

CLEAN WORLD ENVIRONMENT SOLUTIONS

**CAPACITY ENHANCEMENT OF HAZRDOUS WASTE
INCINERATOR UNDER THE NAME OF CLEAN WORLD
ENVIRONMENT SOLUTIONS (FROM 50KG/HR TO 1000KG /HR
AND INSTALLATION OF AUTOCLAVE OF 500 LITERS [0.5m³])
LOCATED AT MAIN SUMUNDRI ROAD, CHAK # 248, DALUWAL
TEHSIL & DISTT. FAISALABAD.**

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June 2026

ENVIRONMENTAL IMPACT ASSESSMENT

CAPACITY ENHANCEMENT OF M/S CLEAN WORLD ENVIRONMENT SOLUTIONS

[HAZARDOUS WASTE INCINERATOR AND AUTOCLAVE]

Address: Main Sumundri Road, Chak # 248, Daluwal

Tehsil & Distt. Faisalabad.

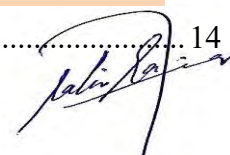
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Client: M/S Clean World Environment Solutions			Document No: GSCON/EIA-CWES/20/02-26		
Report Summary: This document presents findings of Environmental Impact Assessment (EIA) of Clean World Environment Solutions [Hazardous Waste Incinerator and Autoclave] with installed capacity of 500 kg, located at main Sumundri Road, Chak # 248, Daluwal, Tehsil & Distt., Faisalabad in compliance with legal requirement of Punjab Environmental Protection Act, 1997 [Amendment, 2012].					
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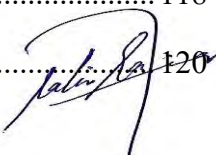
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GLOSSARY

- I. **Environment:** means air, water and land; all layers of the atmosphere; all organic and inorganic matter and living organisms; the ecosystem and ecological relationships; buildings, structures, roads, facilities and works; all social and economic conditions affecting community life; and the inter-relationships between any of the factors mentioned.
- II. **Environmental Impact Assessment:** means an environmental study comprising collection of data, prediction of qualitative and quantitative impacts, comparison of alternatives, evaluation of preventive, mitigatory and compensatory measures, formulation of environmental management and training plans and monitoring arrangements, and framing of recommendations and such other components as may be prescribed
- III. **Initial Environmental Examination:** means a preliminary environmental review of the reasonably foreseeable qualitative and quantitative impacts on the environment of a proposed project to determine whether it is likely to cause an environmental effect for requiring preparation of an environmental impact assessment.
- IV. **Effluent:** means any material in solid, liquid or gaseous form or combination thereof being discharged from industrial activity or any other source and includes a slurry, suspension or vapour.
- V. **Leachate:** A liquid that has percolated through and/or been generated by decomposition of waste material. It includes water that come in contact with waste and is potentially contaminated by nutrients, metals, salts and other soluble or suspended components and products of decomposition of waste.
- VI. **Landfill:** A waste disposal site used for the controlled deposit of solid waste onto or into land.
- VII. **Punjab Environmental Quality Standards:** means the permissible standards for emission of air pollutants and noise and for discharge of effluent and waste.
- VIII. **Discharge:** means spilling, leaking, pumping, depositing, seeping, releasing, flowing out, pouring, emitting, emptying or dumping.
- IX. **Waste:** means any material, substance, or by-product eliminated or discarded as no longer useful or required after the completion of a process.



- X. **Sustainability:** means such developments that meet the needs of the present generation without compromising the ability of future generations to meet their needs.
- XI. **Hazardous Waste:** includes any unwanted or discarded material (excluding radioactive material), which because of its physical, chemical, infectious characteristics can cause significant hazard to human health or environment when improperly treated, stored, transported, disposed of or otherwise managed.
- XII. **Incineration:** The thermal destruction of waste for the primary purpose of disposal, with or without recovery of energy.
- Note: the term incineration generally means 'the act of burning to ashes', however the above definition is the meaning used by EPA in relation to waste.*
- XIII. **Recycling:** Set of processes (including biological) for converting recovered materials that would otherwise be disposed of as waste into useful material and/or products
- XIV. **Reuse:** using a waste product again for the same or different purpose without further manufacture.
- XV. **Transfer Station:** A depot for reception and aggregation of waste streams prior to their transport to other depot or location for further sorting, recovery or disposal.
- XVI. **Composting:** the controlled process whereby compostable organic waste are pasteurized and microbiologically transformed under aerobic and thermophilic conditions for a period not less than six weeks, including the pasteurization phase.



LIST OF ABBREVIATIONS

BOD	Biological Oxygen Demand
CDM	Cleaner Development Mechanism
COD	Chemical Oxygen Demand
CWES	Clean World Environment Solutions
EA	Environmental Approval
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMtP	Environmental Monitoring Plan
EPD	Environmental Protection Department
EPO	Environmental Protection Order
FESCO	Faisalabad Electric Power Company
GOP	Government of Pakistan
HC	Hydro Carbons
HW	Hazardous Waste
IEE	Initial Environmental Examination
IMC	Independent Monitoring Consultant
IPPs	Independent Power Projects
IUCN	International Union for Conservation of Nature
LAA	Land Acquisition Act
MoE	Ministry of Environment
MSW	Municipal Solid Waste
NCS	National Conservation Strategy
PEQS	Punjab Environment Quality Standard
NGO	Non-Government organization
NOC	No-Objection Certificate
NOx	Oxides of Nitrogen
PC	Public Consultation
PEPA	Punjab Environmental Protection Act, 1997 [Amendment, 2012]
PEPC	Punjab Environmental Protection Council
PM	Particulate Matter
PP	Project Proponent



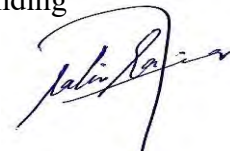
PERSUAP	Pesticide Evaluation Report and Safe Use Action Plan
RAP	Resettlement Action Plan
RFP	Request for Reports
SO _x	Oxides of Sulphur
SP	Seismic Provisions
TES	Threatened, Endangered and Special Status Species
TOC	Total Organic Carbon
UBC	Uniform Building Code
VOC	Volatile organic compound
WAPDA	Water and Power Development Authority
WHO	World Health Organization
WSY	Waste Storage Yard



EXECUTIVE SUMMARY

Managing hazardous waste properly is most crucial factor to be attended now-a-days. The consequences of failure of this waste management system are disastrous for the health of the community and the smooth running of life in that region. Hazardous waste all too often contains unpleasant, potentially dangerous substances, which if, improperly managed, could cause harm to the health & environment, especially if burnt in uncontrolled conditions. Keeping in view these requirements it is beneficial to have more waste management companies in local market to collect and dispose hazardous waste in environment friendly way. Waste treatment and disposal methods are selected and used based on the form, composition, and quantity of waste materials. Incineration is one of the most common waste treatments. This approach involves the combustion of waste material in the presence of oxygen. The combustion process converts wastes into ash, flue, gas, water vapor, and carbon dioxide. This approach has several advantages. It quickly reduces waste volume, lessens transportation costs and decreases harmful greenhouse gas emissions.

M/S Clean World Environmental Solution is planning to enhance their service for hazardous/medical/ clinical waste incineration by installing another incinerator of 1000 kg/hr. capacity under the same name of "Clean World Environment Solutions" and an Autoclave of 500 liters (0.5m³) located at Main Sumundri Road, Chak # 248, Daluwal, Tehsil & Distt., Faisalabad. Proposed project will be developed on 4 Kanals & 9 Marlas land area; out of which 2 kanals will be covered area for storage of hazardous waste specifically. The storage area will be designed according to demands of waste stored in it and it will be located away from food storage/ preparation areas. Proposed incinerator will incinerate hazardous/medical/ clinical waste at capacity of 1000kg/hr. Clean World Environment Solutions is also planning to install Autoclave of 500 liters (0.5³)' capacity. Incineration and autoclave will be carried out at rate of 3 to 4 days a week and 2 to 4 hrs./ day depending on the available wastage. Total cost required for proposed construction & installation of incinerator plant is estimated about Rs. 250 Million inclusive of land cost, construction & operational budget as well as waste transfer vehicle (2 No.). At contemporary stated operation capacity of incineration, it is anticipated that 100 to 120 kg of ash will be produced depending



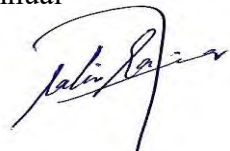
upon type of waste to be incinerated as well. Besides, if glass content ratio is higher in waste to be incinerated, then ash quantity will vary depending on the ratio of glass. Estimated quantity of hazardous/ medical/ clinical waste that will be catered for incineration services in environmental conscious manner is ~ 10,000 – 12,000kg/ month with condition of number of clients to be served. The estimated water requirement of the proposed project is 1000–1200 gallons per day during operational phase of the proposed project for wet scrubbers of incinerator in order to control air pollution and for allied activities such as washroom / office activities. One water settling pond will be operational for recycling and sustainable use of water resources. Waste effluent constituting ash from wet scrubbers will be allowed to settle in pond. After specific retention time, water will be recycled for same purpose. Consequently, settled ash will be collected, dried and managed same as incinerated bottom ash end use.

In order to satisfy EPA's requirement to carry out Environmental Impact Assessment (EIA), Services of **M/S Grand Square Consultancy** were hired by Clean World Environment Solutions.

According to **Schedule II** of Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulation 2022, **Section G-2**, the proposed project falls under category of projects requiring Environmental Impact Assessment (EIA).

Environmental Impact Assessment (EIA) report is being submitted to the Environmental Protection Agency (EPA), Government of the Punjab, Lahore in compliance with the legal requirement for Punjab Environmental Protection Act, 1997 [Amendment, 2012]; Section-12 "*preparation and submission of IEE & EIA*" for obtaining the Environmental Approval (EA) before starting the project activity.

The impacts of the project activities on environment during collection, transportation, storage and disposal of industrial and medical waste have been considered. The mitigation measures have been proposed to minimize / eliminate the negative impacts of the project on the environment. A complete Environmental Monitoring and Environment Management Plan has been recommended to regulate the requirements of Punjab Environmental Protection Act, 1997 [Amendment, 2012]. Biannual



environmental monitoring, by a third party will also ensure environmentally sound operation of the project.

A handwritten signature in black ink, appearing to read "Patir Rajin", is located in the bottom right corner of the page.

The impacts on environment which are likely to be generated during execution of construction phase are summarized in table below:

Activity	Environmental Impacts	Mitigation
- Construction of paved building to contain Incineration Plant; - Construction of Waste Storage Yard.	- Dust due to construction activities like excavation, clearing, leveling, compaction etc.; - Noise due to use of heavy machinery; - Violation of applicable air pollutant emissions or ambient concentration standards; - Safety issues for workers; and, - Solid waste.	- Necessary measures like sprinkling of water especially during dry climatic conditions should be taken to limit pollution from dust and other windblown materials. - Covering or use of wind sheets around the stockpiles to avoid air pollution through dispersion - Contractor will prepare waste management plan related to construction activities; get its approval from proponent and ensure its full implementation - Control noise through control of working hours and selection of less noisy equipment. - PPEs will be provided to the workers and its usage will be made mandatory - Implementation of measures suggested in EMP of subject study. - Adequate care shall be taken during this phase to avoid any kind of damage to environment as well as worker's safety.

The impacts on environment which are likely to be generated during execution of operational phase are summarized in table below:

Activity	Environmental Impacts	Mitigation
- Obligatory running of proposed incinerator facility; - Waste storage at WSY	- Stack emissions from Incinerator; - Noise & vibration; - Ash generation & its disposal; - Soil contamination due to improper storage of waste at WSY and disposal of incinerator residual ash; and, - Health and safety issues.	- Perform regular inspection of facility; - Implementation of measures suggested in EMP of subject study; - Engineering control/ wet scrubbers for control of stack pollution; - Avoid storage of medical waste more than a day; - WSY must be covered for storage of hazardous/ medical waste specifically with impermeable base; - Ash must be disposed of in HW landfill/ can be used to manufacture refractory and the left over can be sent to cement

		factories; and, – Adequate care shall be taken during this phase to avoid any kind of damage to environment as well as worker's safety.
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The proponent / contractor will hire trained staff to ensure the enforcement of Environmental Management Plan. The equipment will be kept in proper condition to save the environment from any damage. Environmental Committee will be formed to attend and address the issues relating to environment, cleanliness, up keeping, aesthetic beauty of the project site, general environmental enhancement, tree plantation, vegetation promotion, planting of flowers and ornamental plants on site.

The mitigation measures have been recommended in the EIA Report based on the best available techniques and fulfill the requirements to commence, complete, and implement the project on environmental friendly manner. Based on the findings of this EIA, it can be concluded that the project has negligible adverse impacts on the existing environment and the proposed project is suitable from environmental point of view.



CHAPTER-1

CHAPTER 1 - INTRODUCTION

1.1 OVERVIEW

Urbanization, industrialization and economic growth are regarded to have advanced drastically in Pakistan in recent decades. More people have migrated into urban areas, and the expansion of urban population in present-day Pakistan seems to be growing at a rate from 3.7% to 7.4% in cities while the overall population growth rate in Pakistan is only at 2.8%. In the case of Punjab, the region regarded in the project, one of the most critical problems emerging from its rapid urban expansion is waste generation and disposal without treatment. The amount of waste generated in urban Pakistan is more than 55,000 tons per day, and waste collection in cities currently averages only 50% of waste generation.

Moreover, none of the municipalities run landfill sites in Punjab, only three municipalities –Lahore, Rawalpindi and Faisalabad - out of the nine¹ considered in the project own lands where open dumping of waste is being done. It is known that uncollected waste is placed in or beside common places and roads. It is widely accepted that waste untreated and dumped close to living spaces may cause contamination of surface and ground water and threaten human health directly and indirectly. It is thus urgent to tackle these problems with comprehensive and interdisciplinary approaches.

Managing hazardous waste properly is most crucial factor to be attended now-a-days. The consequences of failure of this waste management system are disastrous for the health of the community and the smooth running of life in that region. Some common problems as seen because of this failure includes, land and air pollution, blockage of drains and water pollution in natural streams. Mostly in cities and municipalities in Pakistan there are although no proper system of disposal management or even if it is there the maintenance and proper functioning are not up to the mark.

In developing countries, including Pakistan, uncontrolled dumping is used for disposal of solid wastes. These dumps are frequently allowed to burn either deliberately, as means of volume reduction, or accidentally. The emissions from

¹ The rests are Sialkot, Multan, Sargodha, Rawalpindi, Gujranwala, DG Khan, and Bahawalpur.

this type of uncontrolled burning can be noxious and harmful. Typical materials found in waste which contribute to these harmful emissions include certain plastics, batteries, paints, domestic chemicals, pharmaceuticals, and many industrial waste. Hazardous waste all too often contains unpleasant, potentially dangerous substances, which if, improperly managed, could cause harm to the health & environment, especially if burnt in uncontrolled conditions.

Keeping in view these requirements it is beneficial to have more waste management companies in local market to collect and dispose hazardous waste in environment friendly way. Waste treatment and disposal methods are selected and used based on the form, composition, and quantity of waste materials. Though some advancement is being made in waste disposal methods, they are still not adequate. The dramatic increase in waste for disposal led to the creation of the first incineration plant in 1874. Incineration is one of the most common waste treatments. This approach involves the combustion of waste material in the presence of oxygen. The combustion process converts wastes into ash, flue, gas, water vapor, and carbon dioxide. This approach has several advantages. It quickly reduces waste volume, lessens transportation costs and decreases harmful greenhouse gas emissions.

The advisability of using incineration, among the other technologies in Solid Waste Management, is still a debated issue. However, technological evolution in the field of waste incineration plants has strongly decreased their environmental impacts in the last years. The management of solid residues and heavy metal emission resulted the most important environmental concerns. Furthermore, a tentative comparison with the environmental impact of landfill disposal, for the same amount of waste, pointed out that incineration process must be considered environmentally preferable.

Medical waste is posing a growing problem worldwide, jeopardizing the health of staff, patients, disposal workers and anyone else coming into contact with the often hazardous materials discarded by hospitals and other healthcare sites. Some 20 to 25 percent of the total waste generated by healthcare establishments is regarded as hazardous and may create a variety of health and environmental risks if not managed and destroyed in an appropriate manner. Incineration is the only

method providing complete destruction and neutralization of the medical waste ideally.

Incinerators reduce the solid mass of the original waste by 80 to 85 percent and the volume by 95 to 96 percent. While incineration does not completely eliminate the need for landfilling, it does reduce the volume of waste necessary for disposal. Incineration has especially strong benefits for the treatment of specific types of waste, such as clinical wastes and hazardous wastes where pathogens and toxins can be destroyed by extremely high temperatures.

Keeping in view the increasing demand of incineration, M/S Clean World Environment Solutions are planning to enhance their incineration capacities from 50 kg/hr to 1050 kg/hr by adding another incinerator of 1000kg capacity. Further, the proponent is also adding an Autoclave of 500 liters capacity (0.5m³). The capacity enhancement project will be installed/constructed at the same land area of existing incinerator, located at Main Sumundri Road, Chak # 248, Daluwal, Tehsil & Distt., Faisalabad. Project Proponent is one among those committed to excellence in order to ensure regulatory compliance and fulfill environmental requirements in the best of professional manner. Our existing plant is the best example of environmental compliance. During our regular operational period, no complaint has been filed against our unit and no penalty has been imposed by any government agency. We are regularly conducting compliance environmental monitoring of our existing to keep the track of environmental compliances.

Incineration has been opted for reasons including being proactive in meeting upcoming legislations as in future the hazardous waste legislative requirements will need to be complied with. Hazardous waste incinerator is proposed for Bio-medical waste management together with management of hazardous waste.

As already stated above the Clean World Environment Solutions are going to enhance their capacity for incineration of Hazardous/ Medical/ Clinical waste under effective & controlled environment and EIA has been prepared to obtain necessary approval from EPA Punjab. Proposed incinerator is equipped with state of the art technology and providing most economical solution for disposal of medical waste as per environmental standards. The proponent owns 4 Kanals & 9

Marlas land area. The existing land will be used to accommodate the new installation of 500kg incinerator. Land Ownership Documents for the proposed facility is attached as **Annexure-I** of this report. The capacity enhancement will involve extension of yellow and green rooms and installation of new incinerator accordingly. The storage area will be designed according to demands of waste stored in it and it will be located away from food storage/ preparation areas. Storage area will be large enough to contain all hazardous waste with spare capacity to cater for collection/ or incinerator breakdowns.

The estimated cost of the proposed project will be around 250 million rupees including cost of construction/installation, land cost and allied machinery and equipment including 2 vehicles for collection of waste from clients.

In order to satisfy EPA's requirement to carry out Environmental Impact Assessment (EIA), Services of M/S Grand Square Consultancy were hired by Clean World Environment Solutions. According to **Schedule II** of Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulation 2022, **Section G-2**, the proposed project falls under category of projects requiring Environmental Impact Assessment (EIA).

This EIA report has been formulated for the grant of Environmental Approval (EA) from Punjab Environmental Protection Agency, Lahore.

1.2 PURPOSE OF THE REPORT

Environmental Impact Assessment (EIA) report is being submitted to the Environmental Protection Agency (EPA), Government of the Punjab, Lahore in compliance with the legal requirement for Punjab Environmental Protection Act, 1997 [Amendment, 2012]; Section-12 "Preparation and submission of IEE / EIA for obtaining the Environmental Approval (EA) before starting the project activity. 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.
- » Hazardous Substance Rules, 2003.
- » Hospital Waste Management Rules, 2014

Different environmental aspects like social, physical biological etc. and other related features of the project both during collection, transportation, storage, incineration and ash disposal 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.

1.3 IDENTIFICATION OF THE PROJECT AND THE PROPONENT

a. Project Site

The stated project is located at Main Sumundri Road, Chak # 248, Daluwal, Tehsil & Distt., Faisalabad.

b. Contact Person

Mr. M. Atif Masood

Project Proponent

Clean World Environment Solutions

320-A, Peoples Colony # 1, Faisalabad

Tell: +92-413-8719339; **Cell:** +92-321-6686696; **Fax:** +92-413-8500441

E-mail: atifmasood248@ gmail.com

c. Consultant

Grand Square Consultancy (GSCON)

Address: House No. 9-A, Itehad Colony, Multan Road, Lahore

Tel: +92-42-37805259; **Cell:** +92-304-8144088

UAE Office: Khalidiya Tower, Office No. 5, M-22, Al Khalidiya St., Abu Dhabi, UAE

Email: info@gscons.com; **Web:** www.gscons.com

1.4 NATURE AND SIZE OF THE PROJECT

The project aims at safe collection, transportation, storage and incineration / Autoclave of hazardous/ medical/ clinical waste from different hospitals and industries cited in Faisalabad. The collected waste will be transported to storage area for ultimate incineration in environmental responsible way. Proposed incinerator will incinerate hazardous/medical/ clinical waste at capacity of 1000kg/ hr. Incineration will be carried out at rate of 3 to 4 days a week and 2 to 4 hrs./ day at initial stages of project depending upon raw material/ hazardous waste availability. At contemporary stated operation capacity of incineration, it is anticipated that 100 to 120 kg/week of ash will be produced depending upon type of waste to be incinerated as well. Besides, if glass content ratio is higher in waste to be incinerated, then ash quantity will vary than mentioned.

Proposed project will be developed on 4 Kanals & 9 Marlas land area, which is already available and no land acquisition is involved in this project. The estimated cost required for proposed construction & installation of incinerator and Autoclave plant is Rs. 250 Million inclusive of land cost, construction & operational budget as well as waste transfer vehicle (2 No.). it is also important to mention here that as this enhancement is going to be carried out in the existing premises of our already operational incinerator. Therefore, majority of the already existing facilities like Yellow Room, Ash Room, Washroom etc. will be utilized for this enhancement as well.

Estimated quantity of hazardous/ medical/ clinical waste that will be catered for incineration services in environmental conscious manner is ~ 10,000 – 12,000 kg/month in condition with number of clients to be served.²

According to Schedule II of Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulation 2022, Section G-2, the proposed project falls under category of projects requiring EIA.

This project is designed to comply with national standards of pollution by keeping all the environmental and developmental factors in due consideration. Protection from natural disaster like earthquake has also been considered according to the applicable safety codes.

² It is hard to calculate exact figure at very initial stage of project as amount of waste production is highly type of industry/ hospital oriented figure.

It is very hard, at this moment, to calculate the exact quantity of water required for the construction of proposed project during construction. However, estimates are made in this EIA report based on the quantity of water used in similar projects. It is estimated that around 150 to 200 gallon of water will be used on daily basis during construction of the said project. 1000 – 1200 gallon of water per day will be required during operational phase of the proposed project for wet scrubbers of incinerator in order to control air pollution and for allied activities such as washroom/ office activities. One water retention pond will be operational for recycling and sustainable use of water resources. Waste effluent constituting ash from wet scrubbers will be allowed to settle in retention pond. After specific retention time, water will be recycled for same purpose. Consequently, settled ash will be collected, dried and managed same as incinerated bottom ash. The ground-water will fulfill the water requirements of the proposed activity during construction and operation phases of the project.

1.5 LOCATION OF THE PROJECT

Proposed project is planning to be established/ installed at Main Sumundri Road, Chak # 248, Daluwal, Tehsil & Distt., Faisalabad.

1.6 EXTENT OF EIA STUDY

Following factors have been taken into account to assess the Environmental Impacts of the proposed project:

- » Environmental Impacts due to land use, location, waste generation, utility services consumption, noise, oil/fat generation, etc.
- » Environmental Impacts on physical resources i.e. soil, topography, geology, climate, air quality, etc., and ecological resources i.e. flora and fauna. Health and safety of workers is also considered.
- » Any developmental activities outside the project area like rehabilitation of the road and establishment of the other factories outside the project vicinity have not been covered under this EIA study.

1.7 SCOPE OF STUDY

For achieving the above objectives, the study is mainly divided into the following sub-tasks:

- » Identification of various legal / statutory requirements as set forth by the Punjab Environmental Protection Act, 1997 [Amendment, 2012] and the guidelines for preparation of EIA Reports and review of existing regulatory framework in the country with reference to the development projects;
- » Collection of data related to physical, ecological, and socio-economic resources of the project area;
- » Identification and evaluation of salient environmental impacts;
- » Identification of necessary mitigation measures to minimize the adverse impacts; and
- » Preparation of an Environmental Management Plan (EMP).

The key steps followed while conducting EIA are briefly described below.

1.7.1 Review of Project Documents

Previous relevant reports have been reviewed for getting insight into the project area and related issues. Some offices and organizations were also visited for acquisition of published reports and data.

1.7.2 Reconnaissance Survey

The reconnaissance survey under this study was conducted in February 2026 by an interdisciplinary team consisting of Environmentalist, Health & Safety Specialist to conceptualize the project and understand the potential environmental and social impacts associated with the proposed project and also to familiarize the environmental setting and local conditions.

1.7.3 Data Collection

Both primary and secondary data were collected to accomplish the objectives of the study. The primary data was collected by conducting field survey in February 2026 through environmental monitoring, individual interviews of local population, focus group discussions and consultations with local community, while secondary data was collected from the published government documents, i.e. Economic Survey of Pakistan, District Population Census, Multiple Indicators Clusters Survey, Weather data, Government Acts, Laws and Regulations.

Based on the environmental checklist, socioeconomic questionnaires and area profile as well format for consultations, field surveys were carried out to collect data on the physical, biological and social environment aspect of the project site.

i) Physical Environment

The physical aspects of the project site covered the following:

- » Soils - type of soils, erosion, stability
- » Land use pattern of the area including agriculture crops, barren lands, industrial and residential use
- » Affected buildings - residential, industrial, commercial, and structures of buildings (if any)
- » Drainage pattern
- » Available energy source(s)
- » Other private/ public infrastructure/ utilities like pipelines, electric poles
- » Water resources available both surface and groundwater
- » Air quality and noise level in the project impact corridor

ii) Biological Environment

In consideration of ecological environment, the following main aspects were studied:

- » Existing vegetation along the project impact corridor
- » Trees likely to be affected due to the project implementation (if any)
- » Endangered species both flora and fauna
- » Wildlife in the project impact corridor
- » Forests and game reserves existing along project impact corridor
- » Beneficial plants and animals in the project impact corridor
- » Aquatic life including fish resources
- » Wetlands within the vicinity of the project impact corridor

iii) Social Environment

Social assessment has attempted to determine the social implications in terms of assumed positive and negative impacts as a result of the implementation of the proposed project. The socioeconomic baseline data covered the following major aspects:

- » Demographic profile
- » Population
- » Number of households
- » Literacy status
- » Nature of business/ occupations
- » Livelihood/ income
- » Living standard of the population
- » Access to credit
- » Social infrastructure available
- » Women issues
- » Community perceptions about the Project

1.7.4 Stakeholders/ Public Consultations

During the detailed field survey dated February 2025; consultations were made with local community/ general public. The basic purpose of these consultative meetings/ focus group discussions were to i) share information with stakeholders about the expected impacts of proposed development works on the physical, biological, and socioeconomic environment; ii) understand stakeholders' concerns regarding various aspects of the project, including the existing conditions and the potential impacts of the proposed project.

1.7.5 Data Processing and Analysis

After collecting all above data from different sources including interviews from communities, consultations, physical observations, and data compiled from other documents was analyzed. Accordingly, the results were presented through tables (means, percentage, number), graphical/ pictorial illustrations.

1.8 MAGNITUDE OF EFFORTS

All the potential/possible stakeholders have been contacted to get the relevant

data, for preparation of EIA report.

1.9 PERSONS PERFORMING EIA STUDY

EIA study of the project has been conducted by GSCON Consultant-Pakistan, according to the Review of IEE/EIA Regulations 2000, Pakistan Environmental Protection Agency (Pak EPA), Punjab Environmental Protection Act, 1997 [Amendment, 2012], and other relevant Regulations and completed this EIA Report.

NAME & DESIGNATION	QUALIFICATION & EXPERIENCE
Mr. Muhammad Mujahid Principal Consultant (Environment)	MPhil. M.Sc. Environmental Sciences, University of the Punjab. Over 10 year's working experience
Mr. Rizwan Javed Project Manager	M.Sc. Environmental Sciences , University of the Punjab. Over 10 year's working experience
Miss Rabia Rafiq Sr. Environmentalist	M.S. Environmental Sciences, University of the Punjab. Over 5 year's working experience
Hafiz Atif Tariq Environmentalist	B.S. Environmental Sciences , University of the Punjab. Over 6 year's working experience.
Ms. Shagufta Tahir Environmentalist	M.S. Environmental Sciences , University of the Punjab. Over 5 year's working experience.
Ms. Hajira Tahir Environmentalist	MS. Environmental Sciences , University of Veterinary and Animal Sciences. Over 2 year's working experience.
Ms. Komal Aroosh Environmentalist	M.Phil. Chemistry GC University, Lahore Over 4 year's working experience
Mr. Javed Iqbal Kahlon HSE Specialist	Master in Occupational Safety and Health, Turin, Italy. Over 20 year's working experience
Mr. Mudassar Adil HSE Specialist	BS. Environmental Sciences , GC University, Faisalabad. Over 6 year's working experience

Mr. Noor Khan Sociologist	M.Phil. International Development Studies, M.Sc. Sociology. Over 12 year's working experience
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1.10 ROLES AND RESPONSIBILITIES

The executing firm/ company of the proposed project will be the Clean World Environment Solutions. Role and responsibilities have been proposed in the EIA report.

1.11 IMPLEMENTATION OF MITIGATION MEASURES

Proposed mitigation measures, as defined in the EMP will be primarily implemented by the management of M/S Clean World Environment Solutions with responsibilities assigned to various departments and agencies.

1.12 ROLE OF ENVIRONMENTAL PROTECTION AGENCY, PUNJAB

The main responsibility of Environmental Protection Agency, Punjab will be to monitor the mitigation measures, which will be taken up or implemented by management of Clean World Environment Solutions.

1.13 OBJECTIVES OF THE REPORT

Objectives to conduct EIA are as following:

- » A legal binding in accordance to Punjab Environmental Protection Act, 1997 [Amendment, 2012].
- » To identify the potential environmental issues pertaining to the proposed project.
- » To evaluate the ability of the project in view of social acceptance and environmental soundness.
- » To provide the maximum information to the proponent and other stakeholders about the existing environmental conditions and the implications of the proposed project.
- » Collection of available data, reports, drawings and other relevant information about activities of proposed project.
- » Review of applicable existing environmental legislation and Punjab environmental quality standards (PEQS).
- » Propose mitigation measures to eliminate or to reduce the negative impacts to an acceptable level.
- » Development of well-resourced environmental management and monitoring plans to identify mitigation strategies targeted towards avoidance, minimization and rehabilitation of the impacts.

1.14 ORGANIZATION OF EIA REPORT

The EIA report is divided into following chapter:

Executive Summary

Chapter 1: Introduction

Chapter 2:	Legal Framework
Chapter 3:	Project Description
Chapter 4:	Description of Environment
Chapter 5:	Stakeholder Consultation
Chapter 6:	Impact Identification & Mitigation Measures
Chapter 7:	Environmental Management Plan
Chapter 8:	Findings and Recommendations
Annexure	

CHAPTER-2

CHAPTER 2 - POLICY, LEGAL & ADMINISTRATIVE FRAMEWORK

2.0 Policy, Legal and Administrative Framework

2.1 GENERAL

This section deals with the current policy as well as legal and administrative framework related to carrying out of Environmental Impact Assessment of various projects.

Like other Projects, the proposed Project, before its execution, is required to go through an Environmental Assessment, in accordance with the provisions of the Punjab Environmental Protection Act, 1997 [Amendment, 2012].

2.2 EXISTING REGULATIONS AND LEGAL FRAMEWORK

According to environmental laws of the country development projects have to undergo the process of Environmental Impact Assessment (EIA) or Initial Environmental Examination (IEE) in order to predict and mitigate the impacts of the development at an early stage. Based on nature, size, cost and associated impacts, the proposed project has been categorized for EIA Study according to the Regulation “4” of Statutory Notification issued on June 13, 2000 (S.R.O.339 (1) /2001). The Proposed Project is Collection, Transportation, Storage and Incineration of Hazardous/ medical/ clinical Waste falls under Schedule II of the IEE / EIA Regulations 2022 made under section 12 of Punjab Environmental Protection Act, 1997 [Amendment, 2012] under which the Environmental Impact Assessment (EIA) is mandatory for getting Environmental Approval. The Director General, EPA Punjab is the authority to issue the requisite Environmental Approval after proper review of the project.

This EIA Study has been carried out in the light of the policy guidelines of the Government of Pakistan, under the procedures and practices formulated by the Provincial Environmental Protection Agency (EPA-Punjab).

2.3 RELEVANT LEGAL / INSTITUTIONAL FRAMEWORK

The applicable laws for the environmental study of the proposed project are briefly given below. The proponent of the proposed project will abide by the applicable laws and regulations.

2.3.1. NATIONAL CONSERVATION STRATEGY, 1992

On March 1, 1992, the Cabinet of Pakistan approved the National Conservation Strategy. It describes the stark reality of the country's deteriorating resource base and its implications for what is still largely a natural resource-based economy. It sets forth the beginnings of a plan to integrate environmental concerns into virtually every aspect of Pakistani economic life.

The strategy has three overriding objectives: conservation of natural resources, sustainable development, and improved efficiency in the use and management of resources.

2.3.2. PEPO, 1983 AND PEPA, 2012

In 1983, the Government of Pakistan issued an Environmental Protection Ordinance (EPO), which was replaced by the Pakistan Environmental Protection Act (PEPA) 1997, through an Act of Parliament. Now the PEPA 1997 has been replaced by Punjab Environmental Protection Act, 1997 [Amendment, 2012] on 18th April, 2012.

Under Sec. 8 of Environment Protection Ordinance (EPO) 1983, it was necessary to carry out IEE / EIA for all development projects, but there were no IEE / EIA regulations under that ordinance.

Under section 12 of the Punjab Environmental Protection Act, 1997 [Amendment, 2012] it is mandatory to take an Environmental Approval Environmental Protection Agency for commencement of any construction of project. This study has also been carried out under section 14 “**Handling of Hazardous Waste**” of the Punjab Environmental Protection Act, 1997 [Amendment, 2012] stated “no person shall generate, collect, consign, transport, treat, dispose of, store, handle or import any hazardous substance except (a) under a licence issued by the Provincial Agency and in such manner as may be prescribed; or (b) in accordance with the provisions of any other law for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement or other instrument to which Pakistan is a party”.

2.3.3. NATIONAL ENVIRONMENTAL POLICY 2005

The national environmental policy 2005 aims to protect, conserve and restore the environment in order to improve quality of the life of citizens through sustainable development and resource conservation.

The main objectives of the policy are;

- Conservation, restoration and efficient management of the natural resources.
- Integration of the environmental considerations in policy making and planning process.
- Capacity building of government agencies and other stakeholders at all levels for the better environmental management.
- Meeting international obligations effectively in line with the national aspirations.
- Creation of a demand for environment through mass awareness and community mobilization.

2.3.4. NATIONAL FOREST POLICY 2001

This policy covers the Renewable Natural Resources (RNR) of Pakistan i.e. Forests, Watersheds, Rangelands, Wildlife, Biodiversity and their habitats. The policy seeks to launch a process for eliminating the fundamental causes of the depletion of RNR through the active participation of all the concerned agencies and stakeholders, to realize the sustainable development of the resources. It is an umbrella policy providing guidelines to the Federal Government, Provincial Governments and territories for the management of their RNR. In consonance with it, the Provincial and District Governments may devise their own policies in accordance with their circumstances.

The goal of this policy is to foster the sustainable development of RNR of Pakistan, for the maintenance and rehabilitation of its environment and the enhancement of the sustainable livelihoods of its rural masses especially women, children and other deprived groups. The elements of the policy are as follow:

1. Population planning in critical eco-systems.
2. Providing substitutes to firewood in the wooded mountains.
3. Reducing the impact of socio-economic causes.

4. Reducing poverty, poverty of opportunity, and powerlessness.
5. Reducing political interference in the Forestry and Wildlife Departments.
6. Renovating and invigorating the institutions of RNR.
7. Supporting Local Governments in the sustainable development of their RNR.
8. Policies for fragile natural Eco-systems.
9. Riverain forests.
10. Irrigated Plantations.
11. Preservation of relict and unique forests.
12. Wildlife.
13. Rangelands and desert eco-systems.
14. Planting of trees and fodders on farmlands.

2.3.5. REVIEW OF IEE AND EIA REGULATIONS, 2000

The GOP has issued Review of Initial Environmental Examination and Environmental Impact Assessment Regulations 2000, to review the Initial Environmental Examination (IEE) / Environmental Impact Assessment (EIA) Reports.

2.3.6. GUIDELINES FOR THE PREPARATION AND REVIEW OF ENVIRONMENTAL REPORTS, 1997

The GOP has also framed guidelines for the preparation and review of IEE/EIA of projects in various developmental sectors.

2.3.7. PUNJAB ENVIRONMENTAL QUALITY STANDARDS (PEQS)

Powers conferred under clause (c) of sub-section (1) of section 4 of Punjab Environmental Protection Act, 1997 [Amendment, 2012] has been approved the Punjab Environmental Quality Standards (PEQS), 2023 for municipal and industrial effluents, noise, drinking water, motor vehicle exhaust, air emissions, industrial gaseous emissions and treatment of liquid & disposal of biomedical waste.

2.3.8. GUIDELINES FOR SENSITIVE AND CRITICAL AREAS

GOP has issued Guidelines for Sensitive and Critical Areas in October, 1997. The objective of the guideline is to provide guidance to project proponents and

other stakeholders in the environmental assessment process, so that the proposed projects are planned and sited in way that protects the values of sensitive and critical areas.

2.3.9. POLICY & PROCEDURES FOR THE FILING, REVIEW & APPROVAL OF ENVIRONMENTAL ASSESSMENTS, NOVEMBER-1997

Environmental Assessment is the Primary means of managing the approval of new development proposals in Punjab. Environmental Assessment allows for the systematic examination of proposals, clear procedures which provide for the interests of relevant Government Departments and other stakeholders to carefully consider the environmental impacts of new developmental projects.

2.3.10. GUIDELINES FOR PUBLIC CONSULTATION, PAKISTAN ENVIRONMENTAL PROTECTION AGENCY OCTOBER, 1997

This guideline is part of a package of regulations and guidelines which include:

- » Punjab Environmental Protection Act, 1997 [Amendment, 2012]
- » Policy and Procedures for filing, review and approval of environmental assessments
- » Guidelines for the preparation and review of Environmental Reports
- » Guidelines for sensitive and critical areas
- » Punjab Environmental Quality Standards (PEQS)
- » Detailed sectoral guidelines

2.3.11. PUNJAB WILDLIFE PROTECTION ACT, 1974

This act was framed in 1974 by the Province Punjab and is about of protection and conservation of Wildlife.

2.3.12. FOREST ACT, 1927

This act was framed in 1927. The Forest Act, 1927 is still the basic charter for the forest departments in Pakistan. This law empowers provincial governments to manage forest areas.

2.3.13. PUNJAB LOCAL GOVERNMENT ORDINANCE, 2001

Schedules 4 and 8 of this Ordinance pertain to environmental pollution. Under the Ordinance, the local councils are authorized to restrict projects causing pollution to air, water or land. They may also initiate schemes for improving the

environment.

2.3.14. PAKISTAN PENAL CODE, 1860

This defines the penalties for violations concerning pollution of air, water bodies and land. Sections 272 and 273 of this Act deal with the adulteration of food or drink. Noise pollution has been covered in Section 268, which defines and recognizes noise as a public nuisance. “A person is guilty of a public nuisance who does any act or is guilty of an illegal omission which causes any common injury, danger or annoyance to the public or to the people in general who dwell or occupy property in the vicinity, or which must necessarily cause injury, obstruction, danger or annoyance to persons who may have occasion to use any public right.”

2.3.15. OCCUPATIONAL HEALTH

Construction and operational activities could affect the occupational health of the workers. Quantitative national standards with respect to the above aspect are yet to be developed in Pakistan. However, guidance in qualitative terms can be obtained from the Pakistan Factories Rules, 1962 (based on the Factories Act, 1934) and the Labor Laws (Amended) Ordinance, 1972.

2.3.16. TOXIC OR HAZARDOUS WASTE

Protection of the environment with regards to toxic and hazardous waste is covered by the Pakistan Penal Code (PPC), 1860. Environment Protection Department (EPD), Punjab, is mandated to monitor the transportation of hazardous materials within the provincial limits.

2.3.17. HAZARDOUS SUBSTANCE RULES, 2003

Rule 5 stated that project/ industrial activity must be accompanied by Environmental Impact Assessment (EIA) involving generation, collection, consignment, transport, treatment, disposal, storage, handling/ import of hazardous substance in respect of which the license is sought.

2.3.18. PUNJAB HOSPITAL WASTE MANAGEMENT RULES, 2014

Under these rules every hospital is responsible for proper management of waste generated by it till its final disposal in accordance with provisions given in these rules. The rules require each healthcare facility to constitute a waste management

team, and to prepare and implement a waste management plan. The rules also include guidelines for waste segregation, collection, transportation, storage and disposal. These rules will be applicable to the proposed project.

2.3.19. PEQS FOR BIO-MEDICAL WASTE

Environmental Protection Council has approved the Punjab Environmental Quality Standards, 2023 for treatment of liquid & disposal of Bio-medical waste by incineration, autoclaving, microwaving and deep burial. Bio-medical waste incinerators shall be operated at combustion efficiency of 99.0% with min. temp. of 800°C in primary chamber and 1200±50°C in secondary chamber associated residence time of at least 1 sec. and 3% O₂ in stack emissions.

$$\text{Combustion efficiency} = \frac{\% \text{CO}_2}{\% \text{CO}_2 + \% \text{CO}} \times 100$$

CHAPTER-3

CHAPTER 3 - PROJECT DESCRIPTION

3.0 Project Description

3.1 TYPE AND CATEGORY OF PROJECT

According to environmental laws of the country, development projects have to undergo the process of Environmental Impact Assessment (EIA) or Initial Environmental Examination (IEE) in order to predict and mitigate the impacts of the projects at an early stage. Based on nature, size, cost and associated impacts, the project under consideration has been categorized for Environmental Impact Assessment (EIA) Study. According to Schedule II of Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulation 2022, **Section G-2**, the proposed project falls under category of projects requiring EIA.

The Project is the collection, transportation, storage and incineration of the hazardous/ medical/ clinical waste and Industrial. The proposed project will involve the installation of an Incinerator with capacity of 1000 kg/hr and an Autoclave of 500 liters (0.5m³). At current scope the hazardous waste will be collected from different hospitals of proposed locality and hazardous waste from different factories from Punjab region. Collected waste will be transported to Waste Storage Yard (WSY) in premises of incineration plant located at Main Sumundri Road, Chak # 248, Daluwal, Tehsil & Distt., Faisalabad in order to store it on temporary basis prior to incineration. For the subject purpose, the WSY will be developed on 2 Kanals land area; out of which 1.5 kanals will be covered area for storage of hazardous waste specifically. The already covered area will also be used for this capacity enhancement project.

This project requires Environmental Approval under Section 12 of Punjab Environmental Protection Act, 1997 [Amendment, 2012]. The Environmental Impact Assessment (EIA) fulfills the mandatory requirement for getting Environmental Approval. The Director General, EPA Punjab is the authority to issue the requisite Environmental Approval after proper review of the project.

3.2 OBJECTIVES OF THE PROJECT

Stated project is one of the principal professional ventures for managing waste with fore of most standards and superlative performance; assisting the industries/ hospitals/ clinics towards environmental protection by providing efficient hazardous/ medical/ clinical waste management services. Objective of proposed project is to provide facility for incineration of hazardous/ medical/ clinical wastes, as there is no private well maintained & environment friendly incinerator facility available. Proposed project is intended to achieve following:

- » Reduction in solid mass of the original waste by 80–85% and the volume by 95–96%, depending on composition and degree of recovery of materials such as metals from the ash for recycling.
- » Significant reduction in necessary volume for waste disposal after incineration.
- » Particularly strong benefits for the treatment of certain waste types such as hazardous/ clinical/ medical wastes where pathogens and toxins will be destroyed by high temperatures.

3.3 ALTERNATIVES CONSIDERED & THEIR REASON OF REJECTION

In Pakistan the huge amount of uncollected wastes poses great threat to the public health as they are the breeding source of disease transmitting vectors. One of a very hazardous and un-noticed drawback of the waste disposal in Pakistan is that hazardous waste is treated as usual waste. Only 50% of solid waste quantities generated are collected by government services. However, for cities to be clean, at least 70% of these quantities should be collected.

Mostly in cities and municipalities in Pakistan there are although no proper system of disposal management or even if it is there the maintenance and proper functioning are not up to the mark. Integrated Solid Waste management (ISWM) is a combination of those activities that best protects the community itself and environment. For ISWM a sustainable approach is required by giving the stake holders to participate in the process of ISWM and share their responsibilities. Keeping in view the current scenarios of waste handling practices, private vendors like Clean World Environment Solutions must be encouraged to cope up environmental impacts associated with poor waste management.

An analysis of available alternatives is necessary to establish that 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 optional results within defined set of economic environmental, health and safety constraints. In particular, it outlines the following project options:

1. The “No-Development Option”
2. Alternative Site Option
3. Alternative Technology

1. No Development Option: No project means 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. 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 the loss of opportunity in further improvement of the environmental management of the area, environmental baseline data, and the mitigation and compensatory programs.

2. Alternative Site Option- Site Selection Criteria: In reference to the project alternatives, two sites were selected. One site was selected at Plot # 69, Darul, Ehsan Tower, Near Maqbool Road, Faisalabad and the other one at Main Sumudri Road, Chak # 248, Daluwal, Tehsil & Distt., Faisalabad. The final selection of site is based on following criterion:

- **Accessibility:** The site should be accessible from a permanent road to allow ready transport.
- **Water Supply:** Availability of adequate water supply, which should also meet drinking water standards.
- **Soil Condition for civil structures:** Suitability and stability of soil conditions required for civil structures
- **Sufficient land availability:** Availability of sufficient land to design and layout plan in an appropriate manner, with consideration of future expansions.

- **Electricity:** Availability of electricity from the National Grid for an uninterrupted supply of power, required for the project.
- **Existing Plant:** The site located at Sumandri road is selected as the best option as our existing incinerator is already working efficiently at this location. All the existing facilities like electricity, gas, water pump and existing labour will be utilized for this project as well.

CONCLUSION

In view of all above criteria regarding site selection, it was concluded that to enhance the capacity of “Clean World Environmental Solution (Incinerator Facility)” at Main Sumundri Road, Chak # 248, Daluwal, Tehsil & Distt., Faisalabad is the best option to utilize. The first site located at Plot # 69, Darul, Ehsan Tower, Near Maqbool Road, Faisalabad has been rejected due to following reasons:

- Site will be leased to use for intended purpose
- Close proximity to residential area
- Transportation hindrance associated to congested area
- Increased anticipated health effects to nearby communities due to stack emissions of incinerator

The selected project land is owned by proponent, so administrative control on proposed project will be easy. The geographic position of the proposed project is very ideal which connects to the neighboring infrastructure and also away from the human settlement. Rejected proposed site do not possess such a broad spectrum of commercial, industrial and management benefits. The selected proposed project site is environmentally as well as economically viable. The opted site is part of industrial activities far from residential or sensitive areas and best appropriate for core of said project.

3. Technology Alternatives: Incineration of wastes has been widely practiced, but alternatives are being available, such as autoclaving, chemical treatment and microwaving, and may be preferable under certain circumstances. Incineration is the method of choice for most hazardous healthcare wastes and is widely all over the world. However, some recently developed alternative methods is also

becoming increasingly popular. Alternatives to incineration are available in many developed countries. As these technologies are either too complicated or very expensive, they are not being used in Pakistan. However, some technologies used for hospital waste disposal are explained below:

I. Steam Autoclaving: Steam Autoclaving is the most used and most efficient medical-waste-treatment technology. Most available autoclaves are designed to handle both biohazard and normal hospital wastes simultaneously. However, they cannot treat pathological animal wastes, chemotherapy wastes and low radioactive wastes. These wastes have to be treated separately. Medical 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 medical wastes by inactivating and destroying microorganisms. There are two types of autoclaves, greatly displacement and pre-vacuum. Those designed for medical wastes are mostly pre-vacuum.

Advantages

- * Can treat most types of biomedical waste
- * High level of microbial inactivation of biomedical waste
- * Does not create hazardous combustion by products (dioxin, furans, etc.)
- * Produces far fewer emissions than incinerator
- * Treated wastes can be land filled along with normal municipal solid wastes
- * Autoclaves are the most widely used alternative to incineration of biomedical waste
- * Autoclaves have extensive field/ historical experience in the medical industry.
- * Many autoclaves require low capital investment
- * Easier to operate than incinerators
- * The most profitable investment unless there are no regulations at all on incinerator emissions

Limitations/ Draw Backs

- * Inappropriate for industrial waste
- * Most autoclaves do not handle recognizable anatomical wastes

- * Do not handle chemotherapeutic 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 (VOCs)
- * May require hospital to alter method of separating waste

II. Microwaving: The process combines shredding, steam injection and conventional microwaves to disinfect biomedical 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 entire process, prompting the operator to feed more waste. Material feeds evenly into a shredder and emerges as small bits, unrecognizable as medical waste. The granules are automatically conveyed into a treatment chamber where they're moistened by high temperature steam. This mixture runs under a series of conventional microwave generators that disinfect each granule. The treated end product is ready for municipal solid waste landfills 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

Limitations/Drawbacks

- * In appropriate for industrial waste
- * Not a co-generation process like incinerators.

III. Microwave Radiation: In microwave radiation, medical waste is wetted with steam or water and heated by microwave irradiation to decontaminating temperatures.

Advantages

- * This method has good disinfections efficiency under appropriate operational conditions
- * It is environmental friendly

Limitations/Drawbacks

- * Microwave radiation requires high capital investment with higher operation and maintenance Cost
- * Inappropriate for Industrial waste
- * This method also has potential operation and maintenance problems

IV. Vitrification: A vitreous state is a non-crystalline solid or rigid liquid formed by super cooling a melt. It's also called a glassy state. For hazardous or radioactive wastes, vitrification is the process of cooling a liquid fast enough to prevent crystallization. This process turns waste material, even high-level and low-level radioactive wastes, into glass. During vitrification, contaminants are subjected to extremely high temperatures in the melter. The organic compounds are destroyed and the remaining organic elements become part of the glass's molecular structure. Hazardous metal components in the waste are converted to nonhazardous oxides. Radioactive elements can't leach out, so they won't pollute the environment.

Advantages

- * It converts a waste product into recyclable, reusable glass that has value
- * With vitrification clean air, clean water, and glass are end product rather than ash.

Limitations/Drawbacks

- * In appropriate for Industrial waste
- * Too much cost to treat low-level wastes

V. 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 a 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 requires comprehensive safety measures
- * Chemical treatment is inadequate for pharmaceutical, chemical and some types of infectious wastes.

VI. 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.

VII. Land Disposal: If a municipality or medical 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 transmissions of infection than careful disposal in municipal landfill, even if the site is not designed to the standard used in higher-income countries. The primary objection to landfill disposal of hazardous healthcare waste, especially untreated waste, may be cultural/ religious/ based on a perceived risk of the release of pathogens to air and water or on the risk of access by scavengers. Landfilling can potentially result in contamination of drinking water.

CONCLUSION:

The final choice of treatment system i.e. Incineration 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.

Many of the industries/ hospitals in Punjab are looking for the certified waste management companies in order to dispose of their waste properly but due to less number of certified waste contractors they are disposing their waste in a manner which destroy the quality of environment. As described, this project is about collection, transportation, storage and incineration of hazardous/ medical/ clinical waste. Such kind of project are dire need of country in order to tackle heaps of waste from different sources and its related environmental and health impacts; no other alternative can be worth considered in present scenario.

The proposed Autoclave will have following specifications;

Chamber Capacity	500 liters (0.5 m ³)
Chamber Material	SS 316L stainless steel (mirror finish)
Outer Jacket Material	SS 304 stainless steel
Sterilization Method	Saturated steam under pressure

Chamber Dimensions	Approximately 700–800 mm diameter × 1,100–1,300 mm length
Operating Temperature	105–134°C
Maximum Working Pressure	2.1–2.3 bar (30–33 psi)
Design Pressure	3.0–3.5 bar
Vacuum System	Pre-vacuum and post-vacuum cycles (optional or standard)
Heating System	Electric heaters or external steam supply
Heating Power	24–36 kW (electric models)
Control System	PLC with HMI touch screen
Cycle Programs	Wrapped instruments, liquids, textiles, waste, customized cycles
Drying System	Vacuum drying with heated jacket
Door Type	Single-door or double-door (pass-through)
Door Operation	Manual hinged or automatic sliding
Safety Features	Pressure safety valve, low water protection, door interlock, over-temperature protection
Water Consumption	20–60 L/cycle (depending on vacuum system)
Power Supply	380–415 V, 3-phase, 50/60 Hz
Compressed Air Requirement	6–8 bar (for pneumatic doors/valves)
Insulation	Mineral wool or ceramic insulation
Validation Standards	EN 285, ISO 17665, GMP, FDA, CE (depending on model)
Overall Dimensions	Approx. 1,300 × 1,600 × 1,900 mm (W × D × H)
Net Weight	800–1,500 kg

3.4 PROJECT LOCATION/ SITE LAYOUT

Stated project of Capacity Enhancement of incineration facility under the name of Clean World Environment Solutions is proposed to be sited at Main Sumundri Road, Chak # 248, Daluwal, Tehsil & Distt., Faisalabad. M/S Clean World Environment Solutions are committed for quality and traceable waste management services in most appropriate and environmental friendly manner.

Figure 3.1 is showing location map of the project's site. Besides, site location map with more detailed illustrations has been appended as **Annexure-II** and plant layout map has been appended as **Annexure-III** at the end of this document.

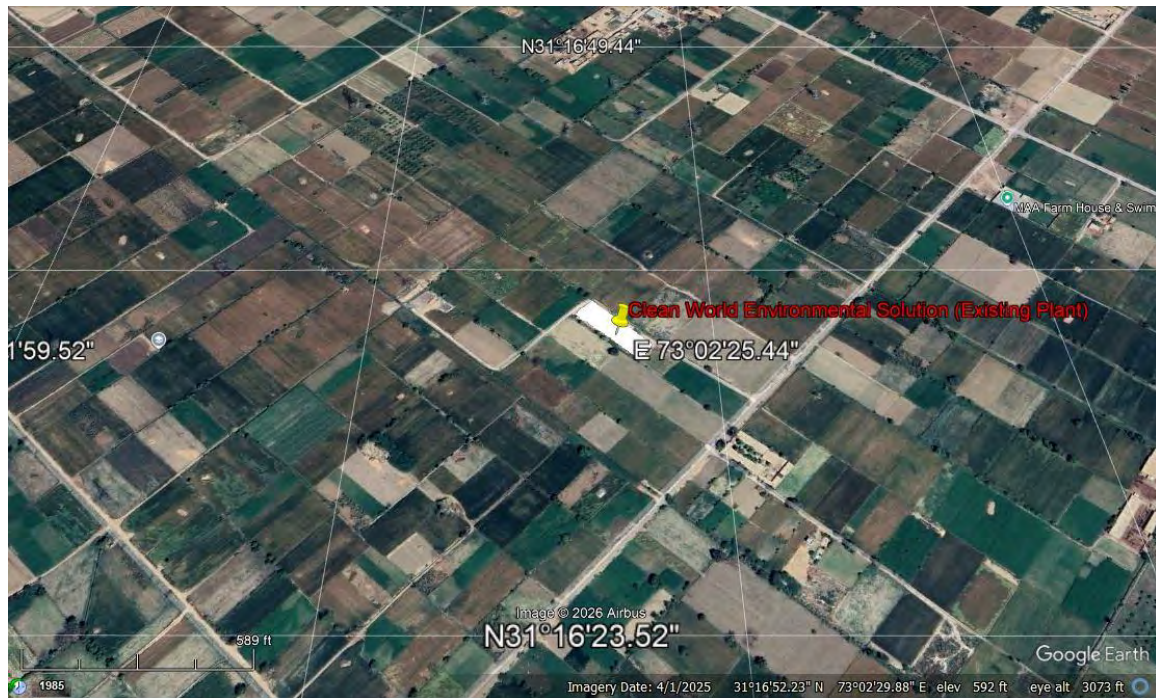


Figure 3.1: Location Map of Project Site

3.5 LAND USE AT THE PROJECT SITE

Proposed project land area is operational under the existing incinerator of Clean World Environmental Solutions. The project area is a part of agricultural activities far away from residential area. Proposed project site is located at Main Sumundri Road, Chak # 248, Daluwal, Tehsil & Distt., Faisalabad.

3.6 ROAD ACCESS

In order to facilitate growing industrialization basic infrastructure facilities like roads network, natural gas, water and power supply, means of transportation and communications etc. are being improved/ developed speedily. The project's site is easily accessible through metalled road. The site is ideally located at easy access of Main Sumundri Road, Faisalabad.

3.7 VEGETATION FEATURES OF SITE

Proposed project site is situated within the semi-urban area of the city Faisalabad. There are no forests or any type of flora worth mentioning around the project area. Details of vegetation features are covered in Chapter – Description of

Environment. However, this is worth mentioned that there is no tree cutting involve in the proposed project as the site is devoid of any tree.

3.8 ENERGY/ POWER SOURCE

Proposed project require electricity only for office purposes. The total electric requirement for the stated project will be 12-15 KW which will be fulfilled by Faisalabad Electric Supply Company (FESCO) as an electricity source. Proposed project involve LPG consumption as fuel for incineration plant. As it is hard to calculate the quantity of fuel required at initial stage of project as the total fuel requirement depends on quantity of waste to be incinerated/ number of clients to be served for waste incineration.

3.9 WATER REQUIREMENT

Adequate quantity of underground water is available to meet all the water requirements. The quality of water is also satisfactory. However, the water for all project activities will be withdrawn from the underground water at the project site.

Proposed project's nature discrete the consumption of large quantity of the water requirement except 1000 – 1200 gallon needed for wet scrubbers, office use as well as cleaning and washing of Waste Storage Yard (WSY).

3.10 SOLID WASTE

The stated study is itself about managing the waste proficiently which isolate the waste production associated to project activities in specific. General municipal waste will be produced from the office work in the form of used paper, stationery items, used bulbs, tubes, broken glass, plastic and wood, which is basically recyclable/ reusable. Major Solid waste from the proposed project will Bottom Ash. The estimated quantity of bottom ash will be 200 to 300kg per week.

3.11 PROJECT COST & MAGNITUDE OF OPERTAION

The estimated capital cost of the proposed project is ~ Rs. 250 Million inclusive of 2 vehicle purchase amount, incinerator plant and their maintenance as of datum. Keeping in view the project contents, the existing anticipated capacity of project will be enhanced in terms of incinerating hours and waste transportation vehicles to cope with skillful management of waste managing services.

As already described, proposed project is of Capacity Enhancement of Clean World Environment Solution, Hazardous Waste Incinerator. Stated project is intended to collect, transport, store and incinerate the hazardous/ medical/ clinical waste. For an effective management of hazardous waste, it is essential to have the necessary tools for assessing status of readiness at all levels. The absence of waste management lack of awareness about health hazards, insufficient financial and human resources and poor control of waste disposal are the most common problems connected with hazardous and healthcare wastes. An essential issue is the clear attribution of responsibility of appropriate handling and disposal of waste. According to the polluter pays principle, this responsibility lies with the waste producer, usually being the industry/ healthcare provider, or the establishment involved in related activities.

3.12 SCHEDULE OF IMPLEMENTATION

Proposed study of collection, transportation, storage and incineration of hazardous/ medical/clinical waste is settled for Environmental Approval to start its 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 include³:

Stage I (August 2026)

The stage-1 comprises the onsite contouring studies and soil investigations.

Stage II (Sept. 2026)

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- Construction of basic infrastructure.
- iv- Fitting of instrumentation.

Stage III (November 2026)

³All dates/ periods for project start are tentative and likely to change depending upon the circumstances.

The stage –3 comprises the following task:

- v- Installation of incineration and Autoclave Plants
- vi- Completion of the basic infrastructures water supply system, fuel supply system & electricity generation start-up supply etc.

Stage IV (December 2026)

The last stage will be Commencement of Regular Operation of the proposed incinerator.

3.13 DESCRIPTION OF THE PROJECT

The project has been duly described at: “1-Introduction- Nature and size of the project - Purpose of the report, identification of the project and the project proponent.” The objective of the project is to construct an incinerator to promote cleaner practices and complete combustion of hazardous wastes with a view to waste volume reduction and amelioration. Incineration can treat healthcare and industrial waste at the same time minimizing impact on environment. Proposed incineration plant will operate at high temperature of 800 – 1200 °C for complete incineration of waste, with all types of medical and hazardous waste classifications. It is dual chamber, semi-automatic type with provision of tertiary chamber with flu gas scrubber. The primary chamber is for burning solid and liquid waste. The secondary chamber is for burning hydrocarbons carried over from the primary chamber. The third chamber is for settling the ash and cooling of flue gases. The three chambers are constructed on steel structure with 45 % Alumina Refractory brick lining.

Furthermore, technical specifications of equipment details of incinerator plant is described below:

- **Model:** BMW-50
- **Waste Burning Capacity:** 1000 Kg/hr.
- **Unit Specifications:**
 - Incinerator design: Controlled Air Type
 - Incinerator Type: Dual Chamber Type
 - No. of Burners: 02 Nos.
 - No. of Blowers: 02 Nos.
 - Thermocouples: 02 Nos.

- Residual time of Flue Gases: 02 Seconds
- Oxygen quantity in the Flue gases: 06%
- Fuel: City Gas/ LPG
- Loading System: Manual/Batch Type
- Unit Warm-up time: 20 Minutes
- Thermal Insulator: Calcium Silicate Slab
- Refractory: High Alumina Castable 46% Al₂O₃
- Total Heat Release: Less than 25000 BTU/cu Chamber/ Chimney Plate
Thickness: 6mm/5mm
- Ventury Scrubber: Heat restoration honey comb system, Wet showering mechanism.
- Burner safety: Emergency shut off control system
- Weight: Approx.: 1500 Kg.
- **Each Unit Comprising:**
 - **Primary Chamber:**
 - Primary chamber Volume: 1.5 m³
 - Waste burning capacity: 500Kg/hr
 - Burner auto gas fired: 41 to 93 KW,
 - Temperature of chamber: 800°C
 - Excess air blower fan: 2 KW
 - Chamber constructed of two-layer refractory Lining
Compromising: Thermal insulator: 100mm
 - Refractory Thickness: 100 mm
 - **Chimney:**
 - Made of MS sheet, Height: 10 Meters, Chimney
 - Dia.: 28cm (Internal). Fitted with Shilling wires
 - **Secondary Chamber:**
 - Chamber Volume: 0.54m³
 - Burner auto gas fired: 116 to 232 KW
 - Temperature of chamber: 800-1200°C
 - Dust Filler for Particle: Metal Gauze and Sieve System
 - Sieve System

- Excess air blower fan: 2.5 KW
- The chamber constructed of two layers
- Refractory Lining, Compromising:
- Thermal insulator: 10mm
- Refractory Thickness: 100mm

- Wet Ventury Scrubber:

- Made of complete S/S 3165WG. Full cone type. Water pump 1.5h. Water based wet ventury scrubber system for BMW-50 for clean smoke emission.

- Burners:

- 2 fully automatic burners are installed, one each at each chamber, operatable by single push buttons.
- Gas flow protection micro sensing. Both burners having blower, motor overload protection, electric spark ignition and flame sensing rod.

- Electric Control Panel:

- Having all electrical/temperature control switches and gauges. Mains push ON/OFF, Burners/Blowers push control systems. Installed Power Electric Voltage: 1 Phase: 220V
 - Temperature controller has provided to automatically maintain the temperature of the secondary chamber. In case temperature in secondary chamber rises or falls down beyond safe limit, both primary & secondary burners will shut down and alarm will sound.
 - Temperature controller has also been provided in the primary chamber to cut off the burner at set temperature for fuel saving. A temperature gauge will monitor fuel temperature as well.
- **Finish/Paint:** High Quality heat resistant, two layered high-grade epoxy Paint coating.
- **Accessories to be supplied with each unit:**
- Operator Overall/ Uniform 5 Nos.
 - Safety Gloves 5 Pairs
 - Long Rubber Shoes 5 Pairs

- Safety Helmet 5 Nos.
- Safety Googles 5 Nos.
- Face Mask 500 Nos.
- Waste Trolleys 3 Nos.
- Ash Removing Trolleys 1 Nos.
- Ash Removing Scraper 2 Nos

- **Installation:** Simple platform and shed to be made, along with civil works.

Hazardous waste incineration is typically cost effective in regions where land suitable for landfilling is scarce. Such landfill scarcity can arise due to geographical constraints, as with highly urbanized region or island, or environmental conditions, as in regions where the water table is high. Jurisdictional and political boundaries can also constrain the size and number of sites available for landfilling, thereby increasing the attractiveness for incineration. Potential pollutants can be contained within the resulting residue, which if disposed of carefully reduce the risk of contamination of local groundwater. Consequently, incineration frequently forms part of an overall strategy for the management of hazardous waste. Landfill will always be required for the residue, which typically amounts to about one-third of the initial mass of waste. Incineration of waste offers the following advantages:

- Volume reduction, especially for bulky solids with high combustible content
- Detoxification, especially pathologically contaminated material, toxic organic compounds or biologically active materials
- Socio-environment compliance, especially for fumes containing odorous compounds, CO or other combustible materials subject to regulatory emission limitations
- Environmental impact mitigation especially for organic materials that would leach from landfills or create odor nuisance
- Reducing atmospheric pollution caused by smoke emitted during combustion

3.14 DESCRIPTION OF THE PROCESS

Combustion is a rapid, exothermic reaction between a fuel and oxygen (O_2). In incineration applications, the fuel is predominately waste (although fossil fuels may be co-fired) and the oxygen source is air. The incineration furnace must be designed to produce good mixing of the combustion air and the gases and vapors coming from the burning waste. Nevertheless, in parts of the furnace where combustion is not complete (for example, near the walls of the furnace), combustible components of organic compounds are burned off, leaving the incombustible particulate matter known as fly ash entrained in the flue gas. The incombustible portion of the waste (known as bottom ash) is left behind.

Incineration facilities incorporate a number of general methods for ensuring proper combustion and reducing emissions. A steady situation with no major fluctuations in the waste-feed supply rate, combustion-air flows, or other incineration conditions promotes efficient combustion. Inefficient combustion can result in higher levels of products of incomplete combustion. Similarly, the more often a facility is started up and shut down (for maintenance or because of inadequate or varying waste stream volume), the more uneven the combustion and the greater the potential for increased emissions. Operational parameters such as incineration temperature, turbulence of the gas mixture being combusted, and gas-residence time has been incorporated in design features of proposed incinerator plant in order to achieve efficient combustion. Every part of the gas stream must reach an adequately high temperature for a sufficient period of time, and there must be adequate mixture of fuel and oxygen.

The temperature achieved is the result of heat released by the oxidation process, and has to be maintained high enough to ensure that combustion goes to completion, but not so high as to damage equipment or generate excessive nitrogen oxides. Typically, temperatures are controlled by limiting the amount of material charged to the furnace to ensure that the heat-release rate is in the desired range, and then tempering the resulting conditions by varying the amount of excess air.

Turbulence is needed to provide adequate contact between the combustible gases and oxygen across the combustion chamber (macroscale mixing) and at the

molecular level (microscale mixing). Proper operation is indicated when there is sufficient oxygen present in the furnace, and the gases are highly mixed.

Incineration of waste is an operation that includes feeding the furnace, burning the waste, exhausting the gases to the atmosphere and removing the residue from furnace. Factors which directly influence the operation of hazardous waste incinerator are as follow:

- Combustion temperatures, combustion gas residence time
- Current & future quantities of waste
- Waste composition & its calorific value
- Capital, operational and maintenance costs

The feed system of proposed hazardous waste is manual (batch); the waste will be typically batch fed into charging hopper or directly into the furnace. Incinerator will operate on the starved air principle in which the waste will be gasified and partially burnt using a support fuel e.g. LPG in primary chamber. Gaseous phase reactions will be completed in a secondary chamber and the remnant solids will be burnt as completely as possible in an air rich zone, or a tertiary chamber, at the discharge end of the incinerator. The gases and airborne particulates will then be subjected to complex clean up/ wet scrubbers before being emitted to atmosphere. A significant proportion of hazardous waste has valued as fuel, but the waste composition could be such that it might become often very difficult to achieve complete combustion using this alone. Therefore, the incinerator has designed to operate using support fuel such as LPG.

Residue generated after combustion will be removed manually. Ash cleaning/ removal will be conducted through ash doors. The doors are steel fabricated with firebrick lining from inside. Furthermore, the above stated process has also been illustrated via flowchart below:

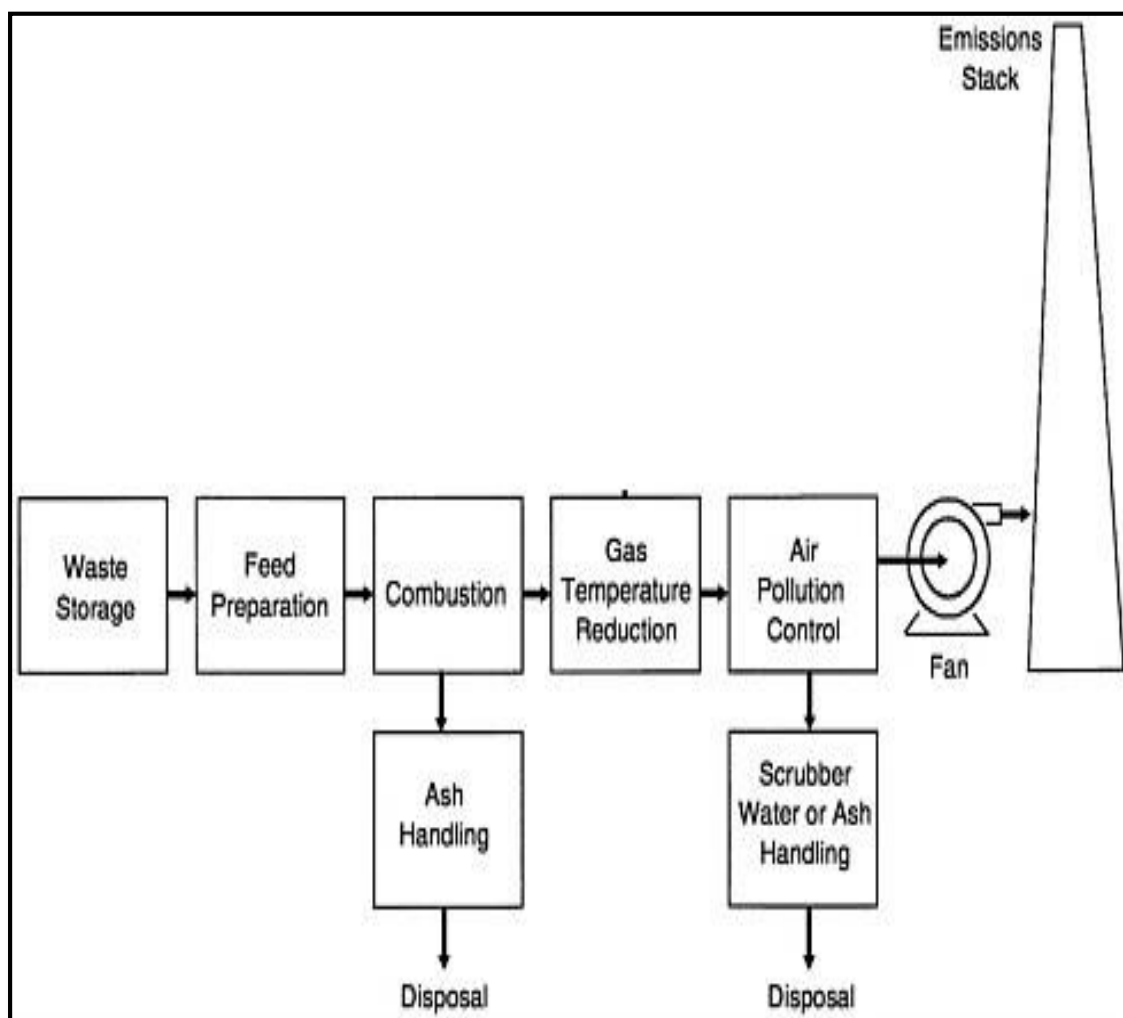


Figure 3.2: Process Flowchart

The proposed incinerator has designed to incinerate hazardous waste at the rate of 50 kg/hr. Incineration of following mentioned waste will be eluded in order to avoid harmful pollutants' release to the air:

- Pressurized gas containers
- Large amounts of reactive chemical waste
- Silver salts/ photographic/ radioactive wastes
- Halogenated plastics/ PVC
- Materials containing chlorine can generate dioxins or furans which are possible carcinogens
- Waste with high mercury or cadmium content such as broken thermometers, used batteries and lead lined wooden panels
- Sealed ampoules/ ampoules containing heavy metals

Incineration method have been adopted over the other methods of waste management which were more expensive and require additional mechanical equipment such as shredders/ or have limitations in the type of the waste that can be managed e.g. cytotoxic, pathological and chemotherapeutic waste. In addition to complying with temperature and residence time standards, incinerators (combustion chambers) shall be operated with such temperature, retention time and turbulence, as to achieve Total Organic Carbon (TOC) content in the slag and bottom ashes less than 3% or their loss on ignition shall be less than 5% of the dry weight.

The procedure of Autoclave is briefly described below;

a. Set Operating Parameters

Common sterilization cycles:

- **121°C at 15 psi (103 kPa) for 15–30 minutes** for small loads.
- **121°C for 30–60 minutes** for larger waste loads.
- Some autoclaves use **134°C for 3–10 minutes** depending on the waste type and equipment.

b. Run the Cycle

- Air is removed from the chamber.
- Steam enters and reaches the set temperature and pressure.
- The holding time begins only after the target temperature is achieved.

c. Cooling and Drying

- Allow pressure to return to normal.
- Open the door slightly and let the load cool before handling.

d. Verification

- Check autoclave tape or chemical indicators.
- Periodically use biological indicators (e.g., *Geobacillus stearothermophilus* spores) to verify sterilization effectiveness.

e. Disposal

- After successful autoclaving, waste is no longer infectious and can be disposed of according to local regulations.

3.15 DETAILS OF RESTORATION & REHABILITATION PLANS

The estimated life of the first phase of the project is 25 years. Much before the project approaches end of its first life cycle it will be completely renovated, refurbished and even new/ latest state of the art machinery will replace the old one. All civil structures and related infrastructures will be extensively renovated. Even during its first life cycle, pre-emptive modifications, replacements and refurbishing will be carried from time to time under the "order of the day principle". This will ensure enhancement of the life of the project at very nominal costs. In this way, the project life will be further enhanced for another twenty-five years or so.

All activities will be carried out in accordance with prevailing environmental management laws and controls so as to avoid any damage to any segment of environment or human health around the project site.

3.16 GOVT. APPROVALS AND LEASES REQUIRED BY THE PROJECT

So far the Environmental Approval from the EPA, Punjab, Lahore is the major requirement for which this EIA report has been prepared and submitted.

CHAPTER-4

CHAPTER 4 - DESCRIPTION OF ENVIRONMENT

4.1 GENERAL – Description of Environment

This Section of the report covers a comprehensive description of the baseline conditions of the project and its related influence area with respect to the physical, biological, and social aspects. In addition to the secondary data, the field survey was carried out in February 2025 and the environmental baseline conditions were established based on socioeconomic interviews⁴; impact location profiles; environmental profile questionnaires and public consultations.

4.2 PHYSICAL RESOURCES

Following is a brief description of various physical resources of the Project Site.

4.2.1 Topography, Geology & Soil

Faisalabad is the third-most-populous city in Pakistan, and the second-largest in the eastern province of Punjab. Historically one of the first planned cities within British India, it has long since developed into a cosmopolitan metropolis. Faisalabad was restructured into city district status; a devolution promulgated by the 2001 local government ordinance (LGO). Faisalabad district actually began as Lyallpur district in 1904 and prior to that, was a Tehsil of Jhang district.

The city of Faisalabad traces its origins to the 18th century when the land was inhabited by a number of forest-dwelling tribes. It is believed these early settlements belonged to the ancient districts of Jhang and Sandalbar, which included the area between Shahdarah to Shorekot and Sangla Hill to Toba Tek Singh. By the mid-18th century, the economic and administrative collapse of provinces within the Mughal Empire, from Punjab to Bengal, led to its dissolution. Internal unrest resulted in multiple battles for independence and further deterioration of the region, which then led to formal colonialization as established by the Government of India Act 1858, with direct control under the British Raj from 1858 to 1947. In 1880, Poham Young CIE, a British colonial officer, proposed construction of a new strategic town within the area. His proposal was

⁴Households resided in the vicinity of the project area, selected randomly and interviewed.



supported by Sir James Broad wood Lyall and the city of Lyall was developed. The predominantly Muslim population supported Muslim League and Pakistan Movement. After the independence of Pakistan in 1947, the Muslim refugees from Eastern Punjab and Haryana settled in the Faisalabad District. Initially a part of Jhang District, it gained the status of a separate district in 1904. In 1982 Toba Tek Singh District (until then a Tehsil of Faisalabad) was created as a separate district from Faisalabad. As of 2006 it is a city district consisting of the city of Faisalabad. Since 2005, Faisalabad was re-organized as a City-District, and composes of eight Tehsil Municipal Administrations.

Faisalabad lies in the rolling flat plains of northeast Punjab, at 184 meters (604 ft) above sea level. The city proper comprises approximately 1,230 square kilometers (470 sq mi) while the district encompasses more than 16,000 square kilometers (6,200 sq mi). The Chenab River flows about 30 kilometers (19 mi), and the Ravi River meanders 40 kilometers (25 mi) to the southeast. The lower Chenab canal provides water to 80% of cultivated lands making it the main source of irrigation. Faisalabad is bound on the north by Chiniot and Sheikhpura, on the east by Sheikhpura and Sahiwal, on the south by Sahiwal and Toba Tek Singh and on the west by Jhang.

Soils form major relation with environment. They influence environment by their special qualities and more so through fertility. Types of soils besides providing food, clothes or housing population serve with special food and lumber products, medicinal plants etc.

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



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

The soils of the adjoining project area are fertile and rich in both organic and inorganic mass because the project site lies right into the centre of the Ravi and Chenab River called as Rachna Doab. The area is made up of flood plain deposits of Qmx (Stream bed and meander belt deposits) and Qfx (flood plain deposits of lower terraces).

The adjoining rural area gives higher yields of crops through the use of synthetic fertilizers and pesticides. Their irrational use is adding to pollution of soil, and water bodies. Faisalabad is situated in eastern part of the Punjab. It is rich agricultural land. The pattern of the temperature and rainfall results into two periods of plant growth i.e., Rabi and Kharif. The main food crops are Gram, wheat and rice and sugar cane. The soil is mostly loamy clay and loamy. Texture of the soil plays a very important role in its water holding capacity of the soil. The same is true for various faunal species, which are important for adding the nutrients in the soil by the breakdown of organic matter and making it suitable for the agriculture.

The adjoining rural area gives higher yields of crops through the use of synthetic fertilizers and pesticides. Their irrational use is adding to pollution of soil, and water bodies.

4.2.2 Hydrology

The sub soils and sub strata encountered in the area have been formed by alluvial deposits transported by ancient streams of the Indus River System. The unconsolidated sediments are to a depth of about 900 feet. The groundwater recharge is mainly derived from the seepage of unlined canals, watercourses and from irrigation practices. Recharge directly from rainfall is small. Also, some recharge takes place from ponds, water supply and sewerage systems.

Underground Water



Groundwater is the major source of water in the study area, which is extracted with the help of pumps and motors. The groundwater extracted is used to fulfill various domestic, irrigation and industrial needs. Unfortunately, the ground water of the city Faisalabad is quite saline, hence, not acceptable for human intake. A limited quantity of potable water is accessible to the citizens from different scarce resources. In the absence of proper sweet water sources, the WASA Faisalabad has to pump and bring the sweet water from the city district (Chiniot) where ample quantity of drinking water is available

Surface Water/Wet Lands

The river Chenab and River Ravi are two rivers passing through the district. The Chenab River flows about 30 kilometers (19 mi), and the Ravi River meanders 40 kilometers (25 mi) to the southeast. The lower Chenab canal provides water to 80% of cultivated lands making it the main source of irrigation.

4.2.3 Seismicity

Seismic Zoning Map of Pakistan showing Proposed Project site area is presented as Figure – 4.1, indicating zones according to the Building Code of Pakistan - 2007. The project site office and waste transfer station at Faisalabad falls in Seismic Zone 2A according to the Seismic Zoning Map of Pakistan.

Figure – 4.2 presents the WHO Seismic hazard map of Pakistan prepared for Peak Ground Acceleration (PGA) for 500 years return period, with intensity level at “medium category”.



4.2.4 Climate

The project area lies in Tehsil and District Faisalabad. This Section describes the general climatic condition of district Faisalabad. The months of May, June and July are the hottest. Monsoon rains occur in July and August. Winter starts in end October/early November and ends till end of February. December, January and February are the coldest months.

Temperature

The temperature of the district is hot and dry during summer and moderately cold in winter. The summer season starts in April and continues till September. June is the hottest month with minimum and maximum temperatures of 27.4 C° to 41.8 C°, respectively. Relief is only provided by occasional dust storms. The winter season begins in November and lasts till March. January is the coldest month. The maximum and minimum temperatures during this month are 18.4 C° and 3.4 C°, respectively. The sky is frequently overcast during winter with meager rainfall. The monsoons set in July and continue till September. The eastern part of the district receives more rain.

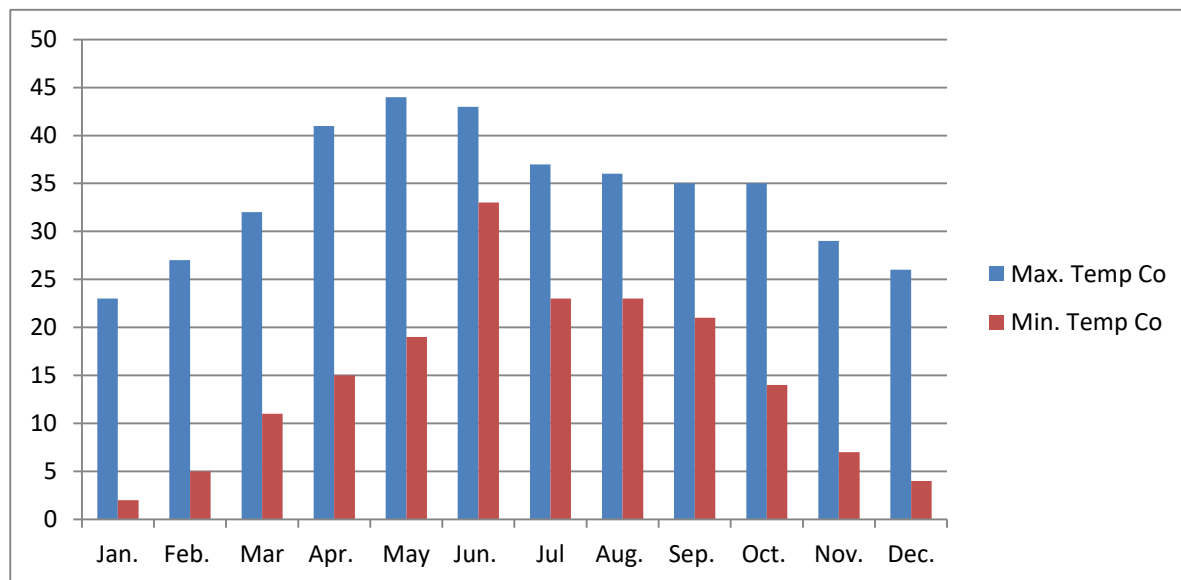
The month-wise minimum and maximum temperature is presented in Table 4.1 and graphic presentation is given in Figure 4.3

Table 4.1: Month-wise Mean Minimum Temperature, Faisalabad

Temp. Category	Jan. 2023	Feb. 2023	Mar. 2023	Apr. 2023	May 2023	Jun. 2023	Jul. 2023	Aug. 2023	Sep. 2023	Oct. 2023	Nov. 2023	Dec. 2023
Max. Temp (°C)	18.4	20.4	28	33.3	39.8	41.8	39.1	36.9	33.6	33	28.4	22.3
Min. Temp (°C)	3.4	5.4	12.6	18.9	24.7	27.4	27.4	26.9	24.4	18.6	13.6	4.8
Mean Temp (°C)	10.1	12.9	20.4	26.1	32.5	34.9	33.5	31.9	28.6	25.6	20.8	12.7

Source: www.Meoweather.com

Figure 4.3: Yearly Temperature



Note: Temperature figures are based on 2023.

Source: www.Meowweather.com

Humidity

The humidity variation in the year 2023 from January to August in District Faisalabad ranges from 32% to 66%. Month-wise mean humidity values are shown in Table 4.2.

Table 4.2: Month-wise Mean Humidity, Faisalabad

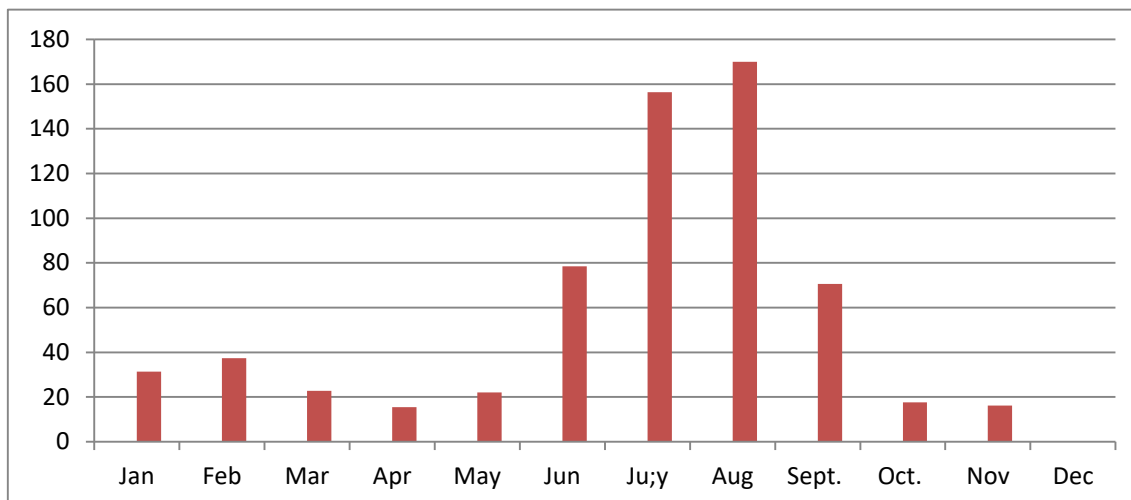
Humidity %	Jan 2023	Feb 2023	Mar 2023	Apr 2023	May 2023	Jun 2023	Jul 2023	Aug 2023	Sep 2023	Oct 2023	Nov 2023	Dec 2023
Mean Humidity	64.3	51.3	48.1	52.7	32.0	37.9	59.6	66	77.1	58.9	64.1	60.7

Source: Myweather2, 2023 (Website).

Rainfall

The average rainfall in District Faisalabad varies markedly. The rainfalls mainly occurred during the months of July, which is commonly known as monsoon month. Month-wise rainfall in district Faisalabad is shown as graphic illustration in Figure.4.4

Figure 4.4: Month-wise Total Rain (mm), Faisalabad

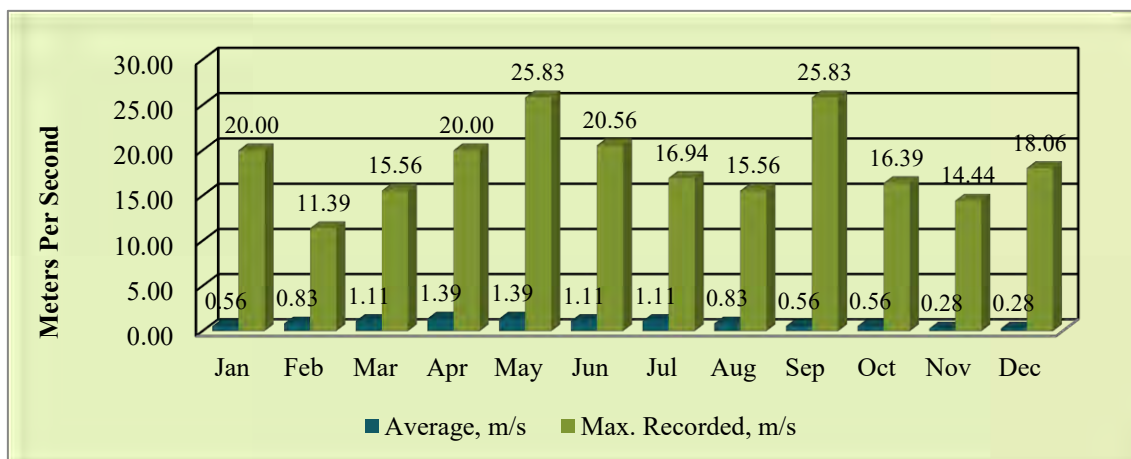


Source: mymeather2.com 2023 (website).

Wind Direction

The predominant wind direction is from North and North West directions. The average and maximum wind speed for District Faisalabad is indicated in Figure 4.5.

Figure 4.5: Average and Maximum Wind Speed, Faisalabad



4.3 ECOLOGICAL RESOURCES

4.3.1 Biodiversity

Mainly a country's wilderness areas and scenic landscapes with their associated flora and fauna form natural capital of a country. Both collectively and within each level, the range or variety of the resources is referred to as the "Biological Diversity". The contribution of the "Natural

capital” is recognized at three distinct levels including genera, species, and community-habitat and ecosystem.

Pakistan comprises of a total of nine major ecological zones and the term has relevance for each of Pakistan’s administrative units—district, province, and particularly country. The greater the number of genera, species and habitats and ecosystems present within these units, the greater is the Biodiversity. It is in this background that the biodiversity of the area is discussed below:

4.3.2 Forestry (Flora)

Since the project site is situated within the semi-urban area of the city of Faisalabad, therefore, there is no likelihood of any forest or any type of flora worth mentioning around the project.

There are no forests within about 30 km radius of the project site. Plantation, grasses and shrubs along road, and project area exists, which will be cut down during construction phase. Similarly, no worth mentioning trees are present on and around project land area.

Main Fruits

The commonly occurring main fruits of the area are Banana, Citrus, Guava and Peach

Crops

Rice; Maize and Sugarcane are the major crops being grown during the kharif (summer) and Wheat; Gram; Barley and Rabi Fodder are the major crops being grown during the rabi (winter) seasons.

Vegetables

The commonly available vegetables of the area are: Carrots, radish, ladyfinger, cauliflower, cabbage, turnip, red and green chilli, spinach, peas, pumpkins, bitter melon, and tomatoes.

4.3.3 Wildlife (Fauna)

The project is to be sited within the semi-urban area of Faisalabad District; therefore, there is no likelihood of any wildlife, game reserves or else around the project site. On very limited scale the following native birds

like sparrows, pigeons, crows, doves, rats, lizards, snakes, etc., are found here and there, like in all Punjab.

4.3.4 Fisheries and Aquatic Biology

The project site is in the semi-urban setting. However, there are no worth mentioning sources of fishery in the form of fresh water fishery or fishing ponds or else in the area of influence of the project.

4.4 HUMAN & ECONOMIC DEVELOPMENT

4.4.1 Population & Communities:

The project lies in the district Faisalabad, Pakistan between longitude 73°74 East, latitude 30°31.5 North, with an elevation of 184 meters (604 ft.) above sea level. According to census 2017 the population of District and city Faisalabad is 7.8 Million and 4.7 Million respectively. The total area of Faisalabad District is 5,856 km² (2,261 sq mi) while the area controlled by the Faisalabad Development Authority (FDA) is 1,280 km² (490 sq mi). Faisalabad's GDP (PPP) in 2013 was \$43 billion (USD). The average annual GDP of Faisalabad is \$20.5 billion calculated by averaging GDP projections from 2015 to 2025 agriculture and industry remains its hallmark. Faisalabad contributes over 5% toward Pakistan's annual GDP; therefore, it is often referred to as the "Manchester of Pakistan".

Like other districts in the province, Faisalabad is headed by the district coordination officer (DCO) assisting the divisional commissioner and is accountable to him. The DCO is appointed by the provincial government from the federal or provincial civil service. The DCO coordinates with executive district officers (EDOs), who head each of the district offices.⁵

The field surveys have shown that the settlement pattern of the project area and its vicinity is mostly urban with no residential settlements exist in the vicinity of the project site. The population located in the project area is divided in main caste groups, such as Arian, Sheikh, Jutt, Jafari, Malik, Rajput, Butt and Ansari.

⁵www.paiman.org.pk

A large number of people in the area belong to the lower middle class segment of the society. A segment of the people belongs to middle class, while there are a few number of the people who live below the poverty line. Awareness about importance of education is growing and the same is reflected by the large number of students in educational institutes within the city and in other cities of learning. Easy access to print and electronic media are also playing great role in modifying life style. With this background and large cross section of the urban population still stick to social customs of the old past. Old traditional life style is being followed in almost all walks of life. Elders belong to respected group and they play vital role in decision making. Most of the old generation is uneducated. Old customs are loved and practiced. Arranged marriages are liked and they are quite successful. Joint family system prevails. The people are very hospitable.

The field survey (including interviews, focus group discussions, census, and area profile) was carried out to collect the socioeconomic data from the project affected people as well as other general population to accomplish the baseline information, which will provide the basis for subsequent monitoring and evaluation studies.

The demographic features include the information on household's profile, gender composition, occupations, and literacy status of the population residing in the project area. The information relating to the demographic profile of the people in the project area are described below.

Family Size and Gender Composition

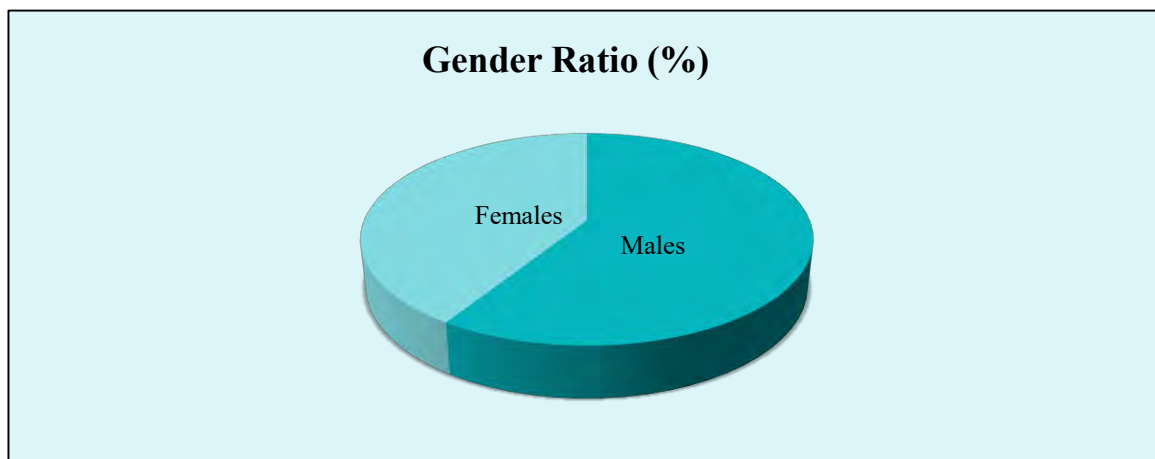
Based on the field survey of sample affected people/ local population, the average family size computed to be 6.82, out of which the proportion of male and female members is 59 percent and 41 percent respectively as shown in Table 4.3 and Figure 4.6.

Table 4.3: Average Family Size & Gender Composition

Average family Size (No.)		
Gender Composition (%)	Male	Female
6.82	59	41

Source: Pakistan Bureau of Statistic

Figure 4.6: Gender Composition



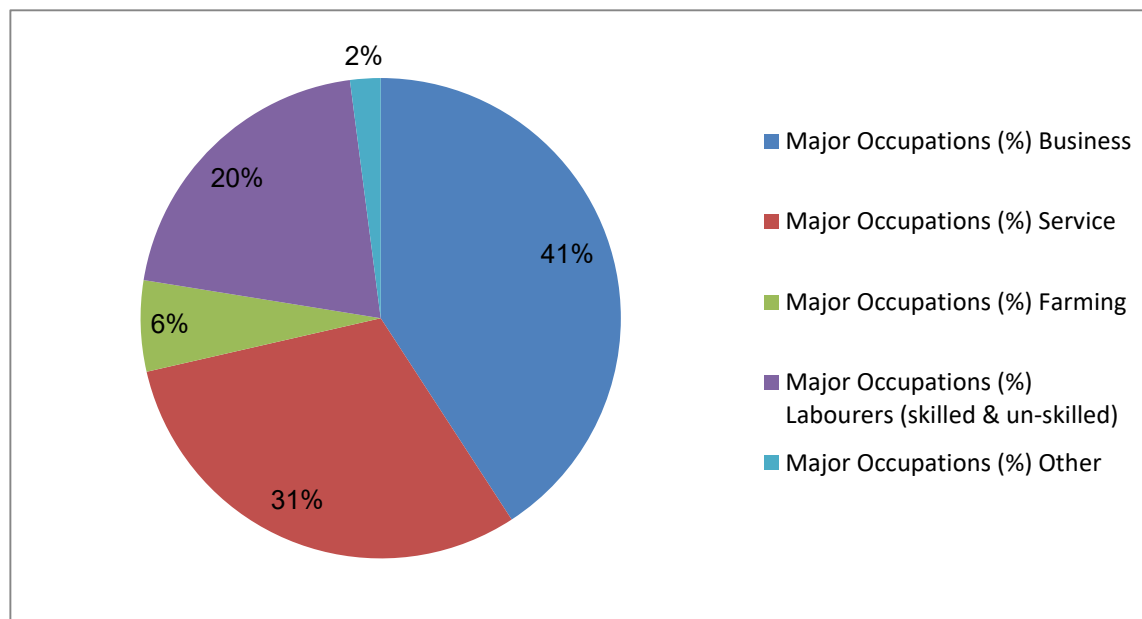
Employment

In the vicinity of the project area, the sample population are involved in different occupations in order to meet their living expenditure. Out of total sample population, 40.8 percent are involved in self business like shops/stores, while 30.6 percent are employed in various services. About 6.12 percent population is involved in farming activities. The percent of labor both skilled and un-skilled of the area is 20.41, while 2.05 percent are daily-wage laborers and others respectively. Table 4.4 and Figure 4.7 shows the major occupations of the sample population resided in vicinity of the project area.

Table 4.4: Major Occupations of the Sample Population

Major Occupations (%)				
Business	Service	Farming	Labourers (skilled & un-skilled)	Other
40.82	30.60	6.12	20.41	2.05

Figure 4.7: Major Occupations of Sample Population



Literacy Status

The general disparity in education exists in low-income communities. Faisalabad district is blessed with higher educational facilities like Agriculture University, Government College University, Sub Campus University of Sargodha, several government and private colleges for boys and girls and technical/ poly institute.

The field survey has shown that on the whole, in the vicinity of the project site, the average literacy rate of the local population estimated as 61.98%. The percentage of literacy rate among males and females residing in the vicinity of the project area is computed to be 68.53 and 52.55 percent respectively. The literacy rate of male and female population in urban and rural area is shown in table 4.5.

Table 4.5: Average Literacy Rate of the Sample Households

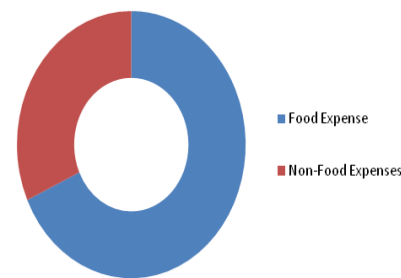
Literacy rate	Male	Female
Project vicinity	68.53%	52.55%
Urban	60.41%	39.59%
Rural	80.67%	19.33%
Overall District	65.8%	34.2%

Note: This is the average literacy rate of population resided in the vicinity of project site.

Average Household Expenditure

The annual expenditure and pattern of expenditure provides an indication for assessing standard of living of a household. The expenditure on food items include cereals, pulses, flour, sugar, cooking oil/ ghee, milk etc., while the non-food items including the expenditure on education, medical treatment, clothes, shoes, cosmetics.

The proportion of expenditure incurred on food and non-food items is 70% and 30% respectively.



4.4.2 Industries

Faisalabad is recognized as the center of the textile industry in Pakistan, contributing to half of Pakistanis total textile shipments. At the end of June 2012, textile mills employed 20% of the nation's workforce, and generated 1.3 trillion rupees (\$13.8 billion) in textile products, most of which were exported to the US and Europe. While Punjab's economy is driven primarily by agriculture, the textile industry along with leather products and light engineering goods play an important role, with more than 48,000 industrial units spread across Punjab. In an effort to boost bilateral trade, Romania and Turkey have honorary-consulates in Faisalabad which enable trade links with the city.

Faisalabad is an industrial center with major railway repair yards, engineering works, and mills that process sugar, flour, and oil seed. Faisalabad is a major producer of superphosphates, cotton and silk textiles, hosiery, dyes, industrial chemicals, beverages, clothing, pulp and paper, printing, agricultural equipment, and ghee (clarified butter). The Faisalabad Chamber of Commerce and Industry monitors industrial activity in the city and reports their findings to the Federation of Pakistan Chamber of Commerce and Industry and provincial government. The city has a major dry port and international airport.

4.4.3 Infrastructure

During the field survey, the availability/ or access to basic infrastructure/ services to the local population was recorded. In this context, it was observed that on the whole, all basic infrastructure/ facilities, i.e. education & health facilities, electricity, telephone/ cell, roads, fuel/ filling station etc. were available to almost all the sample of population resided in the vicinity of the project area.

The area is supplied electricity from the National Grid of Water and Power Development Authority. Variety of private road transport in the form of buses, trucks and wagons are available to reasonable extent. Underground water is used for drinking and other domestic purposes.

4.4.4 Institutions

There are number of private as well as governmental educational institutions are present in District Faisalabad. List of well-known school, colleges, basic education institutions as well as higher education institutions is described below:

- NFC Institute of Engineering and Fertilizer Research (NFC-IEFR)
- National University of Modern Languages (NUML)
- University of Engineering and Technology, Lahore: Faisalabad campus
- Riphah International University Faisalabad
- University of Agriculture, Faisalabad
- Punjab Medical College
- Aziz Fatimah Medical and Dental College
- Government College University, Faisalabad
- Government College Women University (Faisalabad)
- National Textile University
- University of Faisalabad
- Independent Medical College, Faisalabad
- University of Education
- Virtual University
- Institute of Cost and Management Accountants of Pakistan (ICMAP)

- Institute of Chartered Accountants of Pakistan (ICAP)
- Pakistan Institute of Public Finance Accountants (PIPFA)
- College of Physicians and Surgeons of Pakistan (CPSP)

In 2014, the University of Agriculture ranked 1st in agriculture and 4th overall for universities in Pakistan according to the Higher Education Commission of Pakistan (HEC), and was ranked 142nd in the 2013 Top 200 World Universities for agriculture and forestry by Quacquarelli Symonds (QS). In addition to the Zarai Taraqati and commercial banks, private banks, khushali banks and various NGOs like NRSP, PRSP, Akhuwat are working in field of micro-financing. These loans are used for domestic and social needs and agricultural inputs.

4.4.5 Transportation: Roads, Rails, Airports, Navigable Rivers

The project site is located at Main Sumundri Road, enjoys the vast road network. Faisalabad railway station is ~ 22 Km from the project site, it is one of the oldest railway station in Pakistan. The river Chenab and River Ravi are major water bodies in the district. Nearest airport is Faisalabad airport and is ~33 Km from the project site.

4.4.6 Land Use Planning

The project site is situated in semi-urban zone. The entire land use planning is carried out according to the provincial laws. Land use planning of the proposed site will be controlled by project proponent and as lies in semi-urban zone far from residential area so no threat to community.

4.4.7 Power Sources & Transmission

Faisalabad Electric Supply Company (FESCO) power network operates in the area. Proposed project will acquire 10-12 Amp power during operational phase from FESCO. LPG will be used as fuel for regular operation of incinerator. Transmission of power is through overhead electric transmission lines. National grid is the source of all power in the area.

4.4.8 Agriculture & Mineral Development

The project area lies in the semi-urban zone. Extensive area is under the use of agriculture & vacant plots. Underground water, canal system by using tube-wells and motor is used for agriculture but due to cost factor this is unaffordable by many people. Agriculture alone cannot sustain life of the people.

Punjab is also a mineral rich province with extensive mineral deposits of Coal, Iron, Gas, Petrol, Rock salt (with the second largest salt mine in the world), Dolomite, Gypsum, and Silica-sand. The Punjab Mineral Development Corporation is running over a hundred economically viable projects. Manufacturing includes machine products, cement, plastics, and various other goods.

4.5 QUALITY OF LIFE VALUES

4.5.1 Socioeconomic values

Majority of the residents of the city Faisalabad belong to middle class. Small proportion of people is among the affluent class. Some people earn their livelihood while performing private jobs, carrying out business on small and large scale and even running very small shops etc.

Importance of educational values is highly found. Consequently, the people send their children to educational institutions and try to get them educated to the extent their financial means permit them. The people share with each other the social, cultural and economic values of life. To a greater extent there is harmony towards collective interests among the people.

Mostly, locals follow old traditions in almost every walk of their life. Elderly people command respect and play deciding role in decision making. A large cross section of the older generation is uneducated. But due to awareness about education younger generation of both sexes, is now trying to get education in almost every department including science and technology on preferential basis. There is a rising trend in the society to change their old traditional socioeconomic pattern of life. Print and

electronic media are playing great role in bringing tangible change in the old pattern of life.

On overall basis, about 40% of the sample population is women. Women are participating to alleviate poverty, enhance economic growth and human well-being of the families by involving in farming and other income generation activities.

It can be concluded that in the vicinity of the project area, women are involved in several households and income generation activities. In general, there is no issue with the women of the study area associated with the implementation of the project. However, during the consultative meetings, local women pointed out that some suitable jobs to their male members should be provided. In this way, in addition to their jobs, they can also look after their household activities.

During the field survey of the project area, no indigenous people and affected women headed households were observed in the project area as well as in the vicinity of the project area. Thus, there would not have any impact on the indigenous people and women headed households' due to the implementation of this project.

Environmentally speaking, the carrying capacity of the environment is not utilized. The project activity, under the proposed strict operational environmental controls, is not going to leave adverse impacts on all out environment. The operational Environmental Management Plan and Environmental Monitoring Plan further provide protection to the environment around. Legal compliance of environmental monitoring with PEQS standards is to doubly ensure environmental protection of all the segments of the environment.

4.5.2 Public Health

Small scale dispensaries/ clinics are available at some settlements of the area. A Daluwal hospital is located at distance of ~ 3 Km from project for medical needs of the people of the area. Different other hospitals such as

Fazal Hospital (4 Km) and Civil Hospital (3.5 Km) are also present fulfilling medical needs.

4.5.3 Recreational Resources & Development

There is no recreational place found in the vicinity and nearby area of the project site. Thus, there would not have any negative impact on the recreational activities of the local population/ community due to the implementation of this project.

4.5.4 Cultural & Aesthetic Values

The shrine of Sufi Barkat is situated at the distance of ~ 15-20 Km which is far away from project site. No cultural, religious and other structures are present in the vicinity of the project area.

4.6 BASELINE ENVIRONMENTAL QUALITY

4.6.1 Ambient Air Quality

The degradation of air quality in all the large cities is a major environmental concern these days. Air pollution levels in urban centers have either crossed safe limits given in the PEQS or have reached the threshold values. About 60 to 70 % of the deterioration in the air quality is due to the vehicular emissions. The parameters which have proved to be the major threat are particulate matter and concentration of oxides of nitrogen that are relatively higher in all the large cities of Punjab.

The proposed project area is mostly semi-urban area. Vehicular traffic is the major contributor for environmental pollution. The project sections pass through barely built-up area with residential, commercial and institutional establishments. The ambient air quality data with respect to PM (PM₁₀), SO_x, NO_x and CO was measured at specified sites. The data was collected during the month of February 2025 by Solution Environment and Analytical Laboratory Lahore. Standard methods of environmental monitoring were used for sampling and data analysis.

The result of the tests concludes that the values obtained for all of tested parameters are within permissible limits illustrated in tables below. Air Quality test report has been attached as **Annexure-IV** of this report.

Table 4.6: Monitoring results of PM at project site

Reference Point	(Particulate matter)($\mu\text{g}/\text{m}^3$)
Eastern side of the proposed project site	105.13
Western side of the proposed project site	103.47
Northern side of the proposed project site	54.28
Southern side of the proposed project site	69.62
Centre side of the proposed project site	54.19
Punjab Ambient Air Quality Standards (PAAQS)	500.0

Table 4.7: Monitoring results of Ambient Gases at project site

Reference Point	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO ₂ ($\mu\text{g}/\text{m}^3$)	CO (mg/m^3)
Eastern side of the proposed project site	15.7	20.2	0.15
Western side of the proposed project site	24.4	24.6	0.12
Northern side of the proposed project site	11.9	28.1	0.18
Southern side of the proposed project site	26.5	15.2	0.15
Centre side of the proposed project site	6.9	5.2	0.12
Punjab Ambient Air Quality Standards (PAAQS)	120.0	80.0	5.0

4.6.2 Ambient Noise Levels

Noise is generally used as an unwanted sound, or sound which produces unpleasant effects and discomfort on the ears. Noise is considered as environmental pollution, even though it is thought to have less damage on humans than water, air or land pollution. Generally, problems caused by noise pollution include stress, hearing loss, sleep disruption etc. During the construction phase of this scheme, noise can be generated from machinery used.

Traffic movement in area is considered to be the major cause of noise pollution. The noise levels were monitored during day-time by APEX Environment Laboratory during month of February 2025 noise levels were monitored with Noise Level Meter, Model OS-11.

On comparison of noise quality data with the limits specified for in ambient noise quality standards; it is evident that noise values at almost all sites are within permissible limits as presented in table below. Noise Quality test report has been attached as **Annexure-V** of this report

Table 4.8: Monitoring results of Noise at project site

Reference Point	Day L _{eq}	Night L _{eq}
Eastern side of the proposed Project site	50.4	30.4
Western side of the proposed Project site	49.6	29.2
Northern side of the proposed Project site	47.9	25.7
Southern side of the proposed Project site	49.7	25.7
Centre side of the proposed Project site	50.2	28.2

4.6.3 Water Quality

Water quality refers to the chemical, physical, biological, and radiological characteristics of water. It is a measure of the condition of water relative to the requirements of one or more biotic species and or to any human need or purpose. It is commonly compared with a set of standards against which compliance can be assessed.

The water resource in the study area includes groundwater. The groundwater is extracted by means of wells, hand pumps and electric motors. All of tested parameters for drinking water quality are within permissible limits as shown in table below. The results of the water quality test reports have been attached as **Annexure-VI** of this report.

Table 4.9: Monitoring results of Groundwater at project site

Sr. No.	Parameter	Unit	Result	Punjab Environment Quality Standards
1	pH	--	7.4	6.5-8.5
2	Color	TCU	2	<15
3	Taste	--	OK	Non Objectionable
4	Odor	--	OK	Non Objectionable
5	Turbidity	NTU	1	<5
6	Total Hardness as CaCO ₃	mg/l	177	<500
7	Total Dissolved Solids (TDS)	mg/l	390	<1000
8	Aluminium(Al)	mg/l	N.D	0.2
9	Arsenic(As)	mg/l	N.D	<0.05
10	Antimony(Sb)	mg/l	N.D	0.005
11	Barium(Ba)	mg/l	N.D	0.7
12	Boron(B)	mg/l	N.D	0.3
13	Cadmium(Cd)	mg/l	N.D	0.01
14	Chloride (Cl)	mg/l	92	250
15	Chromium(Cr)	mg/l	N.D	0.05
16	Copper(Cu)	mg/l	0.2	2
17	Cyanide(CN)	mg/l	N.D	0.05
18	Fluoride (F)	mg/l	0.06	<1.5
19	Lead(pb)	mg/l	N.D	0.05

20	Manganese(Mn)	mg/l	0.04	0.5
21	Mercury(Hg)	mg/l	N.D	0.001
22	Nickel(Ni)	mg/l	N.D	0.02
23	Nitrate (NO ₃)	mg/l	16.7	<50
24	Nitrite (NO ₂)	mg/l	0.2	3
25	Selenium (Se)	mg/l	N.D	0.01
26	Residual chlorine	mg/l	N.D	0.2-0.5
27	Sulphate as SO ₄ ²⁻	mg/l	209	400
28	Iron as Fe ³⁺	mg/l	0.03	0.3
29	Sodium	mg/l	84	200
30	Zinc (as Zn ²⁺)	mg/l	0.92	5.0
31	Total Coliform	Number/100ml	N.D	0/100 ml
32	E-Coli	Number/100ml	N.D	0/100 ml

CHAPTER-5

CHAPTER 5 - PUBLIC CONSULTATION

5.0 Public Consultation

5.1 GENERAL – Public Consultation

This section deals with the public concerns about the said project. As already given in the description of the project, the said project will be based on collection, transportation, storage and incineration of hazardous/ medical/ clinical waste from Punjab province. Consultation with stakeholders is a tool for managing two-way communication between the project sponsor and the public. Its goal is to improve decision making and build understanding by actively involving individuals, groups and organizations which have a stake in the project. This involvement increases project's long term viability and enhances its benefits to locally affected people and other stakeholder.

Consultation with the community and their active participation plays a vital role in successful implementation of the development projects. To identify the different types of stakeholders and ascertain their perception about the construction of the incinerator facility, an impact assessment survey was conducted by keeping in view the requirement of '*Review of IEE/ EIA Regulations 2022*'. Stakeholders were consulted with the help of structured/ semi-structured tools. The stakeholders were also asked about the operation of existing incinerator and any complaint they have about the existing unit. Informal group discussions were also held as an additional tool for obtaining feedback that are being discussed on the following pages.

Public consultations were carried out keeping in view the following main objectives:

- Sharing of information with stakeholders/ public on the proposed project activities and assess expected impacts.
- Understanding the stakeholder's concerns regarding the various aspects of the project, including the project technology, existing situation and the potential impacts of the project during collection, transportation, storage and disposal phase of the project.

The following methodologies have been used for carrying out public consultation:

- Local communities, educated individuals and communities who are directly or indirectly affected by poor management of waste heaps were given priority while conducting public consultation.
- Walk-through informal group consultations
- The communities had been informed through public consultation with briefing on project interventions including its benefits.
- The environmental concerns and suggestions made by the participants were listed out, discussed and suggestions were accordingly incorporated in the EMP.

5.2 FEEDBACK/ CONCERNS HIGHLIGHTED

The people who were consulted are of the view that such project are dire need of country in view of the present status of waste generation and non-availability of sufficient and proper waste management services to most of the cities of Punjab. Solid waste management and its disposal has assumed a major environment challenge over the past many years.

200 people from local community were consulted during the public survey and majority of people consulted were of view that such project scheme must encourage to manage the waste systematically and responsibly. All of eminent concerns of consulted people have mentioned below:

- Majority of stakeholders appreciated the project and consider it as necessary step towards the current situation of waste problems
- They focused on a point to encourage such schemes in order to decrease health and environmental impacts associated with open burning and dumping of hazardous/ medical/ clinical waste.
- Few people were concerned about the waste that would be left behind after burning and how that waste is going to be handled, odor to the waste carrying by trucks/ pickups etc.
- Their reservations were quite obvious regarding gaseous emissions associated with waste incineration process
- Expectations about employment opportunities and community development were extremely high among all stakeholders

- Most of them foresee positive impacts like reduction in odor due to waste open dumps, less health associated impacts, improves cleanliness and aesthetics of the area.

Besides, written views and observations of related stakeholders were noted during field survey and attached as **Annexure-VII** of this report.

5.3 GREIVANCE REDRESSAL

Key concerns highlighted by consulted stakeholders were settled by suggesting following measures:

- Project activities will be confined to the designated project site, minimizing any damage to the environment
- Proposed incinerator plant will be equipped with state of art technologies e.g. wet scrubber for control of particulate matter and emissions. Regular monitoring of emissions will be practiced to comply with PEQS
- Waste will be transported with proper cover on vehicles to avoid littering & odor dispersal
- Waste will not be stored more than a day before incineration to outlie the odor spread
- Project will be operated on scheduled time to avoid any grievance
- There is no removal of trees and habitat destruction due to project activities as there exist no trees/ habitat at the proposed site
- All unskilled jobs (watchman, laborers) would be given to the locals on priority
- Appropriate measure for safety and control of pollution during project activities will be followed to avoid risk to the community

5.4 PROJECT BENEFITS

As far as the Social Impacts are concerned, positive social impacts are dominant over hardly conceived any negative social impacts observed during the study. Among the people consulted as a part of the Public Consultations, most proportion of them welcome the project. The people have clear perception that the systematic waste management is beneficial for local community especially and the area in general. They have positive expectations and hopes from the project activity and its management.

Proposed project can be related as positive attitude towards current waste management schemes with benefits like reduction of risks to health, less exposure to biohazards and infestation of pest. This project and its related activities will provide a strong base for social change.

From the above facts one can conclude that many more positive environmental and social impacts will appear in the quality of the lives of the people due to this project.

CHAPTER-6

CHAPTER 6 - SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

6.0 Screening of Potential Environmental Impacts and Mitigations

6.1 GENERAL – Potential Environmental Impacts and Mitigations

The potential environmental impacts related to the proposed project have been studied related to design, collection, transportation, storage and incineration stages of the waste management. Environmental protection measures are recommended to eliminate adverse environmental impacts or to reduce them to an acceptable level within the prevailing legislative and regulatory framework.

6.2 IMPACT ANALYSIS

Potential Environmental impacts associated with proposed study has been analyzed by a process wherein a group of experienced people with relevant experience were involved for identifying potential safety and operational problems associated with the design, maintenance or operation of a plant. They assessed different parts/ components of proposed project in critical view to environmental protection. Proposed project has been evaluated laterally and collectively about what impacts might be expected to arise with the incineration facility.

Impacts are evaluated on the basis of magnitude, immediacy and sustainability. Evaluation criteria are as follows:

- Magnitude
 - Type of impact (direct, indirect, cumulative)
- Immediacy
 - Temporal extent (during construction, after construction)
 - Spatial extent (local, widespread)
- Sustainability and Reversibility
 - Mitigability (fully, partially)
 - Monitoring (fully, partially)

Furthermore, **consultative meetings** were held for impact analysis with EIA team members and proponent of the project. Risk rating factors were the main agenda



of these meetings for each environmental inventory element. Final outputs are presented in following sections below.

6.3 METHODOLOGY FOR IMPACT IDENTIFICATION

Screening of the potential impacts associated with the proposed project activities was carried out with help of Checklist, Leopold Matrix and Network method specifically tailored for this project.

6.3.1 Checklist

This lists significant environmental effects known to have occurred in past thermal power development projects. This is arranged to permit (i) ready screening out of non-pertinent items by checking the column ‘No significant effects’ and (ii) ready grading of significant environmental effects by degree of effect. The following checklists show checklist of environmental parameters for hazardous waste incinerator:

Table 6.1: Checklist for Environmental Consequences

Sr. No.	Activity / Parameter	Y*	M*	N*	B*	Impact**	Explanation of Environmental Consequences (Y, M, B)
1) Earth Resources							
1.1	Excavation and leveling	✓				Minor	Excavation of insignificant level will be carried out for the basement of proposed building.
1.2	Geological hazards						
	Faults		✓				The building structure will be designed to withstand the seismic action (load) without local or general collapse.
	Landslides			✓			
	Un-engineered fill			✓			
	Earthquake consideration	✓				Minor	The proposed structure will be designed to withstand seismic loads in accordance with the Uniform Building Code – 1997, Building Code of Pakistan Seismic Provision – 2007 to ensure the safety of the building during such an event. The significance of this impact is minor as the proposed building will be constructed as per the applicable building code for Faisalabad and adjoining areas
1.3	Contaminated soils		✓				Possibility of soil contamination due to oil spills from generators, vehicle workshops, and accidental spills. The chances of soil contamination are close to negligible.
1.4	Contaminated surface or groundwater		✓				The chances of groundwater contamination are close to negligible as the proposed site is an area where no major activity generating excessive effluent exists.
1.5	Borrow pits		✓				Borrow pits (if any), will be restored after completion of the construction activities.
1.6	Loss of high-quality farmlands			✓			
1.7	Site drainage	✓				Minor	A surface drainage system will be designed to cater the needs of the site.

Sr. No.	Activity / Parameter	Y*	M*	N*	B*	Impact**	Explanation of Environmental Consequences (Y, M, B)
2) Air Quality							
Substantial increase in onsite air pollutant emission-construction phase							
2.1	Dust emissions during construction activities	✓				Moderate	Dust emissions during construction will be mitigated by applying measures as per EMP.
	Emissions from vehicles and machinery		✓			Minor	Emissions from vehicles and machinery used during the construction phase will be mitigated by adoption of measures as presented in EMP.
	Substantial increase in odor during construction		✓				Paint, polishing, pesticide spray would produce odor. Safe Use Action Plan will be implemented and further impacts will be mitigated by using proper mitigation measures as per EMP.
Substantial increase in onsite air pollutant emission-operation phase							
2.2	Emissions from generators		✓				Proposed project activity would involve use of generator of 6 kVA capacity during load-shedding hours. Therefore, proper mitigation measures for use of generator would be adopted as per EMP to avoid deterioration of air quality and depending on their size; compliance with Tier 4 US EPA requirements and other local applicable standards will be ensured.
	Increase in odor		✓				Proper ventilation within the building will be ensured.
	Violation of applicable air pollutant emissions or ambient concentration standards	✓					To limit air emissions from incineration of waste, it must be properly operated and carefully maintained. Operation temperature must be 600 – 800 °C in primary chamber and 800 – 1200 °C in secondary chamber.
	Consideration of indoor air quality	✓					Indoor environmental quality will have an impact in terms of the health and productivity of the building user. Poorly designed buildings will lead to increased operating costs and waste of resources. Indoor air quality will be improved by keeping in view the proper ventilation of the building.

Sr. No.	Activity / Parameter	Y*	M*	N*	B*	Impact**	Explanation of Environmental Consequences (Y, M, B)
3) Water Resources and Quality							
3.1	River, stream or lake onsite or around the project site			✓			
3.2	Provision of safe drinking water during operational phase				✓		Water needs will be fulfilled by groundwater which is found safe for drinking after monitoring results appended as Annexure-VI .
3.3	Presence of any wetland of national importance (like game reserve, wildlife sanctuary etc.) or international significance (like Ramsar site etc) located within or around the proposed project site			✓			
3.4	Discharges to surface or groundwater			✓			
3.5	Onsite bulk storage of liquid fuels or hazardous materials.		✓				Chemicals including paints, pesticides, fuel etc. may be stored on padded floor with impermeable lining.
3.6	Site Drainage.			✓			The sewerage/ waste water from the proposed facility will be disposed off into the sewer line. Small diameter sewer line collecting the sewage flow from the proposed center will be combined with the external existing sewer at an appropriate point keeping in view the diameter and invert level etc. Due care will be taken to study the invert levels of the existing main sewer lines.
4) Cultural resources							
4.1	Pre-hisotric, historic or paleontological resources within or around the proposed construction site.			✓			
4.2	Any gazetted or notified			✓			

Sr. No.	Activity / Parameter	Y*	M*	N*	B*	Impact**	Explanation of Environmental Consequences (Y, M, B)
	archaeological site located within or around the project site						
4.3	Any cultural, religious site located around the project site.			✓			
4.4	Site/ facility with unique cultural or ethnic values.			✓			
5) Biological resources							
5.1	Vegetation removal			✓			Proposed project does not involve any vegetation removal/ tree cutting.
5.2	Construction in wetlands or riparian areas			✓			
5.3	Use of pesticide/ rodenticide/ insecticide	✓				Minor	Anti-termite treatment will be used according to Regulation 22 CFR 216.3 (b) (a through l). Only registered pesticide from USEPA will be used. Proper safety measures including use of Personal Protective Equipment (PPE) will be ensured. Selection, storage and application of pesticide will be recommended as per 2011 Pakistan Programmatic Umbrella PERSUAP.
5.4	Protected areas (wildlife sanctuary, national park) or within game reserve declared by provincial wildlife Ordinances/ Laws			✓			
5.5	Any rare, threatened or vulnerable wildlife or vegetation specie observed/reported in or near project site			✓			

Sr. No.	Activity / Parameter	Y*	M*	N*	B*	Impact**	Explanation of Environmental Consequences (Y, M, B)
5.6	Presence of core habitat for any key wildlife species, within or in close vicinity of project site (e.g, path of migratory birds)			✓			
6) Planning and Land Use							
6.1	Potential conflict with adjacent land uses			✓			
6.2	Non-compliance with existing codes, plans, permits or design criteria			✓			
6.3	Potential impact on adjacent buildings due to construction of existing structures			✓			
6.4	Construction in public park or designated recreational areas			✓			
6.5	Create substantially annoying source of light or glare			✓			
6.6	Relocation of > 10 individuals for +6 months			✓			
6.7	Interrupt necessary utility or municipal services for more than 10 individuals for +6 months			✓			
6.8	Substantial loss/ inefficient use of mineral or nonrenewable resources			✓			
6.9	Increase in existing noise levels	✓					Noise will be generated during construction/ operational activities. To minimize the noise impact proper mitigation measures will be adopted as per EMP
6.10	Non-compliance with building codes (structure failure)			✓			

Sr. No.	Activity / Parameter	Y*	M*	N*	B*	Impact**	Explanation of Environmental Consequences (Y, M, B)
7) Traffic, Transportation and Circulation							
7.1	Increase vehicle load or congestion on existing roads		✓				Main Sumundri Road can bear load upto double excel truck however; restoration of any damage to road shall be paid by project proponent.
7.2	Onsite congestion due to construction vehicles.		✓				Allocation of proper place for waste transportation vehicles will be carried out to avoid congestion and haphazard movement of vehicles onsite.
8) Hazards, Workers Safety							
8.1	Substantially increase risk of fire, explosion, or hazardous chemical spill or leakages		✓				Any potential increase in risk of fire, explosion, or hazardous chemical release will be minimized onsite for handling any emergency situations as mentioned in EMP.
8.2	Accidents or human health hazard		✓				Risks of accidents and human health hazards will be avoided by putting caution signs and use of PPE during work hours as mentioned in EMP.
8.3	Workers safety	✓				Minor	Safety procedures will be ensured during electrical installations and operational/ incineration activities.
9) Hazardous waste							
9.1	Collection of waste	✓				Moderate	Waste must be collected from designated sites at decided time shifts. Workers handling with the waste collection procedures must be trained of their code of work. Ensure use of PPEs.
9.2	Transportation of waste	✓				Moderate	Vehicles indulge for waste transportation must be properly covered to avoid environmental nuisance from littering/ odor.
9.3	Waste Storage	✓				Moderate	Environmental impacts associated with its storage such as scavenging, scattering, odor etc. may be observed. Bio-medical waste will not be stored for more than 24 hrs. This must be avoided as per measures suggested in EMP in detail as well.

Sr. No.	Activity / Parameter	Y*	M*	N*	B*	Impact**	Explanation of Environmental Consequences (Y, M, B)
10) Waste Incineration							
10.1	Stack Emissions	✓				Major	Same as mentioned in 2.2 of this checklist. In addition, impacts will be mitigated according to measures mentioned in EMP.
10.2	Ash Disposal	✓				Major	Regular and thorough cleaning of the incinerator, including ash removal is absolutely essential for efficient operation. Ash will be disposed off as per measures suggested in EMP.
11) Electrical and Mechanical Installations and Fixtures							
11.1	Presence of Halons, HCFC's in HVAC systems, refrigeration equipment and fire suppression equipment.			✓			
11.2	Presence of PCBs in electrical equipment.		✓				Electrical equipments free from PCBs must be installed.
11.3	Safety issues for using low quality cables and appliances.		✓				Chances of short circuiting and fire hazard are more in low quality cables so high quality cables and appliances will be used.
12) Paints							
12.1	Presence of Lead and arsenic or any other banned chemical in the paints.		✓				Some paints may contain toxic substances such as arsenic ⁶ . Such paints will not be allowed to use.
13) Spills/ Leakages							
13.1	Leakages from generators		✓				Regular monitoring is required to prevent any leakages.
13.2	Leakages from construction vehicles and machinery		✓				All spills/ leakages from construction vehicles and machinery will be mitigated according to EMP.
14) Result							

⁶ TECHNICAL BULLETIN HEALTH EFFECTS INFORMATION; Oregon Department of Human Services,
<http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/Monitoring/Documents/health/arsenic.pdf>

Sr. No.	Activity / Parameter	Y*	M*	N*	B*	Impact**	Explanation of Environmental Consequences (Y, M, B)
14.1	Substantial adverse impact			✓			
14.2	Adverse impact			✓			
14.3	Minimal impact	✓					Overall the project will have minimal impact.

Notes:

Y*: Yes, M*: May be, N*: No, B*: Beneficial

** Impacts: Minor, Moderate, Major



6.3.2 Leopold Matrix

With the help of this matrix, interaction of various project activities with various components/aspects of the environment was identified. This interaction was then categorized with respect to its severity of impacts, as follows:

- No Impact: N
- Low Impact: L
- Medium Impact: M
- High Impact: H
- Positive Impact: P

With the help of the above ranking, less important/severe impacts were screened out from the ones which were more important, needing further discussion as presented in table below.



Table 6.2: Leopold Matrix – Impacts during waste management

Environment al component Project Component	PHYSICAL ENVIRONMENT									BIOLOGICAL ENVIRONMENT									SOICAL ENVIRONMENT								
	Climate	Geology	Seismicity	Soils contamination	Land use	Surface Water	Groundwater	Air Quality	Noise	Aquatic Ecosystem	Wetland Ecosystem	Trees	Endangered Species (Plants & animals)	Migratory Species	Birds and Animals	Plants	Wildlife	Disease Vectors	Public/ Workers Health	Flow of Road Traffic	Employment	Structures and Infrastructure	Health hazards	Cultural & Religious Values	Tourism & Recreation	Disruption of Businesses	
Design	P	N	P	P	P	P	P	P	N	N	N	N	N	N	N	N	N	N	P	M	P	N	N	N	N	N	
Collection & transportation of Waste	M	N	N	L	P	L	L	M	M	N	N	N	N	N	N	N	N	M	H	M	P	P	H	N	N	N	
Waste Storage Yard	M	L	N	H	L	L	M	M	N	N	N	N	N	N	N	N	N	M	H	L	P	P	H	N	N	N	
Disposal via Incineration	H	H	N	M	M	M	H	H	L	N	N	L	N	N	N	L	N	M	H	L	P	P	H	N	N	N	

*Key: P: Positive Impact; N: No Impact; L: Low Impact; M: Medium Impact; H: High Impact

6.3.3 Impact Identification with Network

Networks, also known as system diagrams, consist of number of linked impacts, known to result from initial actions; even mitigation and control measures can be illustrated. If a magnitude and importance score is assigned to each impact and the probability of occurrence of each impact is known, a final index can be calculated for the network.

The advantage of a network approach is that it shows indirect impacts and the effects of change can be followed through the intermediaries but this approach is excellent for inter linkages. However, there are several problems associated with networks among which are the postulation of indirect effects that do not occur, obtaining reliable data on probabilities of occurrence of effects, and as with all grand index approaches, the final index value may obscure important uncertainties in the effects data. This network shows only the air quality aspect related to incinerator activities.

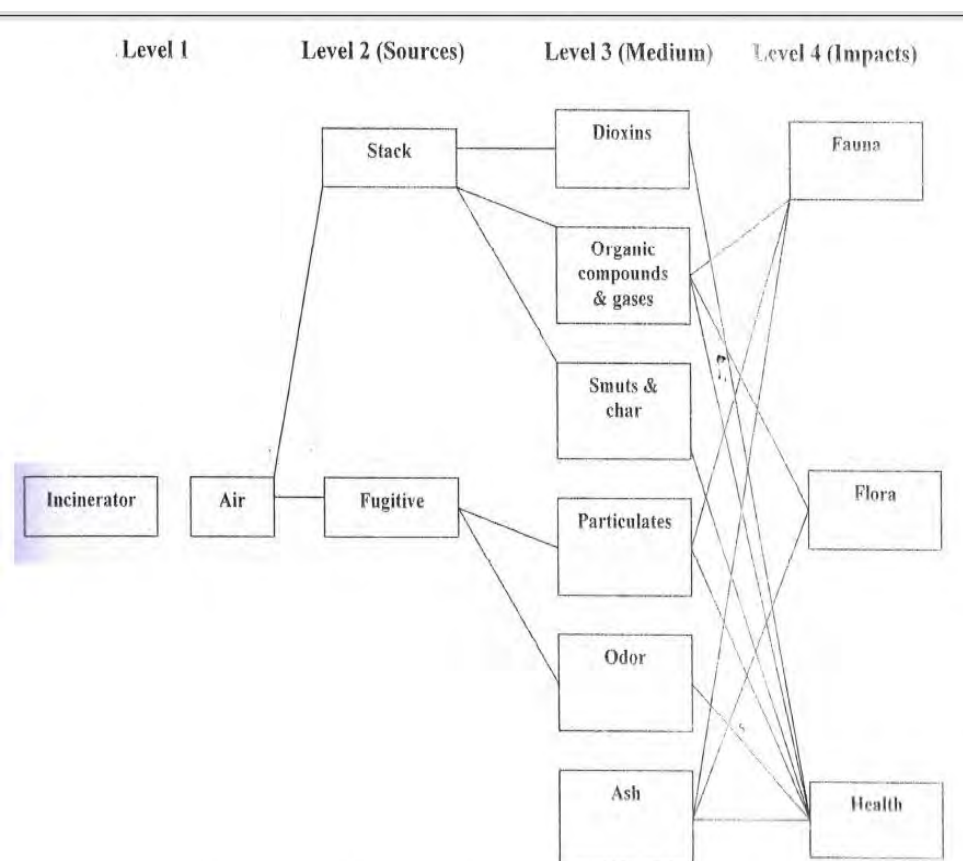


Figure 6.1: Simplified Network for Air Quality Issues Associated with Incinerator

6.4 IMPACT CHARACTERIZATION

Subsequent to the impact screening, various characteristics of the potential impacts including spatial extent (local, regional, global), nature (direct/indirect), temporal extent (temporary, permanent), reversibility, severity, sensitivity of receptors and significance of impacts were determined.

Impacts characterization associated to project activities/ operational phase and their explanation is presented in table 6.3 below.

Table 6.3: Impact Characterization

Environmental Impacts → Categories ↓	Health & Safety Hazard	Soil Contamination	Waste Ash	Air Quality Deterioration	Explanation
Nature	Direct	Direct	Direct	Direct	Direct: The environmental parameters are directly affected by the Project construction or operation. Indirect: The environmental parameter changes as a result of alteration in another parameter.
Duration of Impact	Long term	Long term	Long term	Long term	Short-term: The impacts that last only during the construction of the proposed Project e.g., noise from the construction activities. Medium-term: lasting for a period of few months to a year the project before naturally reverting to the original condition such as loss of vegetation due to clearing of campsite, contamination of soil or water by fuels or oil. Long term: lasting for period much greater than medium term impact before naturally reverting to the original condition such as loss of soil due to erosion.
Geographical Extent	Local	Local	Local	Local	The geographical extent may be local or regional (spatial dimension)
Project Phases	On going	On going	On going	On going	Pre-construction (designing), Construction and Operational. Impacts are ongoing only during operational phase
Reversibility of impacts	Temporary	Temporary	Temporary	Temporary	Temporary: The impacts that don't cross ecosystem threshold value of resilience. Permanent: The impacts that exceed ecosystem threshold value of resilience i.e., community that cannot come back to its original stage without external aid.
Likelihood of the Impact	Certain	Likely	Certain	Likely	Certain: Impact anticipated occurring under extreme circumstances. Likely: Impact will probably occur under less extreme circumstances. Possibly: Impact may possibly occur during different stages of the project. Unlikely: Impact could occur during many stages of the project. Rare: Impact may occur but only under exceptional circumstances.
Impact Consequence	Major	Moderate to Major	Major	Moderate to Major	Major: When an activity causes irreversible damage to a unique environmental feature; causes a decline in abundance or change in

Severity					distribution over more than one generation of an entire population of species of flora or fauna; has long-term effects (period of years) on socio-economic activities of significance or regional level. Moderate: When an activity causes long-term (period of years), reversible damage to a unique environmental feature; causes reversible damage or change in abundance or distribution over one generation of a population of flora or fauna; has short-term effects (period of months) on socio-economic activities of significance on regional level. Minor: When an activity causes short-term (period of few months) reversible damage to an environmental feature; slight reversible damage to a few species of flora or fauna within a population over a short period; has short term (period of months) effects on socio-economic activities of local significance. Negligible: When no measurable damage to physical, socio-economic, or biological environment above the existing level of public concern; and conformance with legislative of statutory requirements.
Significance of Impact	High	Medium to High	High	High	Impact may be categorized as high, medium, or low. Based on the consequence, likelihood, reversibility, geographical extent, duration, level of public concern; and conformance with legislative of statutory requirements.

6.5 IMPACT SIGNIFICANCE

Subsequent to screening and characterization, impacts of significant importance are described below:

- Health hazard for staff, workers, and nearby communities caused by not following PPEs, as well as improper waste segregation, collection, transportation, storage, and disposal;
- Safety hazards caused by various stages of improper waste management and handling;
- Ash generation after waste incineration & its disposal;
- Air quality deterioration caused by waste burning and incineration; and
- Soil contamination caused by waste ash burial and (improper) disposal.

Based on the above screening and evaluation process the following determination (check all that apply) is recommended. It is assessed that proposed project has minimal adverse impacts after proper implementation of mitigation measures proposed for each associated activity.

	The activity contains. . .	(equivalent regulation)
☐	Very low risk sub-activities	categorical exclusion(s)
☐	After environmental review, sub-activities determined to have no significant adverse impacts	negative determination(s)
☒	After environmental review, sub-activities determined to have no significant adverse impacts, given appropriate mitigation and monitoring.	negative determination(s) with conditions
☐	After environmental review, sub-activities determined to have significant adverse impacts	positive determination(s)

6.6 Mitigation & Impact Assessment

Anticipated Environmental Impacts on the subject of proposed project of Clean World Environment Solutions [Hazardous Waste Incinerator] has been assessed. Upon consequent, relevant mitigatory measures have been suggested and presented in table 6.4 below.



Table 6.4: Mitigation and Impact Assessment

Sr#	PROJECT ACTIVITY	DESCRIPTION*			MITIGATION MEASURES**
		When	Where	How	
1. Earth Resources					
1.1.	Excavation & Leveling	»Construct ion phase	»Proposed Project site	»Excavation will be carried out for the basement of proposed building.	»Excavated soil should be stockpiled at appropriate locations. Adequate enclosures to be provided for such storage, to avoid blowing away by wind and run off with storm water. »Use of security fences or hazard tapes to warn and control the access of unauthorized persons to the excavated site. »Weekly monitoring during excavation & reporting by HSE manager of construction contractor.
1.2.	Earthquake consideration	»Planning/ designing phase	»On site	»The building structure will be designed to withstand the seismic action (load) without local or general collapse. »Significance of Impact is minor	»The design specification will be followed to withstand seismic loads in accordance with the Uniform Building Code (UBC) - 1997 and Building Code of Pakistan (BCP), Seismic Provisions - 2007, as required by local codes and standards for high degree of structural competence, reliability and ease of construction ⁷ . »It will be executed and managed at planning & design phase by design contractor.
1.3.	Soil contamination	»Construct ion & Operation al Phase	»On site	»Improper handling of construction material by construction workers; »Inadequate handling & disposal of Incinerator Residual Ash.	»Impart proper training to their workforce in the storage and handling of obnoxious materials that can potentially cause soil contamination by construction contractor. It must be monitored and implemented by HSE manager of construction contractor. »Implement mitigation measures suggested under sub-section 6.9.7 & 6.9.10.
1.4.	Loss of trees/ vegetation	»Construct ion Phase	»Project site	»No tree cutting is involved in stated project.	»It will be executed by project proponent.
1.5.	Land Use	»Planning,	»On site	»Potential impact on adjacent	»The construction contractor must ensures that all structure,

⁷ Structural design at present in Pakistan is designed as per UBC-97 and ACI 318-02M because of the local techniques, procedures, technologies and material available for concrete and other construction material. The building Codes BCP, SP-2007, Design of Concrete Structures by Arthur H. Nilson, Design of Reinforced Concrete by M. C. Cormac, Foundation Analysis and Design by J.E. Bowles will also be followed in due course of time upon availability of advanced materials and techniques in Pakistan

		Construct ion & Operation al Phase		buildings due to construction of proposed unit; it is anticipated to be minor; »Aesthetic value of the area might get impaired.	equipment, materials and facilities used or created on site for/ or during construction activities are removed. »Tree plantation must be encouraged in and around project site for enhanced aesthetics of the area.
2. Air Quality					
2.1.	Dust Emissions	»Construct ion phase	»On site	»Due to construction activities, dust will be generated.	»Sprinkling of water to suppress dust emissions. »Periodic Environmental monitoring in specific to air quality will be carried out by HSE manager of construction contractor.
2.2.	Emissions from vehicles/ incinerator stack	»Designing , Construct ion & Operation al Phase	»On & Off site	»Vehicles washing, servicing and repairing works onsite »Stack Emissions from incinerator plant during incineration	»Use of properly maintained and tuned vehicles onsite to avoid air and soil pollution. »Implement mitigation measures suggested under sub-section 6.9.5. »Periodic Environmental monitoring in specific to air quality will be carried out by HSE manager of construction contractor. »Besides, it will be taken care at design stage to operate processes and activities to minimize emission, release and spread of substances hazardous to health/ or stimulated Engineering Control for emissions at each step of proposed project by Design Contractor & Project Proponent.
2.3.	Increase in odor	»During operation al phase	»On site	»Odor from Waste storage yard »Waste storage for more than 24 hrs.	»Waste Storage Yard (WSY) must be properly ventilated & designed. »Avoid waste storage for more than 24 hrs before incineration. »Implement mitigation measures suggested under sub-section 6.9.6.
3. Water Quality					
3.1.	Surface/ Ground water Contamination	»Construct ion & Operation al Phase	»On & off site	»Improper sanitation system for construction workers; » Leachate generation at WSY.	»Proper sanitary system must be provide to construction workers on temporary bases. »Implement mitigation measures suggested under sub-sections 6.8.4 & 6.9.4. »Waste will be incinerated before such impacts of leachate generation may arise.



					»It will be executed by construction contractor during construction phase & project management during operational phase.
4. Traffic, Transportation, Circulation					
4.1.	Congestion on existing road	»Construct ion & Operation al Phase	»On site	»Traffic jams or congestion on road by the movement of construction/ waste transporting vehicles during the peak traffic hours.	»Allocation of proper place and schedule for construction/ waste transporting vehicles will be carried out to avoid congestion and haphazard movement of vehicles onsite. »Daily monitoring by HSE manager of construction contractor to ensure pedestrian/ operator's safety and their ability to complete the task without incident.
5. Solid Waste					
5.1.	Municipal waste	»Construct ion Phase	»On Site	»Garbage produced by construction worker; »Hideous littering by workers engaged for construction activities.	»Measures should be adopted for safe and environment friendly disposal of all generated solid and liquid wastes. It is recommended that workers must restrict their activities within the project premises. »Orientation trainings will be provided to the workers for identification, segregation & management of solid waste by construction contractor during construction phase.
5.2.	Residual Incinerator Ash	»Operation al Phase	»On site	»Regular and thorough cleaning of the incinerator, including ash removal is absolutely essential for efficient operation.	»Monthly monitoring and inspection of ash cleaning & management activities directly resulting from executing the project process/ incineration in order to ensure compliance as per applicable rules & regulations by project management during operational phase. »Implement mitigation measures suggested under sub-section 6.9.10.
6. Health & Safety					
6.1.	Accidents/ human health hazards	»Construct ion Phase	»On site	»Construction activities will pose certain negative impacts on workers.	»Ensure safe working practices are observed at all times while carrying out work activities by construction contractor. »All accidents, whether to themselves, others or property must immediately be reported to project management. »Site specific HSE Plan must be used as a guide to assist the Contractor working on this project. »HSE manager by Construction Contractor will be responsible



					for periodic site safety inspections.
6.2.	Workers' health & safety	»Operational Phase	»On site & On duty	»All workers entitled to work in environments where risks to their health and safety may arise due to certain reasons/ negligence.	»Contractor as well as project management must be committed to ensuring that all workers remain aware of their responsibility for the safety of themselves and their fellow workers. »Implement mitigation measures suggested under sub-section 6.9.12.
6.3.	Noise/ Vibrations	»Construction & Operational Phase	»On site & On duty	»Construction activities such as excavation, use of heavy machinery etc. may generate noise; »Use of unnecessary horns by drivers of construction/ waste transporting vehicles; »Noise will also arise during operational hours of incinerator plant.	»Drivers must be aware of their code of conduct and avoid use of unnecessary horns. »Implement mitigation measures suggested under sub-sections 6.8.6. & 6.9.9. »Daily monitoring by HSE manager of construction contractor to check compliance as per PEQS during construction phase. »Supplier of the incinerator plant affirmed that noise will be curtailed within limiting values set by PEQS via engineering control.
6.4.	Emergency Response	»Design, & Operational Phase	»On site & On duty	»There are always chances of fire risks/ another hazard of worth considering (explosion, chemical spills, earthquakes etc.)	»Any potential increase in risk of fire, explosion, or hazardous chemical release will be minimized onsite for handling any emergency situations. »Operating procedures must be in place to minimize the fire danger at the site. »It must be executed and monitored by project proponent in close liaison with design contractor of stated facility.
7. Others					
7.1.	Electrical and mechanical installations/ fixtures	»Installation phase during finishing	»On site	»Use of low quality cables as chances of short circuiting and fire hazard are more in low quality cables.	»Procurement and installation of cables/ equipment/ technologies that would have minimum impact on the environment and human health must be ensured by project proponent. »It must be monitored during installation by HSE Manager and executed by procurement contractor in close liaison with project proponent.
7.2.	Spills/ leakages	»Construction Phase	»Project area	»Spills/ leakage may result due to improper handling of	»Ensure proper handling and storage of chemicals/ paints/ fuels etc. and should be marked to highlight their content.



				paints, fuels, solvents, cements etc.	» Workers must be aware of their code of work. » Compliance to above stated as well as to use of PPEs by workers must be monitored by HSE manager of Construction Contractor
7.3.	Use of pesticides/ insecticides		» Operational Phase	» Project area	» Use of mosquito repellent sprays/ fumigation to disinfect WSY and control pest/ disease vectors. » Mosquito repellent sprays/ fumigation should be carried out as per project safety plan. All safety measures including use of PPE must be ensured. » HSE manager will monitor compliance to use of PPEs during pesticide spray.

* It contains when problem will occur and when, where & how it will be occur.

** It suggests whys of achieving mitigation measures [changing in planning and design/ improved monitoring and management practices/ compensation in money terms/ replacement, relocation & rehabilitation]



In addition, assessed impacts and their mitigation measures for proposed study are discussed in detail at each stage of proposed project activities as described below.

6.7 DESIGN RELATED IMPACTS

The proposed project of Clean World Environment Solution [Hazardous Waste Incinerator] is taking all the consideration of work details, their reliability and else as desired under the rules and regulations Hazardous Substance Rules (2003), Punjab Environmental Protection Act, 1997 [Amendment, 2012], Provisions contained in Local Government Ordinance, 2001 for such plans and Punjab Environmental Quality Standards for Incineration of Bio-medical Waste, 2023. This will automatically take care of the accuracy of the plan and its design.

The present EIA Report testifies that there will not be any environmental problems at all, due to project design. In view of these considerations no environmental problems are foreseen in the context of design. Due consideration has been given to optimal design and operation of incineration plant.

A number of new design features and operating techniques have been adopted to increase temperature, extend residence time, and increase turbulence in proposed hazardous waste incinerator in order to improve combustion efficiency and provide other benefits like improved ash quality. It includes high-efficiency burner system, waste-pretreatment practices such as shredding and blending, and oxygen enrichment. Considerable attention has also been given to measurement and control of key process operating conditions to allow better control of the whole combustion process.

6.8 IMPACTS DUE TO PROJECT LOCATION

The project envisages Construction of Hazardous Waste Incinerator Facility under the name of Clean World Environment Solutions at Main Sumundri Road, Chak # 248, Daluwal, Tehsil & Distt., Faisalabad. The possible environmental impacts due to project location are described below.

6.8.1 Land Acquisition & Change in Land Use Pattern

The land required for the proposed project owned by project proponent. So, no land acquisition is involved in this project. This reason best supports the presence of this project at this site. At current situation, most of the land in area is agricultural but with the mushroom growth of



industrial development, this agricultural land might get depleted. This trend may result in the depletion of agricultural land.

Mitigation

Ensure the plantation of those plants which will be removed during construction so that the impact should be compensated.

6.8.2 Environmental Sensitive Areas

There is not any environmentally sensitive or critical zone in or around the project site.

Mitigation

Not required.

6.8.3 Historical, Archeological or Cultural Sites

There are no cultural resources, historical place or archeological sites such as ancient monuments, forts, sculpture, etc. to be destructed.

Mitigation

Not required.

6.8.4 Existing Infrastructure

Infrastructure like roads, electricity, telephone, natural gas and drainage system is already present in the area. As existing planning and design standards are suited to local conditions, hence, there will not be any unnecessarily wasteful of land.

Mitigation

Not required.

6.9 IMPACTS DURING CONSTRUCTION STAGE

The potential environmental impacts of the proposed project along with the mitigation measures during the construction stage have been described as following:

6.9.1 Impacts on Topography

Civil work will be done for the construction of proposed facility so there will not any major changes in the existing topography of the project site. The changes due to the civil work will be of localized nature. There will be no significant changes off-site the project area.

Mitigation

Not required.

6.9.2 Impacts on Soils

The overall geology and soil quality of the project site is not expected to be adversely impacted due to the execution of the proposed project during the construction period. Any improper storage or handling of hazardous or flammable materials including paints, fuels, solvents, oil, cement etc. would result in soil contamination. The contamination of soil can take place at concrete mixing areas if the activities are carried out in unmanaged way.

Mitigation

- » The contractor will be required to impart proper training to their workforce in the storage and handling of obnoxious materials, like furnace oil, diesel, petrol and chemicals etc. that can potentially cause soil contamination.
- » Soil contamination by asphalt and other obnoxious material will be minimized by placing all containers in caissons or dumped into pits lined with impervious liners to avoid contamination of soils/ groundwater from leachates.
- » Proper drainage facility should be provided at campsite areas to avoid the water accumulation which will minimize the soil contamination.
- » Solid waste generated during construction should be properly treated and safely disposed of only at TMA demarcated waste disposal sites.
- » Plantation needs to take place at the project site so that soil becomes stabilized.

6.9.3 Impacts on Groundwater

The ground water is well protected by existing geological conditions in the site area. No appreciable impacts on the ground water quality are expected. The ground water used for the project activity will be taken by installing water pumps. So there will be no additional pressure on the ground water table.

Mitigation



Not required.

6.9.4 Impacts on Surface Water

Excessive runoff, especially in rainy days, due to different activities to be carried out during construction phase can result in the increase of Total Dissolved Solids (**TDS**) and Total Suspended Solids (**TSS**) in small water channels. Similarly, untreated sewage can result in high value of Chemical Oxygen Demand (**COD**) and Biochemical Oxygen Demand (**BOD**) of surface water.

Mitigation

- » The workers will be provided with washrooms and toilets at site.
- » Proper sanitary system will be developed on temporary bases.
- » Wastewater effluent from construction equipment, washing-yards should be passed through the primary treatment process to remove macro contaminants before discharging it into natural streams.

6.9.5 Impacts on Air Quality

Due to the construction activities like excavation, clearing, leveling, compaction, material transportation, earthing/ grounding etc. dust will be generated which will ultimately increase the Particulate Matter (PM) value in the area. Gaseous emissions from the heavy machinery and vehicles will also come out and this will affect the quality of ambient air. This may also pose health risk to the construction workers and residents who suffer from respiratory ailments.

Mitigation

- » Periodic environmental monitoring and testing of emissions from vehicles should be carried out in order to keep the concentration of various pollutants including CO, Noise & Smoke within the PEQS limiting value.
- » Ambient gaseous monitoring for various pollutants like CO, NO₂, SO₂, PM₁₀ etc. should also be carried out periodically.
- » Periodic maintenance of the machinery will be carried out to reduce the concentration of emissions.



- » Haul-trucks carrying earth, sand, aggregate etc. will be kept covered with tarpaulin to help contain construction materials and being transported within the body of each carrier between the sites.
- » Tyres of the vehicles and heavy machinery will be washed and the waste water produced as a result of this activity will be reused after due treatment. This will reduce concentration of PM in the ambient air.

6.9.6 Noise

Project activities like compaction, use of heavy machinery during the clearing of the site and trolleys and trucks used for the transportation of materials will create some noise and vibration. The noise may affect the workers and residents of the surrounding communities of the project site.

Mitigation

- » Engines of vehicles visiting the project site should be properly tuned-up.
- » Use of heavy machinery should be restricted to daylight hours in order to minimize noise pollution and vibration arising from the construction site.
- » To bring down noise levels within the PEQS limiting values, noise control measures should be taken such as provision of silencers on the heavy construction vehicles and sound insulation materials should be used as barriers.
- » Wide zone of green plants will also help decrease sound levels.
- » As the proposed project is going to be constructed in the area far away from residential communities. This will further reduce the exposure of noise to the surrounding communities.

6.9.7 Water Consumption

During the construction of project approximate quantity of water will be used and it will not exert any significant effect on water table.

Mitigation

Not required.

6.9.8 Waste Generation

Garbage will also be produced by workers which, if will not be properly disposed of, will cause unsanitary and unhygienic conditions on and around the project site. Resulting impacts could vary from unsightly littering of the site, fly and vermin infestations.

Mitigation

- » Providing adequate waste baskets and dumpsters is essential to keep the site clean and pest free.
- » Arrangements should be made for regular garbage collection from the proposed project site.
- » All the putrescible material will be segregated from other waste and will be disposed of accordingly.

6.9.9 Construction Debris

Each phase of the development will produce solid waste, the disposal of which, if not managed properly could have negative impacts on the site and surrounding area.

Mitigation

- » A site waste management plan should be made the responsibility of the project contractor to provide for the designation of appropriate waste storage area on the site and a schedule for the timely collection and removal of construction debris to an approved dump site.
- » Only small quantity of the waste will be produced as no major excavation is involved in the project.

6.9.10 Health and Safety of Workers

The construction activities will impose certain negative impacts on health and safety of the workers, however mitigation measures will be required to minimize/ eliminate health and safety related negative impacts of the project.

Mitigation

Implementation of the following measures will ensure health and safety of the workers during the proposed construction stage:



- » The Contractor will ensure that the workers / laborers are trained in safety procedures for all relevant aspects of construction.
- » Proponent of the Project will make regular checks to ensure that the contractor is following safety working procedures/ safety measures.
- » Formal emergency procedures will be developed for proposed project site in case of an accident. First aid kits and other necessary equipment will be kept available at site along with the list of emergency phone numbers to be contacted in case of any accident.

6.9.11 Impacts on Flora & Fauna

There are no trees or shrubs present at the proposed project site. The establishment of the proposed project will not affect the fauna of the area.

Mitigation

Following mitigation measures will be adopted to restore the environment as much as possible.

- » Impact mitigation calls for protecting and restoring as much of the original condition on the development site as possible.
- » In an effort to preserve the existing biodiversity, naturally occurring plants such as those used primarily by the birds for food and shelter should be planted for their survival. This would ensure that primarily native plants are used in the landscape plan thus minimizing the use of imported species and eliminating the introduction of potentially invasive species.
- » Using bird feeder may encourage the displaced avifauna to remain in or return to the general vicinity, thus maintaining the existing biodiversity.
- » The project contractor should be subject to punitive penalties for removal or damage of ecologically valuable trees designated for protection or relocation (if any).

6.9.12 Transportation of Construction Materials

Transportation of heavy machinery implies heavy traffic on the roads leading to the site with possible impacts to the surrounding area (dust, spillage, emissions and noise). Use of uncovered vehicles for transportation of construction materials can lead to inadvertent dispersal of



materials during heavy rains or high winds during dry periods. This could have a negative impact on the residents of the surrounding.

Mitigation

- » Arrangements should be made with contractors to ensure that the vehicles used for transporting materials and machinery to the site are appropriately sealed and covered to minimize dust.
- » The construction activity will go on for a short period of time and there will be no worth mentioned impacts from this activity on the project area.
- » Dust producing materials such as sand or cement should be stockpiled in low enclosures and covered, away from drainage areas where they could easily be washed away during rainfall.

6.9.13 Traffic Congestion

During the construction of the project, movement of heavy trucks and machinery will have only a minor impact on the traffic of main sumundri road as it is a wide road specially designed for this kind of heavy traffic.

Mitigation

No mitigation measures are required as this activity will be for a short period of time and the carrying capacity of main sumundri road is fair enough to accommodate this traffic for that much time period.

6.9.14 Employment Generation

During construction stage of the proposed project, about 20 - 25 workers / laborers will be engaged. This will be positive change.

Mitigation

Not required.

6.10 IMPACTS DURING OPERATIONAL PHASE

Incinerators can generate impacts on the surrounding natural environment if not properly monitored. The major impacts on the natural environment include soil contamination and air quality deterioration. There are however, a number of technical, social and environmental problems associated with incineration. These arise from the potential pollutants contained in the emissions and residual solids remaining from the combustion process.



In Europe the standards imposed for incineration are very high, leading to higher costs of incineration, depending on economies of scale. This is because the employment of Best Available Technology (BAT) requires the complete destruction of the waste to a completely burned, sterile ash and the control of emissions by gas cleaning techniques to reduce particulates, acid gases and dioxins to the very low levels specified in European legislation.

BAT, however, is clearly not affordable for developing countries. Simple incineration that leads to a dramatic improvement in the quality of air emissions compared to the continuation of open burning dumps, must therefore offer a major environmental amelioration.

The assignment of significance to various impacts issued to develop an environmental mitigation and management plan by highlighting significant potential impacts for which prevention, mitigation and control measures need to be implemented as required. The potential environmental impacts of the proposed project along with the mitigation measures during the collection, transportation, storage, incineration and disposal of hazardous/ medical/ clinical waste have been described as following:

6.10.1 Impacts on Climate

The storage and incineration of waste can produce emissions of several greenhouse gases (GHGs), which contribute to global climate change. The most significant GHG gas produced from anaerobic digestion of waste is methane and CO₂.

Mitigation

Pakistan does not lie in the list of countries discharging objectionable carbon emission due to lack of industrialization and primarily energy related issues. Currently, the EPA has not established any thresholds or guidance to evaluate impacts associated with greenhouse gas emissions. This is because Green House Gases (GHGs), especially CO₂, do not pose health risks at ambient concentrations. The impacts associated with GHGs are long-term climatic changes, which are beyond the regulatory preview of the air district. Greenhouse gas contaminant emissions tend to accumulate in the atmosphere because of their relatively long lifespan. As



a result, their impact on the atmosphere is mostly independent of the point of emission; greenhouse gas contaminant emissions are more appropriately evaluated on a regional, state, or even national scale than on an individual project level. Therefore, project-specific GHG emissions are considered less than significant, as climate change would not occur directly from project emissions. So the impact is insignificant and does not need to be mitigated. Overall mitigation measured related to air quality however will be implemented.

6.10.2 Change in land use

As mentioned above the proposed project is about systematic management of waste and no worth mentioning activity related to environment is involved at this phase of project, hence no significant adverse impact will happen. However, the proposed project will increase land value by managing waste from uncontrolled dumps.

Mitigation

Not required.

6.10.3 Impacts on Soils

The overall geology and soil quality is not expected to be adversely impacted due to the execution of the proposed project activities that is systematic incineration of waste rather open dumping of waste to the outside.

Mitigation

Vigorous plantation needs to take place at the open waste dump sites by project proponent in collaboration with responsible anticipated serving clients so that soil becomes stabilized.

6.10.4 Impacts on Surface/ Groundwater

The most significant adverse impact on ground water quality will be due to the leachate generation at WSY. As the water table is already quite low, thus the impact could be negligible. As there is no surface water body passing through or near the project site. The mitigation is required to control or minimize the impact of leachate on ground water. The proper management of leachate is the key to the elimination of the potential to pollute underground aquifers.



Mitigation

Wastes will not be stored more than 24 hr before incineration. Waste will be sent for incineration before such impacts of leachate generation may arise. Besides, following mitigation measures will be adopted to avoid any nuisance to the environment:

- » To the extent possible, Waste Storage Yard must be covered for storage of hazardous/ medical/ clinical waste specifically. If waste (non-hazardous) storage is done in open area, it shall be provided with impermeable base with facility for collection of leachate and surface water run-off into lined drain leading to leachate treatment/ disposal facility;
- » A number of alternatives can be considered to manage the leachate collected, including:
 - leachate recycling,
 - leachate evaporation,
 - treatment followed by spray disposal,
 - wetlands treatment, and
 - discharge to municipal wastewater collection systems.

6.10.5 Air Quality Deterioration

Air quality deterioration can take place by improper storage of the waste. Similarly, incineration of waste can also pollute the air. The combustion of any substance will generate by-product emissions that could be released to the air. Waste burning processes generate wastes, which contain particulates, sulphur and nitrogen oxides, volatile organic compounds, dioxins/furans and acidic gases. The Particulates also includes heavy metals present in the waste. Primary attention needs to be focused on gaseous emissions of particulates less than 10 microns in size, dioxins/furans, sulfur dioxide and nitrogen oxides due to associated health concerns and other environmental damage caused by these pollutants. Incinerator air emissions can have a major impact on the local and regional air quality if not controlled properly. The pollutants can seriously impair human health and damage vegetation and other materials.



Of particular concern are dioxins which are produced by burning of the plastic and polyethylene products. The dioxins are carcinogenic and can affect the facility staff carrying out the waste burning and nearby communities. Open burning of the waste particularly if it contains plastics/polyethylene will be avoided since it produces dioxins in addition to other toxic gases.

Mitigation

Special care must be taken during storage of waste to ensure that waste will not contaminate the air quality. If waste is incinerated, then it will be ensured that i) properly trained staff operate the incinerators according to standard operating procedures; ii) appropriately high (more than 1200°C) temperature is achieved in the incinerator to avoid dioxin discharge; iv) the flue gases are properly treated (e.g. with the help of wet scrubbers) before their release to the atmosphere; and v) 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.

Besides, following mitigation measures will be adhered to protect air quality from stack emissions:

- » To limit these emissions the incinerator should be properly operated and carefully maintained. The temperature in the primary chamber should be around 600-800°C and in the secondary chamber 900- 200°C.
- » To protect human health, agriculture, and native wildlife and vegetation, design higher stacks to reduce ground level concentrations.
- » In order to meet environmental standards, modern pollution control equipment such as wet scrubbers in specific to proposed project is designed to remove emissions.
- » Gaseous and particulate air emissions can be controlled with Wet Scrubber. This method is extremely effective in controlling emissions of metals and organic compounds that could also attach to fine particulates.
- » Exhaust gas from an incinerator will be forced through a wet scrubber to remove toxic gases. Scrubbers are used primarily to control acid gases,



- but they also remove some heavy metals. Wet scrubbers use a moving alkaline liquid solution to neutralize acids.
- » Primary Pollutants emitted from a major incinerator facility should be monitored on a continuous basis.
 - » Some potentially hazardous materials such as gaseous HCl, SO_x, and dioxins resulting from chlorine and sulfur containing materials in the waste are difficult to capture and remove, even when using sophisticated gas-cleaning plant. The pre-sorting of waste and the removal of as much as possible of the materials, which lead to these hazardous contaminants, will therefore help to minimize harmful emissions to atmosphere.
 - » It has been found that a strong correlation exists between combustion temperature, residence time and dioxin emission. The California air resources board recommends minimum temperatures of $98.22 \pm 87.77^{\circ}\text{C}$ with a minimum residence time of 1 second. The design of Incinerator must operate under the conditions as per specifications to minimize the production of dioxins.
 - » Production of CO and HC are directly related to the combustion efficiency therefore the optimum conditions must be ensured to prevent their production. The reasons could be incomplete burning of waste, due to fuel rich burning (overloading of the furnace) and insufficient temperature caused by high moisture content of waste.
 - » Regular and thorough cleaning of the incinerator, including ash removal is absolutely essential for efficient operation. An accumulation of ash/unburnt material/ incombustible matter will cause excessive temperatures to be generated and should therefore be avoided. The incinerator should be cleaned and all ash removed regularly. Free passage of air is essential for combustion as well as for the cooling process. Therefore, the removal of deposits from within as well as underneath the combustion chamber is critical.
 - » Hospitals can reduce the need to burn medical waste by reducing the amount of waste they produce. Much of the waste burned in medical waste incinerators can be recycled and remade into new items instead.



Recycling keeps these items from being burned, reducing air pollution and saving natural resources at the same time. Hospitals can take other steps to reduce the amount of trash they produce. Reducing the amount of trash produced by hospitals will reduce the amount of trash that needs to be burned.

- » Using non-toxic materials as alternatives will reduce much of the toxic materials from incinerator emissions. Alternatives to commonly used medical items containing dioxin and mercury does exist. For example, hospitals can use thermometers that contain no mercury and non-PVC plastic items that contain no dioxin or chlorine.
- » Chlorinated plastics shall not be incinerated and the wastes incinerated shall not be chemically treated with any chlorinated disinfectant.
- » 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. Major variations in these or other incineration operations could lead to a limited but significant belch of contaminated air emissions.
- » Stack emissions must be monitored under maximum capacity of incinerator once in three months through laboratory approved under Punjab Environmental Protection Act, 1997 [Amendment, 2012] and record of such analysis shall be maintained. For dioxins and furans, monitoring shall be done once in a year..

6.10.6 Odor Generation

The main concern during the waste storage and disposal phase is the emission of noxious odors from the storage site and incineration plant. The one of main amenity impacts during this phase are related to odors.

Mitigation

Special attention must be paid to ensure that Waste Storage Yard is properly ventilated and lighted. WSY must be washed and chemically disinfected frequently. Failure to maintain these measures can lead to significant surges in odor levels. The provision of a maintenance design procedure will also ensure the reduction or prevention of odor emissions.



On the other hand, provide wind barrier for the prevention of odor emissions.

6.10.7 Waste Storage Yard (WSY)

WSY is one of crucial component to be considered because of its associated environmental impacts of significant importance. The collected waste has to be properly stored before final disposal by incineration. Segregation of the waste will also be done at this stage. WSY must be located away from residential area, food storage/ preparation facilities at convenient access of waste carrying wheel barrows/ trolleys from authorized staff at all the times. This must be properly covered and secured to keep animals and birds etc. away from the site. Waste Storage Yard will help to prevent scavenging/ scattering of waste and protection from sun & rain.

The project site will be available with waste storage yard for temporary waste storage. This facility could create impacts of major significance if not properly handled and supervised.

Mitigation

The storage facility requires following measures to be adopted for safe and healthy working conditions without affecting personnel's health & environment:

- » Medical waste should be incinerated on the day it is received, if not possible, the medical waste (yellow bag) won't be stored for more than 24 hrs.
- » The storage area must be marked as hazardous storage facility
- » The workers must wear personal protective equipment like gas mask, gloves, overall and safety shoes before entering the storage area
- » Ensuring the housekeeping of area around the storage tanks and especially inside the facility

6.10.8 Water Consumption

During this phase of project nominal quantity of water will be used for washing and cleaning of waste transporting vehicles and it will not exert



any significant effect on water table.

Mitigation

Not required

6.10.9 Noise and Vibration

Main noise source of the proposed project is motor power machinery noises generated by incinerator as well as airborne noises of waste transport vehicles on the surrounding environment.

Mitigation

As for main equipment in proposed project, soundproof and noise reducing measures will be adopted. At the same time, limit value and requirement on noise of equipment will also be brought forward to manufacturers. Central noise-isolation control room with double soundproof door and window which will be closed as much as possible when conditions allow, will be set up in workshop with loud noise. Greening will be done at plant as well as at WSY area. Large amount of trees, which selected in accordance with local condition, will be planted around main plant building so as to realize the aim of dustproof, noise reduction and environment beautification.

Besides, place where workers are exposed to excessive noise provide ear protection to maintain noise levels below 85 dB. Ear protections include Molded and pliable earplugs, cup-type protectors and helmets. Such devices may provide noise reductions ranging from 5 to 35 dB.

6.10.10 Residual Incinerator Ash

Incinerator ash can contain concentrations of heavy metals such as lead, cadmium, mercury, arsenic, copper and zinc, which originate from plastics, colored printing inks, batteries, certain rubber products and hazardous waste from households and small industrial generators.

Mitigation

Bottom ash and fly ash are often managed together and referred to as "Combined ash". Incinerator ash is usually disposed off in a Hazardous Waste (HW) landfill or an ash-only landfill known as an Ash Monofill. Ash Monofills are specially designed to reduce the ability of heavy metals



to migrate from the ash into the environment. Monofills are often co-located with HW incinerators or existing landfills to reduce transportation distances and siting difficulties.

The principal environmental concern regarding incinerator ash is that when ash is disposed off in a landfill, the metals and organic compounds can leach (i.e. dissolve and move from the ash through liquids in the landfill) and migrate into ground water or nearby surface water. In addition to possibly contaminating water supplies. Incinerator ash could also affect human health through direct inhalation or ingestion of airborne or settled ash.

Beside, Incinerator Ash can be used to manufacture refractory and the left over can be sent to cement factories.

Following measures must be considered for disposal of incinerator ash disposal:

- » Initially the ash could be collected in plastic bags and stored in a confined and restricted location. Thereafter, the ash would be mixed with mortar and blocks shall be made which could be used for civil work.
- » If the ash is not collected in bags then the heap should be properly wetted or covered so that there are no fugitive dust emissions.
- » If to be landfilled, Ash can be stabilized and solidified by encasing in concrete prior to disposal, thereby significantly reducing the potential for the contaminant to migrate.
- » Ash from incineration of biomedical waste shall be disposed of at a Hazardous Waste Treatment & Disposal Facility. However, it may be disposed of in municipal landfill, if the toxic metals in incineration ash are within the regulatory quantities as defined under Hazardous Waste.
- » In addition to land filling, incinerator ash can also been used in the production of road bedding, concrete, brick, cinder block, and curbing.



6.10.11 Waste Generation

The proposed project is in itself of nature to manage waste systematically and no waste of significant will be generated during execution of proposed project.

Mitigation

Not required.

6.10.12 Health and Safety of Workers

The project activities will impose certain negative impacts on health and safety of the workers engaged in waste management services including collection, transportation, storage and incineration. However, mitigation measures will be required to minimize/ eliminate health and safety related negative impacts of the project.

Mitigation

Implementation of the following measures will ensure health and safety of the workers:

- » Ensure that the workers/ laborers engaged for provisions of waste management services are trained in safety procedures for all relevant aspects of collection, transportation, storage and incineration of waste;
- » Proponent of the Project will make regular checks to ensure that the workers are following safety working procedures/ safety measures.
- » Formal Environment Occupational Health and Safety Management System Manual will be developed by Proponent and ensure its compliance.
- » Workers who will be engaged in incineration process, must be adhered to the following:
 - Wear safety shoes with non-skid soles
 - Wear long-sleeve shirts and protect hands with protective gloves
 - Wear appropriate eye protection; consult a safety supervisor or a supplier
 - Arrange for periodic inspection of incinerator structure integrity, to detect any cracking, etc.



- Wear respiratory protection (Gas Mask) during maintenance or other work in which dust and noxious gases may be released into the atmosphere.

6.10.13 Employment Generation

The proposed project will engage 5-8 workers for its implementation. This will be positive change.

Mitigation

Not required

6.10.14 Fire Risk

The primary risk for fires at proposed facility results from the accumulation of methane gas, the disposal of combustible refuse, and storage and use of diesel fuel or motor oil. Increased methane-gas generation could increase the risk of safety hazards both on site and on surrounding properties.

Mitigation

Operating procedures must be in place to minimize the fire danger at the site include inspecting incoming vehicles, applying daily and interim cover, maintaining equipment, and training staff on safety and response procedures. With the proposed improvements for the existing safety procedures, this impact is less than significant, and no other mitigation is necessary.

6.11 POTENTIAL ENVIRONMENTAL ENHANCEMENT MEASURES

Besides the concrete measures to be adopted as described above, the quality of environment will further be enhanced through the running of project in complete accordance with the 5RS Principles- Reduce, Reuse, Recycle, Refurbish and Retrofit. The implementation of the proposed project has many benefits. The project solves various environmental and social problems already raised by the poor hazardous/ medical/ clinical waste collection, treatment and disposal. The implementation of the project could lead to various environmental benefits, with the most significant being environmental conservation since it stops the degradation caused by the presence of current open dumping and open burning practices of waste. Some of the most obvious benefits are;



- Creation of employment opportunities;
- Separation of non-sorted waste with gradual increase of source separation following increased awareness of the local population;
- Proposed facility will treat both healthcare as well as industrial waste at the same time;
- Incineration is a high temperature dry oxidation process that reduces organic and combustible waste to inorganic, incombustible matter and results in a very significant reduction of waste volume and weight; and,
- Incineration breaks down some hazardous, non-metallic organic wastes and destroys bacteria & viruses, which is the main benefit of incineration of medical waste.



CHAPTER-7

CHAPTER 7 – ENVIRONMENTAL MANAGEMENT & MONITORING PLAN

7.0 Environmental Management and Monitoring Plan

7.1 ENVIRONMENTAL MANAGEMENT

To implement the recommendations and suggestions for environmental protection included in Chapter 6, a comprehensive management plan is needed.

The objective of the Environmental Management Plan (EMP) is to address all the major environmental issues and provide framework for the implementation of the proposed mitigation measures during the proposed project activities. The proper implementation of the EMP will ensure that all the adverse environmental impacts identified in the EIA are adequately mitigated, either totally prevented or minimized to an acceptable level. The required actions to achieve those objectives will be successfully adopted by the concerned institutions or regulatory agencies. The implementation of EMP will be carefully coordinated with design and management program of the project to ensure that relevant mitigation measures are implemented at the most appropriate stage and resources are properly allocated to achieve the desired results.

The purpose of the EMP is to ensure that the activities are undertaken in a responsible non-detrimental manner with the objectives of: (i) providing a proactive, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site; (ii) guiding and controlling the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iii) detailing specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (iv) ensuring that safety recommendations are complied with.

7.2 INSTITUTIONAL CAPACITY

7.2.1 Environmental Committee and its Responsibilities

Project Proponent will constitute an Environmental Management Committee including at least one qualified and experienced environmental scientist / engineer who will be responsible for the environmental management and supervisory affairs during the different stages of the project. This person can be hired by the management or can be on contract



basis.

The responsibilities of the EMC are as follows:

- To ensure implementation of all the proposed mitigation measures during different stages of the proposed project;
- To organize routine monitoring of water, air quality, noise etc.
- To develop operational guidelines and implementation schedule.
- Receiving complaints from people in the vicinity of the project and concerned institutions and assisting the local environmental authority including establishing liaison with EPA.
- To ensure that project is being implemented in an environmental friendly manner, causing least harm to the existing environment including flora and fauna, geology and soil, surface and ground water, air quality, existing utilities etc. as already discussed in Section 6.
- To look after the efficiency of Horticulture Committee (HC).

For effective environmental management, proponent will assign the necessary responsibilities to an EMC headed by a well-trained person in the field of environment, which will be responsible for the environmental monitoring of the project.

A team will be formed named as “Horticulture Committee” (HC) to attend the issues relating to cleanliness, up keeping, aesthetic beauty of the project site, general environment enhancement, tree plantation, vegetation’s promotion, planting of flowers and ornamental trees on site.

Project proponent will be responsible for the execution of the project with coordination of the client. The proponent will be bound to follow the provisions of the contract documents especially about the environmental protection measures and apply good management techniques and methodology without damaging the existing environment. Obligation(s) of the proponent, to safeguard and mitigate adverse impacts and rehabilitate the environment will be addressed through environmental provisions in the contract document(s) as already highlighted in Chapter 6 and through adequate implementation at site.

7.3 TRAINING SCHEDULES

Proper training will be provided to the workers on health and safety practices/ their code of work and conservation of resources by the proponent. Many variables that affect incinerator operation are controlled by operators, so the combustion conditions that control emission rates may be substantially affected by operator decisions. Poor operator control either of the furnace (by permitting temperature or oxygen concentration to decrease) or of the stoking operation can cause reduced combustion efficiency. In most incinerators, mixing and charging of waste into the incinerator, grate speed, over-fire and under-fire air-injection rates, and selection of the temperature set point for the auxiliary burner are entirely or partially controlled by plant personnel.

In addition, the extent of emission control achieved by post-combustion/ combustion in secondary chamber depends on how the devices are operated. Suboptimal operation can be caused by poorly trained or inattentive operators, faulty procedures, and equipment failure. Operators must be attentive to the flow rate of waste into the incinerator and furnace operation so as to allow for effective function of incinerator.

Although some of the most-modern incineration equipment has been automated, there will always be a need for operators to deal with unexpected situations. In addition, automated equipment requires calibration and maintenance, and combustor parts can wear out or malfunction. Examples of what can go wrong include clogged air injection into the incineration chamber, fouled boiler tubes, a hole in the fabric filters, and a clogged scrubber nozzle.

During the working stage, the management staff of Clean World Environment Solutions will be trained about the requirements of Environmental Management System, including but not limited to the environmental health and safety efficient use of resources, emergency response, fire protection and safety / security issues etc.

In order to raise the level of professional and managerial staff, they need to upgrade their knowledge in the related areas. The EMC will play a key role in this context.

Environmental awareness and appropriate knowledge of environmental protection



is critical to the successful implementation of the EMP because without appropriate environmental awareness, knowledge and skills required for the implementation of the mitigation measures, it would be difficult for the proponent to implement effective environmental protection measures. A domestic training program is proposed to train the staff that will be involved in the collection, transportation, storage and disposal of industrial waste on environmental protection and management.

7.4 SUMMARY OF IMPACTS & MITIGATION MEASURES

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

7.4.1 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.

The impacts on environment which are likely to be generated during execution of this phase are summarized in table below:

Table 7.1: Summary of Mitigation & Impact Assessment during Construction Phase

Activity	Environmental Impacts	Mitigation	Manifestation	Methods of Implementation
– Construction of paved building to contain Incineration Plant; – Construction of Waste Storage Yard.	– Dust due to construction activities like excavation, clearing, leveling, compaction etc.; – Noise due to use of heavy machinery; – Violation of applicable air pollutant emissions or ambient concentration standards; – Safety issues for workers; and, – Solid waste.	– Implementation of measures suggested in EMP of subject study; – Adequate care shall be taken during this phase to avoid any kind of damage to environment as well as worker's safety.	– During building Construction; – Full mitigation definite.	– Hiring of reputable contractor with sound knowledge of environment and HSE; – Substantial training of Workers before commencement of work; – Implementation of formal emergency procedures as per code of work by contractor; – Provision of all resources and PPEs consider essential to HSE; and, – Monitor the performance of contractor/ workers.

As proposed project doesn't involve major construction activity, it would not exert negative impact on all components of environment including air water and soil. All of described impacts are localized in nature and manageable. Inform and train all employees on the hazards and risks of their work. Ensure waste disposal in an environment-friendly manner.

7.4.2 Operational Phase

This section of EMP provides management principles for the collection, transportation, storage and incineration of hazardous/ medical/ clinical waste phase of the project. Environmental actions, procedures and responsibilities as required within this phase are specified. These specifications will form part of the contract documentation and therefore, the management will be required to comply with the specifications to the satisfaction of the project Manager and Environmental Control Officer, in terms of the waste management contract.

However, management principles for the waste storage and disposal phase has also been proposed in this EMP to mitigate all of possible environmental issues associated with waste management activities. This section of EMP provides Environmental actions, procedure and responsibilities are required from proponent within the disposal phase are satisfied. The impacts on environment which are likely to be generated during execution of this phase are summarized in table below:



Table 7.2: Summary of Mitigation & Impact Assessment during Operational Phase

Activity	Environmental Impacts	Mitigation	Manifestation	Methods of Implementation
– Obligatory running of proposed incinerator facility; – Waste storage at WSY	– Stack emissions from Incinerator; – Noise & vibration; – Ash generation & its disposal; – Soil contamination due to improper storage of waste at WSY and disposal of incinerator residual ash; and, – Health and safety issues.	– Perform regular inspection of facility; – Implementation of measures suggested in EMP of subject study; – Engineering control/ wet scrubbers for control of stack pollution; – Avoid storage of medical waste more than a day; – WSY must be covered for storage of hazardous/ medical waste specifically with impermeable base; – Ash must be disposed of in landfill/ can be used to manufacture refractory and the left over can be sent to cement factories; and, – Adequate care shall be taken during this phase to avoid any kind of damage to environment as well as worker's safety.	– During operational and maintenance phase; and, – Full mitigation definite	– Perform site check & corrective action; – Maintain record as required; – Substantial training of Workers regarding their code of work; – Provision of all resources and PPEs consider essential to HSE; – Monitor the performance of workers as well as work environment as order of the day; – Proper housekeeping; and, – Check and review regularly all elements of control measures for their continuing effectiveness.

Intend to evaluate the environmental impact of proposed operational activity to avoid damage to the environment and risks to safety. Guarantee a safe working environment to employees. Proposed project is designed to appropriate standards and is fitted with adequate safety and pollution control devices and will be operated by competent person.

7.5 Mitigation Plan for Hazardous Waste Incinerator

A comprehensive Environmental Management Plan (EMP) of proposed project for its construction & operational phase has been present in table 7.3 below.

A handwritten signature in black ink, likely belonging to a representative of Grand Square Consultancy.

Table 7.3: Environmental Management Plan for Hazardous Waste Incinerator

Sr #	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
Construction Phase					
1.	Air Quality – Dust resulting from construction – Use of heavy machinery can generate exhaust and dust emissions – Dispersion of particles from stockpiles during high velocity wind – Smoke from burning of waste materials or burning of firewood in the labor camp	– Compliance with prescribed PEQS to control air pollution	– Necessary measures like sprinkling of water on regular basis especially during dry climatic conditions should be taken to limit pollution from dust and other windblown materials. – Covering or use of wind sheets around the stockpiles to avoid air pollution through dispersion – Periodic maintenance and management of all the machinery and vehicles – Cutting and burning trees / shrubs for fuel will be prohibited. Instead gas cylinders should be used in the labor camp for cooking purposes. Similarly, waste burning will not be allowed.	Contractor with coordination of Proponent	Proponent/ EPA
2.	Water Quality – Run-off water from construction area – Drainage of wastewater on ground can contaminate the soil and groundwater. – Inappropriate disposal of waste.	– Control of groundwater or surface water pollution from construction activities	– Use of spill prevention trays and impermeable sheets to avoid contamination of the groundwater – Maximize the use of treated waste water on site (e.g. sprinkling purpose to control dust) – Proper disposal of waste material on dumping sites to avoid leachate	Contractor with coordination of Proponent	Proponent/ EPA



Sr #	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
	– Open sewerage water disposal on land can contaminate ground water and cause generation of mosquitoes and various other insects in the area. – Leakage of oil and chemical materials from construction activity		– generation and contamination of groundwater – 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. – Regular water quality monitoring according to determined sampling schedule; – The contractor shall ensure that construction debris do not find their way into the drainage system which can block them; – Prohibit washing of machinery and vehicles in surface waters, provide sealed washing basins and collect wastewater in sedimentation/ retention pond.		
3.	Waste – Waste from construction activities – Domestic waste from workers	– Proper & safe handling and disposal of construction related waste – Compliance with applicable waste	– Ensure prevention of inappropriate disposal of waste material – Conduct separate collection of construction and domestic waste to promote recycling and re-use – Ensure maximized use of construction	Contractor with coordination of Proponent	Proponent/ EPA



Sr #	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
		management rules for hazardous and non-hazardous waste disposal – Implementation of waste management plan	debris on-site to fill excavations etc. – 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 river or other water bodies – Contractor will prepare waste management plan related to construction activities; get its approval from proponent and ensure its full implementation		
4.	Noise – Noise caused by construction machinery and vehicles used for mobilization of equipment and workers	– 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 (hoods and shrouds) on generator – Proper maintenance of vehicles and	Contractor with coordination of Proponent	Proponent/ EPA



Sr #	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
			construction equipment. – Minimize unnecessary use of pneumatic drills and other noisy machinery – The personal protective equipment (PPE) will be provided to the workers and its usage will be made mandatory		
5.	Biological Resources – Removal of vegetation covers by cutting of trees, crops, herbs and shrubs – Fauna including birds and animals will be affected during excavation, movement of labor and carriage of goods and machinery	– Obligation to respect wildlife, Forest and Fisheries Laws. – Conserve biodiversity and its terrestrial as well as aquatic habitat	– Proposed project site does not involve cutting of any trees – Plantation of maximum number of trees. – Staff and workers should be instructed not to damage nearby vegetation of the surrounding area. – Open fires should be prohibited in the area to avoid the hazard of fire and impact on nearby flora and fauna. – Proper disposal of organic waste (if any) generated to avoid rodents and other insects' generation.	Contractor with coordination of proponent	Proponent/ EPA
7.	Staff Conduct	– Timely completion of project activities	– The Contractor must monitor the performance of workers to ensure that point relayed during their induction have been properly understood and being followed	Contractor	Proponent/ EPA



Sr #	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
8.	Leakages/ spills/ Paints/ Used oil	– Compliance with standards set forth by “Guidelines for Oil Spill Waste Minimization and Management” issued by International Petroleum Industry Environmental Conservation Associate	– Contractor will apply strict rules on his workers and labor to ensure that no spill or leakages are caused – All fuels, oils and bitumen will be stored appropriately, with concrete padding and bunding for containment in case of leakage – Chemical waste will be disposed of in approved disposal site. – All fuel tanks, chemicals including paints, pesticides or other hazardous substances will be properly marked to highlight their content – PPE will be enforced to use during the handling and application of chemicals – The contractor will employ the general criteria for oil and leakage at construction sites, as per standards	Contractor	Proponent/ EPA
9.	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/ EPA



Sr #	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 – Any loss of public/ private property will be compensated by the contractor – Regular checks should be carried out to ensure a contractor is following safe working procedures and practices.		
10.	Socio-economic Impacts	– Prevention of conflicts among locals and make the project socially acceptable – Empowerment of locals to possible extent – Increase in employment and business opportunities for locals	– Contractor 's activities and movement of staff to be restricted to designated within industry – 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 – The site must be kept clean to minimize the visual impact of site – 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	Contractor with coordination of proponent	Proponent/ EPA



Sr #	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
			by the projects – Employ local residents as much as possible		
11.	Clearance of site from extra / surplus material	– Restoration of site to a similar condition prior to the commencement of the work or to a condition agreed with the project management and landscaping of the site	– Timely removal of waste from the site to avoid congestion at work place. – 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. – Empty/available space will be covered with grassy lawns & ornamental plant species like roses, jasmine, and seasonal flowers	Contractor	Proponent/ EPA
Operational Phase					
1.	Air Quality	– Compliance with Ambient air quality (PEQS) standards for control of ambient air pollution – Compliance with	– Transportation of hazardous/ medical/ clinical waste is a specialized activity requiring appropriate equipment/ vehicles and suitably trained staff. – Follow applicable national regulations and internationally accepted standards	Environmental Manager (EM) of Clean World Environment Solutions (CWES)	Project Proponent/ EPA



Sr #	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
		prescribed PEQS of treatment & disposal of biomedical waste incineration	for collection, labeling, and transport of hazardous wastes. – Necessary measures like right choice of fuel, tuning/ maintenance of waste trucks on regular basis, proper speeding of vehicles should be taken to limit pollution from dust and vehicle exhaust. – Covering or use of tarpaulin sheets around the waste stockpiles to avoid air pollution through littering or odor dispersion. – Use tanks and containers specially designed and manufactured to incorporate features appropriate for the wastes they are intended to carry – If drums or other containers are used to transport waste, containers should be in good condition and compatible with the waste and are adequately secured in the transport vehicle – Periodic maintenance and management of all the waste transporting vehicles. – Adequately label all transport tanks and containers to identify the contents, hazards, and actions required in various		

Sr #	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
			emergency situations – Proposed facility must be properly ventilated as properly designed and maintained, this can greatly reduce exposure to harmful emissions and keep room temperature suitably against heat from incineration plant. – Stack emissions will be controlled by engineering control/ wet scrubbers. – Design and operate incinerator to minimize emissions, release and spread of hazardous substances – Setting up of a system to monitor air quality along Project Area in accordance with the applicable standards/limits – Incinerator plant must be operated at optimal conditions of waste feed, grate speed, air injection rate and set point of temperature of auxiliary burner as per specifications to minimize the production of dioxins. – Flue gases must properly be treated via wet scrubbers before their release to the atmosphere. <i>(Moreover, Ensure adherence to mitigative measures suggested under</i>		



Sr #	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
2.	Water Quality – Wastewater/ Sewerage – Leachate [Leachate will be generated if waste storage yard is not properly designed for hazardous waste storage/ waste stored for more than a day]	– Compliance with Wastewater standards	<i>section 6.9.5)</i> – No source of chemical contamination in the proposed project so most of the treated sewage effluents after due treatment in 3 stage septic tanks will be discharged into public sewer through submerged pipes. – Special care must be taken to store waste at impermeable base provided with facility for collection of leachate and surface water run-off into lined drain leading to leachate treatment/ disposal facility. – WSY must be designed as per requirements specified for storage of hazardous/ medical waste. – WSY must be covered for storage of hazardous/ medical/ clinical waste specifically – Hazardous/ Medical waste will not be stored for more than a day before incineration to avoid possibility of leachate generation. <i>(Moreover, Ensure adherence to mitigative measures suggested under section 6.9.4)</i>	EM & Project Proponent	Project Proponent/ EPA



Sr #	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
3.	Materials Management	– Safe, secure and hygienic environment at incinerator facility	– Waste Stockpiles shall not be situated such that they obstruct natural pathways – If waste heaps are exposed to windy conditions or heavy rain, they shall be covered either depending on the duration of waste collection. – Provision of all necessary equipment/ accessories for secure collection and transportation of hazardous waste	Environmental Manger	Project Proponent/ EPA
4.	Residual Incinerator Ash	– Compliance with prescribed PEQS of treatment & disposal of biomedical waste incineration	– Ash from incineration of biomedical waste shall be disposed of at a Hazardous Waste Treatment & Disposal Facility. However, it may be disposed of in municipal landfill, if the toxic metals in incineration ash are within the regulatory quantities as defined under Hazardous Waste. – It can also be used to manufacture refractory and the left over can be sent to cement factories. – Ash can be used in road construction as a fill material, mainly in large motorway embankments. – Ash is a popular foundation and fill	EM with direction of Project Proponent	Project Proponent/ EPA



Sr #	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
			material in all works involving large areas of asphalt pavement and where there is no danger of direct contact with the groundwater. Bottom ash can be used as a raw material in the construction of noise barriers with a natural appearance, especially along motorways⁸. <i>(Moreover, ensure adherence to mitigative measures suggested under section 6.9.10).</i>		
5.	Noise & Vibration Noise and vibration from machine working	Compliance with prescribed PEQS to control Noise pollution	- Vibration insulator paddings for the noise generating machines of incinerator plant. - No activity producing extra ordinary levels of noise will be allowed. - Adequate basis of machinery to reduce the vibration. - Proposed machinery will be curtailed within the limiting values of the PEQS certified by its Supplier. - Regulate the length of noise exposures by proper shift scheduling, job rotation	Environmental Manager	Project Proponent/ EPA

⁸ An example is the 1.2 kilometer noise barrier along the A12 motorway at De Meern in the Netherlands, the core of which consists entirely of Waste-to-Energy bottom ash.

Sr #	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
			Provision of ear muffs/plugs for the workers working in noise zones; and – Provision of sign boards for sensitive zones		
6.	Community Development – Social facilities like road, school, mosque, hospital etc. – Employment opportunities	– Improved social infrastructure and living standards of local residents	Increased access to social services – A well-managed community development plan must be prepared/ exercised by the management of proposed project. – This plan should include provision of dispensary for the nearby communities, employment opportunities for the workers of the nearby communities, provision of one school for children, provision of one hospital in the nearby village, one fare price shop, well paved road, a mosque etc.	Project Proponent	Project Proponent/ EPA
7.	Environment quality enhancement measures: – Flowers and plants and trees – Aesthetic beauty of the project site surroundings	– Enhanced land value and scenic beauty of the area	– Plantations in and around the incinerator plant must be carried out to further beautify the area around the facility. – All other necessary measures shall also be taken to maintain standards of cleanliness so that the proposed facility	Project Proponent	Project Proponent/ EPA

Sr #	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
			may add to the scenic/aesthetic beauty of the area around.		
8.	Health & Safety: – Work safety – Accident reduction	– To improve the working conditions and environment for the insurance of safe work	– Provision of all the resources to ensure the safety for workers – Long term changes in the infrastructure and machinery to ensure the health of the workers – Environmental monitoring/ Indoor air quality monitoring of sources of emissions in the facility – Frequent training and awareness sessions of workers regarding health and safety procedure with special reference to their code of work – Formal Environment Occupational Health and Safety Management System Manual must be developed by Proponent and ensure its compliance. <i>(Moreover, ensure adherence to mitigative measures suggested under section 6.9.12).</i>	Environmental Manager	Project Proponent/ EPA
9.	Emergency Response – Fire risk	– Compliance with OSHA Standard – Prevention of any possibility of fire	– Operating procedures must be in place to minimize the fire danger at the site inclusive of inspecting incoming vehicles, applying daily and interim	Environmental Manager	Project Proponent/ EPA



Sr #	Project Component/ Impact	Targets to be Achieved	Mitigation/ Preventive Action	Responsibility	
				Implementation	Monitoring
		hazard or other natural calamity	cover, maintaining equipment, and training staff on safety and response procedures.		



7.6 Environmental Monitoring Program

It will be in the fitness of the things to operate this project under the Environmental Management Plan (EMP). The EMP will ensure that even all type of pollutants from project is within the prescribed limiting values of the PEQS. Thus the environment and human health around the project will be safeguarded. Regular monitoring of all the significant environmental issues is essential to check the compliance status of EMP.

The main objective of the monitoring will be;

- To verify the results of the environmental study with respects to the proposed project.
- To estimate the trends of concentrated values of the issues, which have been identified as critical and then planning the mitigating measures.
- To assess the efficiency of pollution control mechanism.
- To ensure that any additional parameters, other than those identified in the EIA report, do not turn critical after the commissioning of proposed project.

The project proponent will hire an Independent Monitoring Consultant (IMC) in consultation with EPA, Punjab, to monitor the environmental performance of the construction contractor and environmental impacts of project activities.

Table 7.4: Environmental Monitoring Plan for Hazardous Waste Incinerator

Parameter/Receptor	Location	Monitoring Parameter	Monitoring and Reporting Frequency
Physical Environment			
Water Quality	- Incinerator plant facility - WSY	Surface/ Groundwater Leachate analysis if generated	- Sampling and laboratory testing should be done on monthly basis during the construction and annually during the operational/ incineration stage. - Leachate composition must be analyzed for pH, BOD, COD, Ammonia (NH₃), Sulphate (SO₄), Chloride (Cl), Manganese (Mn), Zinc (Zn) in order to determine effects of leachate on groundwater.
Air Quality	- Tracks along roads during construction phase - Incinerator plant facility - Stack of Incinerator plant	PM ₁₀ , SO _x , NO _x , CO, HCl, Total Dioxins/Furans, Hg & its Compounds	- Ambient Particulate Matter Monitoring should be conducted on monthly basis during construction phase. - Stack gaseous emissions monitoring should be carried out once in 3 months under maximum capacity of incinerator. - Continuous emission monitoring system for CO, CO₂, O₂ by combustion gas analyzer during operational phase. - Dioxins/furans monitoring should be done annually.
Noise Levels	Selected locations along the access	Noise in dB(A)	Monthly during the construction & operational phase.
Pest Control	- Incinerator plant facility - WSY	Spray of pesticides and fumigation to avoid spread of vectors.	Once in a week during operational phase by project proponent.
Residual Incinerator Ash	Ash Disposal Site	TOC content of slag/ bottom ash	Once in a month by project proponent to

			ensure incinerator plant is working on specified optimal conditions of generating ash with TOC of less than 3%/ loss on ignition is less than 5% of dry weight.
Ecological Environment			
Cutting of trees Tree plantation	In all Project Area during the execution of proposed project.	Landscaping.	Monthly during construction phase monitoring and annually during the operational phase.
Socio-cultural Environment			
Inconvenience to community/ Public Health	All around the Project Area	Diseases caused by rodents/ vectors Stack emissions	- Monthly monitoring and reporting during the start period of project implementation. - Consultations with community to get feedback about inconvenience due to the execution of project activities to perform their daily routine chores.

7.7 EQUIPMENT MAINTENANCE

The project proponent will create their own system, i.e. equipment, machineries, containers, vehicles etc. for the execution of project activities/ hire IMC for monitoring of environmental performance.

7.8 ENVIRONMENTAL BUDGET

The cost for environmental management will be the part of contract of proponent and consultant respectively. However, a lump sum amount of Rs. 1 million will be allocated by the project proponent as cost for environmental training and tree plantation during collection, transportation, storage and incineration of hazardous/ medical/ clinical waste. After that, monitoring program will be revised in consultation with EPA and cost will be revised accordingly.

CHAPTER-8

CHAPTER 8 - RECOMMENDATIONS & CONCLUSIONS

8.1 RECOMMENDATIONS

The Environmental Impact Assessment (EIA) Report and survey results are finally evaluated to recommend the following:

- ◆ The present Environmental Impact Assessment (EIA) Report of Collection, Transportation, Storage and Incineration of hazardous/ medical/ clinical waste by Clean World Environment Solutions meets the administrative and legal framework of the EPA Punjab.
- ◆ Care shall be given on the health and safety of workers during Collection, Transportation, Storage and Incineration of waste phases of the project.
- ◆ The Proponent should assign trained staff for execution of proposed project activities.
- ◆ The Proponent should plant vigorously indigenous plants and trees in and around the project site office and WSY.
- ◆ Consider Fire safety precautions to prevent or reduce the likelihood of a fire to break out.
- ◆ There should be adherence to safe working procedures to ensure health safety of workers.
- ◆ Mosquito repellent sprays/ fumigation should be carried out once a week to keep WSY disinfected and pest free and spread of disease vectors in control.

8.2 CONCLUSION

The EIA Report of Clean World Environment Solutions [Hazardous Waste Incinerator] located at Main Sumundri Road, Chak # 248, Daluwal, Tehsil & Distt., Faisalabad is made to fulfill the legal requirement of Punjab Environmental Protection Act, 1997 [Amendment, 2012]. In order to address the potentially adverse impacts of the project, an EMP has been developed, which will further improve the environmental performance of the project. The EMP assigns roles and responsibilities, provide environmental guidelines and discuss the scope of Environmental Management Plan.

The EIA Report has thoroughly assessed all the potential environmental impacts associated with the project. The environmental impacts identified by the study are manageable. Project specific and practically suitable mitigation measures are recommended to mitigate the impacts. This EIA concludes that Collection, Transportation, Storage and Incineration of hazardous/ medical/ clinical waste will not pose any major adverse environmental impacts on environment if the anticipated impacts are properly mitigated and the Environmental Management Plan is properly implemented. It is environment friendly project as it fosters the economic, social and aesthetic values of country without any environment degradation. The project solves various environmental and social problems already raised by the poor hazardous waste management in the Pakistan.

Therefore, the project under consideration does not require any further environmental study; hence the EIA Report has been completed for the said project so the project of Clean World Environment Solutions [Hazardous Waste Incinerator] is recommended for the Environmental Approval and issuance of NOC from the EPA, Punjab.

CHAPTER 9 – LIST OF REFERENCES

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ANNEXURE-I

Land Ownership Documents

نقل رجسٹر حقداران زمین (مسل میعاد)

فائل		پیک نمبر 248/درب		طرف / پلاٹ نمبر		قبضہ		فصل آباد صدر		شعبہ فصل آباد		سال 2014 - 2015		
۱	۲	۳ (الف)	۳ (ب)	۳ (ج)	۳ (د)	۳ (هـ)	۳ (و)	۴	۵	۶	۷	۸	۹	۱۰
نمبر کیسٹ نمبر 188	نمبر کیسٹ نمبر 504	نمبر کیسٹ نمبر 506	نمبر کیسٹ نمبر 508	نمبر کیسٹ نمبر 510	نمبر کیسٹ نمبر 512	نمبر کیسٹ نمبر 514	نمبر کیسٹ نمبر 516	نمبر کیسٹ نمبر 518	نمبر کیسٹ نمبر 520	نمبر کیسٹ نمبر 522	نمبر کیسٹ نمبر 524	نمبر کیسٹ نمبر 526	نمبر کیسٹ نمبر 528	نمبر کیسٹ نمبر 530
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4-9-0 چار کنال نو مرے

میزان کل حصہ

کل کھیوت خسرہ

فہرست خسرو نمبران کھیوٹ

فهرست کتب	فهرست فهران	فهرست کتب	فهرست کتب
100	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23		

نقل مطابق اصل ہے

نقل جرائے ذاتی و بیگانه

نام درخواست کننده: خالد مسعود ولد عبدالعزیز بذریعہ سائل

قوم = اراکین ملت

33100-0999149-1 کتابخانه کاغذی

سکونت و ملاقات

23/10/2017 10:10:00AM تاريخ وقت اجرا

23/10/2017 10:10:00AM تاريخ وقت اداء

250 50

لیکھنا

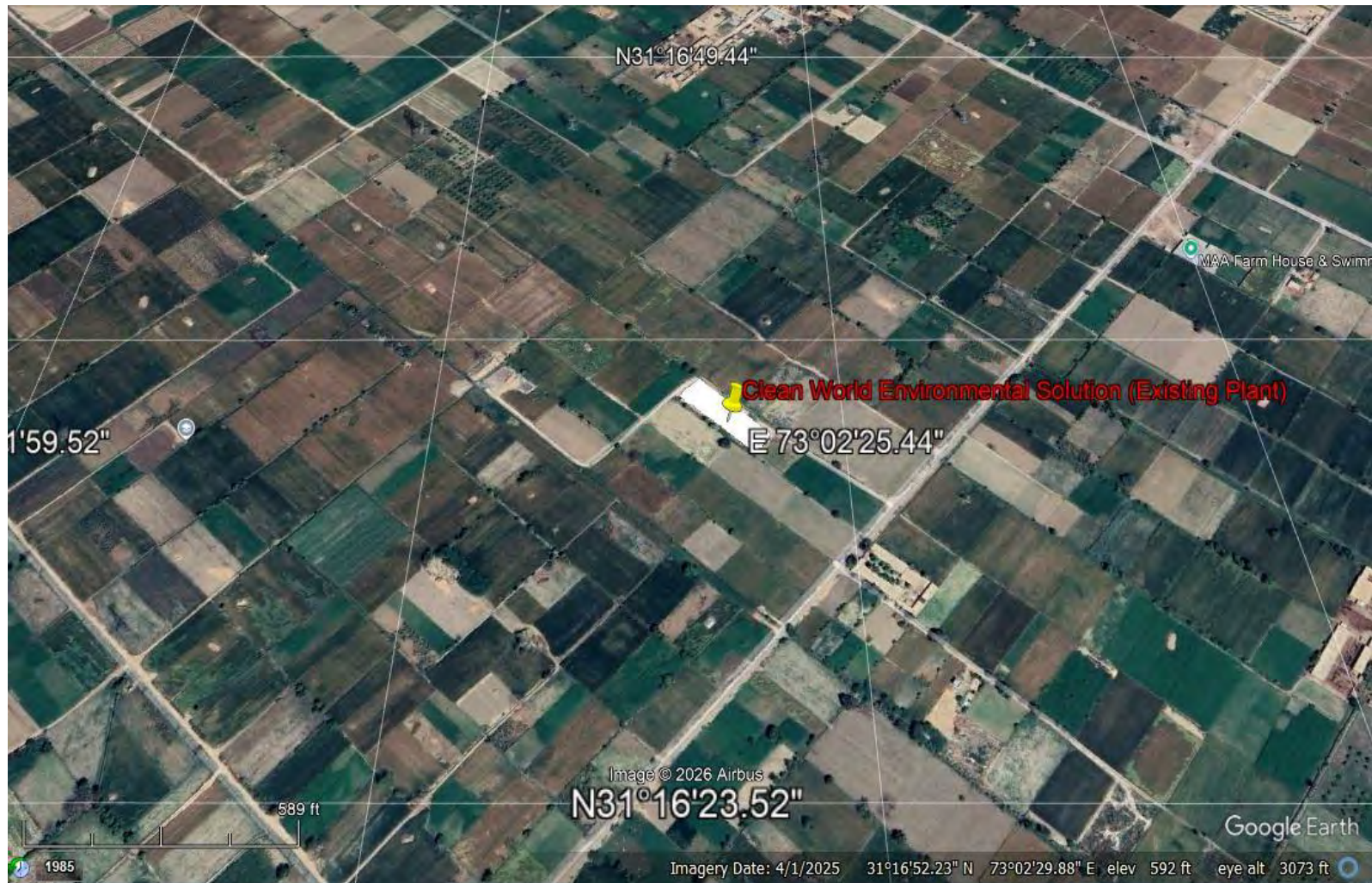
370 فریادی

دستاویز کمیٹی فرسے تیار کر رہی ہے لہذا احتیاط کی ضرورت نہ ہے

ANNEXURE-II

Project Site Location Map

Location Map of Clean World Environmental Solutions



ANNEXURE-III

Incinerator Plant Layout Map

ANNEXURE-IV

Air Quality Monitoring

ANNEXURE-V

Background Noise Monitoring

ANNEXURE-VI

Water Quality Monitoring

ANNEXURE-VII

Public Consultations

**PUBLIC CONSULTATION QUESTIONNAIRE FOR ENVIRONMENTAL
IMPACT ASSESSMENT / INITIAL ENVIRONMENTAL EXAMINATION**

Project Title: *Clean World*

Date:

Name of the Person Interviewed: *Ramiz Shahid*

Age: *38*

Qualification: *BSCS*

Designation / Profession: *Software programmer*

Address: *310-A, Peoples Colony, FSD*

Views about the Project:

The mechanism of waste handling is very professional and environment friendly. we all support of this project and request to enhance the capacity of this environment friendly project, which is in the favour of society.

Ramiz Shahid
Signature of the Person Interviewed

Signature of the Interviewer

Pakistan Office: House No. 9-A, Itehad Colony, Multan Road, Lahore
UAE Office: Khalidiya Tower, Office No. 5, M-22, Al Khalidiya St., Abu Dhabi, UAE
Web: www.gscons.com ; email: info@gscons.com; Tel: +92 42 37805259

**PUBLIC CONSULTATION QUESTIONNAIRE FOR ENVIRONMENTAL
IMPACT ASSESSMENT / INITIAL ENVIRONMENTAL EXAMINATION**

Project Title:

کلیں 19 لکھ

Date:

Name of the Person Interviewed:

مشوکت عزیز

Age:

52

Qualification:

میٹرک سے ایم اے تعلیم

Designation / Profession:

کھاجی

Address:

چک نمبر 248 سیر الہ آباد

Views about the Project:

میں اس گاؤں میں تیس سال سے گوشت کا کام کر رہی ہوں اور یہ
تجربہ بہت اچھے طریقے سے اپنے فرائض سرانجام دے رہی ہوں۔ لہذا اس
کو 19 لکھ پیمانہ پر کام کرنے کی اجازت دی جائے۔
شکریہ

Signature of the Person Interviewed

مشوکت عزیز

Signature of the Interviewer

**PUBLIC CONSULTATION QUESTIONNAIRE FOR ENVIRONMENTAL
IMPACT ASSESSMENT / INITIAL ENVIRONMENTAL EXAMINATION**

Project Title:

کلیں 19/1

Date:

Name of the Person Interviewed:

محمد رفیع

Age:

40

Qualification:

Under MATRIC

Designation / Profession:

Agriculture

Address:

جک ٹی 248 دب

Views about the Project:

کلیں 19/1 ہمارے اس گاؤں میں پہلے کئی سالوں سے کام کر رہی ہے۔ یہ زمینی صفائی کا بہت اچھا انتظام کرتی آ رہی ہے۔ یہ ہمارے اس گاؤں کے پتھر کو بھی تلت کرتی تھی جب سے شہاب موجود نہیں تھا۔


Signature of the Person Interviewed

Signature of the Interviewer

Pakistan Office: House No. 9-A, Itihad Colony, Multan Road, Lahore
UAE Office: Khalidiya Tower, Office No. 5, M-22, Al Khalidiya St., Abu Dhabi, UAE
Web: www.gscons.com ; email: info@gscons.com; Tel: +92 42 37805259

**PUBLIC CONSULTATION QUESTIONNAIRE FOR ENVIRONMENTAL
IMPACT ASSESSMENT / INITIAL ENVIRONMENTAL EXAMINATION**

Project Title: *Clean World*

Date:

Name of the Person Interviewed: *Bilal EHSAN*

Age: *38*

Qualification: *B.A*

Designation / Profession: *Agriculture*

Address: *CHAK # 248, Bismillah - P4r*

Views about the Project:

*This is very good project in
this village, we all are ready to support
this project, we already want keep our
village and environment clean.*

Bilal
Signature of the Person Interviewed

Signature of the Interviewer

Pakistan Office: House No. 9-A, Itchad Colony, Multan Road, Lahore
UAE Office: Khalidiya Tower, Office No. 5, M-22, Al Khalidiya St., Abu Dhabi, UAE
Web: www.gscons.com ; email: info@gscons.com; Tel: +92 42 37805259



**PUBLIC CONSULTATION QUESTIONNAIRE FOR ENVIRONMENTAL
IMPACT ASSESSMENT / INITIAL ENVIRONMENTAL EXAMINATION**

Project Title: CLEAN WORLD

Date:

Name of the Person Interviewed: DR. MOHSIN

Age: 36

Qualification: HOMEOPATHIC DR.

Designation / Profession: DOCTOR

Address: CHAK # 248

Views about the Project:

THIS IS VERY HEALTHY PRACTICE
IN THE FIELD OF WASTE MANAGEMENT

Signature of the Person Interviewed

Signature of the Interviewer

Pakistan Office: House No. 9-A, Itehad Colony, Multan Road, Lahore
UAE Office: Khalidiya Tower, Office No. 5, M-22, Al Khalidiya St., Abu Dhabi, UAE
Web: www.gscons.com ; email: info@gscons.com; Tel: +92 42 37805259

**PUBLIC CONSULTATION QUESTIONNAIRE FOR ENVIRONMENTAL
IMPACT ASSESSMENT / INITIAL ENVIRONMENTAL EXAMINATION**

Project Title:

گلشن ۶۱ (شیراز)

Date:

Name of the Person Interviewed:

شیراز

Age:

Qualification:

Under Matric

Designation / Profession:

سٹریٹ

Address:

جک نمبر 248

Views about the Project:

یہ جگہ بہت اچھا کام کر رہے ہیں۔ اس علاقوں میں
ان کے اس کام کو بہت سا فائدہ ہو گا۔ یہ ۱۱-۱۲ م سب سے
اس کام کے فروغ کے لیے کوشش کریں۔

Signature of the Person Interviewed

Signature of the Interviewer

Pakistan Office: House No. 9-A, Itihad Colony, Multan Road, Lahore
UAE Office: Khalidiya Tower, Office No. 5, M-22, Al Khalidiya St., Abu Dhabi, UAE
Web: www.gscons.com ; email: info@gscons.com; Tel: +92 42 37805259

**PUBLIC CONSULTATION QUESTIONNAIRE FOR ENVIRONMENTAL
IMPACT ASSESSMENT / INITIAL ENVIRONMENTAL EXAMINATION**

Project Title:

(سکندر علی) گلشن وائلڈ

Date:

Name of the Person Interviewed:

سکندر علی

Age:

35

Qualification:

Matric

Designation / Profession:

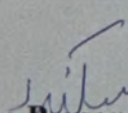
ویلڈنگ شاپ

Address:

جک نمبر 248 دب

Views about the Project:

یہ ایک بہت عمدہ قسم کا کام ہے جو کہ ماحول دوست
ہے۔ اس سے یہاں کے لوگوں کو کام ملے گا۔


Signature of the Person Interviewed

Signature of the Interviewer

Pakistan Office: House No. 9-A, Itihad Colony, Multan Road, Lahore
UAE Office: Khalidiya Tower, Office No. 5, M-22, Al Khalidiya St., Abu Dhabi, UAE
Web: www.gscons.com ; email: info@gscons.com; Tel: +92 42 37805259

**PUBLIC CONSULTATION QUESTIONNAIRE FOR ENVIRONMENTAL
IMPACT ASSESSMENT / INITIAL ENVIRONMENTAL EXAMINATION**

Project Title:

لکھن واریٹ

Date:

Name of the Person Interviewed:

محمد حیات

Age:

44

Qualification:

FA

Designation / Profession:

یونین کونسل کا ملازم

Address:

CHAK # 248

Views about the Project:

یہ ایک بہت اچھا اقدام ہے، جس سے ماحول صاف ستھرا ہو گا
سینٹال اور سیٹارڈی، ٹیپنری جو کوڑا بارے ماحول میں جیک کر آ رہی
تھیں اس پر جیک سے اس کوڑے کو ہیج جنس میں ختم
کیا جائے گا۔

Signature of the Person Interviewed

Signature of the Interviewer

Pakistan Office: House No. 9-A, Itihad Colony, Multan Road, Lahore
UAE Office: Khalidiya Tower, Office No. 5, M-22, Al Khalidiya St., Abu Dhabi, UAE
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**PUBLIC CONSULTATION QUESTIONNAIRE FOR ENVIRONMENTAL
IMPACT ASSESSMENT / INITIAL ENVIRONMENTAL EXAMINATION**

Project Title: *Clear Wood*

Date:

Name of the Person Interviewed: *Umar Tariq*

Age: *42*

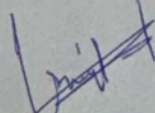
Qualification: *F.A*

Designation / Profession: *Supervisor in Happy Lac paints*

Address: *CHAK # 248, Bismillah-pan*

Views about the Project:

*This is good project, waste
managing in Chak # 248 is very good
for us and helpful for Hospitals.*


Signature of the Person Interviewed

Signature of the Interviewer

Pakistan Office: House No. 9-A, Itehad Colony, Multan Road, Lahore
UAE Office: Khalidiya Tower, Office No. 5, M-22, Al Khalidiya St., Abu Dhabi, UAE
Web: www.gscons.com ; email: info@gscons.com; Tel: +92 42 37805259

**PUBLIC CONSULTATION QUESTIONNAIRE FOR ENVIRONMENTAL
IMPACT ASSESSMENT / INITIAL ENVIRONMENTAL EXAMINATION**

Project Title: CLEAN WORLD

Date:

Name of the Person Interviewed: WAQAR AHMAD

Age: 34

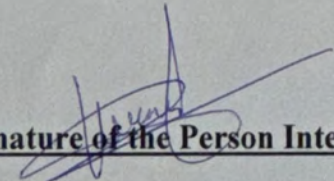
Qualification: L.L.B / Advocate High Court

Designation / Profession: Advocate High Court

Address: Tec-Town, Satyana Road, Faisalabad.

Views about the Project:

These people are very professional
in the field of WASTE Management. I Really
Appreciate these kinds of projects, which is
in Favour of Society.


Signature of the Person Interviewed

Signature of the Interviewer

Pakistan Office: House No. 9-A, Itihad Colony, Multan Road, Lahore
UAE Office: Khalidiya Tower, Office No. 5, M-22, Al Khalidiya St., Abu Dhabi, UAE
Web: www.gscons.com ; email: info@gscons.com; Tel: +92 42 37805259

ANNEXURE-VIII

Terms of References

CLEAN WORLD ENVIRONMENT SOLUTIONS

Subject: Terms of Reference (TOR) for EIA Preparation and Submissions to Environmental Protection Agency, Punjab for Clean World Environment Solutions [Hazardous Waste Incinerator]

Reference to our meeting at your office in Faisalabad regarding the EIA (Environmental Impact Assessment) and subsequent submission to EPA Punjab, for your proposed project “Capacity Enhancement of Clean World Environment Solutions [Hazardous Waste Incinerator]” located at Main Sumundri Road, Chak # 248, Daluwal, Tehsil & Distt., Faisalabad.

M/S Clean World Environment Solutions has agreed to award the proposed project to M/S Grand Square Consultancy on following terms and conditions:

1. M/S Grand Square Consultancy will conduct Environmental Impact Assessment (EIA) and prepare report under section 12 of Punjab Environmental Protection Act, 1997, [Amendment, 2012] and IEE/EIA Regulations 2000.
2. The EIA report will be submitted to EPA Punjab to fulfil the legal requirements of section 12 of the Punjab Environmental Protection Act, 1997, [Amendment, 2012].
3. The EIA draft report will be submitted in 3rd week of after award of work by M/S Clean World Environment Solutions.
4. M/S Grand Square Consultancy will not follow up the case in EPA Punjab except submission of suitable replies to the queries of EIA review committee and attend the necessary presentation in EPA in coordination with Clean World Environment Solutions till issuance of Environmental approval by EPA Punjab.
5. It will not be the responsibility of M/S Grand Square Consultancy responsibility to get Environmental Approval for construction phase from EPA Punjab. The approval from EPA will be pursued by client himself as per the legal time frame of EPA Punjab.
6. Cost of the TOR will be as agreed between two parties.
7. M/S Grand Square Consultancy will only prepare the EIA report and all other legal documents of the project will be prepared and submitted by the client.
8. All the baseline data related to physical, biological and socioeconomic environment of the proposed project area will be provided by M/S Grand Square Consultancy.

9. All the project specific data like layouts, location map, water requirements, energy requirement, approvals from other departments and other project related information will be provided by proponent of M/S Clean World Environment Solutions.
10. EPA review fee Rs 30,000/- in form of pay order along with report will be deposited by M/S Clean World Environment Solutions.
11. All required copies (ten copies hard and 02 copies soft) will be responsibility of M/S Grand Square Consultancy.
12. One hard and one soft copy of report will be provided to the proponent of Clean World Environment Solutions.
13. Meal and residence during site survey will be arrange by M/S Clean World Environment Solutions.

Grand Square Consultancy

Dated: 02-02-2026

Clean World Environment Solutions

Dated: 02-02-2026

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