PAK GHAZI WASTE SOLUTION

18-km Behind Mughal Steel Sheikhupura Road, Mouza Mandhiali, Tehsil Ferozwala District Sheikhupura

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT

Prepared By

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Waste is becoming increasingly complex due to changing technologies and increase in the services that the hospitals perform for the community. Out of the available technology for the final disposal of solid wastes, incineration is best suited for hospital waste as it renders the waste nontoxic, non hazardous, non putrescible and reduces the volume of material for ultimate disposal. Waste management (or waste removal) incorporates the cycles and activities needed to oversee waste from its beginning to its last removal. This incorporates the assortment, transport, treatment, and removal of waste, along with checking and guideline of the waste management cycle and waste-related issues, advances and monetary system.

Pak Ghazi Waste Solution, is working with the industrial, hospitals, and commercials areas of the waste producing industries and seeking smart and sustainable solutions to collect, recover, safe disposal, and incineration the collected waste and turn the area clean and sustainable. Regarding the waste reduction effort that ended in the TPA/landfill, a long time, the company adopted 3R developed concept (Reduce-Reuse-Recycle) with the following details:

- **Reduce–** reduce waste generation
- **Reuse–** reuse materials that can and are safe to be reused
- **Recycle–** recycling waste by melting, chopping to be re-formed into new products that most likely to experience a decline in quality

The installation of a new incineration facility along with nonhazardous waste storage at 18-km Behind Mughal Steel Sheikhupura Road, Mouza Mandhiali, Tehsil Ferozwala District Sheikhupura will increase the handling capacity of hazardous waste which will both assist the economic growth of industries and provide a proper treatment and disposal route that is affordable.

I. Title and location of the Project

Title: Pak Ghazi Waste Solution.

Location: 18-km Behind Mughal Steel Sheikhupura Road, Mouza Mandhiali, Tehsil Ferozwala District Sheikhupura

Latitude: 31°39'20.0"N

Longitude: 74°10'36.2"E

- **East Side:** Agri Land
- **South Side:** Agri Land
- **North Side :** Agri Land
- **West Side:** Agri Land

Figure A-0.1 The Project Site

II. Name of the Proponent

Proponent: Mudassir Shahid

Address: Elam Din Park Qaisar Town Shahdara Lahore.

III. DETAIL OF CONSULTANT

Integrated Environment Consultants

Head Office: 218 Upper Mall Scheme, Lahore, Pakistan.

Phone: (042)-37897273;

Email: inenvconsultants@yahoo.com

IV. Brief outline of the Proposal

The proposed project is Pak Ghazi Waste Solution, at 18-km Behind Mughal Steel Sheikhupura Road, Mouza Mandhiali, Tehsil Ferozwala District Sheikhupura. The burning capacity of the incinerator will be 500 kg per hour incinerator having capacity of

500 Kg/hr each for Hospital waste, ETP sludge, Pharmaceutical Waste, Hazardous waste. Incinerator will be of dual chamber i.e. Primary (Temperature at 850°C) and secondary (Temperature 1250°C) fueled by Natural Gas/Diesel.

V. Project Impacts and Recommendations for their Mitigation

Table C-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 C-0.1 Project Impacts and their Mitigations Measure

Impacts	Magnitude	Recommendation Measure	Responsibility
PRE-CONSTRUCTION PHASE			
Land Acquisition And Land Use	Minor	– Land is owned by proponent and there is no settlement so no impact will be there. Land will be improved from open land to industrial land	Proponent
Use of local manpower	Major	– Local people will be hired for less technical work or non-skilled work	Contractor
Site establishment	Minor	– All the waste that has been created during this phase will be transported by the contractor or a company that has been specifically contracted to send the waste in the authorized sanitary landfill.	Contractor
Site Housekeeping disruption and nuisance to adjacent landowners and the public as a whole	– Minor	– The site where the construction is taking place should be organized using the standard schemes for organizing construction sites, in order identifying: • Equipment used in the construction; • Dynamics of the construction works; • Safety conditions for the workers hired by the contractor and the conditions of public safety,	Contractor

Impacts	Magnitude	Recommendation Measure	Responsibility
Emergency Response Disasters such as earthquakes, flooding and other manmade disasters such as fires may occur	– Major	– Complete equipment control system, fire exits and secured access system supplemented with close circuit surveillance equipment/alarms.	Contractor
CONSTRUCTION PHASE			
Air Pollution – Dust Generation, – Gases emissions from vehicles during construction phase	Minor	• Sprinkling of water at active construction sites and unpaved roads on regular basis especially during dry climatic conditions • Periodic maintenance and tuning of all the construction machinery and vehicles	Proponent Contractor
Solid waste – Construction waste and domestic waste from worker camps – Land contamination may occur due to improper disposal of waste	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 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 Contractor

Impacts	Magnitude	Recommendation Measure	Responsibility
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 • Avoiding or reducing noisy activities or limiting the noise sources far away from the sensitive areas.	◆ Proponent ◆ Contractor
Vehicular Traffic – Road congestion	Minor	• Proper management of construction traffic • Speed limit of 20 km/hr. will be maintained by all project related vehicles and nighttime (10 pm to 6am) driving of project vehicles will be limited where possible.	◆ Contractor
Movement and fueling of vehicles Fuel Leakages & Spillage, Emissions, Noise &Vibration	Minor	– Periodic maintenance and inspection of vehicles – Vehicles with leaks will not be operated. – Vehicles should not be washed or serviced in the field. – No vehicle-related waste, such as oils, filters, old tires or parts, will be left in the field – All vehicles will be maintained in good working condition – All vehicles will have properly functioning silencers (mufflers).	◆ Contractor
Transportation of construction material Dust and Particulate Emissions, Noise Generation, Safety and Health Effects,	Major	– Excessive use of horns will be avoided – PPE's will be provided to workers – Covering of transporting material trucks – Nighttime driving of project vehicles will be limited where possible	◆ Contractor

Impacts	Magnitude	Recommendation Measure	Responsibility
slow movement of vehicles		– Low speed limit will be maintained on the section of the access road that is adjacent to the community and site. – The fence surrounding the site will be put in on during the construction to prevent access to the construction site	
Movement and fueling of vehicles Fuel Leakages & Spillage, Emissions, Noise &Vibration	Minor	– Periodic maintenance and inspection of vehicles – Vehicles with leaks will not be operated. – Vehicles should not be washed or serviced in the field. – No vehicle-related waste, such as oils, filters, old tires or parts, will be left in the field – All vehicles will be maintained in good working condition – All vehicles will have properly functioning silencers (mufflers).	Contractor
Land Acquisition – Workers camps	Minor	• Temporary workers camps will be built away from the plant site • Photographs will be taken to record the conditions before setting-up camp. • Camps will not be established within a 300- m radius of any water body. – Camps will be established in the existing clearings. • Camps will be kept as small as possible.	Contractor
Workers health and safety – Accidents during construction activities	Minor	• Provision of Personal Protective equipment, good housekeeping and training of workers	Contractor
• **OPERATIONAL PHASE**			

Impacts	Magnitude	Recommendation Measure	Responsibility
Air Pollution – During operation of incinerator – Odor from the feed production – Gaseous emissions	Minor	• wet scrubber will be installed to filter the air before it will be emitted to ambient air. • 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 will be achieved in the incinerator to avoid dioxin or furan discharge. • The flue gases are properly treated (e.g. with the help of water scrubbers) before their release to the atmosphere. An inbuilt scrubber will be installed. • There is no leakage of gases from the first chamber of the incinerator to avoid any release of dioxins before they can be destroyed in the second chamber. – Odor will be control through proper plantation, ventilation system and controlling the moisture and pH level in the shed.	Plant Operators
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 approved pit will be prepared with the incinerator room and ash will be dumped there.	Plant Operators
Water Quality (250 Liters/Hr for operation)	Moderate	• Installation of wastewater treatment facility so any wastewater produced will be treated and in compliance with wastewater standards of PEQS and reused in the facility.	Plant Operators

Impacts	Magnitude	Recommendation Measure	Responsibility
Noise – Noise from Equipment/ Machinery/Vehicles	Minor	• Generator and vehicles used during the operation will be properly tuned and maintained to minimize noise and air • 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 • Installing fire extinguishers in fire handling places • Developing firefighting organization and implementing fire drills	Plant Operators
Collection and transportation of hazardous waste	Major	• Waste will be collected in closed containers to avoid spillage of hazardous waste. • Waste will be transported during daytime when there will be less traffic load. • Good quality fuel (EURO II) will be used in transportation vehicles for environmental safety • Hazardous waste will not be stored for more than 24 hours to avoid decomposition of waste. • Washing of tanker/ container and disposal of effluent: each container will be thoroughly washed prior to being sent for collection of wastes & post collection & unloading at site. The effluent water will be treated in	EHS officer

Impacts	Magnitude	Recommendation Measure	Responsibility
		the proposed effluent treatment plant. • The words "HAZARDOUS WASTE" will be displayed on all sides of the container in Urdu & English. • Name of the facility operator will be displayed	
Accidental spill – Accidental spill of waste during transportation may cause land pollution	Minor	• Transportation vehicles will be maintained in good conditions to avoid the chances of accidents. There will be a proper mechanical department where maintenance of machinery and vehicles will be monitored regularly	◂ Plant Operators ◂ Proponent

VI. 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 C-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 ◂ Contractor
2.	Noise Levels	Continuous source appropriate monitoring for day and night time using Noise meter	On quarterly basis by a third party	◂ Proponent ◂ Contractor

Sr. No.	Monitoring Parameters	Monitoring Mechanism	Frequency	Responsibility
3.	Gaseous Emissions	Emissions Monitoring system. Monitoring of Ambient air quality.	Will be carried out on quarterly Basis.	▪ Proponent ▪ Contractor
4.	HSE Plan	Health, safety and Environment will be monitored on daily basis	Daily	▪ Proponent ▪ Contractor
DURING OPERATION				
1.	Noise Levels	Continuous source appropriate monitoring for day and night time using Noise meter as per PEQS	On quarterly basis by a third party	▪ Proponent
2.	Water Quality	Discrete grab sampling and Laboratory testing of water sample.	As described by PEQS	▪ Proponent
3.	Emissions	Emissions monitoring system. Monitoring of ambient air quality and stack emission from incinerator stack.	Will be carried out on quarterly basis as per PEQS	▪ Proponent
4.	Security	Security arrangements will made	Daily	▪ Proponent
5.	HSE Plan	Health, safety and Environmental will be monitored on daily basis	Daily	▪ EHS officer of Project ▪ Proponent

VII. Conclusion

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

report. The EIA was carried out keeping in view the Punjab Environmental Protection Act 1997 (ammended-2012).

SECTION-01

INTRODUCTION OF PROJECT

1 INTRODUCTION

Waste is becoming increasingly complex due to changing technologies and increase in the services that the hospitals perform for the community. Out of the available technology for the final disposal of solid wastes, incineration is best suited for Hospital waste, ETP sludge, Pharmaceutical Waste and Hazardous waste as it renders the waste nontoxic, non hazardous, non putrescible and reduces the volume of material for ultimate disposal. Waste management (or waste removal) incorporates the cycles and activities needed to oversee waste from its beginning to its last removal. This incorporates the assortment, transport, treatment, and removal of waste, along with checking and guideline of the waste management cycle and waste-related issues, advances and monetary system.

Pak Ghazi Waste Solution is working with the industrial, hospitals, and commercials areas of the waste producing industries and seeking smart and sustainable solutions to collect, recover, safe disposal, and incineration the collected waste and turn the area clean and sustainable. Regarding the waste reduction effort that ended in the TPA/landfill, a long time, the company adopted 3R developed concept (Reduce-Reuse-Recycle) with the following details:

- **Reduce**– reduce waste generation
- **Reuse–** reuse materials that can and are safe to be reused
- **Recycle–** recycling waste by melting, chopping to be re-formed into new products that most likely to experience a decline in quality

1.1 PURPOSE OF THE REPORT

The proposed project envisages the installation of Pak Ghazi Waste Solution, at 18-km Behind Mughal Steel Sheikhupura Road, Mouza Mandhiali, Tehsil Ferozwala District Sheikhupura.

In accordance with 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 Punjab Environmental Protection Act (PEPA), Section 12 - Initial environmental examination, and environmental impact assessment: "No proponent of a

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

This report provides detailed basic 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; as desired under the Punjab Environmental Protection Act, 1997 (amended 2012), the National 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 Punjab in the present case, before issuing the desired Environmental Approval (EA).

1.2 IDENTIFICATION OF PROJECT AND PROPONENT

The proposed project is Pak Ghazi Waste Solution, at 18-km Behind Mughal Steel Sheikhupura Road, Mouza Mandhiali, Tehsil Ferozwala District Sheikhupura.

Proponent: Mudassir Shahid

Address: Elam Din Park Qaisar Town Shahdara Lahore

1.3 DETAIL OF CONSULTANT

Integrated Environment Consultants

Head Office: 218 Upper Mall Scheme, Lahore, Pakistan.

Phone: (042)-35960091;

Email: inenvconsultants@yahoo.com

1.4 BRIEF DESCRIPTION OF NATURE, SIZE AND LOCATION OF PROJECT

The proposed project is "Installation of waste incineration plant (500kg/h) and Non Hazardous Waste storage, drainage cleaning through hydraulic vehicles, and warehousing of hazardous and non-hazardous waste by M/S Pak Ghazi Waste Solution". The raw materials of project are Hospital waste, ETP sludge, Pharmaceutical waste, industrial hazardous and non-hazardous waste, paper & board, empty, drums, wood, metals and organic waste will be stored for recycling. The total area of proposed project is 02 Kanal 10 Marla and 226 Sft while estimated cost is PKR 70 million

SECTION-02

SCREENING OF PROJECT

2 SCREENING OF PROJECT

Screening is an essential part of an EIA process. Screening often results in a categorization of the project and from this a decision is made on whether or not a full EIA is to be carried out. The EPA Punjab has provided a layout for the screening process. In accordance with the Punjab Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2022, SRO # 339 (1)/2000, the project for waste incinerator falls in Schedule –II, Part-G "Waste Storage and 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 fulfill the legal requirements of the Section-12 of the Punjab Environment Protection Act (amended 2012) 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)

SECTION-03

SCOPING OF PROJECT

3 SCOPING OF PROJECT

Scoping is the stage in EIA at which issues, impacts and preliminary alternatives are determined that should be addressed at subsequent stages. It directly follows the screening stage and is a systematic exercise that establishes the boundaries and Terms of Reference (TOR's) for the EIA. A quality scoping study reduces the risk of including inappropriate components or excluding components which should be addressed. While scoping has been defined by many different terms, the definition adopted in recent guidance on project EIA, developed for the European Commission, sets out its meaning in its broadest sense as follows: "Scoping is the process of determining the content and extent of the matters which should be covered in the environmental information to be submitted to a competent authority for projects which are subject to EIA/IEE." (European Commission, 2001).

3.1 GUIDING PRINCIPLES FOR CARRYING OUT THE SCOPING STAGE

The guiding principle for the proposed scoping stage is the emphasis on anticipated environmental impacts and affected people. The scoping session was initiated at the EIA planning stage to include all relevant stakeholders in the study. This helped in defining the boundaries for field assessment of environmental and social parameters.

3.2 OBJECTIVES

The key objectives of this scoping are to:

- Inform the public about the proposed project
- Identify main stakeholders and their concerns and values
- Define reasonable and practical alternatives to be addressed
- Focus the important issues and significant impacts to be addressed in the EIA report
- Define the boundaries in time, space and subject matter
- Set requirements for the collection of baseline and other information
- Establish the Terms of Reference (TOR's) for the EIA study

3.3 LEGISLATION AND GUIDELINES DECIDED TO BE FOLLOWED FOR THE EIA/IEE

EPA Punjab has established laws and regulations for environmental assessment studied. These legislations include:

- Punjab Environmental Protection Act, 1997 (Amended 2012)
- Punjab Environmental Quality Standards 2016

In addition to the legislative framework, there are certain guidelines notified by the Pakistan Environmental Protection Agency which provide a standard course of actions to be pursued during such studies. These guidelines are:

- Guidelines for the Preparation and Review of Environmental Reports
- Guidelines for Public Consultation
- Guidelines for Solid Waste Management
- Environmental, Health, and Safety General Guidelines of the World Bank Group

In addition to these legislations, there are specific rules, made regarding the healthcare waste. They include

- Hazardous Substances Rules, 2003
- Punjab Healthcare Waste Management Rules, 2014

3.4 EIA REPORT CONTENT

The content of the EIA report for the proposed project will be as according:

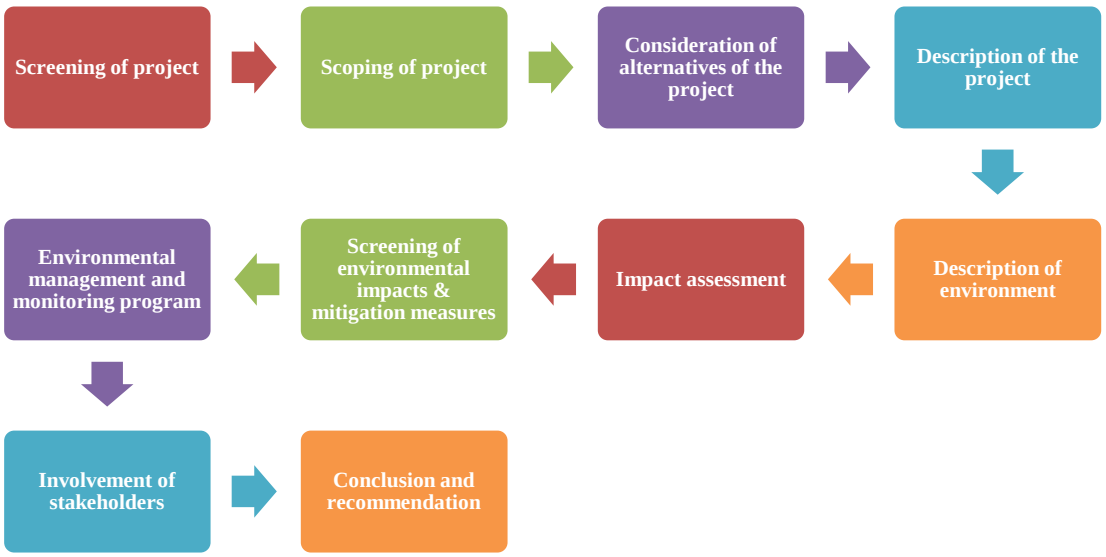

Figure 3.1 Contents of EIA Report

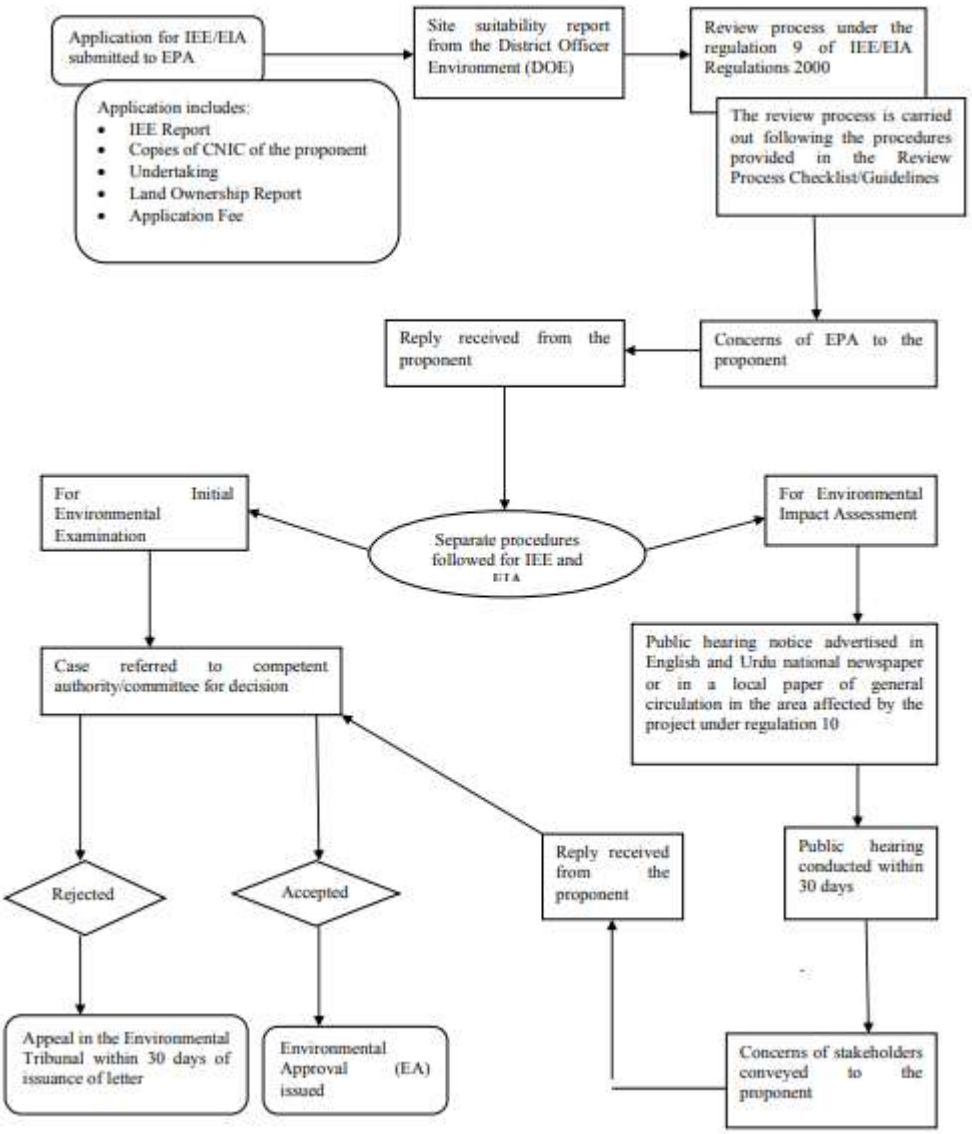

Figure 3.2 EIA Process flowchart

3.5 SPATIAL AND TEMPORAL BOUNDARIES OF ENVIRONMENTAL ASSESSMENT

The title of proposed project is "**Pak Ghazi Waste Solution**".

Location: 18-km Behind Mughal Steel Sheikhupura Road, Mouza Mandhiali, Tehsil Ferozwala District Sheikhupura.

The Google coordinates of the project are as followings:

Location: 18-km Behind Mughal Steel Sheikhupura Road, Mouza Mandhiali, Tehsil Ferozwala District Sheikhupura.

Latitude: 31°39'20.0"N

Longitude: 74°10'36.2"E

East Side: Agri Land

- **South Side:** Agri Land
- **North Side :** Agri Land
- **West Side:** Agri Land

3.6 INFORMATION DISCLOSURE AND CONSULTATION

In the case of an EIA, the Provincial Agency shall, simultaneously with issue of confirmation of completeness under clause (a) of sub-regulation (1) of Regulation 9, cause to be published in any English or Urdu national newspaper and in a local newspaper of general circulation in the area affected by the project, a public notice mentioning the type of project, its exact location, the name and address of the proponent and the places at which the EIA of the project can, subject to the restrictions in sub-section (3) of section 12, be accessed.

For the purpose of engaging stakeholders for maximization of the project benefits, open invitation of participation in public hearing through newspaper advertisement will be given to local public, where project information will be disclosed. Reviews of general public will be taken and their concerns will be addressed.

Public hearings provide an opportunity for the public to provide formal comments and oral testimony on proposed company/agency actions. Occasionally the company/agency will present introductory information at the public hearing prior to receiving comments. All testimony received becomes part of the public record.

3.7 IMPORTANT ISSUES AND CONCERNS RAISED DURING CONSULTATION

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. 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

3.8 SIGNIFICANT IMPACTS AND FACTORS TO BE DETERMINED

Following impacts are considered to be significant and proper mitigation and maintenance plan of these are made.

- Collection and transportation of hazardous waste
- Offsite transportation of hazardous waste
- Storage of containers
- Record keeping and maintenance
- Air and noise pollution

SECTION-04

CONSIDERATION OF ALTERNATIVES OF PROJECT

4 CONSIDERATION OF ALTERNATIVES OF THE PROJECT

This section covers the project alternatives which were examined for the proposed project. Before carrying out any project, it is imperative to evaluate different alternatives to arrive at the best possible option. An analysis of the available alternatives is necessary to establish the most suitable management and technology options will be adopted for the project, while minimizing environmental impacts. This evaluation explains the selection of appropriate option that was required to ensure optimal results within defined set of economic, environmental, health and safety constraints. In particular, it outlines the following project options:

- No Project option
- Alternative Site Option
- Alternative Technology

4.1 ALTERNATIVE I – NO DEVELOPMENT OPTION:

No project option means that there would be no project at all. The no project option, if taken, would stop the community from an important and necessary project which is the need for today as per alarming situation of waste generated from industries and hospitals. No project means, the public, overall in general Sheikhupura shall become deprived of the hospital waste management which will worsen the environmental conditions of the city.

Accelerated growth of population and a gradual increase of per capita solid waste have been observed in the Sheikhupura. Lack of awareness prevails among stakeholders regarding reduction at source and segregation of waste and available other options. The existing solid waste management system is administered by the Municipal Administration of Tehsil (TMA). In addition, the current collection of solid waste is divided into primary and secondary collection systems. There is no proper system of solid waste disposal in the city, even so there is no sanitary land fill site. If the situation exists for the next few years, the Sheikhupura will give a picture of heaps of solid waste at public places.

Other impacts of the no project option would be loss in employment and social welfare in the project area, as the project is bound to create jobs and improve the existing

condition of the community of the area through different community development and social welfare projects.

From the environmental point of view, this option would result in a loss of opportunity in further improvement of the environmental management of the area, environmental baseline data and the mitigation and compensatory programs.

4.2 ALTERNATIVE II- SITE ALTERNATIVE:

In reference to the project site alternatives, several lands were evaluated. The final selection of site is based on following criterion:

Accessibility:

The proposed project site is accessible from Lahore-Sheikhupura Faisalabad road (N-60) to allow ready transport.

Water Supply:

As the proposed project site already owned by the project and situated near industrial area, it has water pipeline wiring. While the other two sites are agricultural sites, they do not have proper pipeline wiring but they do have availability of adequate water supply, which also meets drinking water standards.

Soil Conditions for Civil Structure:

All the sites (site proposed for the project and 2 alternative sites) do have availability of sufficient land to design and layout plan in an appropriate manner, with consideration of future expansions but proposed site is already owned by the proponent and other 2 sites will involve purchase cost. Site 1 will also involve land clearing as it has agricultural growth.

Electricity:

Proposed project site has availability of electricity from the LESCO for an uninterrupted supply of power, required for the project. Both the other proposed alternatives do also have access to WAPDA supply.

In view of the above criteria, it was concluded to establish the incinerator facility on the current site. The geographic position of the proposed project is very ideal which connects it to the neighboring infrastructure. The proposed project is also away from the human settlement.

Any other nearby site does not possess such a broad spectrum of commercial and management benefits.

As no important religious, archaeological, historical or recreational site, or any other ecologically sensitive, declared protected area or poor population exists within close vicinity of the selected site. In view of these facts, it can be concluded that the selected project site is very suitable which is outside the city. The project site does not require cutting of trees and the land is already owned by the proponent and considered suitable both in terms of environment and physical constraints. As sufficient area is available for installation that would also reduce the transportation cost for solid waste handling.

4.2.1 Zoning or Identification of Land of Prime Importance:

Site selected for the subject project is owned by the proponent. The current site was used for agriculture purposes but now the surrounding land is being converted to be used as industrial land. Many famous industries like Newage Cable, Affco Auto Parts Factory, Descon Oxychem Limited, Mughal Steel Industry etc. are present near the project Site The land selected for the subject project is not of prime agricultural importance. The establishment of the incinerator here will be out of the city premises and will not cause any disturbance to general public.

4.2.2 Sites of Special Cultural or Historical Interest:

There is not any area of historic or cultural importance near the project site, so the impact of the project on destruction of resources of historic and cultural importance is not applicable.

4.2.3 Areas of Land with Constraints upon Development – Land Liable To Flooding

Land is suitable for the development and land is not prone to flooding because history show the area is free from flooding.

4.3 ALTERNATIVE III- TECHNOLOGY ALTERNATIVE

Incineration of wastes has been widely practiced but alternatives are becoming available such as autoclaving, chemical treatment and microwaving and may be preferable under certain circumstances. Incineration is the method of choice. Lot most hazardous healthcare wastes and is widely used all over the world. However some recently developed alternative treatment method are also becoming increasingly popular.

Incineration is the method of choice lot most hazardous healthcare wastes and is widely all over the world. Alternatives to incineration are available in many developed countries. As these techniques are either too complicated or very expensive, they are not being used in Pakistan. Keeping in view all the environmental consideration, best suited technology has been proposed for the said project including no air emissions. Water mitigation techniques are also considered at their best.

However, some techniques used for the waste management are explained below:

4.3.1 Steam Autoclaving

Steam autoclaving is the most widely used and most efficient alternative healthcare waste treatment technology. Most available autoclaves are designed to handle both biohazard and normal healthcare wastes simultaneously. However they cannot treat pathological animal wastes, chemotherapy wastes and low level radioactive wastes. These wastes have to be treated separately. Healthcare waste autoclaves usually jointly operate with a shredder and a compactor to minimize the waste volume. In autoclaves the effects of heat from saturated steam and increased pressure decontaminate the healthcare waste by inactivating and destroying microorganisms. There are two types of autoclaves, gravity displacement and pre-vacuum. Those designed for healthcare waste are mostly pre-vacuum.

Advantages

- Can treat most types of bio healthcare waste
- High level of microbial inactivation of bio healthcare waste
- Does not create hazardous combustion by-products (Dioxin, Furans, etc) • Produces far fewer emissions than incinerators
- Treated wastes can be land filled along with normal municipal solid waste

- Autoclaves are the most widely used alternative to incineration of bio healthcare waste
- Autoclaves have extensive field/ historical experience in the healthcare industry
- Many autoclaves require low capital investment
- Easier to operate than incinerator
- The most profitable investment unless there are no regulations at all on incineration emissions.

Limitations / Draw Backs

- Inappropriate for industrial waste
- Most autoclaves do not handle recognizable anatomical wastes
- Do not hand chemo therapeutic or other toxic chemical and radiological wastes
- Large volumes of liquids in sealed containers may not be adequately treated.
- Offensive odors can be generated.
- May exhaust volatile organic compounds
- May require hospital to alter method of separating waste

4.3.2 Microwaving

The process combines shredding, steam injection and conventional microwaves to disinfect bio healthcare waste. The microwave process begins when an operator fills the loading bucket with waste. An automatic hoist dumps the material into a hopper at the top of the unit. Before opening, the hopper air is treated with high temperature steam, and then extracted with a high efficiency particulate air filter to capture airborne pathogens. Computers control the shredder and emerge as small bits, unrecognizable as healthcare waste. The granules are automatically conveyed into a treatment chamber where they are moistened by high temperature steam. This mixture runs under a series of conventional microwave generators or waste to energy plants.

Advantages

- Microwave system is easier to get permitted because it doesn't generate potentially toxic air emissions.
- No obnoxious odors, its quiet
- It eliminates needle sticks and back problems

- Consequently, there is no need for pollution control devices
- The cost for microwaving is about the same as for incineration.

Limitation / Drawbacks

- Inappropriate for industrial waste
- Not a co-generation process like incinerators.

4.3.3 Chemical Treatment

In chemical treatment systems, an anti-microbial chemical such as sodium hypo chloride, chlorine dioxide, or per acetic acid decontaminates the waste. Most chemical treatment systems currently in use operate at ambient temperature.

Limitations / Drawbacks

- This kind of treatment could become costly if the waste generated is in large quantity and would require greater amount of chemical
- Chemical treatment requires highly qualified technicians for operation of the process
- Use of hazardous substances also require comprehensive safety measures
- Chemical treatment is inadequate for pharmaceutical, chemical and some type of infectious wastes.

4.3.4 Thermal Systems

Some systems use a combination of infrared radiation and forced hot-air convection to treat the waste. The waste then is compacted, preparing it for landfill. Other systems use gamma radiation to heat the waste to disinfecting temperatures. A portion of the solid residue obtained is recycled while the remainder is disposed. Several other thermal systems currently under development use steam, oil, electricity or some form of irradiation as their source of heat.

4.3.5 Land Disposal

If a municipality or healthcare authority genuinely lacks the means to treat wastes before disposal, the use of a landfill has to be regarded as an acceptable disposal route. Allowing healthcare waste to accumulate at hospitals or elsewhere constitutes a far

higher risk of the transmission of infection than careful disposal in a municipal landfill, even if the site is not designed to the standard used in higher income countries.

4.4 CONCULSION:

The final choice of treatment system is made carefully on the basis of various factors, many of which depend on local conditions

- Disinfections efficiency
- Volume and mass reduction
- Occupational health and safety considerations
- Quantity of wastes for treatment and disposal / capacity of the system
- Types of waste for treatment and disposal
- Locally available treatment options and technologies
- Options available for final disposal
- Training requirements for operation of the method
- Operation and maintenance considerations
- Available space
- Location and surroundings of the treatment site and disposal facility
- Investment and operating costs
- Public acceptability
- Regulatory requirements

Certain treatment options may effectively reduce the hazards of healthcare and industrial waste but simultaneously give rise to other health and environmental hazards. Land disposal may result in groundwater pollution if the landfill site inadequately designed. In choosing a treatment or disposal method the health-care and industrial waste, particularly if there is a risk of toxic emissions or other hazardous consequences it should therefore be carefully evaluated in the light of local circumstances. So incineration is the best option to be opted for the Hazardous Waste Management in Pakistan.

SECTION-05

DESCRIPTION OF PROJECT

5 DESCRIPTION OF THE PROJECT

5.1 PROJECT FEATUERS

5.1.1 OBJECTIVES OF PROJECT

Sr. No.	Aspect	Details Description
1	**Project Category**	Schedule –II, Part-G "Waste Disposal" {Waste disposal and/or storage of hazardous or toxic wastes (including landfill sites, incineration of hospital toxic waste)
2	**Screening of Project**	Scale, as per define in PEPA,1997 (Amended 2012)
3	**Total Area**	02 Kanal 10 Marla 226 SFT.
4	**Total Project Cost**	PKR 70 Million
5	**Raw materials**	Hospital waste, ETP sludge, Pharmaceutical waste industrial hazardous waste, paper & board, empty drums, wood, metals, ashes of boilers, organic waste
6	**Process Description**	• Segregation of hazardous waste for Incineration • Storage of Non Hazardous Waste
7	**Detail of Labor**	Construction : 10 (Approx.) Operation: 06 (Approx.)
8	**Capacity of Project**	a) Incineration: 500kg per hour b) Non Hazardous Waste Storage Capacity 500kg Per Day

The objective of the proposed project is minimizing the for hospital waste, ETP sludge, pharmaceutical waste, hazardous 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.

5.2 LOCATION AND SITE LAYOUT OF THE PROJECT

The project site is located at 18-km Behind Mughal Steel Sheikhupura Road, Mouza Mandhiali, Tehsil Ferozwala District Sheikhupura.

Location map is given below in Figure: 5-1.

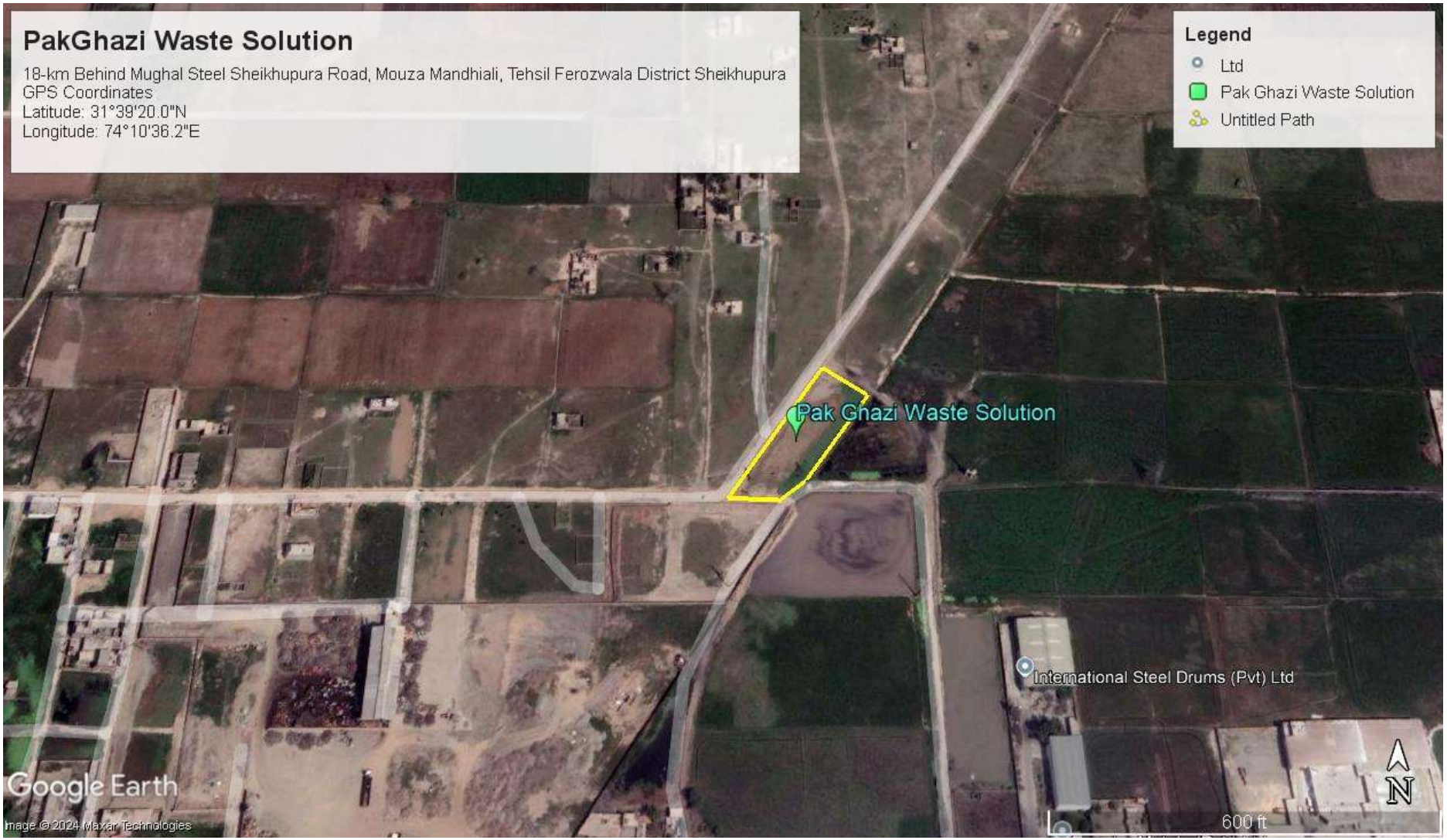

Figure 5.1 Project Site Location

5.3 LAND USE

Currently the land is open plot o agricultural or construction activity start.

5.4 VEGETATION AROUND THE SITE

Around 200 meter of the project site no vegetation exists which can be affected by the project.

5.5 ACCESS ROAD

The project site is easily accessible through a road that connected to main Lahore Sheikhupura Faisalabad road (N-60).

5.6 COST AND MAGNITUDE OF OPERATION

The project cost has been estimated about PKR 70.00 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 2024.

5.7 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:

- Laying of foundations excavation and commencement of erection work.
- Start of civil, electrical and mechanical work.
- Development of basic infrastructure.
- Fitting of instrumentation.

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

- Equipment erection completion.
- Completion of the basic infrastructures water supply system, electricity supply etc.

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

5.8 DESCRIPTION OF THE PROJECT

The proposed project is installation of Pak Ghazi Waste Solution, at 18-km Behind Mughal Steel Sheikhupura Road, Mouza Mandhiali, Tehsil Ferozwala District Sheikhupura.

a. The burning capacity of the incinerator will be 500kg per hour, incinerator having capacity of 500 Kg/hr. each for Hospital waste, ETP sludge, Pharmaceutical Waste, Hazardous waste.

5.8.1 WASTE MANAGEMENT SYSTEM

Waste management (or waste removal) incorporates the cycles and activities needed to oversee waste from its beginning to its last removal. This incorporates the assortment, transport, treatment, and removal of waste, along with checking and guideline of the waste management cycle and waste-related issues, advances and monetary systems. Waste management manages a wide range of waste, including mechanical, natural, family, metropolitan, natural, biomedical wastes. At times, waste can represent a danger to human wellbeing. Medical problems are related all through the whole interaction of waste management.

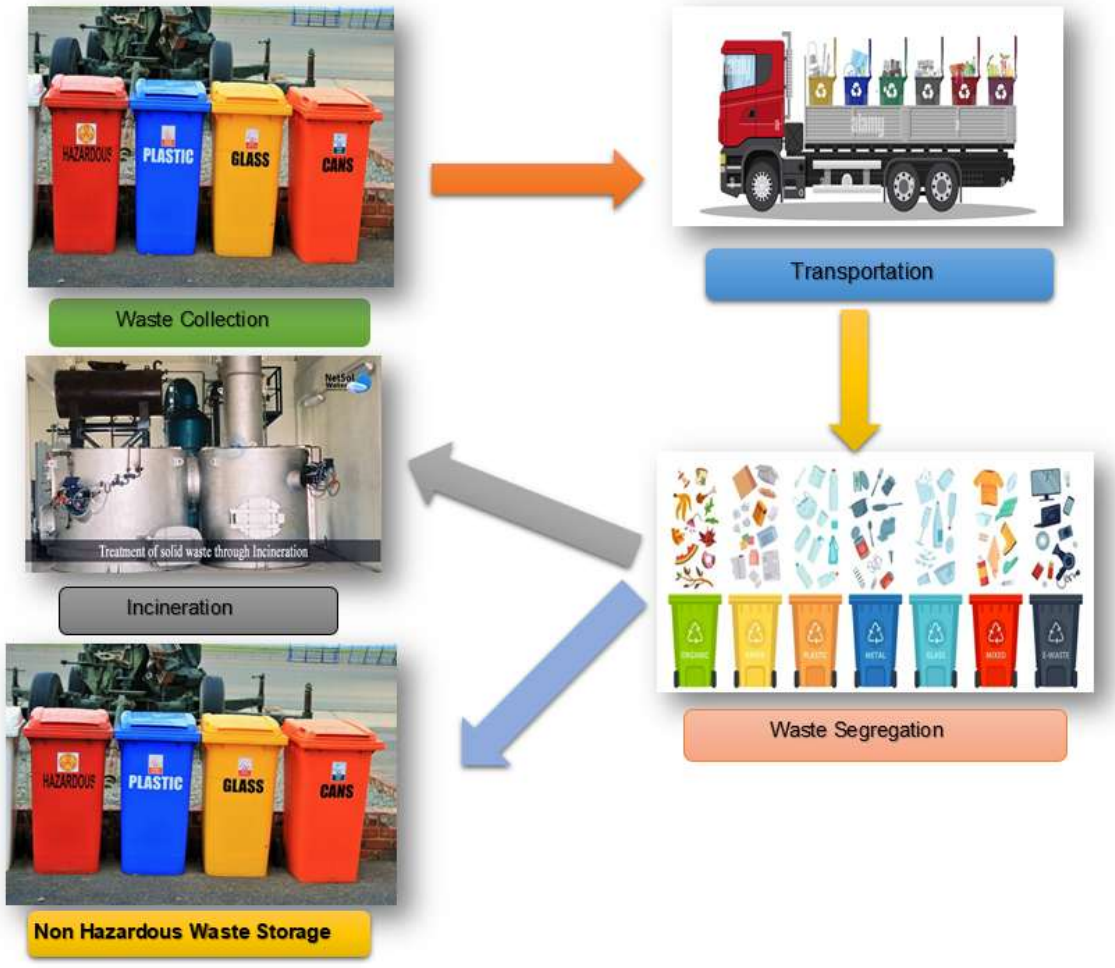

Figure 5.2 Process Flowchart for Waste Management

1. **Waste collection**

A well-planned collection and transfer process can result in significant reductions within the overall cost of waste management. Collection of waste is very important

for our healthy environment. Pak Ghazi Waste Solution will operate a fleet of vehicles of all sizes to collect the waste from their respective source

Table 5.1 Waste Collection Details

Sr. No.	Components	Comments
1.	Waste Collection Source	Waste will be collected from different contracting hospitals, pharmacies or industries.
2.	Collection Capacity	5 to 8 cubic yards of material
3.	Collection Frequency	It will be collected on weekly basis (from one facility in a day)
4.	Collection Time	Waste will be collected in late night hours or early in the morning
5.	Means of Collection	Dump Trucks will be used to collect bulk waste

Types of Waste

- Hospital waste
- ETP sludge
- Pharmaceutical waste
- Industrial hazardous waste
- Recyclable waste (paper and board, empty drums, wood)
- Organic waste

2. Segregation and Storage of non-hazardous waste

Waste segregation is the sorting and separation of waste types to facilitate recycling and correct onward disposal and waste will be stored into the yellow room. Waste segregation should be based on:

- The type of waste
- The most appropriate treatment and disposal

Machinery installation

- Bailing Press
- Metal Crusher
- Paper and Board Crusher
- Non-Hazardous Plastic Crusher
- Warehousing Under Covered Shed

3. Incineration Process

- The incinerator has a capacity of destruction 1 tons per hour.
- Two incinerators, capacity of 500 kg/hour each for hospital waste, ETP sludge, Pharmaceutical waste, Hazardous waste.
- Incinerator will be of dual chamber i.e. Primary (Temperature at 850°C) and Secondary (Temperature 1200°C) fueled by Natural Gas/LPG.
- The incinerator will be dual chamber, consisting of primary and secondary chamber.
- The incinerator is designed as a packaged unit, having pre-wired electrical connection and fuel pipes in place, making installation easier at site.
- The details of installing structure are given in the table

Table 5.2 Details of Installing Structures

Loading List Incinerator		
Zone	**Loading Name**	**Description**
1	Primary chamber	Stepped hearth (3.4×2.1×2.1)
2	Secondary chamber	As above with arc brick work
3	Emergency stack	33" OD side lined with bricks
4	Boiler	Optional
5	Cyclones	4" OD conical 4"× 4" multi
6	ID Fan	4×1.5', 2.25' OD, 1.5' ID
7	Wet scrubber	18' High
8	Chimney	2' OD, 55' Height

Process

- Unloading of waste at the facility
- Storage at yellow room (in case of storage more than 24 hours)
- Feeding of waste at feeding hopper
- Combustion at primary chamber at 850°C

- Combustion at secondary chamber at 1200°C.
- Quench Scrub, to lower the temperature of hot gases.

Storage of Ash

The main product of waste incineration is Fly ash (4 % of total weight). The collected fly ash is typically conveyed from the Incinerator to storage unit where it is kept dry pending utilization (fly ash brick making). Fly-ash storage needs to provide a dry, consistent environment and requires special material handling to prevent poor flow. The dry collected ash is normally stored and handled using equipment and procedures similar to those used for handling Portland cement:

- Fly ash is stored in domes and other storage facilities
- Fly ash can be transferred using air slides, bucket conveyors and screw conveyors, or it can be pneumatically conveyed through pipelines under positive or negative pressure conditions

Dry collected fly ash can also be moistened with water and wetting agents, when applicable, using specialized equipment (conditioned). Water conditioned fly ash can be stockpiled at jobsites. Exposed stockpiled material must be kept moist or covered with tarpaulins, plastic, or equivalent materials to prevent dust emission.

Simplified flow scheme of an Incinerator (Process Flow Chart)

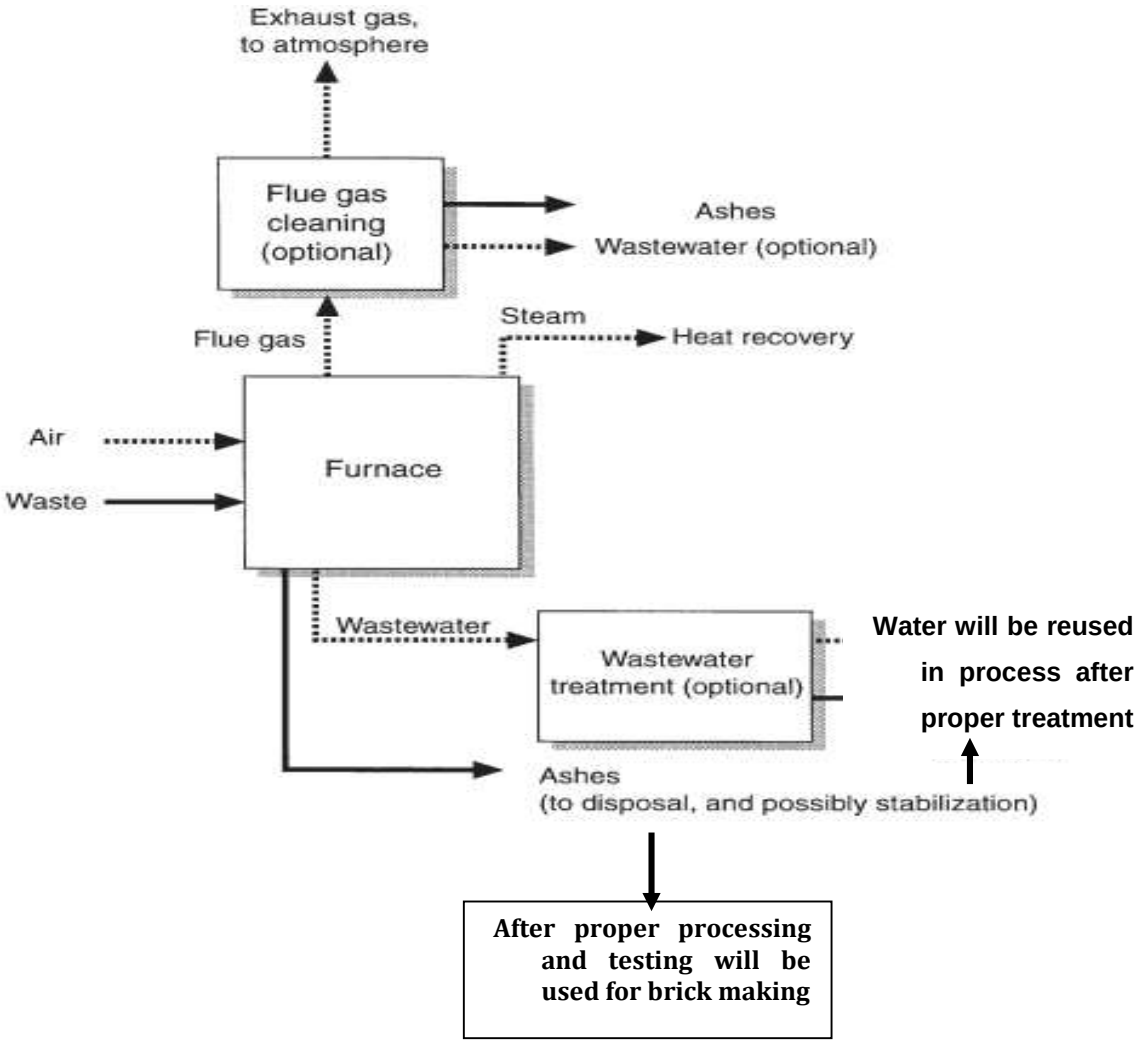

Figure 5.3 Specifications of the Incinerator

5.9 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 spillover of these materials will be cleared adequately. The land, if and where pitted will be adequately leveled. On the whole, the project site and the area in its near vicinity will be made neat and clean.

SECTION-06

DESCRIPTION OF ENVIRONMENT

DESCRIPTION OF ENVIRONMENT

6 INTRODUCTION

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

6.1 METHODOLOGY OF CONDUCTING BASELINE STUDY

Establishing the environmental baseline includes both the present and likely further state of the environment, taking into account changes resulting from natural events and from other human activities.

The guiding factors for the present baseline study are the EPA's requirements for the Environmental Impact Assessment notification and local regulations and directives.

The studies were conducted by considering the following:

- The various environmental attributes were divided into primary and secondary studies
- Primary attributes such as air environment, water, soil noise, flora and fauna
- Micro-meteorology were assesses by conducting field studies, on-site monitoring
- Review of the past studies conducted
- Secondary attributes such as land use studies, geology, physiological characteristics
- Socio-economic environment have been assessed by literature review of previous studies conducted by various Government publications etc.
- A reconnaissance survey was conducted to identify the sampling locations on the basis of:
- Locations of villages / towns / sensitive areas for noise, air, socio economics

- Accessibility of power connection and security for monitoring equipment, pollution pockets in the area; and
- Areas that best represent the baseline conditions.

The scoping and the extent of data generation were formulated with interdisciplinary team discussions, criteria questions and professional judgment.

The field data generated has been used to:

- Identify extent of impacts on natural resources and nearby communities
- Identify mitigation measures and monitoring equipment

These data can be used to prognosticate possible future impacts on environment and lead to suggesting suitable measures to stem or minimize the adverse impact (if any) as far as possible.

6.2 Physical Environment

6.2.1 Topography

Sheikhupura, located in the Punjab province of Pakistan, boasts a diverse topography that reflects the region's rich natural landscape. Predominantly a flat and fertile plain, the area is interspersed with a network of canals and waterways stemming from the Ravi River, contributing to its agricultural prominence. The district is characterized by its vast stretches of cultivated fields, primarily producing wheat, rice, and sugarcane, which thrive due to the alluvial soil. In addition to the agricultural land, Sheikhupura features scattered pockets of woodland and small clusters of natural vegetation, providing a scenic contrast to the expansive fields. The city itself is relatively low-lying, with elevation levels generally ranging between 200 to 250 meters above sea level. This combination of fertile plains and well-irrigated fields underscores Sheikhupura's significance as an agricultural hub within Pakistan.

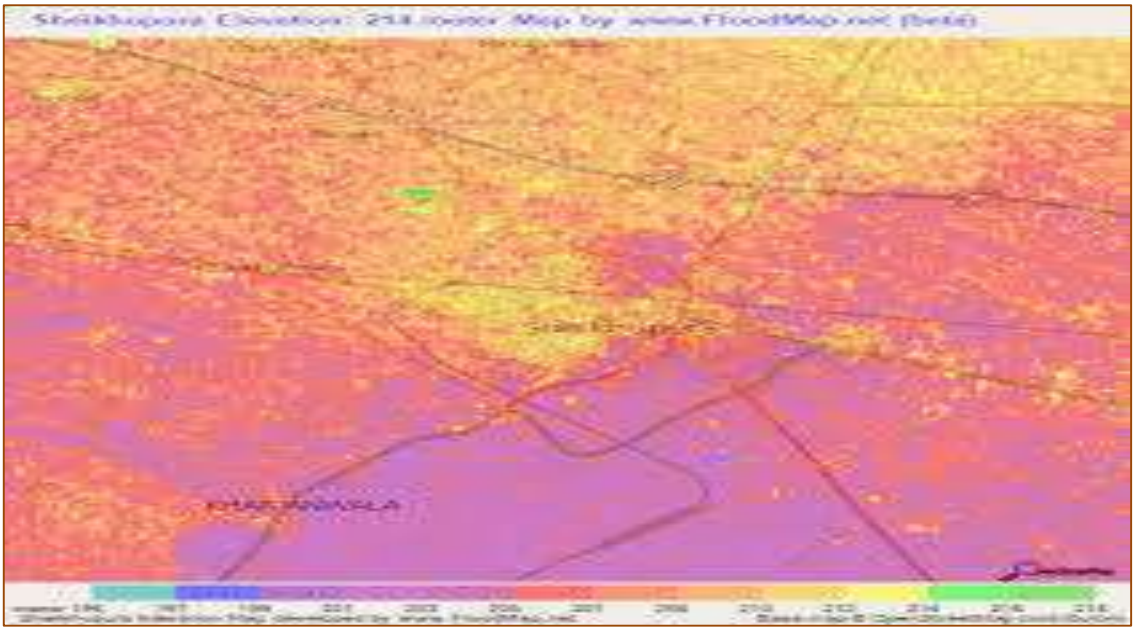

Figure 6-1 Topography of the Proposed Project

6.2.2 Geology

The project site is primarily characterized by its alluvial plains, formed by the sedimentary deposits of the Ravi and other rivers. This region lies within the Indo-Gangetic Plain, one of the world's largest alluvial plains, which is composed of unconsolidated sediments like sand, silt, and clay. These sediments are deposited by the extensive river system over millennia, creating highly fertile soil ideal for agriculture. The underlying geology is relatively young in geological terms, lacking significant mineral diversity or mountainous formations. Instead, the region's subsurface is dominated by deep layers of these alluvial deposits, which can extend hundreds of meters below the surface. Occasionally, minor limestone and sandstone formations can be found, remnants of older geological processes. The water table in Sheikhupura is relatively high, supported by the region’s numerous canals and rivers, which also play a crucial role in maintaining the soil's fertility and agricultural viability.

6.2.3 Climate and Meteorology

The city typically sees high temperatures averaging around 42°C (104°F) during the summer months of June through August, accompanied by high humidity levels. Winter, spanning from December to February, brings relief with temperatures dropping to around 8°C (41°F) to 10°C (50°F). The region receives most of its rainfall during the monsoon season, which extends from July to September, contributing to the annual precipitation of approximately 540 millimeters. Due to its geographical location and

climatic conditions, Sheikhupura faces challenges such as water scarcity during the dry months and occasional flooding during heavy monsoon rains, emphasizing the importance of sustainable water management and infrastructure development in the region.

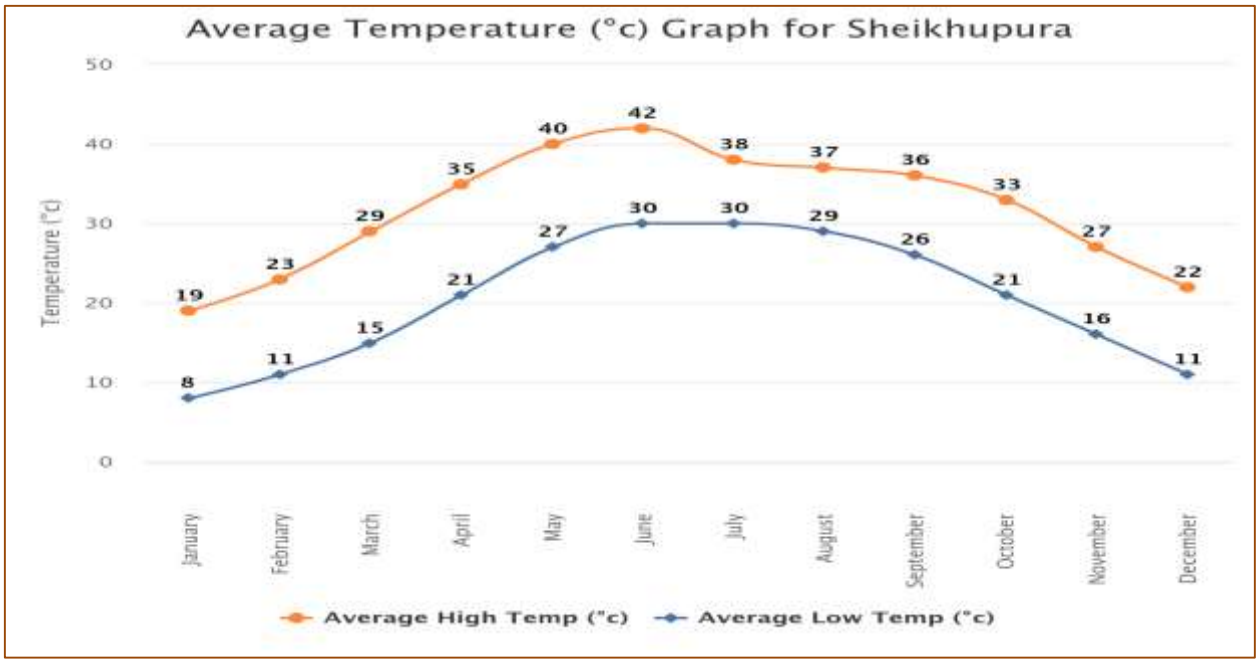

Figure 6-2 Average Temperature of the Proposed Area

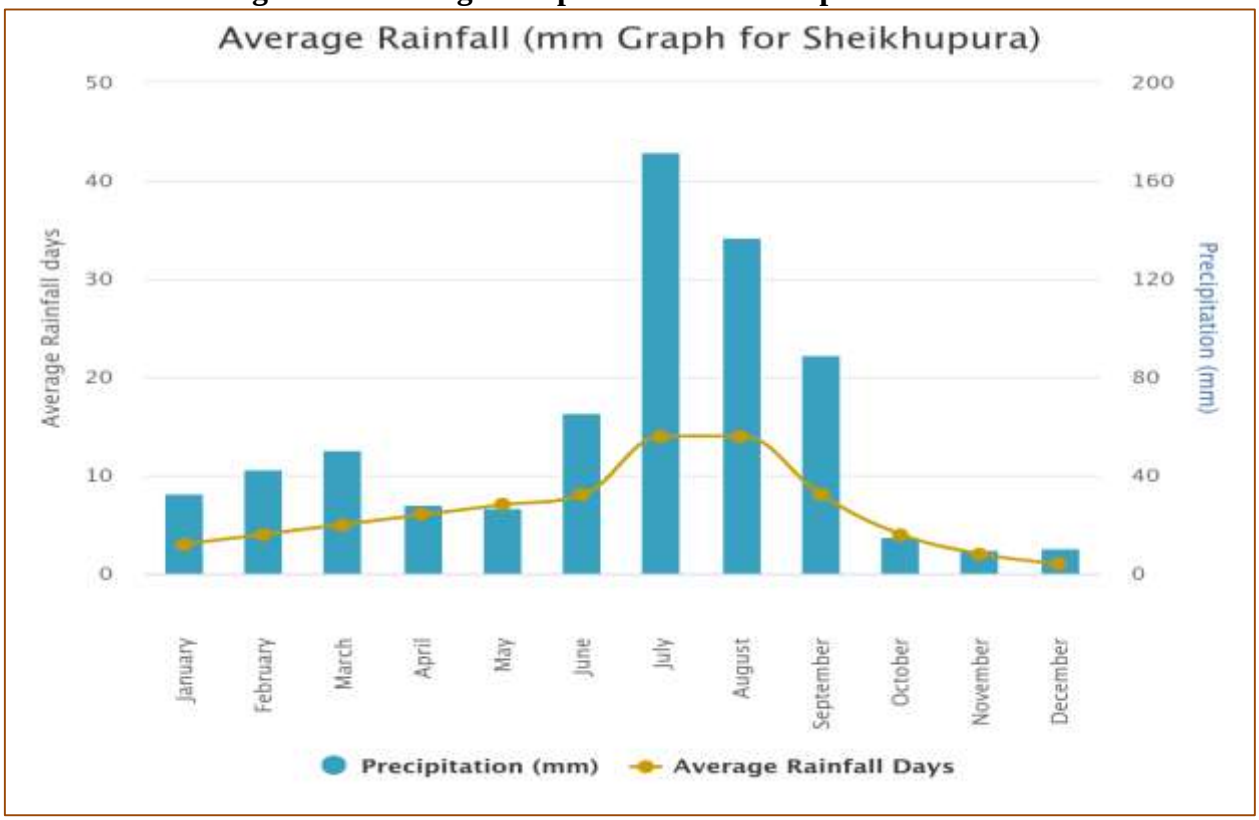

Figure 6-3 Average Rainfall of the Proposed Area

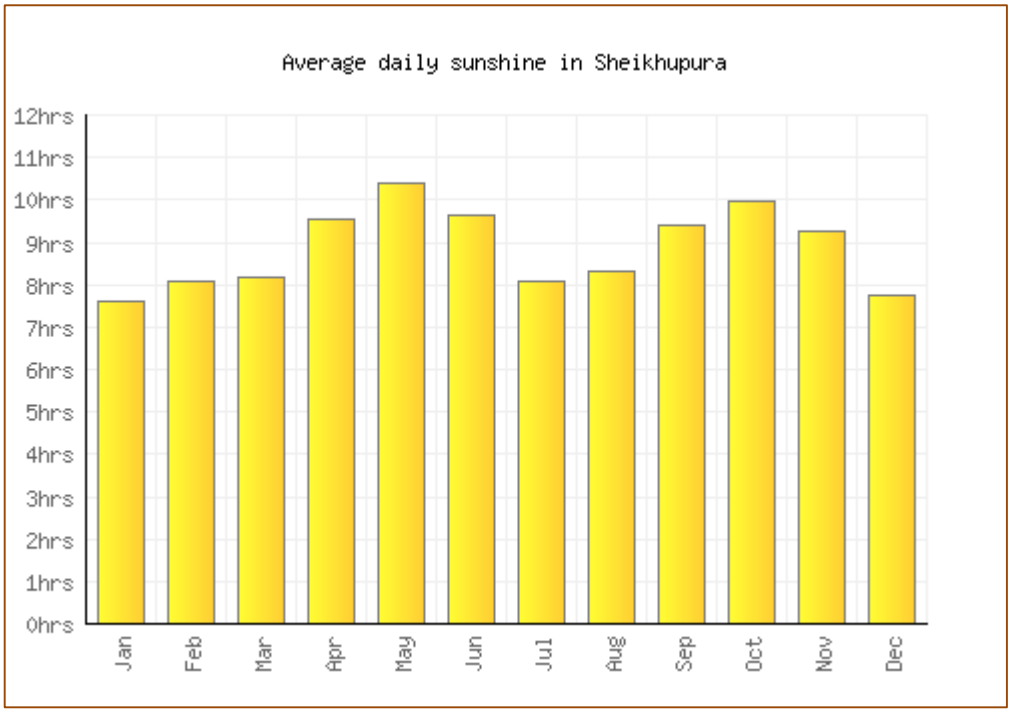

Figure 6-4 Average Sun Hours of Sheikhupura

6.2.4 SURFACE AND GROUND WATER

6.2.4.1 Surface Water resources

The project area benefits from various surface water resources that play a crucial role in sustaining agricultural activities, providing drinking water, and supporting industrial processes in the region. One of the primary surface water sources is the Lower Bari Doab Canal, which originates from the River Ravi and irrigates vast agricultural lands in and around Sheikhupura. Additionally, the city is situated near the Upper Chenab Canal, which further supplements irrigation water supply to the area. These canals are integral components of the Indus Basin Irrigation System, one of the largest contiguous irrigation systems globally, and they play a vital role in supporting the region's agricultural economy. Moreover, Sheikhupura benefits from several small reservoirs and ponds, primarily used for local irrigation and livestock watering purposes. While these surface water resources are essential for meeting the water needs of Sheikhupura and its surrounding areas, sustainable management practices and measures to address issues such as water pollution and sedimentation are necessary to ensure their long-term availability and usability.

6.2.4.2 Groundwater resources

The project area heavily relies on groundwater as a primary source of water for

agriculture, industry, and domestic purposes. The city's groundwater resources are mainly sourced from the aquifers in the region, primarily the Upper and Lower Indus Basin aquifers. These aquifers are replenished primarily by rainfall and surface water infiltration. However, due to increasing population, urbanization, and agricultural demands, there has been significant stress on these groundwater reserves, leading to declining water levels and deteriorating water quality in some areas. Over-extraction of groundwater for irrigation purposes, coupled with limited recharge rates, has resulted in issues such as land subsidence and saltwater intrusion in coastal areas. Sustainable management practices, including groundwater recharge initiatives, efficient irrigation techniques, and regulation of groundwater extraction, are essential to ensure the long-term viability of Sheikhupura's groundwater resources and to mitigate the risk of water scarcity in the region

6.3 Seismology

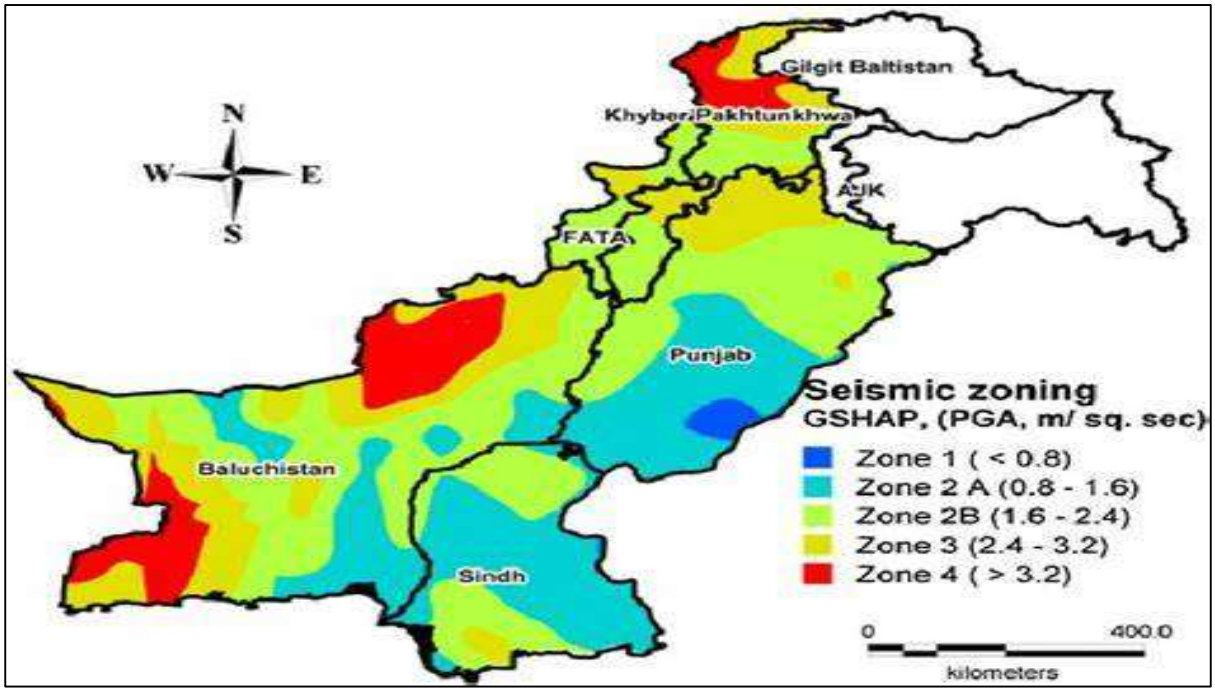

Figure 6-5*:* Seismic Map of Punjab

6.4 Flooding

No serious episodes of flooding have been reported in recent years. Despite the city's vulnerability to flooding due to its flat terrain and monsoon season.

6.5 ECOLOGICAL RESOURCES

6.5.1 Habitat

6.5.2 Flora and Fauna

Some of the common trees found in Sheikhupura include:

Shisham (Dalbergia sissoo): A fast-growing, nitrogen-fixing tree with dark brown wood used for furniture and construction.

Kikar (Acacia nilotica): A drought-resistant tree with yellow flowers and long thorns, used as a source of gum arabic.

Neem (Azadirachta indica): A multipurpose tree with medicinal properties, used in traditional medicine and as a pesticide.

Jamun (Syzygium cumini): A large evergreen tree with purple fruit, used for jams, jellies, and wine.

The fauna of Sheikhupura encompasses a diverse array of species adapted to the region's agricultural landscape and semi-arid climate. Common fauna in Sheikhupura include various bird species such as sparrows, doves, mynas, and parakeets, which thrive in both urban and rural habitats. The district's water bodies, including irrigation canals and ponds, support aquatic fauna like fish, frogs, and waterfowl.

Figure 6-6*:* Flora of Project Area

6.6 SOCIO-ECONOMIC ENVIRONMENT

6.6.1 History

Sheikhupura, located in the Punjab province of Pakistan, has a rich and diverse history dating back thousands of years. The region has been inhabited since ancient times, with archaeological evidence suggesting human settlements dating back to the Indus Valley

Civilization, around 2500 BCE. Over the centuries, Sheikhupura has been ruled by various empires and dynasties, including the Mauryans, Kushans, Ghaznavids, and Mughals.

During the Mughal era, Sheikhupura gained prominence as a center of trade and culture. It was founded by Emperor Jehangir in 1607 and named after his beloved son, Prince Sheikhupura. The city flourished under Mughal rule, with the construction of notable landmarks such as Hiran Minar, a monumental tower built in memory of Emperor Jehangir's pet deer.

In the 18th and 19th centuries, Sheikhupura witnessed political upheavals and changing rulers, including periods of Sikh rule under Maharaja Ranjit Singh. After the British annexation of Punjab in the mid-19th century, Sheikhupura became a prominent administrative center in the British colonial administration.

Following the partition of India in 1947, Sheikhupura became part of Pakistan, and its demographics underwent significant changes due to migration and resettlement of refugees. Today, Sheikhupura is a thriving city with a diverse population, known for its agricultural economy, industrial growth, and cultural heritage. Despite its modernization and urbanization, the city's historical legacy is preserved in its monuments, landmarks, and cultural traditions, providing a glimpse into its rich and vibrant past

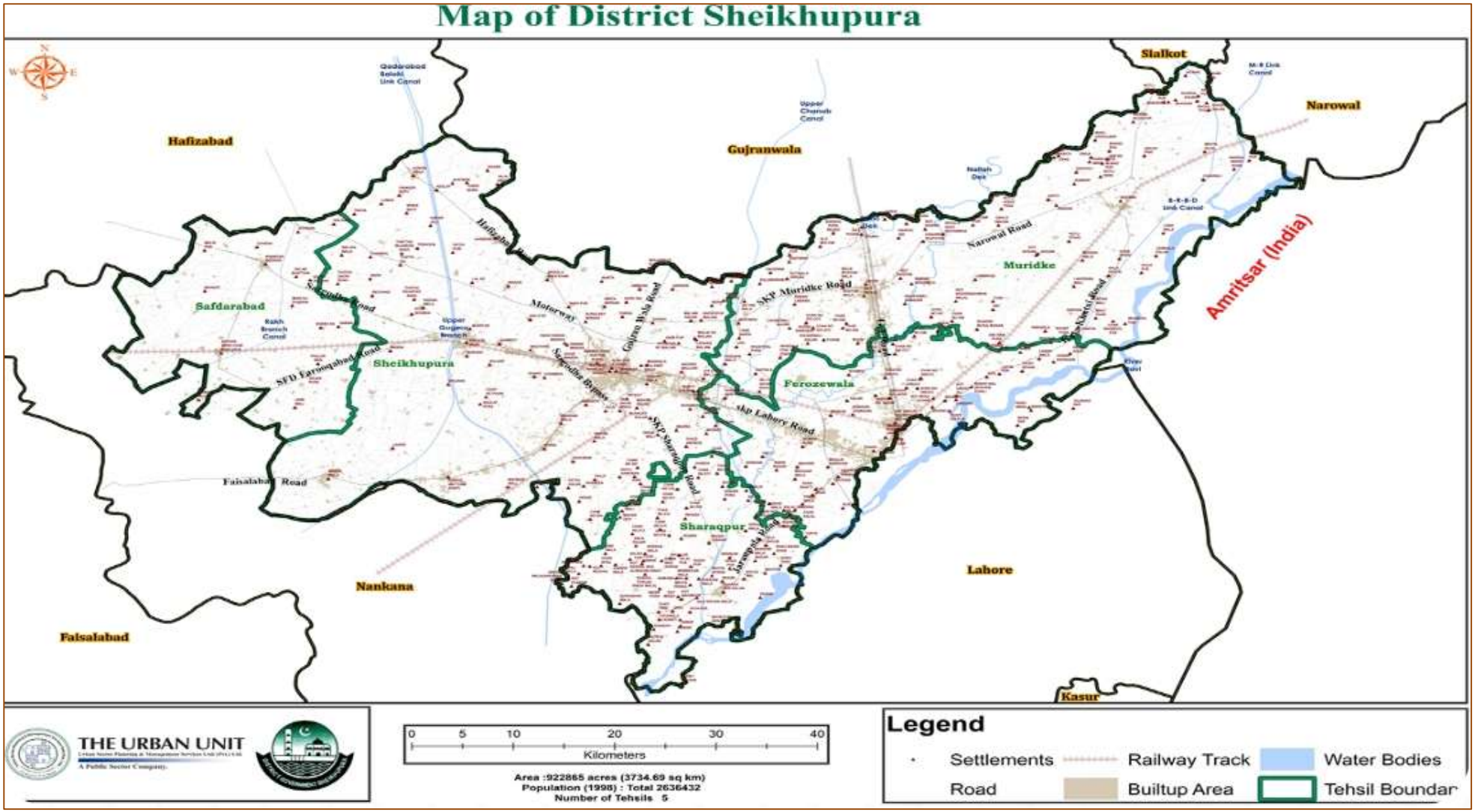

Figure 6-7 Map of Sheikhupura

6.6.2 Agricultural and Industrial Activities

6.6.2.1 Agricultural Activities

Agriculture is the backbone of Sheikhupura's economy, with the region known for its fertile lands and diverse agricultural activities. The city's agricultural sector primarily revolves around the cultivation of crops such as wheat, rice, sugarcane, maize, and citrus fruits. These crops are not only crucial for local consumption but also contribute significantly to Pakistan's overall agricultural output.

Wheat and rice are staple crops grown throughout the region, with Sheikhupura being one of the leading producers of these grains in Punjab. Sugarcane cultivation is also widespread, supporting the thriving sugar industry in the area. Maize is another important crop, often used for both human consumption and as fodder for livestock.

Citrus fruits, including oranges, kinnows, and lemons, thrive in Sheikhupura's favorable climate and are cultivated extensively in orchards across the region. These fruits are not only consumed domestically but also exported to various international markets, contributing to the city's economy.

Aside from these major crops, Sheikhupura also engages in livestock farming, including dairy farming, poultry farming, and cattle rearing. Livestock and dairy products are essential components of the agricultural economy, providing additional income sources for farmers and supporting rural livelihoods.

6.6.2.2 Industrial Activities

The project is located in an industrial zone of Sheikhupura. The city hosts a diverse range of industries, including textiles, ceramics, pharmaceuticals, food processing, and manufacturing. The industrial sector in Sheikhupura is characterized by both large-scale industrial complexes and small to medium-sized enterprises, collectively driving economic growth and employment generation in the region.

Textile manufacturing is one of the leading industries in Sheikhupura, with numerous textile mills producing a wide range of fabrics and garments for both domestic consumption and export markets. The textile sector plays a vital role in the city's economy, employing a large workforce and generating substantial export revenues.

The ceramics industry is another prominent sector in Sheikhupura, with numerous

ceramic factories producing tiles, sanitary ware, and pottery items. These products are in high demand both domestically and internationally, contributing to the city's industrial output and export earnings.

Additionally, Sheikhupura is home to several pharmaceutical companies, producing a variety of pharmaceutical products, including medicines, vaccines, and healthcare products. The pharmaceutical industry in Sheikhupura not only caters to the local market but also exports its products to neighboring countries, further boosting the city's industrial profile.

Food processing is another thriving sector in Sheikhupura, with several food processing units engaged in the processing and packaging of agricultural products such as fruits, vegetables, and dairy products. These food processing units play a crucial role in adding value to agricultural produce, reducing post-harvest losses, and meeting the demand for processed food products in both domestic and international markets.

6.7 Quality Of Life Values

6.7.1 Demographic Survey

Between 2017 and 2023, Sheikhupura experienced a steady population growth rate of 2.7% annually, reaching an estimated population of 4,049,418 in 2023 according to citypopulation.de. This substantial increase reflects the city's status as a vibrant economic and industrial center in the Punjab province of Pakistan.

6.7.2 Cultural and social status

Sheikhupura boasts a rich cultural heritage and a vibrant social fabric that reflects the diversity of its population and the traditions of Punjab, Pakistan. The city's cultural landscape is characterized by a blend of indigenous Punjabi customs, religious festivities, and artistic expressions. Traditional Punjabi folk music, dance, and poetry are integral parts of Sheikhupura's cultural identity, often showcased during festivals, weddings, and social gatherings.

Religiously, Sheikhupura is home to significant sites such as the Sheikhupura Fort and the Shrine of Baba Fariduddin Ganjshakar, which attract pilgrims and visitors from across the country. These religious landmarks contribute to the city's spiritual and cultural significance, fostering a sense of community and religious tolerance among its residents.

In terms of social dynamics, Sheikhupura reflects a mix of urban and rural lifestyles, with close-knit communities and strong family ties playing a central role in social interactions. Hospitality is a hallmark of Sheikhupura's social fabric, with residents known for their warmth and generosity towards guests and neighbors.

Moreover, Sheikhupura's social landscape is evolving with modernization and urbanization, leading to changes in lifestyle, attitudes, and social norms. The city is witnessing the emergence of new social trends, increased access to education and healthcare, and growing participation in cultural and recreational activities.

6.7.3 Religion

The predominant religion of the people in Sheikhupura, as in much of Pakistan, is Islam. The majority of the population adheres to the Sunni sect of Islam, which is the largest denomination within the country. Mosques are integral to the social and religious fabric of Sheikhupura, serving as centers for worship, community gatherings, and religious education. Additionally, there is also a significant Shia Muslim population in Sheikhupura, along with small minority communities of Christians and Hindus. These religious communities contribute to the city's cultural diversity, fostering interfaith harmony and mutual respect among its residents. Overall, Islam plays a central role in the daily lives and identity of the people of Sheikhupura, shaping their social customs, cultural practices, and religious observances.

6.7.4 Languages

The primary language spoken by the majority of people in Sheikhupura is Punjabi. Punjabi is not only the most widely spoken language in the city but also serves as a significant cultural and linguistic marker for its residents. Within the Punjabi language, various dialects are spoken, reflecting the diverse regional and cultural backgrounds of the population. Additionally, Urdu, the national language of Pakistan, is also widely understood and used, particularly in formal settings, education, and government institutions. Moreover, due to globalization and urbanization, many residents of Sheikhupura also have proficiency in English, especially among the younger generation and in educational and professional environments.

6.7.5 Institutions

Various institutes are located in the vicinity of the project area. Jamia-tur-Rasheed is

located on Lahore-Sargodha Road.

- Government College University, Sheikhupura
- Government College for Women, Sheikhupura
- Punjab Group of Colleges
- Unique Group of Institutions
- The Educators
- Allied School Sheikhupura Campus

6.7.6 Transportation

A diverse range of transportation options that cater to the needs of its residents and visitors can be found in the project area. At the heart of the city's transportation network are its roadways, which are well-connected and bustling with various modes of transport. From colorful rickshaws zigzagging through narrow streets to modern taxis and buses traversing the main thoroughfares, commuters have ample choices for getting around.

6.7.7 Health Facilities

The project area has a number of health care facilities in its vicinity. Basic Health Unit (Mandiali) is located near the project area. Government-run hospitals such as District Headquarters Hospital Sheikhupura provide essential healthcare services to the community, including emergency care, outpatient services, and inpatient treatment.

6.8 Site Suitability

Based on the existing facilities and infrastructure, it has been concluded that Mouza Mandiali, is a suitable location for the Pak Ghazi Waste Solution Project.

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SECTION-07

IMPACT ASSESSMENT

7 IMPACT ASSESSMENT

7.1 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

7.2 Risk Assessment Matrix

A likelihood of occurrence was assigned to each identified hazardous incident based on definitions shown in Table. The contribution of preventative and protective management controls were taken into account when assessing the likelihood of occurrence and potential consequence from each hazardous incident. The probability of occurrence used for this risk assessment is based on AS 4360 Risk Management. The risk levels denote residual risk.

Table 7.1 Likelihood of Occurrence for Hazardous Incident

Likelihood of Occurrence for Hazardous Incident		
Likelihood rank	**Descriptor**	**Description**
A	Almost certain	The event is expected to occur in most circumstances
B	Likely	The event will probably occur in most circumstances
C	Possible	The event could possibly occur at some time
D	Unlikely	The event could possibly occur at some time but is unlikely
E	Rare	The event may occur only in exceptional circumstances

The consequences assessed include both threats to the natural environment and to health and safety of the public based on definitions shown in Table. Where a hazardous

incident may have several outcomes, each potential outcome was assessed in turn. The severity classes for health and safety type outcomes are based on AS 4360 Risk Management, while those for the threat to the natural environment are based on common environmental risk management consequence categories.

Table 7.2 Consequence Classes for Public Safety and Environmental Impact

Consequence Classes for Public Safety and Environmental Impact			
Consequence rank	**Descriptor**	**Public health and safety**	**Environmental severity**
1.	Catastrophic	Fatality	Irreversible detrimental effect to off-site natural resource
2.	Major	Permanent disability	Prolonged but reversible detrimental effect to offsite natural resource
3.	Moderate	Hospital treatment	Short term detrimental effect to off-site natural resource with full recovery.
4.	Minor	Medical treatment	Minor detrimental effect to on or off-site natural resource and promptly contained/cleaned.
5.	Insignificant	First aid	On site release - no damage to natural resource

The shading and numerical coding in the risk matrix at Table, refers to qualitative bands of risk level. Risk ranks from 1 to 8 are considered to be extreme, 9 to 16 high, 17 to 20 moderate and 21 to 25 low, in accordance with Appendix E of AS 4360 Risk Management.

Table 7.3 Risk Assessment Matrix

	A	**B**	**C**	**D**	**E**
1	1	2	4	7	11
2	3	5	8	12	16
3	6	9	13	17	20
4	10	14	18	21	23
5	15	19	22	24	25

7.2.1 Hazard Identification and Assessment

In the following tables, C is consequence, L is likelihood and R is the risk ranking. The assessed risks are residual risks assuming that the proposal controls are in place.

Table 7.4 Hazard Identification and Assessment

Hazards	Proposed controls	Environmental			Health and safety		
		C	L	R	C	L	R
Dust from road	Sprinkler Water Speed limits.	5	c	22	5	c	22
Construction activity hazards(Falls from heights , Scaffold collapse , Trench collapse)	Fall from heights controls. Personal Protective Equipment (PPE) Safety management systems Experienced supervision	-	-	-	3	c	13
Leaks of oil, fuel or chemicals from vehicles onto construction works	Refueling in designated areas fitted with spill containment. Clean up, response procedures and training. Material used in construction will be stored and used in an appropriate to ensure containment.	4	c	18	3	E	20
Excessive noise (e.g. earth moving equipment, generators)	Design and operate all equipment to comply with the Environmental Protection (Noise) Policy	5	c	22	5	c	22
Traffic incidents on site	Traffic management plan Speed controls Safety inductions for workers	4	D	21	3	D	17

Failure to provide emergency treatment and response.	Contractor will have an emergency response capability and will work with construction to develop a co-operative arrangement for emergency response in this area. This would be developed in conjunction with mines rescue.	-	-	-	4	E	23
	Compliance with Emergency Response Plan and Procedures						

. A proper management plan shall be prepared in case of any accident

Table 7.5 Impact & Mitigation Measures

S. #	Environmental Attribute	Impact	Mitigation Measures
1.	Land	➢ The existing land cover of the proposed project site will have a minimal affect from site preparatory works for which clearance of shrubs, preparation of internal roads, excavation and paving of site for installing plant equipment and machineries is required.	➢ The present land use of macro environment is for Hospital purpose. ➢ Proposed greenbelt development & plantation will improve the aesthetics of the microenvironment.
2.	Soil	➢ No significant adverse impact on the soil is anticipated from construction & installation work.	➢ Excavated soil will be reused within site; storm water will be properly channelized to avoid water logging.
3.	Air Quality	➢ Dust generation ➢ Exhaust emission from vehicles. ➢ Exhaust from construction Machinery	➢ Regular sprinkling of water will be done at the construction site. ➢ No unpaved roads will be kept ➢ Construction equipments and vehicles will be kept maintained to minimize automobile exhaust
4.	Noise Levels	➢ The noise produced during the construction, erection and commissioning activities may add to the existing ambient noise levels.	➢ The machineries / vehicles will be kept in good order to reduce excessive noise.
5.	Water quality	➢ Ground water as well as surface water contamination due to improper management / handling of construction wastes. ➢ Non-point discharges of solids ➢ Improper discharge of Sewage generated from the construction work force stationed at the site	➢ Provision of water supply has been made and will be utilized. ➢ The construction in the project will be more related to mechanical fabrication, assembly and the erection; hence the water requirements would be small. ➢ Septic tanks will be set up for disposal of sewage.

S. #	Environmental Attribute	Impact	Mitigation Measures
6.	Ecology	➢ The impact on the surrounding ecology due to the project will mainly occur from the deposition of dust generated due to construction activities onto the nearby vegetation	➢ No national park, wildlife sanctuary, biosphere reserve exists within the close proximity of the project site. ➢ Agriculture fields dominate the terrestrial ecology in the area. ➢ Adequate measures will be taken to suppress dust generated due to construction activities. ➢ The incremental emission of air pollutants during construction phase is not likely to induce any significant changes in the terrestrial ecology. ➢ No cutting of trees will be done.
7.	Occupational & Community Health	➢ Over-exertion, and ergonomic injuries and illnesses, such as repetitive motion, over-exertion, and manual handling, are among the most common causes of injuries in construction activities. ➢ Respiratory issues due to dust. ➢ High blood pressure etc. due to continuous working near noise generating machinery	➢ PPEs such as dust masks & earmuffs will be provided to workmen to reduce occupational health hazards. ➢ Implementation of administrative controls into work processes, such as job rotations and rest or stretch breaks will be done. ➢ Sprinkling of water for dust suppression to minimize dust from vehicle movements & construction activities.

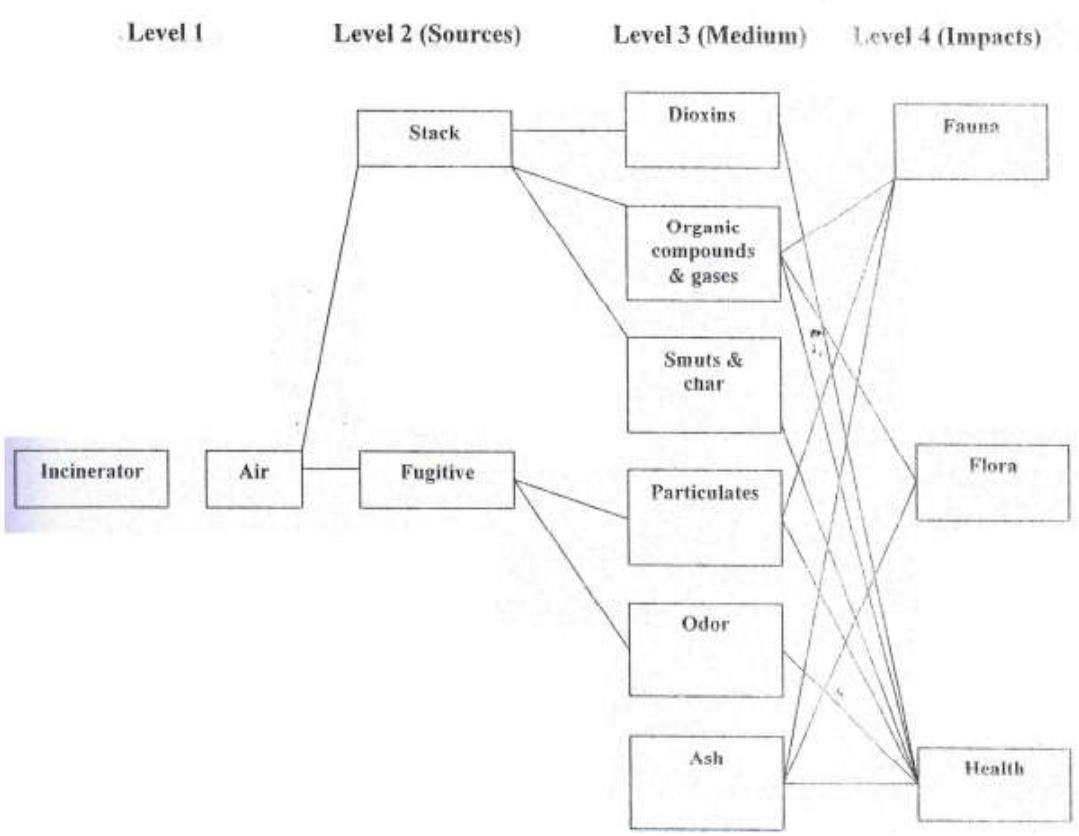


Figure 7.1 Simplifies Network of Air Quality Issues due to Incineration

As mention above that the project will not pose any adverse impacts to the environment. An assessment of impact during construction and operation phase is given in Table - 7.6, which indicates the impact and their magnitude.

MAGNITUDE OF NEGATIVE IMPACT	INDEX FOR NEGATIVE IMPACT
NIL	
LOW	1-3 -
MEDIUM	4-6 -

Table 7.6 Anticipated Impacts and their magnitude of the Proposed Project

Environmental Aspect	ACTIVITIES												
	Construction Phase Activities					Operation Phase Activities						Decommissioning Phase Activities	
	Excavation and leveling	Operation of construction machinery	Transportation of construction material	Structural Development	Provision of basic facilities	Storage of raw material	Incineration	Transportation of waste	Operation of generators	Improper disposal of solid waste	Improper disposal of liquid waste	Site Clearing	Improper disposal of waste
Land use	3- / 9-			3+ / 9-									
Soil erosion	3- /)-	1- / 2-	1- / 6-	2- / 3-				1- / 6-				1- / 7	
Soil Quality	1- / 7-	1- / 7-	1- / 3-	1- / 4-				1- / 3-					
Air quality	1- / 9-	2- / 9-	1- / 9-	2- / 9-		1- / 6-	1- / 10-	1- / 7-	1- / 7-				

Surface water quality													
Ground water quality		1- 5-		2- 8-									
Noise	3 - 9-	2- 9-	1- 6-	3- 8-			2- 7-	3- 6-	1- 7-				
Flora	1- 8-	2- 6-											
Fauna	1- 3-	1- 3-											
Resettlement & Relocation													
Health issues	2- 8-	2 - 9-	1- 7-	1- 8-		1- 7-	1- 7-	1- 7-					
asic utilities (gas, electricity, lecommunication supply							3- 9-			1- 5-			
Road access		1- 7-	1- 9-	1- 9-				1- 7-					
Employment opportunities	**8+** **10+**	**8+** **10+**	**8+** **10+**	**8+** **10+**	**8+** **10+**	**8+** **10+**	**8+** **10+**	**8+** **10+**	**8+** **10+**			9.5+ 10+	

SECTION-08

SCREENING OF ENVIRONMRNTAL IMPACTS & MITIGATION MEASURES

8 SCREENING OF ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

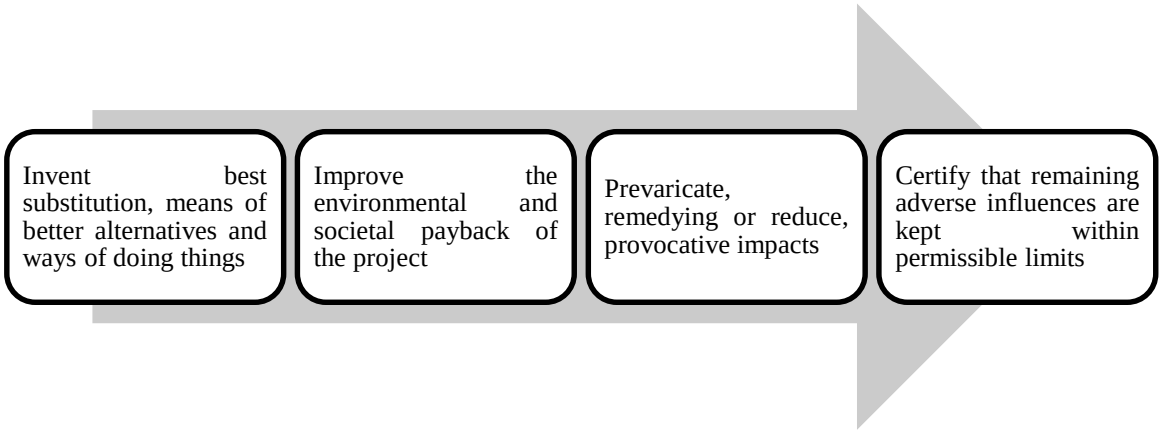
8.1 GENERAL

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

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

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

Purpose of mitigation is to evade, reduce or balance the expected antagonistic effects in suitable way, to integrate these into environmental managing strategy or plan. At every stage of the project, mitigation plan for all the adverse impacts should be predictable and coasted to find out the best alternatives. The objectives of mitigation are to:



8.2 PURPOSE OF MITIGATION MEASURES

Purpose of mitigation measures includes that what is the problem, when the problem will occur, when, where and how the problem should be addressed. The answers to these questions are given below:

a. What is the Problem?

As the project is the incineration of hazardous& non-hazardous industrial as well as healthcare waste so the problem can be the impacts that could likely to cause from the activities involved in construction and operation phase of the project i.e. air pollution, noise pollution, solid waste, wastewater generation etc.

b. When Problem will occur and when it should be addressed?

Problem can occur during different phases when different activities are done through machinery or manual work. These problems may include noise, solid waste, liquid waste etc. These all problems should be addressed on the spot to avoid the adverse impacts.

c. Where Problem should be addressed?

As the problem is generating from the construction and operational of the project so it should be addressed on source i.e. site of the project.

d. How the Problem should be addressed?

Proper mitigations measures are being provided according to the nature of the impacts/ problems.

8.3 WAYS OF ACHIEVING MITIGATION MEASURES

a. Changing in Planning and Design

The proposed project is planned as per feasibility assessment. There is no need of changing in planning and design of the Project.

b. Improved Management & Monitoring Practices

Improving activities will be carried out for betterment while monitoring will also be conducted to keep environment friendly throughout the operation of the project.

c. Compensation in Money Terms

There is no damage of fauna, flora or any other resource. So, compensation in money is not needed.

d. Replacement/ Relocation/ Rehabilitation

Project site is located where there is no sensitive area, population or natural resource. So, replacement, relocation and rehabilitation are not required.

8.4 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.

8.5 PROJECT DESIGN RELATED ENVIRONMENTAL PROBLEMS

Impact significance: Moderate to high or may be negative

Nature of impact: Direct

Duration: Long-term

Timing: Constructional phase & Operation phase

Reversibility: NA

Likelihood: Moderate to high

Consequences: Moderate to high or may be negative

A) Increased Energy Consumption

The design of building plays a vital role in determining the energy demand. Unplanned design may lead to overall rise in energy demand.

Mitigation Measure

Building of the project will be ventilated and environmental friendly in terms of more utilization of day light in order to conserve the energy resources. Project proponent is committed to provide all these provision in the design of the project.

B) Traffic Congestion

Unplanned traffic management and traffic infrastructure development may lead to traffic related issues such as accidents and traffic congestion.

Mitigation Measure

The project has included traffic management as integral part of its overall design. The project construction activities are planned within the boundary walls. Transportation of heavy construction materials will be done during less traffic hours. Also, the project site is away from any heavy traffic area. Management of vehicle movement will be done to avoid traffic jam and long queues. Parking of vehicles alongside the road should be prohibited at all time.

C) Fire Exits /Emergency Evacuation Plan

Emergency evacuation plans is necessary to curb fire issues due to electric short circuit etc.

Mitigation Measure

The project proposes Emergency Evacuation Plans in events of fire hazards. Quality of wiring work and gas lines will be ensured through installation of good quality wiring during construction and proper monitoring during operational phase. The site will be equipped with proper firefighting equipment to ensure increased safety. Water and foam fire extinguishers will be fixed vertically at 5 ft. height from the ground for easy access.

D) Accessibility To Public Utility / Services

Inaccessibility to public utilities will render the project uninhabitable.

Mitigation Measure

This is not going to create any issues since the proposed site is planning to develop an extensive network of utilities. Public utilities will not be used during any stage of the project life cycle.

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.

E) Careful Planning Of Greenbelts/Horticulture Plan

Unavailability of greenbelts would create aesthetic nuisance.

Mitigation Measure

The design of proposed project involves establishment of green belts and develop aesthetically crafted lawns around the project building to increase its aesthetic value.

F) Underground Sewer /Drinking Water Lines

Wires and pipelines lay open and above surface may consequently give rise to leakages, contamination and short circuits in the lines.

Mitigation Measure

There will be no any such issue at the proposed project site because the site is devoid of any such infrastructure. However, during the installation of underground pipe lines, the project engineer will make sure that the contractors and team of workers are well aware of precautionary measures needed to curtail any such issue.

8.6 ENVIRONMENTAL PROBLEMS ASSOCIATED WITH CONSTRUCTION

Impact significance: Low

Nature of impact: Direct

Duration: Short-term

Timing: Constructional phase

Reversibility: NA

Likelihood: Slightly significant

Consequences: Moderate to high or may be negative

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 8.1 Project Impacts Associated with Construction

Impacts	Magnitude	Recommendation Measure
Air Pollution – Dust Generation, – Gases emissions from vehicles during construction phase	Minor	• Sprinkling of water at active construction sites and unpaved roads on regular basis especially during dry climatic conditions • Periodic maintenance and tuning of all the construction machinery and vehicles

Impacts	Magnitude	Recommendation Measure
Solid waste – Construction waste and domestic waste from worker camps – Land contamination may occur due to improper disposal of waste	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
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
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 • Avoiding or reducing noisy activities or limiting the noise sources far away from the sensitive areas.
Vehicular Traffic – Road congestion	Minor	• Proper management of construction traffic • Speed limit of 20 km/hr. will be maintained by all project related vehicles and nighttime (10 pm to 6am) driving of project vehicles will be limited where possible.

Impacts	Magnitude	Recommendation Measure
Land Acquisition – Workers camps	Minor	• Temporary workers camps will be built away from the plant site
Workers health and safety – Accidents during construction activities	Minor	• Provision of Personal Protective equipment, good housekeeping and training of workers
Air Pollution – During operation of incinerator – Odor from the feed production – Gaseous emissions	Minor	• Dry scrubber will be installed to filter the air before it will be emitted to ambient air. • 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 will be achieved in the incinerator to avoid dioxin or furan discharge. • The flue gases are properly treated (e.g. with the help of water scrubbers) before their release to the atmosphere. An inbuilt scrubber will be installed. • There is no leakage of gases from the first chamber of the incinerator to avoid any release of dioxins before they can be destroyed in the second chamber. – Odor will be control through proper plantation, ventilation system and controlling the moisture and pH level in the shed.
Solid waste – Residual and fly ash (about 5-	Moderate	• Proper testing and in compliance with standards before disposal. A scientifically approved pit will be

Impacts	Magnitude	Recommendation Measure
10% of the total waste and as per quality of waste)		prepared with the incinerator room and ash will be dumped there.
Water Quality (250 Liters/Hr for operation)	Moderate	• Installation of wastewater treatment facility so any wastewater produced will be treated and in compliance with wastewater standards of PEQS and reused in the facility.
Noise – Noise from Equipment/ Machinery/Vehicles	Minor	• Generator and vehicles used during the operation will be properly tuned and maintained to minimize noise and air • 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.
Work Safety	Minor	• Prepare a manual for labor accident prevention including safety education and training • Provide workers with appropriate protective equipment • Installing fire extinguishers in fire handling places • Developing firefighting organization and implementing fire drills
Accidental spill – Accidental spill of waste during transportation may cause land pollution	Minor	• Transportation vehicles will be maintained in good conditions to avoid the chances of accidents. There will be a proper mechanical department where maintenance of machinery and vehicles will be monitored regularly

8.7 ENVIRONMENTAL PROBLEMS RESULTING FROM PROJECT OPERATION

Impact significance: Low to high

Nature of impact: Direct

Duration: Long-term

Timing: Operational phase

Reversibility: NA

Likelihood: Moderately significant

Consequences: Moderate to high or may be negative

Environmental problems relating to operation phase are insignificant, which are given in Table – 8.2.

Table 8.2 Project Impacts Associated with Operation

Possible Impact	Impact Magnitude	Proposed Mitigation Measures
Air Pollution – During operation of incinerator – Odor from the feed production – Gaseous emissions	Minor	• Wet scrubber will be installed to filter the air before it will be emitted to ambient air. • 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 will be achieved in the incinerator to avoid dioxin or furan discharge. • The flue gases are properly treated (e.g. with the help of water scrubbers) before their release to the atmosphere. An

Possible Impact	Impact Magnitude	Proposed Mitigation Measures
		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. – Odor will be control through proper plantation, ventilation system and controlling the moisture and pH level in the shed.
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 approved pit will be prepared with the incinerator room and ash will be dumped there.
Water Quality (250 Liters/Hr for operation)	Moderate	• Installation of wastewater treatment facility so any wastewater produced will be treated and in compliance with wastewater standards of PEQS and reused in the facility.
Noise – Noise from Equipment/ Machinery/Vehicles	Minor	• Generator and vehicles used during the operation will be properly tuned and maintained to minimize noise and air • Enhanced management to reduce machinery noise and exhaust and its impact on the surrounding environment.

Possible Impact	Impact Magnitude	Proposed Mitigation Measures
		• Green belts around the project area, peripheral and internal areas.
Work Safety	Minor	• Prepare a manual for labor accident prevention including safety education and training • Provide workers with appropriate protective equipment • Installing fire extinguishers in fire handling places • Developing firefighting organization and implementing fire drills
Accidental spill – Accidental spill of waste during transportation may cause land pollution	Minor	• Transportation vehicles will be maintained in good conditions to avoid the chances of accidents. There will be a proper mechanical department where maintenance of machinery and vehicles will be monitored regularly

8.8 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:

(a) 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.

(b) Fire Hazards/ Explosions Mitigation

The risk of fire and explosions emerged to be of paramount concern to the neighbors 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.

(c) 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.

(d) Training of staff

Unskilled persons will not be able to tackle environmental, health and safety related situations which may further aggravate any such issues and cause loss of human life and property.

Regular training of the staff will be conducted. Proper monitoring and reporting mechanism will be developed where the team is responsible to communicate/report any illegal or hazardous situation to the team leader.

SECTION-09

ENVIRONMENTAL MANAGEMENT & MONITORING PROGRAM

9 ENVIRONMENTAL MANAGEMENT AND MONITORING PROGRAM

The purpose of developing this Environmental Management and Monitoring Plan (EMMP) is to provide a dynamic guideline to the concerned stakeholders to define details of who, what, where and when environmental management and mitigation measures are to be implemented besides providing the contractors and proponents better on-site environmental management control over the life of the project. The scope of this Environmental Management and Monitoring Plan includes the activities during operational. However, to ensure the compatibility of the Environmental Management and Monitoring plan in accordance with the changing socio-cultural, economic and environmental factors, it would be used as a dynamic tool which means that the EMMP would undergo necessary modifications to keep catering to the changing environmental needs of the project.

The feedback provided by the environmental monitoring is instrumental in identifying any problem or lapse in the system under implementation and planning corrective actions. The main objectives of the environmental monitoring are:

- To provide a mechanism to determine whether the project construction contractors are carrying out the project in conformity with the EMP
- To identify areas where the impacts of the project are exceeding the criteria of significance and, therefore, require corrective actions.
- To document the actual project impacts on physical, biological, and socioeconomic receptors, quantitatively where possible, in order to design better and more effective mitigation measures.

Following environmental record should be maintained:

- Periodic inspection reports of the site
- Audit reports
- Incident record of all moderate and major spills and other incidents and accidents.

The record will include:

- Location of spill or battery limit of the accident
- Estimated quantity or the amount of injury

- Spilled material or nature of injury or loss (temporary or permanent)
- Restoration measures
- Photographs
- Description of any damage to vegetation, water resource, or community asset.
- Corrective measures taken, if any
- Waste Tracking Register that will hold records of waste generated during the construction period. This will include quantities of waste disposed, recycled, or reused.
- Records of water consumption with use wise breakdown
- Survey reports, in particular, the following:
  - Vehicle and equipment noise.
  - Ambient noise survey reports.
  - Ambient level of PM
  - Vendor data- all vendors disturbed by the project and compensation paid Public infrastructure: Record of all damages and repair work undertaken.
  - Employment
  - Total number of unskilled, semi-skilled, and skilled jobs offered during Construction.
  - Name and domicile of the employed staff.
  - Project and Community Interface
  - Record of community complains and the measures taken to address them.
  - Number of meetings held in various communities and data of persons who attended

Table 9.1 Users of This EMMP would Include but not be Restricted to the following

Sr. #	EMMP Elements	End Users
1	Background	All stakeholders – internal and external Community groups Approval or consent authority e.g. EPA Punjab
2	Environmental Management	The management and supervisory staff of M/S Pak Ghazi Waste Solution

Sr. #	EMMP Elements	End Users
3	Implementation	The management and supervisory staff of M/S Pak Ghazi Waste Solution. Community groups, EPA Punjab
4	Monitor and review	The management and supervisory staff of M/S Pak Ghazi Waste Solution

9.1 OBJECTIVES OF ENVIRONMENTAL MANAGEMENT PLAN

The objectives of the EMP are as follow:

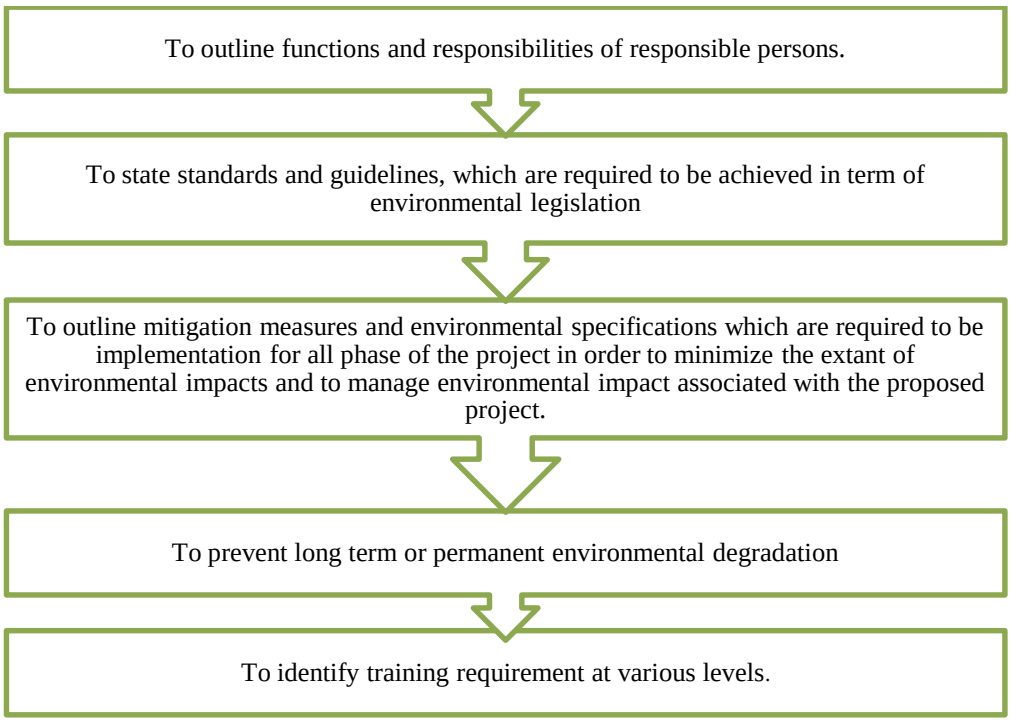


Figure 9.1 Objectives of EMP

9.2 MANAGEMENT APPROACH

The overall responsibility for compliance with the environmental management plan rests with the project proponent. The organizational roles and responsibilities of the key players are summarized below:

Proponent: The project proponent will undertake overall responsibility for compliance with the EMP. Concerned Departments will carry out verification checks to ensure that

the contractors are effectively implementing their environmental and social requirements.

Contractors: The contractors will implement the majority of environmental and social mitigation measures. The contractors will carry out field activities as part of the project. The contractors are subject to certain liabilities under the environmental laws of the country, and under its contract with proponent.

9.3 SCHEDULE OF IMPLEMENTATION AND ENVIRONMENTAL BUDGET

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.

9.3.1 ENVIRONMENTAL BUDGET

The total cost for the environmental management is estimated as 2.1 million Pak Rupees both during construction and its regular operation. The estimations are as followings;

Table 9.2 Environment Management Cost

Environmental Component	Quantity	Amount PKR
(i) Tree Plantation	1200	800,000.0
(ii) Health and Safety Measures and Provision of PPEs	L.S.	400,000.0
(iii) Air and Water Quality & Noise Monitoring	L.S.	500,000.0
(iv) Environmental Trainings	L.S	400,000.0
Total Environmental Management and Monitoring Cost		**2,100,000.0**

9.4 EQUIPMENT MAINTENANCE DETAILS

All work equipment's will be maintained in an efficient space, efficient order, and in a good repair. Maintenance operations will be carried out safely. Details of maintenance are given below

9.4.1 Role and Responsibilities

9.4.1.1 Roles and Responsibilities of Waste Management in charge / Site Services

- Ensure that relevant waste handling training is provided to all waste management personnel at site and only properly trained individuals (Qualified Incinerator Operators) operate the incinerator.
- Ensure that the Incinerator Operator follows the requirements of the Incinerator Operational Plan, Operation Manual and other relevant guidelines of the company.
- Ensure that all checklists and data logs are filled up, and the records required by this guidance document are collected and maintained.
- Ensure adequate re-training is provided to the operators are regular interval.
- Ensure the safety of all personnel and the site.
- Carryout periodic inspections and record observations in Supervision checklist appended in this document.

9.4.1.2 Roles and Responsibilities of Incinerator Operator

- Ensure the safe operation of the incinerator and the associated work and storage area.
- Ensure the operation and maintenance of the incinerator is carried out in accordance with the Equipment Operation Manual.
- Ensure that only appropriate wastes are incinerated, and all other inappropriate wastes including plastics, aerosol cans, metallic containers or cans filled with waste oil are removed and handled accordingly.
- Document and maintain the required logs and records as appended in the document (pre operational checklist, operational checklist and waste incineration log).
- Notify the supervisor or waste management In charge of any incinerator upsets malfunctions or required repairs.
- Wear proper Personal Protective Equipment at all times while working at incinerator or waste yard.

9.4.1.3 Roles and Responsibilities of Maintenance Personnel

- Carry out timely Inspections and maintain the records.
- Carry out preventive maintenance at scheduled intervals and record and report any unusual observations on the equipment.
- Do not alter the electrical wirings and incinerator components.
- Consult relevant companies for any clarifications or guidance related to maintenance of the equipment
- Fill and record the inspection and maintenance checklist and follow the checklist for weekly, monthly and annual inspection and maintenance
- Make sure to lock out/tag out the unit as per the company's existing procedures if there is a problem

9.4.1.4 Routine Inspection and Maintenance

Routine inspections and preventative maintenance will be carried out in accordance with the manufacturer's specifications (Operating and Maintenance Manual). Record of all inspections shall be maintained in the inspection and maintenance checklist.

A quarterly, six monthly and annual inspections and maintenance program will be established with the incinerator manufacturer. The six monthly and annual maintenance

programs shall also include re-training of the operators. Some daily /routine inspections requirements include:

- Check fuel lines for leaks and check connections.
- Check sparks arrestor to ensure no plugging.

- During ash removal
  - Inspect refractory for large cracks (not expansion cracks).
  - Inspect door gaskets for damages.

9.5 ENVIRONMENTAL MANAGEMENT PLAN

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

9.5.1 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.

9.5.2 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.

9.5.3 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.

Table 9.3 Environmental Management Plan

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
ENVIRONMENTAL MANAGEMENT PLAN					
Pre-Construction Phase					
1.	**Land Acquisition And Land Use**	– Positive use of land but proper planning will be required that is fencing and Signalization is put in place in accordance with best practices.	– Land is owned by proponent and there is no settlement so no impact will be there. Land will be improved from open land to industrial land	Proponent	Proponent
2.	**Use of local manpower**	– Employment Generation	– Local people will be hired for less technical work or non-skilled work	Contractor	Proponent
3.	**Site establishment**	– Site cleaning and leveling of the waste	– All the waste that has been created during this phase should be transported by the contractor or a company that has been specifically contracted to send the waste in the authorized sanitary landfill.	Contractor	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
4.	**Site Housekeeping** disruption and nuisance to adjacent landowners and the public as a whole	– Construction activities shall avoid causing unnecessary disruption and nuisance to adjacent landowners and the public as a whole	– The site where the construction is taking place should be organized using the standard schemes for organizing construction sites, in order identifying: • Equipment used in the construction; • Dynamics of the construction works; • Safety conditions for the workers hired by the contractor and the conditions of public safety,	Contractor	Proponent
5.	**Emergency Response** Disasters such as earthquakes, flooding and other manmade disasters such as fires may occur	– Prevention of any possibility of work site accident /impact on worker's health	– Complete equipment control system, fire exits and secured access system supplemented with close circuit surveillance equipment/alarms.	Contractor	Proponent
Construction Phase					
1.	**Air Quality**	– Compliance with prescribed PEQS	– Necessary measures like sprinkling of water on regular basis especially during dry	During Construction Phase,	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
		to control air pollution	climatic conditions should be taken to limit pollution from dust and other windblown materials. – Avoidance: Covering the pile, for example with tarpaulin or thick plastic sheets, to prevent emission – Periodic maintenance and management of all the construction machinery and vehicles – Prohibition of open burning of solid waste. – Workers and staff should be provided with dust masks & instructed to use them on site	Contractor Proponent staff	
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	During Construction Phase, Contractor Proponent staff	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
			– Prohibit illegal dumping of waste – The contractor will repair / replace / compensate for any damages caused by the Construction activities to the drinking water source/s.		
3.	**Waste**	– 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. – Dedicated waste segregation units will be provided. Recycling items will be provided to recycling contractors. – 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	During Construction Phase, Contractor Proponent staff	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
			– Contractor will prepare waste management plan related to construction activities; get its approval from site engineer and ensure its full implementation.		
4.	**Noise**	– Compliance with prescribed PEQS to control Noise pollution	– The contractor will strictly follow the PEQS for ambient noise – Control noise through control of working hours and selection of less noisy equipment. – Prohibit use of pressure horns – Provision of acoustic enclosures (hood and shrouds) on generator – Proper maintenance of vehicles and construction equipment. – Minimize/avoid unnecessary use of pneumatic drills and other noisy machinery – The personal protective equipment (PPE) will be provided to the construction workers and its usage will be made mandatory	During Construction Phase, Contractor Proponent staff	Proponent
5	**Vehicular Traffic** – Road congestion	Minor	• Proper management of construction traffic • Speed limit of 20 km/hr. will be maintained by all project related vehicles and nighttime	During Construction Phase, Contractor	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
			(10 pm to 6am) driving of project vehicles will be limited where possible.	▪ Proponent staff	
6.	**Movement and fueling of vehicles** Fuel Leakages & Spillage, Emissions, Noise &Vibration	– Compliance with prescribed PEQS to control water pollution, noise pollution.	– Periodic maintenance and inspection of vehicles – Vehicles with leaks will not be operated. – Vehicles should not be washed or serviced in the field. – No vehicle-related waste, such as oils, filters, old tires or parts, will be left in the field – All vehicles will be maintained in good working condition – All vehicles will have properly functioning silencers (mufflers).	During Construction Phase, ▪ Contractor ▪ Proponent staff	Proponent
7.	**Transportation of construction material** Dust and Particulate Emissions, Noise Generation, Safety	–	– Excessive use of horns will be avoided – PPE's will be provided to workers – Covering of transporting material trucks – Nighttime driving of project vehicles will be limited where possible	During Construction Phase, ▪ Contractor ▪ Proponent staff	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
	and Health Effects, slow movement of vehicles		– Low speed limit will be maintained on the section of the access road that is adjacent to the community and site. – The fence surrounding the site will be put in on during the construction to prevent access to the construction site		
8.	**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	During Construction Phase, Contractor Proponent staff	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
			– Hazardous substances / materials are to be transported in sealed containers or bags – Spraying of insecticide shall not take place under windy conditions		
9.	**Construction of campsites** Damage to Topsoil	– Restoration of site to a similar condition prior to commencement of the work or to a condition agreed with the project management and landscaping of the site	– Photographs will be taken to record the conditions before setting-up camp. – Camps will not be established within a 300-m radius of any water body. – Camps will be established in the existing clearings. – Camps will be kept as small as possible.	During Construction Phase, Contractor Proponent staff	Proponent
10.	**Workers Health & Safety**	– Prevention of any possibility of work site accident /impact on worker's health	– Provision of Personal Protective Equipment to the workers – Provision of first aid box at work site to cope with emergency situation – Safety training to the workers – Safe driving training to the drivers – Adequate safety signs on site	Contractor	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
			– 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.		
11.	**Socio-economic Impacts**	– Prevention of conflicts among locals and make the project socially acceptable – Empowerment of locals to possible extent	– 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	During Construction Phase, Contractor Proponent staff	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
		– Increase in employment and business opportunities for locals.	– 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 – 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).		
12.	**Clearance of site from extra**	– Restoration of site to a similar	– Timely removal of waste from the site to avoid congestion at work place.	Contractor	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
	surplus material and construction equipment	condition prior to commencement of the work or to a condition agreed with the project management and landscaping of the site	– 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. – 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.		

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
Operational Phase					
1.	**Air Quality** - Exhaust flue gases - Odor production from feed unit	Compliance With Emission gas standards, Ambient air quality (PEQS) standards, Prevention of air pollution in surrounding area;	– Wet Scrubber will be provided with proper functioning to avoid air emissions. – Higher stacks should be designed to reduce ground level concentrations – Good combustion practices can control emissions by ensuring that the temperature in the combustion chamber and the time the Waste remains in the combustion chamber are kept at optimal levels – Relevant legislative and PEQS design requirements will be adhered to where appropriate. – Incinerators specifically designed for hospital, pharmaceutical and hazardous are used; – Properly trained staff operate the incinerators according to standard operating procedures;	EHS officer	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
			– Appropriately high (more than 1250°C) temperature is achieved in the incinerator to avoid dioxin discharge. – The flue gases are properly treated (e.g. with the help of water scrubbers) before their release to the atmosphere; – There is no leakage of gases from the first chamber of the incinerator to avoid any release of dioxins before they can be destroyed in the second chamber. – Odor will be control through proper plantation, ventilation system and controlling the moisture and pH level in the shed. – Covered collection vehicles, unloading waste only in the designed area. – Include a buffer zone around the facility,		
2.	**Water Quality**	– Compliance with Wastewater standards of PEQS	– Installation of wastewater treatment plant, so any wastewater produced complies with wastewater standards of PEQS.	EHS officer	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
			– To carry out water analysis periodically.		
3	**Spillage/leakage Control** Pollution of soil and water contamination by Hazardous waste.	– Avoid soil / underground water Contamination	– The storage areas will be inspected daily for detecting any signs of leaks or deterioration if any. – Leaking or deteriorated containers will be removed and ensured that such contents are transferred to a sound container. – In case of spills/ leaks/ dry adsorbents/cotton will be used for cleaning instead of water. – Proper slope with collection pits will be provided in the storage area so as to collect the spills/leakages. – Adequate number of spill kits with compatible sorbent material in adequate quantity will be provided. – Material Safety Data Sheets (MSDSs) must be available on site for all chemicals and hazardous substances to be used onsite, including information on		

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	**Monitoring**
			their ecological impacts and how to minimize the impacts in case of leakage; – All spillage must be cleaned up immediately after they have occurred;		
4	**Hazardous Waste**	– Compliance with waste management rules – Management of waste, especially hazardous waste – Prevention of inappropriate waste disposal	– Proper testing and in compliance with Punjab Waste Management Rules 2014 before disposal. – Segregation of waste will be done prior the collection.	EHS officer	Proponent
5	**Collection and transportation of hazardous waste**	– Compliance with waste management rules	– Waste will be collected in closed containers to avoid spillage of hazardous waste. – Waste will be transported during daytime when there will be less traffic load. – Good quality fuel (EURO II) will be used in transportation vehicles for environmental safety	EHS officer	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
			– Hazardous waste will not be stored for more than 24 hours to avoid decomposition of waste. – Washing of tanker/ container and disposal of effluent: each container will be thoroughly washed prior to being sent for collection of wastes & post collection & unloading at site. The effluent water will be treated in the proposed effluent treatment plant. – The words "HAZARDOUS WASTE" will be displayed on all sides of the container in Urdu & English. – Name of the facility operator will be displayed		
6	**Noise & Vibration** Noise from vehicles	– Compliance with prescribed PEQS 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	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
7.	**Work Environment (including work safety)** – Labor accidents due to handling heavy loads; working at heights; electric shocks – Diseases caused by air pollutants, water pollutants, and noise from the operation – Fire Hazards	– 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. – 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 fire fighting organization and implementing fire drills	EHS officer	Proponent
8	**Land Pollution**	– Avoid any leakage /soil contamination.	– Impervious flooring will be provided at areas wherever handling/storage of waste will be done. Effluent generated due to	EHS officer	Proponent

Sr. No.	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
		– Landscape esthetic	container/vehicle/floor washing will be collected & treated in effluent treatment plant. – No effluent will be discharged outside plant premises. – Keep the facility clean, do not litter, implement and maintain the landscape plan		
9	**Solid waste** Waste generation from the packaging section	– Reduced waste generation	– Reducing single-use plastics and increasing the usage of biodegradable materials would lighten the load for waste-management system.	EHS officer	Proponent

9.6 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 9.4 Environmental Monitoring Plan

a) Construction phase						
Components	**Objective of Monitoring**	**Parameter to be Monitored**	**Measurement**	**Frequency**	**Location**	**Responsibility**
Noise Levels	To determine the effectiveness of the noise abatement measures on the sound level	Noise level on the site and adjacent area on dB(A) scale	Continuous source appropriate monitoring for day and night time using Noise meter	Quarterly	At least three locations on the unit boundary	EHS Officer by Proponent/ Contractor
Workers safety	To check and evaluate the effectiveness of the workers safety plan	Injuries and accidents	Recording injuries	Daily	Onsite	EHS Officer by Proponent/ Contractor
Water conservation	To determine the effectiveness of	leakages, spills and wastages	Visual inspection and	On monthly basis	At all points of use	Environmental officer/manager

	Water Conservation Techniques in Practice		record tracking			
Dust emissions	To confirm the ambient air quality	Air quality at different points	Readings will be taken	Twice a year	At least three pointson mine and site	EHS Officer by Proponent/ Contractor
Property value	Access to public private properties	Monitoring impact of project on business in the project area	Using questionnaire s	After 2-3months	2-3 surrounding area	Environmental manager

b) Operation Phase

Monitoring Category	**Type of Monitoring**	**Monitoring Responsibility**
Operation and Maintenance System		
Noise and air emissions due to generators and vehicles	Monitor proper maintenance of the equipment's LAMINAR AQM09, a smart air quality monitoring system, ideal for real time monitoring of criteria pollutants, particulate	EHS Officer of Proponent

	matter, noise level, weather parameters and other gaseous contaminants will be installed.	
Solid waste segregation, recycling and final disposal	Monitor adequacy of measures undertaken to collect and dispose of solid waste	Proponent
Sewage and wastewater disposal	Monitor disposal of wastewater according to the proposed mitigation	EHS Officer of Proponent
Environment and Landscape		
On site wastage material's minimization	Monitor waste minimization activities	EHS Officer of Proponent
Creation of landscape by tree planting, appropriated to local conditions	Monitor and implement site restoration and landscaping	EHS Officer of Proponent

9.7 ENVIRONMENTAL COMPLIANCE

The waste management, 2014 and PEPA,2012 (amended) provide for the Legal obligations to well-organize the process of waste-disposal, segregation, treatment, and collection with respect to either human beings or animals.

9.7.1 Rules of Compliance:

Every establishment generating/involved with waste needs to follow the following procedure:

1. Strict guidelines to abide by: - No adverse effect on the environment or human health - Segregation in vessels during the Generation of biomedical waste. - Handled and to be disposed of in accordance with the standards set.

2. All such institutions need to either set treatment facilities or make sure the BM waste is treated at a common waste-treatment facility.

As confirmed in the Preliminary EMP, Proponent will be responsible for regular audit and review of environment and safety management of the project. This will include both on-site auditing and review of performance reports. Additional onsite inspections and investigations will be undertaken in the event of significant environmental incidents. These will be undertaken in conjunction with the relevant government agencies.

The finalization of the EMP will see the completion of Compliance Audit Table, which will record dates of compliance by the proponent with recommendations and Commitments and a reference to appropriate documentation from the relevant approving authority. The Compliance Table is meant to be a live document and will be updated periodically throughout the life of the project.

9.7.2 Audits

In particular, there will be:

- Annual audit reports.

- A triennial review and improvement of the EMP.

Proponent recognizes that periodic external compliance audits and inspections will be made to monitor, assess and validate the level of Proponent performance and compliance pursuant to the commitments made in the accepted Environmental Management Plan.

9.7.3 Environmental Management Systems Audit

Environmental Management Systems Audit shall be conducted to assess the implementation and operational success of the EMS at the site. This is achieved by assessing the objectives, organizational structure, and responsibilities, Procedures, processes and resources available at the site. The EMS Audit is a systems assessment, rather than an audit of environmental compliance, which is assessed through the Site

Pak Ghazi Waste Solution will comply to the Environmental quality standards and hospital waste management rule, 2014 by following certain mitigation measures (discussed in EMP) and will follow a monitoring plan to ensure the effectiveness of EMP.

Pak Ghazi Waste Solution will follow corrective action plan to double ensure the compliance of PEQS & Hospital Waste Management Rules, 2014.

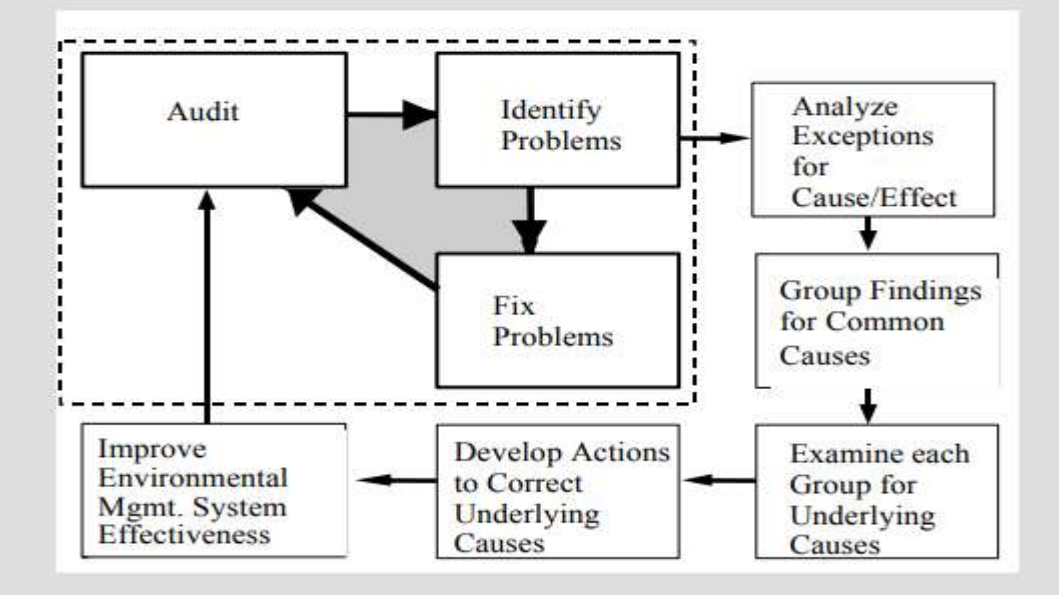


Figure 9.2 Corrective Action Plan

9.8 PROPOSED EMP REPORTING AND REVIEWING PROCEDURE

This section will specify institutional responsibilities for contractors, Borrower, local authorities, and EPA, with the roles that prepare, submit, receive, review, and approve

the reports. An implementation schedule detailing the timing, frequency and duration of mitigation measures, monitoring, and reporting of the progress will be prepared, showing phasing and coordination with procedures in the project operations manual and loan agreement. Recipients of such reports will include those with responsibility for ensuring timely implementation of mitigation measures and for undertaking remedial actions. In addition, the structure, content and timing of reporting will be specified to facilitate supervision, review and approval (if necessary) by EPA.

The implementation of the EMP will be the prime responsibility of the project proponents who designate responsibilities and obligations to their selected contractors and staff. Monitoring, documentation and reporting the compliance components of the EMP will be the responsibility of proponent. Specific responsibilities of key role players are illustrated hereunder:

A. Proponents

Waste Management Team will be responsible for ensuring overall implementation of the EMP during construction as well as operational stages of the project. The responsibilities of the proponent and the site team supervising the project activities include;

i. Project Manager (Proponent)

- Make sure that all activities are completed according to specifications.
- Certify that work being done by the contractor/s is in accordance to the EMP.
- Make sure that the specific system for environmental management is planned, documented, implemented and maintained through all stages of the project.
- Coordinate with regulatory agencies like TMA and EPA, etc.
- Communicate with local community in order to get time to time feedback of these stakeholders on various social and environmental concerns.
- Make sure liaison between the contractor/s and environmental consultant men to check environmental compliance with EPA requirements.
- Conduct environmental monitoring during operational stage of the project.

ii. Site Supervisor

- Make sure all work crew are inducted in environmental and emergency procedures and instruct on control measures.

- Direct site activities according to the EMP.
- Monitor operations of the EMP and recommend any necessary changes to the Project Manager (Proponent).
- Make sure all contractors, subcontractors and suppliers have necessary and current certificates of competency.
- Collect delivery certificates for quality assurance.

iii. Work Crew

- Attend site induction and other training sessions.
- Make sure that procedures are followed.
- Advise site supervisor of any potential or actual breaches of plans.

B. Contractor

The Contractor will be responsible for the implementation of all measures necessary to ensure that Proponent's environmental and HSE policies are met. In order to fulfill these requirements Contractor will carry out the following;

- Implement environmental good practice measures outlined in the mitigation measures.
- Provide, to extent practicable, environmental training to the work force and promote environmental awareness.
- Coordinate with local authorities as appropriate.
- Advise site supervisor of any violations of EMP.
- Facilitate consultants during environmental monitoring.

C. EPA

The role of EPA is on the apex and includes checking:

- Whether requirements of the conditional NOC awarded by the EPA against EIA report are met.
- The Implementation of mitigation recommendations as given in EIA.
- Approval for starting actual project operations is obtained from EIA.
- Review of audit/monitoring reports prepared internally or by a third party monitoring
- Suggest or order any appropriate solutions if something goes against the given EMP.

9.8.1 FACILITY CONSTRUCTION AND OPERATING PROCEDURES

For any EMP to be effective every site must have in place procedures relating to the following activities

Construction Procedures

Proponent will require through contract terms that this framework EMP is adopted and developed by the Contractor. Suppliers will also be included in the EMP, through auditing and approved supplier lists.

Normal Operating Procedures

These procedures cover all unit operations such as plant start-up, shutdown, restart and all operating equipment. The procedures can be linked together in a hierarchical structure according to the links between sections of plant. These procedures also cover routines that are scheduled on a time basis. Routines cover such operations as standby checks, safety equipment checks and critical alarm checks.

Emergency Procedures

These procedures cover all uncontrolled initial events, which by use of the emergency procedures allows the incident, plant and equipment to be brought under control, whilst minimizing adverse impacts on health, safety and the environment.

Operational Plans

These plans provide the philosophy by which the plant must be operated. They contain such information as resource consent, permit and approvals limits, constraint parameters, guiding principles and optimization parameters. All operating procedures are bounded by the relevant plant operating plan.

Administration Procedures

These procedures cover the methods by which each department is administered

Production and Utilities Technical Procedures

These procedures are relevant to the routine functions performed by the Technical group.

9.8.2 ENVIRONMENTAL REPORTING

Project environmental safeguards monitoring (EMP monitoring) reports will be submitted to EPA quarterly during construction and operation. Project environmental

monitoring reports will be prepared by the EHS specialists and the proponent, based on the results of environmental safeguards monitoring (EMP monitoring) and quarterly environmental monitoring reports, which will be will be prepared by the proponent. If the project environmental monitoring report has identified a weakness or deficiency in the implementation of the EMP that has already been addressed, the Project environmental safeguards monitoring (EMP monitoring) report will explain the manner by which the issue was resolved. The semi-annual and annual environmental safeguards monitoring (EMP monitoring) reports are stand-alone documents but these will also be incorporated into the overall Project Performance Monitoring reports.

9.8.3 Waste Management Worker PPE – Guidance

General

The handling of waste entails health risks for staff throughout the chain. The purpose of protective measures is to reduce the risks of accident/exposure or the consequences. Preventive measures can be divided into two categories: primary and secondary. Primary prevention comprises four levels of action:

Primary Prevention:

- Eliminating hazard: for example, by using less toxic substances, eliminating mercury, or using self-locking injection equipment.
- Collective and technical prevention: for example, using needle receptacles, ventilation.
- Organizational prevention: such as assigning duties and responsibilities to all involved, management (sorting, packaging, labeling, storage, and transport), best practices (such as refraining from putting the caps back on syringes), and training.
- Individual prevention: personal protective equipment, vaccination, washing hands.

Personal Hygiene

Elementary personal hygiene is important for reducing risks of infections and breaking the infection chain when waste are being handled.

- **Vaccination**

The hepatitis B virus disease can be avoided by vaccination, which has been available since 1980. Numerous studies have shown that the vaccine is effective in

preventing all of the forms of infection with hepatitis B virus. Although this vaccination is safe, effective and cost-efficient, it is still under-used.

Waste Handler

- Face masks – depending on operation
- Heavy duty gloves – obligatory
- Heavy duty boots – obligatory
- Overalls or clothes that cover the body – obligatory
- Industrial aprons – obligatory

Incinerator Operator

- Long sleeved shirt and long pants;
- Long cuffed, puncture resistant gloves;
- CSA approved, Grade 1 safety footwear;
- CSA/ANSI approved safety glasses.

The personal protective equipment related to specific tasks is listed below:

- Ash removal and handling: NIOSH N85 respirator
- Waste charging: (1) heat protective clothing and gloves, and (2) CSA/ANSIapproved full face shield.

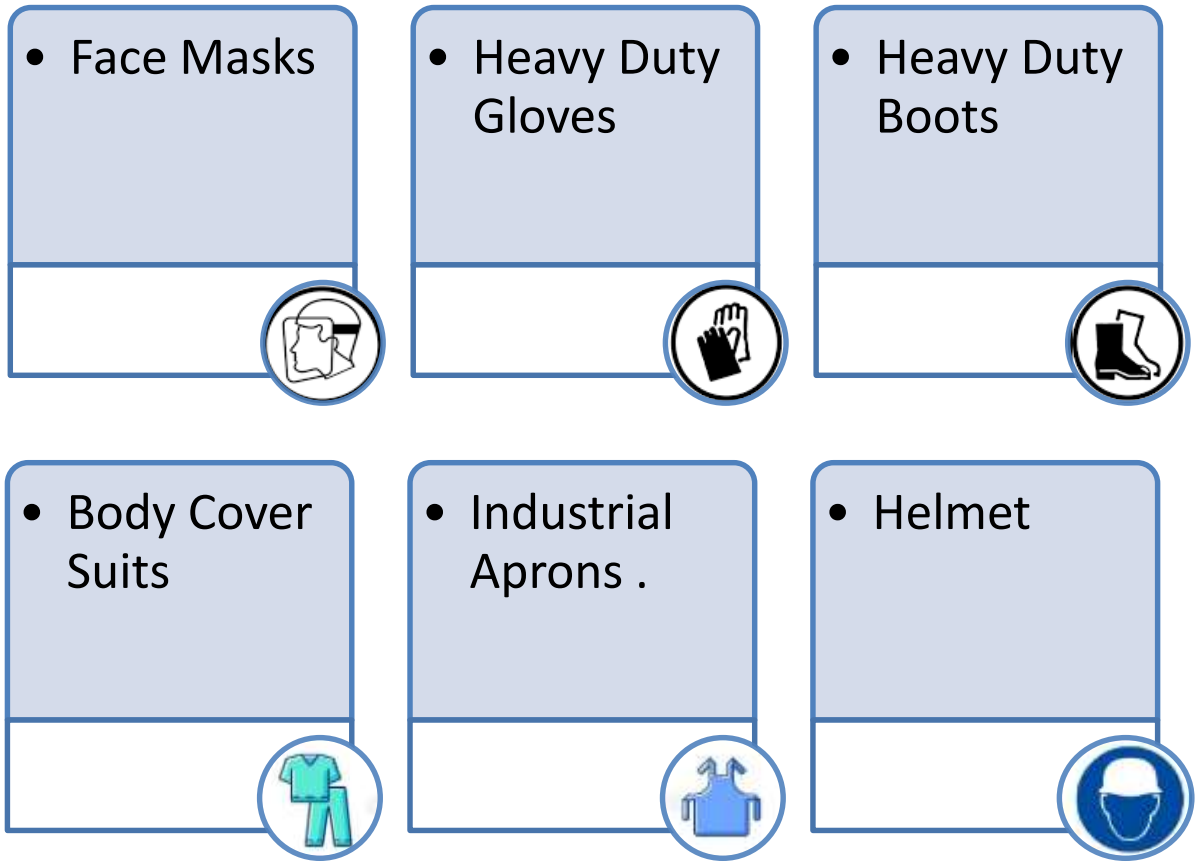


Figure 9.3 Personal Protective Equipment's

Therefore, the general precautionary actions include:

- Not opening waste batches
- Not touching hot surfaces, and minimum exposure to heat radiation through open doors (charging / ash doors while combustion is taking place).
- Wearing appropriate personal protective equipment (PPE) for charging waste and raking the primary chamber, and minimizing the time for those tasks.

9.9 WASTE MANAGEMENT PLAN

9.9.1 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.

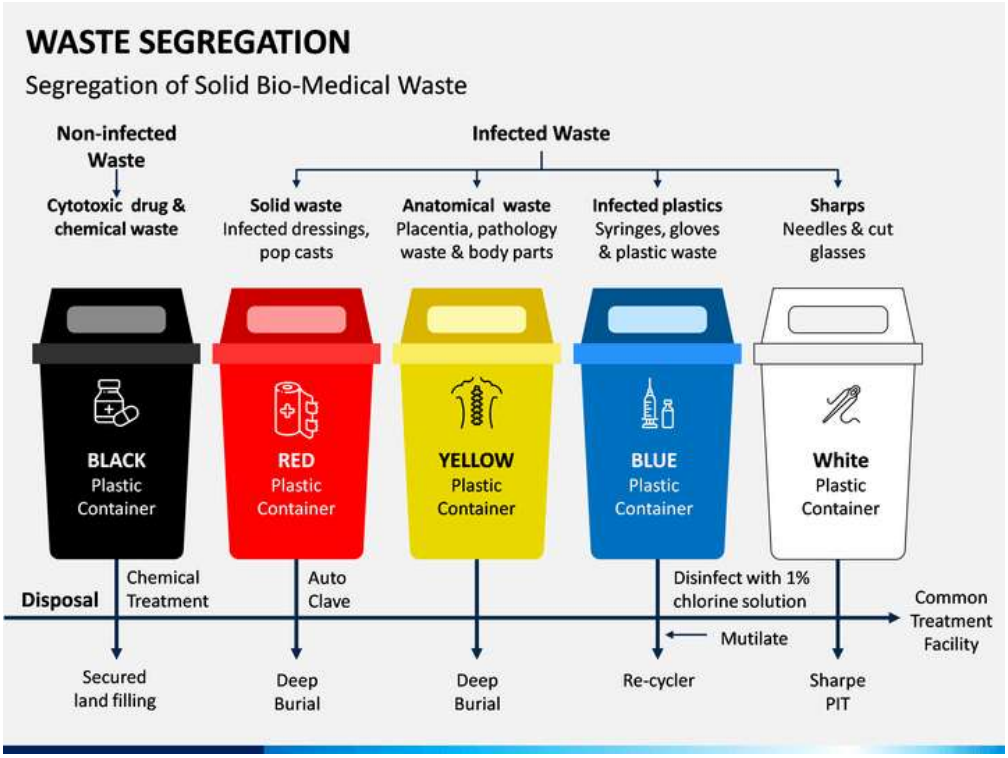


Figure 9.4 Waste Segregation

9.9.2 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.

9.9.3 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.

9.9.4 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.

Storage of Ash

The main product of waste incineration is Fly ash (4 % of total weight). The collected fly ash is typically conveyed from the Incinerator to storage unit where it is kept dry pending utilization (fly ash brick making). Fly-ash storage needs to provide a dry, consistent environment and requires special material handling to prevent poor flow. The dry collected ash is normally stored and handled using equipment and procedures similar to those used for handling Portland cement:

- Fly ash is stored in domes and other storage facilities
- Fly ash can be transferred using air slides, bucket conveyors and screw conveyors, or it can be pneumatically conveyed through pipelines under positive or negative pressure conditions

Dry collected fly ash can also be moistened with water and wetting agents, when applicable, using specialized equipment (conditioned). Water conditioned fly ash can be stockpiled at jobsites. Exposed stockpiled material must be kept moist or covered with tarpaulins, plastic, or equivalent materials to prevent dust emission.

9.9.5 Waste Disposal

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

9.9.6 Tree Plantation Plan

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

Table 9.5 Tree Plantation Plan

Sr. No.	Plant Name	Area	Tentative Quantity
Ornamental Plants			
1	Roses	Lawn Area	100
2	Rose Marry	Lawn Area	100
3	Ribbon Grass	Green belts	100
4	Canna	Green Belt	100
Trees			
5	Shisham	Boundary wall of hospital and incinerator area	150
6	Sukh Chain	Around the incinerator area	100
7	Moor Pankh	Generator area	150
8	Jhumka Vail	Transport vehicle area	150

9.10 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.

Table 9.6 Training Schedule

Provided By	Contents	Trainees/Events	Duration
Organizations specializing in Environmental	Short seminars and courses on: Environmental Laws	Seminars for Project Proponent and	3 days

Management and Monitoring	and Regulations, daily monitoring and supervision	contractor project staff	
Organizations specializing in Environmental Management and Monitoring	Short seminars and courses on social awareness	Seminars for project staff dealing in social/lands matters.	3 days
Organizations specializing in Occupational, health and safety issues	Short lectures relating to occupational safety and health.	Seminars for contractor's staff	3 days

9.11 EMERGENCY RESPONSE PLAN

9.11.1 Introduction

Emergency management can be defined as the organization, coordination and implementation of a range of measures to prevent, mitigate, respond to, overcome and recover from the consequences of emergency events affecting the community, its assets and the environment.

9.11.2 Purpose of Plan

This plan intends to provide a framework for safety and security to infrastructure, people and vehicles. It assigns responsibility to organizations and individuals for carrying out specific actions at projected times and places in an emergency situation that exceeds the capability or routine responsibility of any one agency. The emergency response plan provides guidance to:

- Prevent any potential sources causing hazard to the resources during all stages of the project;
- Coordinate between various organizations to take actions in case of emergencies;
- Protect people and property in emergencies and disasters;
- Develop procedures to respond to the emergencies efficiently;

- Identify and ensure availability of personnel, equipment, facilities, supplies, and other resources for use in order to provide timely and efficient response and recovery operations; and
- Confirm that measures taken in an incident are adequate to recover the affected resources or further improvements are needed.

9.11.3 Planning

Emergency Response Team

A group/team shall be dedicated to identify and control potential emergencies during the construction and operation of the project. The roles and responsibilities of the group members shall be clearly defined. The primary responsibilities of the group are described below:

- Identify the potential hazard or risk sources that can lead to emergency situations; Ensure availability of adequate resources, procedures and communication system to deal with the identified emergency situations;
- Ensure awareness and training of the staff to facilitate implementation of the emergency response plan;
- Maintaining the records of any previous incidents; and
- Post-event analysis to bridge the gaps of the existing risk prevention procedures.
- The emergency response team shall include but not limited to the following;
    1. Team Leader
    2. Safety Engineer
    3. Reporting officer/Inspector

Team Leader

- Approve/ modify devised measures to prevent or mitigate the risks associated with the identified risk sources
- Arrange resources for dealing with potential emergencies including, financial, equipment's and personnel required to deal with emergencies.
- Assure that the Emergency Response plan is adequate, effective and can be implemented practically.

Safety Engineer

- Analyze the Identified risk sources and devise measures to prevent or mitigate the risks in close consultation with the Team Leader;
- Develop and implement the Emergency Response Procedures, in case of the possible emergencies arise;
- Ensure effective internal and external communication; and
- Provide regular trainings and arrange drills to make people aware of dealing with emergencies.

Reporting officer/Inspector

- Regular inspections of the site, to identify potential risks associated with equipment's, materials and work practices;
- Anybody from the site can notify the reporting officer about potential risk and/or near misses on the site;
- Record any identified risks and mitigation measures to control the identified risk; and
- Notify the issue and control measures taken thereby to the safety engineer.

The designation, roles and responsibilities of each member shall be clearly defined and communicated to the employees. An outline of the framework of responsibilities is presented in the following organizational chart:

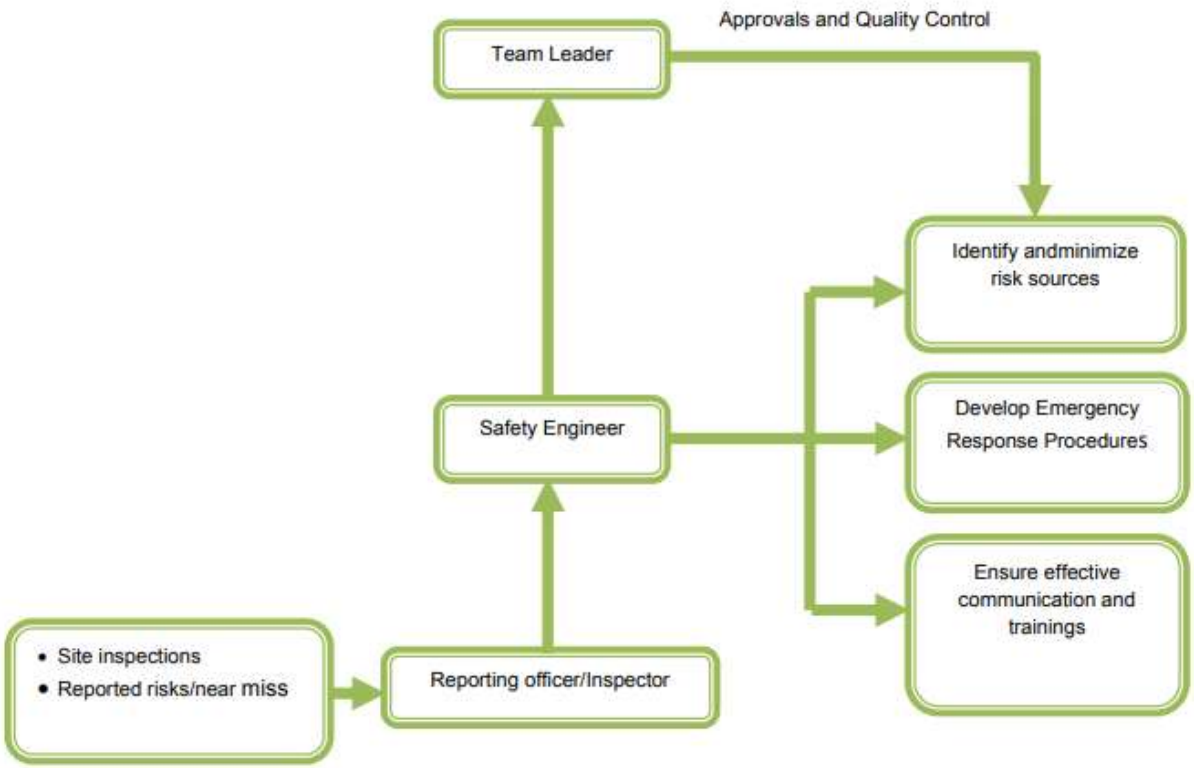


Figure 9.5 Organizational Chart

9.11.4 Hazard Identification

A comprehensive identification and evaluation of the hazards/risks likely to cause an emergency shall be done by Emergency Response Team (ERT). Major potential emergencies identified are as follows:

- Structural failure
- Disruption of Utility (Power, Water, Telecommunications, Gas, etc)
- Accidents
- Vehicle accident
- Smoke
- Power/equipment failure
- Fire
- Earthquake
- Disease Outbreak
- Spillage from hazardous waste

9.11.5 Prevention and Mitigation

The ERT shall work to eliminate or reduce the impact of identified emergencies and increasing the resilience of affected community/workers to recover from the consequences of such events. These activities include:

- Design considerations to control spillages and proper waste segregation
- Regular inspection and maintenance of construction machinery and the structural integrity;
- Review of work schedules based on weather updates
- Provision of proper PPEs to workers

9.11.6 Emergency Preparedness

The ERT shall be prepared with all necessary resources and the personnel's shall be trained regularly.

Resources Finance and Administration

The financial resources shall be reserved for dealing with any emergencies arising on site during construction and operation. Responsibilities of the person managing the resources in case of emergencies shall be clearly defined and the required resources shall be adequate and updated regularly.

Equipment's

All the necessary equipment's needed in an event of emergencies shall be made available, as a minimum, the equipment's needed include;

- Personal Protective Equipment's
- Alarms/ Warnings
- Fire extinguishers
- First Aid Facility
- Detection instruments, e.g.; personal alarm kits; smoke detection instruments
- Tools to fix minor machinery faults

Communication

All external and internal communication systems shall be made available. Local emergency numbers shall be clearly posted and communicated to the personnel

involved in construction and during operation. The local emergency numbers are given below, which shall be regularly updated.

Trainings

Personnel shall be made aware of the importance of safety, potential emergencies and how to respond in case of emergencies. Training and mock exercise shall be done to prepare, the personnel to deal with emergencies.

9.11.7 Emergency Response

Response includes actions taken to reduce the impacts of an emergency event, and to limit the threat to life, property and the environment.

I. Emergency Response Procedure

Any person can report about an emergency, an on-site worker or the public. Circumstances change during the course of an emergency in different events, thus, the procedure will vary as per the specific situation on ground. However, a basic action plan to be followed in an emergency is discussed below. This order of response is applicable to almost any emergency and should be followed in sequence.

Assess the Situation

The most important thing to do in case of emergency is to stay calm and avoid panic. Assess the situation, the cause and most immediate requirement to control, limit and/or manage the immediate, ongoing, or further damage.

Immediate Control

The most senior person on the scene should take control and contact, or delegate someone to contact emergency services as posted and communicated by ERT and inform the reporting officer of ERT and explain the situation. The area of emergency shall be restricted by barricades, tapes and adequate signage, if and as required.

Protection from Further Losses

Once the site is restricted, to provide protection and reduce further losses, the source causing the emergency shall be controlled including equipment's, materials, environment and accident scene from continuing damage or further hazards to the area

and people .e.g.: suppress fire, prevent objects from falling, shut down equipment or utilities, and take other necessary measures as required depending upon the type of emergency;

i- Provide first aid if required or in doing so;
ii- Designate people to emergency duties. e.g.: assign personnel to guide emergency services on arrival;
iii- Headcount People/personnel to identify any missing persons;
iv- People/ personnel shall be directed to safe location;
v- Preserve the accident scene until experts mark it safe; only disturb what is essential to maintain life or relieve human suffering and prevent immediate or further losses.

II. Communication

Emergency Service Providers

The emergency service providers 'need to be kept informed of the situation. On site, personnel from the emergency services shall be guided towards the emergency scene, brief about the event, ongoing and potential hazards and cause(s), if known.

Emergency Response Team and Management

Members of ERT shall be immediately informed and the management shall also be kept informed.

9.11.8 Recovery

Emergency affected individuals, communities and infrastructure shall be restored in terms of emotional, economic, and physical wellbeing including the following as a minimum:

- A detailed analysis and assessment of causes of emergency, extent of damage and gaps if any, in managing the emergency;
- Recovery/replacement of the assets and infrastructure;
- Reinstatement of disrupted services;
- Update of safety arrangements and Emergency response procedures to ensure better safety and security in any other arising emergencies.

SECTION-10

INVOLVELEMNT OF STAKEHOLDERS

10 INVOLVEMENT OF STAKEHOLDERS

It is a mean of involving the both primary and secondary stakeholders in the project decision making process in order to address their concern, improve project design and give the project legitimacy. The stakeholders' consultation has been conducted in a participatory and objective manner to enhance the project stability.

Public discussions were held with the inhabitant of the surrounding area. They are quite positive to the project and see the project as growing business. The people observe strong positive impacts regarding employment, business and structural development due to this project. EIA findings depict that people perceive overall positive social and economic impacts by the project. Their attitude towards the project operation is highly optimistic. Majority of the people are convinced for development in the area and they correlate this progress with the pace of their social mobility but they were also concerned with scenic beauty of the area and employment which the proponent has ensured to maintain the aesthetics of the area, reclaim the land and also to provide jobs/employment during construction and at the time of functioning of the project. Moreover, project proponent admitted to adopt all the mitigation measures to control any impacts resulting from the subject project.

For the purpose of engaging stakeholders for maximization of the project benefits, open invitation of participation in public hearing through newspaper advertisement will be given to local public, where project information will be disclosed. Reviews of general public will be taken and their concerns will be addressed.

10.1 IDENTIFICATION OF STAKEHOLDERS:

The identification of stakeholder is important for the sustainability of a development project. Stakeholder will be identified as the people who may directly or indirectly affected by the project activities. This will be helpful in predication and assessment of project impacts at an early stage; and accordingly, appropriate mitigation measures can be suggested. The stakeholders that are likely to be influenced by the project activities or would like to participate in the project will include the following:

- Communities in the project or surrounding area;
- Government Departments;
- Non-Governmental Organizations (NGO) and community Based Organizations

10.1.1 Proponent

Possible impacts and mitigation measures related to the subject incinerator project were discussed with the project proponent and management. They assured to take all suggested mitigation measures to control any deviation arose by the project and to make the project Environmental friendly.

Proponent Environment Management Team

Environment Management Team includes the following members for smooth operation of incinerator for waste management

- Project Manager
- SHE Officer
- Waste Management Team
- Electrical Technician

The above all members will be hired after the completion of construction activities

10.1.2 The Responsibility Authority

M/S Pak Ghazi Waste Solution shall be the responsible authority to take all measures prior to start the project and during operation

10.1.3 Other Departments and Agencies

For the impact analysis detailed with the management, local community, educational institutes, health institutes, hospitals and NGOs. All issues were discussed related to implementation of the project. Scoping sessions, focused group discussion and way side consultations were held with the relevant stakeholders in the area.

10.1.4 Environmental Practitioners and Experts

Team of Integrated Environment Consultants visited the project site, had discussion with stakeholders and consulted with the local people of nearby and other towns to evaluate the project socio-economic impacts. People of the area belong to different professions like mostly belong to employment, own businesses, doctors, some in abroad, in Army, teaching, in agriculture etc. women were also consulted for their point of view regarding the betterment of the area by this project, some of them communicated but according to social value of the area they mostly hesitate to

communicate comfortably and get pictured. People provide the massive information about the project and have positive remarks regarding the project development.

10.1.5 Target Population

The target population was comprised of the Site workers and the people living nearby the site area.

10.1.6 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.

10.2 METHODS OF PUBLIC CONSULTATION

The following methods were used for public consultation with project stakeholders in order to ascertain their concerns regarding project implementation.

- Focused Group Discussion (FGD)
- Scoping Sessions
- Formal Group Meetings
- Informal Group Meetings
- Public hearing

10.3 STUDY AREA

The proposed plant site and its surrounding areas were visited on August, 2024 for socio-economic aspects. The people of surrounding village of the proposed plant site were consulted:

10.4 CONCLUSION

Comparison of potential adverse and beneficial impacts of the proposed project observed during consultation process shows that it has proved to be beneficial for the inhabitants of the area. The project implementation has provided job opportunities for the local inhabitants hence improve their socioeconomic status. Employment opportunities generated by the project include construction labor at the site in the initial stages of setting up of the proposed facility, skilled and unskilled labor and security

(chowkidars) during the production phase. Additional employment opportunities are envisaged, such as provision of daily raw materials. Reliance on local markets for provision of construction materials and other supplies pose significant effect. Following mitigations are recommended for the anticipated social impacts:

- Opportunity for Employment generation for the local
- Environmental safeguard

The overall socio-economic impact of the project is interpreted in relation to the existing environmental conditions. It followed that such a development that is proposed can contribute in improvement of socio-economic and health status of inhabitants of the community if environmental management measures are adopted in true sense. The project, overall, does not have major adverse impacts on the existing environment and people. Suitable mitigation measures have been recommended to minimize the adverse impacts identified in this study. With due implementation of the mitigation measures, there would be very insignificant adverse impacts on the socioeconomic environment.

CONCLUSION AND RECOMMENDATIONS

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.

APPENDICES

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 **Contaminate**	Each of a group of numbers used to indicate the position of a point, line, or plane to make impure, pollute
Disclosure	The action of making new or secret information known
Disruption	Disturbance or problems which interrupt an event, activity, or process.
Environmental Management	Attempt to control human impact on and interaction with the environment in order to preserve natural resources
Evaluation	The making of a judgment about the amount, number, or value of something; assessment.
Genotoxic waste	Waste includes cytotoxic drugs and outdated materials, vomitus, faeces or urine from patients treated with cytotoxic drugs or chemicals and materials such as syringes and vials contaminated from preparation and administration of such drugs.
Geology	A science that studies rocks, layers of soil, etc., in order to learn about the history of the Earth and its life
Ground Water	Aquifers currently being used as a source of drinking water or those capable of supplying a public water system. They have a total dissolved solid content of 10,000 milligrams per liter or less, and are not "exempted aquifers."
Hazardous	Substance or material, which could adversely affect the safety of the public, handlers or carriers during transportation

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

LIST OF ABBREVIATIONS

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

REFERENCES

Listed below are some of the documents, reports and other references consulted during the preparation of this report:

a. Information and data provided by project proponents;
b. Project Pre-feasibility Study Report;
c. Technical Design Data related to the project.
d. Information gathered through discussions with the project related persons of the project proponent;
e. Information collected from the Technical documents of various suppliers of machinery/equipment.
f. Punjab Environment Quality Standards for Ambient Air November 2010;
g. Punjab Environment Quality Standards Noise Levels November 2010;
h. Punjab Environment Quality Standards for Drinking Water November 2010;
i. Pakistan Environmental Protection Act, 1997;
j. The Punjab Environmental Protection (Amendment) Act 2011 covers aspects related to:
    - The protection, conservation, rehabilitation and improvement of the environment and the prevention, control of pollution and promotion of sustainable development;
    - Establishing complete regulatory and monitoring bodies, policies, rules, regulations and Punjab environmental quality standards; and
    - To ensure enforcement, the act establishes regulating bodies i.e. Punjab Environmental Protection Council (PEPC) and responsible bodies i.e. Punjab Environmental Protection Agency (Punjab EPA) at Provincial level.
k. Environment related Laws in Pakistan and the Province of Punjab;
l. Government of Pakistan, Pakistan Environmental Protection Agency, Policy and Procedures for Filing, Review and Approval of Environmental Assessment, 2000;
m. Google earth, maps.
n. 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.

o. workplace safety and health act 2011

p. Land Acquisition Act (LAA) of 1894

q. The forest Act 1927

r. Pakistan Penal Code, 1860

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- Consensus building and dispute resolution.

gg. workplace safety and health act 2011

hh. Land Acquisition Act (LAA) of 1894

ii. The forest Act 1927

jj. Pakistan Penal Code, 1860

TERMS OF REFERENCES

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

List of Persons Performing IEE Project

Name	Status in Project	Relevant Experience
Mr. Ahtesham Raza	Project In-charge	▪ 11-years of experience in the field of Environment Assessment. ▪ Completed about 20 ESIAs of Mega Project, 130 EIAs and above 200 IEEs in all province of Pakistan.
Mr. Adnan Sharif	Team Leader	▪ 7-years of experience in the field of Environment Assessment. ▪ Completed about 4 ESIAs of Mega Project, 30 EIAs and above 32 IEEs in all province of Pakistan.
Mr. Mehmood Amjad	Environmentalist	▪ 5-years of experience in the field of Environment Assessment
Ms. Nabia Farrukh	Environmentalist	▪ 1-year of experience in the field of Environment Assessment