make: ATI Industries

Country of Origin: United Kingdom

The Incinerator i8-200G (waste management system) is a turn-key project which will comprise a hospital grade incinerator for proper disposal of hospital solid waste material.

3.10.1 Technical Details

- The incinerator has a capacity of destruction 150 kg per hour.
- The incinerator shall work with natural gas burners with the option to operate on standby LPG fuel as well.
- Combustion gas is re-burned in the post-combustion (secondary) chamber at the temperature of 1250°C during minimum 2 seconds.
- The control panel is fitted with a functional synoptic view showing the operating situation of the whole incinerator and is controlled by P.L.C.
- 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.

3.10.2 Combustion Chamber of Waste

- The first phase of the incineration combustion is without air (pyrolytic effect), comparable to gasification.
- The combustion chamber has thick sheet of steel (5 to 8 mm), especially elaborated in rectangular shape.

- The insulation of the combustion chamber is composed of refractory bricks having high content aluminium and insulates bricks in order to assure a minimum temperature on the outside metal sheet.
- Composition of the refractory bricking up;

3.10.3 Refractory

Thickness: 110 mm

Maximum temperature: 1650 °C

Nature: 42% of Al_20_3

3.10.4 Insulator

Thickness: 80 mm

Maximum temperature: 1250°C

Nature: Calcium silicate

3.10.5 Air Supply Fan:

- The combustion hearth is equipped with primary air nozzles to assure the perfect combustion.
- The air injection is done with a high pressure.
- One motorized valve regulates the fan according to the combustion situation.

3.10.6 Combustion burners:

- The combustion hearth has equipped with one combustion burners.
- Automatic burning and mono-bloc casting guiding flames have fitted with an electronic ignition device and permanent ventilation.

3.10.7 Secondary Combustion Chamber

- The post-combustion of gases take place at a temperature of minimum 1250°C for seconds. The cylindrical form of the secondary combustion chamber, combined with vortex effect in the secondary air injection enables to assure the achievement of very low hydrocarbon refuse.
- The post-combustion chamber has fitted with inspection doors so that a periodical cleaning of dust can be achieved.

- The post-combustion has lined with high thermal insulating materials having a thickness of 250mm or more.
- The design of the post-combustion burner has similarity to the combustion burner.

3.10.8 Gas Washer / Scrubber

- Mild Steel integrated pass-through type gas washing system with water sprayer
- Water saving system with re-circulating system.

3.10.9 Water Treatment

- Water treatment unit to treat the water used for gas washing before opening it into main drain.

3.10.10 Electric Control and Regulation Panel

- The installed materials are well-known marks functioning at the frequencies of 50 Hz.
- The panels have the temperature regulators which have digital showings.
    - One for regulating the temperature of combustion burners
    - One for regulating the temperature of post-combustion

* The control panel commanded by the P.L.C (Programmable Logic Controller) System.
* The manual commanding is anticipated on each element.

3.10.11 Chimney

- The chimney is made of welded and flanged stainless steel tube.
- The chimney is fitted with sampling port for the collection and measuring of gas samples.
- The height of chimney has 15 m tall stack from ground with 500 mm diameter

3.10.12 Standby LPG Fuel

LPG Vaporizer with manifold system for reserve LPG cylinders having sufficient capacity to run the incinerator for at least 12 hours including shed.

3.10.13 Technical Requirements

- Destruction capacity: Minimum 150 kg/hour
- Operation time: 12 hours

- Heating power: 480 kW/h
- Volume of combustion chamber: 2 m^3
- Temperatures
- Combustion: 850 °C and above
- Post-combustion: 1250°C and above
- Burners power
- Combustion: 1 * 300 kW
- Post-combustion: 1 * 300 kW
- Gases dwell time in the post- combustion chamber: 2 seconds

3.10.14 Shredder

- Number of shafts: 4 or more
- Driving power: 4x10 kW or more
- Number of cutter disks: 50 or above
- Cutter disk thickness: 24mm or above
- Cutting chamber: 840x900mm or more
- Shaft Speed: 20-35 rpm
- Mobile for ease of movement
- Low noise operation

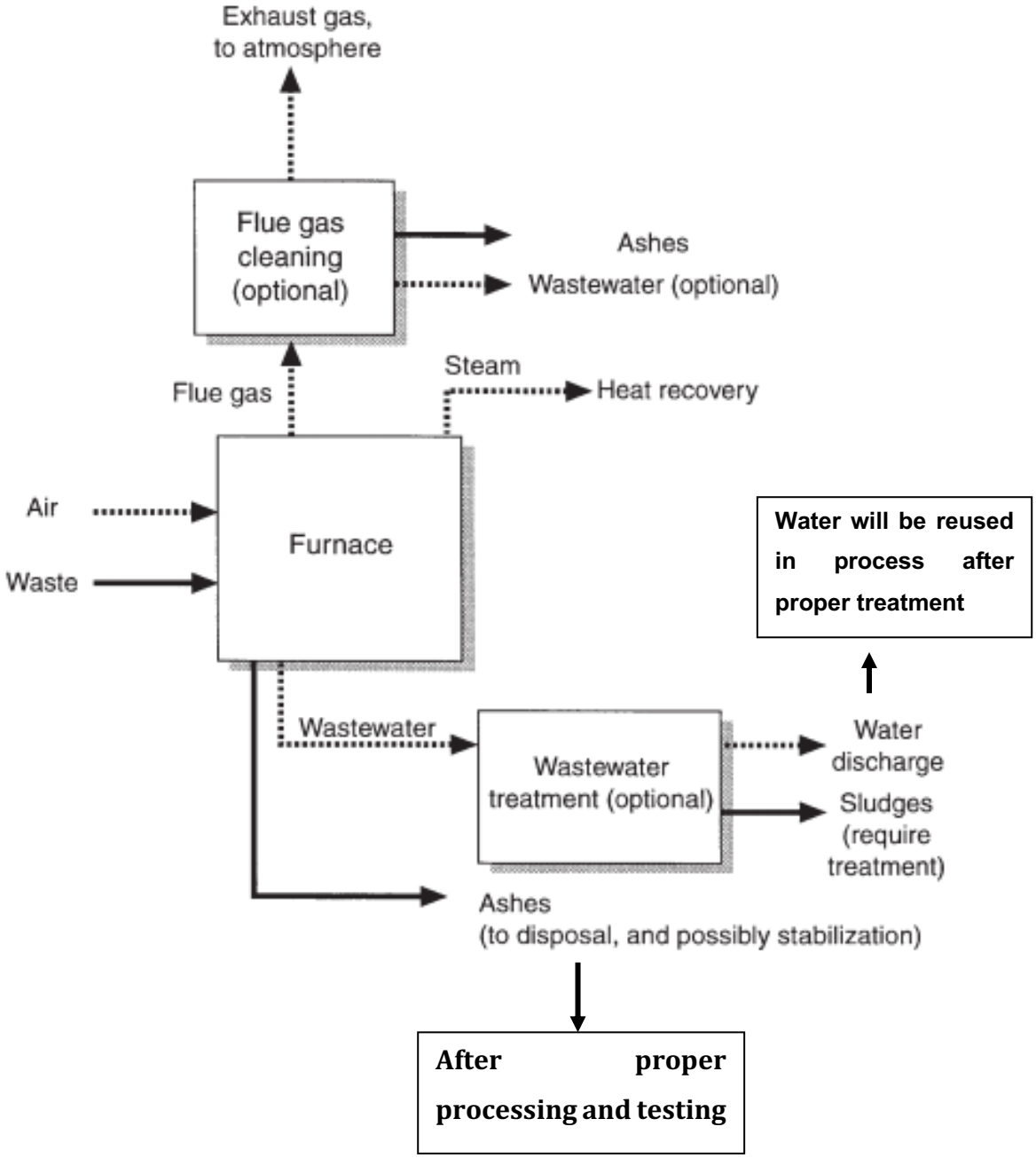
3.10.15 Generator System

- Generator 15 KVA brand new
- Caterpillar, Siemens or FG- Wilson or equivalent

3.10.16 04 Night Vision Camera

- 01 Computer System Cori 3 along with 22 PPM Printer

3.10.17 Simplified flow scheme of an Incinerator (Process Flow Chart)



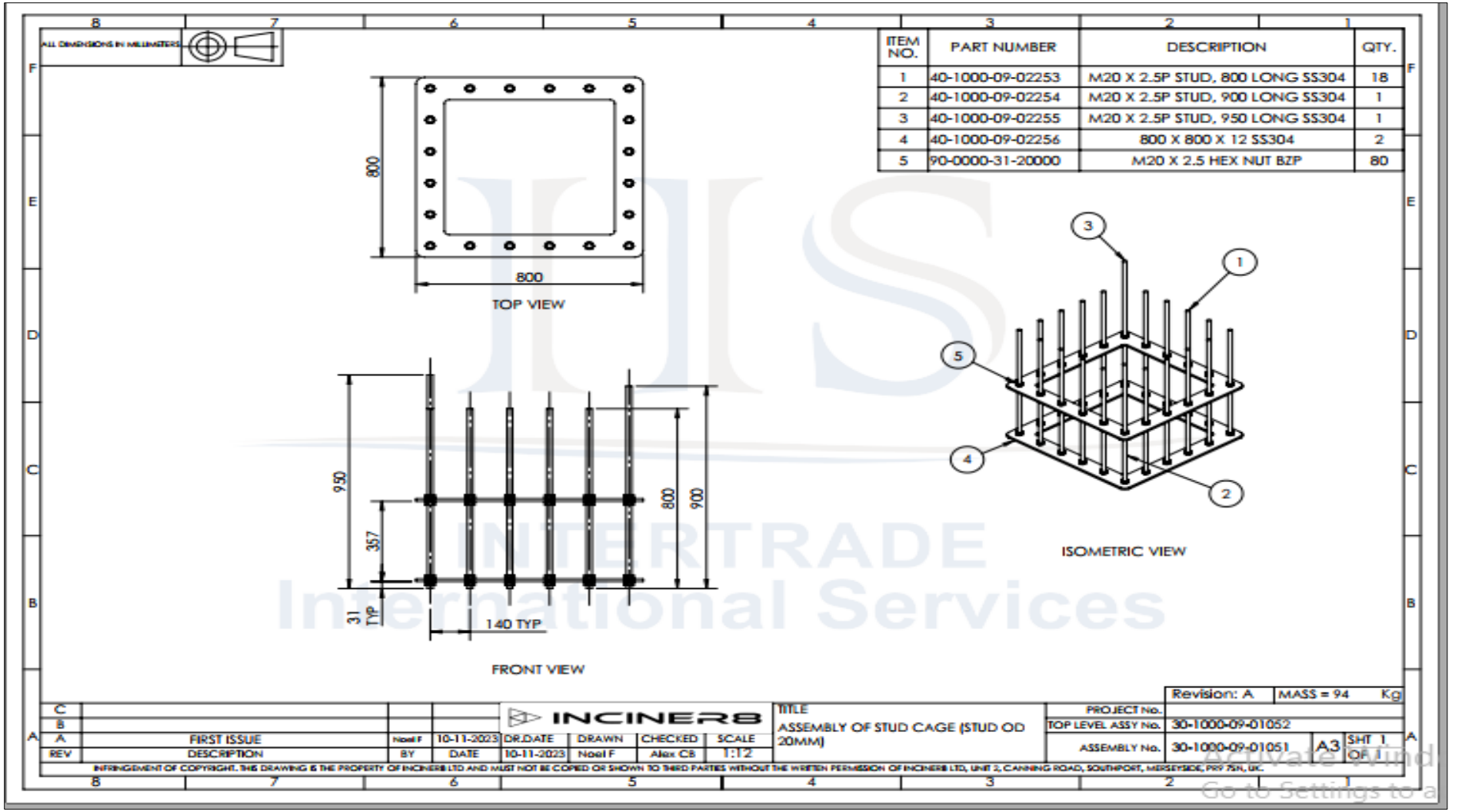
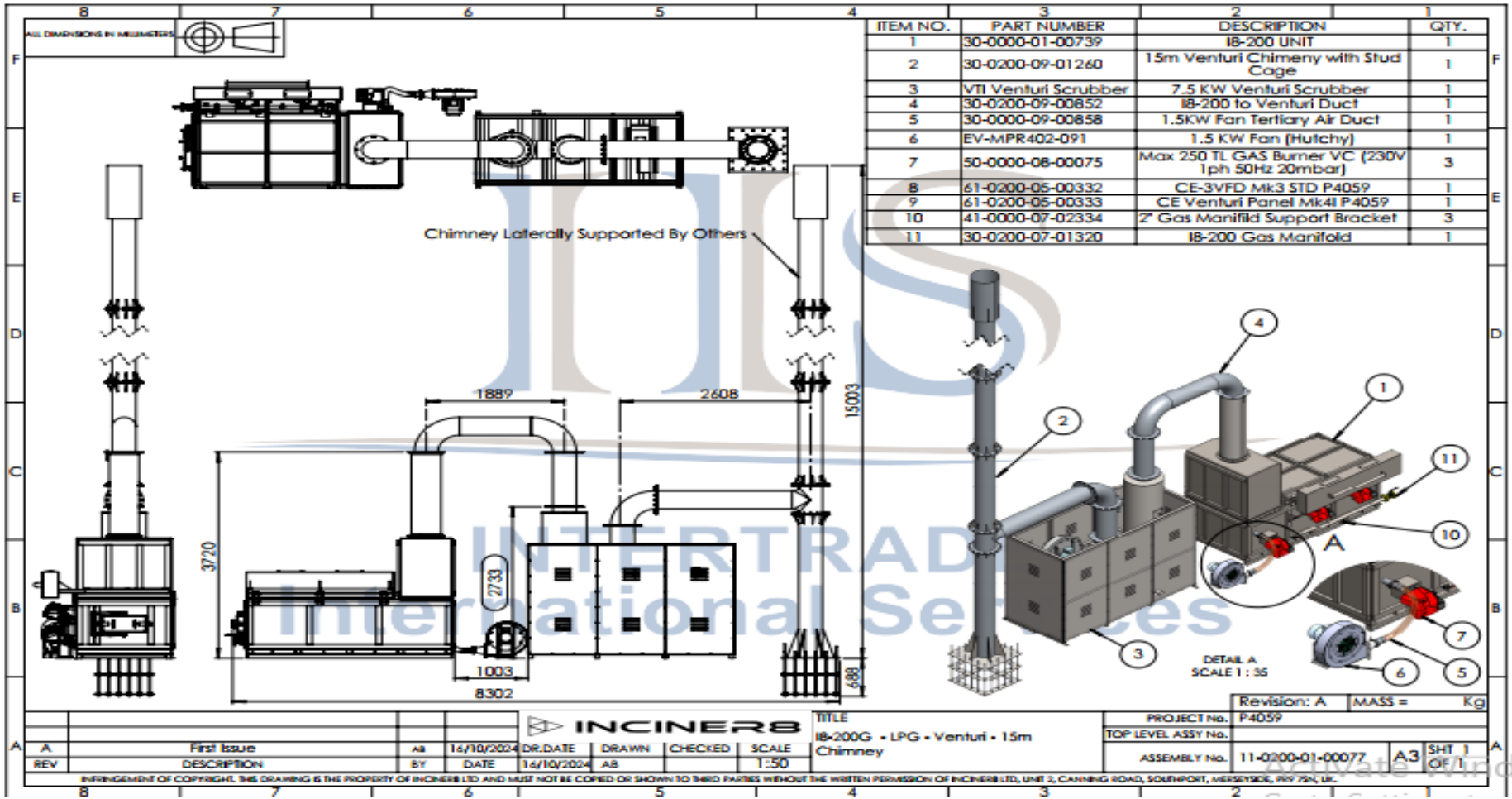


Figure 3-2: Proposed Plan layout of Incinerator i8-200G



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	30-0000-01-00739	I8-200 UNIT	1
2	30-0200-09-01260	15m Venturi Chimeny with Stud Cage	1
3	VTI Venturi Scrubber	7.5 KW Venturi Scrubber	1
4	30-0200-09-00852	I8-200 to Venturi Duct	1
5	30-0000-09-00858	1.5KW Fan Tertiary Air Duct	1
6	EV-MPR402-091	1.5 KW Fan (Hutchy)	1
7	50-0000-08-00075	Max 250 TL GAS Burner VC (230V 1ph 50Hz 20mbar)	3
8	61-0200-05-00332	CE-3VFD Mk3 STD P4059	1
9	61-0200-05-00333	CE Venturi Panel Mk4I P4059	1
10	41-0000-07-02334	2" Gas Manifild Support Bracket	3
11	30-0200-07-01320	I8-200 Gas Manifold	1

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

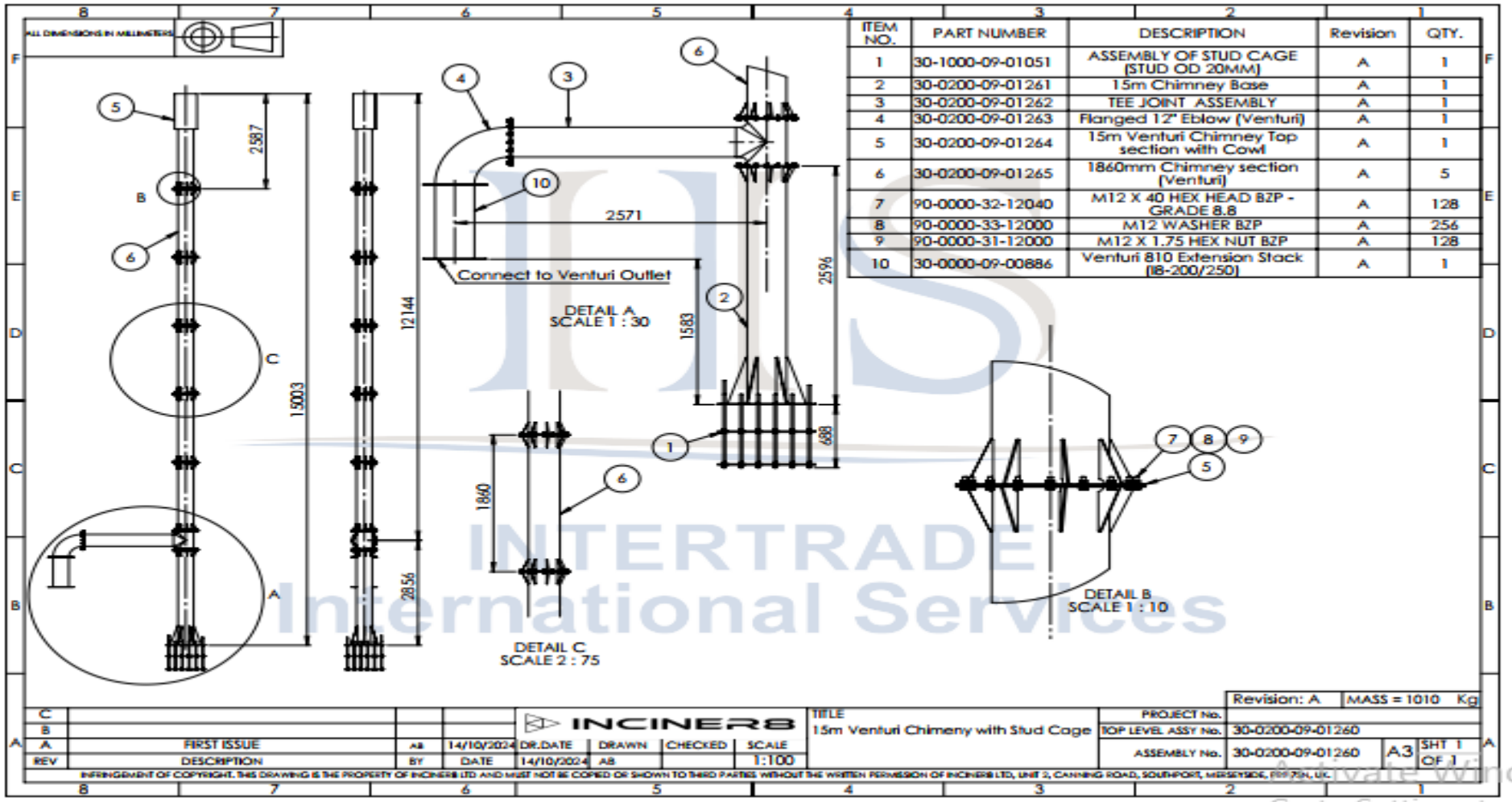


Figure 3-4: Proposed Plan layout of Incinerator i8-200G

3.11 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.

3.12 Decommissioning of the Existing Incinerator

FGH has already installed an incinerator which has low capacity and sometimes does not work as per the NEQS, if required the existing plant will also be removed for better operations of the new incinerator plant.

4 DESCRIPTION OF ENVIRONMENT

4.1 General

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 other agencies and prevailing environmental laws and environmental quality standards etc.

4.2 Delineation of Area of Impact

The existing environmental conditions of the proposed project have been considered within 100-250m from boundary of the proposed project The information has been collected from variety of sources,, including published literature, DCRs, field observations, monitoring and surveys, conducted specifically for this Project have been analyzed for this study. Consultations were also held with the general public and stakeholders of the project area in order to seek the public opinion on the implementation of the proposed project.

4.3 Physical Environment

The following section provides an overview of the information on physical environment of the proposed Project study area collected from primary as well as secondary sources. The major parameters covered include physiographic and topography, geology, soil, seismicity, climate and meteorology, water resources, solid waste, and land use etc.

4.3.1 Physiography and Topography

Islamabad is located at 33.43°N 73.04°E at the northern edge of the Pothohar Plateau, along Rawalpindi District and at the foot of the Margalla Hills in Islamabad Capital Territory with general height of 540 m (1,770 ft.) above the mean sea level (MSL). The terrain in Islamabad consists of plains and mountains whose total relief exceeds 1,600 m. The modern capital and the ancient Gakhar city of Rawalpindi form a conurbation, and are commonly known as the Twin Cities. The city is divided into four physiographic3 zones i.e.: i) Margalla Hills; ii) Higher Plain; iii) Lower Plain; and iv) Valley Area.

4.3.2 Margalla Hills

It is located in the north of the area. The dominant formations are composed of sandstone, siltstone, shale, and lenses of conglomerates and are covered with permanent mixed scrub and coniferous forest. The ground elevation is up to 1,240 m at the upstream end. There are three major tributaries of Lai Nullah namely Saidpur Kas, Tenawali Kas and Bedarawali Kas, which originate from the Margalla Hills forming a very steep channel bed slope of about 1/10.

4.3.3 The higher plain

It expands over the built-up area of Islamabad City with a gradual slope from North to South. Saidpur Kas, Tenawali Kas and Bedarawali Kas run southward in the plain and finally flow into Lai Nullah just upstream of Kattarian Bridge.

4.3.4 The lower plain

It is the upper part of the Rawalpindi area above Chaklala Bridge. This area is flatter than the upper Higher Plain and the lower Valley Area forming a bowl-shaped topography. Rawalpindi city area is covered with alluvium and eolian deposits and is part of dissected basin plain formed by Lai Nullah and its tributaries.

4.3.5 The valley area

It is located downstream of Chaklala Bridge. The valley area, falling down to the Soan River, a tributary of the River Indus is composed of gravel/boulder and sand/silt.

4.4 Regional Geology

The geological structure and Stratigraphic of the Islamabad-Rawalpindi area is very complex due to the convergence of the Pakistan-India and Eurasian tectonic plates and their collision that began about 20 million years ago. The geological history records a long period of gentle geological fluctuations and slow deposition in the study area while the Pakistan-India plate drifted northward. This period is followed by more vigorous tectonic processes and rapid deposition since the convergence of the Pakistan-India and Eurasian plates. Therefore, the period from the Middle Jurassic to the Lower Miocene (150 million years) is represented by only 675 m of primarily marine sedimentary rocks, whereas the last 20 million years are represented by more than 7,572 m of continental sedimentary rock. The sedimentary rocks exposed in the Islamabad area date from the Middle Jurassic to the Quaternary. Three structural zones can be pointed out in Islamabad:

- Mountainous Margalla Hills in the north: Jurassic through Eocene limestone and shale complexly folded and thrust along the Hazara fault zone;
- South of the Margalla Hills: the southward-sloping piedmont bench (piedmont fold belt) is underlain mainly by truncated folds in the sandstone and shale of the Rawalpindi Group;
- Southernmost area: fluvial sandstone, clay stone and conglomerate deposits along the axis of the Soan syncline west-south-westward.

4.5 Soils

There is an important relation between soils and environment. Environment is greatly influenced by soils. Soils also provide food, clothes or housing population and lumber products, medicinal plants etc.

Soil is not a lifeless residual layer rather it is a very dynamic element of environment in which complicated physical, chemical and biological activities are constantly proceeding. It is dynamically developing and changing body. Soil scientists restrict the word soil or solum merely to the surface material, which has come to have distinct layers or horizon over the extended period of time.

Soils mean differently for different people. While for a soil scientist it means the upper a few layers created through weather effect in which plants are grown the solid portion of soil is both organic and inorganic. The organic part consists of both living and decayed plant and animal materials.

Geographically, Pakistan is highly diversified in environment and landscape. Lofty snow-clad mountains, extensive rivers, piedmont plains and vast sandy deserts have resulted in variations of soil forming elements. Accordingly, in order to have a generalized account of various kinds of soils which are available in Pakistan, the country has been divided into nine broad ecological zones. The project area falls in the Western Mountainous Region.

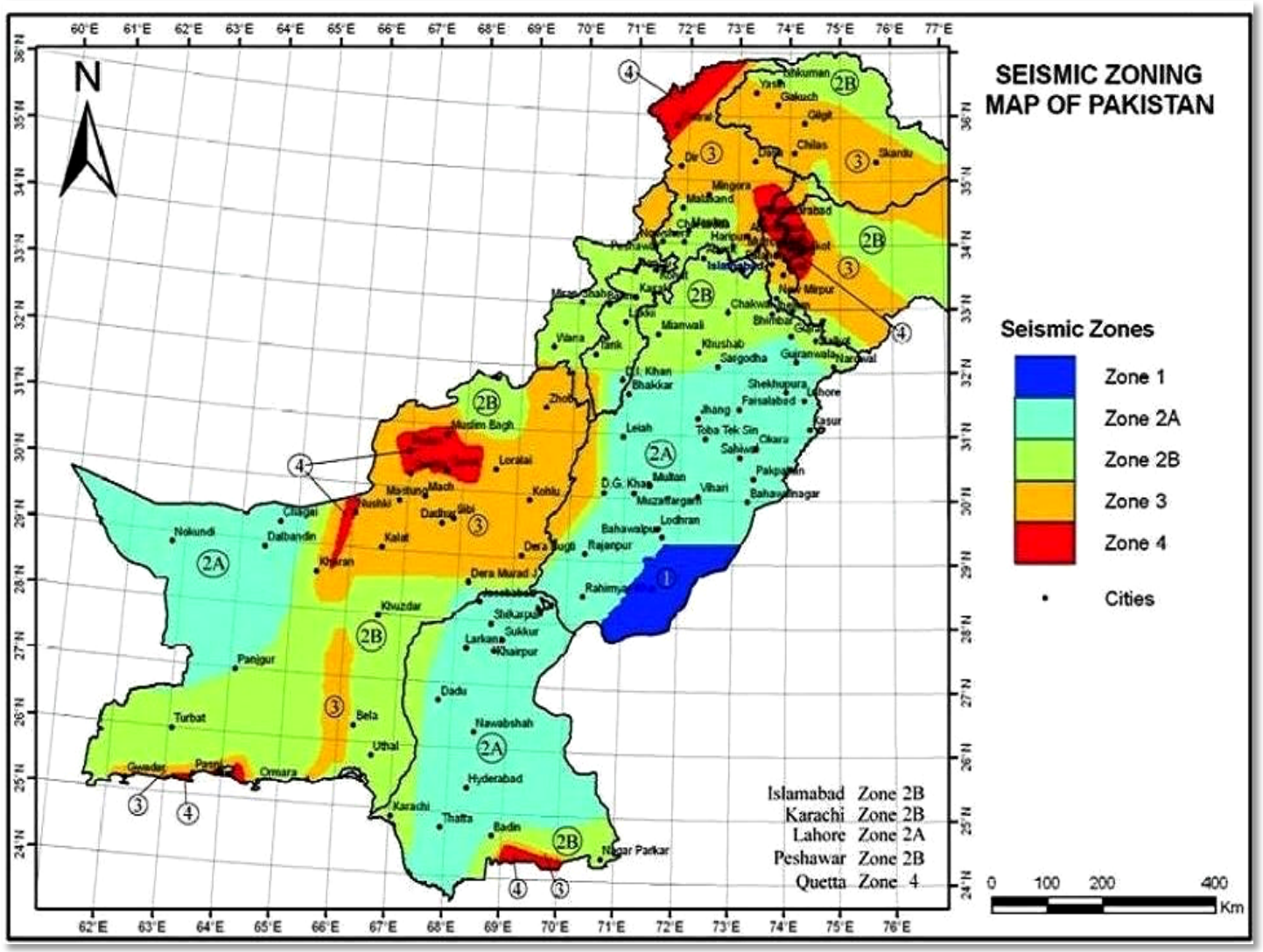


Figure 4-1: Seismic Zoning of Pakistan

Soil in the area is derived from rocks in the Punjab province, as well as originates from fluvial deposits. In zones where depositional landforms are present, the surface can be: i. Without any soil development (stream beds, low islands and bars), ii. Covered with fine sand, silt and clay with a relatively high organic content and fertile soil (stream flood plains), iii. Covered with a thin layer of fine-textured soil overlying channel deposits of sand and gravel (stream and fan terraces), and iv. Covered with fertile and easy tilled soil overlying fine silt and clay deposits (loess plains). In areas where erosional landforms are present, the surface can be covered with thin sandy soil derived from weathering of the underlying rock (conglomerates of the Soan formation or Lei conglomerate, Kamlial formation).

The soil of the project area is made up of river Alluvia brought down from the Himalayas and deposited during the Pleistocene epoch. The sediments generally are loamy in the northern reaches and become silty southwards. Finer materials settled in the digressional parts and coarse materials on higher undulations, intermediate level area received the particles-sized fractions in between. The sediments are characteristically calcareous and of mixed minerals makeup. The soils are typically deep calcareous, weakly structured, bright colored and with a zone of secondary lime accumulation at or near one meter depth.

4.6 Climate

In Islamabad, the summers are sweltering, humid, wet, and clear and the winters are short, cold, and partly cloudy. Over the course of the year, the temperature typically varies from *38°F* to *100 F* and is rarely below *33°F* or above *107°F*.

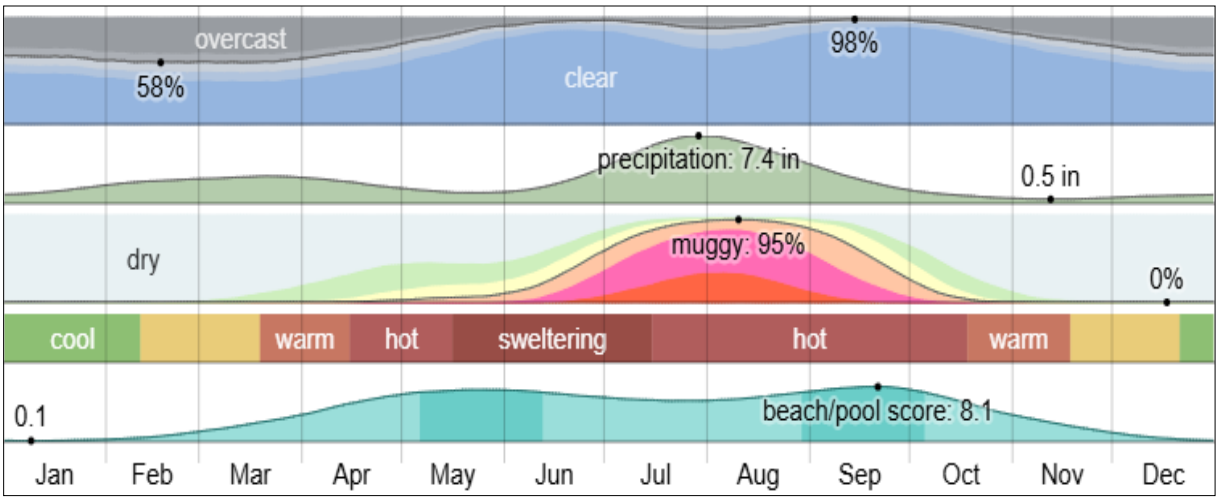


Figure 4-2: Climate in Islamabad

4.7 Average Temperature in Islamabad

The hot season lasts for 3.0 months, from May 5 to August 5, with an average daily high temperature above 92°F. The hottest month of the year in Islamabad is June, with an average high of 99°F and low of 75°F.

The cool season lasts for 2.9 months, from December 4 to March 1, with an average daily high temperature below 69°F. The coldest month of the year in Islamabad is January, with an average low of 39°F and high of 62°F.

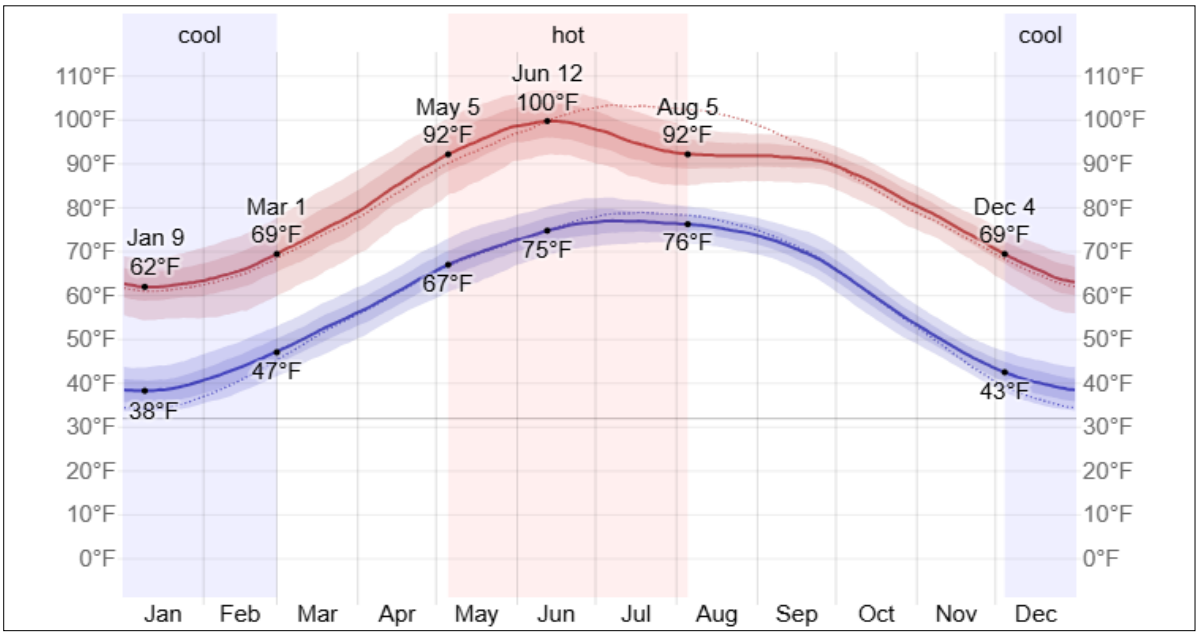


Figure 4-3: Average High and Low temperature in Islamabad

4.8 Precipitation

A wet day is one with at least 0.04 inches of liquid or liquid-equivalent precipitation. The chance of wet days in Islamabad varies very significantly throughout the year.

The wetter season lasts 2.5 months, from June 24 to September 10, with a greater than 30% chance of a given day being a wet day. The month with the wet days in Islamabad is July, with an average of 15.2 days with at least 0.04 inches of precipitation.

The drier season lasts 9.5 months, from September 10 to June 24. The month with the fewest wet days in Islamabad is November, with an average of 1.6 days with at least 0.04 inches of precipitation.

Among wet days, we distinguish between those that experience rain alone, snow alone, or a mixture of the two. The month with the most days of rain alone in Islamabad is July, with an average of 15.2 days. Based on this categorization, the most

common form of precipitation throughout the year is rain alone, with a peak probability of 55% on July 27.

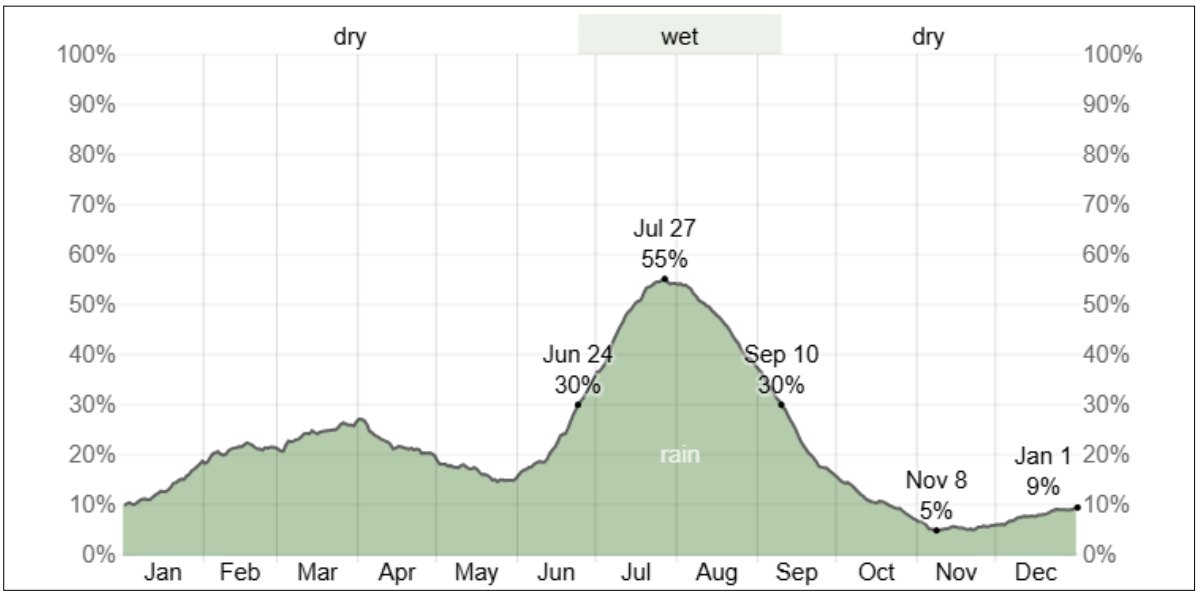


Figure 4-4: Daily Chances of Precipitation in Islamabad

4.9 Rainfall

To show variation within the months and not just the monthly totals, we show the rainfall accumulated over a sliding 31-day period centered around each day of the year. Islamabad experiences extreme seasonal variation in monthly rainfall.

Rain falls throughout the year in Islamabad. The month with the most rain in Islamabad is July, with an average rainfall of 6.4 inches. The month with the least rain in Islamabad is November, with an average rainfall of 0.5 inches.

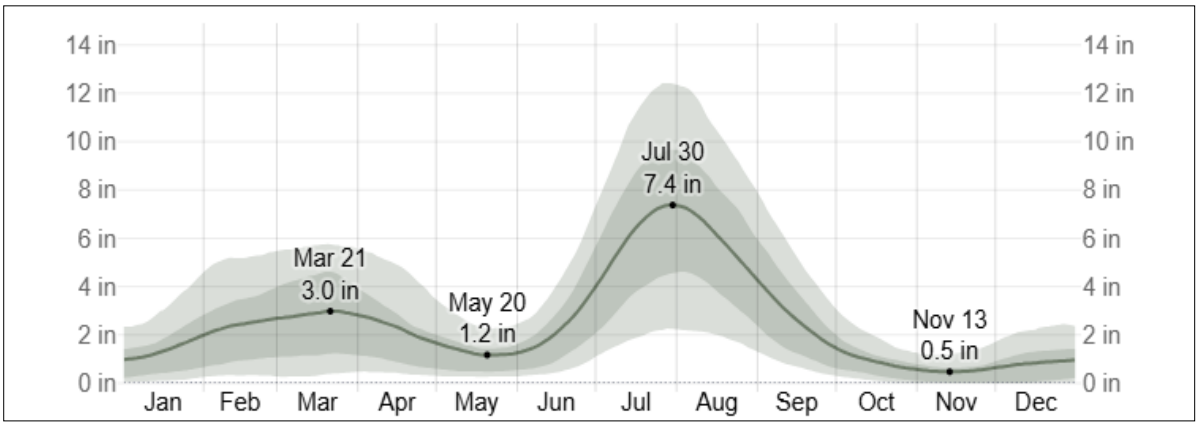


Figure 4-5: Average Monthly Rainfall in Islamabad

4.10 Humidity

We base the humidity comfort level on the dew point, as it determines whether perspiration will evaporate from the skin, thereby cooling the body. Lower dew points

feel drier and higher dew points feel more humid. Unlike temperature, which typically varies significantly between night and day, dew point tends to change more slowly, so while the temperature may drop at night, a muggy day is typically followed by a muggy night. Islamabad experiences extreme seasonal variation in the perceived humidity.

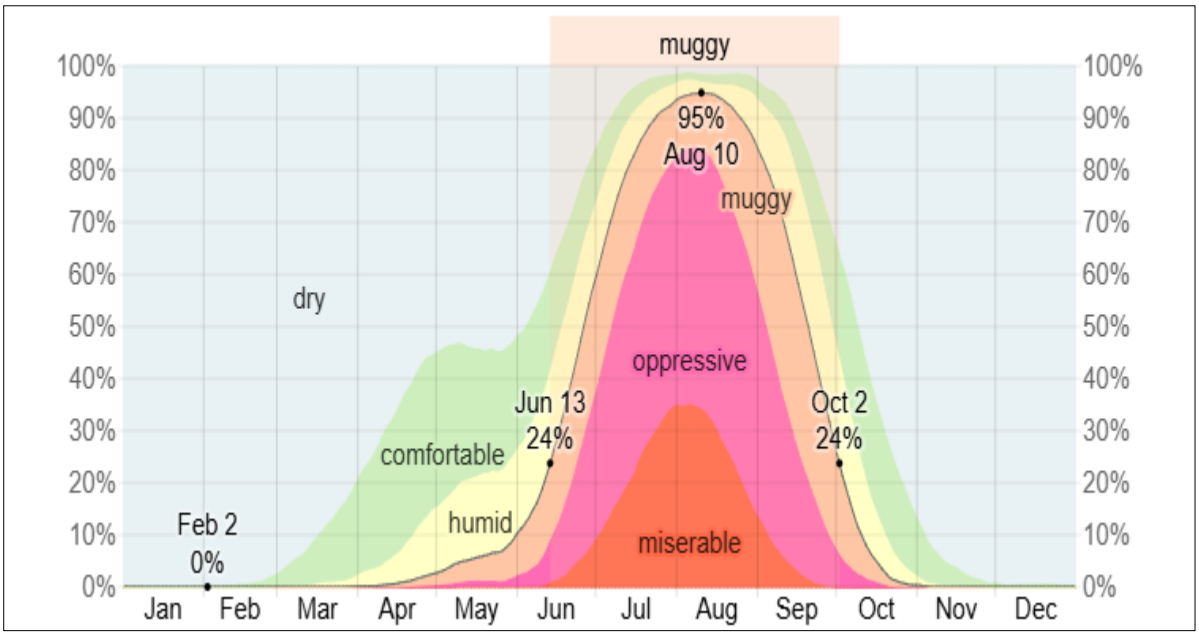


Figure 4-6: Humidity Comfort Levels in Islamabad

4.11 Wind

This section discusses the wide-area hourly average wind vector (speed and direction) at 10 meters above the ground. The wind experienced at any given location is highly dependent on local topography and other factors, and instantaneous wind speed and direction vary more widely than hourly averages.

The average hourly wind speed in Islamabad experiences mild seasonal variation over the course of the year.

The windier part of the year lasts for 5.3 months, from January 25 to July 4, with average wind speeds of more than 5.2 miles per hour. The windiest month of the year in Islamabad is May, with an average hourly wind speed of 5.9 miles per hour.

The calmer time of year lasts for 6.7 months, from July 4 to January 25. The calmest month of the year in Islamabad is September, with an average hourly wind speed of 4.5 miles per hour.

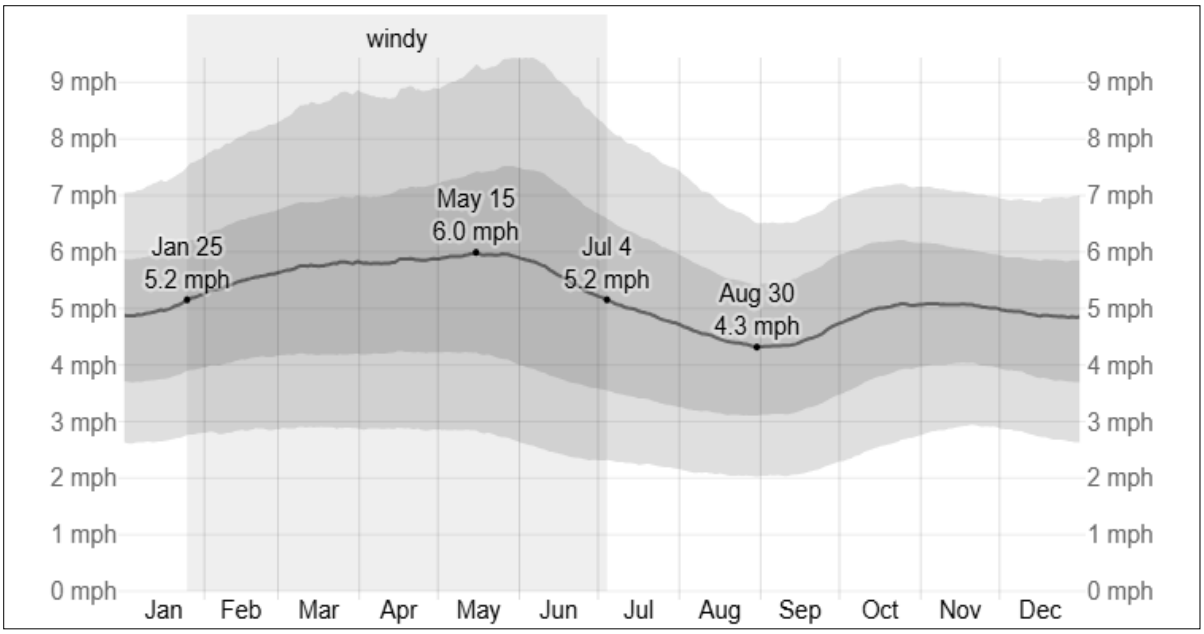


Figure 4-7: Average Wind Speed in Islamabad

The wind is most often from the west for 2.1 months, from April 22 to June 26, with a peak percentage of 35% on June 11. The wind is most often from the south for 1.7 months, from June 26 to August 16, with a peak percentage of 44% on July 23. The wind is most often from the east for 3.5 months, from August 16 to November 30 and for 4.1 months, from December 20 to April 22, with a peak percentage of 41% on September 6.

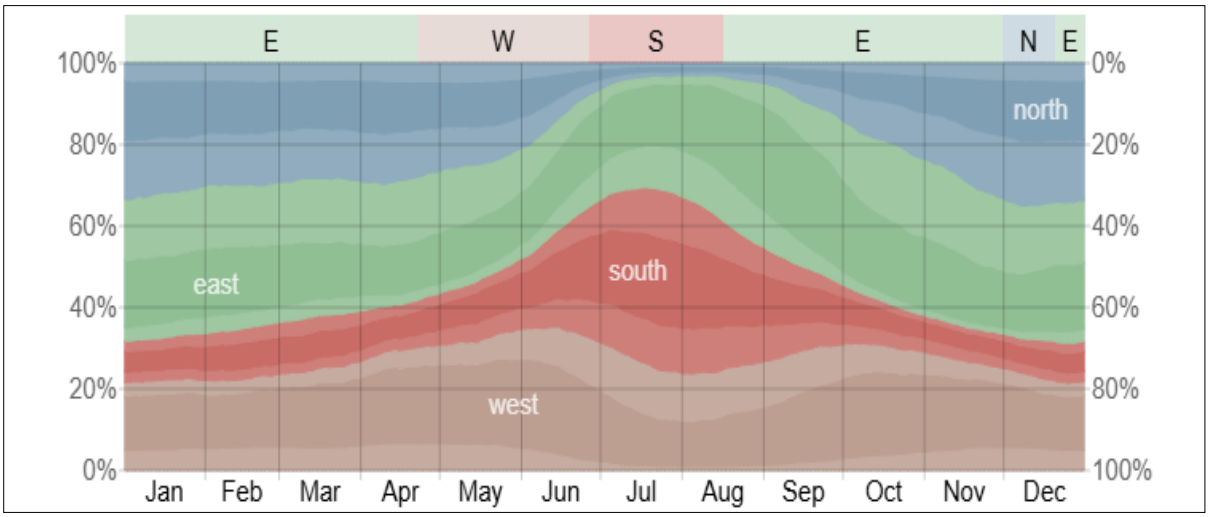


Figure 4-8: Wind Direction in Islamabad

4.12 Ground Water

Groundwater resources in the Islamabad-Rawalpindi area are mainly contained in and discharged from the recent Quaternary alluvium deposits. Recharge is principally due to precipitation and supplied by nearby streams. The amount of the available

groundwater in Islamabad is not exactly known. Capital Development Authority (CDA) is supplying the ground water of 180 tube wells to Islamabad Private and municipal wells are also used to fulfill the water requirements.

4.13 Surface Water Hydrology and Drainage

Due to the location of Islamabad at the foot of the Margalla Hills on the north and the Murree and Kotli Sattian Hills on the east, the area benefits from the natural slope in terms of surface water resources.

In the jurisdiction of Islamabad, the river system is composed of three major tributaries, namely (i) Saidpur Kas, (ii) Tenawali Kas, and (iii) Bedarawali Kas. They originate from the Margalla Hills and flows into the mainstream of Nullah Lai just upstream from Kattarian Bridge, at I.J. Principal Road forming the administrative boundary between Islamabad and Rawalpindi.

4.13.1 Soan River

Soan River rises near the small village Bun in the foothills of Patriata and Murree and drains much of the water of the Potohar region. Its water is stored in the Simly Dam.

Figure 4-9: Soan River

4.13.2 Kurang River

Kurang River is the main stream draining the area of Islamabad. It's main tributary is Gumrah Kas which drains westward into the Kurang River from the area between Kurang and Soan River.

Figure 4-10: Kurang River

4.13.3 Rawal Lake or Rawal Dam

Rawal Lake is an artificial reservoir located in an isolated section of the Margalla Hills National Park. It is fed by water from Kurang River and other small streams coming from the Margalla Hills like the Jinnah Stream. Its storage capacity is about 58,600,000 m3; the discharge capacity of its spillway is about 2,300m3 /s. It provides drinking water for the population of Islamabad and Rawalpindi. Mean annual water available is 72 MGD (million gallons per day).

Figure 4.12: Rawal Lake or Rawal Dam

4.13.4 Simly Dam

Simly dam is located on the Soan River at some 30 km east of Islamabad and fed by melting snow and natural springs of Murree Hills. It is the largest reservoir of drinking water for the population of Islamabad. The storage capacity of the dam is about

35,463,000 m^3 with a spillway of discharge capacity of 1,275 m^3/s. Mean annual water available is 68 MGD. E) Khanpur Dam Khanpur Dam is located on the Haro River in the north of the Margalla Hills at about 40 km of Islamabad. Its stored water provides domestic water to Rawalpindi and Islamabad as well as irrigation water for agriculture and industries in the surroundings of these cities. The storage capacity of the dam is about 140,000,000 m^3. Mean annual water available is 198 MGD.

Figure 4.13: Simly Dam

4.13.5 Headwork

Headwork water is diverted from springs located at Saidpur, Nurpur and Shahdara. The capacity of the four headwork sources is as follows: (i) Kurang River: 4 MGD, (ii) Saidpur: 0.8 MGD, (iii) Nurpur: 0.7 MGD, and (iv) Shahdara: 1.6 MGD.

4.13.6 Nullah Lai

The Lai Nullah Basin is located between 33º 33′ and 33º 46′ North and 72º 55′ and 73º 07′ East. It has a catchment area of 234.8 Km^2 (161.2 Km^2 in Islamabad and 73.6 Km^2 in Rawalpindi) and a length of about 30 Km, stretching from the Margalla hills in Federal Capital City Islamabad at the North-western edge until Soan River at the South-eastern edge in District Rawalpindi of Punjab Province. The principal surface water sources in Lai Nullah basin come from Simly Dam on Soan River, Khanpur Dam on Haro River and Rawal Dam on Kurang River and the current land use in the Lai Nullah basin is 38.6 % of residential and 14.2 % of agricultural areas, 14.8 % of forest and the rest are grass and bare land surfaces.

Figure 4-11: Lai Nullah

The present water supply capacity in the Lai Nullah Basin area is about 785 million liters per day in total. Out of the total water supply, the service area of Capital Development Authority in federal Capital, Islamabad shares 507.33 million liters per day, while the service area of Water & Sanitation Agency (WASA) of Rawalpindi city and its Cantonment share 122.749 million liters per day and 155.48 million liter per day respectively.

4.14 Ecological Environment

4.14.1 Ecosystem

Islamabad region lies in sub-tropical scrub zone. The dominant trees species of this natural zone are Kau (Olea ferruginea), Phulai (Acacia modesta) and sanatha (Dodonaea viscosa). Islamabad is known for Margalla Hills and Margalla Hills National Park and Rawal Lake. Margalla Hills in Islamabad have been declared as National Park since 1980 to conserve the existing flora and fauna. There are around 250 to 300 species of plants in Islamabad (Capital Development Authority). As many as two third of them are used by the people for their medicinal effects to treat or cure various diseases. In order to improve the landscape and living environment of the Islamabad the traits like color or blossom, shade, form or shape, scent and free from disease and nuisance are considered during the selection of trees and shrubs for given location.

4.14.2 Floristic Composition

Islamabad city falls in sub-tropical broad leaved evergreen scrub forest. Dominant tree species include Phulai (Acacia modesta), Wild olive (Olea ferruginea), Sanatha

(Dodonaea viscosa), Black berries (Monotheca buxifolia), Reptonia buxifolia, Beri (Zizyphus mauritiana), Royle's Spike Thorn (Gymnosporia royleana), Baikarh (Adhatoda vasica), Zebrawood (Pistacia integerrima), Tecoma undulate, and Capparis decidua on drier slopes. These are low branching small evergreen trees with varying densities. Some of these tree species are thorny. Most of these tree and shrub species produce substantial feed and fodder for wildlife and livestock.

These forests types have been subjected to heavy felling and lopping as well as excessive grazing in the past and are now found in degraded condition. These forests occur at height of 1500-5000 feet. These forests are found in Gujrat, Margalla Hills, Attock, Rawalpindi and Malakand. Actually broadly speaking, these forests occur throughout the country at suitable elevation merging downwards with the sub-tropical pine forest.

The indigenous species are mainly Phulai and Sanatha, whereas, Poplar, Shisham and mulberry etc. are found in Study Area. The detail of vegetative species of Islamabad region are given in below:

Table 4-1: Names of Trees/shrubs & Herbs of Islamabad Region

Sr. No.	Common Name	Scientific Name
1	Phulai	Acacia modesta
2	Wild olive	Olea ferruginea
3	Sanatha	Dodonaea viscosa
4	Dhak	Butea frondosa
5	Anar	Punica granatum
6	Pear	Pyrus pasha
7	Kachnar	Bauhinia variegate
8	Amaltas	Cassia fistula
9	Woodfordia	Woodfordia fruticose
10	Jasmine	Jasminum humile
11	Holmskioldia	Holmskiodia sanguine
12	Beri	Zizyphus mauritiana
13	Royle's Spike Thorn	Gymnosporia royleana
14	Baikarh	Adhatoda vasica
15	Zebrawood	Pistacia integerrima
16	Poplar	Populus sp.
17	Devil tree	Alstonia scholaris
18	Bougainvillea	Bougainvillea spectabilis
19	Sukh chain	Pongamia pinnata
20	Dharek	Melia azedarach

Phulai


Sukh chain


Devil tree


Bougainvillea

4.15 Present status of the Project Site

4.15.1 Flora

As climate of study area is subtropical, the vegetation of the area falls under subtropical broad leaved evergreen scrub forest type as per phyto-geographical classification of the area. The tract, in which the project site exists, was once covered with native vegetation consisting of trees and thick cover of bushy vegetation. With the onslaught of civilization, this vegetation was cleared for agricultural purposes.

The present condition of the project area is almost fallen in the category of degraded and barren land. The project area is designated as residential area as per master planning so, no green developmental activities were considered in the past to improve its ecological balance in the targeted area. Limited number of trees exist in the area which are mostly near the road.

The table below shows that some mature and sub-mature Eucalyptus (Eucalyptus camaldulensis), Phulai (Acacia modesta), ziziphus (Ziziphus *mauritiana*), Citrus Spp Mulberry (*Morus alba*), Shisham (*Dalbergia sissoo*), Dharek (*Melia azedarach*), Sumbal (*Bombax ceiba)* and Jaman (*Syzygium cumini*) were presently found in the Project Area and vicinity

Table 4-2: Names of Trees (wood and fruit) of the Project Area

Sr. No.	Common Name	Scientific Name
1	Eucalyptus	**Eucalyptus camaldulensis**
2	Dharek	**Melia azedarach**
3	Shisham	**Dalbergia sisso**
4	Mulberry	**Morus alba**
5	Ziziphus	**Ziziphus mauritiana**
6	Phulai	**Acacia modesta**
7	Jaman	**Syzygium cumini)**
8	Citrus	**Citrus Spp**
9	Paper mulberry	**Broussonetia papyrifera**
10	Mesquit-Bushy	**Prosopis glandulosa**
11	**Sumbal**	**Bombax ceiba**

Jaman


Sumbal


Citrus


Eucalyptus

4.15.2 Fauna/Wildlife

Different areas in Islamabad are home to various species of wildlife, including monkeys, exotic birds and carnivores such as the rare and presently Margalla common leopard, but the project area is found degraded and almost barren and not supporting any designated habitats.

Much less common are Leopards, which occasionally come down from the Murree area but usually remain high up in the hills. Villagers dwelling in the Margalla do report sighting of leopards off and on but these habitats are far away from the project site as per expert's filed observations and in consultation with IWDB.

Monkey

4.15.3 Mammals

Margalla Hills is a habitat to all kinds of animals, exotic birds, monkeys, grey gorals, barking deer, jungle cats, porcupines, cape hares, Himalayan palm civets, red foxes, Asiatic jackals, white crested kalij pheasants, golden orioles, paradise flycatchers, grey shrikes, spotted doves and others. However, there is no wild mammalian specie observed in the project area except some domesticated animals including cats, dogs, etc.

Table 4-3: List of indigenous Mammals

Sr. No.	Mammals	Scientific Name
1	Jackal	Canis aureus
2.	Fox	Vulpes vulpes
3.	Jungle Cat	Felis chaus
4.	Palm Squirrel	Funambulus palmarum
5	Mongoose	Herpestes auropunctatus
6	Indian mole rat	Rattus rattus
7	Field mouse	Funambulus pennant
8	Porcupine	Hystrix indica
9	Rabbit	Oryctolagus cuniculus
10	Cape hare	Lepus capensis
11	Masked palm civet	Paguma larvata
12	Wild boar	Sus scrofa

Grey gorals

Cape hare

Field mouse

Porcupine

4.15.4 Amphibians

The amphibians that are found near or around the project area are given in the below.

Table 4-4: Amphibians of the Study Area

Sr. No.	Local/ English Name	Scientific Name
1	Common frog	Rana tigrine
2	Common toad	Bufo bufo
3	Marble frog	Uperodon systoma

4.15.5 Reptiles

Islamabad region supports a good variety of reptiles. In Islamabad, the most common reptile that is worth mentioning and is occasionally witnessed by the hikers is Monitor Lizard. These are generally large reptiles, although some can be as small as 12 centimeters in length. They have long necks, powerful tails and claws, and well-developed limbs.

Table 4-5: Reptiles of the Study Area

Sr. No.	Local/ English Name	Scientific Name
1	Fringed toed Lizard	**Acanthodactylus cantoris**
2	Spiny tailed Lizard	**Uromastyx hardwickii**
3	Common Krait	**Bungarus caeruleus**
4	King Cobra	**Ophiophagus Hannah**
5	**Viper**	**Vipera xanthine**


Fringed toed


Lizard King Cobra

4.15.6 Birds – Avifauna

Many bird species have been reported in and around the study area. These include passage migrants, vagrant, resident, breeding and irregular visitors. The migratory birds descend from higher altitudes during the winter months

Table 4-6: Birds Found in Study Area

Sr. No.	Common Name	Scientific Name
1	Rock Pigeon	Columba livia
2	Myna	Acrido therestritis
3	Grey Partridge	Perdix perdix
4	House Sparrow	Passer domesticus
5	Red-billed chough	Pyrrhocorax pyrrhocorax
6	Magpie	Pica pica
7	Alpine Chough	Pyrrhocorax graculus
8	Grey shrikes	Lanius excubitor
9	Spotted doves	Spilopelia chinensis


Rock Pigeon


Magpie

4.16 Institutions

4.16.1 Education

Islamabad has three public universities Quaid–e-Azam University, Allama Iqbal Open University and International Islamic University. There are two campuses of Hamdarad University, Karachi, Sindh and Al-Khair University Muzaffarabad, AJK. In addition to that there are 07 Degree Colleges, 13 Higher Secondary, 79 High Schools, 46 Middle and 216 Primary Schools. There are additional 14 Islamabad Model Colleges.11

4.16.2 Health

The major health facilities available in the district are Federal Government Services Hospital, Capital Hospital, Pakistan Institute of Medical Sciences (PIMS), Children Hospital, National Institute of Health and Shifa International Hospital. Besides, 35 (ICT) Dispensaries, Maternal Child Hospital (MCH), 03 Rural Health Centers and 13 Basic Health Units in rural area are functioning day and night. The health network of ICT seems to be satisfactory as compared with other areas of the country. Likewise, PIMS hospital and basic level private health facilities are also available in the communities around the project area.

4.17 Socioeconomic Values

As mentioned earlier, Punjabi is the predominant language being spoken in the Islamabad Capital Territory (ICT). The population of the ICT is predominantly Muslims. The next higher percentage is of Christians and Ahmadis. The family system common is joint family system in which parents and children live with other combination of family members. The staple food of the people is wheat and rice. The

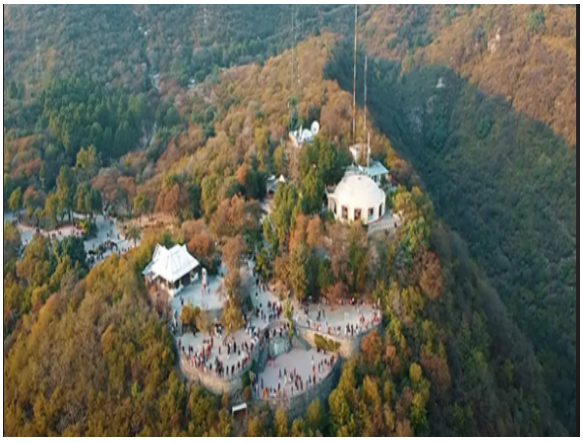
people usually take meal thrice a day. Cultivation is the main occupation of the people. The majority of people of ICT are working in different government departments as well as private offices as their occupation. Female are also engaged in the government/ private sector for their job purpose. The main castes of the people are Bhatti, Rawal, Janjua and Chohan. Besides, Gujjar, Awan, Mughal, Qureshi, Syed and Satti are also living there. Some of the other minor tribes are the Jat, Malyar and Pathan and some Khattar.

4.17.1 Public Health

Access to safe drinking water and insufficient fulfilment of nutritional requirements has a significant influence on the health status of the population. Mostly people use government supply/tap water for drinking purpose. Drinking water is not good and its quality is unsatisfactory. People use filtration plants or boiled water for the dinking purpose. Most common diseases are hyper tension, sugar, allergy and skin diseases etc.12 The sewerage system and solid waste management is being looked after by the Metropolitan Corporation Islamabad (MCI).

4.17.2 Recreational, Archeological and Historical Resources

The recreational place near the project area is the sector parks. Pakistan Monument elevation makes the monument visible from across the Islamabad and is popular tourist destination and adjoining the monument is the Pakistan Monument Museum. In addition, the other places of interest include the Margallah Hills National Park, Damn-e-Koh, Saidpur Village, Supreme Court of Pakistan, parliament House, Jinnah Sports Stadium, Saudi Pak Tower Building etc.



Damn-e-Koh

Margallah Hills

Mosques and Shrines

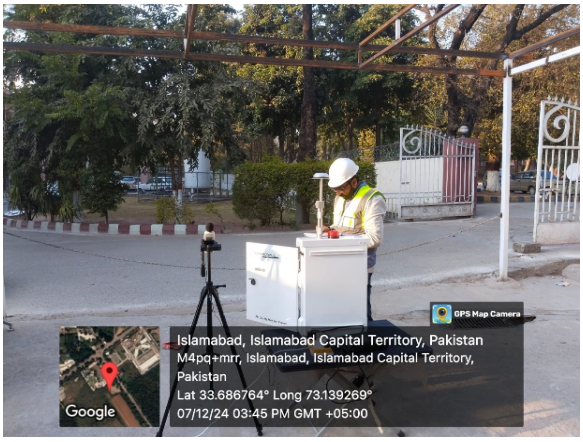
Jinnah Sports Stadium

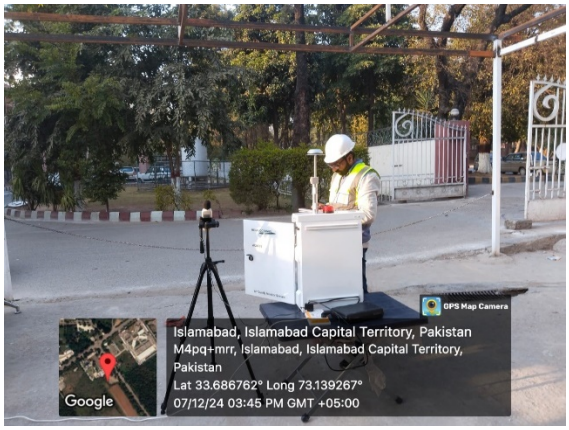
There is beautiful Shah Faisal Mosque and it was designed by a renowned Turkish Architect, Vedat Dalokay and named after late King Faisal of Saudi Arabia.

Faisal Mosque

4.18 Environmental Monitoring

The environmental monitoring of parameters like ambient air gaseous, ambient particulate matter noise level, and ground water help us to analyze the prevailing environment conditions in and around the project area. The reports of analysis have been attached in annexure.





Environmental Monitoring at Project Site

5 SCREENING OF ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

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 NEQS will 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 NEQS. The project activities will, therefore, neither adversely affects the population nor the environment around the project site.

5.2 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.

5.3 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.

5.4 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 5-1: 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	• 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	• 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	• 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 serious

Possible Impact	Impact Magnitude	Proposed Mitigation Measures
		impact as a result of the construction.
Noise pollution due to the moving machines (mixers, tippers, communicating workers) and incoming vehicles	Minor / Short Term	• 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	• 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.

5.5 Environmental Problems Resulting from Project Operation

Environmental problems relating to operation phase are insignificant, which are given in Table - 5.2.

Table 5-2: 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 NEQS and will be 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	Minor/Long Term	The waste will be the ashes which shall be disposed of in environmentally sustainable manner after proper testing.
Occupational accidents and hazards	Minor/Long Term	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.

5.6 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:

5.6.1 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.

5.6.2 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.

5.6.3 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.

6 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.

6.1 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.

6.2 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.

6.3 Equipment Maintenance Details

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

6.4 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 - 6.1: 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

6.5 Environmental Management Plan

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

6.5.1 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.

6.5.2 Operation and Mitigation Phase

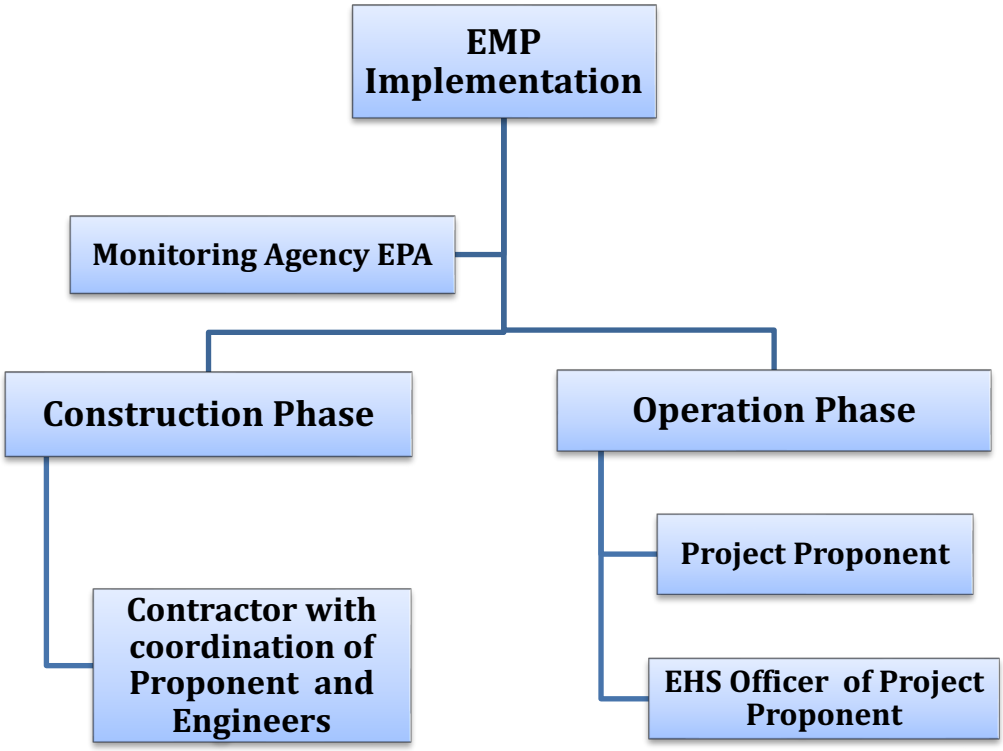
This section of EMP provides management principles for the operation and maintenance phase of the project. Environmental actions, procedure and responsibilities are required from proponent within the operation and maintenance phase are satisfied.

6.5.3 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.

6.5.4 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**	– Compliance with prescribed NEQS to control air pollution	– 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**	– Control of groundwater or surface water pollution from construction activities	– 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 – 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.	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
3.	**Waste**	– 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	– 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
4.	**Noise**	– Compliance with prescribed NEQS to control Noise pollution	– The contractor will strictly follow the NEQS 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.	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
			– 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		
5.	Materials Management	– Safe and secure environment for construction workers	– 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 depending on the duration of the project. Stockpiles may further be protected by the construction of low brick walls around their bases – 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	During Construction Phase by Contractor with coordination of Proponent staff	Proponent
6.	Workers Health & Safety	– Prevention of any possibility of work site	– Provision of Personal Protective Equipment to the workers	Contractor	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
		accident /impact on worker's health	– 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 – 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	– Prevention of conflicts among locals and make the project socially acceptable – Empowerment of locals to possible extent – Increase in employment and business opportunities for locals.	– 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
			– 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	– Restoration of site to a similar condition prior to the commencement of the work or to a condition agreed with the project management and landscaping of the site	– 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. – 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.	Contractor	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
			– The contractor must ensures 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					
1.	**Air Quality** Exhaust flue gases	Compliance With Emission gas standards, Ambient air quality (NEQS) standards, Prevention of air pollution in surrounding area;	– Relevant legislative and NEQS 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	EHS officer of Project Proponent	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
			of dioxins before they can be destroyed in the second chamber.		
2.	**Water Quality**	– Compliance with Wastewater standards of NEQS	– Installation of wastewater treatment plant, so any wastewater produced complies with wastewater standards of NEQS. – To carry out water analysis periodically.	EHS officer of Project Proponent	Proponent
3.	**Waste**	– Compliance with waste management rules – Management of waste, especially hazardous waste – Prevention of inappropriate waste disposal	– Proper testing and in compliance with Hospital Waste Management Rules 2014 before disposal.	EHS officer of Project Proponent	Proponent
4.	**Noise &Vibration**. Noise from vehicles	– Compliance with prescribed NEQS to control Noise pollution	– 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
6.	**Work environment (including work safety)** – Labor accidents due to handling heavy loads;	– Prevention measures against labor accidents and health problems	❖ **Labor accidents** – Prepare a manual for labor accident prevention including safety education and training. – Provide workers with appropriate protective equipment.	EHS officer of Project Proponent	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
	working at heights; electric shocks – Diseases caused by air pollutants, water pollutants, and noise from the operation – Fire Hazards		– Keep lifting devices well maintained and perform maintenance checks as appropriate. – Use equipment that protects against electric shock. ❖ **Environment Pollution** – Observe related standards and provide workers with appropriate facilities. ❖ **Fire Hazards** – Installing fire extinguishers in fire handling places – Developing firefighting organization and implementing fire drills		

6.6 Hospital Waste Management Plan

In Hospital waste management Rules 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.

6.6.1 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 Theater, 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.

6.6.2 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.

6.6.3 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.

6.6.4 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.

6.6.5 Waste Disposal

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

6.7 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 6-1: 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

6.7.1 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

7 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 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

7.1 Relevant Legislation

7.1.1 Pakistan Environmental Protection Act 1997

Public consultation is mandated under Pakistan'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 7-1: 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.

7.2 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.

7.3 Stake Holders Consultation Technique

The purpose of the consultation is to inform the affected parties about the proposed project and to analyse 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

7.4 Stake Holders Involved and Their Roles

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

Table 7-2: 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 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.

7.5 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.

7.6 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 neighboring areas. The remarks of people are positive regarding the project and people foresee positive impacts like employment opportunities, business, development of the area etc.

Figure 7-1: Public Consultation

7.7 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.

7.7.1 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 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 management.
- If the AP/s is not satisfied with the decision of the management or in the absence of any response, the AP/s can appeal to the management. The management 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)

7.7.2 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. Management will work to understand the cause of the grievance for which may need to contact the complainant again and obtain details.

Step 2: Investigation

The proponent 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 Proponent

Proponent have investigated a grievance, it will share with the complainant the proposed course of action to resolve the complaint, should Proponent believe any to be necessary. If the complainant considers the grievance to be satisfactorily resolved, the Proponent 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.

8 IMPACT ASSESSMENT AND MITIGATION

8.1 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 - 8.1**, which indicates the impact and their magnitude.

Table 8-1: Anticipated Impacts and their magnitude of the Proposed Project

Environmental Components	**Physical Environment**										**Biological Environment**										**Social Environment**					
Components/ Activities	Agricultural Lands	Soil (Erosion/Stability)	Housing	Cultural/Religious Properties	Infra structure	Mineral Resources	Downstream River Flows	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 System	Employment	Community Stability	Cultural and Religious Value
Construction Phase																										
Construction Camp	MA	LA	O	O	O	O	O	O	O	LA	LA	LA	O	O	O	O	O	O	LA	O	LA	O	LB	O	O
Incinerator Site	LA	LA	O	O	O	O	O	O	O	O	LA	LA	O	O	O	O	O	O	O	O	O	O	LB	O	O
E&M of Equipments	O	LA	O	O	O	O	O	O	O	O	LA	LA	O	O	O	O	O	O	O	LA	O	O	MB	O	O
Vehicular Movement	O	LA	O	O	O	O	O	O	O	LA	LA	MA	O	O	LA	O	O	O	O	LA	LA	O	O	LA	O
Operation Phase																										
Solid Waste	LA	LA	O	O	O	O	O	O	O	LA	O	O	O	O	O	O	O	O	O	LA	O	O	O	O	O
Incinerator operation	O	O	O	O	O	O	O	O	O	O	LA	LA	O	O	O	O	O	O	O	LA	LA	O	O	O	O
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	MB	O	O
Fire Fighting Arrangement	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	HB	O	LB	LB	MB	O
Health and safety	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	HB	O	LB	LB	MB	O

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

8.2 Ways Of Achieving Mitigation Measures

8.2.1 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.

8.2.2 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.

8.2.3 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 FGH Islamabad.

8.2.4 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.

9 EMERGENCY RESPONSE PLAN & EVACUATION/EXIT PLAN

9.1 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.

9.2 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.

9.3 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.

9.4 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.

9.5 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 causalities.
- In addition of firefighting, supervisor should ensure all the flammable articles are removed.

9.6 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 non-combustible 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.

9.7 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.

10 HEALTH AND SAFETY PLAN

10.1 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.

10.2 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.

10.2.1 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.

10.2.2 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).

10.3 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 be required by all employees following exit from the Exclusion Zone, prior to breaks, and at the end of daily work activities.

10.4 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.

10.5 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.

10.6 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.

11 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.

12 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.
- National Environment Quality Standards for Ambient Air November 2010;
- National Environment Quality Standards Noise Levels November 2010;
- National Environment Quality Standards for Drinking Water November 2010,
- National Environmental Protection Act, 1997;
- The Pakistan Environmental Protection (Amendment) Act 1997 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 environmental quality standards; and
    - To ensure enforcement, the act establishes regulating bodies i.e. Pakistan Environmental Protection Council (PEPC) and responsible bodies i.e. Pakistan Environmental Protection Agency.
- Environment related Laws in Pakistan;
- 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

13 TERM OF REFERENCES

1 The Consultant is required to carry out an Environment Assessment Study of the Project as required under section 12 of Pakistan Environmental Protection Act 1997.

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:

- Identification and recommendation for suitable solution/treatment/mitigation measures of emissions and effluents such as waste water and sludge etc in accordance with National Environmental Quality Standards (NEQS).
- 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 NEQS.

3 The Study should be acceptable to the relevant national and/or provincial authorities (relevant authorities) in Islamabad.

14 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 EPCCD.
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.

ANNEXURE MONITORING REPORT

Integrated Environment Laboratory

AMBIENT AIR GASES MONITORING REPORT

Reference Number	FGH/ENV/167-2024		
Project Name:	Installation of Hospital Waste Incinerator at Federal General Hospital, NIH Road Chak Shahzad,Islamabad.		
Monitoring Date:	07-12-2024	**Monitoring Location**	Project Site
Source:	Ambient Air	**Monitoring Instrument:**	AQMS 09

Sr. No	Time	Parameters			
		CO	NO	NO_2	SO_2
		Units			
	Hours	(mg/m^3)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
1.	09:00 A.M	0.52	9.38	11.58	9.63
2.	10:00 A.M	0.57	10.23	11.76	9.5
3.	11:00 A.M	0.49	10.3	12.03	8.77
4.	12:00 P.M	0.6	11.05	10.94	8.9
5.	01:00 P.M	0.63	10.45	10.81	9.05
6.	02:00 P.M	0.52	10.63	10.92	8.13
7.	03:00 P.M	0.5	11.17	11.28	8.75
8.	04:00 PM	0.45	10.31	11.43	9.94
9.	05:00 PM	0.41	9.47	10.95	7.77
10.	06:00 PM	0.47	9.24	11.07	8.26
11.	07:00 PM	0.45	10.02	11.65	9.69
12.	08:00 PM	0.43	10.35	10.76	9.36
13.	09:00 PM	0.44	11.16	11.19	8.93
14.	10:00 PM	0.42	9.44	11.04	8.59
15.	11:00 PM	0.43	9.01	11.87	9.44
16.	12:00 AM	0.45	10.19	11.12	9.72
17.	01:00 AM	0.42	10.26	10.66	8.65
18.	02:00 AM	0.41	9.51	10.82	8.46
19.	03:00 AM	0.41	11.3	10.7	8.24
20.	04:00 AM	0.42	10.51	10.33	8.55
21.	05:00 AM	0.47	10.27	9.76	8.92
22.	06:00 A.M	0.45	9.8	10.62	9.08
23.	07:00 A.M	0.47	10.55	10.91	9.37
24.	08:00 A.M	0.5	9.79	11.01	9.24
Average Concentration		**0.47**	**10.18**	**11.05**	**8.95**
NEQSAA		**05 (24 hr)**	**40 (24 hr)**	**80 (24 hr)**	**120 (24 hr)**

NEQSAA: National Environmental Quality Standards for Ambient Air

Note:

- Selected measurement units were mg/m^3 and $\mu g/m^3$ 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.

Signature of Analyst:

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Integrated Environment Laboratory

NOISE LEVEL MONITORING REPORT

Reference Number	FGH/ENV/167-2024		
Project Name:	Installation of Hospital Waste Incinerator at Federal General Hospital, NIH Road Chak Shahzad,Islamabad.		
Monitoring Date:	07-12-2024	**Monitoring Location**	Project Site
Source:	Ambient Condition	**Monitoring Instrument:**	Noise Meter-IEC651-Type-2

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1.	09:00 AM	dB(A)	58.2	59.6	58.9
2.	10:00 AM		60	61.6	60.8
3.	11:00 AM		59.7	62.6	61.15
4.	12:00 PM		56.2	58.4	57.3
5.	01:00 PM		62.4	62.9	62.65
6.	02:00 PM		62.8	63	62.9
7.	03:00 PM		61.6	63.7	62.65
8.	04:00 PM		59.7	60.1	59.9
9.	05:00 PM		50.4	52.2	51.3
10.	06:00 PM		54.8	56.3	55.55
11.	07:00 PM		53.2	54.8	54
12.	08:00 PM		52.8	56	54.4
13.	09:00 PM		52.9	60.4	56.65
14.	10:00 PM		57.2	57.5	57.35
15.	11:00 PM		54.9	59.1	57
16.	12:00 AM		57.2	61.7	59.45
17.	01:00 AM		53.1	54.4	53.75
18.	02:00 AM		53.3	59.7	56.5
19.	03:00 AM		56.8	58.9	57.85
20.	04:00 AM		55.1	56.3	55.7
21.	05:00 AM		53.9	55.7	54.8
22.	06:00 AM		53.4	59.7	56.55
23.	07:00 AM		54.9	56.4	55.65
24.	08:00 AM		57.2	58.3	57.75
NEQS limit : 50-45 dB					

NEQS: National 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.
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AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number	FGH/ENV/167-2024		
Project Name:	Installation of Hospital Waste Incinerator at Federal General Hospital, NIH Road Chak Shahzad,Islamabad.		
Monitoring Date:	07-12-2024	**Monitoring Location**	Project Site
Source:	Ambient Air	**Monitoring Instrument:**	AQMS 09

Sr. No	Time	Parameters		Results (Average 24 Hrs)	
		$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}
		Units			
	Hours	($\mu g/m^3$)	($\mu g/m^3$)		
1	09:00 AM	31.27	101.99	26.45 ($\mu g/m^3$)	93.90 ($\mu g/m^3$)
2	10:00 AM	30.52	102.86		
3	11:00 AM	28.6	101.31		
4	12:00 PM	27.85	104.6		
5	01:00 PM	27.88	103.05		
6	02:00 PM	28.24	102.34		
7	03:00 PM	28.18	99.81		
8	04:00 PM	27.78	98.59		
9	05:00 PM	26.68	95.37		
10	06:00 PM	25.45	93.85		
11	07:00 PM	24.68	92.12		
12	08:00 PM	25.08	93.6		
13	09:00 PM	25.58	90.88		
14	10:00 PM	25.95	90.15		
15	11:00 PM	23.69	89.63		
16	12:00 AM	25.57	86.9		
17	01:00 AM	24.71	86.37		
18	02:00 AM	26.28	87.66		
19	03:00 AM	25.58	88.09		
20	04:00 AM	25.16	86.4		
21	05:00 AM	24.75	87.25		
22	06:00 AM	23.88	89.53		
23	07:00 AM	25.56	90.44		
24	08:00 AM	26.08	91.57		
NEQSAA				35 ($\mu g/m^3$)	150 ($\mu g/m^3$)

NEQSAA: National Environmental Quality Standards for Ambient Air

Note:

- Selected measurement units were $\mu g/m^3$ 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.
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Integrated Environment Laboratory

GROUND WATER ANALYSIS REPORT

Reference Number	FGH/ENV/167-2024		
Project Name:	Installation of Hospital Waste Incinerator at Federal General Hospital, NIH Road Chak Shahzad,Islamabad.		
Sampling Date:	07-12-2024	**Sampling Location**	Project Site
Source:	Ground Water	**Analysis Method**	APHA/USEPA Standard Methods

Sr. No.	Parameters	Standard Methods	Units	NDWQS	Results
1.	pH	APHA-4500H+ B	--	6.5-8.5	7.47
2.	Temperature	---	°C	----	14
3.	Taste & Odor	In-house	--	Non Objectionable	Non-Objectionable
4.	Color	APHA-2120 B/C	TCU	≤15	7
5.	Turbidity	APHA-2130 B	NTU	<5	4.07
6.	Total Dissolved Solids (TDS)	APHA-2540 C	mg/L	<1000	303
7.	Total Hardness as $CaCO_3$	APHA-2340 C	mg/L	<500	198.4
8.	Nitrate (NO_3)	APHA-4500NO3 B	mg/L	≤50	5.17
9.	Nitrite (NO_2)	APHA-4500NO2 B	mg/L	≤3	0.59
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	85.3
14.	Chlorine	APHA-4500 CL	mg/L	0.5-1.5	0.37
15.	Lead (Pb)	APHA-3500 Pb-B	mg/L	≤0.05	N.D.
16.	Fluoride	APHA-4500F- C	mg/L	≤1.5	0.38
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	0.27
21.	Mercury (Hg)	APHA-3500 Hg-B	mg/L	≤0.001	N.D.
22.	Copper (Cu)	APHA- 3500 Cu-B	mg/L	2	0.35
23.	Zinc (Zn)	APHA- 3500 Zn B	mg/L	5	1.12
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

NDWQS National Drinking Water Quality Standards **N D** Not Detected

Signature of Analyst:

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