



**ENVIRONMENTAL
IMPACT
ASSESSMENT (EIA)**



**INSTALLATION OF
INCINERATION FACILITY
FOR HAZARDOUS
AND NON-
HAZARDOUS WASTE**

BY

**M/S LASANI WASTE
MANAGEMENT**

**AT SOA ASAL MOZA
SARAICH TEHSEEL
MODEL TOWN
DISTRICT
LAHORE**



Environmental Consultancies
& Options

4-5, Commercial Area, 2nd Floor,
Cavalry Ground, Lahore Cantt.

EXECUTIVE SUMMARY

Proposed Project - Title and Location

M/S Lasani Waste Management is planning to install an “Incineration Facility for Hazardous and Non-Hazardous Waste, Including Scrap Items at Mouza Saraich, Model Town Tehsil, District Lahore. Facility will provide services like; Collection, Transportation, Handling and Disposal / Incineration of following type of waste:

- Hazardous Industrial Waste
- Non-Hazardous Waste (scrap items)

The total area of the project is 4 Kanals and 1 Marla and covered area will be 2 Kanal. Proposed project site is located at Mouza Saraich Tehsil Model Town District Lahore

M/S Lasani Waste Management– The Proponent

Lasani Waste Management is engaged in providing waste disposal services with emphasis on the solution of problems related to the management of industrial and commercial waste. The Company provides services and benefits that are unsurpassed in the industry today. The company is striving to provide the highest quality and cost-effective disposal services to the different industries and food manufacturing plants therefore Lasani Waste Management has become a preferred choice of businesses and industries nationwide.

Lasani Waste Management’s philosophy is guided and underpinned by the concept that “One man’s Trash is another man’s Treasure”. The whole idea of Lasani Waste Management is to build around this philosophy of trash management & focuses on recovering value while protecting the natural environment on which all the life depends – and that’s what set us apart from our unorganized vendors. The other services of M/S Lasani Waste Management include:

- Collection, Transportation, Storage, Handling, Incineration and disposal of hazardous Waste including asbestos from various National and Multinational Companies of Pakistan
- Disposal of Non-Hazardous Waste Material in an environment friendly way
- Disposal of Non-Hazardous Waste Material including scrap items based on 3R system of Waste Management, naming; reducing, reusing and recycling



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Environmental Consultancies and Options - The Consultant

ECO is a professionally run environmental management & engineering firm with strong backup of highly qualified and experienced personnel. The company specializes in diversified fields and continuously identifies the current and future demands related to the environment and engineering. ECO services include environmental assessments, audits, risk assessments, environmental monitoring, training, water, wastewater treatment and alternate energy. The ECO is serving market niche with a broad range of high technology products and services to a wide spectrum of industries in Pakistan. ECO is a member of groups of companies. The other members are:

- ☐ Global Waste Management (GWM)
- ☐ Global ECO Laboratories (GEL) [Certified by EPAs]
- ☐ ECO-Waste Management

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Proposed Project

The proposed project is basically the installation of an Incinerator of 300 kg/hour which will provide services like, Collection, Transportation, Storage, Handling, and Incineration & Disposal of the following types of the waste:

- Hazardous Industrial Waste
- Non-Hazardous Waste (scrap items)

Project components during installation of incineration facility of M/S Lasani Waste Management.

- Leveling off the ground



- Disposal and storage locations will be designated.
- Installation of Waste Incinerator of 300 Kg/ hr. capacity.
- Construction of allied facilities like office complex, washrooms and security rooms

A waste disposal and processing facility is a comparatively unsophisticated facility in that (in most cases) there is no processing or other transformation on site. The products/waste which reaches the facility (from various industries) are in their final form ready to be disposed or recycled (industrial non-hazardous waste including scrap items).

Brief Outline of the Proposal

The EIA report has been organized into ten (10) chapters. **Chapter-1** describes the introduction of proponent, overview of the proposed project activities and location of the proposed project. **Chapter-2** describes Screening for environmental assessment, **Chapter-3** describes scoping process whereas **Chapter-4** discusses consideration of alternatives in terms of environment, design, technology, site, and cost. **Chapter-5** describes in detail the project and process activities. **Chapter-6** gives the environmental setting of the project area including the physical and socio-economic conditions. **Chapter-7** discusses impact assessment criteria & methodology. **Chapter-8** describes Screening of Potential Environmental Impacts and mitigation measures. **Chapter-9** describes an Environmental Management and Monitoring Program (EMMP), **Chapter-10** describes stakeholder consultation and **Chapter-11** concludes the report.

Impacts & Mitigation Measures

All the impacts associated with the proposed project activities are localized, temporary and manageable. Below section describes major impacts associated with proposed project activities along with their relevant mitigation measures.

Impacts during Construction Phase

- The changes at the site may occur due to construction activities such as excavations and diggings for the building foundations, Construction, and installation of Incinerator Plant. However, this impact will be of temporary and moderate negative in nature.

- Ground water in the path of the project may be disturbed by excavation for the building and machine foundations. The excavated area, if linear could act as a conduit to extend groundwater contamination to new areas.
- The emissions of dust and particulate matter can be significant depending upon the nature of activity taking place i.e., installation of incinerator of 300 Kg/hr. capacity. Particulate matter pollution is likely to occur during the excavation of the top soil and loading and transportation of the machinery which may affect the site workers and even the neighbors' health.
- The excavation activity will create solid waste and debris and lower the aesthetic value of the land during the establishment period.
- Excavation and land leveling activities can destabilize the surrounding land surface, particularly if the excavated area is left unfilled for long, which may lead to rainfall induced soil erosion.
- The unspent materials and debris produced from consumed up materials, if left as such and allowed to mix with soil underneath, can degrade the quality of receiving soils and may render them unfit for plantation later on;
- Washing of the gadgets, machinery, and equipment without proper drainage of the washout water can adversely affect the soil quality. This impact is, however, temporary, and minor negative in nature.
- The work on site will most likely have noisy operation due to the moving machines (shredders, mixers, tippers, communicating workers), incoming vehicles to deliver waste materials, onsite workers, and other normal construction activities.

Mitigation Measures (Construction Phase)

- Excavations will be kept confined to the specified location as per the approved engineering drawings and unnecessary excavations will be avoided.
- The site will be fenced/walled during establishment so as to contain the negative impact within the boundary.

- Controlling dust during construction phase is useful in minimizing nuisance conditions and consequently health (respiratory and eye) complications. It is recommended that a standard set of feasible dust control measures be implemented for all the activities.
- All personnel working on the project site will be trained prior to the start of the project on methods for minimizing air quality impacts. Training will be focused on minimizing the air pollution during the establishment of compost ditches.
- Waste arising from excavation activities will be recycled or reused to ensure that materials that would otherwise have been disposed of as waste are diverted for productive uses.
- The waste which is reusable/recyclable (iron bars, aluminum) will be sold to waste vendors and those which cannot be sold out (brick pieces) will be used as a filling material for leveling the depressions, subject to technical feasibility.
- Workers and supervisory staff will be encouraged and educated to practice waste minimization, reuse, and recycling to reduce quantity of the waste for disposal.
- Waste from various activities will be dumped in approved sites, in line with the legal prescriptions for dumpsites, and covered accordingly.
- As applicable and needed, plantation of grasses and shrubs will be done at appropriate place where required.
- Excavations will be kept confined to the specified foundation spots as per the approved engineering drawings. Unnecessary excavations will be avoided.
- Washout from washing of Incineration Plant and gadgets will be drained into either a septic tank or a sand-gravel bed for removal of the grit and contaminants.
- Limit pickup trucks and other small equipment to an idling time of one minute, observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible.
- Protective gears such as earplugs, etc. will be provided to personnel exposed to high noise levels.
- All the equipment and vehicles used will be in good working condition, properly lubricated and maintained to keep noise within the permissible limits.

Impacts during Operation Phase

- The emissions from the incineration operations will produce obnoxious gases into the atmosphere which will, if not managed properly, be harmful for the workers, operators, and the general public in the nearby residents.
- The proposed Project is very sensitive and can cause many occupational hazards at site.
- It is expected there will be a generation of both solid and liquid waste. Solid wastes are likely to consist of bottom ashes of incinerators, fly ashes paper, plastic containers and organic waste from foodstuffs eaten by employees. On the other hand, liquid waste shall mainly include effluent from the scrubber and sanitation facilities installed for use by the staff.
- The operation of incinerator plants and generators may create high noise and vibrations levels in the project area. However, this would be a local issue and noise and vibration levels will attenuate with distance from the project site. High noise and vibration levels may cause disturbance in the immediate neighborhood.

Mitigation Measures (Operation Phase)

- The incinerator proposed to be installed will have built in Integrated Gas Washing Systems.
- The flue gases from the secondary chamber will first be fed to the heat exchangers and ceramic filters to reduce the amount of particulate matter present in them and to reduce the temperature of the smoke.
- The gases will then be fed to wet scrubbers where the remaining particulate matter will settle with the help of the double water showers.
- The smoke emitted after this treatment will be harmless and the scrubber water will be used again in the scrubber showers, thus eliminating the burden upon the water resources.
- The particulate matter settled with the scrubber water will be screened from the scrubber outlet and will again be incinerated.

- The bottom ashes will be collected with the help of the ash containers already built in the incinerator. The ash would then be mixed with the construction material (only in case of hazardous waste) and would be converted into bricks and would be used in the construction of road pavements and other civil construction operations other than construction of houses, schools, and hospitals.
- The bottom ash produced as result of incineration of hospital waste will be sent to the landfill site for the deep burial.
- Proper training and awareness programs should be arranged for the worker at the site.
- The facility operator shall be required to draw up detailed contingency plans based upon an approach of prevention and detection in the first instance and to ensure containment and safe disposal if any hazardous waste spills from the waste disposal facility.
- Necessary health and safety rules shall be enforced by the management to ensure that all staff members adhere to these standards.
- The workforce (experts of various specializations and qualifications, etc.) is one of the key elements of industrial activity. Operated facility safety status depends much on the personnel actions.
- All workers at the site should be provided with personal protective equipment.
- First Aid kits should always be available at the site and staff members trained in first aid administration.
- Waste generation and collection registers should be established for tracking the disposal of waste.
- The generator will only be used as a secondary source of electricity, during operational phase of the project.
- While fixing generators at the project site all possible noise and vibration reducing measures would be adopted, including usage of canopy over the generator and vibration -dampener pads over the foundation platform.

- The noise and vibration levels of the generators and other fixed equipment would be monitored regularly, and necessary maintenance would be done to control the noise and vibration levels.

Proposed Monitoring

The proponent will engage a third party to do the environmental audit monthly during the construction period. Three periodic audits will be carried out; one at preconstruction stage, the second will be carried out during the construction and third at post construction stage.

However, for this EIA study the following environmental aspects of the project site has been monitored.

- Drinking Water (Chemical and Physical Analysis)
- Wastewater (Chemical and Physical Analysis)
- Ambient Air Quality
- Noise Quality
- Soil Quality

Conclusion

After assessing the significance of potential impacts, this EIA report concluded that:

“All environmental and social issues involved during the project activities are manageable, therefore it is concluded that the project is environmentally friendly, financially viable, economically sustainable, generally neutral and pro-poverty alleviation.”

Environmental Impact Assessment (EIA) Report

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CHAPTER 1

INTRODUCTION

1.1 Purpose of the Report

With a view to evaluate likely impacts/ risks associated with the proposed project on various components of the environment and to achieve certain environmental objectives besides the existing local legal requirements, M/S Lasani Waste Management has hired Environmental Consultancies and Options (ECO) to carry out an Environmental Impact Assessment (EIA) study of their proposed project i.e., **“Installation of Incineration Facility for Hazardous and Non-Hazardous Industrial Waste Including Scrap Items” at Mouza Saraich, Tehsil Model town District Lahore.**

Therefore, ECO has carried out detailed assessment study covering all the features of the environment, i.e., physical, ecological, and socio-economic. The outcome of the study is this EIA report which will be submitted to EPA Punjab in order to obtain Environmental Approval/NOC for the construction phase of the said project.

1.1.1 Identification of the Project

M/S Lasani Waste Management is planning to establish an incineration facility at Mouza Saraich Tehsil Model Town District Lahore. The facility will provide temporary storage and incineration of Hazardous Industrial Waste, proposed to be transported to the facility of M/S Lasani-Waste Management. Following are the types of the waste proposed to be handled at the Incineration Facility of M/S Lasani Waste Management:

- Industrial hazardous waste
- Industrial Non-Hazardous Waste (Scrap Items)
- Hazardous Waste Water Treatment Sludge
- Chemical drums
- Chemical plastic cans and drums

1.2 M/S Lasani Waste Management– The Proponent

M/S Lasani Waste Management is engaged in providing waste disposal services with emphasis on the solution of problems related to the management of industrial waste. The Company



provides services and benefits that are unsurpassed in the industry today. The company is striving to provide the highest quality and cost-effective disposal services to the different industries and manufacturing plants therefore, M/S Lasani Waste Management has become a preferred choice of businesses and industries nationwide.

The whole idea of M/S Lasani Waste Management is to build around the philosophy of industrial waste management & focuses on recovering value while protecting the natural environment on which all the life depends – and that’s what set us apart from our unorganized vendors. The services of M/S Lasani Waste Management include:

- Disposal of Hazardous Waste Material from various National and Multinational Companies working in Pakistan, through incineration
- Disposal of Non-Hazardous Waste Material based on 3R system of Waste Reduce, Reuse and Recycle.
- Disposal of industrial/domestic asbestos waste

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1.3 Environmental Consultancies and Options - The Consultant

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1.4 Brief Description of Nature, Size and Location of Project

The proposed project is basically an installation of an Incinerator for the disposal of Industrial hazardous and non-hazardous waste at 300 kg / hour capacity in Mouza Saraich Tehsil model Town District Lahore. Following are the types of the waste that are proposed to be managed at the Incineration Facility of M/S Lasani Waste Management:

- Industrial hazardous waste
- Industrial Non-Hazardous Waste (Scrap Items)
- Hazardous Waste Water Treatment Sludge

Total area of the project area is 4 Kanals 1 Marla and covered area is about 2 Kanals. The Proposed project site is located at Mouza Saraich Tehsil Model Town District Lahore. Table **1.1** shows geographic coordinates of the proposed project site and **figure 1.1** shows location map of the proposed project.

Table 1.1 Geographic Coordinates of Proposed Project Site

Sr. No	Proposed Site	Latitude	Longitude
1	Lasani Waste Management	31°18'43.0" N	74°25'30.2" E



Figure 1.1 Location Map of the Proposed Project (M/S Lasani Waste Management)
(Source: Google Earth Map)

CHAPTER 2

SCREENING FOR ENVIRONMENTAL ASSESSMENT

2.1 Screening for Environmental Assessment

The preparation and submission of an Environmental Impact Assessment (EIA) report for any development project is a statutory obligation under Punjab Environmental Protection Act, 1997 (PEPA, 1997) amended in 2012 in terms of Section 12 of the Act which states as under:

“No proponent of a project shall commence construction or operation unless he has filed with the Government Agency designated by Federal Environmental Protection Agency or Provincial Environmental Protection Agencies, as the case may be or where the project is likely to cause an adverse environmental effect an Environmental Impact Assessment (EIA) and has obtained from the Government Agency approval in respect thereof.” Review of IEE & EIA Regulation 2000, Schedule-II clearly states the list of projects requiring EIA.

2.1.1 Type and Category of the Project

According to Section 12 of Punjab Environmental Protection Act 2012 and its regulations “Review of IEE/EIA Regulations, 2000”, the present project of Incineration Facility falls in ***Schedule-II (EIA) under the Category G (1)- Waste Disposal and or / storage of hazardous or toxic waste (including landfill sites, incineration of Hospital Toxic Waste).***

2.2 Environmental Impact Assessment (EIA)

Environmental Impact Assessment (EIA) is a systematic identification and evaluation of potential impacts of proposed projects, plans, programs, or legislative actions relative to the physical, chemical, biological, cultural, and socio-economic components of the total environment.

2.3 Objectives of the EIA

The objectives of the EIA are as follows:

- To assess and establish the existing environmental and socio-economic conditions in the project area,
- To assess the potential environmental or socio-economic impacts of project activities and identify issues of concern,

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- To implement and execute environmental safeguards,
- To propose mitigation and monitoring measures that can be incorporated into the design of the project to remove or reduce any damaging effects as far as possible, and to control and monitor residual impacts,
- To facilitate the environmental decision making,
- To facilitate an appropriate follow up process with requirements for monitoring, management, audit, and evaluation,
- To assess the proposed activities to ensure that they comply with the relevant environmental and social regulations and standards, and
- To prepare an EIA report as per the relevant guidelines for submittal to the concerned Environmental Protection Agency (EPA).

2.4 Approach & Methodology

Detailed methodology is discussed as follows:

The project activities were discussed with Lasani Waste Management personnel. Preliminary information was obtained. A Safety Health & Environment Department has been developed and provided an elaborate SHE Management Plan in Line with Lasani Waste Management's Policy and Procedures in this report.

2.4.1 Step - 1: Scoping / Data Collection

In this step, information related to the physical, technical, and environmental parameters was collected from the Client and other agencies. Local inhabitants were interviewed in detail to understand the socio-economic conditions, culture, and customs of the area. An extensive literature review was also carried out in this step.

Following information was collected:

- Details of project activities
- Legislative obligations
- Environmental data (both primary and secondary) was collected through physical surveys (Monitoring of Effluent, Air Quality and Drinking Water Quality), field visits and desk reviews including
 - Climatology



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- Topography, Geology
- Hydrology, Hydrogeology
- Ecology, flora, and fauna
- Socio - economic conditions
- Sensitive Areas
- Land use patterns
- Technical Surveys for project details such as Process, Utilities availability, Liquid Effluent Generation, Air Emissions, Solid waste generation, Transportation mechanisms and Storage of chemicals.

2.4.2 Step - 2: Data Analysis

The data collected in step-1 was analyzed in the framework of Punjab Environmental Protection Act, 1997 (Amended 2012).

2.4.3 Step - 3: Environmental Impact Assessment

The data collected in previous phases was used to investigate existing environmental conditions and assess the potential impacts of the proposed project activities. Although the major emphasis remained on the compliance of the client's operations with the provincial legislation, available national and international guidelines were also reviewed, and mitigation measures were developed to ensure environmentally safe practices.

2.4.4 Step - 4: Environmental Impact Assessment (EIA) Report

The finding of the study was communicated to the client in the form of a draft Environmental Impact Assessment (EIA) report. The report has been prepared in accordance with the relevant guidelines of the Punjab EPA.

The discussion and comments of the client regarding the recommendations by the consultants were considered and appropriate modifications were incorporated in the Draft Report to be presented as a Final Report.

2.5 Salient Features of the Report

The EIA report has been organized into ten (10) chapters. **Chapter-1** describes the introduction of proponent, overview of the proposed project activities and location of the proposed project. **Chapter-2** describes Screening for environmental assessment, **Chapter-3**



ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

describes scoping process whereas **Chapter-4** discusses consideration of alternatives in terms of environment, design, technology, site, and cost. **Chapter-5** describes in detail the project and process activities. **Chapter-6** gives the environmental setting of the project area including the physical and socio-economic conditions. **Chapter-7** discusses impact assessment criteria & methodology. **Chapter-8** describes Screening of Potential Environmental Impacts and mitigation measures. **Chapter-9** describes an Environmental Management and Monitoring Program (EMMP), **Chapter-10** describes stakeholder consultation and **Chapter-11** concludes the report.



Chapter 3

SCOPING

3.1. Introduction

The scoping identifies the key issues and impacts that should be further investigated. The scoping describes the spatial and temporal boundaries of the proposed project, important issues and concerns raised during consultation and significant impact factors to be determined.

3.1.1 Spatial and Temporal Boundaries

The proposed project is basically an installation of an Incinerator for the disposal of hazardous and non- hazardous Waste. Currently the proposed project is at zero stage. Although the design phase is complete and layout plan has been prepared, the construction work is not initiated until EPA approval is granted. Land reserved for the project is flattened and empty plain area.

The proposed project site is a barren land and is 5-7 km away from the Main Ferozepur Road of District Lahore. The area is the least populated and other commercial activities are also on a very limited scale. The nearby residential area is 4-5 km away from the proposed site. The spatial and temporal boundaries of the proposed project are given in figure 3.1.

3.1.2 Important Issues and Concern Raised During Consultation

The consultation and scoping meetings were carried out in the project area to disseminate information about the project and its expected impact on the primary and secondary stakeholders. During the survey, number of relevant stakeholders were consulted i.e., local community, government officials and environmental practitioners and experts. After consultation, it was observed that maximum people were in favor of proposed project. On the other hand, very few of the stakeholders seem reluctant in favoring the project as they said that such projects will bring disturbance to their environmental and economic setup. They were afraid of usage of heavy machinery that will lead to public nuisance i.e., noise and air pollution.



Following concerns of the local community, government departments and environmental practitioners and experts were noted:

- Environmental Monitoring should be carried out regularly
- Local residents should be preferred for the job opportunities.
- The biodiversity of the area should not be damaged and proper management should be done.
- An effective environmental management plan should be designed and enforced with true spirit.
- Environmental and safety training should be arranged for the workers to avoid any mishap.

3.1.3 Significant impacts and factors to be determined.

Main impacts and factors to be determined are:

- Occupational Health and safety
- Traffic Management
- Hygiene Management
- Job Opportunities for Locals
- Resource Conservation
- Avoid Excessive Water Consumption
- Energy Efficient Techniques must be adopted
- Proper Site Restoration after construction
- Emergency Preparedness



Figure 3.1 Spatial and Temporal Boundaries of the Proposed Project

Chapter 4

ANALYSIS OF ALTERNATIVES

4.0. Project Alternatives

This section of the EIA report of the proposed project of M/S Lasani Waste Management of Installation of Incineration Facility for Hazardous and Non-Hazardous Waste, explains the alternatives of the project based upon the economic feasibility and environmental sustainability. An assessment of Project alternatives was carried out to fulfill the requirements of the TOR and IEE/EIA Guidelines. The alternatives were selected through professional experience and consultation with Project stakeholders, including Regulatory Agencies (EPA Punjab), the public and Aboriginal communities. The screening criteria considered potential environmental effects, social acceptability, engineering feasibility and cost. Alternatives further identified during the development of the Project are also assessed. This chapter provides an overview of the alternatives assessment process, the alternatives assessed, and the set of preferred alternatives that are carried into this EIA Report.

4.1. The No Action Alternative

The No Action Alternative in respect to the proposed project implies that the status quo is maintained i.e., no construction/development activity to take place. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. However, the need for such development is high and the anticipated insignificant environmental impacts resulting from construction have already been experienced. This option will, however, involve several losses both to the project proponent/land owner. The property will remain under-utilized or neglected. The No Project Option is the least preferred from the socio-economic and partly environmental perspective since if the project is not done: -The economic benefits especially during construction i.e., provision of jobs for skilled and non-skilled workers will not be realized.

- There will be no generation of income by the developer.



- The social-economic status of the area would remain unchanged.
- The local skills would remain underutilized.
- No employment opportunities will be created for locals who will work in the project area.

4.2. Site Alternatives

Relocation option to a different site is an option available for the project implementation. Many other site alternatives such as Mahmood Booti, Lakhodair, Bhaini Village were considered before the selection of the current location. There are several reasons for selecting Moza Saraich District Lahore Location for the proposed waste processing unit as;

- The proposed site has higher potential of revenue generation.
- This site will cater major areas in Lahore and South Punjab
- Few competitors are present in this area
- The site is not dangerous for public safety
- The proposed site does not fall in any category of protected or environmentally sensitive area.

The project proponent would spend another long period of time on design and approval of the plans by the relevant government departments. The project design and planning before the stage of implementation would call for costs; already incurred in the proposed development i.e., whatever has been done and paid to date would be counted as a loss to the proponent. In consideration of the above concerns and assessment of the current proposed site, relocation is not a viable option. From the analysis above, it becomes apparent that the Site Relocation is not the appropriate alternative to the local people and proponent.

4.3. Design / Technology Alternative

The incineration facility proposed to be constructed by M/S Lasani Waste Management, is one of its own kind Environmentally friendly facility. The incinerator would have an integrated gas washing system pre-installed in it. All the gases emitting from the chimney will pass through that gas washing system having wet scrubbers and cyclones. After that operation, harmless smoke will be emitted in the environment which will not have any detrimental impacts on the air quality of the area. The water used for the scrubbing

operations will be used in a closed loop system and shall be recycled throughout the cycle of the incineration. By this way no additional water will be required in the scrubbing of the gases. The ashes produced as the byproduct of the incineration will be converted into bricks. Therefore, the facility would not produce any kind of waste in the form of gases, solid or liquid. Hence, no other technological alternative was considered for the proposed project.

4.4. Environmental Alternatives

As already explained in the above section, the proponent is planning to install the state-of-the-art incinerator, with integrated noise, water and air pollution controls. The byproduct, i.e., ashes will also be converted into bricks in the same facility; and the water used in the scrubbing operations will be recycled throughout the operational cycle of the machinery, hence no solid or liquid waste would be generated during the incineration process. The proposed project site is a barren land and surrounded by empty plots. Furthermore, no protected, archaeological, cultural and / or religious places are present around the project site. There is no surface water body present in the form of stream and river.

4.5. Economic Alternatives

The proposed project of M/S Lasani Waste Management is planned in Moza Saraich Tehseel Model Twon District Lahore. The project site is linked with all major cities of the country through a network of national Highways. This strategic location of the proposed project reduces the cost of the transportation of the waste material. Furthermore, the project will also enhance the social well-being of the area by providing job opportunities to the skilled and unskilled workers residing in the nearby communities.

4.6. Conclusion

After the detailed analysis of the alternative options for the proposed project, the planned locality, i.e., Moza Saraich Tehseel Model Town District Lahore, and the proposed project of the construction of incineration facility is environmentally friendly, socially acceptable, financially viable and sustainable in all the aspects like; Site setting, technology being utilized, and environmental & economic prospects.

CHAPTER 5

PROJECT DESCRIPTION

5.1. Type and Category of the Proposed Project:

According to Section 12 of Punjab Environmental Protection Act 2012 and its regulations “Review of IEE/EIA Regulations, 2000”, the present project of Incineration Facility falls in **Schedule-II (EIA)** under the Category **G (1)- Waste Disposal and or / storage of hazardous or toxic waste (including landfill sites, incineration of Hospital Toxic Waste)**.

5.1.1. Proposed Project Area

The project will spread over land area of **4 Kanal 1 Marla** and the covered area is **2 Kanal**:

Project	Total Area (Sq. m)
Lasani Waste Management Company	2023.43 m ²

5.2. Project Objectives:

The proposed project objectives are to:

- Collection, Transportation, Storage, Handling, Incineration and Disposal of Hazardous and Non-Hazardous Waste Material including scrap items.
- Management and disposal of hazardous and non-hazardous waste in environment friendly waste incinerators
- Reducing, re-using and recycling the non-hazardous industrial waste and scrap items
- To reduce the burden on the local landfill sites by employing 3R concept of waste reduction
- To Remain competitive
- Provide opportunities for project-related community improvements.

5.3. Location and Site Layout Map

The proposed site is located at Mouza Saraich, Sue-e Asal Tehseel Model Town District Lahore. Google Earth Map showing location of the proposed site is attached as **Annex-D** and Site Layout of project is attached as **Annex-E**

5.4. Nearby Areas

- **East:** Open lands
- **West:** Open Lands
- **North:** Open Lands
- **South:** Open Lands

5.5. Land Use on the Site

The proposed project site is an open land and is 5-7 km away from Main Ferozepur Road. The area is the least populated and other commercial activities are also on a very limited scale. The nearby residential area is 4-5 km away from the proposed site.

5.6. Road Access

The proposed project site is easily accessible through Lahore-Kasur Road / Ferozepur Road, which is about 2.72 km away from the proposed facility.

5.7. Vegetation Features of the Site

The proposed project site is a barren land and comprises of few wild vegetation mainly grasses and shrubs. No particular species of trees were found at site. Scattered xerophytes and a few Poplar trees were observed in the area.

5.8. Cost & Breakdown

Cost of the proposed project is **100 Rs Million** and Cost Break Up is detailed below;

- Installation of hazardous waste Incinerator of Capacity of 800 kg / hour: 50 million Rupees.
- Offices and other auxiliary facilities: 10 million Rupees
- Fire Fighting and other safety equipment: 10 million Rupees
- Gantry Structure (Loading / Unloading):10 million
- Emergency back-up generators: 10 million Rupees
- Land and area rehabilitation, aesthetics and greenery: Rs. 10 million

5.9. Magnitude of Operation

The proposed scheme has a low impact on the environment. All the associated impacts with the proposed scheme are localized, temporary and can be phased out over time through proper management.

5.10. Schedule of Implementation

Development work at the site will be started after attaining approval from Punjab-EPA. However, the completion time period of the proposed project will be approximately 15 Months.

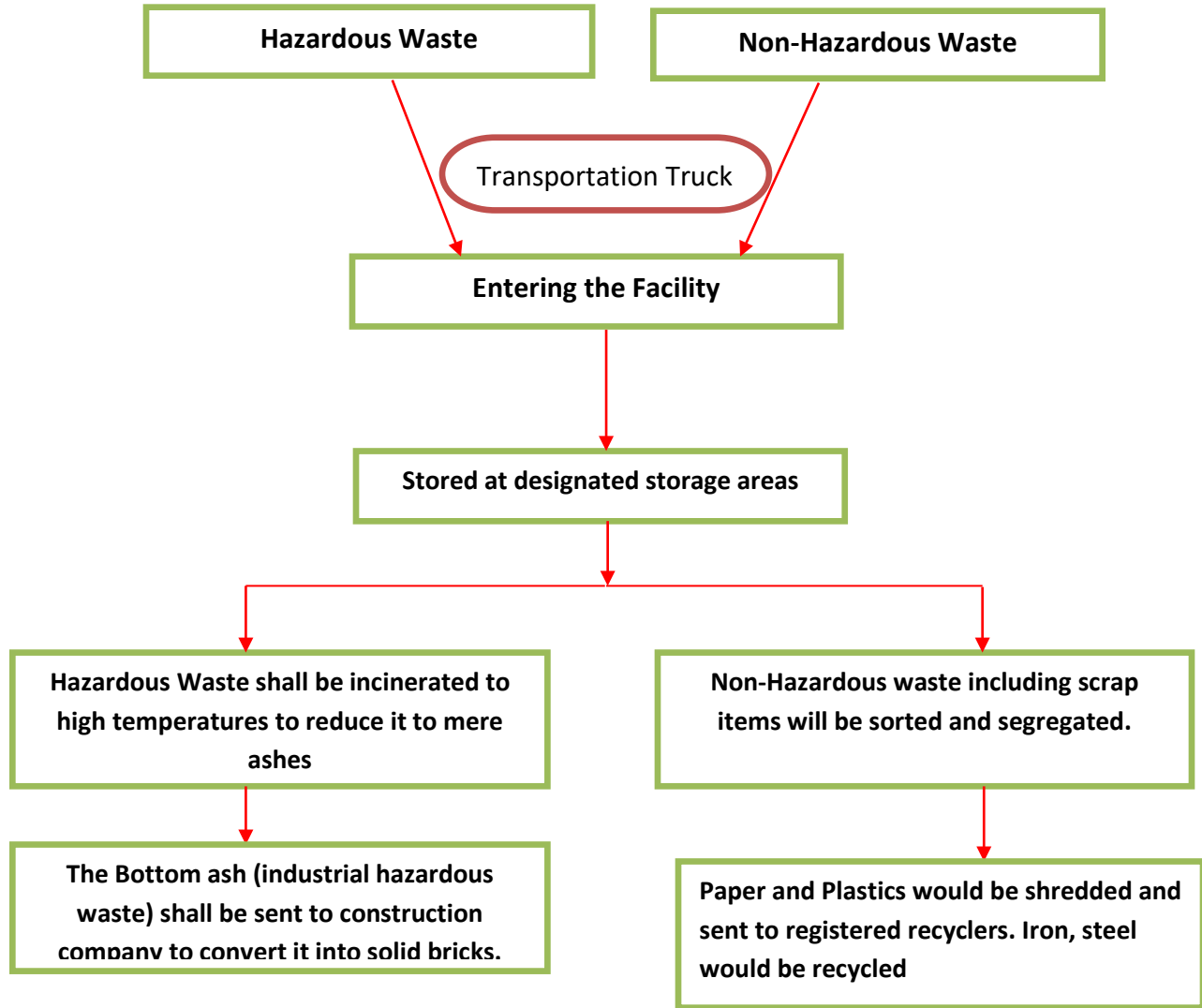
5.11. Project Description

Project components during construction of incineration facility of M/S Lasani Waste Management.

- Collection, transportation, and handling of hazardous (industrial) and non-hazardous waste items
- Installation of waste incinerators of 300 Kg/hr capacity.

5.11.1. Process Flow Diagram

Figure 5.1 Process Flow Diagram



5.11.2. Detailed Process description Construction Phase of the Project:

Following mentioned is the detailed description of the whole construction phase of the project:

- In construction phase of the project, M/S Lasani Waste Management will install incinerator of about 300 kg/hour capacity
- The waste incinerator shall incinerate only the industrial and hazardous waste as per its' capacity of incinerating 300kg/hr. of industrial hazardous Waste on daily basis.
- The project will also involve the construction of allied facilities of the site, including building the offices, waste storage areas, and washroom areas for the workers and staff.

5.11.2.1. Technical Features of the Incinerator

M/S Lasani Waste Management has proposed to install the incinerator for industrial hazardous and non-hazardous waste, which would have the following technical features installed in it, to maximize the reduction of impacts of incinerating the hazardous waste on environment:

- **Description of the waste material:**

The waste material proposed to be incinerated would be of following type:

- Industrial hazardous waste: WWTP sludge, unused and spent chemicals, expired chemicals and other waste material which is contaminated by any harmful agent and is unfit to store or otherwise dispose of in an un-professional manner.
- Pharmaceutical waste: expire bottles, boxes, and expired medicines.
- Scrap items: Paper, Plastic, Iron, carboards etc. and other material which comes under the category of Non-Hazardous Waste.

- **Technical features of incinerator**

The technical features of both the incinerators are as following:

1. Running Principle
2. Incinerator Components
 - a. Waste loading facility
 - b. Combustion chamber
 - c. Post-combustion chamber
 - d. Burners
3. Electric control and regulation panel
4. Chimney
5. Wet Scrubber
6. Technical features

1. **Running Principle**

- Waste Destruction Capacity: 300 kg/h
- Combustion gas would be re-burned in the post-combustion chamber at a temperature of min. 1,200 °C.
- The control panel would be fitted with a functional synoptic view showing the operating situation of the whole installation.

- Incinerator would be designed as a packaged unit, having electrical connection pre-wired and fuel pipes in place, making installation easier at site.

2. Incinerator Components

a. Waste Feeding Chamber

The incinerators shall have a built-in waste feeding chamber, consisting of a hopper made up of mild steel sheet and internally lined with fire bricks.

b. Combustion Chamber

- i. The first phase of the incineration would be combustion without air comparable to gasification.
- ii. The combustion chamber shall be made of thick steel sheet.
- iii. The inside of combustion chamber would be rectangular shape.
- iv. The insulation of the combustion chamber shall be composed of refractory bricks having high content aluminum and isolation bricks in order to assure a minimum temperature on the outside sheet metal.
- v. Composition of the refractory lining:
 1. Refractory bricks:
 2. Thickness: 110 mm
 3. Maximum temperature: 1,400 °C
 4. Nature: 42% of Al_2O_3
- vi. Insulator:
 1. Thickness: 80 mm
 2. Maximum temperature: 1,000 °C-1200°C
 3. Nature: Calcium silicate
- vii. Air Supply Fan:
 1. Electro-ventilator to distribute the primary and secondary air in the incinerator.
 2. This combustion hearth would be equipped with primary air nozzles to assure the perfect combustion.
 3. The air injection would be done with a high-pressure blower in the primary chamber.
 4. The adjustment of air rates would be carried out through valves and servomotor according to the automatic cycle controls.

c. Post Combustion Chamber

- i. The post combustion chamber would have a facility of a post-combustion of the flue gas produced by the combustion chamber at high temperature.
- ii. The post-combustion chamber will be situated just beside the combustion chamber so as to re-burn easily the flue gas.
- iii. The post-combustion of gases will take place at a temperature of 1,200-1300°C.
- iv. The flue gases would be held for 02 seconds in the post combustion chamber.
- v. The design of two post-combustion burners would be similar to the combustion burner.
- vi. The post-combustion chamber would be fitted with inspection doors so that a periodical cleaning of dust can be achieved.
- vii. The post-combustion would be lined with high thermal insulating materials with a thickness of 150 mm of refractory bricks and 85 mm of insulator.

d. Burners

- i. There would be four burners. Two burners in primary chamber and two burners in secondary chamber.
- ii. The burners will operate on: natural gas, crude oil, furnace oil and diesel.

3. Electric control and regulation panel

- a. Power supply would be 380V, 50 Hz three phase
- b. The installed materials would be with well-known marks functioning at the frequencies of 50/60 Hz.
- c. Dust-tight control box shall contain:
 - i. One circuit breaker switch for each engine (ventilator and burners).
 - ii. Four timers with adjustable delay time for controlling each engine (ventilator and burners)
 - iii. One digital display regulator for the combustion temperature.
 - iv. One digital display regulator for the post-combustion temperature
 - v. Control box in compliance with current standards.

4. Chimney

- a. The chimney would be made up of stainless-steel flanged sections with anti-corrosive coating.
- b. The height of chimney would be 20 m from the ground putting the incinerator.
- c. The chimney would be fitted with sampling port for the collection and measuring of gas samples.

5. FLUE GAS CLEANING SYSTEM

a. WET SCRUBBER

Gas washing system with water sprayer. The gases will pass through the integrated gas washing system, i.e., wet scrubber. The gases will be sprayed with water to remove the particulate matters, if present in the gases.

The flue gas treatment will compose with an emergency by pass stack, a flue gas cooling system, two reactors and a particulate filtering system.

b. CYCLONES

The gases after leaving the wet scrubber will be subjected to the cyclone section of the incinerator. In the cyclone, the gases will swirl in an anti-clock wise direction, so that the remaining particles in the smoke of settles down.

6. Other Technical Features of Incinerators

- a. Operation Time: 8 hours daily
- b. Temperature
 - i. Combustion Chamber: 800-1200°C
 - ii. Post-Combustion Chamber: 1200-1350°C.
- c. Burner Power
 - i. Combustion Chamber: 1000 KW
 - ii. Post-combustion Chamber: 1000 KW
- d. Gases dwell time in post-secondary chamber: 2 seconds

5.11.3. Detailed Process description of Operational Phase of the Project

This section of Environmental Impact Assessment (EIA) report will highlight and briefly explain the activities of the project proposed to be carried out in the operational phase. As already mentioned, the project may become operational after 15 months of construction and installation of the machinery, the operational phase is proposed to initiate after successful trial runs of the incinerator.

In the operational phase of the project, following would be the proposed stages of the daily operations of the incinerator:

- **Collection and transportation of Hazardous Waste**

In this step, the hazardous and non-hazardous waste material from various industries and manufacturing units shall be collected by the specialized vehicles of M/S LASANI Waste Management. The vehicle would be equipped with GPS tracking system, CCTVs camera and necessary safety equipment. The workers would be equipped with all the type of necessary personal protective equipment. The PPEs, proposed to be involved are: Hard gloves, safety goggles, hard helmets, safety shoes and chemical suits etc., to avoid minimum contact with any type of the hazardous waste they are dealing with. The workers will load the vehicle and ensure the waste is sealed in separate sealed containers and will not come in contact with environment and workers in during collection and transportation. In case, the client had mixed type of waste material, then M/S LASANI Waste Management will arrange two vehicles subsequently and avoid the mixing hazardous and non-hazardous waste material. The vehicles shall be monitored through its vehicle tracking system and through geo-fencing.

- **Unloading of Waste**

At the proposed incineration facility of M/S LASANI Waste Management, the workers would unload the vehicle containing the hazardous waste by following proper health safety and environment procedure with zero tolerance. The waste material, as per its' nature, shall be stored temporarily in the storage areas proposed to be constructed under current project. The storage room shall have the following specifications:

- Conditions: dry mostly
- Ventilation: through huge exhaust fans proposed to be installed in ceilings and wall of the warehouse, so that the hazardous fumes may not accumulate in the area
- The warehouses shall have their proper firefighting systems, smoke detectors and fire alarms installed in them.
- The warehouses shall have separate emergency exits, which shall not be blocked in any case.
- The workers would be given proper training on quarterly basis on subject of using the firefighting equipment and using the emergency exits and responding to the emergency sirens and bells in case of emergency.

The waste shall be stored, as per the storage instructions given in the MSDS (material safety Data Sheets) of the type of the chemical in the waste, which is proposed to be stored in the warehouse for some time. The waste material shall be stored for limited period of time, after which it will be incinerated as per the prescribed incineration policy of M/S LASANI Waste Management.

- **Incineration**

In this step, the hazardous waste material will go through a proper incineration channel, in order to decontaminate it and dispose it of finally in an environmentally safe manner. Following steps would be followed for the proper incineration of the hazardous industrial waste:

- The incinerator shall be pre-heated to the temperatures around 400-500°C.
- After pre-heat, the primary chamber of the incinerator will be fed with hazardous waste. The rotary type primary chamber will initiate the incineration operation and through this very particular action of the primary chamber, the waste material will be homogenized and to ensure the complete incineration of the industrial hazardous waste material.
- The temperature will escalate from 800 to 1100°C, which is enough to reduce the huge amount of industrial waste to mere ashes.
- After and during the incineration operation in the primary chamber, the gases produced during the combustion of the hazardous waste material will be pushed into the secondary chamber of the incinerator where they are incinerated to the highest possible temperatures the secondary chamber of the machine can ever bear, i.e., from 1200 to 1350°C.
- At these high temperatures in the secondary chamber, all types of dioxins and furans will be incinerated in the secondary chamber, from where the gases are pushed towards the wet scrubbers to eliminate remaining particulate matters, if still present in the smoke after the high temperature treatment.
- Leaving the wet scrubbers, the gases will be swirled in anti-clock wise direction in the cyclones to remove any other particulate matter present in them.

- **De-Ashing System**

The bottom ashes produced as a result of the incineration, will be removed from the primary chamber during the cooling hours of the machine. The ashes recovered from the incineration operations will be stored in specialized ash containers. The samples of the ash will be subjected to the laboratory analysis to determine the nature of ash, i.e., hazardous or non-hazardous. If the ash is found to be inert and non-



hazardous, it will be mixed with the construction material to convert it into bricks. If the ash is found to be hazardous and reactive, then it will again be subjected to incineration again.

5.11.4. Management of Non-Hazardous Waste Material and Scrap Items

The non-hazardous waste material from industries and manufacturing units will be sorted, and following process will be adopted to manage and dispose of the non-hazardous waste material in an environmentally safe and sound management of the scrap items:

- The non-hazardous waste material shall be stored separately and shall not be mixed with the hazardous waste material.
- If the non-hazardous waste material is assumed to be contaminated, then it shall be decontaminated before through incineration operation and then shall be subjected to recycling.
- The non-hazardous waste material as per their nature and type shall then be sent to the registered recyclers.

5.11.5. Quarterly Environmental Monitoring

It will be a legal binding for the management of M/S Lasani Waste Management (Proponent), to carry out environmental monitoring of the facility on quarterly basis through an EPA Certified environmental lab, and submit its findings and results to EPA Punjab regularly.

5.12. Estimated Manpower Requirement in Construction Phase

The proposed project will require **30** persons (20 persons directly involved) for installation of the Incinerators while **10** persons (5 persons directly involved) for operations and support services.

5.12.1. Water Requirement

Groundwater is available at the average depth of 40-50 feet below surface while at a depth of 450-500 feet, greater quantities of good quality ground water is available from where most of the city water is derived. Water requirements of the proposed installation will be fulfilled by installing tube-wells. The source of water for the proposed project will be Ground Water through tube well. Water consumption during operational phase will be **375 gallons per day** for personnel use.

5.13. Energy Requirement

Energy requirements of the proposed project will be met from main WAPDA LINE which is near



from the proposed incinerators. Generally, the supply of the electricity is smooth without any interruption. Total approx. units consumed by the Incinerator plant are 276/Day and it consumes 7196.8 units for 26 Days (s). Under load shedding conditions generator of 50 KVA will be installed by the proponent to supply the electricity to the Incinerators.

5.14. Restoration and Rehabilitation Plan

The main areas to be considered for site restoration include the Incinerator plant site, camp sites area, temporary tracks; land used for vehicle and material stores etc. These areas would be restored to its original condition with the maximum possible effort. The restoration work comprises the removal of temporary work equipment and removal of any fence installed, leveling of areas (wherever required), etc. The following procedures would be adopted for the restoration of the site:

- All temporary equipment built for the site development would be removed.
- Site for labor camps would be restored to its previous conditions as much as possible.
- Any debris from the establishment of the project activities would be removed properly from the site.
- All fencing and gates will be removed and additional pits will be backfilled.
- Whole of the site will be covered with the original soil to the original levels and grades and vegetation will be done, where required.

Finally, after the completion of the restoration process, the proponent and the supervisory consultants should inspect the site and the proponent would give the restoration clearance to the contractor.

“To limit the disturbance to the public caused by excavation and other works, restoration has been made a part of the work activities to be performed by the Management of M/S LASANI Waste Management. M/S LASANI Waste Management has bound the Contractors to restore the dismantled as well as temporary sites.”

5.15. Government Approvals

Only the Environmental Approval is required for the establishment of the proposed project from Punjab Environmental Protection Agency (EPA)



CHAPTER 6

DESCRIPTION OF ENVIRONMENT

6.1. General

This section describes the existing environmental conditions around the proposed Project Area. Information that has been collected from different sources including public literature, reports of other studies conducted in this area, knowledge with the proponent and the concerned government departments and the first-hand surveys and field measurements has been presented in this section. This encompasses all the important aspects of local environment; such as Physical, Ecological and Socio-economic resources.

6.2. Study Parameters

The existing information to establish a database for the EIA of the proposed project was collected from different government departments; review of previous studies and through the site visits carried out in the Project Area. To comprehend the existing environmental conditions, a site survey was conducted and salient observations were duly noted. The pertinent data were also collected from the Census Report of Lahore District. In addition to the Census Report, relevant government departments were also consulted for related data.

The Social Assessment of the proposed Project Area was conducted through consultation with the community. Area residents were interviewed to get their opinions and views regarding the Project:

6.2.1. Study Area

An area about half a kilometer radius around the project has been considered as influence zone and hence it has been taken as Study Area (SA) to collect the primary data related to physical, ecological and socio-economic environment. It included the village of Moza Saraich, Soa Asal, Tehsil Model Town, District Lahore

6.2.2. Project Area



Environmental Impact Assessment (EIA)

The proposed project of M/S Lasani Waste Management is the construction of “Incineration Facility for Hazardous and Non-Hazardous Waste”. The total area of the proposed project is about 4 Km 1 Marla, located in Moza Saraich, Soa Asal, Tehsil Model Town District Lahore.

6.3. Physical Environment

This part examines the physical resources such as geography, geology and soils, topography, land use, climate, surface and ground water resources, water quality and ambient air quality of not only the project site but also the study area as a whole to assess whether the project under assessment can have any adverse impact on any of these parameters. Following is a brief description of various physical resources of the Study Area, of which the Project Area makes an integral part:

6.3.1. Topography

Lahore is the capital city of the Pakistani province of Punjab, and is the country's second-most populous city after Karachi. Lying between 31°15' - 31°45' N and 74°01' - 74°39' E, Lahore is bounded on the north and west by the Sheikhupura District, on the east by Wagah, and on the south by Kasur District. The Ravi River flows on the northern side of Lahore. The total area of district is 1,772 square kilometers (684 sq. mi).

The topography of the project area is flat. The General height of the area is approximately 220 meters above the Mean Sea Level (MSL). The district Lahore is divided into two parts. The low-lying alluvial soil is along the Ravi River, and the upland in the east. Upland is a plain slope from north-east to south-west. The lowlands are generally inundated during the monsoon season by Ravi River, flowing in the west of district along its boundary with district Sheikhupura.

The project area has flat topography with elevation of 676 ft from MSL. Topographic map of project area showing elevation is shown below in Figure 6.1:





Figure 6.1: Topographic Map of Project Area

6.3.2. Geology and Soil

The project site is located in Punjab which is a vast plain of alluvial material, deposited by Indus's basin and its tributaries crossing the Punjab Plain. The alluvial deposits underlying the site are deposited by the rivers. The thickness of alluvial deposits in Lahore division is thought to be more than 300 m which are underlain by the basement rocks of the Indian shield. The alluvial deposits mainly consist of sands, with intercalation of silt and clay layers of varying thickness.

6.3.3. Seismicity

According to seismic zoning of Pakistan, the Project area lies in Zone 1 of Modified Mercalli (M.M) scale and represents minor damage. Distant earthquakes may cause damage to structure with fundamental period greater than 1.0 seconds, corresponds to intensity V and VI of the M.M scale" (National Disaster Management Authority).

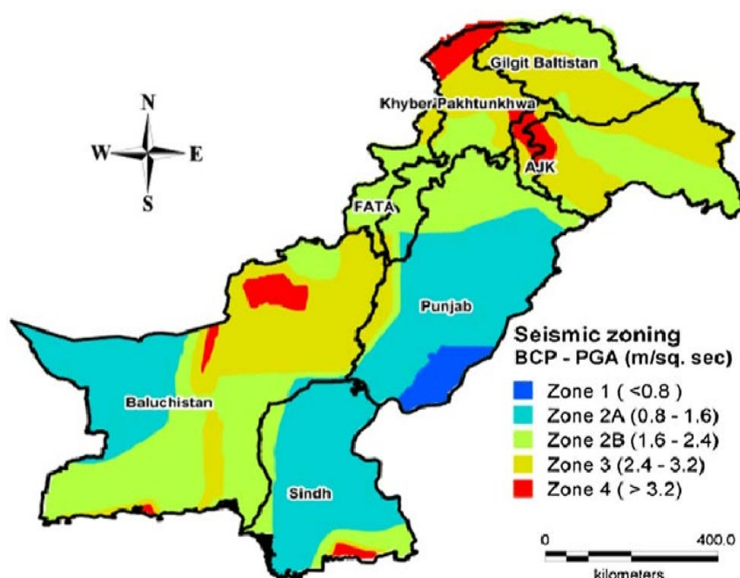


Figure 6.2: Seismic Zoning Map-Pakistan

6.3.4. Climatic Conditions

As a part of mandatory seasonal and climatic conditions are considered for the design and execution of Project. The climate including air, temperature, precipitation, humidity and evaporation is an influencing factor, affecting the construction of engineering structures. Climatic conditions of the study area are discussed below in detail.

6.3.4.1. Temperature and Precipitation

Lahore has distinct seasons marked by wide variation in temperature. The coldest month is January in which the mean maximum temperature is 21°C and the mean minimum temperature is 4°C. June is the hottest month with the mean maximum temperature near 45°C and the mean minimum temperature as 28°C. The average rainfall in the district is about 289 mm. Average, minimum, maximum temperatures and precipitation for district Lahore are given in Table 6.1:

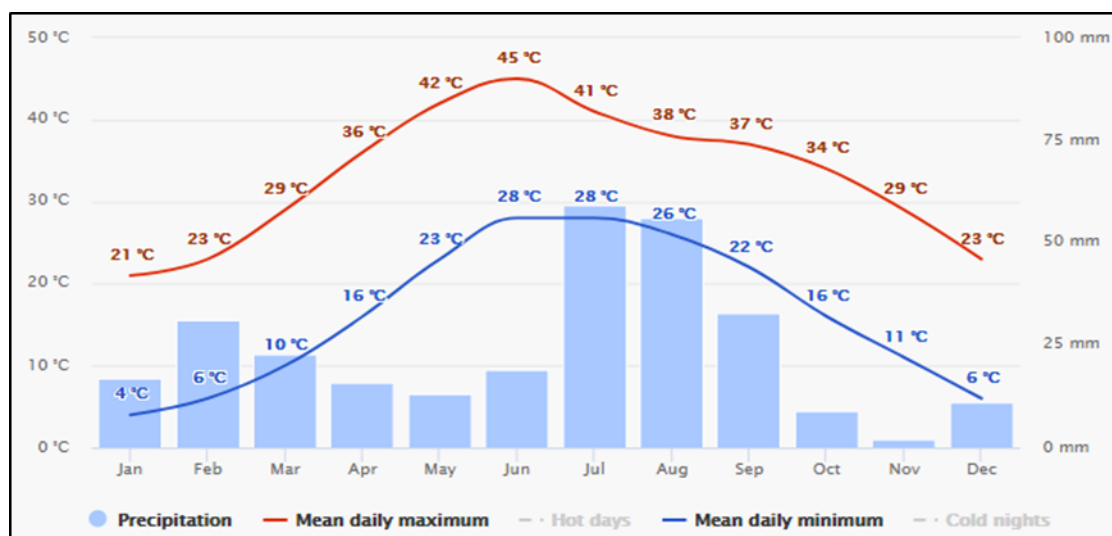
Table 6.1: Average Temperature and Precipitation

Month	Mean Daily Temperature		Precipitation (mm)
	Min. Temp. (°C)	Max. Temp. (°C)	

Environmental Impact Assessment (EIA)

January	4	21	17
February	6	23	31
March	10	29	23
April	16	36	16
May	23	42	13
June	28	45	19
July	28	41	59
August	26	38	56
September	22	37	33
October	16	34	9
November	11	29	2
December	6	23	11

Whereas the variable temperature trends have been shown in Figure 6.3



6.3.4.2. Wind Speed

Wind speed in District Lahore varies throughout the year. The maximum wind speed noted is 11km/h in July and the minimum is 7km/h which is recorded in October to January. The

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average annual wind speed for district Lahore is 8.75km/h. following Table 6.2 shows the average wind speed for each month.

Table 6.2: Wind Speed of Study Area

Sr.	Month	Avg. Wind Speed (km/h)	Sr.	Month	Avg. Wind Speed (km/h)
1	January	7	7	July	11
2	February	9	8	August	9
3	March	10	9	September	8
4	April	10	10	October	7
5	May	10	11	November	7
6	June	10	12	December	7
Yearly Average = 8.75					

Following figure 6.4 shows the graphical representation of maximum, average and minimum wind speed for each month:

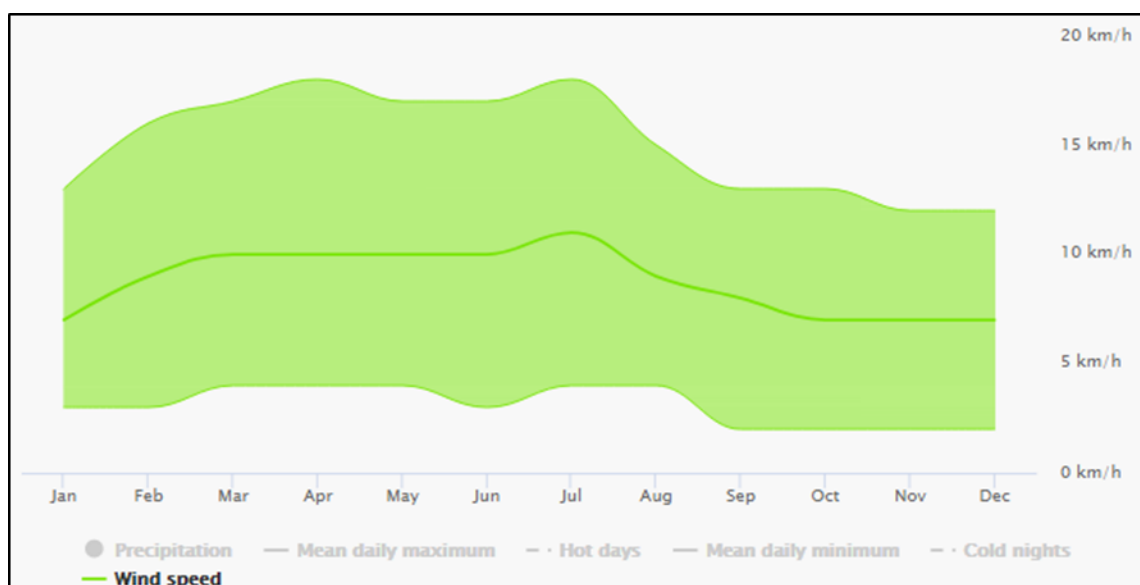


Figure 6.4: Wind Speed

6.3.4.3. Wind Direction

Wind direction of any area shows that from which direction the wind is blowing. For this purpose, wind rose diagram is formulated which shows that for how many hours the direction of wind blow from specific direction i.e., from SW to NE etc. The prominent wind direction of district is WSW to ENE. Wind rose of District Lahore is shown in Figure 6.3:

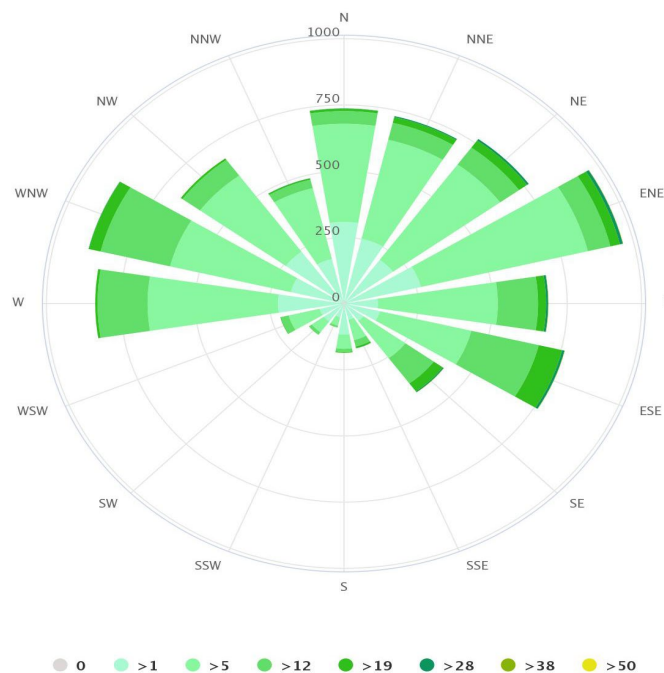


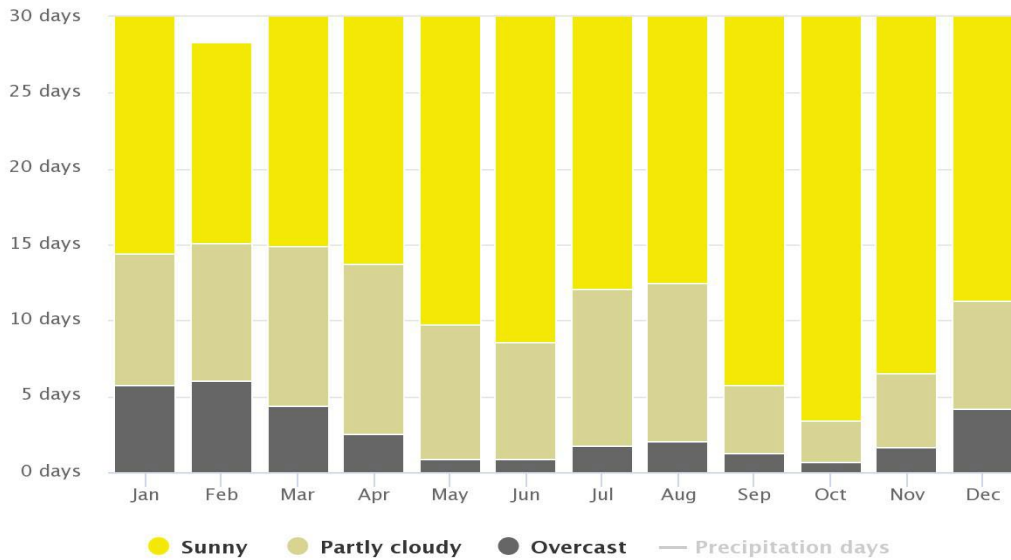
Figure 6.5: Wind Rose Diagram

6.3.4.4. Sunshine Patterns

Sunshine of any area shows that how many days are sunny in a month. The sunshine patterns for a specific area vary accordingly. For each month, the number of sunny and cloudy days for District Lahore is shown below in Figure 6.6.

Figure 6.6: Sunshine Patterns

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The graph shows the monthly number of sunny, partly cloudy, overcast and precipitation days. Days with less than 20% cloud cover are considered as sunny, with 20-80% cloud cover as partly cloudy and with more than 80% as overcast.

6.3.5. Ambient Air Quality

The monitoring of air has been conducted to analyze the ambient air quality of the Study Area. Equipment used for monitoring was Haz Scanner HIM 6000 Air Quality Monitoring Station. The results of which are shown below:

Table 6.3: Ambient Air Quality

Parameter	CO	SO ₂	NO ₂	Ozone	PM ₁₀	Noise
PEQs	5 mg/m³	120 µg/m³	80 µg/m³	130 µg/m³	150 µg/m³	75 (dBA)
Main Gate	2.3	12.5	64	11	89	65.5
Mid of the Site	1.8	7.8	53	8.0	44	54.4

The results of monitoring shows that the major air pollutants i.e., carbon monoxide, Sulphur dioxide, nitrogen dioxide and particulate matter are within PEQS.

6.3.6. Noise Level

Noise level was also measured on Project site, the noise level recorded at project site was 51 dB which is within PEQS.

6.3.7. Water Quality

Ground water quality testing was carried out to determine its suitability for use. Testing data shows that ground water is suitable for drinking. Following are the results of testing.

Table 6.4: Ground Water Quality Analysis

Sr.	Parameter		Units	PEQS	Concentrations	Methods
1	pH		-	6.5-8.5	7.2	APHA 4500H ⁺ B
2	Total Solids	Dissolved	mg/l	<1000	760	APHA 2540 C
3	Chloride		mg/l	<250	189	APHA 4500 Cl-B
4	Turbidity		NTU	<5NTU	0.25	APHA 2130 B
5	Fluoride		mg/l	<1.5	0.79	APHA 4500 FD
6	Sodium		mg/l	NGVS	132	APHA 4500 Na-B
7	Potassium		mg/l	N.S	4.5	APHA 6500 K-B

The results of ground water analysis show, almost all the parameters are within safe limits of PEQS.

6.3.8. Ecological Environment

The ecological environment of an area is generally considered sensitive to large-scale developments. Disturbances and imbalances in the ecological environment can adversely affect the biodiversity features of an area. The biodiversity of an area generally reflects the abundance and richness of the biological and or the ecological resources.

6.3.8.1. Flora

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a. Forests

The project site is devoid of any specific or major plantation except a few ordinary trees. There is no major forest plantation within the zone of influence of the project.

b. Trees

The diversity and distribution of plant species depends upon the availability of water and the underlying geology. The trees existing in the Study and Project Area mostly consist of Kekkar, Taali and papolar.

c. Grasses

The common grasses present in Study and Project Areas are Boi Grass, Dab Grass and Gorkha Grass. The botanical names of above stated grasses are shown below in Table 6.5:

Table 6.5: Major Grasses present in Study Area

Sr. No.	Local Name	Botanical Name
1	Boi Grass	Cyperus
2	Dab Grass	Desmost Achya
3	Frash Grass	Tamarix Aphylla

d. Shrubs and Herbs

The shrubs and herbs provide nutritious supplemental feed to livestock during lean period because they are perennial and have depth root systems. The common Shrubs and Herbs present in Study and Project Area are Karer, Jand, Aak, Kana and Lana; Botanical names of which are shown below in Table 6.6

Table 6.6: Major Shrubs and Herbs of Study Area



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Sr. No.	Local Name	Botanical Name
1	Karer	Capparis Decidua
2	Jand	Prosopis Cineraria
3	Aak	Calotropis Procera
4	Kana	Sueda Fruiticosa
5	Lana	Saccharum Munja

e. Endangered Floral Species

No such plant species is encountered at Study Area that is endangered or declared protected under national, provincial or local government definitions as well as international agreements/protocols ratified by Government of Pakistan.

6.3.8.2. Fauna

The assessment on terrestrial fauna in the Study Area is based upon the field investigation and reports of Forest Department. A variety of animals is found in Study Area which is categorized as Mammals, Birds, Reptiles and Amphibians.

a. Mammals

The common Mammals found in Study Area is Jackal, Dog and Monkey. Following Table gives the Common and Zoological names of Mammals:

Table 6.7: Mammals present in Study Area

Sr. No.	Common Name	Zoological Name
1	Jackal	Canis Aureus
2	Dog	Canis Lupus Familiaris



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3	House Rat	Rattus Rattus
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b. Birds

Native species of birds present in Study Area is Pigeon, Sparrow, Crow and Parrots. Common and Zoological names of birds are given in Table 6.8:

Table 6.8: Major Birds present in Study Area

Sr. No.	Common Name	Zoological Name
1	Pigeon	Columbidae
2	Sparrow	Passeridae
3	Crow	Corvus

c. Reptiles and Amphibians

The native species of Reptiles and Amphibians observed in Study Area is Snake, Lizard and Frog.

Table 6.9: Common Reptiles and Amphibians of Study Area

Sr. No.	Common Name	Zoological Name
1	Snake	Serpentes
2	Lizard	Lacertilia
3	Frog	Anura

d. Endangered Faunal Species

None of the faunal species encountered at Study Area that is endangered or declared protected under national, provincial or local government definitions as well as international agreements/protocols ratified by Government of Pakistan.



6.4. Socio-Economic Environment

This section provides an overview of the baseline information relating to the socio-economic environment of the Study Area. The information collected from the respondents comprised their occupation, civic facilities, educational and health facilities, agricultural status including livestock population.

6.4.1. Demographic Profile

According to the 2017 population census the district has a population of 11,126,285. From 1998 to 2017, the population grew with an estimated average annual growth rate of 3 %. Population Statistics of district Lahore is given in Table 5.101:

Table 6.10: Population Statistics of Lahore District

District/Tehsil	Population	
	1998	2017
District Lahore	6,340,114	11,126,285
Lahore City Tehsil	2,219,399	3,655,774
Lahore Cantt. Tehsil	918,730	1,636,342
Model Town Tehsil	1,409,228	2,698,235
Shalimar Tehsil	1,434,823	2,280,308
Raiwind Tehsil	357,934	855,626
Kasur Tehsil	902,792	1,335,000

In terms of population balance or male female sex ratio, an improvement has been made. Urban and rural male female sex ratio is shown in Table 6.11:

¹Cited on May28,2018; Available from: Pakistan Bureau of Statistics

Table 6.11: Male Female Ratio

	Sex Ratio (Males per 100 Female)
	2017
Lahore District	109.87
Urban	109.87
Rural	0

6.4.2. Infrastructural Facilities

Lahore is one of the most accessible cities of Pakistan. In addition to the historic Grand Trunk Road (G.T. Road), a Motorway (M-2) was completed in 1997 from Lahore to Islamabad. The government has built underpasses to ease congestion and prevent traffic jams, and according to official figures, Lahore has the highest number of underpasses in Pakistan.

The Pakistan Railways headquarters is located in Lahore. Pakistan Railways provides an important mode of transportation for commuters and connects distant parts of the country with Lahore for business, sight-seeing, pilgrimage, and education. The Lahore Central Railway Station, built during the British colonial era, is located in the heart of the city. For air traffic, there is a beautiful modern international airport at Lahore. PIA and other air companies operate regular flights from Lahore to other parts of the country as well as on international routes. Air traffic between India and Pakistan also operates from this airport.

Project area is connected with other area by metaled roads and has easy access to the local market.

6.4.3. Education

Total number of Government schools in Lahore District is 409 out of which, 223 are boy schools and 186 are girls' schools while total number of students studying in these schools are 121,417 out of which, 46,625 are boys while 74,792 are girls. Besides this many private schools are also working in the area. Similarly, there are number of colleges and universities dealing with all fields of science and arts i.e. The University of the Punjab, University of Health Sciences, Allama Iqbal Medical University, University of Engineering & Technology, LUMS and many more.

6.4.4. Health

Ample health facilities are available in the Lahore. Among the prominent hospitals are General Hospital, Lady Willington Hospital, Mayo Hospital, Fatima Jinnah Hospital, The Children Hospital, Services Hospital, Punjab Institute of Cardiology and Ganga Ram Hospital etc. Besides, number of private medical practitioners, Hakims and homeopathic doctors are also practicing in the city.

Study area has Rashid Latif Medical Colleges at a distance of just one kilometer from Gulvera Village which falls in Study Area.

6.4.5. Energy Facilities

The transmission lines for electrical power run to a main grid substation at. The existing 132 kV Grid Station owned by LESCO, transmits power to the load centers. The other significant energy sources in the area are kerosene and LPG. There are numerous petrol stations and LPG dealers in the district.

6.4.6. Agriculture

a. Prevailing Crops



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The main crops of the district are wheat, rice, maize and barley. Moreover, Sunflower, Sugar Beet, Sun Hemp, Rape Seed, Linseed are Also Grown. In Fruits, Citrus, Guava, Date Palm, Mango, Jaman while in Vegetables, Garlic, Onion, Radish, Potato, Carrot, Spinach, Cauliflower are cultivated.²

b. Prevailing Livestock

Common domestic livestock is found in area. The prevailing livestock is Buffalo, Goat Sheep and Cow. These animals are reared to get milk and meat; which are then supplied to nearby area to earn livelihood. Following Table gives the Common and Zoological names of Livestock animals present in Study Area:

Table 6.12: Common Livestock present in Study Area

Sr. No.	Common Name	Zoological Name
1	Buffalo	Bubalus Bubalis
2	Cow	Bos Taurus
3	Goat	Capra Aegagrus Hircus
4	Sheep	Ovis Aries

6.4.7. Industry

After Karachi, Lahore is the biggest industrial area in Pakistan. There has been a steady expansion of industries in and around Lahore since independence. There are many large industrial units in the district. These units manufacture cotton, woolen and silk cloths, carpets and rugs, textile products, leather and rubber foot wears, wearing apparel, pharmaceutical goods, soap, iron and steel products, hardware, miscellaneous fabricated products, agriculture machinery, engines and turbines, textile machinery, printing machinery, metal working

² Cited on May28,2018; Available from: agrihunt.com/articles/pak-agri-outlook/agricultural-profile-of-district-lahore/

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machinery, pumps and compressors, household machinery, water generators, motor generators, transformers, electric fans, communication equipment, cycles and rickshaw.

6.4.8. Common Diseases

The common diseases of study area are fever, diarrhea, dengue fever, tuberculosis and cough.

6.4.9. Quality of Life Values

People of the Lahore have both nomadic and non-nomadic life style. The people of walled city are living here from the time of their ancestors but the people of newly developed areas have migrated from other areas of country in pursuit of jobs and education. Both Family Systems (Joint and Nuclear Family System) are found in the project and study area.



CHAPTER 7

ASSESSMENT OF IMPACTS

7.1. Introduction

Assessment of impact of different activities, and of resulting emission of air, noise, gases, wastewater discharges during construction and subsequent operation of the proposed project are discussed in this section. The entire screening procedure was designed in such a way so as to provide a complete assessment of the impacts on the macro-environment and microenvironment of the project. The project site has no protected area such as game reserve, wildlife, national parks, archeological sites or cultural heritage in its neighborhood.

The process for identification of potential impacts involves understanding of sources of effect in relationship between an activity and environmental parameters. The impact assessment criteria are summarized in **Table 7.1**. However, the detail of impacts that may arise during stages of project phases are discussed in Chapter 8 along with their relevant mitigation measures.

Table 7.1 Impact Assessment Criteria	
Nature of Impact	Direct: The environmental parameter is directly changed by the project. Indirect: The environmental parameter changes as a result of change in another parameter. No Impact: When there is no impact on the environment by the project
Mitigation	What measures could be applied to reduce negative impacts or enhance positive impacts
Magnitude	High: Natural and/ or social functions and/ or processes are severely altered Medium: Natural and/ or social functions and/ or processes are notably altered Low: Natural and/ or social functions and/ or processes are slightly altered Very Low: Natural and/ or social functions and/ or processes are negligibly altered Zero: Natural and/ or social functions and/ or processes remain unaltered
Extent	Local: Site Specific/Local Extends only as far as the activity

	- Limited to the site and its immediate surroundings Regional/Provincial: - Will have an impact on the region/province National: - Will have an impact on a national scale - particularly if an ecosystem or species of national significance is affected International: - Will have an impact across international borders or will impact on an ecosystem or species of international significance.
Duration	Construction period: Up to 2 years Short Term: Up to 5 years after construction Medium Term: 5-15 years after construction Long Term: More than 15 years after construction
Reversibility of the impact	Reversible: The impact is reversible within 2 years after the cause or stress is removed. Irreversible: The activity will lead to an impact that is in all practical terms permanent
Significance	The significance of the impact is determined as a synthesis of the above assessment criteria in which: Low Significance: The impact would not have an effect on the decision to approve the project (or a particular project alternative) Medium Significance: The assessment should have an effect on the decisions unless it is effectively mitigated High Significance: The decision would be influenced regardless of any mitigation

Table 7.2 Characteristics of Environmental Impact from Construction Activities

Sr. No	Environmental Impact	Impact Characteristics					
		Nature	Magnitude	Extent	Duration	Reversibility	Significance
1	Topography	Direct	Low	Localized	Construction Period	Reversible	Low (If provided mitigation measures are effectively implemented)
2	Water Quality	Direct	Low	Localized	Construction Period	Reversible	Low (If provided mitigation measures are effectively implemented)
3	Wastewater Generation	Direct	Medium	Localized	Construction Period	Reversible	Low (If provided mitigation measures are effectively implemented)
4	Air& Dust	Direct	Low	Localized	Construction Period	Reversible	Low (If provided mitigation measures are effectively implemented)
5	Exhaust Emissions	Direct	Low	Localized	Construction Period	Reversible	Low (If provided mitigation measures are effectively implemented)

Table 7.2 Characteristics of Environmental Impact from Construction Activities

Sr. No	Environmental Impact	Impact Characteristics					
		Nature	Magnitude	Extent	Duration	Reversibility	Significance
6	Soil Contamination	Direct	Low	Localized	Construction Period	Reversible	Low (If provided mitigation measures are effectively implemented)
7	Solid Waste	Direct	Low	Localized	Construction Period	Reversible	Low (If provided mitigation measures are effectively implemented)
8	Noise Pollution	Direct	Low	Localized	Construction Period	Reversible	Low (If provided mitigation measures are effectively implemented)
9	Biological Environment	Direct	Very Low	Localized	Short term	Reversible	Low (If provided mitigation measures are effectively implemented)
10	Socioeconomic Environment	No impacts	zero	N/A	N/A	N/A	N/A
11	Traffic Flow	No Impact	Zero	N/A	N/A	N/A	N/A

Table 7.3 Characteristics of Environmental Impact from Operational Activities

Sr. No	Environmental Impact	Impact Characteristics					
		Nature	Magnitude	Extent	Duration	Reversibility	Significance
1	Exhaust Emissions	Direct	Low	Localized	Short term	Reversible	Low (If provided mitigation measures are effectively implemented)
2	Wastewater	Direct	Low	Localized	Short term	Reversible	Low (If provided mitigation measures are effectively implemented)
3	Groundwater Contamination	Direct	Low	Localized	Short term	Reversible	Low (If provided mitigation measures are effectively implemented)
4	Solid Waste	Direct	Very Low	Localized	Short term	Reversible	Low (If provided mitigation measures are effectively implemented)

Table 7.3 Characteristics of Environmental Impact from Operational Activities

Sr. No	Environmental Impact	Impact Characteristics					
		Nature	Magnitude	Extent	Duration	Reversibility	Significance
5	Noise Pollution	Direct	Low	Localized	Short term	Reversible	Low (If provided mitigation measures are effectively implemented)
6	Fire Hazards and Explosion	Direct	Medium	Localized	Short term	Irreversible	Low (If provided mitigation measures are effectively implemented)
7	Occupational Hazards	Direct	Low	Localized	Short term	Reversible	Low (If provided mitigation measures are effectively implemented)
8	Biological Environment	Direct	Very Low	Localized	Short term	Reversible	Low (If provided mitigation measures are effectively implemented)

Table 7.3 Characteristics of Environmental Impact from Operational Activities

Sr. No	Environmental Impact	Impact Characteristics					
		Nature	Magnitude	Extent	Duration	Reversibility	Significance
9	Socioeconomic Environment	No Impact	Zero	N/A	N/A	N/A	N/A
10	Traffic Flow	No Impact	Zero	N/A	N/A	N/A	N/A

CHAPTER 8

ASSESSMENT OF IMPACTS AND MITIGATION MEASURES

8.1 Assessment of Impacts

Assessment of impact of different activities, and of resulting emission of air, noise, gases, wastewater, discharges during construction and subsequent operation of the proposed “Construction of Incineration Facility for Hazardous and Non-Hazardous Waste” are discussed in this section. The entire screening procedure was designed in such a way so as to provide a complete assessment of the impacts on the macro-environment and microenvironment of the project. The project site has no protected area such as game reserve, wildlife, national parks, archeological sites or cultural heritage in its neighborhood.

The process for identification of potential impacts involves understanding of sources of effect in relationship between an activity and environmental parameters. The impact assessment criteria are summarized in table 8.1.

Table 8.1 Impact Assessment Criteria	
Nature of Impact	Direct: The environmental parameter is directly changed by the project. Indirect: The environmental parameter changes as a result of change in another parameter. No Impact: When there is no impact on the environment by the project
Mitigation	What measures could be applied to reduce negative impacts or enhance positive impacts
Magnitude	High: Natural and/ or social functions and/ or processes are severely altered Medium: Natural and/ or social functions and/ or processes are notably altered Low: Natural and/ or social functions and/ or processes are slightly altered Very Low: Natural and/ or social functions and/ or processes are negligibly altered Zero: Natural and/ or social functions and/ or processes remain unaltered
Extent	Local: Site Specific/Local Extends only as far as the activity

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	- Limited to the site and its immediate surroundings Regional/Provincial: - Will have an impact on the region/province National: - Will have an impact on a national scale - particularly if an ecosystem or species of national significance is affected International: - Will have an impact across international borders or will impact on an ecosystem or species of international significance.
Duration	Construction period: Up to 1 year Short Term: Up to 2 years after construction Medium Term: 2-5 years after construction Long Term: More than 5 years after construction
Reversibility of the impact	Reversible: The impact is reversible within 1 year after the cause or stress is removed. Irreversible: The activity will lead to an impact that is in all practical terms permanent
Significance	The significance of the impact is determined as a synthesis of the above assessment criteria in which: Low Significance: The impact would not have an effect on the decision to approve the project (or a particular project alternative) Medium Significance: The assessment should have an effect on the decisions unless it is effectively mitigated High Significance: The decision would be influenced regardless of any mitigation

Table 8.2 Characteristics of Environmental Impact from Construction Activities

Sr No	Environmental Impact	Impact Characteristics					
		Nature	Magnitude	Extent	Duration	Reversibility	Significance
1	Topography	Direct	Low	Localized	Construction Period	Reversible	Low (If provided mitigation)



Environmental Impact Assessment (EIA)

							measures are effectively implemented)
2	Water Resources	Direct	Very Low	Localized	Construction Period	Reversible	Low (If provided mitigation measures are effectively implemented)
3	Air & Dust Emissions	Direct	Low	Localized	Construction Period	Reversible	Low (If provided mitigation measures are effectively implemented)
4	Solid Waste	Direct	Low	Localized	Construction Period	Reversible	Low (If provided mitigation measures are effectively implemented)
5	Wastewater	Direct	Low	Localized	Construction Period	Reversible	Low (If provided mitigation measures are effectively implemented)
6	Soil Erosion	Direct	Low	Localized	Construction Period	Reversible	Low (If provided mitigation measures are effectively implemented)
7	Noise Pollution	Direct	Low	Localized	Construction Period	Reversible	Low (If provided mitigation



Environmental Impact Assessment (EIA)

							measures are effectively implemented)
8	Biological Environment	Direct	Very Low	Localized	Short term	Reversible	Low (If provided mitigation measures are effectively implemented)
9	Socioeconomic Environment	No impacts	zero	N/A	N/A	N/A	N/A
10	Traffic Flow	Direct	Low	Localized	Short Term	Reversible	Low (If provided mitigation measures are effectively implemented)

Table 8.3 Characteristics of Environmental Impact from Operational Activities

Sr No	Environmental Impact	Impact Characteristics					
		Nature	Magnitude	Extent	Duration	Reversibility	Significance
1	Air Pollutions	Direct	Medium	Localized	Short Term	Reversible	Low (If provided mitigation measures are effectively implemented)
2	Exhaust Emissions	Direct	Low	Localized	Short term	Reversible	Low (If provided mitigation measures are effectively implemented)
3	Wastewater	Direct	Low	Localized	Short	Reversible	Low (If provided



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					term		mitigation measures are effectively implemented)
4	Noise Pollution	Direct	Low	Localized	Short term	Reversible	Low (If provided mitigation measures are effectively implemented)
5	Solid Waste	Direct	Low	Localized	Short term	Reversible	Low (If provided mitigation measures are effectively implemented)
6	Hazardous Waste	Direct	Medium	Localized	Short term	Reversible	Low (If provided mitigation measures are effectively implemented)
7	Fire Hazards and Explosion	Direct	High	Localized	Short term (if mitigation measures implemented)	Reversible	Low (If provided mitigation measures are effectively implemented)
8	Occupational Hazards	Direct	Low	Localized	Short term (if mitigation measures implemented)	Reversible	Low (If provided mitigation measures are effectively implemented)
9	Biological	Direct	Very Low	Localized	Short term	Reversible	Low (If provided

	Environment						mitigation measures are effectively implemented)
10	Socioeconomic Environment	No Impact	Very Low	N/A	N/A	N/A	N/A
11	Traffic Flow	Direct	Low	Localized	Short term	Reversible	Low (If provided mitigation measures are effectively implemented)

8.2 Impacts and Mitigation Measures

Environmental impact is any change in the environmental attributes, adverse or beneficial, caused or induced by the proposed action or set of actions. The predicted adverse impacts during each stage of project development are superimposed over the baseline status of the existing environmental quality to infer the scenario of environmental conditions in the post-project stage. The main purpose of identifying the impacts is that it helps in adopting appropriate mitigation measures for the adverse consequences if any.

This chapter discusses the project's potential environmental impact on the area's soil, water, air, biological resources and socioeconomic conditions and, where applicable, identifies mitigation measures that will reduce, if not eliminate, its adverse impact. The assessment carried out in this chapter is based on potential impacts on overall environmental receptors within the project area.

8.3 Project Location

Proposed project site is located in Tehsil Model Town and District Lahore. The proposed project site is easily accessible through main Ferozepur Road of Lahore

8.4 Key Environmental Concerns

Technical and organizational aspects of safety should be taken into account throughout the whole life cycle of the Project. Such an integrated view can be reflected by elements of the safety chain, which comprises safety elements from the design and feasibility stage to the construction and operation till the decommissioning phase. The proposed project will be accomplished in three main phases; planning and design, installation/construction and operation. Environmental concerns associated with such activities are as follows:

- Physical Environment
- Biological Environment
- Socioeconomic Environment

8.5 Impacts and Mitigation Measures

8.5.1 Anticipated Impacts during Planning & Design Phase

Some of the concerns to be considered during this phase are described below:

a. Layout and Design

Layout and design of the proposed project can have impacts on the environment if it is not prepared accordingly. It is necessary to consider a sustainable project approach. Proposed project conforms to national standards and guidelines.

Environmental Mitigation Measures

- The design process should be carried out in recognition of identified hazards and risks assessment. Accepted design solutions should focus on maximum possible opportunity for risks reduction.
- Carry out engineering surveys including environmental surveys depending on the level of complexity and potential hazards of the planned facilities in the area of construction.

b. Site Inspection

Site inspection is vital to commission any project. It is done to ensure the site is feasible to construct/install. Detailed site investigation will be done for site development.

Environmental Mitigation Measures

- Care shall be taken if the site is present in any seismic zone or it is vulnerable to flooding and earthquake.
- The proposed project site does not fall in any of the active seismic zones of Pakistan.
- Site-selection decisions shall take into account the risk of exposing human populations and vulnerable habitats to the hazards of toxic and flammable materials (if any).

c. Cultural and Heritage Impact

No cultural attachment or heritage site exists near the proposed project areas. So, there would be no impact on heritage and culture of that area due to project placement.

8.5.2 Anticipated Impacts during Construction Phase

Environmental impacts associated with project construction phase include the following:

- **Impact on Physical Environment**
 - ✓ Topography
 - ✓ Water Resources
 - ✓ Air Quality and Dust Emissions
 - ✓ Solid Waste
 - ✓ Soil Erosion
 - ✓ Noise Pollution
- **Impact on Biological Environment**
 - ✓ Fauna & Flora
- **Impacts on Socio-Economic Environment**
 - ✓ Displacement
 - ✓ Employment
 - ✓ Traffic and Transportation
 - ✓ Noise

(i) Topography

The changes at the site may occur due to construction activities such as excavations and diggings for the building foundations, incinerator plant sites etc. However, this impact will be of temporary and moderate negative in nature.

Mitigation Measures

- Excavations will be kept confined to the specified location as per the approved engineering drawings and unnecessary excavations will be avoided.
- The site will be fenced/walled during construction phase so as to contain the negative impact within the boundary.
- Area around the Site will be sprinkled so as to reduce the kicking up of dust. Proper disposal of waste.

(ii) Water Resources

Ground water in the path of the project may be disturbed by excavation for the construction of foundations etc. The excavated area, if linear could act as a conduit to extend groundwater contamination to new areas.

Mitigation Measures

Several measures shall be put in place to mitigate the impacts that are likely to lead to surface and groundwater quality degradation. Some of measures are as follows

- As the excavations would be for normal buildings, only normal excavations would be carried out and shall not be deep enough to meet up the ground water.
- If suspected contaminated groundwater is encountered in the depths of the proposed area, samples will be collected and submitted for laboratory analysis.

(iii) Air Quality and Dust Emissions

The emissions of dust and particulate matter can be significant depending upon the nature of activity taking place i.e., construction of buildings and installation of plants. Particulate matter pollution is likely to occur during the excavation of the top soil and loading and transportation of the machinery and its auxiliaries and may affect the site workers.

Mitigation Measures

- Controlling dust during constructional phase is useful in minimizing nuisance conditions and consequently health (respiratory and eye) complications. It is recommended that a standard set of feasible dust control measures will be implemented for all the activities.
- All personnel working on the project site will be trained prior to start of the project on methods for minimizing air quality impacts. Training will be focused on minimizing the air pollution during the construction and installation of plants.
- Vehicles' drivers will be given strict instructions to minimize unnecessary trips, refill petrol fuel tanks in the afternoon, and minimize idling of engines.
- Air Quality monitoring will be done on quarterly basis by 3rd party.

Dust emissions will be controlled by the following measures:

- a. By watering all active areas when necessary.
- b. By covering all trucks hauling soil, sand and other loose materials.

(iv) Solid Waste

The excavation activity will create solid waste and debris and lower the aesthetic value of the land during the establishment period.

Mitigation Measures

- Waste arising from excavation activities will be recycled or reused to ensure that materials that would otherwise be disposed of as waste, are diverted for productive uses.
- The wastes which are reusable/recyclable (iron bars, aluminum) will be sold to waste vendors and those which cannot be sold out (brick pieces) will be used as a filling material for leveling the depressions, subject to technical feasibility.
- Workers and supervisory staff will be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste for disposal.
- Open burning of solid waste will be strictly prohibited.

(v) Wastewater

The wastewater generated through the constructional activities will cause disturbance to the local aesthetic. If not managed properly, the wastewater generated by constructional activities

and the worker's toilets and rest area may gather in the surface impoundments and may become breeding places for the mosquitoes and other pests.

Mitigation Measures

- The wastewater generated through constructional activities and from the worker's toilet areas will be retained in a sedimentary tank.
- After settling down, the wastewater would be disposed of in the local municipal drains.
- The construction contractor would be bound to fumigate the area during the constructional activities.
- The contractor will also be responsible for the regular inspection of the construction site to look for any surface impoundments filled with waste water and to subsequently remove it to prevent any pests to habitat that area.

(vi) Soil Erosion

The proposed project site is located on a barren earth where already commercial activities are occurring. Soil erosion and contamination may occur at the site due to the following likely impacts:

- Excavation and land leveling activities can destabilize the surrounding land surface, particularly if the excavated area is left unfilled for long, which may lead to rainfall induced soil erosion
- The unspent materials and debris produced from consumed up materials, if left as such and allowed to mix with soil underneath, can degrade the quality of receiving soils and may render them unfit for plantation later on;
- Washing of the gadgets, machinery and equipment without proper drainage of the washout water can adversely affect the soil quality. This impact is, however, temporary and minor negative in nature.
- Improper on-site storage of equipment and machinery such as wheelbarrows, mixers and compactors and disorderly parking of machinery and equipment may cause soil contamination from trickling or accidental leakages of oils and lubricants.

Mitigation Measures

Mitigation measures will include:

- All spoils will be disposed of as desired and the site will be restored back to its original conditions.
- Wastes from various activities will be dumped in approved sites, in line with the legal prescriptions for dumpsites, and covered accordingly.
- As applicable and needed, plantation of grasses and shrubs will be done at appropriate place where required.
- Excavations will be kept confined to the specified foundation spots as per the approved engineering drawings. Unnecessary excavations will be avoided.
- Site camps for the resident labors will not be setup on the land earmarked for developing green belts and lawns.
- Septic tanks of adequate capacities will be constructed for receiving and treating wastewater from all the worksite toilets and the offices, if any. The toilet wastewater will not be discharged untreated onto the adjacent lands.
- All machineries and materials will be stored at the designated areas and compounds.
- Washout from washing of equipment and gadgets will be drained into a septic tank, for removal of the contaminants.

(vii) Noise Pollution

The work on site will most likely have noisy operation due to the moving machines (shredders, mixers, tippers, communicating workers), incoming vehicles to deliver waste materials, onsite workers and other normal construction activities.

Mitigation Measures

The proponent and contractor shall put in place several measures that will mitigate noise pollution arising during the establishment.

- Limit pickup trucks and other small equipment to an idling time of one minute, observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible.



- The traffic will be properly managed during loading and unloading of material.
- Unnecessary honking of the involved machinery will be avoided.
- Protective gears such as earplugs, etc. will be provided to personnel exposed to high noise levels.
- All the equipment and vehicles used will be in good working condition, properly lubricated and maintained to keep noise within the permissible limits.
- Noise Monitoring will be done by 3rd party on quarterly basis.

(viii) Impacts on Biological Environment

The proposed project site is barren earth with few shrub species. No major and minor tree cutting is involved in this project. No natural forest area has been observed in the study area. There is no notified ecological sensitive location, migratory path, sanctuaries, etc. within the study area. There are no endangered floral species. The proposed project does not envisage any destruction or displacement of any endemic floral or faunal species; hence the impact will be insignificant.

Mitigation Measures

Following mitigation measures will be adopted to minimize impacts on flora and fauna of the site.

- All the necessary precautions will be taken to ensure the minimum disturbance to the local flora and fauna.
- Strict instructions will be given to all personnel working in project area to refrain from killing, capturing or disturbing any species of bird, reptile or mammal encountered during project activities, except in self-defense.

(ix) Impacts on Socio-economic Environment

- **Displacement:**

No displacement of population is envisaged.

- **Employment:**

Employment opportunities generated by the project include labor at the site in the initial stages of setting up of the proposed facility, skilled and unskilled labor. Reliance on local

markets for provision of materials and other supplies will be a significant effect. Thus, good amount of employment opportunities will be generated.

- **Traffic and Transportation:**

Vehicle movement shall not result in significant increase in traffic density. The Traffic management however is done according to the requirements.

- **Noise:**

Extra measures should be considered so that the noise from the operational activities shall not exert any adverse impact on the community.

Mitigation Measures

Following mitigations are recommended for the anticipated social impacts

- The civil work should be undertaken as such that negligible noise will be induced.
- Employment opportunities should be preferably provided to the locals in case of new requirement, if any.

8.5.3 Anticipated Impacts during Operational Phase

In this section the environmental and socioeconomic impacts associated with the proposed project operation activities are discussed. The impacts that are discussed are as follows:

- Air & Exhaust Emissions
- Wastewater
- Solid and Hazardous Waste Management
- Fire Hazards
- Occupational Health and Safety

(i) Air & Exhaust Emissions

Potential Impacts

Impacts on local air quality may arise from the following project activities:

- Air emissions like CO, CO₂, NO_x, SO_x etc. from incineration operations.
- Exhaust emissions sources from the facility may include generators and waste transportation vehicles

Mitigation measures

The proposed mitigation measures to reduce the impacts on air quality during the proposed operation activities are:

- All equipment, incinerator and its allied machinery, generators, and vehicles used during the project will be properly tuned and maintained in good working condition in order to minimize exhaust emissions.
- The incinerators proposed to be installed at the facility of M/S Lasani Waste Management will have built in integrated gas washing system (i.e., wet scrubbers). The gases emitting from the primary chamber will again be burnt at 1200°C temperatures in the secondary chamber to kill all the dioxins and furans if present in the gases.
- Monitoring of Stack & Ambient air parameters (PM₁₀, SO₂, CO and NO_x) should be carried out on quarterly basis to ensure compliance with the PEQs. If the mitigation measures are effectively implemented, the residual impact of the proposed activities on the area's air quality is expected to be low in significance.
- Emission testing will be done on quarter basis by 3rd party EPA certified Environmental Lab.
- Personal protective equipment such as masks will be provided to the workers working near the plants and generator.

(ii) Wastewater Management

Potential Impacts

No process wastewater generation is involved in this project. The water will be used in the scrubbers, which will be recycled in a closed loop cycle. However, very minimum quantity of waste water will be generated by the site washrooms and kitchen, which will be disposed of in a septic tank and will be removed by local municipality.

Mitigation measures

The mitigation measures described below will ensure that the surface and aquifer resources of project area are not significantly affected by project activities.



- The water used in the wet scrubbers, will be recycled in closed loop cycle, only makeup water will be added to minimize the dependency on the area ground water source.
- Water quality analysis should be carried out on quarterly basis by 3rd party EPA Certified Environmental Lab.

(iii) Noise Potential

Impacts

The proposed project will not have any issue regarding noise. The only source of noise to produce may be from vehicles that will be used for loading and unloading of waste material, but will not impose any significant impact on people and environment.

Mitigation Measures

The following mitigation measure will be undertaken in order to further reduce the noise levels.

- Proper maintenance of the vehicles, generators and incinerator will be done on regular basis.
- The blowers and burners will be tuned and lubricated on daily basis to reduce the noise pollution to the maximum extent.
- Vehicles used for the proposed project will not be allowed to blow horn uselessly
- All equipment with potential of noise generation will be kept well maintained.
- Generator shall be kept in a close canopy to avoid noise.
- Noise monitoring will be carried out on quarterly basis by 3rd party EPA Certified Environmental Lab.
- The workers, operators and visitors will be provided with proper Personal Protective Equipment to save them from immense noise pollution during the operational hours of the incinerators.

(iv) Solid and Hazardous Waste Management

Potential Impacts

The solid waste generated during the operational phase of proposed project can pose a health hazard, pollute soil, surface and ground water if not manage properly

Assessment of Potential Impacts

A significant impact will be interpreted if the waste management is not carried out properly; which may affect to health of workers, pollution of soil, surface or groundwater. The operation of the proposed project will generate a negligible amount of solid waste per day, so the impact will be of low level. The hazardous waste from industries will be properly incinerated and its ashes would be mixed with the constructional material and shall be re-used as described in the Chapter 2 (Project Description).

Mitigation Measures

Key elements of the waste management system will be the following:

- All the hazardous industrial waste shall be incinerated and would not be stored for the longer durations.
- The waste material would be stored in the designated areas and shall not be mixed with other types of the waste items being handled in the same locality.
- The scrap items shall be recycled through registered vendors, hence resulting in zero waste generation during the whole life of the proposed project.
- The ashes produced as a result of the incineration operations will be used in the construction material.
- No waste will be dumped at any location outside the proposed project boundary.
- Records of all waste generated will be maintained. Quantities of waste disposed, recycled, or reused or incinerated, will be logged on a Waste Tracking Register.
- Training will be provided to personnel for identification, segregation, and management of waste.

Proper implementation of the mitigation measures will ensure that the residual impact from waste will be negligible.

(v) Fire Hazards

Poorly designed and constructed electric installations can lead to fire and explosion that may in turn injury and death of a worker. Welding or cutting torch on or near drum (even empty) should never be used because product (even just residue) can ignite explosively.

Mitigation Measures

Recommended measures to prevent and control fire include the following:

- Early release detection for smoke and heat should be provided at the site
- Fire extinguishers, fire hydrants and fire alarms would be provided at convenient locations within the facility. These should be regularly inspected and maintained by a reputable fire security company.
- Fire drills would be conducted at least biannually to ensure that workers are conversant with the action to take in the event of fire or explosions
- Fire awareness materials should be placed in strategic locations within the facility to educate the workers and customers on what to do in the event of fire.
- An elaborate emergency response plan should be developed to address the risks associated with the facility's operations.
- Leak detection devices should also be installed at appropriate areas to warn on leakages that are likely to trigger fires.
- Workers should be trained on handling accidental spillage of flammable substances that may also trigger fires.

(vi) Occupational Hazards and Accidents

There could be a number of safety issues during operational phase. General impression in the facility operations is that the workers hesitate to use the safety equipment. To reduce the occupational health and safety impacts during the operation phase of the proposed project, the proponent is committed to adhere to the occupational health and safety rules and regulations.

Mitigation Measures

In order to ensure safety at the site, following measures should be implemented.

- All hazardous waste should be labeled.
- Necessary health and safety rules shall be enforced by the management
- All workers at the site should be provided with personal protective equipment
- First Aid kits should always be available at the site and staff members trained in first aid administration
- Clear signage should be posted alerting of possible danger situations

Table 8.4: Checklist (Impact Assessment)

Environmental Aspects (Construction Phase)		Impact Categorization								
		Mild			Moderate			Severe		
		*	*	**	*	*	**	*	*	**
			*	*		*	*		*	*
1. Land Resources										
1.1	Site for disposal of waste generation and disposal of waste material	✓								
1.2	Location of labor camps, material camps, equipment yards and approach roads	✓								
1.3	Access tracks	✓								
1.4	Drainages paths roads crossed. Damages by moving machinery	✓								
1.5	Waste disposal Management		✓							
1.6	Damage to vegetation	✓								
1.7	Any discharge or diversion of water to a graveyard or archaeological site	✓								
1.8	Electrical and mechanical works	✓								
2. Hydrology and Water Resources										

2.1	Impact on source of construction water	✓							
2.2	Contamination of surface water due to diesel and other fluids spilling over from machinery.	✓							
2.3	Protection of construction work from floods	✓							
3. Air Quality and Noise Pollution									
3.1	Dust and smoke and other pollutants	✓							
3.2	Dust or other pollutant from stored materials and spoil heaps	✓							
3.3	Noise control from use of old or outdated machinery	✓							
4. Biological Resource									
4.1	Damage to biological resource flora, fauna, biota	✓							
4.2	Impact of construction on aquatic life (if any)	✓							
5. Socioeconomic and Cultural Issues									
5.1	Existing services; education health, electricity, and water supply	✓							
5.2	Tribal tensions and local rivalries on canals and aquatic life	✓							
5.3	Land ownership and land acquisition	✓							
5.4	Access to other construction materials				✓				
5.5	Effects on sites of archaeological,	✓							

	historical, cultural or religious significance											
5.6	Public safety at construction sites		✓									
5.7	Health and safety of labor and employees on construction site		✓									
5.8	Employment		✓									
5.9	HIV/AIDS and other communicable diseases.		✓									
5.10	Aesthetic / scenic value	✓										
Key: * Avoidable through design (Preventive) ** Mitigation through contractor's obligation *** Non-reversible permanent change.												

CHAPTER 9

ENVIRONMENTAL MANAGEMENT & MONITORING PLAN

9.1 Introduction

This section presents the environmental management plan (EMP) for the proposed project. The EMP specifies the mitigation and management measures which the proponent will undertake and shows how the project will mobilize organizational capacity and resources to implement these measures.

EMP has been prepared addressing the issues like:

- Institutional setup identified/ recommended for implementation of the EMP including institutional strengthening and training.
- Preventive, mitigation & enhancement measures for minimization and abatement of the undesirable impacts caused during design, construction and operation stage.
- Environmental monitoring programme during construction phase including parameters, locations and frequency of monitoring and their implementation programme to be undertaken.
- Expenditures for environmental protection measures and budget for implementation of the EMP

9.2 Institutional Capacity (Construction Phase)

The Proponent will utilize the following arrangements in the implementation of the EMP during planning, design and construction phase. The Proponent is accountable for ensuring that resources are made available to effectively implement the EMP and necessary environmental management measures arising from the project.

9.2.1 Management of Contractor

The Contractor will be responsible for implementation of some of the EMP commitments. However, the Proponent fully recognizes that it is not absolved from those management responsibilities. Ultimate responsibility for meeting all commitments lies with the Proponent.

The Proponent will make the contractor commit to meeting the relevant responsibilities by



means of specific conditions in the contracts of appointment. Where there is concern over the capacity of contractor to undertake specific activities according to the system stated here, the Proponent will provide additional training to improve the capacity of the contractor. Activities of contractor will be overseen by the Project Manager and staff as appropriate.

The Proponent will put in place the following construction phase contractor arrangements to support EMP implementation:

- Contractor will have certain key environmental line functions included in their job descriptions and performance criteria. Critical among these is the Construction Manager.
- The Construction Manager will be accountable for environmental (including social) management during the construction phase. Specific responsibilities for the Construction Manager will include regular performance reviews and undertake corrective and/or remedial action where this may be required.
- Regular (at least monthly) liaison between the Construction Manager, HSE Manager and the Project Manager and his/her team must be carried out. At the commencement of the construction phase, weekly meetings should occur. Meetings should review implementation of EMP requirements, highlight issues of concern, identify required interventions and prescribe corrective actions and schedule, and allocate budget and appoint responsible parties. The project owner should receive minutes of meetings and should be invited to attend meetings at least once in a month.
- A code of practice for construction teams will be prepared and implemented. This code will guide the management and behavior of construction teams. The code will include items relating to health safety and community relations.
- Information on the implications of construction will be disseminated before construction starts
- Contracts will be key tools in managing many potential negative impacts such as transport related incidents. They will specify required environmental and social practices.

9.2.2 Environmental Training

Environmental training will help to ensure that the requirements of the EIA and EMP are clearly understood and followed by all project personnel in the course of the project. The contractor and his HSE manger have the responsibility for providing training to all project personnel. An indicative environmental training program is provided in **Table 9.1**. The duration of this training program will be 1-2 weeks.

Table 9.1 Training Program

Target Audience	Trainer	Contents	Schedule
All Site Personnel	Contractor HSE Manager	• Key Findings of EIA • Environmental Enhancement Measures • Environmental Management Plans such as: ✓ Waste Disposal Procedure ✓ Traffic Management ✓ Health and Safety Measures ✓ Noise & Dust Control ✓ Natural Resource Conservation ✓ Material Loading and Unloading ✓ Fire Control ✓ Emergency Situation Handling ✓ Wildlife Protection	Prior to the Start of Project Activities
Drivers	Contractor	• Road Safety & Access • Vehicle Movement Restrictions • Fugitive Emissions & Exhaust Control • Noise Reduction Measures • Loading and unloading	Before and during Project activities

9.2.3 Training and Awareness

The Proponent will ensure that all contractors' staff is inducted on health and safety, environmental and emergency response procedures. The Proponent will use written (newsletter/posters/toolbox talks) and verbal (as part of routine briefings) communication methods to raise awareness on a range of health, safety and environmental issues. This will be done in both Urdu and English languages (as appropriate) to ensure that all members of the workforce are made aware.

9.2.4 Monitoring and Compliance Assessment

During the construction phase, the Proponent will monitor and inspect contractor's written records to demonstrate compliance with the EMP. This compliance monitoring will verify that the responsible parties are implementing the specifications contained in the EMP. Compliance will mean that the contractor is fulfilling contractual obligations.

To determine the effectiveness of the EMP, the Proponent will use a series of internal and external inspections and audits:

- Internal environmental, health and safety inspections will be carried out once every week
- Minor non-conformances will be discussed during the inspection and recorded as a finding in the inspection report. Major non-conformances will be formally reported as an incident and will be subject to the Proponent's existing incident reporting and handling procedures.
- HSE Manager (Contractor) will arrange for initial and subsequent environmental audits and will provide relevant information required by relevant authorities including EPA Punjab. The audit will be carried out in accordance with Punjab Environmental Protection Act (Amended 2012) and its subsidiary legislation, IEE/EIA Regulations, 2000. Any negative findings arising from the audits will be addressed accordingly.

9.2.5 Incident Handling and Reporting

An incident can arise from the following:

- Significant non-conformance with the EMP identified during an internal inspection
- Any non-conformance identified by either the authorities or an external audit

- Accidents resulting in potential or actual environmental harm
- Significant complaints received from any source.

All incidents will be formally recorded and noted in the General/Complaint Register.

9.2.6 Checking and Corrective Action

Checking and if necessary, implementing corrective action, to ensure that required EMP management activities are being implemented and desired outcomes are achieved. As such this component includes four key activities namely:

- Monitoring selected environmental quality variables as defined in the objectives and targets.
- Ongoing inspections of the operational controls and general state of the operations.
- Internal audits to assess the robustness of the EMP or to focus on a particular performance issue.
- External audits to provide independent verification of the efficacy of the EMP.

9.2.7 Reporting

The findings of all of the above will be structured into instructive reporting that provides information to all required parties on project performance, together with clearly defined corrective action where this is seen to be required. Both the monitoring and inspections are to be reported continuously.

9.2.8 Management Review

The Proponent will organize for formal management review at defined intervals both during the construction and operation phase. The purpose of the management review is for senior project management to review the environmental management performance during the preceding period and to propose measures for improving that performance in the spirit of continuous improvement.

9.2.9 Liaison

Throughout the project cycle, the Proponent will liaise with authorities especially EPA Punjab to ensure on going feedback on the environment performance of the project.

9.3 Institutional Capacity (Operation Phase)

The Proponent will utilize the following arrangements to effectively implement the EMP during the operational phase of the project complex.

9.3.1 Environmental Management Committee (EMC)

The proponent shall setup an Environmental Management Committee (EMC) to effectively run the project complex. The EMC should be an independent functional unit headed by a senior officer, who will be assisted by an appropriate number of subordinate officers, technical personnel, and others. The EMC should be equipped with all essential equipment for dealing with any situation of emergency and disaster.

9.3.1.1 Roles and Responsibilities of the EMC

The primary responsibility with respect to management of environmental issues at the project complex will rest with the EMC. Some of its responsibilities may include the following:

- To generate periodic reports and fill-in the checklists on environmental and social performance of the project and the actions taken by the EMC for rectifying the issues and problems
- To maintain liaison and linkages with the concerned municipal and regulatory authorities for troubleshooting and timely removal of the bottlenecks with respect to social and physical issues at the project premises
- To ensure troubleshooting of the problems relating to health, safety, environment, and social issues
- To take all necessary steps to protect safety, sanitation and health of the labor and workers of the project complex
- To prepare and execute awareness raising, educational and training programs on safety, health and sanitation for the staff, laborers, officers and also for the visitors.

9.3.2 Reporting and Recordkeeping

The community Management and EMC will ensure a robust reporting and recordkeeping system. Such recordkeeping should be managed through a computer system and should be handy as and when required. The record may include the following:



- Recording of readings of the meters of the common facilities like streetlight electricity meter
- Record of withdrawal of groundwater
- Operating hours of the tube wells, their repair and maintenance
- Cleaning and disinfection schedule of the overhead tanks
- Status of safety and emergency equipment
- Daily status report on sanitation, safety, environment, and any reportable incident
- Annual, routine, and special repairs
- Wages and salaries paid to the staff of the EMC
- Location, condition, and capacities of the waste collection bins
- Registers of repair and maintenance of various equipment/machinery (repair history sheets)
- Record of laboratory investigations of freshwater and other environmental parameters
- Records of correspondence with various authorities, agencies and the head office
- Other miscellaneous records, if any

9.3.3 Budgeting

Funds will be required for efficient performance of the EMC. It is therefore, suggested that maintenance charges should be imposed on the proponent and also for the EMC staff.

9.4 Impacts Mitigation & Management Measures

Table 9.2 presents the EMP for the proposed project. It covers on the proposed management and mitigation measures for the identified impacts. In addition, it also provides a schedule for the implementation of management/mitigation activities, sub-divided by project phase.

Environmental Impact Assessment (EIA)

Table 9.2 Environmental Management Plan

Sr. No.	Activity/ Aspect	Objective	Project Enhancement Measures	Timing of Implementation	Responsibility	
					Implementation	Supervision
PLANNING & DESIGN PHASE						
1	Site Selection	To ensure that the site is feasible for the construction of the proposed building	- The project site is not located in the following areas: ✓ Major floodplain ✓ Areas of unstable soil ✓ Areas subject to landslides ✓ Seismically active area Moreover, structure stability report of the site will be obtained from the concerned department.	During Planning and Design Phase	Architect, Contractor & M/S Lasani Waste Management	M/S Lasani Waste Management



Environmental Impact Assessment (EIA)

2	Layout Plan and Engineering Design	To ensure the project complex is being constructed according to the regulatory requirements. To protect aesthetic beauty and ambience of the project area	All structural, layout and engineering will be carried out in strict accordance with the applicable bylaws and engineering parameters.	During Planning and Design Phase	Architect, Contractor & M/S Lasani Waste Management	M/S Lasani Waste Management
3	Cultural/ Historical Sites	To avoid any impact on cultural and historical sites	- There is no cultural or historical site present near the project site. - Moreover, the M/S Lasani Waste Management will ensure that construction of the building and infrastructure will be limited within the already acquired land for the proposed project.	During Planning and Design Phase	M/S Lasani Waste Management	M/S Lasani Waste Management
4	Construction Camps/ Material	To minimize the potential effect of the work camp on the	Plan sites for workers camps and back up areas for stockpiling materials and equipment in advance.	Before Construction	Contractor/ M/S Lasani Waste	M/S Lasani Waste Management



Environmental Impact Assessment (EIA)

	Management	surrounding environment			Management	
5	Public Participation	To gain public views, concerns and values and to build trust amongst the various stakeholders	• Proper sensitization of the community at the initial stages of the project with aim of educating them on advantage of the project. • Involving the community on its implementation especially as casuals.	During Planning and Design Phase	M/S Lasani Waste Management	M/S Lasani Waste Management
<u>CONSTRUCTION PHASE</u>						
6	Review of EMP	To ensure EMP is sufficient to control impacts and compliance with legal requirements of EPA	• Make sure that EMP covers all the impacts associated with this project	Before Construction	Contractor/ M/S Lasani Waste Management	M/S Lasani Waste Management



Environmental Impact Assessment (EIA)

7	Orientation for Contractor and Workers	To ensure that the Contractor, Subcontractors and workers understand the key environmental impacts and their relevant mitigation measures.	• Conducting special briefing and / or on-site training for the contractors and workers on the environmental requirement of the project. • Periodic progress review sessions to be conducted every six months	Before and during work	Contractor/ M/S Lasani Waste Management	M/S Lasani Waste Management
8	Plans to control environmental impacts	To avoid impacts that may occur from unplanned activities.	Following plans will be prepared before construction a. Material Handling and Storage b. Waste Management Plan c. Health & Safety Plan d. Emergency Response Plan e. Fire Control Plan	Before Construction	Contractor/ M/S Lasani Waste Management	M/S Lasani Waste Management



Environmental Impact Assessment (EIA)

9	Equipment Maintenance	To achieve best performance while working with equipments and to avoid any delay	• Before construction make sure every equipment/instrument to be used is in good condition • Equipment shall be serviced or maintained on regular basis	Before Construction	Contractor	Contractor
10	Landscape and Visual Impact	To protect the aesthetic value of the site.	• Proper landscaping will be done after the end of all the construction works.	Construction Phase	Contractor	M/S Lasani Waste Management
11	Topography	To minimize the changes which can occur due to the excavation at the site	• Excavations will be kept confined to the specified location as per the approved engineering drawings and unnecessary excavations will be avoided. • The site will be fenced/walled during construction so as to contain the negative impact within the boundary. • Area around the Site will be sprinkled so as	Construction Phase	Contractor	M/S Lasani Waste Management



Environmental Impact Assessment (EIA)

			to reduce the kicking up of dust. Proper disposal of waste.			
12	Water Resources	To minimize any negative impacts on water resources during construction activities	- The wastewater arising from the construction activities will be retained in a sedimentary tank, and after removing the sediments, the water will be disposed off in nearby municipal drain. - The wastewater from workers' washrooms shall also be retained in sedimentary tank and then will be dumped in the local drain.	Construction Phase	Contractor	M/S Lasani Waste Management
13	Air Quality (Fugitive, Exhaust and Gaseous Emissions)	To minimize air pollution effectively and avoid complaints due to the airborne particulate matter released to the atmosphere.	- Controlling dust during construction phase is useful in minimizing nuisance conditions and consequently health (respiratory and eye) complications. It is recommended that a standard set of feasible dust control measures will be implemented for all the activities. - All personnel working on the project site	Construction Phase	Contractor	M/S Lasani Waste Management



Environmental Impact Assessment (EIA)

			will be trained prior to start of the project on methods for minimizing air quality impacts. Training will be focused on minimizing the air pollution during the construction of compost ditch. • Vehicles' drivers will be given strict instructions to minimize unnecessary trips, refill petrol fuel tanks in the afternoon, and minimize idling of engines. • Air Quality monitoring will be done on quarterly basis by 3rd party.			
14	Solid Waste	To minimize any negative impacts associated with waste generation	• Waste arising from excavation activities will be recycled or reused to ensure that materials that would otherwise be disposed off as waste, are diverted for productive uses. • The wastes which are reusable/recyclable (iron bars, aluminum) will be sold to waste	Construction Phase	Contractor	M/S Lasani Waste Management



Environmental Impact Assessment (EIA)

			vendors and those which cannot be sold out (brick pieces) will be used as a filling material for leveling the depressions, subject to technical feasibility. - Workers and supervisory staff will be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste for disposal. - Open burning of solid waste will be prohibited.			
15	Soil Erosion	To avoid or minimize soil disturbance/ Contamination due to the construction at the site	- All spoils will be disposed off as desired and the site will be restored back to its original conditions. - Wastes from various activities will be dumped in approved sites, in line with the legal prescriptions for dumpsites, and covered accordingly. - As applicable and needed, plantation of	Construction Phase	Contractor	M/S Lasani Waste Management



Environmental Impact Assessment (EIA)

			grasses and shrubs will be done at appropriate place where required. Excavations will be kept confined to the specified foundation spots as per the approved engineering drawings. Unnecessary excavations will be avoided.			
16	Noise Pollution	To minimize the potential for noise to adversely affect sensitive receptors	- Limit pickup trucks and other small equipment to an idling time of one minute, observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible. - The traffic will be properly managed during loading and unloading of construction material. - Unnecessary honking of the involved machinery will be avoided. - Protective gears such as earplugs, etc. will be provided to personnel exposed to high	Construction Phase	Contractor	M/S Lasani Waste Management



Environmental Impact Assessment (EIA)

			noise levels. - All the equipment and vehicles used will be in good working condition, properly lubricated and maintained to keep noise within the permissible limits. - Noise Monitoring will be done by 3rd party on quarterly basis.			
17	Sanitary conveniences	To provide workers with sanitation facilities at site	- Suitable, efficient, clean, well-lit and adequate sanitary conveniences will be provided for construction workers - Mobile toilets will be provided on site, until proper toilets are established	Construction Phase	Contractor/ M/S Lasani Waste Management	M/S Lasani Waste Management
18	Ecological considerations (flora & fauna)	To conserve the biological resources	- All the necessary precautions will be taken to ensure the minimum disturbance to the local flora and fauna. - Strict instructions will be given to all personnel working in project area to refrain from killing, capturing or disturbing any	Construction Phase	Contractor/ M/S Lasani Waste Management	M/S Lasani Waste Management



Environmental Impact Assessment (EIA)

			species of bird, reptile or mammal encountered during project activities, except in self-defense.			
19	Environment Health and Safety preparedness	To provide workers/employees with safe working environment	• Health Safety Plan before commencement of construction will be prepared • Adequate warning signs will be placed at various places of the site • Every construction worker will be provided with appropriate personal protective equipments (PPE's) such as with skull guard or hard hat and safety shoes. • The Contractor will ensure the use of PPE's by all workers • Adequate first aid facilities will be provided at the project site.	Construction Phase	M/S Lasani Waste Management / Contractor	M/S Lasani Waste Management
20	First Aid	To treat any injury on time	• An adequately stocked "First Aid Box" will be placed at the site and employees will be properly trained on how to administer first	Construction Phase	Contractor/ M/S Lasani Waste	M/S Lasani Waste Management



Environmental Impact Assessment (EIA)

			aid		Management	
21	Social Impacts	To engage local workforce in the proposed project and to ensure minimum impacts to people living close to the project site.	- Local labor as far as possible will be preferred for manual work - Local educated people for office work will be hired where possible. - Project monitoring will be encouraged by local groups - Claims/complaints of the people on construction nuisance/damages close to the proposed project site will be considered and responded promptly by the Contractor and monitored by Proponent	Construction Phase	Contractor/ M/S Lasani Waste Management	M/S Lasani Waste Management
22	Grievance Redress	To ensure that the stakeholder or affected people's concerns, complaints and grievances about the	- Complaints from people will be recorded and solved on immediate basis - The employer and site manager will try to resolve grievance in the first instance - A booklet outlining grievance contact	Construction Phase	Contractor/ M/S Lasani Waste Management	M/S Lasani Waste Management



Environmental Impact Assessment (EIA)

		project environmental performance is received recorded and replied in a systematic way	points will be maintained.			
<u>OPERATIONAL PHASE</u>						
23	Soil and Water Quality	To protect the aesthetic beauty of the project complex	- No makeup water will be utilized in the scrubbing operations of the incinerators, the water used to shower the gases will again be recycled, after removing the particulate matter, in the same scrubbing operations of the flue gases. - The water produced from office and worker toilets shall be retained in the sedimentary tank to settle the all the particulate matter and the	During Operational Phase	M/S Lasani Waste Management	M/S Lasani Waste Management



Environmental Impact Assessment (EIA)

			Municipal Committee will collect and dispose of the waste water. Water quality monitoring should be carried out on quarterly basis by 3rd party EPA Certified Environmental Lab.			
	Air & Exhaust Emissions	To provide clean and healthy environment and to reduce the emissions by incinerator operations	- All equipment, incinerator and its allied machinery, generators, and vehicles used during the project will be properly tuned and maintained in good working condition in order to minimize exhaust emissions. - The incinerators proposed to be installed at the facility of M/S Lasani Waste Management will have built in integrated flue gas cleaning system. The gases will be burnt at high temperatures to kill all the dioxins	During Operational Phase	M/S Lasani Waste Management	M/S Lasani Waste Management



Environmental Impact Assessment (EIA)

			and furans if present in the gases. • Afterwards the gases will be pushed into heat exchangers and ceramic filters to reduce the temperature and to remove the Particulate Matters present in the smoke of incinerators respectively. • The gases leaving the heat exchangers will then be subject to final washing in the scrubbers of the incinerators with double water showers, to remove any left overs of the Particulate Matter in smoke. • Monitoring of Ambient air parameters (PM₁₀, SO₂, CO and NO_x) emissions should be carried out on quarterly basis to ensure compliance			
--	--	--	---	--	--	--



Environmental Impact Assessment (EIA)

			with the NEQs. If the mitigation measures are effectively implemented, the residual impact of the proposed activities on the area's air quality is expected to be low in significance. • Emission testing will be done on quarter basis by 3rd party EPA certified Environmental Lab. • Personal protective equipment such as masks will be provided to the workers working near the incinerator and generator.			
24	Occupational Hazards and Accidents	To provide the safe work place and avoid from the accidents during the plant's	• The whole facility should be labeled for the easy understanding of every person. • Necessary health and safety rules shall be enforced by the management to ensure	During Operational Phase	M/S Lasani Waste Management	M/S Lasani Waste Management



Environmental Impact Assessment (EIA)

		operation	that all staff members adhere to these standards. • Workforce (experts of various specializations and qualification, etc.) is one of the key elements of industrial activity. Operated facility safety status depends much on the personnel actions. • All workers at the site should be provided with personal protective equipment's. • First Aid kits should always available at the site and staff members trained in first aid administration • Clear signage should be posted alerting of possible danger situations			
25	Solid & Hazardous waste Management	To manage solid waste effectively and in environmentally friendly way.	• All the hazardous industrial waste shall be incinerated and would not be stored for the longer durations.	During Operational Phase	M/S Lasani Waste Management	M/S Lasani Waste Management



Environmental Impact Assessment (EIA)

			• The waste material would be stored in the designated areas and shall not be mixed with other types of the waste items being handled in the same locality. • The scrap items shall be recycled through registered vendors and the food waste would be converted into compost, hence resulting in zero waste generation during the whole life of the proposed project. • The ashes produced as a result of the incineration operations will be used in the construction material and the compost produced as a result of composting will be utilized in farming operations as the fertilizers. • Separate waste bins will be placed for different type of wastes - plastic, paper,			
--	--	--	--	--	--	--



Environmental Impact Assessment (EIA)

			metal, glass, and containers etc. - Recyclable material will be separated at source. The recyclable waste will be sold to waste contractors for recycling or will be recycled at site. Non-hazardous non-recyclable wastes will be disposed of on designated site. - No waste will be dumped at any location outside the proposed project boundary. - Records of all waste generated will be maintained. Quantities of waste disposed, recycled, or reused will be logged on a Waste Tracking Register. - Training will be provided to personnel for identification, segregation, and management of waste.			
26	Noise and Vibrations	To avoid from high nuisance and	Proper maintenance of the vehicles, generators and incinerator will be done on	During Operational Phase	M/S Lasani Waste	M/S Lasani Waste



Environmental Impact Assessment (EIA)

		disturbance with in the facility premises	regular basis. • The blowers and burners will be tuned and lubricated on daily basis to reduce the noise pollution to the maximum extent. • Vehicles used for the proposed project will not be allowed to blow horn uselessly • All equipment with potential of noise generation will be kept well maintained. • Generator shall be kept in a close canopy to avoid noise. • Noise monitoring will be carried out on quarterly basis by 3rd party EPA Certified Environmental Lab. • The workers, operators and visitors will be provided with proper Personal Protective Equipment to save them from immense noise pollution during the operational hours of the incinerators.		Management	Management
--	--	---	---	--	------------	------------



Environmental Impact Assessment (EIA)

			Whereas, the proposed locality of M/S Lasani Waste Management is far from the residential area, the operational noises will not affect the local community.			
27	Traffic Density	To avoid accidents in the project facility area	- Warning/ informative signs will be erected at the project complex. The signs will be positioned in a way to be easily viewed by the public, drivers and mostly motorists. - Drivers will be expected to observe strict traffic rules to reduce the risk of accidents or incidents. - Proper parking places will be provided to the visitors.	During Operational Phase	M/S Lasani Waste Management	M/S Lasani Waste Management
28	Cleaning	To maintain cleanliness at the project site and nearby	The M/S Lasani Waste Management will be responsible for regular washing and cleaning of the pavements and communal areas. The workers will be responsible for washing and cleaning their own premises/	During Operational Phase	M/S Lasani Waste Management	M/S Lasani Waste Management



Environmental Impact Assessment (EIA)

			residences. Cleaning operations will involve the use of substantial amounts of water, disinfectants and detergents.			
--	--	--	---	--	--	--

9.5 Environmental Monitoring

This section presents an Environmental Monitoring Plan that identifies the roles and responsibilities of project staff involved in environmental monitoring and list the parameters that will be assessed in the monitoring process. **Table 9.3** presents the Monitoring Plan for performance indicators. Whereas, **Table 9.4** presents the breakdown of the total environmental budget allocated for this project.



Environmental Impact Assessment (EIA)

Table 9.3 Environmental Monitoring Plans (Construction Phase)

Environmental Quality	Parameters	Location	Method	Standards/ Guidelines	Frequency	Responsibility
Air (Emission of dust and exhaust)	Air Quality (PM 10) All relevant stack emissions (CO, NOX, SOX)	Construction site	Visual control Technical inspection of machinery Instrumental measuring	PEQS	Quarterly	Proponent
Water Quality	Groundwater Quality (Total Coliform, Fecal E.Coli, pH, TDS, Total hardness, Alkalinity Nitrates, Chloride, Sodium, iron)	Construction site	Laboratory control.	PEQS	Quarterly	Proponent



Environmental Impact Assessment (EIA)

Wastewater Quality	Waste water quality (pH, TDS, TSS, BOD5, COD, Chloride, Iron, Nitrate)	Construction camps; At construction sites	Laboratory control	PEQS	Quarterly	Proponent
Noise Level	Noise level on dB (A) Scale	Construction site	Instrumental Monitoring	PEQS	Quarterly	Proponent
		Potentially affected sensitive receptors	Instrumental Monitoring	PEQS	Quarterly	Proponent
Soil Quality	Calcium, Magnesium, Iron Fluoride, Sulphide, Sulphate, Zinc, Barium, pH, Sodium, Potassium	Construction camps Construction sites Material and waste storage areas	Lab control	USEPA	Regular inspection Inspection after completion of works. Laboratory analysis—in case of pollutant spill	Proponent

PEQS

Provincial Environmental Quality Standards



Environmental Consultancies & Options (ECO)

Environmental Impact Assessment (EIA)

USEPA

United States Environmental Protection Ag



Environmental Consultancies & Options (ECO)

Environmental Impact Assessment (EIA)

Table 9.4 Cost Estimates for Environmental Management

Sr. No.	Item	Rs.
1	Water Sampling & Testing	100,000.00
2	Wastewater Sampling & Testing	80,000.00
3	Vehicular Emission Testing	15,000.00
4	Air Quality Monitoring	50,000.00
5	Purchase of PPEs	100,000.00
6	Maintenance of Equipment	100,000.00
7	Waste Disposal	100,000.00
8	EHS Training	25000.00
Sub Total		Rs. 570,000.00

Chapter 10

STAKEHOLDER CONSULTATION

10.1. Stakeholder Consultation

Stakeholder consultation involves the development of constructive, productive relationships over the long term. It results in a relationship of mutual benefit; it enables us to identify trends and emerging challenges which are currently or will in the future impact on the project or business.

For this project, consultant has maintained a steady consultation process with all relevant parties, to ensure that all issues of concern are rationalized and sorted out prior to implementation of proposed project. The key consulted stakeholders were

- General Public
- Proponent's Environmental Management Team
- Environmental Experts
- Government Officials

10.1.1. Public Consultation

Public participation basically involves encouragement of the public to express their views. This exercise tries to ensure that due consideration will be given to public values, concerns and preferences when decisions are made. Information and notification, strictly speaking, are the preconditions of meaningful public involvement. On its own, information disclosure is not a sufficient provision in public involvement for an audit of a major project. Consultation denotes an exchange of information designed to canvass the views of stakeholders on a project and its impacts. Participation is a more interactive process of engaging the public in addressing the issues, establishing areas of agreement and disagreement and trying to reach common positions.

As previous experience shows that certain potentially contentious issues never get to the public domain if the correct consultation process is not maintained from the conceptual stage of any development.



10.1.2. Objectives of Consultation

The objectives of embarking on the consultations process for the project are:

- Inform and educate to avoid misunderstandings about the proposed project/development
- Identify problems, concerns and needs
- Obtain feedback
- Learn through local knowledge and understanding, particularly for environmental and social baseline feedback
- Dissemination of information on the project
- Promote ownership and enhance social acceptability
- Build trust amongst the various stakeholders
- Evaluate alternatives and seek solutions

10.1.3. Methodology

The project team comprising of environmentalists and sociologists consulted the people residing around the project area. The responses from different stakeholders were captured via interviews and questionnaires. All the obtained feedback was recorded in the field notebook.

10.1.4. Comments and Responses

Majority of the consulted locals have no objection with the establishment of the proposed project. Because they are having perspective of healthy future which will bring prosperity to their young ones. They also gave comments that this project will pave the path of unemployment. As this project will commence; it will open the door of employment opportunities not only during construction phase but also in operation. On the other hand, few people seemed not satisfied with the project. As they said that project owners always provide employment opportunities to the skilled people. If the owners will provide unskilled people jobs after giving them a proper training, then they would have no objection with this project.

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Environmental Impact Assessment (EIA)

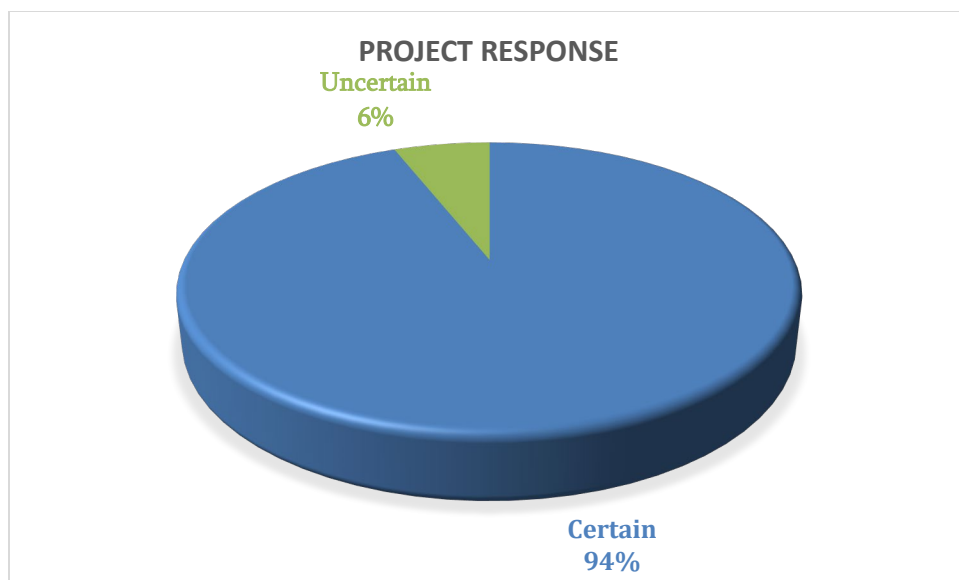
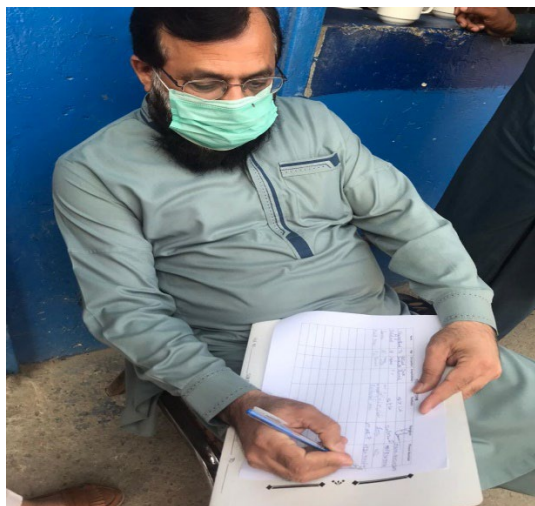
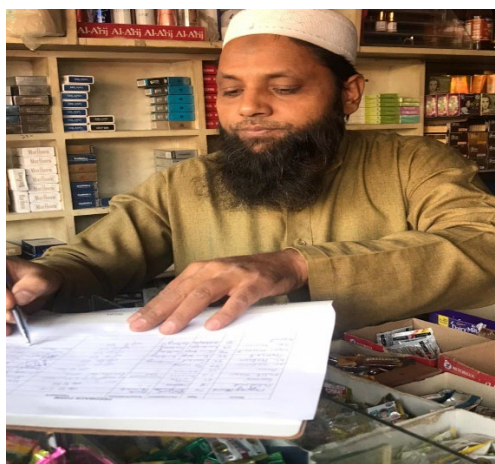


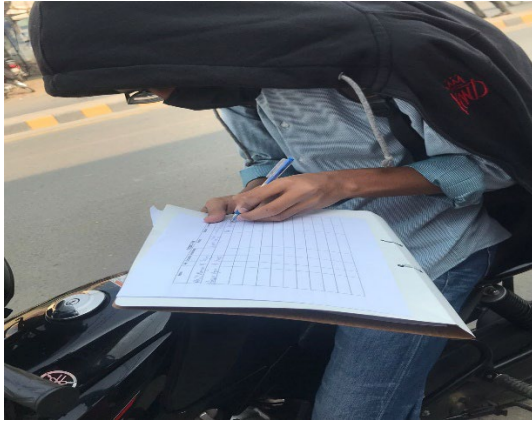
Figure 10.1 Project Response

Figure 10.1 shows percentage of people against and in favor of the proposed project

PICTORIAL PROFILE OF SOCIAL SURVEY



Environmental Impact Assessment (EIA)



10.1.5. Proponent's Environmental Management Team

Proponent's Environmental Management team has ensured that every measure will be taken to make the project environment friendly during construction and operation phases. The proposed project won't cause pollution as solid waste to be generated during construction and operation phase will be reused and recycled. He further said that the project will provide jobs to the locals during construction and operation phases.

Environmental Impact Assessment (EIA)

10.2. Consultation with Experts and Government Officials

There are many important reasons to establish and maintain good working relationships with governmental authorities at different levels, and to keep them informed about project's activities and anticipated impacts. Government support can be critical to the success of a project and routine engagement with various regulatory and public service authorities is often required as part of doing business. On a practical level, local government authorities may have long-established relationships with project-affected communities and other local and national stakeholder groups, and as such can play a role in convening and facilitating discussions between the project and stakeholder representatives.

10.2.1. Objectives

The objective of conducting consultation with government officials was

- To provide them with the information of proposed project
- To resolve and avoid conflicts in future
- To establish areas of co-operation and development
- To provide an opportunity to influence project design in a positive manner
- To tap information on key environmental and social baseline of the project area
- To manage expectations and misconceptions regarding the project
- To provide opportunities to discuss their opinions and concerns

10.2.2. Methodology

The consultant has arranged a meeting with various government officials and environmental experts in order to obtain feedback regarding the proposed project. Below section shows list of officials contacted, their feedback and pictures.

Table.10.1: List of Experts Contacted

Sr. No.	Name	Designation	Department
1.	Mr. Nouman Yonus	Assistant Director, EPA	Environmental Protection Agency, Punjab
2	Mr. Tariq Naseem	Deputy Secretary (Planning)	Forest Department, Lahore
3	Dr. Kauser Jamal	Environmental Expert	Ex. Dean Faculty of Natural Science,



Environmental Impact Assessment (EIA)

	Cheema		LCWU
4	Dr. Aleem Chaudhry	Wildlife Expert	Aleem Conservation Consultants
5	Mr. Waqar Ahmad	Hydrological Expert	College of Earth and Environmental Sciences, University of Punjab
6	Dr. Ali Kamran	Waste Management Expert	College of Earth and Environmental Sciences, University of Punjab



Consultation with Environmental Expert Dr. Kauser Kamal Cheema

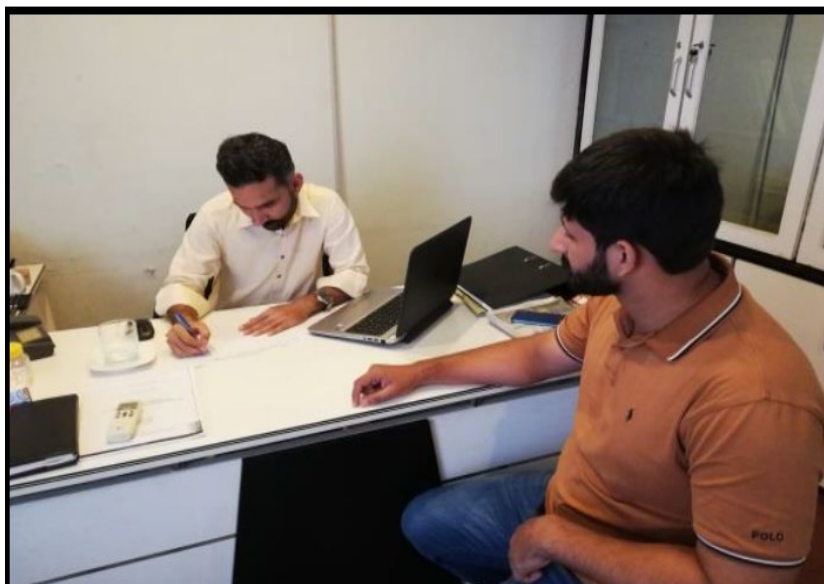


Consultation with Wildlife Expert Dr. Aleem Chaudhry

Environmental Impact Assessment (EIA)



Consultation with Waste Management Expert Dr. Ali Kamran



Consultation with Hydrological Expert Mr. Waqar Ahmad



Consultation with Tariq Naseem Deputy Secretary Planning Forest Department

10.2.3. Feedback

All officials contacted had responded in a positive manner and gave useful feedback regarding proposed project.

CHAPTER 11 CONCLUSION

The EIA of the proposed project of M/S Lasani Waste Management for Construction of Incineration Facility for Hazardous (Industrial) and Non-Hazardous Waste Items Including Scrap in Lahore Punjab has achieved the following goals:

- Identification of national environmental regulatory requirements that apply to the proposed development activities.
- Identification of the environmental features of the project area and the likely impacts of the project on the environment.
- Recommendation of appropriate mitigation measures that proponent will incorporate into the project design to eliminate or mitigate all adverse environmental impacts.

Baseline environmental and socioeconomic information was collected from a variety of sources including published literature and field surveys. The information collected was used to compose profiles of the natural and socioeconomic environments likely to be affected by the project. Information for the section describing the project came mainly from Proponent.

An assessment was then made of the potential impacts of the described project on the area's natural and socioeconomic environments.

The impacts of the planned activities in the project area will be insignificant, provided the generic mitigation measures proposed in this report will be implemented. In areas where these activities may have a significant impact, additional mitigation measures are given to reduce impacts to as low as reasonably possible.

After assessing the proposed project activities and investigating the project area, the environmental consultants, Environmental Consultancies and Options (ECO) have concluded that:

"If the activities are undertaken as proposed and described in this report, and the recommended mitigation and environmental management measures are implemented/adopted, the project will not result in any long-term or significant impacts on the local community or the environment".



ANNEXURES

ANNEX-A

GLOSSARY

Climate:

The weather conditions prevailing in an area generally or over a long period.

Ecological Environment:

Ecological environment refers to all living and non-living things around us within which we live and work.

Environmental Impact Assessment (EIA):

It is the process of identifying, predicting, evaluating and mitigating of effects of biophysical, social and other relevant proposed projects and physical activities prior to major decisions and commitments being made.

Environmental Management Plan (EMP):

An EMP is a site-specific plan developed to ensure that all necessary measures are identified and implemented in order to protect the environment and comply with environmental legislation.

Fauna:

Word used for combination of all the species of animals.

Flora:

Word used for combination of all the species of plants.

Geography:

It is the study of Earth's landscapes, peoples, places and environments. It is, quite simply, about the world in which we live. Geography is unique in bridging the social sciences (human geography) with the natural sciences (physical geography).

Initial Environment Examination (IEE):

Initial examination of projects for identification of hazards that will rise from any proposed project.

Institutional Capacity:

Capacity can be defined as “the ability to perform functions, solve problems and set and achieve objectives”. Increasing the level of human resources or strengthening organizations, while it may be necessary, may not be sufficient to increase capacity. The way individuals and

organizations interact both in the public sector and within society as a whole may be more relevant to the overall level of capacity.

Mitigation:

The act of lessening the force or intensity of something unpleasant

No Objection Certificate (NOC):

It is a kind of clearance issued by EPA necessary for any project to be constructed.

Physical Environment:

The part of the human environment that includes purely physical factors (as soil, climate, water supply)

Punjab (Punjab Environmental Protection Act 1997 (Amended 2012):

An act to provide the protection, conservation, rehabilitation and improvement of environment, for the prevention and control of pollution and promotion of sustainable development.

Quality of Life:

The standard of health, comfort, and happiness experienced by an individual or group living in an area.

Topography:

Physical features of any area including soil, water and air are called topography.

Waste:

Waste is any substance which is discarded after primary use, or is worthless, defective and of no use.

Waste Management:

Waste management is collection, transportation, and disposal of garbage, sewage and other waste products.

Utilities:

Useful features or something useful for the betterment of surroundings and environment for the use on daily or permanent such as electricity, gas, water, cable and telephone etc.

Restoration:

In an ecosystem, “restoration” means the process of recovering an ecosystem that has been damaged, degraded, or destroyed maybe because of soil erosion or human interference. Restoration of an ecosystem is an attempt to return it to its historical trajectory.

Rehabilitation:

The reparation of ecosystem processes, services and productivity but it does not mean to restore the ecosystem to its pre-existing conditions.

Biological Environment

The natural biological factors (such as wild animals, plants or bacteria) that affect human life (as in particular place or area).

Basic Health Unit

The BHU is located at a Union Council and serves a catchment population of up to 25,000. Services provided at BHU are promotive, preventive, curative and referral.

Rural Health Center

The Rural Health Clinic (RHC) program is intended to increase access to primary care services for Medicaid and Medicare patients in rural communities. RHCs can be public, nonprofit, or for-profit healthcare facilities.

ANNEX-B

LIST OF ABBREVIATIONS

List of Abbreviations

BDL	Below Detectable Limit
BOD	Biological Oxygen Demand
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
dB	Decibel
ECO	Environmental Consultancies & Options
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
EPD	Environmental Protection Department
GEL	Global Eco Laboratories
GT	Global Technologies
GWM	Global Waste Management
HSE	Health Safety Environment
IEE	Initial Environmental Examination
NGO	Non-Governmental Organization
NOC	No Objection Certificate
SO _x	Oxides of Sulphur
NO _x	Oxides of Nitrogen
OH	Overhead
PEQS	Punjab Environmental Quality Standards
PM	Particulate Matter
PMO	Project Management Office
PPE's	Personal Protective Equipment's
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
HSE	Health Safety & Environment

ANNEX-C

QUESTIONNAIRE

SOCIO-ECONOMIC SURVEY & HEALTH SURVEY QUESTIONNAIRE

Q. 1. Name of the respondent:

Q. 2. Present Residential Address

Q. 3. Gender:

1- Male

2- Female

Q. 4. Age of the respondent: -----

Q. 5. What is your marital status?

1- Single

2- Married

3- Divorced

4- Widow/Widower

Q. 6. Education Level

1- Illiterate

2- Primary

3 - Middle

4- Secondary

5- Higher Secondary

6- Graduate

7- Post Graduate

8- Deeni Uloom

Q. 7. Employment Status

1- Unemployed

2- Employed

3- Housewife

4- Student

Q. 8. Type of Employment

1- Govt. Employee

2- Private Employee

3- Labor class

4- Business

5- Any other

Q. 9. Personal Income (Monthly average)

1- Rs. 1,000---10,000

2- Rs. 10,001---20,000

3- Rs. 20,001-30,000

4- Rs. above 30,000

Q. 10. Other sources of income?

1- Over Time

2- Part time

3- Private work

4- Other

Q.11. How many earning members are there in your family?

1- 1

2- 2

3- 3

4- 4

5- 5 & above

Q. 12. Which family system do you belong?

1- Joint

2- Separate

Q. 13. How many people are there in your household?

1- 1-5 persons

2- 6-10 persons

3- 11-15 persons

4- Above 15

Q. 14. How many children are there in your house?

1- 1 – 3

2- 4 – 7

3- Above

Q. 15. What is the type of the ownership of your house?

1- Self Owned

2- Rented

Q. 16. If rented how much rent you paid?

1- 1000—2000

2- 2001--- 3000

3- 3001--- 4000

4- 4001--- 5000

5- 5001----6000

6- 6001---7000

7- 7001----8000

8- 8001---9000

9- 9001---10000 & above

Q. 17. Nature of construction of your house:

1-Pacca

2-Semi-Pacca

3-Katcha

4-Temporary settlement

Q. 18. Which of the following facilities are available in your house?

1-Electricity

2-Water Supply 3-Gas

4-Telephone

5- Sewerage

6- other

Q. 19. Is there any social welfare trust in your area?

1- Yes

2- No

Q. 20. Nature of social welfare trust in your area?

1- NGO

2- Vocational training institute

3- Women welfares center

4- Women health care centers

5- Any other.....

Q. 21. Are you satisfied with the standard of the Educational Institutions in your area?

1- Yes

2- No

Q. 22. Are you in the favor of proposed project in your area?

1-Yes

2- No

Q. 23. What are the benefits of the proposed project for local community?

1-

2-

3-

4-

Q. 24. Is it become a source of development for the local community?

1- Yes

2- No

Q. 25. How do the project activities affect the environment?

1- By contaminated Water

2- By polluted Air

3- By creating noise pollution

4- Any other

5- All of the above.....

6-Will not affect if the pollution is
controlled at the sources

Q. 26. Do you have problem in the Availability for the following facilities?

1- Education

2- Job Opportunities

3- Transport

4- Recreational Places

5- Health services

6- Any other.....

Q. 27. Is there any solution for the particular issue?

1- No

2- Yes

Q. 28. Common diseases of an area?

1-

2-

3-

4-

Q. 29. Occupation of the Community inhabitants?

1- Business

2- Agriculture

3- Jobs

4- Small Industries

5- Others

Q. 30. Do you have any recommendation for the improvement of your area?

Q. 31. Is there any disease particularly associated with project activities?

1-

2-

3-

4-

Sr No	Name	Age	Occupation	Area/Address	Feedback	Signature
1	Bilal Ahmed	17	دکاندار	جھانگ ٹاؤن	علامہ مولوی نور محمد خان صاحب کے دور کا وہی جس کی بھائی	Bilal Ahmed
2	محمد رحیم	32	مورس سٹور ملنگ	مانگ	بھیس دور کار میاں جو کا - نور محمد خان عظیم اخلاقی سرچشموں سے بھیس	محمد رحیم
3	محمد سلیم	26	ڈرائیور	مانگ	میلنگ لوگ کے لئے کمر بستہ جس کی بھائی	محمد سلیم
4	محمد خیر	18	دکاندار	جھانگ ٹاؤن	علامہ مولوی نور محمد خان صاحب کی بھائی بھائی طی زین الدین جس مرقی کے بھائی کا	محمد خیر
5	محمد رحیم	36	ڈرائیور	جھانگ ٹاؤن	دور کا وہی جس کی بھائی	محمد رحیم

6	Mo Kamal	28	مزدور	بجائے کوٹ	اس کام میں تمہیں بڑی فائدہ ہوگا۔	
7	Bashir Ahmad	21	مزدور	بجائے کوٹ	نور کی کھروافخ میں اٹھیں گے۔	
8	Shafiq Parag	32	مزدور	بجائے کوٹ	اس کام سے جلانے میں تمہاری مدد ہوگی۔	
9	Qas Butti	27	مزدور	طائف	روزگار نہ پائے گی۔	
10	Ahluhan Jameel	36	کانوار	طائف	آہنی میں اطمینان نہ پائے گا۔	

11	Shaid Khan	31	سید ایمنی	اس کا ہم سے بہتری بخاری کی ہے۔	
12	Museem Tariq	38	سید رائے سیدی	خانہ کی بجائی میں بخاری اور بخاری کی ہے۔	
13	M. Shabool	23	سید رائے سیدی	روزی کا، خانہ سے آوری میں امانت ہو گا۔	
14	Yousaf Rajwa	25	سید رائے سیدی	زیادہ کا مے کا نو زیادہ آمد کی ہوئی کھجور آسانی ہوئی	
15	Ali Humam	32	سید رائے سیدی	بخاری کی خانہ میں سے بخاری کی ہے۔	

ANNEX-D

GOOGLE EARTH MAP

Lasani Waste Management

Moza Saraich Soa Asal District Lahore

Legend



Feature 1



Site of Lasani Waste Management

Lasani Waste Management 31.3119403,74.4250471

Google Earth

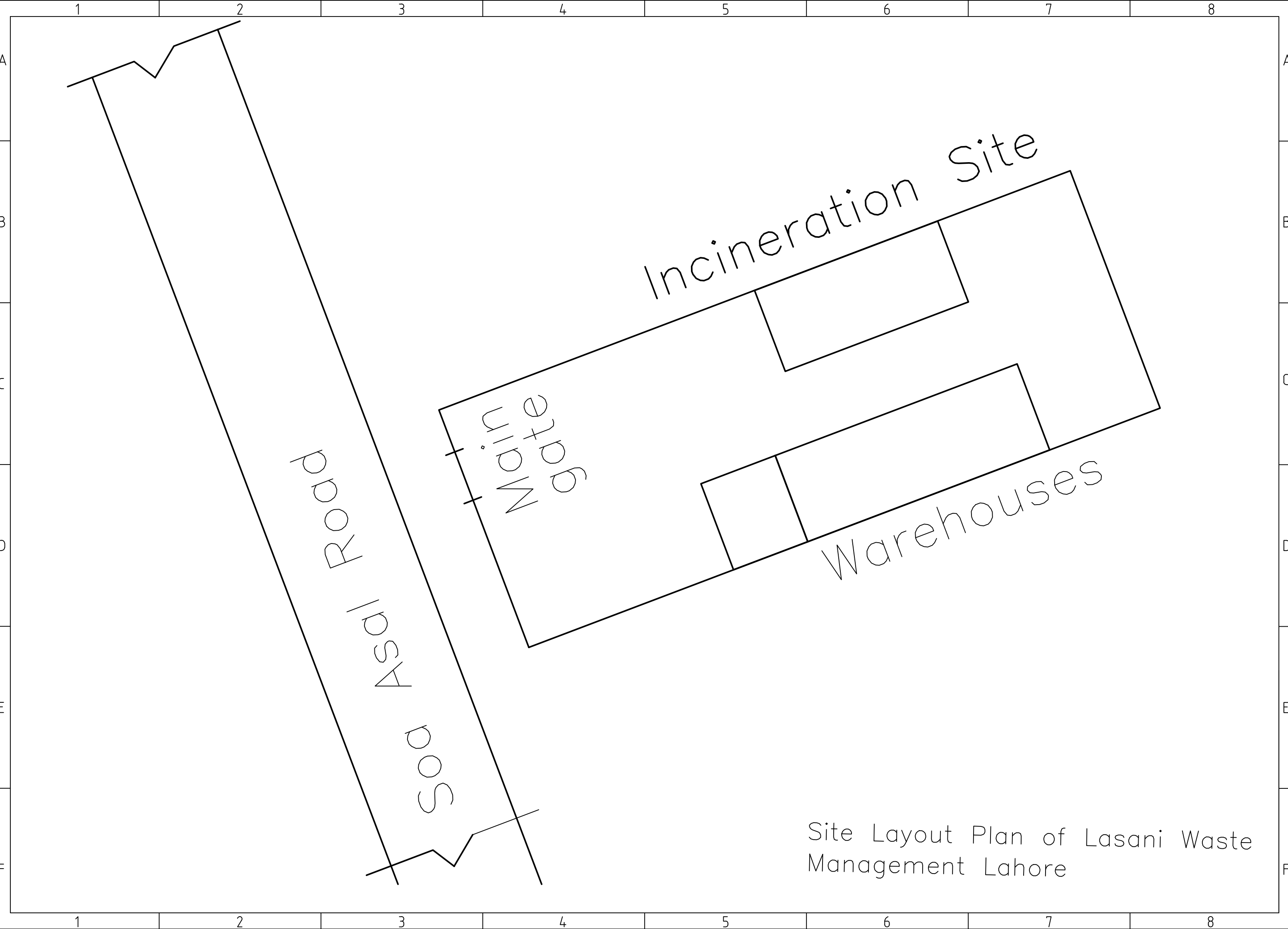
Image © 2023 Maxar Technologies

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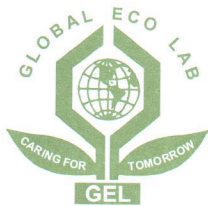
ANNEX-E

PROJECT SITE LAYOUT



ANNEX-F

LAB REPORTS



GLOBAL ECO LAB

Certified by Pakistan Environmental Protection Agency (Pak EPA) F.No. 5 (11) 2009-Dir (Lab/NEQS)11

Doc: GEL/LMS/7.8-FRM/01
Issue: 02
Issue date: 14-06-21
PAGE: 1 OF 1

CHEMICAL ANALYSIS TEST REPORT

Report reference No: W/48881
Name of Customer: M/S Lasani Waste Management
Address: Soa Asal, Tehsil Model Town, District Lahore
Nature of Sample: Ground Water
Date of sample received: 18.03.2023
Date of completion of analysis: 31.03.2023

Dated: 31.03.2023

Sr. No.	Parameters	Unit	PEQs	Concentration	Remarks
1	pH		6.5 to 8.5	7.80	
2	Chloride	mg/l	<250	78.0	
3	Turbidity	NTU	<5	0.10	
4	Colour	ptcu	<15	2.7	
5	Total Dissolved Solids	mg/l	<1000	542.0	
6	Total Hardness	mg/l	<500	147.0	
7	Fluoride	mg/l	≤1.5	0.8	
8	Iron	mg/l	NS	0.040	
9	Nitrate (NO ₃)	mg/l	≤50	4.5	
10	Nitrite	mg/l	≤3	0.0220	

Deviation from standard method if any: Nil
PEQS: Punjab Environmental Quality Standards.
Note: All parameters are within PEQS limits.
BDL: Below detectable limit
NS: Not Specified.

1. Report Prepared by:

Analyst
Analyst

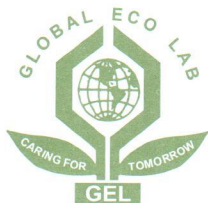
2. Checked/Verified by:

Chief Analyst
Chief Analyst

3. Signature of incharge of the environmental laboratory:

Name: Dr. Asim Mahmood
Designation: Chief Executive Officer
Date: 31.03.2023

END OF THE REPORT



GLOBAL ECO LAB

Certified by Pakistan Environmental Protection Agency (Pak EPA) F.No. 5 (11) 2009-Dir (Lab/NEQS)11

Doc.# GEL/LMS 7 & FRM 01

Issue # 02

Issue date: 14-06-21

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AMBIENT AIR QUALITY MONITORING REPORT

Report reference No: A/48882
Name of Customer: M/S Lasani Waste Management
Address: Soa Asai, Tehsil Model Town Tehsil Lahore
Location: Mentioned Below
Date of Monitoring: 18.03.2023
Date of Completion of Analysis: 31.03.2023

Date: 31.03.2023

S. NO.	Location	CO (mg/m ³)	SO ₂ (ug/m ³)	NO ₂ (ug/m ³)	Noise (dBA)	PM ₁₀ (ug/m ³)	Remarks
	PEQs	10	120	80	75	150	
1	Mid Point of the Site	0.21	74	34.8	57.1	123	

Deviation from standard method if any: Nil

BDL: Below detectable Limit.

This report is not valid for any negotiation.

1. Report Prepared by:

Asim Sardar
Analyst

2. Checked/Verified by:

Masood
Chief Analyst

3. Signature of the incharge of the environmental laboratory:

Name: Dr. Asim Mahmood
Designation: Chief Executive Officer
Date: 31.03.2023

END OF THE REPORT

ANNEX-G

TERMS OF REFERENCES (TORs)

TERMS OF REFERENCE FOR EIA STUDY

Title of the Assignment	Construction of Incineration Facility for Hazardous and Non-Hazardous Waste including Scrap Items
Project Total Cost	100 Million PKR
Implementation Period	15Months
Location of the Assignment	Moza Saraich Tehsil Model Town, District Lahore

M/S Lasani– The Proponent

M/S Lasani Waste Management is engaged in providing waste disposal services with emphasis on the solution for problems related to the management of industrial and commercial waste. The Company provides services and benefits that are unsurpassed in the industry today. The company is striving to provide the highest quality and cost-effective disposal services to the different industries and food manufacturing plants therefore M/S Lasani-Waste Management has become a preferred choice of businesses and industries nationwide.

M/S Lasani-Waste Management philosophy is guided and underpinned by the concept that “One man’s Trash is another man’s Treasure”. The whole idea of M/S Lasani-Waste Management is to build around this philosophy of trash management & focuses on recovering value while protecting the natural environment on which all the life depends – and that’s what set us apart from our unorganized vendors. The other services of M/S Lasani-Waste Management include:

- Collection, Transportation, Storage, Handling, Incineration and Disposal of Hazardous Waste including Scrap and Asbestos from various National and Multinational Companies working in Pakistan
- Disposal of Non-Hazardous Waste Material based on 3R system of Waste Reduce, Reuse and Recycle.

Terms of Reference (TORs)

Name: Mr. Hafiz Rameez (Manager)

Address: House No. 946, Block C-2 Muhalla Gujjar Pura Lahore Cantt.

Phone No: 0306-7973015

Fax: 042-36681281

1.0 TERMS OF REFERENCE

The term of reference (TOR) will include the following:

1.1 Executive Summary

This section would allow for a clear understanding of the project proposal and summarize the significant results of the EIA study, e.g. positive and negative environmental, social and economic impacts, options considered, reasons for selection of the proposed option and the measures to be implemented to prevent or mitigate negative impacts or capitalize on positive impacts.

1.2 Introduction

In this section the context of the project and the EIA would be explained, the delineation and justification of the boundary of the study area, general methodology, assumptions and constraints of the study.

1.3 Comprehensive Description of the Proposed Project

This should include but not be limited to the following:

1.3.1 The Proponent

This section should provide a description/profile of the company proposing to carry out the development project, profile of principals of the company, and business alliances of the company.

1.3.2 Project Concept & Description

This section should provide detailed description of the project including but not limited to:

- History and background of the project,
- Site location, Site Layout,

Expected project components and alternatives that may be considered by the developer

- Schematic plans,
- Estimated cost of the proposed development,
- Proposed project milestones,

Terms of Reference (TORs)

If the project is to be done on a phased basis, all phases should be clearly defined and the relevant time schedules provided, supported by maps, diagrams or any other appropriate visual aids,

- Proposed times of operation of the facilities,
- Construction methods and equipment,
- Construction materials.

1.3.3 Project Infrastructure

Overview of the proposed infrastructure and structural components of the Projects, including but not limited to the conceptual/preliminary design for:

- Water storage and supply,
- Drainage,
- Sewage disposal,
- Solid waste disposal,
- Transportation systems (on land and water),
- Electrical power (fossil energy, wind, sun, wave and tidal),
- Communications and other utility requirements
- Supporting infrastructure on the mainland,

1.3.4 Project Operations & Maintenance

Proposed operations and maintenance activities including but not limited to:

- Equipment and machinery to be involved, and how these will be mobilized,
- Areas to be used for storage of machinery and material should be clearly indicated,
- Transportation systems or arrangement pre-, during- and post – construction,
- Workforce requirements, including proposals for mobilization and accommodation,
- Health, safety and security systems.

1.4 Description of the Existing Environment

An inventory and assessment of the natural resources in the study area should be conducted for a period equivalent to at least one (1) calendar year adequately representing seasonal, diurnal and nocturnal variations.

Terms of Reference (TORs)

Secondary data can be used in the assessment as long as it is representative and relevant. The source of all data (existing or collected for the study) would be disclosed; who collected the information, when and where. All limitations and assumption made must be clearly stated.

The proponent shall submit an inventory of existing data and a statement on the data gaps for review by EPA before starting the EIA.

The following aspects must be described in this section:

1.4.1 Physical

Morphology and morphological processes (Topographical features including bathymetry of surrounding waters Soils & geology of the area), including but not limited to: geological structure, surrounding water bodies, mineral resource potential of the area under study and Existing Infrastructure

- Climate (wind and precipitation), run-off and drainage
- Data to support the use of alternative energy sources (wind solar, wave)
- Air quality
- Water quality
- Identify source of freshwater, including drinking water supply

1.4.2 Natural Hazards

This section would include the following:

- A study on Hurricanes and storm surges in the area under study
- Earthquakes and landslides and the history of such events in the area under study

1.4.3 Biological

This section would include the consideration of the following:

- Flora and fauna survey of project area and surrounding environment,
- Detailed qualitative and quantitative assessment of the economic zone, including inventory (list) and distribution (map) of species.
- Detailed description and qualitative and quantitative assessment of natural habitats and communities including but not limited to area where the project would be initiated;
- Commentary on the ecological health and functions, threats and conservation significance of terrestrial and fresh water habitats.

Terms of Reference (TORs)

- Species interdependence, habitats/niche specificity and community structure and diversity would also be considered.

The field data collected shall include, but is not limited to:

- Species lists and distribution for each community (ecosystem) Migratory species, insects and micro-organisms should also be considered,
- A habitat map of the area
- Other benthic features of the proposed development areas as well as the areas of potential impact
- Vegetation profile
- Fish and other fresh water species

1.4.4 Heritage

This section would include the assessment of the existing archeological structures of the area under study and probability of loss of archeological structures during the construction and operation of any project.

1.4.5 Human/Social

This section of the EIA would include the assessment of following:

- Demography, regional setting, location assessment and current and potential land-use
- Description
- of existing infrastructure such as transportation, electricity, solid waste disposal; water and telecommunications, and public health and safety
- Identification of all the existing resource users (including traditional users) ranging from subsistence utilization of the natural resources to commercial activities
- Public perception of the proposed project inclusive of potential impacts on social, aesthetic, historical and cultural values and any prescriptive rights for usage of the economic zone.

1.4.6 Identification and Assessment of Potential Direct and Indirect Impacts

A detailed analysis of the various project components shall be done in order to identify the potential environmental impacts, both negative and positive, of the project at all stages. The identified impacts must be profiled to assess the magnitude and importance of the impacts. The extent and quality of the available data shall be characterized, explaining significant information deficiencies

Terms of Reference (TORs)

and any uncertainties associated with the predictions of impacts. The impact must take in account the number and magnitude of mitigation strategies which need to be employed to reduce the risk(s) introduced to the environment. Where possible, impacts must be quantified. Each project activity or impact is to be assessed and ranked for both the magnitude and importance of the impact and presented in a weighted matrix for all the phases of the project (i.e. preconstruction, construction and occupation and operational).

1.5 Policy, Legal and Administrative Framework

Outline the pertinent legislation, regulations, policies and standards governing environmental quality, safety and health, protection of sensitive areas, protection of endangered species, siting and land use control at the national and local levels. The examination of the legislation should include the relevant international conventions, protocols and treaties where applicable

- All applicable legislation, regulations, policies and standards in relation to the construction and operation of the development should be highlighted, including but not be limited to the other development permits such as Planning and Building. (Punjab Environmental Protection Act 1997, (Amended 2012)
- Describe traditional land use and prescriptive rights including public access rights.
- Discuss issues relating to provisions for law enforcement and security as it relates to this development.

1.6 Public Participation and Consultation

The proponent should consult with relevant entities and the public throughout the EIA process. Document the public participation. Describe the public participation methods, timing, type of information provided and collected from the public and stakeholder target groups consultations. Instruments used to collect the information must be included in the appendix. The issues identified during the public participation process and discuss the public input that has been incorporated or addressed in the TOR and EIA.

2.0 Recommended Mitigation

Mitigation and abatement measures would be formulated for each potential negative impact identified. This will also include recommendations for the maximization and enhancement of beneficial impacts, energy conservation and the use of green building technology.

Terms of Reference (TORs)

2.1 Identification and Analysis of Alternatives

Alternatives to the site location (on other cays or islands), project design, scale, conditions of operation and technology shall be analyzed including the “no-action” alternative. The examination of project alternatives should incorporate the use history of the overall area in which the site is located and previous uses of the site itself. These alternatives must be assessed based on the physical, ecological and socio-economic parameters of the proposed site. Justification for the selection of the chosen alternative(s) shall be included.

3.0 Environmental Management of the Project

A draft environmental monitoring and management plan would be developed which will detail the monitoring requirements for pre and post construction and during the operational phases of the project. This will include recommendations to ensure the documented implementation of mitigation measures and long-term minimization of negative impacts and maximization of positive impacts.

3.1 At a minimum the draft monitoring plan should include:

- Introduction outlining the need for a monitoring programme
- The activity being monitored and the parameters chosen to effectively carry out the exercise
- The methodology to be employed and the frequency of monitoring
- Frequency of reporting to EPA
- The sites being monitored. These should incorporate a control site where no impact from the development is expected
- Raw data to be collected and relevant Tables and graphs to be used

Deliverables

The No Objection Certificate from Environment Protection Department (EPD) KPK is main deliverable. The other key deliverables, as per following:

1. Study of previous EIA's of project area and other relevant literature review
2. Collection of baseline secondary and primary data of site in terms of social, economic, environmental, flora, fauna and hydrological factors. Collection of any other relevant data considered important by consultant.

Terms of Reference (TORs)

3. Development of baseline conditions at site including analysis of air, water, soil, solid waste and noise samples.
4. EIA report to be prepared exactly as per the guidelines of EPD KPK/EPA whichever applicable at site.
5. Required number of EIA copies to be submitted to EPA/EPD for approval

Proponent

M/S Lasani-Waste
Management

Consultant

Environmental Consultancies & Options
(ECO)

ANNEX-H

**PROJECT TEAM
DETAILS**

PROJECT TEAM DETAILS AND RESPONSIBILITIES

NAME	POSITION	QUALIFICATION	Responsibilities
Dr. Asim Mahmood	Director	PhD & MBA	Dr. Asim would be responsible for: • Environmental Assessment& Management. • Supervision of monitoring team for air water noise and soil analysis. • Preparation of technical EMP
Dr. Saamia Saif	Executive Director	PhD. (Environmental Science & Management)	Dr. Saamia would be responsible for: • Report writing • Field surveys and consultation with stakeholders • Preparation of Environment monitoring plan • Preparation of technical EMP • Identification of sensitive receptors
Dr. Kausar Jamal Cheema	Environmentalist	PhD	Dr. Kausar will be responsible for: • Capacity building & training • Conducting and monitoring of health assessment surveys • Environment health risk assessment and management
Dr. Farooq Ahmed	Environmentalist	PhD Forestry	Dr. Farooq would be responsible for: • Biodiversity assessment

			• Detailed flora fauna survey of project sites • Identification of threaten and endangered species • Project impacts on flora and fauna
Mr. Shehzad Ahsraf	Environmentalist	M.Phil. Forestry	Mr. Shehzad would be responsible for: • Detailed flora fauna survey of project sites
Mr. Muhammad Amir	Sociologist	MA. Sociology	Mr. Amir would be responsible for: • Detailed social survey of project sites • Social impact assessment
Mr. Zahid Iqbal	Sociologist	MA. Sociology	Mr. Zahid would be responsible for: • Detailed social survey of project sites • Consultation with stakeholders
Ms. Sunaina Ashfaq	Project Manager (Environmental)	M.Phil (Environmental Science)	Ms. Sunaina would be responsible for: • Detailed survey of project sites • Socio-Economic survey • Environmental Assessment • Socio-Economic survey & analysis • Risk Assessment (OHS & EMP) • Social Assessment • Quality Check
Mr. Mustafain Haider	Project Manager	M.Phil. (Environmental	Mr. Mustafain would be responsible for:

	(Environmental Scientist)	Science)	• Site Monitoring • Socio-Economic survey & analysis • Risk Assessment (OHS & EMP)
Ms. Munazza Khan	Project Manager (Environmental Scientist)	M.Phil. (Environmental Science)	Ms. Munazza would be responsible for • Environmental Assessment • Socio-Economic survey & analysis • Risk Assessment (OHS & EMP) • Report Writing
Mr. Usman Sheikh	Project Manager/ (Environmental Scientist)	B.S (Environmental Science)	Mr. Usman would be responsible for • Detailed survey of project sites • Environmental Assessment • Detailed flora and fauna survey of project sites • Socio-Economic survey & analysis • Risk Assessment (OHS & EMP) • Socio-Economic survey • Social Assessment • Liaison with EPA and Proponent
Mr. Shah Zaib	Project Manager (Environmental Scientist)	M.Phil. (Environmental Science)	Mr. Shah Zaib would be responsible for • Detailed survey of project sites • Environmental Assessment

			• Detailed flora and fauna survey of project sites • Socio-Economic survey & analysis • Risk Assessment (OHS & EMP) • Socio-Economic survey • Social Assessment
Mr. Arslan Shahid	Project Manager	MBA	Mr. Arsalan would be responsible for • Detailed survey of project sites • Quality Check • Liaison with EPA and Proponent
Mr. Saif Ullah	Chemist	M.Sc.	Mr. Saif Ullah would be responsible for: • Detailed survey of project sites • Soil & water samples collection • Onsite Monitoring • Analytical analysis of samples
Mr. Waqas	Field Analyst	BSc (Chemistry)	Mr. Waqas would be responsible for • Soil & water samples collection • Onsite Monitoring • Analytical analysis

ANNEX-I

HSE Plan

ENVIRONMENT, HEALTH AND SAFETY (EHS) PLAN

EHS MANAGEMENT AND ADMINISTRATION

The EHS is a broader and holistic aspect of protecting the worker, the workplace, the tools / equipments and the biotic environment. It is an essential tool in determining the EIA study. The objective of the EHS on the project activities is to develop rules that will regulate environmentally instigated diseases and occupational safety measures during the operation phases of the project activities by:

1. Avoidance of injuries;
2. Provision of safe and healthy working environment for workers comfort so as to enhance maximum output;
3. Control of losses and damages to machines, equipment and other products;
4. Enhance environmental sustainability through developing sound conservation measures.

POLICY, ADMINISTRATIVE AND LEGISLATIVE FRAMEWORK

It is the primary responsibility of the proponent to promote a safe and healthy environment at the workplace and within the neighborhood in which the proposed activities will be undertaken by implementing effective systems to prevent occupational diseases and ill-health, and to prevent damage to property. The EHS Management Plan when completed will be used as a tool and a checklist by the contracted engineers in planning and development of the project.

ORGANIZATION AND IMPLEMENTATION OF THE EHS MANAGEMENT PLAN

The proponent shall use the EHS plan at the proposed depot during operation.

THE GUIDING PRINCIPLES TO BE ADOPTED BY THE PROPONENT

The facility will be guided by the following principle: -

1. It will be a conscious organization committed to the promotion and maintenance of high standards of health and safety for its employees, the neighboring population and the public at large.
2. Ensuring that EHS activities are implemented to protect the environment and prevent pollution.

3. Management shall demonstrate commitment and exercise constant vigilance in order to provide employees, neighbors of the depot and the environment, with the greatest safeguards relating to EHS.
4. Employees will be expected to take personal responsibility for their safety, safety of colleagues and of the general public as it relates to the EHS management plan.

EHS MANAGEMENT STRATEGY TO BE ADOPTED BY THE PROPONENT

The following strategies will be adopted to achieve the above objectives:

- Environment Health and Safety Management committee will be created and incorporate EHS as an effective structure at various levels and units to manage and oversee EHS programs in all construction and operation phases of the project
- Maintain an effective reporting procedure for all accidents.
- Provision of appropriate tools and protective devices for the success of the project.
- Encourage, motivate, reward and support employees to take personal initiatives and commitment on EHS.

SAFETY AGENDA FOR BOTH THE PROPONENT AND THE WORKERS

There will be a permanent EHS agenda during operation of the depot.

Proponent:

The EHS management plan code of practice shall be applicable to the proponents working in the premises, and shall be read and signed. This should also remind the proponent of his/her;

- Legal requirements
- Statutory obligations
- Obligation to lay-down a system for reporting accidents
- Responsibility to ensure that his employees are supplied with personal protective equipment and where applicable as per the EHS management plan for the whole project.
- Obligation to ensure that he obtains detail of jobs and areas where permit-to- work must be issued.

SAFETY REQUIREMENT AT THE DEPOT DURING OPERATION PERIOD

Proponent:

The proponent will ensure that:

- There are safe means of entry and exit exist at the depot.
- Ensure adequate briefing of job at hand on the safe system of work before commencement of work
- The EHS coordinator must be in attendance at all times throughout the duration of the project.
- The EHS consultant must maintain constant assessment of the risk involved as the work progresses
- A safety harness must be worn before entry into all confined spaces

Fire hazard at the depot:

The proponent at the depot shall ensure that: -.

- Appropriate fire extinguishers are kept available for immediate use at all times

EMERGENCY PROCEDURE DURING OPERATION

An emergency situation means:

Unforeseen happening resulting in serious or fatal injury to employed persons or the neighboring communities

1. Fire or explosion.
2. Natural catastrophe

In the event of such an emergency during operation, the workers shall:

- Alert other persons exposed to danger.
- Inform the EHS coordinator.
- Ring the nearest police station
- Do a quick assessment on the nature of emergency.
- Call for an ambulance

REQUIREMENT OF HEALTH, SAFETY AND ENVIRONMENT

1. ENVIRONMENT

All hose pipe connections to be properly fitted and tightened to avoid leakage/ spillage of oil. All spillages to be collected in sump Bucket.

2. HEALTH

- Avoid direct contact with White Oil Product.

- Proper PPE's i.e. Coverall, Safety helmet, Safety Shoes & Hand Gloves to be used by the personnel working in the area.
- The person taking dips of bowser or monitoring bowser decantation on top of bowser should stand in up wind direction diagonally such that hydrocarbon vapors to be carried away to avoid exposure of hydrocarbon vapors to the person carrying out dipping.

3. SAFETY

- Decanting valves should be at the tank bottom. No dripping from valves.
- Bowser valves should be leak proof and bowser should not have structural fatigue
- Before climbing ensure that hand brake is applied and wooden stoppers are placed before/ after the wheel. Minimum no. of person should be on the bowser. (i.e. should not more than 04).
- Drivers must accompany with bowsers all time while bowsers stand in terminal premises.

4. SECURITY

Following are the points to be checked at terminal gate by Security Department.

- Bowser should be in road worthy condition i.e. general condition should be satisfactory.
- Bowser should contain 6kg dry chemical powder fire extinguisher 02 Nos.
- Bowser should have spark arrestor at silencer outlet.
- Battery terminals should be properly covered with insulated mate

ANNEX-J

**WASTE MANAGEMENT
PLAN**

WASTE MANAGEMENT PLAN

1. Purpose:

The purpose of this document is to provide a system and define responsibilities for collection, segregation, storage and final disposal of waste generated at the _____.

2. Scope:

This procedure applies to the waste management activities in the entire area of _____.

3. Responsibilities

- Contractor/Site in charge are responsible for hazardous & nonhazardous waste management activities at the site.
- Site supervisor ensure collection of various categories of waste generated from their activities, segregation of waste and its transfer at storage locations.

4. Procedure

The activities involved with the management of wastes from the point of generation to the final disposal have been grouped into following functional elements:

- a. Waste Generation
- b. On-site Segregation & Storage
- c. Collection and Transport to Scrap Yard
- d. Disposal

4.1 Waste Generation:

Those activities in which materials identified are no longer being of any value or use and are either thrown away or gathered for disposal. The main waste that can be generate is:

- Site excavation waste
- Excavation material
- Waste concrete
- Wooden material
- Wheel wash sheets
- Dirty / oily cotton rags
- Used cotton gloves

- Polybags
- Oil contained cartons
- Office & kitchen waste etc.

4.2 On-site Segregation & Storage:

On-site handling refers to the activities associated with the handling of solid waste until they are placed in the containers used for their storage before collection. The solid wastes that accumulate in the offices or work locations are usually collected in drums/containers/bins.

4.3 Collection and Transport to scrap yard:

Those activities associated with the gathering of solid waste and the hauling of the wastes after collection to the location where the waste is to dump.

4.4 Disposal:

Those activities associated with ultimate disposal of solid wastes, including those collected and transported directly to a landfill site, semisolid wastes (sludge's) from septic tanks or other substances that are of no further use. Nominated approved waste management Venders.

5. Waste Management Process:

5.1 Solid Waste:

Generally solid waste can be categorized as follows:

5.1.1. Non-Hazardous Waste (Trash):

This includes paper/cardboard, packaging waste, wooden crates and pallets, kitchen waste, trash, polybags etc.

5.1.2. Non-Hazardous Waste (Recyclable):

This includes, empty bottles (glass/plastic), empty drums/containers, metal pieces, packaging material, office equipment and redundant furniture etc.

5.1.3. Hazardous Waste:

This includes used refined, lube oils, material, and effluent from storage pits, waste that comes out of tank cleaning as sludge or other operational activities.

6. Identification & Segregation of Wastes:

The solid wastes are identified, segregated and collected in color coded drums for each category of the wastes. The drums are placed at various locations on each operating location which

describes the following color coding for drums that are used in the plant for collecting the wastes generated from various activities at the facility

YELLOW (Nonhazardous waste): for reclaimable material e.g. metal pieces, tubes, nuts, bolts, Office trash, packaging waste, plastic, kitchen & food waste etc.

RED (Hazardous Waste): for material e.g. wooden dust, cotton rags, gloves, cloth, glass etc.

7. Collection and segregation of wastes at storage site:

The janitorial staff collects the waste from the colored bins placed in the work locations and ensures that the different categories of waste are not mixed during collection. The scrap collected is emptied in the SCRAP YARD in the designated area specified for each type of the wastes. A TRASH DISPOSAL YARD is being reserved for collection and disposal of the disposable material and will be handled by Admin Services.

Kitchen / food waste generated from camp sites or kitchen is collected in a drum placed outside. Approved vendor is responsible to ensure safe disposal of the waste.

8. Waste Storage in Scrap Yard

Following is the list of areas demarcated for various categories of wastes in the SCRAP YARD:

LOT # 1: Contaminated Waste

LOT # 2: Paper/ Kitchen Waste

LOT # 3: Scrap, Glass & Plastic

9. Final Disposal:

The material stored in the SCRAP YARD is disposed of through company authorized vender who is responsible for its safe disposal.

Documented Information to be retained in given data sheet.

Sr. No.	Title of Documented Information to be retained	Identification No. of Documented Information to be retained	Revision No.	Revision Date	Retention time
1.					
2.					