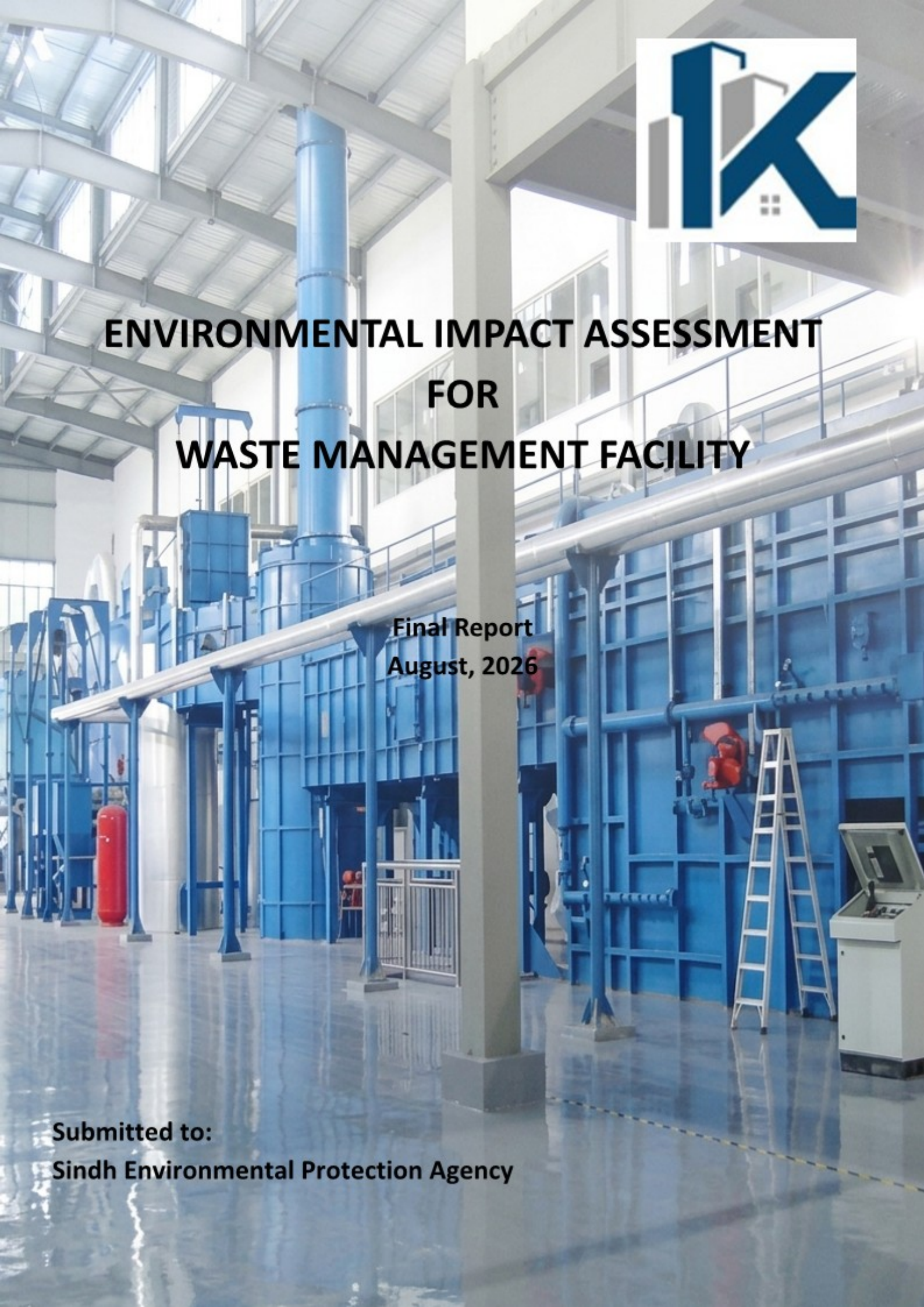


ENVIRONMENTAL IMPACT ASSESSMENT
FOR
WASTE MANAGEMENT FACILITY

Final Report
August, 2026

Submitted to:
Sindh Environmental Protection Agency

ENVIRONMENTAL IMPACT ASSESSMENT
(EIA)
WASTE MANAGEMENT FACILITY

Final Report

August 2026

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TABLE OF CONTENTS

1. INTRODUCTION 1
1.1. Background 1
1.2. Purpose and Objective of the EIA 2
1.3. Scope of the EIA 2
1.3.1. Environmental Baseline Study 2
1.3.2. Environmental Impact Identification 3
1.3.3. Mitigation and Management Measures 3
1.3.4. Monitoring and Compliance 3
1.3.5. Stakeholder Consultation and Public Participation 3
1.4. Approach and Methodology 3
1.4.1. Scoping 5
1.4.2. Data Collection and Baseline Analysis 5
1.4.3. Stakeholder Engagement 5
1.4.4. Impact Assessment and Prediction 5
1.4.5. Mitigation and Management Planning 5
1.4.6. Reporting 5
1.5. EIA Report Structure 6
1.6. Project Proponent 6
1.7. EIA Consultant 7
1.8. Study Team 7
2. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK 9
2.1. Background Information 9
2.2. Environmental Legislation Framework 9
2.2.1. Pakistan Environmental Protection Ordinance, 1983 (PEPO, 83) 9
2.2.2. Pakistan Environmental Protection Act, 1997 (PEPA, 97) 9
2.2.3. Sindh Environmental Protection Act, 2014 10
2.2.4. Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021 11
2.2.5. Sindh Environmental Quality Standards (SEQS) 11
2.2.6. The Sindh Environmental Quality Standards (Self-Monitoring and Reporting by Industry) Rules, 2014 11
2.2.7. Sindh Hazardous Substance Rules, 2014 12
2.2.8. Sindh Hospital Waste Management Rules, 2014 12
2.3. National and Provincial Environmental Policies and Guidelines 13
2.3.1. National Conservation Strategy (NCS) 13

2.3.2. National Environmental Policy, 2005 14
2.3.3. National Climate Change Policy, 2011 14
2.3.4. Sindh Drinking Water Policy, 2017 14
2.3.5. Pakistan Climate Change Act (PCCA), 2017 15
2.4. International Protocols & Conventions 15
2.5. Other Cross-sectoral Laws in Sindh 16

3. PROJECT DESCRIPTION 18
3.1. Background Information 18
3.2. Project Location and Land Selection Criteria 19
3.2.1. Benefits of the Selected Site 19
3.3. Project Accessibility 20
3.4. Project Significance 20
3.5. Guidelines Regarding Hazardous Waste Management 21
3.6. Technical Description 23
3.6.1. Construction Phase Activities 23
3.6.2. Site Clearance 23
3.6.3. Project Timelines 23
3.6.4. Engineering and Miscellaneous 23
3.6.5. Machinery Required 23
3.7. Design and Technical Details 24
3.7.1. Waste Feeding System 26
3.7.2. Primary Chamber 26
3.7.3. Secondary Chamber 26
3.7.4. Scrubbing System 26
3.7.5. De-ashing System 27
3.8. Project Support Services and Utilities 27
3.8.1. Water Supply 27
3.8.1.1. Wastewater Management 27
3.8.2. Solid Waste Management 27
3.8.3. Electricity Supply 28
3.8.4. Gas Supply 28
3.8.5. Diesel Storage Facility 28
3.8.6. Manpower Requirement 28
3.8.7. Safety and security 28
3.9. Land Status 29
3.10. Corporate Social Responsibility Activities (CSR) 29

3.11. Project Phases and Activities 29
3.11.1. Construction Phase 29
3.11.1.1. Construction Material Sourcing 29
3.11.1.2. Construction Materials 30
3.11.1.3. Construction Phase Activities 30
3.11.1.3.1. Site Preparation and Land Development 30
3.11.1.3.2. Structures and Infrastructure Development 30
3.11.1.3.3. Construction Schedule and Durations 30
4. ANALYSIS OF ALTERNATIVES 31
4.1. Rationale for Site Selection 31
4.2. Rationale for Technology Selection 31
5. ENVIRONMENTAL AND SOCIAL BASELINE 34
5.1. General 34
5.2. Reconnaissance and Detailed Field Visit 35
5.3. Physical Environment 35
5.3.1. Methodology 35
5.3.2. Land Resources 36
5.3.2.1. Geography 36
5.3.2.2. Topography 36
5.3.2.3. Geology 37
5.3.2.4. Seismology 38
5.3.3. Water Resources 40
5.3.4. Climatic Conditions 40
5.3.4.1. Temperature 40
5.3.4.2. Rainfall 41
5.3.4.3. Wind Speed 42
5.3.4.4. Humidity 43
5.3.5. Ambient Air Quality 44
5.3.6. Ambient Noise 45
5.3.6.1. Monitoring Results 45
5.4. Ecological Environment 45
5.4.1. Flora of the Project Area 46
5.4.2. Fauna of the Project Area 48
5.5. Socio-economic and Cultural Environment 54
5.5.1. Socio-economic Features 55
5.5.1.1. Demographics and Settlements 55

5.5.1.2. Healthcare Facilities 56
5.5.1.3. Livelihood and Economic Activities 56
5.5.1.4. Sensitive Receptors 56

6. STAKEHOLDER CONSULTATION 57
6.1. Introduction 57
6.2. Objectives of Stakeholders Consultation 57
6.3. Types of Stakeholders 57
6.4. Stakeholder Consultation Process 58
6.5. Outcomes of Consultations 58
6.5.1. Consultations with Local Community & Nearby Business Owners 58
6.5.2. Consultation with Government Departments and NGOs 60
6.5.2.1. Sindh Environmental Protection Agency (SEPA) 60
6.5.2.2. Town Municipal Committee, Islamkot 61
6.5.2.3. Rural Health Center (RHC), Islamkot 62
6.5.2.4. Secours Islamique France (SIF) - NGO 63
6.5.2.5. Participatory Village Development Program - NGO 64

7. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES 65
7.1. Construction Phase Impacts 66
I. Topography and Land Use 66
II. Site Aesthetics 67
III. Ambient Air Quality 68
IV. Noise and Vibration 69
V. Wastewater Discharges 70
VI. Soil Quality 70
VII. Ecological Environment 71
VIII. Occupational Health and Safety 72
IX. Solid Waste 74
7.2. Operational Phase Impacts 75
I. Topography and Land Use 75
II. Site Aesthetics 75
III. Ambient Air Quality 75
IV. Noise & Vibration 77
V. Wastewater Discharges 78
VI. Soil Quality 79
VII. Ecological Environment 79

VIII. Health and Safety 81
IX. Road Safety & Traffic 82
X. Employment and Labor Issues 83
XI. Solid Waste 84

8. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN 86
8.1. Purpose and Objective of EMMP 86
8.2. Environmental Monitoring Plan 110
8.2.1. Objective of Monitoring 110
8.2.2. Performance Indicators 110

9. CONCLUSION 116

ANNEXURES 117
Annexure I: Sindh Environmental Protection Act, 2014 118
Annexure II: SEPA (Environmental Assessment) Regulations, 2021 148
Annexure III: Sindh Environmental Quality Standards, 2016 166
Annexure IV: Hazardous Substance Rules, 2014 181
Annexure V: Hospital Waste Management Rules, 2014 200
Annexure VI: Copy of Ownership Document 209
Annexure VII: Ambient Air Quality Monitoring Report 210
Annexure VIII: Ambient Noise Levels Monitoring Report 211
Annexure IX: Air Dispersion Modelling 212

LIST OF TABLES

Table 1-1: Study Team for EIA of Waste Management Facility 8
Table 3-1: Specifications of Incineration Unit (500 kg/hr.) 24
Table 3-2: Specifications of Incineration Unit (100 kg/hr.) 25
Table 4-1: Advantages VS Disadvantages of Available Hospital/Hazardous Waste Treatment Options 31
Table 5-1: Seismic Profile of the Proposed Site 39
Table 5-2: Ambient Air Monitoring Results 44
Table 5-3: Ambient Noise Monitoring Results 45
Table 5-4: Floral Species Present in Project Area 46
Table 5-5: Fauna Species Present in Project Area 48
Table 6-1: Stakeholder Consultation Process for Waste Management Facility Project 58
Table 8-1: Environmental Management Plan during Construction Phase of Waste Management Facility 87
Table 8-2: Environmental Management Plan during Operational Phase of Waste Management Facility 96
Table 8-3: Environmental Monitoring during Construction Phase of Waste Management Facility 111
Table 8-4: Environmental monitoring during Operational Phase of Waste Management Facility 113

LIST OF FIGURES

Figure 1-1: Flow Chart of EIA Activities in Pakistan Including Sindh Province 4
Figure 3-1: Layout Plan of the Proposed Facility 18
Figure 3-2: Location Map of the Project Site 19
Figure 5-1: Elevation Map of Project Site 37
Figure 5-2: Geological Map of Tharparkar 38
Figure 5-3: Location of Tharparkar with Respect to Tectonic Plates 39
Figure 5-4: Maximum and Minimum Temperatures (°C) in the Project Area 41
Figure 5-5: Yearly Rainfall Pattern in the Project Area 42
Figure 5-6: Yearly Wind Speed Pattern in the Project Area 43
Figure 5-7: Month-Wise Average Humidity Levels in the Project Area 44
Figure 6-1: Pictorial View of Consultations 60
Figure 6-2: Pictorial View of Consultation with TMC 62
Figure 6-3: Pictorial View of Consultation with RHC 63
Figure 6-4: Pictorial View of Consultation with SIF 64

LIST OF ABBREVIATONS

ACEA	ACEA International Private Limited
AKC	Al-Khyber Construction
AOI	Area of Influence
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CoI	Corridor of Impact
dB(A)	decibels
EHS	Environmental, Health, and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
EPRP	Emergency Preparedness and Response Plan
GHG	Greenhouse Gases
GoS	Government of Sindh
HSE	Health, Safety and Environment
km	Kilometers
NCS	National Conservation Strategy
NGOs	Non-Governmental Organizations
OM	Operations Manual
PPE	Personal Protective Equipment
SEPA	Sindh Environmental Protection Agency
SEQS	Sindh Environmental Quality Standards
SDG	Sustainable Developmental Goal
ToRs	Terms of Reference
WMF	Waste Management Facility

EXECUTIVE SUMMARY

1. M/s Al-Khyber Construction ("AKC") has proposed the establishment of a Waste Management Facility ("WMF") with a cumulative processing capacity of 600 kg/hour at Survey No. 28, Bhave Jo Tar, PO Islamkot, Tharparkar. The proposed project site is located at District Tharparkar, at the geographical coordinates 24.735669°N and 70.318131°E.

2. The proposed project is aimed at strengthening the waste management infrastructure in the province through the establishment of a dedicated Waste Management Facility (WMF) for the environmentally sound management and disposal of industrial, infectious, and other waste streams. Considering the limited availability of dedicated waste treatment and disposal facilities within the region, the proposed WMF is intended to improve waste management practices, reduce pressure on existing disposal infrastructure, and facilitate compliance with applicable environmental laws, regulations, and standards. The facility is envisaged as a waste management complex equipped with appropriate infrastructure, treatment systems, and operational arrangements to ensure the safe, efficient, and environmentally responsible management of waste in accordance with applicable regulatory requirements.

3. Under Section 17 of Sindh Environmental Protection Agency Act, 2014, it is mandatory for the proponents of projects to execute the Initial Environmental Examination (IEE) and/ or Environmental Impact Assessment (EIA) and obtain the approval from SEPA. The Sindh EPA (Environmental Assessment) Regulations, 2021 provides screening categories of projects for which Environmental Checklists (EC) or IEE or EIA need to be conducted. The proposed WMF falls under the Category 'H(1)' "Facilities for handling, storage or disposal of hazardous or toxic wastes or radioactive waste (including landfill sites, incineration units, etc.)" of Schedule III. This category requires an EIA study to be conducted to initiate the process of environmental approval.

4. The EIA employed a stepwise methodology starting from scoping and baseline data collection to impact prediction and stakeholder consultations. Field surveys, sampling, laboratory analyses, and qualitative assessments were undertaken to determine potential impacts and formulate appropriate mitigation strategies. Consultations were held with local communities and officials from key government departments to capture and address concerns, ensuring inclusive stakeholder engagement.

5. The proposed project site was selected following a comprehensive analysis. This location presents optimal compatibility for the proposed project, demonstrating minimal ecological disruption, robust multi-modal transport connectivity, and alignment planning policies.

6. The Wastewater Management System for the Waste Management Facility (WMF) is engineered to optimize resource recovery, mitigate environmental degradation, and ensure strict compliance with the Sindh Environmental Quality Standards (SEQS). The primary water supply will be sourced from ground water.

7. Industrial wastewater generated from the wet scrubbing process will be managed within a

closed-loop system, undergoing appropriate retention, clarification, and continuous recirculation to minimize freshwater consumption. Domestic wastewater will be routed to an on-site sanitation system comprising a primary septic tank followed by a secondary soakage pit. The septic system's design capacity and hydraulic retention time (HRT) strictly adhere to World Health Organization (WHO) guidelines to prevent groundwater contamination. The sludge generated during treatment processes will be dewatered, securely stored on-site, and evacuated on a regular basis for final disposal at the designated Landfill Site.

8. The "No Project" alternative, although avoiding potential impacts associated with project development, was considered unsustainable due to the limited availability of appropriate waste management infrastructure within the region. The absence of adequate facilities may result in continued reliance on existing practices, including improper handling, and disposal of industrial, infectious, and other potentially hazardous waste streams, thereby increasing environmental and public health risks.

9. The baseline environmental assessment indicates that the proposed project site comprises open, vacant land, where no endangered or protected species were identified. The site is located in Seismic Zone 2A and is characterized by an arid climatic condition, with average temperatures during the hottest months reaching approximately 40°C. The ambient air quality and noise levels at the site were observed to be within the applicable permissible limits during the baseline assessment. The ecological assessment identified commonly occurring flora and fauna, including native vegetation, animals, reptiles, and avian species in the surrounding areas. No ecological sensitivities or critical habitats were identified within the proposed project area.

10. Socio-economically, the proposed project site is located in Bhave Jo Tar, Taluka Islamkot, District Tharparkar, Sindh, Pakistan. The surrounding area is predominantly barren and characterized by sparse vegetation, which is typical of the arid desert environment of Tharparkar. The population of Tharparkar is approximately 1.78 Million, as of the 2023 census. The area has limited health services and poor water availability. The surrounding villages are well connected through a public and private transportation services. The nearby communities are predominantly agrarian and belong mainly to the Sindhi and Thari communities. While there are no archaeological or culturally significant sites in the project area.

11. Environmental and social impacts during construction at WMF may include air pollution, noise pollution, soil contamination, and occupational health and safety risks, solid waste management. Mitigation measures proposed in the Environmental Management Plan (EMP) include controlled excavation, dust suppression, regulated noise levels, safe waste disposal, and the use of PPE. During the operational phase, potential environmental aspects associated with gaseous emissions, solid waste management, wastewater management include controlled emission discharge and dispersion, water recirculation, effluent treatment, and sludge handling. These aspects will be managed through appropriate pollution control measures, operational controls, and regular environmental monitoring, including ambient air quality

monitoring. Seasonal variations in wind speed and direction may influence the dispersion pattern of emissions; however, based on the air dispersion modelling assessment, the predicted impacts are expected to remain within acceptable limits. Relevant mitigation measures and environmental monitoring mechanisms have been incorporated into the project design and management plan to ensure effective control and management of potential environmental impacts, while maintaining compliance with applicable environmental standards and regulatory requirements.

12. Positively, the proposed project is expected to strengthen waste management infrastructure by providing an organized system for the collection, treatment and environmentally sound disposal of waste streams. The facility will contribute to improved waste handling practices, reduction in improper disposal, and minimization of associated environmental and public health risks. The project will also support enhanced compliance with applicable environmental regulations through the adoption of appropriate waste management technologies, operational controls, and monitoring mechanisms. Capacity-building and training programs will be implemented to promote safe waste handling practices among relevant personnel. An environmental management and monitoring framework, with defined roles and responsibilities for project management, implementation, and supervision entities, will ensure effective oversight and compliance throughout the project lifecycle.

13. In conclusion, while the proposed Waste Management Facility (WMF) may involve certain potential environmental and social impacts associated with the handling, treatment, and management of waste streams, these impacts are considered manageable through the implementation of appropriate mitigation measures, operational controls, and environmental monitoring mechanisms outlined in this EIA. With effective implementation of the proposed Environmental Management Plan (EMP), the project is expected to significantly improve waste management practices, reduce risks associated with improper waste disposal, enhance public health protection, and support environmentally sustainable development through a safe and regulated waste management system.

1. INTRODUCTION

1.1. Background

14. This document presents the Environmental Impact Assessment (EIA) Report for the proposed Waste Management Facility (WMF) being developed by Al-Khyber Construction (AKC). The proposed WMF includes the installation of two (02) incineration units, one with a treatment capacity of 500 kg/hour and the other with a treatment capacity of 100 kg/hour, providing a combined waste treatment capacity of approximately 600 kg/hour. The facility is intended to enhance the regional capacity for the safe, controlled, and environmentally sound treatment and disposal of industrial waste, infectious waste, and other risk waste streams. The proposed project is aimed at strengthening the waste management infrastructure in the province through the establishment of a dedicated WMF equipped with appropriate waste treatment systems, supporting infrastructure, and operational arrangements. Considering the limited availability of dedicated waste treatment and disposal facilities within the region, the proposed WMF is expected to improve waste management practices, promote proper handling and treatment of hazardous and infectious waste, minimize associated environmental and public health risks, reduce dependence on existing disposal infrastructure, and support compliance with applicable environmental laws, regulations, standards, and approval conditions.

15. The proposed project site is located at District Tharparkar, at the geographical coordinates 24.735669°N and 70.318131°E. A detailed description and location of the WMF project are provided in Chapter 3 of this report. The proposed land comprises an area of approximately ~1 acre for installation and operation of proposed incinerators.

16. The WMF is designed to ensure safe, efficient, and environmentally responsible waste management through controlled incineration processes, emission control systems, wastewater management measures, ash and residual waste handling arrangements, environmental monitoring programs, and operational management procedures. The project design and management framework incorporate appropriate environmental safeguards and mitigation measures to ensure that potential impacts are effectively managed throughout the project lifecycle in accordance with applicable regulatory requirements.

17. Industrialization and urbanization have intensified environmental health risks and pollution, especially in developing countries like Pakistan. The total amount of waste that is generated by the industries, commercial and health-care facilities is approximately 85% general, non-hazardous and the remaining 15% is considered as hazardous in its nature and type that may be infectious, toxic, carcinogen, flammable, corrosive, reactive, explosive or radioactive. The amount of solid waste is expected to substantially increase with rapid growth of population and economic activities. The quality of civic life is closely related and affected by sanitary conditions, where efficient collection of garbage is the key to a clean and healthy environment.

18. The garbage transfer stations conspicuously lack in the province, which need to be developed for better handling of the garbage and transfer to sanitary landfills. Poor planning,

inappropriate technology and poor management are obviously the main areas of concern needing serious efforts towards efficient management and modern technological development of this sector.

19. Solid waste management combines all activities performed to maintain the cleanliness on a regular basis and handles waste collection and disposal, sewerage, water treatment, recycling, health, and hygiene issues. With the ratio of solid waste, increasing amount of solid waste per day in the urban center, there is an immediate need to implement major steps to improve the current situation. A more consolidated strategy for solid waste management needs to be designed and implemented, which streamlines the processes of waste collection, disposal, and treatment.

20. The above-mentioned information demonstrates that there is a dire need to increase the number of well managed waste management, handling, transportation, and treatment facilities within the province, therefore in this regard AKC is looking forward for establishing a robust waste management facility by installation of two incineration plants which will be equipped with air pollution control system. The proposed incineration units would be installed for the treatment of medical as well as industrial waste.

1.2. Purpose and Objective of the EIA

21. The primary purpose of this EIA is to evaluate and predict the potential environmental and social impacts of the proposed WMF project in accordance with the applicable national and provincial environmental legislation[1]. Detailed descriptions of applicable environmental and social requirements for the EIA study have been provided in Chapter 2 of this report. The Specific objectives of the EIA include: -

- Identify the potential positive and negative impacts of the project on the environment and communities.
- Assess the significance and magnitude of these impacts across various environmental aspects, including air, water, land, noise, biodiversity, and socio-economic conditions.
- Propose feasible mitigation and management measures to avoid, minimize or offset adverse impacts.
- Ensure compliance with provincial environmental laws and regulations of Sindh.

1.3. Scope of the EIA

22. The scope of the EIA encompasses the following elements:

1.3.1. Environmental Baseline Study

[1] After the 18th constitutional amendments in 2010 in Pakistan, the environment has become the provincial subject and all provincial of Pakistan have formulated their own environmental laws, regulations, policies and rules.

23. A comprehensive baseline study has been conducted to document the current environmental and social conditions of the project area. This includes data collection on air quality, water quality, noise levels, biodiversity, soil, and socio-economic conditions. This baseline data serves as a reference point for assessing the potential impacts of the project.

1.3.2. Environmental Impact Identification

24. The EIA has identified potential environmental impacts of the project during construction and operation phases. These impacts have been assessed in relation to air pollution, water consumption, solid waste management, land use, noise pollution, and potential effects on the local community.

1.3.3. Mitigation and Management Measures

25. Based on the identified impacts, appropriate mitigation and management strategies have been developed to minimize adverse environmental effects of the proposed WMF project. This includes recommendations on technology, operational practices, and management plans aimed at reducing pollution, conserving natural resources, and protecting public health.

1.3.4. Monitoring and Compliance

26. A monitoring plan has been devised to ensure that the mitigation measures are implemented effectively and that the environmental performance of the project is tracked throughout its lifecycle. This includes periodic reporting and assessments to verify compliance with local environmental regulations.

1.3.5. Stakeholder Consultation and Public Participation

27. An integral part of the EIA process involves engaging stakeholders, including local communities and government agencies, to understand their concerns, expectations, and feedback regarding the project. Stakeholder consultations and meetings were organized to ensure transparency and accountability.

1.4. Approach and Methodology

28. The EIA for proposed WMF project followed a systematic approach and methodology based on the guidelines and standards set by the Sindh Environmental Protection Agency (SEPA). Figure 1-1 below provides a flow chart of key steps and activities performed for conducting EIA studies.

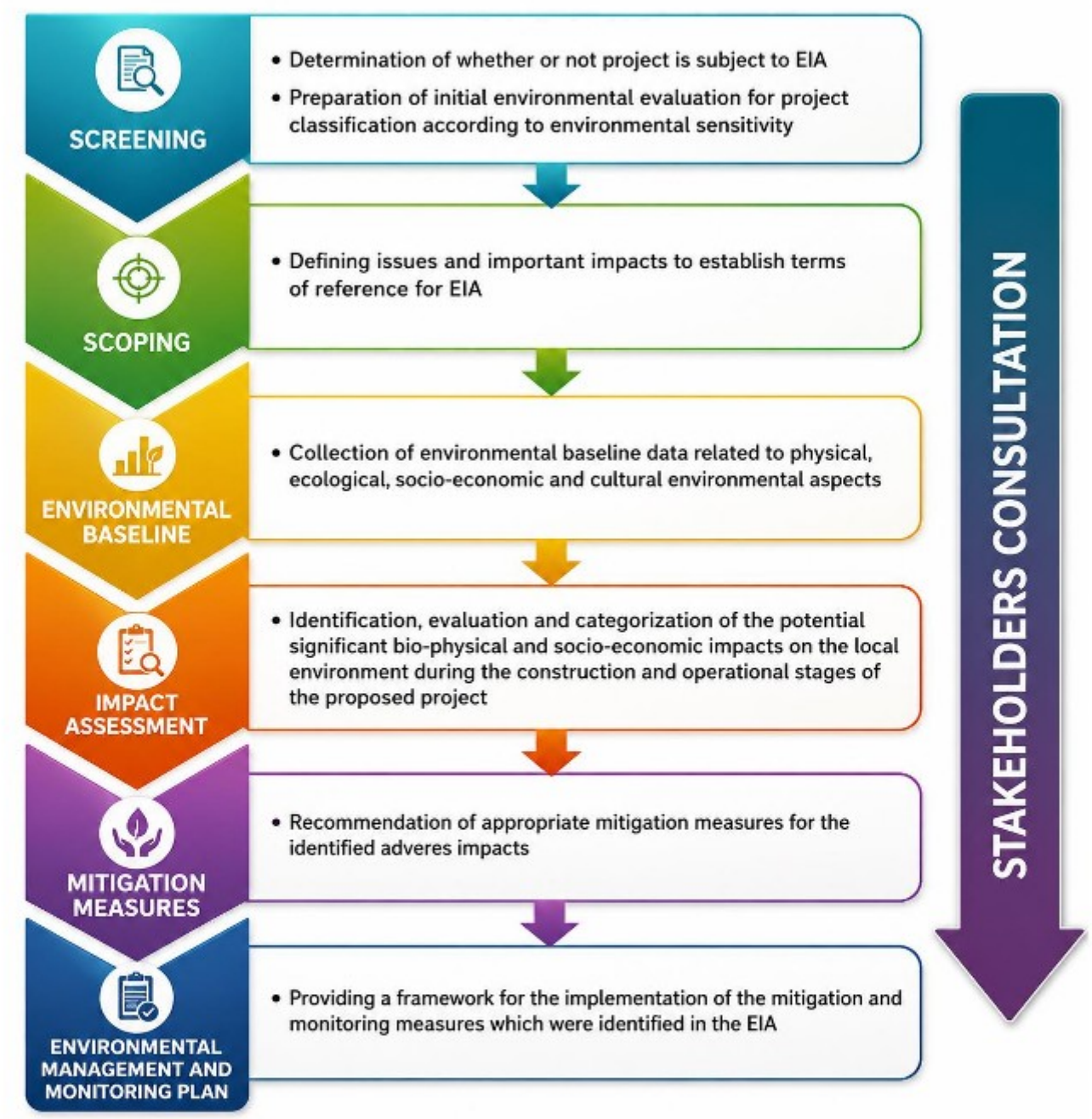


Figure 1-1: Flow Chart of EIA Activities in Pakistan Including Sindh Province

29. Sindh Environmental Protection Agency (Environmental Assessment) Regulation, 2021[2] provides screening categories of projects for which EC or IEE or EIA need to be conducted. The proposed WMF falls under the Category 'H (1)' "Facilities for handling,

[2] Sindh Environmental Protection Agency (SEPA) Regulations 2021 are part of the broader environmental framework in Pakistan, aimed at ensuring the protection and conservation of the environment within the Sindh. The Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021 set out the processes and requirements for conducting Environmental Assessments (EIA/IEE) in Sindh province.

storage or disposal of hazardous or toxic wastes or radioactive waste (including landfill sites, incineration units, etc.)". This category requires an EIA study to be conducted to initiate the process of environmental approval.

30. The methodology adopted for this EIA includes the following steps. However, the detailed methodology for each of the following steps has been provided under the respective sections of this EIA report.

1.4.1. Scoping

31. The EIA process began with a scoping phase to identify the key environmental issues that need to be addressed, based on the project's scope, the location, and relevant legal and regulatory frameworks. This phase included consultations with stakeholders to gather input on significant environmental concerns.

1.4.2. Data Collection and Baseline Analysis

32. An extensive data collection process was undertaken to gather baseline environmental data for the project site and surrounding areas. This involved site visits, surveys, and interviews / meetings with stakeholders, including local stakeholders and local authorities. Secondary data was collected from environmental reports and existing studies.

1.4.3. Stakeholder Engagement

33. Stakeholder consultations were conducted at various stages of the EIA process to ensure that the concerns and views of local communities and other stakeholders are incorporated. This included meetings with local stakeholders and government agencies to discuss the project's environmental impacts and proposed mitigation measures.

1.4.4. Impact Assessment and Prediction

34. Using the baseline data and project design, the potential environmental impacts of the project were identified and predicted. The impacts were assessed using qualitative and quantitative methods, including expert assessment, and field surveys.

1.4.5. Mitigation and Management Planning

35. For each identified impact, appropriate mitigation measures are proposed to avoid or minimize negative effects. These measures are incorporated into the project's construction and operational phases. The mitigation strategies are prioritized based on the severity of the impact and the feasibility of implementation.

1.4.6. Reporting

36. The EIA findings have been documented in a detailed report that includes an executive summary, introduction, environmental legislation and description of the project, analysis of alternative, the environmental baseline, summary of stakeholder feedback, identified impacts, mitigation measures, and monitoring plans. The report will be submitted to SEPA as required for review and approval.

1.5. EIA Report Structure

37. The EIA report is structured as follows:

- **Chapter 1: Introduction** - Overview of the project, purpose, and scope of the EIA, introduction to project proponent and consultant and study team.
- **Chapter 2**: **Policy, Legal and Administrative Framework** - Brief summary of national and provincial Policies/Strategies. Acts/Legislations concerning EIA study of the proposed project.
- **Chapter 3: Project Description** - Detailed description of the WMF project, including its location, design, components and alternate analysis.
- **Chapter 4: Analysis of Alternatives** - Preferred options for achieving project objectives by ensuring that best possible solution.
- **Chapter 5: Environmental and Social Baseline** - Baseline data on environmental and social conditions in the project area.
- **Chapter 6: Stakeholder Consultation** - Summary of consultations and feedback from stakeholders.
- **Chapter 7: Environmental Impacts and Mitigation Measures** - Assessment of potential environmental impacts of the project and Proposed mitigation strategies to reduce negative impacts.
- **Chapter 8: Environmental Management Monitoring Plant (EMMP) and Compliance -** Mechanism to be adopted for the implementation of measures and monitoring the plan to ensure ongoing compliance with environmental standards.
- **Chapter 9: Conclusion** - Summary of the EIA findings and recommendations.

1.6. Project Proponent

38. Al-Khyber Construction (AKC) is the Project Proponent for the proposed Waste Management Facility. The company is duly incorporated and registered with the relevant regulatory authorities.

39. AKC is engaged in resource recovery, waste management, and waste-to-value initiatives, with a commitment to promoting environmentally sustainable practices. The company's operational philosophy is guided by the principles of the **3Rs (Reduce, Reuse, and Recycle)**, aimed at minimizing waste generation, maximizing resource efficiency, and supporting the transition towards a circular economy.

40. The management and technical team of AKC comprise experienced professionals with extensive expertise in waste management, resource recovery, environmental compliance, and related infrastructure projects.

41. AKC places strong emphasis on business integrity, environmental stewardship, occupational health and safety, legal compliance, and customer satisfaction. In recognition of its responsibilities towards employees, surrounding communities, and the environment,

the company has planned to establish a dedicated Health, Safety and Environment (HSE) Policy and an Emergency Preparedness and Response Plan (EPRP). These management systems are designed to ensure the safe and environmentally responsible operation of project activities and shall be implemented across all levels of the organization.

Contact Details

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    Cell No: + 92 305 3467933

1.7. EIA Consultant

43. The Environmental Impact Assessment (EIA) for the proposed Waste Management Facility (WMF) has been undertaken by ACEA International Private Limited (ACEA). ACEA is a multidisciplinary consulting organization comprising qualified and experienced professionals in the fields of environmental management, occupational health and safety, social development, climate resilience, sustainability, air quality management, water and wastewater management, and related disciplines.

44. ACEA provides professional consulting services in the areas of environment, health, safety, and sustainability, supporting public and private sector organizations in meeting applicable regulatory requirements and international good practices. The firm possesses the technical capability and professional expertise required to undertake environmental and social assessment studies for a wide range of development projects.

45. The ACEA team includes specialists with experience in conducting environmental and social impact assessments, environmental monitoring and evaluation, pollution and public health studies, community-based assessment programs, hazard identification and risk assessment, environmental audits, environmental management systems, occupational health and safety evaluations, and other related technical studies. The multidisciplinary expertise of the team enables the delivery of comprehensive and scientifically sound assessments in accordance with applicable environmental regulations and recognized professional standards.

Contact Details

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1.8. Study Team

47. For this EIA study, the ACEA has deployed a team of highly experienced professionals belonging to multisectoral areas including air, wastewater, solid waste, socio-economic, health and safety etc. **Table 1-1** provides the name of team members and their designations in this EIA study.

Table 1-1: Study Team for EIA of Waste Management Facility

No.	Name	Designation for EIA
1	Engr. Iftikhar Hussain	Sr. Environmental Engineer/ Team Lead
2	Faisal Khan	Sr. Environmentalist
3	Engr. Babar Imtiaz	Sr. Environmental Engineer
4	Khalid Hussain	Sr. Environmentalist / Solid Waste Expert
5	Dr. M. Mansha	Air Quality Expert
6	Muhammad Ghufran	Sr. Environmentalist
7	Vijay Kumar	Sr. Social Safeguard Specialist
8	Omer Yousufzai	Sr. Environmentalist
9	Adnan Khan	Project Manager

2. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1. Background Information

48. The first cover to the environmental safeguards within the country was under the Pakistan Environmental Protection Ordinance (EPO), 1983. It was the first commitment at the state level to ensure environmental conservation and safeguards in developmental pursuits. EPO focused primarily on industrial operations and unspecified other environmental aspects. The perceived technical lacunas were resolved when Pakistan Environmental Protection Act (PEPA), 1997 was enacted which was ambitious to incorporate preventive and curative measure for the promotion of sustainable development in the country (GoP, 1997).

49. Before the 18th Amendment in the constitution of Pakistan, Environmental Protection Act empowered Pakistan Environmental Protection Agency to implement all the relevant environmental legislation across all the provinces of Pakistan. However, after the 18th amendment the environmental portfolio devolved to provincial governments. Consequently, the Sindh Environmental Protection Agency (SEPA) was empowered to formulate environmental legislation, rules, regulations and standards and their enforcement/implement in the whole Sindh province as a formulating, regulatory and monitoring agency. However, it is important to note that, the enactment of comprehensive legislation on the environment, covering multiple areas of concern, is a relatively an ongoing and continuous phenomenon in a developing country like Pakistan.

2.2. Environmental Legislation Framework

2.2.1. Pakistan Environmental Protection Ordinance, 1983 (PEPO, 83)

50. Pakistan Environmental Protection Ordinance, 1983 (PEPO), 83 was the first specialized environment law promulgated through an ordinance. Under section 8 of the PEPO, 83 it was required to get environmental approval. However, practically this law was never implemented due to lacunas in it. Environmental Protection Agencies were not established at that time and there was no judicial mechanism for implementation and execution of this law. No rules were framed and thus for practical purposes this law was never implemented. However, with this introductory law Environment Protection Agencies were established in late 80s of last century and later on in 1994 National Environmental Quality Standards (NEQS) were notified.

2.2.2. Pakistan Environmental Protection Act, 1997 (PEPA, 97)

51. After passed by the Majlis-e-Shoora (Parliament), Pakistan Environmental Protection Act, 1997 (PEPA), 97 received the assent of the Acting President on the 3rd December, 1997. The law provides for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution, promotion of sustainable development, and for matters connected therewith and incidental thereto.

52. Requirement of Section 12 of PEPA, 1997 is reproduced below.

> *"12. Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA). (1) No person of a project shall commence construction or operation unless he has filed with the federal Agency an EIA or IEE, where the project is likely to cause an adverse environmental effect an environmental impact assessment and has obtained from the Federal Agency approval in respect thereof."*

2.2.3. Sindh Environmental Protection Act, 2014

53. After the 18th amendment all provinces adapted or enacted their own Environmental Protection Laws in the relevant province. The Sindh Environmental Protection Act was notified by the Provincial Assembly of Sindh via notification #PAS/Legis-B-06/2014 dated March 20, 2014. The Act extends to whole of the province of Sindh. The Sindh Environmental Protection Act, 2014) like PEPA, 1997 provides for the protection, conservation, rehabilitation and improvement of the environment. This Act, consisting of 37 sections divided into eleven Parts, establishes composition, duties and responsibilities of the Sindh Environmental Protection Council, entitled to: co-ordinate and supervise the enforcement of all the provisions relating to the environment in the Province; approve comprehensive provincial environmental and sustainable development policies and ensure their implementation within the framework of a conservation strategy and sustainable development plan; approve the Sindh Environmental Quality Standards (SEQS); provide guidelines for the protection and conservation of species, habitats, and biodiversity and for the conservation of renewable and non-renewable resources; integrate principles and concerns of sustainable development into socio-economic and development policies, plans and programs at the provincial, district and local levels; deal with inter-provincial and federal-provincial issues; provide guidelines for biosafety and for the use of genetically modified organisms; etc.

54. It creates SEPA entitled to administer and implement the provisions of this Act and the rules and regulations regarding environmental issues. The Sindh Sustainable Development Fund shall be managed by a Board known as the Provincial Sustainable Development Fund Board. The Act specifies that no person shall discharge waste, pollutant, emit noise or any other matter that may cause or likely to cause pollution or adverse environmental effects (as defined in section 2) in levels higher than specified in SEQS. No person shall import hazardous waste into Sindh province or its coastal, internal, territorial or historical waters, except prior approval of the Agency. Part VI deals with Environmental Examinations and Assessments and specifies that all provincial authorities, local councils and local authorities responsible for formulating policies, legislation, plans and programs to be implemented in Sindh province which may cause any environmental impact in the jurisdiction of the province shall forward to SEPA a strategic environment assessment. SEPA Act, 2014 is attached as ANNEXURE I for ready reference and further guidance.

2.2.4. Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021

55. Under these regulations the projects are categorized requiring IEE or EIA at the planning stage to be approved by SEPA. The categories are defined in the Sindh Environmental Protection Agency (SEPA). According to the Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021 the proposed project falls under the Schedule III. SEPA (Environmental Assessment) Regulations 2021 is attached as ANNEXURE II for ready reference and further guidance.

- Category-H(I) "Facilities for handling, storage or disposal of hazardous or toxic wastes or radioactive wastes (including landfill sites, incineration units, etc.)"

2.2.5. Sindh Environmental Quality Standards (SEQS)

56. Environmental quality standards play a crucial role in regulating industrial activities, waste disposal, and other human interventions that may impact the environment. Compliance with these standards is essential to prevent and mitigate adverse environmental effects, ensuring sustainable development and the well-being of the population.

57. In exercise of the powers conferred by section 37 of the Sindh Environmental Protection Act, 2014, SEPA, with the approval of the Government, have notified Sindh Environmental Quality Standard, 2016 which specifies standards for industrial and municipal effluents, gaseous emissions, vehicular emissions, and noise levels. These standards would be applicable to all industrial units located inside the WMF individually as well as to the whole industrial city. Sindh Environmental Protection Agency, with the approval of the Sindh Environmental Protection Council, has established following standards.

- SEQS for Municipal and Industrial Effluent
- SEQS for Industrial Gaseous Emissions and Motor Vehicle Exhaust
- SEQS for Ambient Air Quality and Ambient Noise

58. The WMF will have various types of industries described in the relevant section and thus would emit emission and discharge effluents which will require to be in compliance with SEQS. Copy of SEQS is attached as ANNEXURE III.

2.2.6. The Sindh Environmental Quality Standards (Self-Monitoring and Reporting by Industry) Rules, 2014

59. These rules are called the Sindh Environmental Quality Standards (Self-Monitoring and Reporting by Industry) Rules, 2014. Priority parameters are parameters of Sindh environmental quality standards which are selected for the purpose of submission of Environmental Monitoring Reports to the Agency by an industrial unit. On the basis of the pollution level of an industrial unit, these rules classify the unit into category "A", "B" or "C"

for liquid effluents, and category "A" or "B" for gaseous emissions.

Category "A" Industrial unit

60. An industrial unit in category "A" shall submit environmental monitoring reports on monthly basis. An industrial unit in category "A" shall maintain a record of the times during which start- up and upset conditions occur and shall mention the total time elapsed in such conditions in its monthly environmental monitoring report.

Category "B" Industrial unit

61. An industrial unit in category "B" shall submit environmental monitoring reports on quarterly basis.

Category "C" Industrial unit

62. An industrial unit in category "C" shall submit environmental monitoring reports on biannual basis for priority parameters in respect of liquid effluents.

2.2.7. Sindh Hazardous Substance Rules, 2014

63. The Sindh Hazardous Substances Rules, 2014 are a set of rules derived from the Sindh Environmental Act, 2014 and are first of the very specific hazardous substances regulations brought into force in 2014 after the initial draft set of rules devised in 2003. They represent specific regulations with aspect of handling, storage and disposal of hazardous substances and issuing an approving license to the user or facility. The Schedule-I of the Rules enlists the hazardous substances that are under the scrutiny of SEPA. Copy of Sindh HSR is attached as ANNEXURE IV.

64. Under its licensing terms, the Rules highlight particular components as follows:

- Employment of Qualified technical personnel
- Packing and labeling
- Conditions of Premises
- Safety precautions
- Trainings
- A comprehensive safety plan
- Waste management Plan and
- Transporting of hazardous substances

2.2.8. Sindh Hospital Waste Management Rules, 2014

65. Sindh Hospital Waste Management Rules, 2014 promulgated under SEPA 2014 were enforced in December, 2014. Under these Rules, every hospital owner, occupier, operator

shall be responsible for the management of the hospital waste generated by it till its final disposal in accordance with the provision of the Act and these rules. Copy of Sindh HWMR is attached as ANNEXURE V.

2.3. National and Provincial Environmental Policies and Guidelines

66. Environmental Policies and Guidelines relevant to the proposed project were also reviewed for this EIA study and a brief history of the national policies and guidelines are given below.

2.3.1. National Conservation Strategy (NCS)

67. The National Conservation Strategy (NCS) is the primary and earliest Policy document of the Government of Pakistan on national environmental issues. The Policy was approved by the Federal Cabinet in March 1992. The Strategy also attained recognition by international donor agencies, principally the World Bank. The NCS identifies 14 core areas including conservation of biodiversity, pollution prevention and abatement, soil and water conservation and preservation of cultural heritage and recommends immediate attention to these core areas in order to preserve the country's environment. A midterm review of the achievements of the NCS in 2000 concluded that achievements under the NCS have been primarily awareness raising and institutional building rather than actual improvement to environment and natural resources and that the NCS was not designed and is not adequately focused as a national sustainable development strategy3. The need therefore arose for a more focused National Environmental Action Plan (NEAP) required to bring about actual improvements in the state of the national environment with greater emphasis on poverty reduction and economic development in addition to environmental sustainability.

68. The NEAP was approved by the Pakistan Environmental Protection Council under the chairmanship of the President/Chief Executive of Pakistan in February 2001. NEAP now constitutes the national environmental agenda and its core objective is to initiate actions that safeguard public health, promote sustainable livelihoods, and enhance the quality of life of the people of Pakistan. A National Environmental Policy has been approved by the Federal Cabinet in its meeting held during June 2005[4]. This policy has already been endorsed by the Pakistan Environmental Protection Council during 2004. The new policy has total 171 guidelines on sectoral and cross-sectoral issues. The objectives of new policy include assurance of sustainable development and safeguard of the natural wealth of country. The following are the approved Sectoral Guidelines:

- Water Supply and Management;
- Air Quality and Noise;

[3] Arthur J. Hanson et al, Pakistan's National Conservation Strategy Renewing Commitment to Action, Report of the Mid-Term Review, 2000

[4] National Environmental Policy, GoP, 2005

- Waste Management;
- Forestry;
- Biodiversity and Protected Areas;
- Climate Change and Ozone Depletion;
- Energy Efficiency and Renewable;
- Agriculture and Livestock; and
- Multilateral Environmental Agreements.

2.3.2. National Environmental Policy, 2005

69. National Environmental Policy aims to protect, conserve and restore Pakistan's environment in order to improve the quality of life of the citizens through sustainable development. The objectives of the policy are:

- Conservation, restoration and efficient management of environmental resources.
- Integration of environmental considerations in policy making and planning process.
- Capacity building of government agencies and other stockholders at all level for better environmental management.
- Meeting international obligations effectively in line with the national aspirations.
- Creation of a demand for environment through mass awareness and community mobilization[5].

2.3.3. National Climate Change Policy, 2011

70. The National Climate Change Policy (NCCP) of Pakistan offers a comprehensive framework to guide the country toward climate-resilient and low-carbon development. Updated in 2021, the policy emphasizes mainstreaming climate considerations into all major sectors, promoting both adaptation to climate impacts and mitigation of greenhouse gas emissions. Key objectives include ensuring water, food, and energy security, reducing disaster risks, enhancing policy coordination, and mobilizing climate finance. The policy targets specific areas such as water resources, agriculture, forestry, coastal zones, and urban planning, while also promoting gender equality, public awareness, and technological innovation. Notably, the updated NCCP commits to a 15% reduction in emissions and aims to achieve a 60% share of renewables in the energy mix by 2030.

2.3.4. Sindh Drinking Water Policy, 2017

71. The Public Health Engineer and Rural Health Development Department, Government of

[5] National Environmental Policy, 2005.

Sindh with the approval of Chief Minister Sindh issued Drinking Water Policy in 2017. The main principles of Sindh Drinking Water Policy have been adopted from National Water Policy, 2009. The goal of Sindh Drinking Water Policy, 2017 is to improve the quality of life of people of Sindh by reducing morbidity and mortality caused by waterborne diseases through provision of safely managed and potable drinking water to the entire population that is located in premises available when needed and free from contamination, affordable and sufficient quantity and in a way that is equitable and sustainable.

2.3.5. Pakistan Climate Change Act (PCCA), 2017

72. To meet Pakistan's obligation under international conventions relating to climate change and address the effect of climate change, the Pakistan Climate Change Act was promulgated on 31 March 2017. Under section 3 of the law, there is a provision for the establishment of the Pakistan Climate Change Council (PCCC) to be headed by Prime Minister or his/her nominee having around 53 members. The main function of the PCCC is to coordinate, supervise, and enforce the provision of this Act. It has to monitor implementation of international agreement and mainstream climate change concerns into decision making.

73. For operating the Pakistan Climate Change Act, 2017, there is a provision for the establishment of the Pakistan Climate Change Authority (PCCA) with a chairman and four members (Member, Mitigation, Member adaptation, Member, climate Finance and Member coordination) along with supportive staff. In sections 5-11 the powers and function of the PCCA are given in the law while there also is a provision for the establishment of the Pakistan Climate Change fund (section 12 &13).

2.4. International Protocols & Conventions

74. As Pakistan is a member of a number of international organizations such as United Nations Organization (UNO), Organization of the Islamic Cooperation (OIC), South Asian Association for Regional Cooperation (SAARC), Economic Cooperation Organization (ECO) etc., so it has to follow the international protocols and obligations related to the environment. The following international protocols and conventions are listed below.

    i. United Nations Framework Convention on Climate Change, "The Rio Declaration" 1992.

    ii. UNFCCC, Kyoto Protocol, 1997.

    iii. The Paris Agreement, 2016.

    iv. UNESCO Convention on the Protection of the World's Cultural and Natural Heritage, 1972.

    v. Convention on Biological Diversity, 1994

    vi. The Basel Convention, 1989.

    vii. Stockholm Convention on Persistent Organic Pollutants (POPs), 2004.

viii. International Union for Conservation of Nature and Natural Resources Red List, 2000.

ix. Sustainable Development Goals (SDGs), 2015.

x. Convention on the International Trade of Endangered Species (CITES), 1975.

xi. Convention on Conservation of Migratory Species of Wild Animals, 1979.

2.5. Other Cross-sectoral Laws in Sindh

75. The term "environment" encompasses both physical and biological factors and includes the air, water, soil, climate, flora, fauna, and various other elements that collectively create the ecological system in a specific area. The environment also encompasses the interactions and relationships between living organisms and their surroundings. The concept of the environment extends beyond immediate physical space and incorporates the complex web of interconnected ecosystems and habitats on a global scale.

76. Understanding and protecting the environment are crucial for promoting sustainable development and ensuring the well-being of all living organisms. As such, apart from Sindh Environment Protection Act in general other special laws related to forests, water resources, wildlife, land, agriculture, health and planning are also applicable while preparing the EIA report of a development project. The following laws are relevant to this project and are discussed briefly:

i. **Land Acquisition Act 1894:** Land Acquisition Act, 1894, empowers the government to acquire private land for a project of national importance and lays down the acquisition procedure. Compensation is paid to the owners as per the principles laid down in the law. However, in the current project, the land is the property of the proponent, which is located in PO Islamkot, Bhave Jo Tar, Islamkot.

ii. **The Sindh Forest (Amendment) Act, 2012:** Regulates Forest resources in the province. Categorize the forest area such as reserve, guzara and protected forests. It empowers the government to declare any forest area reserved or protected and implement the relevant rules and regulation in such forests. The proposed project land is neither protected nor reserved forest. This act is not relevant as far as the WMF project is concerned.

iii. **The Sindh Wildlife Protection Ordinance 1972 (Amendment 2001, 2010) Act, 2007, 2020:** The law empowers the provincial wildlife department to establish game reserves, parks, and wildlife sanctuaries. It regulates the hunting and disturbance of wildlife. It provides for the preservation, protection, and conservation of wildlife by the formation and management of protected areas and the prohibition of hunting of wildlife species declared protected under the ordinance. The ordinance also specifies three broad classifications of the protected areas which are National Parks, Wildlife Sanctuaries and Game Reserves. No protected area, game reserve is located in the surroundings of the project which can be affected by the project activities during construction and/ or operation.

iv. **The Sindh Occupational Safety and Health Act, 2017:** While environmental laws and standards mainly focus on the impacts of the project on the surrounding environment (air, water, soil, socioeconomics), the health and safety laws primarily focus on the inside environment of the project to be suitable and safe for the staff and workers. The Sindh Occupational Safety and Health Act, 2017 provides for the health, safety and welfare of workers, disposal of solid wastes and effluents, and damage to private and public property, compulsory vaccination, inoculation, and Precautions against contagious or infectious diseases at workplaces. The project management will chalk out a standard health and safety policy and shall implement the same in accordance with the provision of law.

v. **Sindh Cultural Heritage (Preservation) Act – 1994:** Preservation of culture heritage is an important role in the development of society and understanding of the past culture of the civilizations. Sindh Cultural Heritage (Preservation) Act – 1994 provides rules and regulations to preserve and protect ancient places and objects of agricultural, historical, ethnological, archaeological, artistic, and national interest in the province of Sindh. Nothing is expected to be damaged of culture and heritage importance due to execution of the Proposed WMF project. However, during the excavation if anything of such nature was found, the same will be preserved according to the provision of the law.

vi. **The Antiquities Act 1975:** Preservation and protection of antiquities (any object more than 75 years old) is mandatory under the Antiquities Act, 1975. The law also empowers the government to declare any antiquity as protected. There is hardly any chance of finding such material in the proposed project area, however, if during digging for the infrastructures any such material was found the same shall be brought in the notice of relevant department of the Government for further action.

vii. **Employment of Child Act, 1991**: Child labor is prohibited through the world and likewise it is in Pakistan. In Pakistan, the Employment of Child Act (ECA) 1991 disallows child labor in the country. It states that no child shall be employed or permitted to work in any of the occupations outlined in the ECA (such as transport sector, railways, construction, industrial operation and any other jobs of similar nature) or in any workshop wherein any of the processes defined in the Act is carried out. The project proponent is bound by this Act to disallow any child labor at the project site. All these regulations will be applied to the project's construction & operation phases.

3. PROJECT DESCRIPTION

3.1. Background Information

77. This section of the EIA report presents a detailed project description which is mainly related to the construction, commissioning, and operational phases of the proposed project. A detailed insight regarding the project description was established by reconnaissance survey, site visits, and discussions between technical team of project proponent and the consultant. The cumulative waste treatment capacity of the proposed Incinerator-I and Incinerator-II would be approximately 600 kg/hr. Incinerator-I would be capable of treating around 500 Kilograms (KG) of waste per hour and Incinerator-II would be capable of treating around 100 Kilograms (KG) of waste per hour. The proposed incinerators are designed for the incineration of medical as well as industrial waste in an environmentally sound manner with proper and effective air pollution control system. The project will cover a land area of ~01 acre. Which will include the following components: (02) incinerators, guard room, labor rooms, office room, stores, fuel tank, scrubber water tank, wastewater tank and green belt. The incineration units will essentially include built in air pollution control system (wet scrubber), combustion chamber, control panel, feeding system, hydraulic ramp, ash removal system, induced auxiliary fan and temperature control system etc. The layout plan of the proposed facility is provided in Figure 3-1.

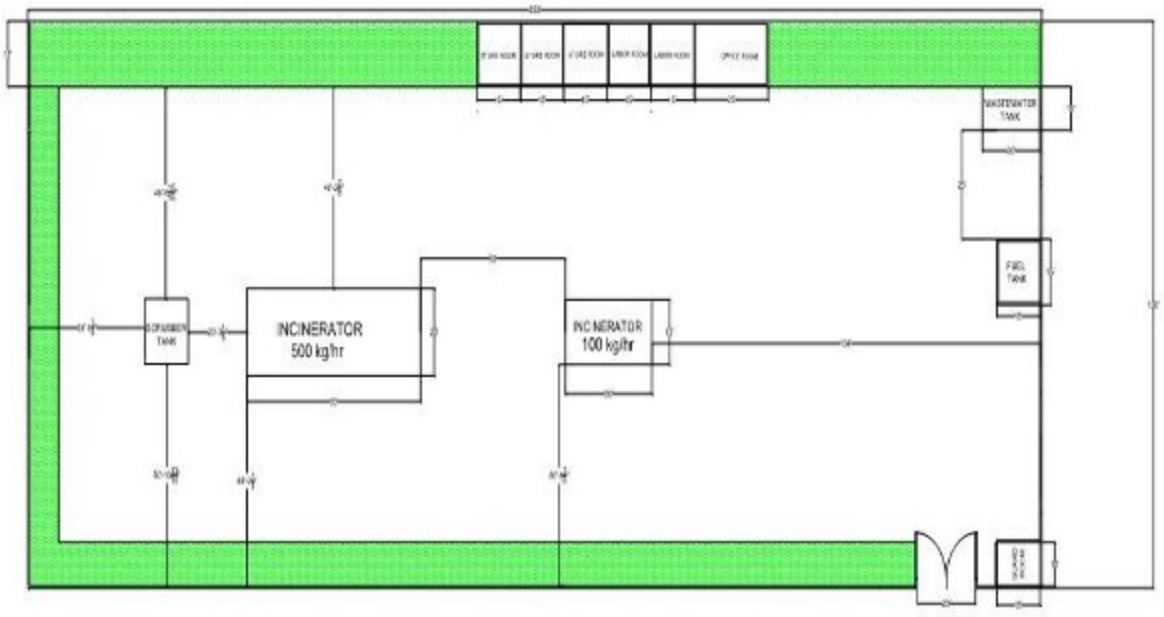


Figure 3-1: Layout Plan of the Proposed Facility

3.2. Project Location and Land Selection Criteria

78. The proposed project site is located at Bhave Jo Tar, Taluka Islamakot, District Tharparkar, at the geographical coordinates 24.735669°N and 70.318131°E. The location map of project site is provided in Figure 3-2.

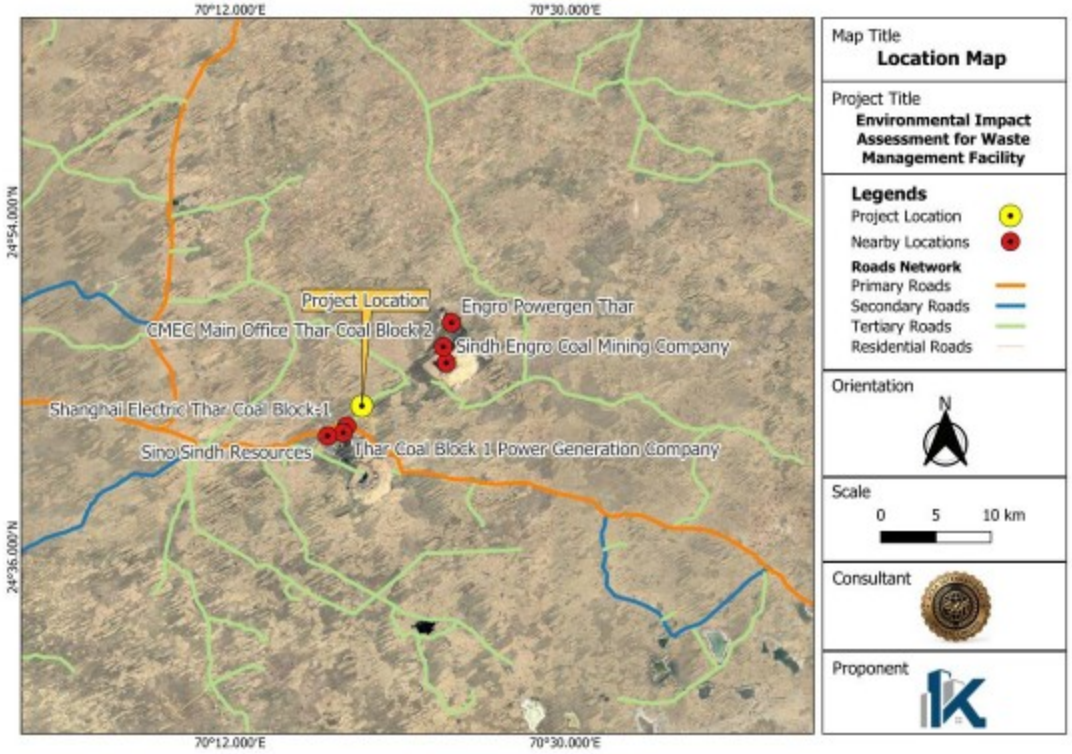


Figure 3-2: Location Map of the Project Site

3.2.1. Benefits of the Selected Site

79. The selected site offers several logistical and operational advantages for the proposed WMF:

Excellent Connectivity:

- Located only 0.37 km from the Nagarparkar Road, ensuring convenient access for the transportation of waste to the plant.

Reduced Environmental Sensitivity:

- The absence of dense vegetation, permanent habitats, or sensitive ecosystems minimizes the environmental footprint of development.
- No significant land use conflicts or displacement of existing communities, reducing the likelihood of social opposition or land acquisition disputes.

3.3. Project Accessibility

80. The site is strategically positioned and well-connected to significant thoroughfare to the Nagarparkar Road. It is located 0.37 km from the Nagarparkar Road.

3.4. Project Significance

81. Industrial and healthcare facilities generate various types of hazardous and potentially infectious waste that require proper and controlled treatment and disposal to prevent risks to human health and the environment. Such waste requires appropriate segregation, handling, storage, transportation, treatment and final disposal. Inadequate management or improper disposal of hazardous and medical waste can result in environmental contamination and significant health risks with workers, waste handlers and surrounding communities being particularly susceptible to exposure. Contact with hazardous or biomedical waste, whether through direct physical contact, inhalation, ingestion or other exposure pathways, may result in infectious diseases, acute health effects and in some cases, serious chronic health implications.

82. The proposed project will provide a facility to dispose both hazardous and non-hazardous waste of industries as well as the facility will also facilitate effective incineration of medical waste. Additionally, it is important to note that Industrialization and urbanization have intensified environmental health risks and pollution, especially in developing countries like Pakistan. It has been observed that Environmental sanitation is the subject of least priority in developing countries where appreciable amount of hazardous waste is produced, and disposed at open dumping sites without any treatment which often results in air pollution, bad sanitation and unhygienic conditions. The population is expanding day by day and with the increase in population environmental stress is inflated within the province. Among all the relevant environmental issues solid waste management is one of the prominent ones. In addition, field investigations and surveys during this EIA study revealed that there were no engineered landfill sites (both hazardous and non-hazardous) in the province; however, the available sites referred to as “Landfill Sites” are merely open dumping sites. Looking at the increasing amount of solid waste generation in 2014 Sindh Assembly passed Sindh Solid Waste Management Act, 2014 under the umbrella of which, Sindh Solid Waste Management Board (SSWMB) proposed scientific improvement of the landfill sites at Gond Pass and Jam Chakro which at present are the main dumping sites in Karachi. However, at present due to limited capacity of the management authorities, a bulk of residential, industrial, and medical waste at time is left unattended contributing to harmful diseases and infections. In addition, to study the need of incinerators installation at proposed site the present situation of medical and industrial waste management/treatment were thoroughly reviewed and studied. It has been observed that the hazardous as well as medical waste management system is under capacity, therefore there are significant leakages in the waste treatment system of the city. It has been observed that due to mishandling of hazardous waste somehow or other; many consumables like used syringes, urinary bags, blood bags, glass slides, vials, I.V drips bags, and etc. are

often reused in the markets.

83. As per World Health Organization (WHO) Key Fact Sheet, which was updated in October 2024; following facts and figures were taken into consideration while reviewing the significance of the proposed project:

- The total amount of waste generated by health-care activities can be categorized as follows; ~ 85% is general and non-hazardous waste and the remaining 15% is considered as hazardous one that may be infectious, toxic, carcinogen, flammable, corrosive, reactive, explosive or radioactive.[6]
- The disposal of untreated health care waste in landfills can lead to the contamination of drinking, surface, and ground waters if those landfills are not properly constructed.
- Worldwide, an estimated 16 billion injections are administered every year. Not all needles and syringes are disposed of safely, creating a risk of injury and infection and opportunities for reuse.
- Additional hazards occur from scavenging at waste disposal sites and during the handling and manual sorting of hazardous waste from health-care facilities.
- These practices are common in many regions of the world, especially in low- and middle-income countries.
- The waste handlers are at immediate risk of needle-stick injuries and exposure to toxic or infectious materials.
- Health-care waste contains potentially harmful microorganisms, viruses, bacteria which can infect hospital patients, health workers and the public in general if left unattended and disposed of at open dumping sites directly without any treatment.

3.5. Guidelines Regarding Hazardous Waste Management

84. International Finance Corporation (IFC) has issued general/hazardous waste guidelines under the General EHS guidelines. These guidelines must be applicable to all the projects that, in any phase, generate, store, transport and handle the waste.

85. Hazardous waste must always be handled separately from the non-hazardous waste. The key response is to prevent generation. However, after it is generated, it demands management for the safety of the environment and human health.

- Hazardous waste must be stored in such a way that its contact with other waste is minimal to zero, with proper ventilation and a cool environment.
- Any leaks or spills to be monitored and inspected.

[6] https://www.who.int/news-room/fact-sheets/detail/health-care-waste

- Facilities that are to generate hazardous waste must have permits and approvals of applicable government authorities.
- Ensure regular visual inspection, proper labeling and categorization of the waste.
- Ensure regular audits of waste segregation and collection.
- Ensure regular monitoring of groundwater quality in cases of hazardous waste on site storage and pretreatment/disposal.
- Maintain monitoring records for hazardous waste collected, stored, or shipped should include identification number/name, physical state, quantity, date of storing and packing, repacking and treatment, shipment tracking, dispatching date, receiving date.

86. Lack of awareness about handling the waste and hazards related to health-care waste, inadequate training in proper waste management, absence of waste management and disposal systems, insufficient financial and human resources and the low priority given to the topic are the most common problems connected with health-care waste. The proposed WMF is likely to reduce risk of public health and environmental degradation associated with health care waste likely to generate commercially in the future. High tech incinerators will significantly reduce the chances of ambient air pollution within the project surrounding and therefore this state-of-the-art technology shall serve as a model for other upcoming stakeholders to effectively manage and treat hazardous waste likely to generate from proposed development in coming days.

Key Benefits of Proposed Facility

- Volume and Mass Reduction of hazardous, medical, and non-hazardous waste.
- Proper disposal of waste with reduced environmental impacts.
- Reduction in air pollution is currently caused due to uncontrolled burning of waste.
- Improved health and sanitation conditions of Tharparkar and surrounding areas.
- State-of-the-art facility with occupational health and safety considerations.
- Capacity to handle a variety of waste.
- Capacity development of hospitals and industries for proper handling of waste.

3.6. Technical Description

87. The incineration units will essentially include built in air pollution control system (wet scrubber), combustion chamber, control panel, feeding system, auto hydraulic ramp, ash removal system, induced auxiliary fan and temperature control system etc.

3.6.1. Construction Phase Activities

- Site clearance
- Base construction
- Engineering works
- Office construction
- Development of green areas
- Wastewater treatment system
- Utilities/labor requirement during construction

3.6.2. Site Clearance

88. It is important to note that the proposed project site is a vacant plot located at Bhave Jo Tar Taluka Islamkot. During site clearance, any trees identified within the construction area will be retained, and no trees will be cut or removed.

89. Installation and commission activities will be executed as per the standards by adopting Good Engineering Practices (GEP) to complete the assigned work in specified time schedule. A prefabricated structure of different sections and offices will be assembled for WMF.

3.6.3. Project Timelines

90. The installation of the incineration units and the construction of associated facilities are expected to be completed in 6-8 months after obtaining all necessary permits.

3.6.4. Engineering and Miscellaneous

91. The electrical and other auxiliary works will essentially consist of the following:

- Electrical services including power, lighting, and gas supply, etc.
- Plumbing and drainage services
- Coloring and painting
- Carpentry work

3.6.5. Machinery Required

92. The details of major machinery that will be used are listed below:

- Hand Trolleys
- Dumpers / Trucks
- Water Pumps
- Steel Cutting Equipment
- Steel Shuttering
- Scaffolding Pipes
- Power Generators
- Tractors

3.7. Design and Technical Details

93. The objective of the proposed project is to construct a waste management facility consisting of two incineration units. The cumulative waste treatment capacity of the proposed incinerators would be around 600 Kg/hr. Incinerator-I and Incinerator-II would be capable of treating around 500 kg/hr. and 100 kg/hr. of waste per hour for industrial and medical waste with a view to supporting the waste management issue faced in the province of Sindh. The technical specifications of the incineration units are provided in Table 3-1 and Table 3-2, respectively.

Table 3-1: Specifications of Incineration Unit (500 kg/hr.)

S. No.	Features	Descriptions
1.	Temperature Control	Digital Temperature Controller
2.	Type of Waste	Solid/Fluid
3.	Combustion Air Motor	1.5 HP
4.	Combustion Chamber Burner	2 x 500 kW
5.	Thermocouples	3
6.	Wet Scrubber Water Consumption	~230 gallons/hr.
7.	Electrical Pump for Scrubber	1 x 1 HP
8.	Refractories withstand temp.	1800 centigrade
9.	Air Damper	Manual
10.	Post Combustion Chamber Burner	1 x 500 kW
11.	Induced Draft Fan	1 x 10 HP

12.	Stack Height	15 meters
13.	Chambers	Two
14.	Primary Chamber Temperature	800 to 900 °C
15.	Secondary Chamber Temperature	1250°C
16.	Excess Air Blower	2
17.	Waste Feeding	1 Door
18.	Ash Removal	2 Doors
19.	Control Panel	Pre-wired PLC Controlled
20.	Paint	Heat Resistant
21.	Fuel	Gas and Oil

Table 3-2: Specifications of Incineration Unit (100 kg/hr.)

S. No.	Features	Descriptions
1.	Temperature Control	Digital Temperature Controller
2.	Type of Waste	Solid/Fluid
3.	Combustion Air Motor	1.0 HP
4.	Combustion Chamber Burner	2 x 100 kW
5.	Thermocouples	2
6.	Wet Scrubber Water Consumption	~100 gallons/hr.
7.	Electrical Pump for Scrubber	1 x 1 HP
8.	Refractories withstand temp.	1800 centigrade
9.	Air Damper	Manual
10.	Post Combustion Chamber Burner	1 x 100 kW
11.	Induced Draft Fan	1 x 2 HP
12.	Stack Height	10 meters
13.	Chambers	Two
14.	Primary Chamber Temperature	800 to 900 °C

15.	Secondary Chamber Temperature	~1250°C
16.	Excess Air Blower	2
17.	Waste Feeding	1 Door
18.	Ash Removal	1 Door
19.	Control Panel	Pre-wired PLC Controlled
20.	Paint	Heat Resistant
21.	Fuel	Gas and Oil

3.7.1. Waste Feeding System

94. The waste feeding in the proposed incineration units will be done through hydraulic lift ram to transport the waste into the feeding chamber. The feeding chamber will first drop the waste into the holding area which after receiving the waste will air locked from the top, following which it will be transferred to the combustion chamber where it will be incinerated.

3.7.2. Primary Chamber

95. The waste is loaded in the incinerators when the primary chamber is first heated to attain a temperature of 800°C. In most cases the waste generates heat itself and the temperature rises to almost 900°C. However, in case of waste with low calorific values, external heating is required to maintain the temperature between 800°C to 900°C.

3.7.3. Secondary Chamber

96. The secondary chamber is meant for combustion of gases produced by the incineration of waste in the primary chamber. The temperature in the secondary chamber reaches up to 1250°C, the incinerator permits the gases to be exposed to this temperature. This process in the secondary chamber helps get rid of obnoxious matter and pollutants.

3.7.4. Scrubbing System

97. A wet scrubbing system has been proposed for each incineration unit. The scrubbing system will remove the remaining particulate matter and acid gases from waste gas streams and will reduce the temperature of the gases coming out of the secondary chamber. The pollutants are removed primarily through the impaction, diffusion, interception and/or absorption of the pollutant onto droplets of liquid. The scrubbers will be constructed from stainless steel and will consist of multiple water spraying nozzles. The details of water consumption for incineration units are provided in Table 3-1 and Table 3-2, respectively. The two-stage scrubbing process ensures cleaning of gases to meet the standards for emissions.

98. A wastewater treatment system will be constructed for water recirculation to reduce water consumption. The sludge formed in the tanks will be collected and incinerated in the incineration plant, whereas clean water will be filtered and re-cycled in the scrubbing system.

3.7.5. De-ashing System

99. The ash sump is a mild steel fabrication positioned below the level of the final hearth of the primary combustion chamber. The sump is refractory lined to the same standard as the combustion chamber. Air inlets are provided around the sump to ensure burn out of combustible material in the ash and to cool the ash prior to discharge into the ash quenching tank. When the de-ashing door opens, ashes are fallen directly into an ash quenching tank positioned below the ash sump. Cooling ashes are evacuated from the quenching tank to ash skip by a scraper functioning with chains. The ashes bin is designed to accept multiple discharges of ash from the ash quenching tank up to its maximum content volume without any shut down of the incinerator. The ash will be sent to the off-site government designated site for final disposal. The ash removal will be a batch process and has been designed to remove the ash in the minimum time and safest manner.

3.8. Project Support Services and Utilities

3.8.1. Water Supply

100. The water requirements for the proposed project will be sourced through ground water. The estimated water demand during the construction phase would be approximately 1500 gallons per day (GPD), while the estimated water demand during the operational phase will be 5500-6000 GPD. This requirement will be mainly for scrubbing system and domestic usage.

3.8.1.1. Wastewater Management

101. During the operation phase, both process and domestic wastewater will be generated. The process wastewater will be generated approximately 5,000 – 5,500 GPD and the domestic wastewater will be generated approximately 400-500 GPD from washrooms, kitchen, ablution, etc. The process wastewater will be routed to a recirculation tank, filtered, and reused in the wet scrubbing system and domestic wastewater will be treated into the wastewater treatment system. The system will be based on dual staged mechanism. The initial stage will have a septic tank. The wastewater from the proposed project will be routed to the septic tank from where it will flow from the top portion of the septic tank into the second stage. The second stage will contain a soak pit. The soak pit will contain loose gravel which allows wastewater to gradually soak into the ground, while wastewater from wet scrubbers will be recycled.

Sludge Management:

102. Sludge generated from the wastewater treatment process requires proper handling to ensure environmental safety and compliance with regulatory requirements. Therefore, the sludge settled in the tanks will be collected and incinerated in the incineration plant.

3.8.2. Solid Waste Management

103. The purpose of solid waste management is to outline the requirements to handle the solid waste generated from the project during construction and operation phases. AKC has a solid waste management policy which will be implemented at all project stages.

3.8.3. Electricity Supply

104. The primary source of electricity for the proposed project would be HESCO. The requirement for the proposed project will be approximately 80 kW during operational phase. The AKC management will apply for a new connection to HESCO during the construction phase. In addition to this, a dedicated diesel-based generator will be installed capable of generating around 100 kVA of power as secondary power source at proposed project. The generator will be placed in a dedicated room to avoid any unforeseen environmental hazard.

3.8.4. Gas Supply

105. The AKC management will apply for a new gas connection during construction phase, it is estimated that 6-8 MMBTU/day will be required during normal operation of the proposed project. In case of gas outage, the LPG will be utilized for operation of incinerators.

3.8.5. Diesel Storage Facility

106. A dedicated diesel storage area will be established at the proposed project site in accordance with the relevant safety standards. The diesel storage tank will have a capacity of 400 liters.

3.8.6. Manpower Requirement

107. During the operation phase, a workforce of 15-20 will be employed, including manager, site supervisors, workers, and security staff.

108. The total manpower requirement during the operation phase of the project will be as follows:

- Manager - 1
- Site Supervisor - 1 supervisor in each shift
- Workers - 4-6 workers in each shift
- Security Staff - 2 private security guards in each shift

3.8.7. Safety and security

109. The safety considerations of the project will include the following:

- Firefighting systems
- Safety Alarm systems
- Complete PPEs for staff working at site
- Periodic safety audits

- Safety signs and markings
- Emergency showers and eye wash for employees
- Fire drills / safety drills

110. Security guards will be hired for security purposes of the project site; in addition, CCTV cameras with recording backup will be installed during operation phase.

3.9. Land Status

111. The proposed project site is located at Bhave Jo Tar, Taluka Islamkot, District Tharparkar, and is owned by the project proponent. Copy of ownership document is attached as ANNEXURE VI.

3.10. Corporate Social Responsibility Activities (CSR)

112. As a part of this project, AKC will carry out tree plantation in and around project area and conduct training for hospitals and schools to guide them on waste handling and storage techniques.

113. AKC's objective is to develop awareness in society on the importance of handling and disposal of waste in a proper and appropriate manner.

114. It is very important for the hospitals and children to know how the different types of waste should be handled and stored on their site.

115. AKC will use the services of experts in the field to create awareness. Training programs are planned to be carried out as regular activities during the operational phase of the project.

3.11. Project Phases and Activities

3.11.1. Construction Phase

3.11.1.1. Construction Material Sourcing

116. The construction material sourcing and supply chain for the proposed WMF project involves a series of steps to ensure the timely procurement, delivery, and management of materials required for the development of infrastructure.

117. Local suppliers will be contacted to supply the construction materials to the proposed site and timely delivery will also be ensured. Local Suppliers will be given priority based on the cost and quality of materials. Since the proposed project is expected to be completed in 6-8 months a long-term partnership with suppliers will be made. Coordinating timely deliveries is essential to avoid delays in construction. Since the proposed project is small in scale and located near Nagarparkar Road, the material supply vehicles will not exert additional pressure

on the road.

3.11.1.2. Construction Materials

118. The materials used in construction of the proposed project will include following but not limited to cement, sand, aggregates, brick infill, brick cladding coarse aggregates (crush), fine aggregates, water, steel reinforcement bars, iron rods, glass, aluminum, etc.

3.11.1.3. Construction Phase Activities

119. The construction phase activities of WMF will involve several key stages. Below is an overview of the activities that will be involved in the construction phase:

3.11.1.3.1. Site Preparation and Land Development

120. The proposed site is open vacant land. Therefore, site preparation will be the first step for implementation of the proposed project. Site preparation activities will include clearing, grading and leveling the land for construction internal roads, offices and other planned infrastructure while maintaining an appropriate slope for drainage. These clearing and leveling activities will require excavation work and waste will be handled in a responsible manner.

3.11.1.3.2. Structures and Infrastructure Development

121. For the smooth functioning and operation of the WMF, the development of appropriate structures and infrastructure is essential. Construction at the proposed project site will involve the development of a variety of structures and supporting infrastructure. These will include labors' rooms, office area, stores, waste storage areas, a drainage system, wastewater management facilities, internal roads, and utility services (gas, electricity, and water).

3.11.1.3.3. Construction Schedule and Durations

122. The construction is scheduled for expected completion within 6-8 months. The implementation of construction schedule is flexible and will be dependent upon current weather conditions (how current weather conditions will impact the construction activity and workers capacity is discussed in detail in Chapter 7).

4. ANALYSIS OF ALTERNATIVES

123. Analysis of alternatives as it is an integral part of the EIA process to select the best option among the entire possible project options related to project location, technology and design. After careful examination and experts' judgment rationale for project location and technology selection was developed and discussed in the below section.

4.1. Rationale for Site Selection

124. The basic purpose of the proposed WMF is to provide support to waste management system in Sindh. The province lacks proper incineration facilities at government level; therefore, the installation of incineration units to treat the medical and industrial waste is a necessity. During the operational phase, some fugitive emissions are always expected, thus the incineration unit is expected to be built in a sparsely populated area, meanwhile, consisting of efficient technology to reduce the release of emissions during its operational phase.

125. Additionally, the site available to the proponent for proposed incineration units is better than the other available option as the modeling study of air dispersion predicted that the ambient air levels of the selected criteria pollutants (CO, SO2, NOx, and PM10) would be in compliance with the SEQS limits when plant would be in operational phase subject the present emission rates, stack design, metrological and topographic condition in/around the project site within the modeling domain.

4.2. Rationale for Technology Selection

126. Due to strict environmental regulations for medical and industrial waste management, and the associated adverse health and environmental impacts, a number of technologies are adopted globally to treat medical and hazardous waste prior to final disposal, with minimal effects on public health and the environment. In this context, among all possible options, incineration is considered the most suitable option for the treatment of hospital and other hazardous wastes in the project area. Table 4-1 refers for a comparison of the advantages and disadvantages of available hospital and hazardous waste treatment options.

Table 4-1: Advantages VS Disadvantages of Available Hospital/Hazardous Waste Treatment Options

S. No.	Treatment Option	Advantages	Disadvantages
1.	Pyrolytic incineration /two-stage incineration with efficient gas cleaning.	Very high disinfection efficiency. Adequate for all infectious waste and most	Incineration temperature above 800°C, expected outcomes after and during incineration process.

		pharmaceutical and chemical waste.	- Air emissions. - Fly ashes. - Bottom ashes.
2.	Single chamber incineration with dust reduction	- Good disinfection efficiency and waste volume reduction - Residues will be disposed off in a land fill; no need for highly qualified operators; relatively low investment and operation costs.	- Significant concentration of air pollutants/emissions into the environment. - Periodic accumulation of slag and soot particles. - Inefficient in destruction of thermally resistant chemicals and drugs such as cytotoxic.
3.	Drum or brick incinerator	- Waste volume reduction. - Residues may be disposed off in a landfill; no need for highly qualified operators; very low investment and operating costs.	- Significant air emissions of black smoke, fly ash and toxic flue gas - Exception only for disposal of infectious waste under certain circumstances outside urban areas
4.	Chemical disinfection	- Efficient disinfection under good operating conditions with special waste.	- Costly if the chemical disinfectants are expensive. - Requirement of highly qualified technicians for operation of the process; use of hazardous substances which require comprehensive safety measures. - Inadequate for pharmaceutical,

			chemical and most types of infectious waste (mixed solid waste).
5.	Microwave irradiation	- Good disinfection efficiency under appropriate operational conditions; environmentally sound.	- High investment and operation costs; potential operation and maintenance problems. - Only for wet infectious waste or for infectious waste with a high water content.
6.	Shredding and Disinfect/ Autoclave wet-thermal treatment,	- Environmentally sound; relatively low investment and operation costs. - Good for infectious and microbiological wastes. - Immediate treating of hospital waste without any transportation to faraway of hospital site for treating. - Low volume of residues up to 90%	- Shredders may be subjected to breakdowns and may require qualified technicians; - Inadequate for chemical waste or waste which is not easily penetrable by steam (post shredding type)

127. Based on thorough literature review, review of available technologies, options for medical and industrial waste disposal and environmental experts' judgment the finest possible option for treatment of medical and industrial waste is incineration covering following key advantages in terms of environmental sustainability.

- Insignificant impact and disturbance onto the existing land use patterns.
- Very high disinfection efficiency.
- Adequate for all infectious waste and most pharmaceutical and chemical waste.
- Conversion of hazardous waste into inert and non-pathogenic waste.

5. ENVIRONMENTAL AND SOCIAL BASELINE

5.1. General

128. This chapter provides the preliminary level description of the baseline conditions within the Corridor of Impact (CoI) of the proposed Waste Management Facility (WMF). The existing environmental and socio-economic settings of the proposed project's CoI are considered as a benchmark for comparison of the physical, ecological, socio-economic conditions and cultural features before and after construction and during operational phases of WMF project. This baseline provides the datum for identification of impacts at various phases of the project activities. Environmental and Social features discussed in this Chapter include:

Physical Environment

- Land Resources: Geography, topography, landscape, land use, geology and seismicity of the project area.
- Water Resources: Surface and ground water resources in project area.
- Air, Noise and Climate: Quality of ambient air and noise and climatic conditions (including the description of temperature profile, rainfall, humidity, wind speed and direction) of the project area.

Ecological Environment

- Flora This includes plant species
- Fauna This includes animal species

Social Environment

- Socio-economic Features Demography, education facilities, healthcare facilities, employment, sensitive receptors
- Cultural Features Religion, language, archaeological and religious places

129. The key focus of the chapter is to highlight those features which have the potential to be adversely affected by the construction and operation of the proposed project.

5.2. Reconnaissance and Detailed Field Visit

130. The ACEA team conducted the reconnaissance field visits. The major objective of the reconnaissance field visits was to familiarize with the environment in general. Furthermore, the stakeholder consultation and the acquisition of secondary data/information were also carried out for identification of impacts at scoping stage.

131. For the primary data acquisition, the team conducted a detailed field visit to the proposed project site. The major objective of the field visits was to collect the baseline data on physical, ecological and social aspects along with identification, assessment and categorization of the significant environmental and social impacts of the proposed project. The secondary data was collected from published sources/reports and relevant departments, which were also verified through visual observations during reconnaissance and detailed surveys.

5.3. Physical Environment

132. The following section provides an overview of the information on physical environment of the proposed project site.

5.3.1. Methodology

133. The physical environment baseline has been developed by using both secondary and primary data sources.

Secondary Sources

• Desk Studies	Relevant information about environmental features of the project area was extracted from electronically available data/literature including: • EIA/IEE reports of various similar national and international projects. • Research articles related to the project area; • Reports of various government agencies of Pakistan; • Information available on websites of government agencies particularly that of Sindh province; and, • International reports and other material available on internet.
• Consultations with Local Communities	Knowledge of the local people, about project area, was recorded during the consultations carried for this EIA.

Primary Sources

• Field Observations	Physical features in the project area were visually looked by environmental experts during the visits to the project area.
• Environmental Sampling and Monitoring	Ambient air quality and noise monitoring locations were initially identified through Google Earth by consultant's team and then verified during the field observations. The monitoring plan prepared by the consultant's team was communicated to Climate and Environmental Research Laboratory (CERL) team which is an EPA certified lab. (EPA Certified No. SEPA/LAB/CERL/01/1414/25). The laboratory monitoring results for air and noise have been incorporated into this EIA report.
• Meteorological Data	Historical data related to meteorological conditions of project area (including rainfall, temperature, humidity and wind speed and direction) was obtained from Pakistan Meteorological Department. The data obtained was processed and analyzed to extract required results related to meteorological and climatic conditions of the project area.

5.3.2. Land Resources

5.3.2.1. Geography

134. WMF is located near Nagarparkar Road in Tharparkar. The district lies in the southeastern part of Sindh, bordering India to the east and characterized by the arid Thar Desert landscape.

5.3.2.2. Topography

135. The proposed site is flat, vacant land. It has an average elevation of approximately 70 meters above sea level (Figure 5-1). The land is generally dry and arid, consistent with the overall landscape of the southeastern part of Sindh.

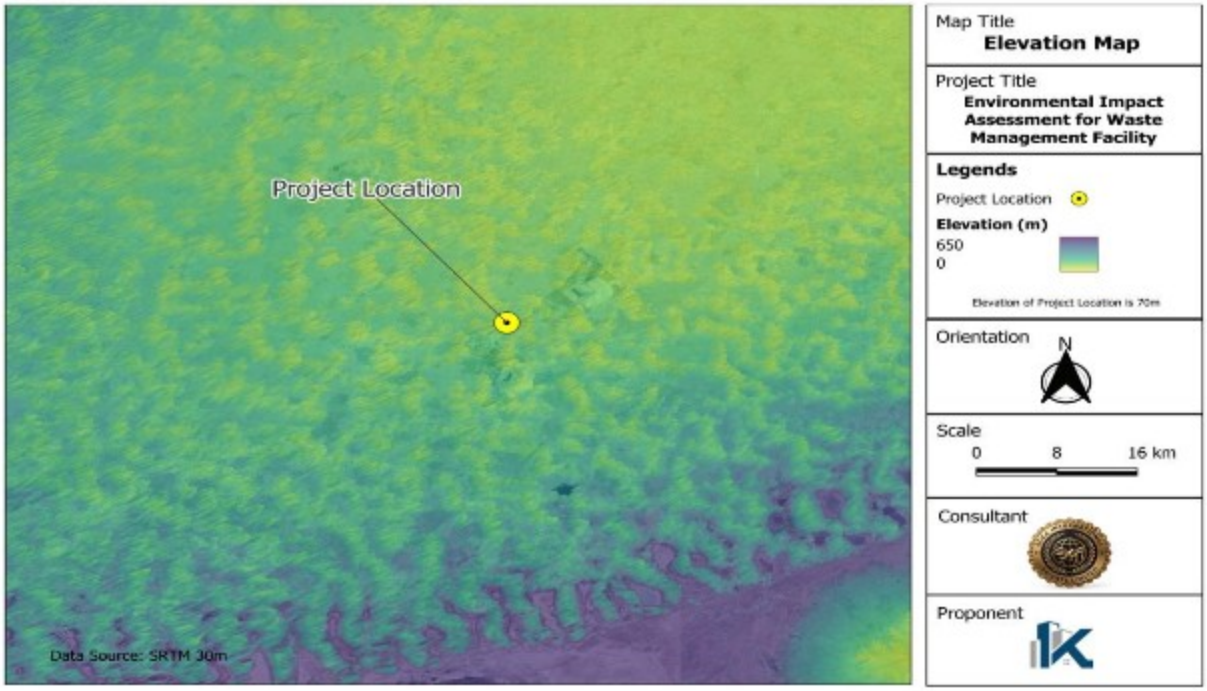


Figure 5-1: Elevation Map of Project Site

5.3.2.3. Geology

136. The project area is located in Islamkot, Tharparkar. The region is mostly covered with sand dunes that were formed by wind over thousands of years. Beneath the sand are layers of sedimentary rocks such as sandstone, shale, clay, and limestone. At greater depths, the area contains the Thar Coalfield, one of the world's largest deposits of lignite (brown coal), which is an important source of energy for Pakistan. The exposed rocks in the project area are sand dunes (Figure 5-2).

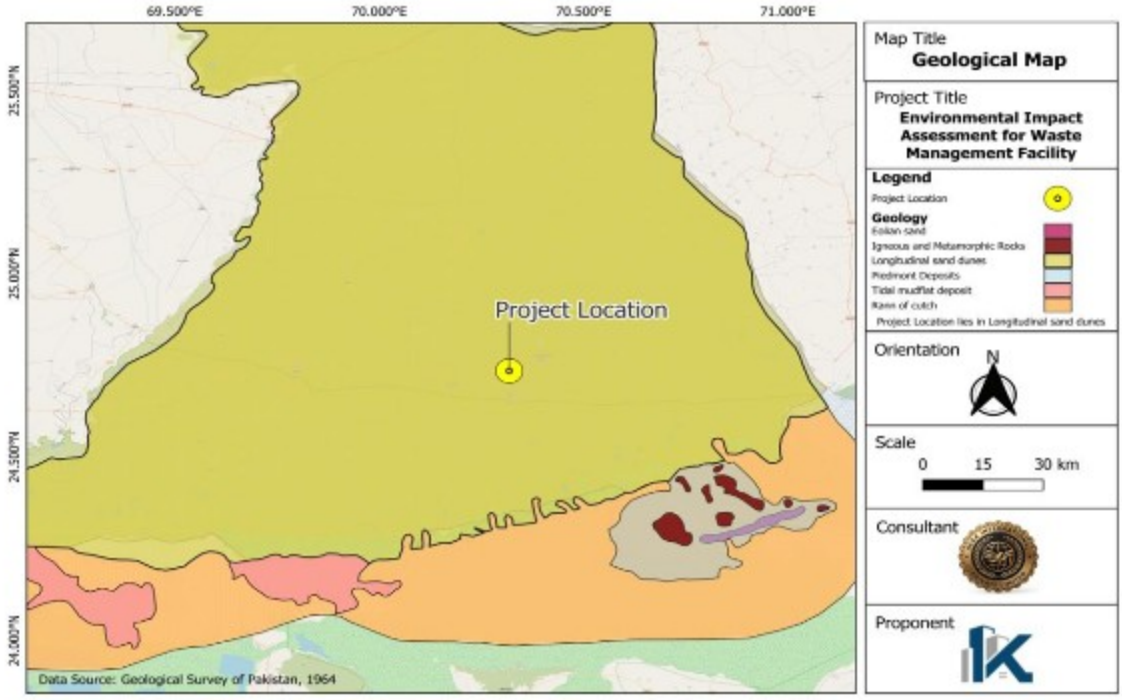


Figure 5-2: Geological Map of Tharparkar

5.3.2.4. Seismology

137. Seismo-tectonics of Pakistan is related to interaction of the following three lithospheric plates: Indian, Arabian, and Eurasian Plate. Tectonically, 75% of Pakistan lies on fault lines. The proposed project area is situated to the south-east of the junction of three tectonic plates (Indo Pakistan, Arabian and Eurasian Plates). The significant fault in the vicinity include Ran of Katch Fault to the south. The Rann of Kutch fault, also known as Jati-Allah Bund fault.

138. Figure 5-3 shows the location of Tharparkar with respect to tectonic plate boundaries. According to one classification, Pakistan has 15 seismo-tectonic regions. The proposed project is located in the seismo-tectonic region where low-moderate level of seismic activity is believed to exist. Table 5.1 gives seismic zone, seismic zone factor and soil profile type of proposed site.



Figure 5-3: Location of Tharparkar with Respect to Tectonic Plates

Table 5-1: Seismic Profile of the Proposed Site

Seismic Zone	Zone Factor (z)	Soil Profile Type
2A	0.08-016	'S_D'

a. **Seismic zone:** a geographic area that has been categorized based on the likelihood and severity of seismic activity, such as earthquakes. According to the Uniform Building Code (1997), zone 2A refers to areas with a low to moderate level of seismic risk.

b. **Zone factor:** a numerical value that quantifies the level of seismic hazard in a specific seismic zone. A Zone Factor of 0.08-0.16 typically indicates a low-moderate seismic risk area.

c. **Soil Profile type:** refers to the classification of the soil on which a structure is built affecting seismic wave propagation and amplification. Type 'S_D' refers to stiff soil and deep sand layers.

5.3.3. Water Resources

139. Tharparkar district does not have a perennial surface-water source and is largely dependent on groundwater and local water-supply schemes to meet domestic and other water requirements. Groundwater in the Islamkot area is generally limited and highly variable in quality, with aquifers between approximately 26–50 meters generally falling within the highly saline category. At depths of 51–75 meters, groundwater is predominantly highly saline, making it unsuitable for drinking and other domestic purposes without appropriate treatment.

5.3.4. Climatic Conditions

140. Climatic conditions such as wind speed and direction, significantly affect the pollutant dispersion dynamics in an area. Contamination of soils and water resources is also somehow related with the precipitation patterns in an area. Provided below is the description of climatic conditions (e.g. temperature, rainfall, humidity, wind speed and direction) in the project area.

5.3.4.1. Temperature

141. The hot season in Islamkot lasts for approximately 2.9 months, from April 11 to July 7, with an average daily high temperature above 39°C. June is the hottest month of the year, with an average high temperature of 41°C and a low of 28°C. In contrast, the cool season lasts for approximately 2.2 months, from December 6 to February 12, with an average daily high temperature below 29°C. January is the coldest month of the year, with an average low temperature of 11°C and a high of 26°C. The graph showing the maximum and minimum temperatures in Islamkot is provided in Figure 5-4.

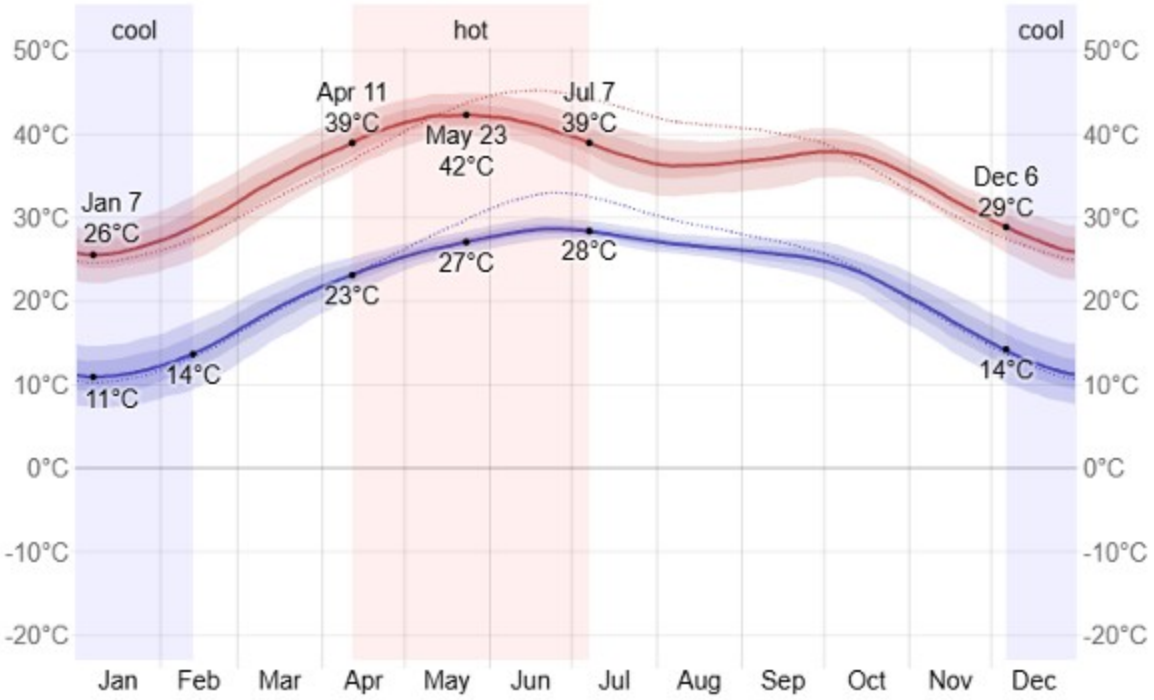


Figure 5-4: Maximum and Minimum Temperatures (°C) in the Project Area

5.3.4.2. Rainfall

142. The rainy period in Islamkot lasts for approximately 3.8 months, from June 11 to October 5, with a sliding 31-day rainfall of at least 13 millimeters. August is the wettest month of the year, with an average rainfall of 60 millimeters. In contrast, the rainless period lasts for approximately 8.2 months, from October 5 to June 11, with February being the driest month, receiving an average rainfall of 2 millimeters. The graph showing the yearly rainfall pattern in Islamkot is provided in Figure 5-5.

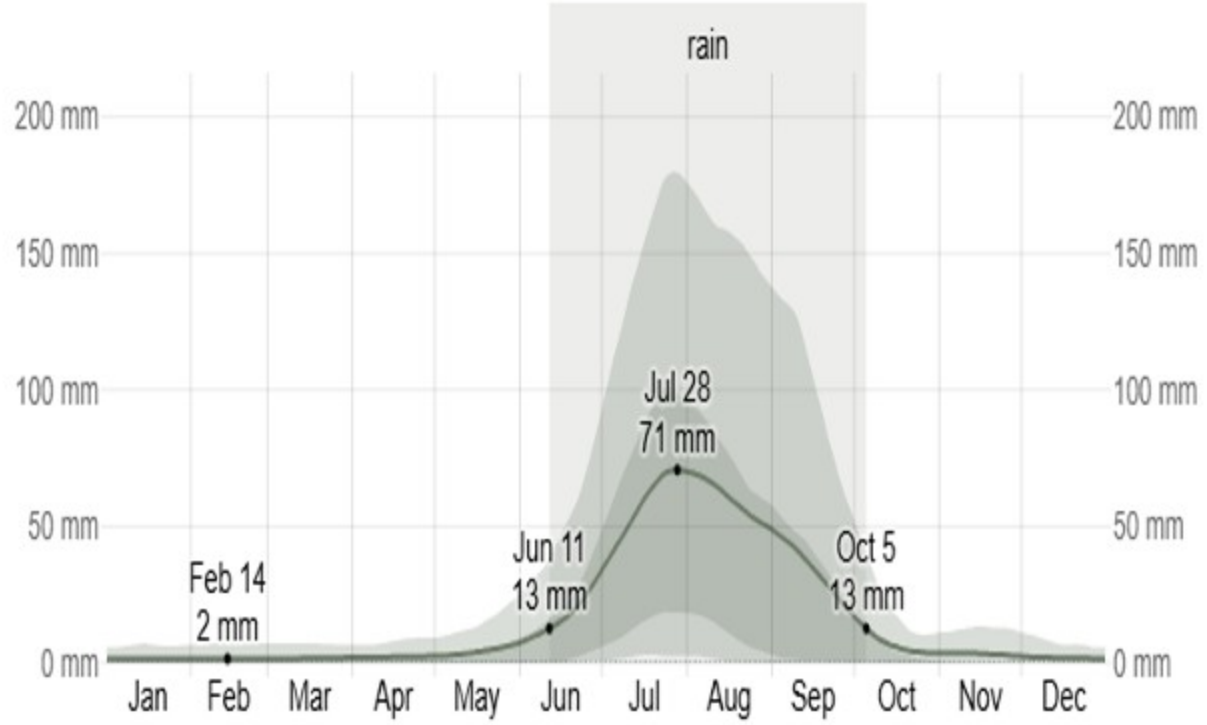


Figure 5-5: Yearly Rainfall Pattern in the Project Area

5.3.4.3. Wind Speed

143. This section discusses the wide-area hourly average wind vector (speed and direction) at 10 meters above the ground. Wind conditions at any given location are highly dependent on local topography and other factors, and instantaneous wind speed and direction may vary more widely than hourly averages. The average hourly wind speed in Islamkot experiences significant seasonal variation throughout the year. The windier period lasts for approximately 4.5 months, from April 21 to September 5, with average wind speeds exceeding 17.1 kilometers per hour. June is the windiest month of the year, with an average hourly wind speed of 24.4 kilometers per hour. In contrast, the calmer period lasts for approximately 7.5 months, from September 5 to April 21, with November being the calmest month, having an average hourly wind speed of 10.2 kilometers per hour. The graph showing the yearly wind speed pattern in Islamkot is provided in Figure 5-6.

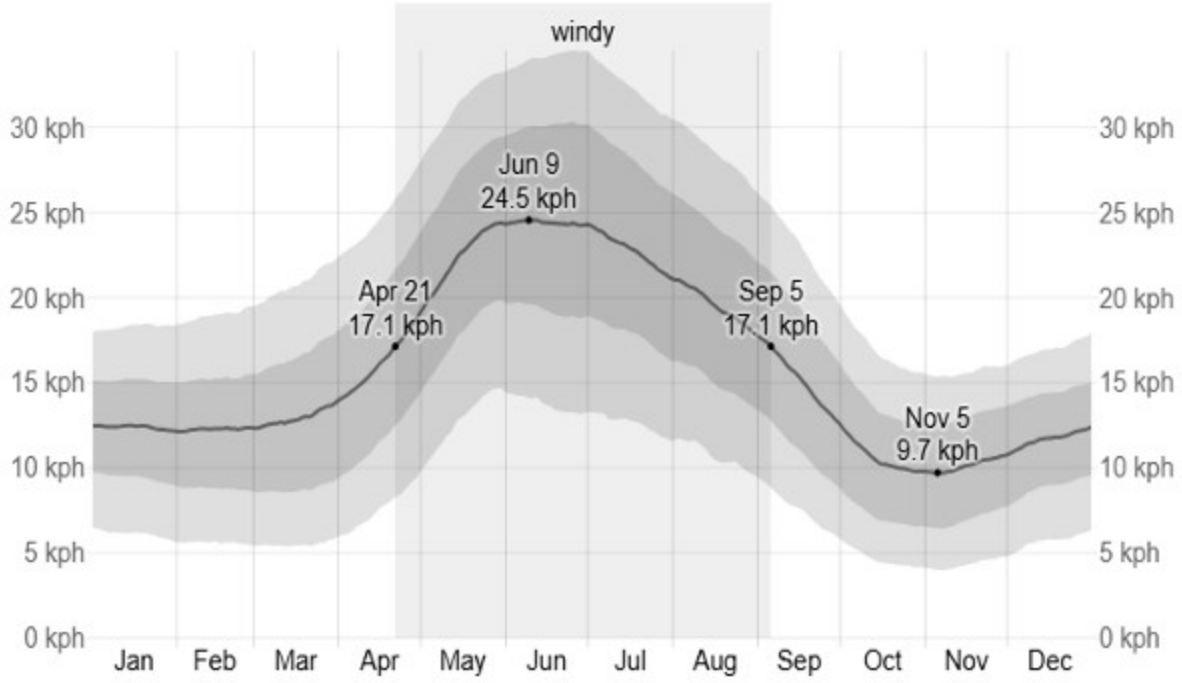


Figure 5-6: Yearly Wind Speed Pattern in the Project Area

5.3.4.4. Humidity

144. Islamkot experiences significant seasonal variation in perceived humidity throughout the year. The muggier period lasts for approximately 5.7 months, from April 25 to October 14, during which the comfort level is classified as muggy, oppressive, or miserable for at least 25% of the time. July is the muggiest month of the year, with an average of 30.4 days experiencing muggy or worse conditions, while December has the fewest muggy days, with an average of 0.1 days classified as muggy or worse. The graph showing the yearly humidity levels pattern in Islamkot is provided in Figure 5-7.

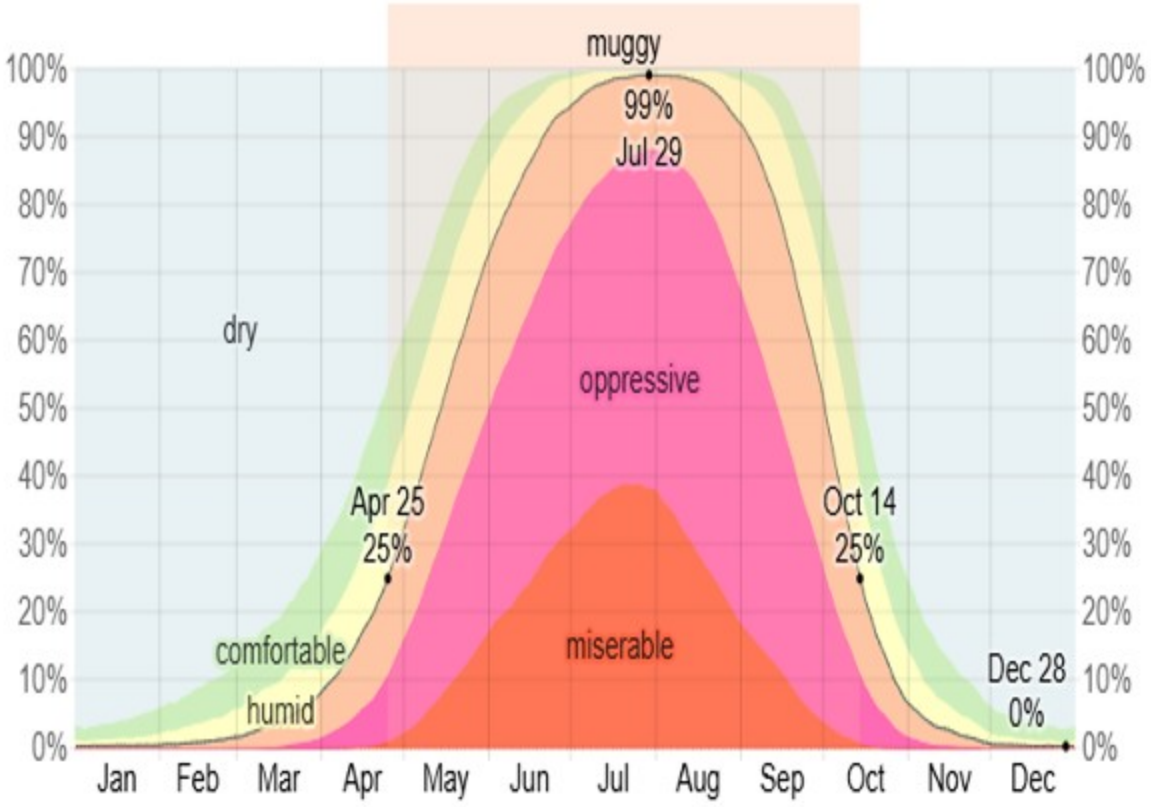


Figure 5-7: Month-Wise Average Humidity Levels in the Project Area

5.3.5. Ambient Air Quality

145. The ambient air quality monitoring of the proposed project area was conducted through a third-party SEPA approved Laboratory. The ambient air quality concentrations of parameters including CO, O3, NO, NO2, SO2, SPM, PM10 PM2.5, and Lead are within the prescribed limits of SEQS, and the results are provided in Table 5-2. Copy of laboratory report is attached as ANNEXURE VII.

Table 5-2: Ambient Air Monitoring Results

Sr. #	Parameters	Unit	SEQS	Result
1.	Carbon Monoxide (CO)	mg/m^3	10	4.4
2.	Ozone (O_3)	$\mu g/m^3$	130	23.7
3.	Nitrogen Oxide (NO)	$\mu g/m^3$	40	30.2
4.	Nitrogen dioxide (NO_2)	$\mu g/m^3$	80	58.1
5.	Sulfur dioxide (SO_2)	$\mu g/m^3$	120	8.1

6.	Suspended Particulate Matter (SPM)	µg/m^3	500	204
7.	Particulate Matter PM_{10}	µg/m^3	150	128.4
8.	Particulate Matter $PM_{2.5}$	µg/m^3	75	44.8
9.	Lead (Pb)	µg/m^3	1.5	<0.1

5.3.6. Ambient Noise

146. Ambient noise level is an important element of environmental quality of an area. Noise affects every living particularly humans in everyday life - at home, at leisure, during sleep, when traveling, and at work. However, humans cannot stop hearing the noise and feel the vibration. Hearing is a continuous and permanent process using cortical and subcortical structures to filter and interpret acoustical information hence the analysis of acoustical signals is essential for human survival and communication.

5.3.6.1. Monitoring Results

147. The ambient noise monitoring of the proposed project area was conducted through a third-party SEPA approved laboratory. The laboratory report shows the project area has the average ambient noise levels which are ranging between 51.2-58.5 dB(A) and falling within permissible limits of SEQS. The results of ambient noise monitoring are provided in Table 5-3. Copy of laboratory report is attached as ANNEXURE VIII.

Table 5-3: Ambient Noise Monitoring Results

Sr. #	Description (Proposed Location)	Unit	SEQS Limit	Results		
				Min	Max	Avg.
1.	Location -1 (24.735880, 70.318493)	dB (A)	75.0	56.2	58.5	57.35
2.	Location -2 (24.736009, 70.319029)			52.3	54.3	53.3
3.	Location -3 (24.735726, 70.319198)			55.2	56.4	55.8
4.	Location -4 (24.735582, 70.318731)			51.2	53.4	52.3

5.4. Ecological Environment

148. This section provides the ecological baseline of the project area. The ecological baseline provided in this section includes terrestrial and aquatic species found in the area. Each specie (animals and plants) has separately been discussed in this section including a brief introduction of the species and its ecological linkages.

149. In order to compile the biodiversity in the vicinity of the proposed project location, the data and information were obtained from secondary data from published literature. The

information was further refined and verified by utilization of various tools including literature review, stakeholders/departmental consultations and random ground truthing. Information regarding the field based (first hand) ecological profile of study area was gathered through desk study.

5.4.1. Flora of the Project Area

150. Islamkot, Tharparkar, is located within the arid landscape of the Thar Desert, characterized by high temperatures, low and highly variable rainfall, prolonged dry periods, and sandy soils. Vegetation in the area is generally sparse and adapted to the harsh desert environment. The natural flora mainly comprises drought- and heat-tolerant grasses, shrubs, herbs, and scattered trees, along with various seasonal grasses and herbaceous species that emerge following rainfall. During the survey, no endangered or vulnerable floral species were observed in the immediate vicinity of the proposed project site. Table 5-4 provides details of the various floral species identified in the project area, along with their ecological linkages and significance. Photographs of the identified species have been obtained from secondary sources for demonstration purposes.

Table 5-4: Floral Species Present in Project Area

Sr. No.	Species Name		Ecological linkages	Photograph
	Local Name	Scientific Name		
1	Karir	*Capparis decidua*	It provides food and shelter for various desert fauna and serves as an important component of the Thar Desert ecosystem. Its dense, thorny branches provide shelter and nesting sites for small birds and protection for reptiles and insects. The plant is highly drought-resistant and contributes to soil stabilization and vegetation cover in arid sandy areas.	

2	Kumbat	*Acacia senegal*	Its extensive root system helps stabilize sandy soils, reduces wind erosion, and contributes to maintaining vegetation cover in the arid Thar Desert ecosystem. The tree also produces gum, which has traditional economic and livelihood importance for local communities.	
3	Karkanr	*Zizifhus nummularia*	It serves as an important resource in arid environments, providing food for wildlife and humans, offering shade and erosion control, and promoting soil fertility through its deep root system and nitrogen-fixing capabilities.	
4	Babul	*Acacia nilotica*	It is a roosting and nesting tree for doves, crows, black drongo, shrikes, bulbuls, flycatchers and so many other passerine birds. Garden lizard is commonly seen on it. Wasps and black ants also occupy this tree. Some spiders weave their webs in its foliage. Its gum is used by humans.	

5	Jand/Kandi	*Prosopis cineraria*	It helps prevent soil erosion, improves soil fertility through nitrogen fixation, and provides resources like firewood and fodder. Its pods are rich in nutrients and are eaten by domestic livestock.	
6	Khimp or Khipp	*Leptadenia pyrotechnica*	It provides forage for livestock, and offers medicinal benefits. Its leaves and stems are used in traditional medicine, and it serves as a habitat for various herbivores and pollinators. The plant is drought-resistant and thrives in poor soils, contributing to ecosystem stability in harsh conditions.	

5.4.2. Fauna of the Project Area

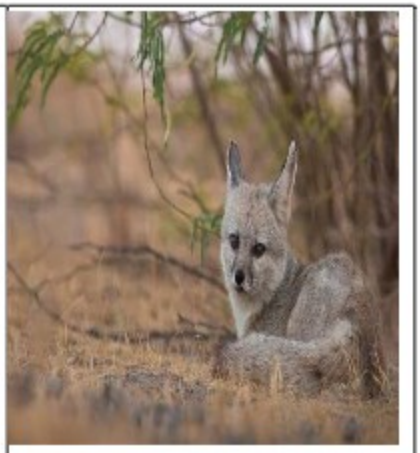
151. This section provides the key fauna reported in the project area. The arid and semi-desert environment of the project area supports a variety of fauna adapted to high temperatures, limited water availability, and sparse vegetation. However, the availability of suitable habitats for large mammals and other wildlife is generally limited in the vicinity of the proposed project area due to the arid conditions and low biodiversity. During the survey, no significant habitats or breeding/nesting sites of large mammals, small mammals, birds, or reptiles were observed within or near the proposed project site. The fauna species presented in Table 5-5 represent species reported from the broader project area. Photographs of the identified fauna have been obtained from secondary sources for demonstration purposes.

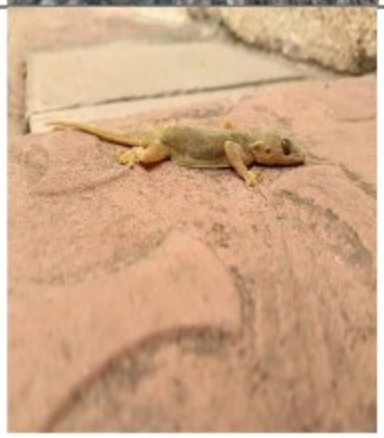
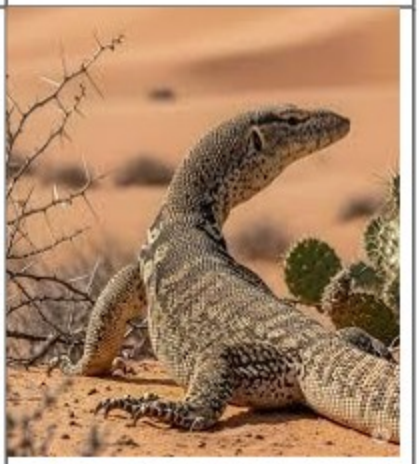
Table 5-5: Fauna Species Present in Project Area

Sr. No.	Species Name		Ecological linkages	Photograph
	Local Name	Scientific Name		
	Mammals			

1	Desert Jird	*Meriones hurrianae*	Desert jird is a small, desert-adapted omnivorous rodent that plays an important role in arid ecosystems. It feeds on seeds, grains, roots, and plant material, thereby contributing to seed dispersal and influencing vegetation dynamics. Its burrowing activities can disturb and aerate the soil, while it also serves as an important food source for predators such as owls, raptors, snakes, foxes, and other carnivorous species.	
2	Desert Hare	*Lepus nigricollis*	Desert hare feeds mainly on grasses, herbs, leaves, shoots, and other vegetation, thereby contributing to grazing pressure and vegetation dynamics. The species also forms an important part of the desert food web by providing prey for predators such as foxes, jackals, eagles, owls, and other raptors. Its presence is therefore ecologically linked with desert vegetation, open habitats, and predator–prey interactions within the Thar Desert ecosystem.	

3	Jungle Cat	*Felis chaus*	It plays ecological role as both a predator and prey. It impacts local ecosystems by controlling populations of small mammals and birds.	
4	Grey Mongoose	*Herpestes edwardsii*	It is a predator, feeding on a variety of small animals such as rodents, birds, insects, and reptiles, including eggs. While it helps control pests, it is also considered an invasive species in many areas, where it negatively impacts native wildlife.	
5	Long-eared Hedgehog	*Hemiechinus collaris*	It plays an important role in controlling insect and other invertebrate populations, particularly ants, termites, beetles, and other ground-dwelling insects. Its burrowing activities help aerate and loosen the soil, contributing to soil health and nutrient cycling.	

6	Fox	*Vulpes bengalensis*	It is an important mesopredator, helping regulate populations of rodents, insects, reptiles, and small mammals. By controlling these prey populations, it contributes to maintaining ecological balance and reducing excessive pressure on vegetation. Its scavenging activities also assist in the removal of carrion and organic matter, supporting nutrient cycling within the desert ecosystem.	
	Reptiles			
1	Saw-scale Viper	*Echis carinatus*	It is an important predator in its habitat, feeding on small mammals, birds, and reptiles, and playing a role in controlling rodent populations. It can pose a significant danger due to its venom.	

2	Scorpion	*Hottentotta tamulus*	It is a highly venomous species of scorpion found preying on a variety of invertebrates, including crickets, cockroaches, and other small arthropods	
3	House Gecko	*Hemidactylus frenatus*	It helps regulate populations of mosquitoes, moths, flies, ants, termites, and other small insects, thereby contributing to natural pest control. It also serves as prey for larger reptiles, birds, and small carnivorous animals, forming an important link in the local food web.	
4	Desert Monitor	*Varanus griseus*	It is an important predator in desert ecosystems, helping regulate populations of insects, rodents, lizards, snakes, and other small animals. By preying on a variety of species, it contributes to maintaining ecological balance and controlling prey populations. It also serves as prey for larger predators, thereby forming an important link in the desert food web.	

	Birds			
1	Grey francolin	*Ortygornis pondicerianus*	It is an important ground-dwelling bird of arid and semi-arid habitats. It feeds on seeds, grains, grasses, insects, and other small invertebrates, helping regulate insect populations and disperse seeds.	
2	Bataira or common quail	*Coturnix*	It is ground-dwelling bird that form large flocks, and its nesting habits help maintain plant diversity by dispersing seeds. It is also a significant prey species for predators such as birds of prey, mammals, and snakes.	
4	House Crow	*Corvus splendens*	It is an omnivore, feeding on a wide variety of food, including scraps from human settlements, small animals, insects, and seeds. Its scavenging behavior makes it an important participant in urban ecosystems, helping to clean up waste.	

5	Black - Kite	*Milvus migrans*	It helps control populations of small rodents, reptiles, insects, and other small animals while also feeding on carrion and organic waste, contributing to natural waste removal. As both a predator and scavenger, it plays an important role in maintaining ecological balance and nutrient cycling within the food web.	
6	Myna	*Acridotheros tristis*	It is an omnivorous bird that feeds on a wide range of food sources, including fruits, seeds, insects, and human food scraps. It plays a role in controlling insect populations,	

5.5. Socio-economic and Cultural Environment

152. This section provides the baseline socio-economic conditions in the project area. Purpose of this baseline description is to provide a basis for the evaluation of the potential adverse and beneficial socioeconomic impacts of the proposed project.

153. The information regarding socio-economic baseline survey is based on the primary data collected from the project area through field visit. socio-economic baseline survey was carried out for:

- Informing the stakeholders about the proposed project;

- Providing an opportunity to those involved with the planning of project to ensure that the benefits of the proposal are maximized and that no major impacts have been overlooked;
- Providing an opportunity for the public to influence the project design in a positive manner;
- Increasing public confidence in front of proponent, reviewers and decision makers;
- Providing better transparency and accountability in decision making; and
- Reducing potential conflict (if any) through the early identification of contentious issues and working through these to find acceptable solutions; and creating a sense of ownership of the proposal in the minds of the stakeholders.

154. The socio-economic data was gathered using both primary and secondary sources through a time-efficient and comprehensive survey approach. Relevant documents were reviewed and meetings were held with key department officials. A reconnaissance survey was conducted, followed by a detailed field survey to collect primary data. Public consultations were also carried out at various locations using a random sampling method to gather views from diverse groups such as nearby residents and small business owners. The survey aimed to assess local socio-economic conditions and understand community perceptions of the proposed project.

5.5.1. Socio-economic Features

155. Detailed findings of the survey comprising of different parameters are discussed in the following section.

5.5.1.1. Demographics and Settlements

156. Tharparkar is one of the largest and most geographically distinctive districts of Sindh Province, Pakistan, located in the southeastern part of the country along the Pakistan–India border. The district covers an area of approximately 19,638 square kilometers, making it one of the largest districts in Sindh. Its headquarters is Mithi, which serves as the administrative, commercial, and cultural center of the district.

157. The district is characterized by the Thar Desert, comprising vast sand dunes, arid plains, and scattered settlements. The climate is predominantly hot and arid, with extremely high temperatures during summer and limited rainfall that is largely dependent on the annual monsoon season. Due to its desert environment, water scarcity remains one of the district's most pressing challenges, influencing livelihoods, agriculture, and public health.

158. According to the 2023 Population Census, Tharparkar District has a total population of 1,778,407, with 91.9% of residents living in rural areas and only 8.1% in urban areas, highlighting its predominantly rural character. The district recorded a moderate annual population growth rate of 1.29% between 2017 and 2023, with urban areas growing slightly faster (1.44%) than rural areas (1.28%). Males outnumber females, with a sex ratio of 109

males per 100 females, while the average household size is 5.4 persons. The district has a low population density of 90.56 persons per square kilometre, reflecting its vast desert landscape and dispersed settlements. Overall, Tharparkar remains a sparsely populated, predominantly rural district with gradual urban growth.

5.5.1.2. Healthcare Facilities

159. During the field survey and consultations, it was confirmed that no medical or healthcare facilities are located in the immediate vicinity of the proposed project site, as the surrounding area is predominantly vacant. Residents rely on nearby Basic Health Units (BHUs), Rural Health Centres (RHCs), and healthcare facilities in Islamkot for primary and secondary healthcare services. For specialized medical care, emergency treatment, diagnostic services, and inpatient facilities, the local population generally travels to Islamkot downtown, which is located approximately 15 km from the project site.

5.5.1.3. Livelihood and Economic Activities

160. The economy of the project area is predominantly based on rain-fed (barani) agriculture and livestock rearing, which constitute the primary sources of livelihood for the local population. Agricultural production is highly dependent on the monsoon season, with rainfall typically occurring between July and September. Due to the arid climate of Tharparkar, the quantity and distribution of rainfall are often erratic, resulting in significant year-to-year variations in crop production. Livestock rearing—including cattle, goats, sheep, and camels—plays a vital role in household livelihoods and serves as an important source of income, food security, and financial resilience during periods of poor agricultural production. Animals are primarily dependent on natural rangelands, crop residues, and locally available fodder. In addition to farming and livestock, a small proportion of the population is engaged in wage labor, local trade, transport services, and employment associated with the Thar coal and energy development projects in the Islamkot area, providing supplementary sources of household income.

5.5.1.4. Sensitive Receptors

161. No major sensitive receptors were identified during the field survey. The notable sensitive receptors include mosques, temples, and graveyard, those are located at a sufficient distance from the proposed project site and are not expected to be affected by the planned activities. Additionally, no villages or residential settlements were identified in the immediate vicinity of the proposed site.

6. STAKEHOLDER CONSULTATION

6.1. Introduction

162. Stakeholder consultations were a critical component of the Environmental Impact Assessment (EIA) process for the Waste Management Facility (WMF) project, ensuring transparency, inclusiveness, and the incorporation of diverse perspectives into project planning and impact mitigation. The consultations engaged a wide range of stakeholders, including government authorities, local communities, and nearby small business owners. Government agencies and key institutions, including Sindh Environmental Protection Agency (SEPA), Town Municipal Committee, Islamkot, and Rural Health Center (RHC), Islamkot were consulted to understand regulatory expectations and local development priorities. Local community members were engaged through individual interviews and informal discussions to gather their views on the potential socio-economic benefits and environmental concerns associated with the project. The consultations and focused group discussions (FGDs) have also been incorporated into the consultation framework to better understand impacts and inform inclusive development strategies. The outcomes of these consultations have been carefully analyzed and integrated into the project's environmental management and mitigation plans to ensure that the WMF project is socially responsible, environmentally sound, and aligned with national and international safeguard standards.

6.2. Objectives of Stakeholders Consultation

163. The overall objectives of the stakeholder consultation were;

- To disseminate project-related information such as location/boundaries, activities/plan of action, duration/timelines, expected positive outcomes, etc. among different stakeholders,
- To gather stakeholders' feedback on the proposed project – positive and negative and record their expectations, and
- To determine the extent of the potential negative impacts of project activities and propose suitable mitigation measures to reduce or eliminate them.

6.3. Types of Stakeholders

164. The project stakeholders are considered as individuals, groups, or other entities. Following stakeholders were consulted:

- Local Community
- Sindh Environmental Protection Agency
- Taluka Municipal Committee, Islamkot

- Rural Heatlh Center, Islamkot
- Participatory Village Development Program
- Secours Islamique France
- Nearby Business Owners

6.4. Stakeholder Consultation Process

165. The overall process for stakeholder consultations was inclusive and transparent. All project-related information was shared with the primary and secondary stakeholders and discussions were made regarding projects' potential positive and negative impacts, and possible mitigation measures. The feedback received from all stakeholders have been summarized in this section.

166. The stakeholder consultation process is provided in Table 6-1.

Table 6-1: Stakeholder Consultation Process for Waste Management Facility Project

Sr. No.	Type of Stakeholders	Purpose of Consultations	Approach	Tools
1	Local Community & Nearby Business Owners	• Sharing of project-related information like project boundary/extent, duration, type of activities, etc. • Discussion on potential positive impacts • Discussion on potential negative impacts and the possible mitigation measures • Record their feedback and concerns • Assess their expectations from the project	• Field Visits • In-depth Interviews • Focus Group Discussions	• Note for record
2	Government Departments & NGOs	• Sharing of project-related information • Role of the secondary stakeholders in project planning and execution • Discussion on possible mitigation measures • Ensure cooperation and create liaison	• One to one meeting	• Note for record

6.5. Outcomes of Consultations

6.5.1. Consultations with Local Community & Nearby Business Owners

167. The comments, concerns and recommendations received during the stakeholder consultations have been included in this section. The comments gathered from stakeholder consultation were helpful in the screening of potential environmental and social aspects of the project. Figure 6-1 shows the stakeholders' consultations.

- A comprehensive waste management system was recommended to ensure the safe and proper handling of medical and other hazardous waste to be treated at the proposed WMF.
- The local community members expressed their support for the proposed project, highlighting its potential to contribute positively to the development and socio-economic growth of the surrounding area.
- It was suggested that waste storage areas should be properly covered to prevent odour-related problems.
- It was suggested that periodic consultations should be conducted with local communities throughout the project lifecycle to maintain transparency and community participation.
- It was suggested that effective noise and air pollution control measures should be implemented to minimize impacts on nearby communities.
- The development of an appropriate waste transportation and management system was recommended to ensure the safe and proper handling of waste.
- It was suggested that a comprehensive firefighting system be installed at the project site.
- The establishment of an appropriate drainage system was recommended to prevent contamination of soil and water resources.







Figure 6-1: Pictorial View of Consultations

6.5.2. Consultation with Government Departments and NGOs

168. Extensive consultations were done with the provincial government departments and NGOs. The recommendations received from secondary stakeholders have been provided in this section. The comments gathered during the consultations were helpful in the screening of potential environmental and social aspects of the project. Figure 6-2 to Figure 6-4 show consultations with secondary stakeholders.

6.5.2.1. Sindh Environmental Protection Agency (SEPA)

169. A meeting was held with Mr. Ali Muhammad Rind, Regional In-charge, Sindh EPA, Mirpur Khas. He acknowledged the development activities in the region and stressed the following points:

- He recommended that comprehensive technical information be provided to the relevant stakeholders, including the number of incineration units and their capacities, emission control systems, and environmental monitoring arrangements.
- He informed that an Environmental Impact Assessment would be required as per Sindh (Environmental Assessment) Regulation 2021.
- He emphasized that Air Dispersion Modelling should be conducted to evaluate the potential impacts of emissions on the surrounding environment. He recommended that hazardous and non-hazardous waste should be stored separately.
- It was recommended that hospital waste be disposed of at an incineration plant immediately to avoid interim storage and bacterial growth.
- He recommended establishing a green belt around the proposed Waste Management Facility (WMF) to provide environmental benefits and mitigate potential impacts.

170. It was ensured that all these elements would be considered in the project planning phase.

6.5.2.2. Town Municipal Committee, Islamkot

171. A meeting was held with Mr. Kamlesh Kumar, Chairman Town Committee. A pictorial view of the consultation is provided in Figure 6-2. He suggested the following points:

- He appreciated the proposed Water Management Facility (WMF), emphasizing that such a project is urgently needed in the area.
- He further informed that solid waste is currently collected through loaders and tractor-trolleys and disposed of at temporary landfill sites.



Figure 6-2: Pictorial View of Consultation with TMC

6.5.2.3. Rural Health Center (RHC), Islamkot

172. A meeting was held with Mr. Krishan Lal, In-Charge, RHC Islamkot. A pictorial view of the consultation is provided in Figure 6-3. He suggested the following points:

- He recommended that the waste generating industries/departments should be clearly informed about the respective roles and responsibilities of all parties.
- He suggested that infectious waste be handled and transported by trained personnel to minimize potential risks to human health and the environment.



Figure 6-3: Pictorial View of Consultation with RHC

6.5.2.4. Secours Islamique France (SIF) - NGO

173. A meeting was held with Mr. Rajesh Kumar, representative SIF. A pictorial view of the consultation is provided in Figure 6-4. He suggested the following points:

- He recommended that adequate arrangements be made for the safe handling and transportation of infectious and hazardous waste by trained personnel.
- He emphasized the need for regular community awareness and engagement to promote proper waste disposal practices and encourage community participation.



Figure 6-4: Pictorial View of Consultation with SIF

6.5.2.5. Participatory Village Development Program - NGO

174. A meeting was held with Mr. Arjun Das. He suggested the following points:

- He recommended establishing a grievance redress mechanism to ensure that concerns and feedback from affected communities are addressed promptly and transparently.
- He emphasized that the job opportunities should be provided to the local communities during both the construction and operation phases.
- He suggested that skill development and training programs be arranged for local residents to enhance their participation in waste management related activities.

7. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

175. This chapter identifies the beneficial as well as the potentially significant adverse environmental and social impacts during construction and operation phases of the proposed Waste Management Facility (WMF) project on the physical, ecological and socio-economic conditions of the environment. The appropriate mitigation measures are also proposed in this chapter. Apart from positive impacts, there are some potential significant adverse environmental and social impacts on the local environment. The proposed project is divided into two stages i.e. construction stage and operational stage.

176. Potential construction phase and operational phase impacts from the various activities at proposed project were identified thorough review of the project activities, study of surrounding environment, review of literature, review of previous similar studies and experts' judgment.

177. The identification and assessment of environmental impacts is based on the local and international guidelines as discussed previously in the section of legislative requirements of this EIA document, which was supplemented by review of project activities, experts' judgment, study of surrounding environment, review of literature and review of previous similar studies. The assessment procedure includes following steps:

A. Predication of the Potential Environmental and Social Impacts

178. This step refers to the description, quantitatively (where possible) or qualitatively impacts of the proposed project. This may be achieved through comparison with other similar activities.

i. Definition of the Criteria for Determining Significance

179. The consequence of the proposed activity is evaluated by comparing it against a recognized Significance Criteria. The criteria are of the following types:

- Institutional recognition laws, standards, government policies, or plans
- Technical recognition guidelines, scientific or technical knowledge, or judgment of recognized resource persons
- Public recognition social or cultural values or opinion of a segment of the public, especially the community directly affected by the proposed project
- Professional interpretation of the evaluator

ii. Identification of the mitigation measures

180. If it is determined that the predicted impacts are significant then the suitable mitigation measures are identified. There is a range of mitigation measures that can be applied to reduce impacts. Broadly, these measures can be classified into four categories:

- Avoiding the impacts altogether by not taking certain proposed activities or parts of an activity, for example, using chlorofluorocarbons (CFC) -free equipment to avoid impact on ozone layer
- Minimizing impacts by limiting the degree or magnitude of the activities, for example, minimizing dust emission by reducing vehicle speed
- Rectifying the impacts by repairing, rehabilitating, or restoring the affected environment
- Compensating for the impacts by replacing or providing substitute resources or environments

iii. Evaluation of the Residual Impacts

181. Incorporation of the suggested mitigation measures reduce the adverse impacts of the proposed project and bring it within the acceptable limits. This step refers to the identification of the anticipated remaining impacts after mitigation measures have been applied.

iv. Identification of the monitoring requirements

182. The last step in the assessment process is the identification of the minimum monitoring requirements. The scope and frequency of the monitoring depends on the residual impacts, and its details are later addressed in Chapter 8; Environmental Management and Monitoring Plan (EMMP) of this EIA document. The purpose of monitoring is to confirm that the impacts are within the predicted limits and to provide timely information if unacceptable impacts are taking place.

183. Each impact rating reflects an integrated assessment of the scale, duration, reversibility, and significance of potential changes to environmental and socio-economic conditions, in line with SEPA and international best practices.

7.1. Construction Phase Impacts

I. Topography and Land Use

Potential Impact

184. Site preparation activities will involve small-scale excavations, leveling and grading, which may result in micro topographical changes of the project site. Further, in the case of residual construction material such as cement and or ready mix if not handled properly and left unattended it may result information of uneven structures referred to as heaps. The impact on the topography is expected to be insignificant.

Criteria for Determining the Significance

185. An adverse impact on the surface topography of the project site will be interpreted if site preparation or construction activities result in modifications to the existing topographic elevation or the formation of prominent heaps due to improper handling or disposal of construction materials.

Mitigation Measures

i. Proper site leveling should be ensured, in order to minimize the probability of topographic changes at and project site.

ii. The cutting and leveling activities within the site will be controlled as required for the proposed project.

iii. Ensure that construction material such as cement and or ready mix is handled properly, and no residual material is left unattended to avoid the probability of formation of heaps and uneven structures.

Residual Impacts

186. If the suggested mitigation measures are implemented, disturbance to the surface topography will be minimized.

Monitoring Requirements

187. Surface topography will be monitored during construction phase by an Independent Environmental Monitoring Consultant (IEMC).

II. Site Aesthetics

Potential Impact

188. If construction residuals are not well managed and or shifted and not disposed of at a designated area, it may affect the site aesthetics. Furthermore, the construction activities will generate solid waste, if the waste is scattered and not handled properly and left unattended it will result in adverse visual aesthetics at the proposed project site.

Criteria for Determining the Significance

189. Adverse, unpleasant, and unaesthetic conditions may be developed if construction residuals and waste left unattended.

Mitigation measures

i. A designated area will be allocated for storage of the construction residual and associated waste material, prior to its final disposal.

ii. Ensure that construction material such as cement and or ready mix is handled properly, and no residual material is left unattended so as to avoid the probability of formation of heaps and uneven structures.

iii. It is recommended that green belts will be developed in and around the proposed project site, while considering plantation of native species.

iv. Proper site-specific housekeeping is to be ensured during construction activities.

Residual Impacts

190. Implementation of the mitigation measures will not leave long-term residual impacts.

Monitoring Requirements

191. Periodic visual inspections will be carried out as part of the Environmental Management Plan (EMP) to ensure good site aesthetics.

i. Proper housekeeping

ii. Waste Storage Practices

III. Ambient Air Quality

Potential Impact

192. The air quality of the project area will be affected by the exhaust emissions (NO2, SO2, CO and particulate matter) produced from the construction machinery and equipment. All these are considered as pollution indicators. Fossil fuels combustion in construction and transport vehicles will emit greenhouse gases (CO2, CH4, and N2O). These greenhouse gases trap the heat and results in warming. Monitoring results of ambient air quality shows that air in project area is in limits of SEQS. These emissions may also affect the air quality by further polluting the air. As discussed, earlier temperature is usually high throughout the year and the wind speeds also remain high and emissions may be carried over longer distances.

193. Higher temperatures can lead to more intense vehicle emissions due to the greater use of construction vehicles and machinery, often in poor maintenance conditions. These emissions contribute to the buildup of nitrogen oxides (NOx), carbon monoxide (CO), and particulate matter in the air, which degrades air quality. Moreover, high temperature will cause fast evaporation and keep the soil dry which will make the soil more prone to erosion and wind will carry these soil particles as suspension and make them travel to long distance. Relative humidity is usually high during April to October (Section 5.3.4.4, Chapter 5) which can further increase the temperature feel in area. High Humidity can enhance the formation of ground-level ozone when combined with heat and sunlight, though its effects are typically more prominent in warmer, drier conditions. Project site is located in arid climate so this problem can affect the air quality. The impact is temporary and moderate adverse.

Criteria for Determining the Significance

194. An adverse impact will be interpreted if the ambient air quality of the proposed project location exceeds the prescribed SEQS limits.

Mitigation measures

i. All vehicles, machinery, equipment and generators to be used during construction activities should be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions;

ii. SEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery should be enforced during construction works;

iii. During periods of high temperature and humidity, less frequent but larger applications of water or dust suppressants can be effective at keeping dust levels low; and

iv. The vehicles speed on graded roads will be limited in order to minimize dust emissions.

Residual Impacts

195. Ambient air quality is likely to be altered during the construction phase.

Monitoring Requirements

196. Ambient air quality monitoring includes critical pollutants such as NO2, SO2, CO and particulate matter to be conducted by engaging Independent Environmental Monitoring Consultant (IEMC). The monitoring reports to be submitted quarterly to EPA-Sindh, providing compliance status with applicable regulations.

IV. Noise and Vibration

Potential Impact

197. The noise monitoring results suggest that the average noise level ranging between 51.2 dB(A) to 58.5 dB(A). However, construction activities can contribute to noise pollution and vibration in several ways. The noise and vibration will be produced due to the operation of construction machinery and equipment. The construction machinery is expected to generate noise levels that would be severe in the project area. Erosion and dust emissions during construction will further enhance the noise levels. Dust accumulates on the moving parts of machines, increasing friction and mechanical wear. This forces machines to work harder, leading to higher noise levels. The dust can settle on nearby infrastructure, including vehicles and machinery. When workers or other equipment interact with these surfaces, it can lead to additional noise as debris is moved or cleaned.

Criteria for Determining the Significance

198. An adverse impact will be interpreted, if the noise level within the close proximity of the proposed project construction site exceeds the SEQS limits.

Mitigation Measures

i. All construction vehicles, machineries and equipment to be installed with suitable silencers;

ii. Regular maintenance of machinery ensures it operates efficiently and produces less noise;

iii. Project construction zone will be barricaded, and proper sign boards will be displayed.

iv. Unauthorized personnel will not be allowed to access construction zone.

v. Onsite workers associated with construction activities will be provided with adequate 'personal protective equipment' (PPEs) to reduce their probability of high noise exposure.

vi. The construction activities will be scheduled / planned in such a way as to prevent high noise activities during night times and simultaneous operation of multiple high noise equipment will be avoided to the extent feasible.

Residual Impact

199. Strict implementation of the mitigation measures will not leave any long-term residual impact; however, the minimal level of noise is still expected from proposed project activities.

Monitoring Requirements

200. During construction phase periodic noise level monitoring will be carried out as prescribed in SEQS, by an IEMC. The ambient noise levels and emissions from equipment and machineries will also be monitored.

V. Wastewater Discharges

Potential Impact

201. Generation of wastewater from the construction site may contaminate the soil if not properly managed. This may not only cause harm to soil, but also provide breeding place for mosquitoes and other insects, which is dangerous for the environment.

Criteria for Determining the Significance

202. A significant impact will be interpreted if wastewater is improperly discharged, which could cause stagnant water, and provide breeding place for mosquitoes.

Mitigation measures

i. No direct discharge will be allowed.

ii. Wastewater will be drained after passing through settling pit.

Residual Impacts

203. Residual impacts are foreseen to be negligible/low in this case if adhered to the recommended mitigation measures.

Monitoring Requirements

204. Visual inspection and proper implementation of mitigation measures will be ensured.

VI. Soil Quality

Potential Impact

205. Since the proposed project will be developed on a vacant land, hence very minimum excavation will be required, which may result in soil erosion, not only this but leakage and spillage of construction material and or leakages from construction machineries may also result in soil contamination.

Criteria for Determining the Significance

206. The adverse impact onto the site soil will be interpreted in case if it is contaminated by spillage of construction material.

Mitigation Measures

i. Careful use of heavy machineries and equipment should be ensured in order to prevent leakages which may result in release of contaminants directly onto the soil.

ii. Ensure that malfunctioning machineries should be kept away from exposed soil area and should be repaired on immediate basis at designated workshops having impermeable floors.

iii. A spill prevention procedure will be implemented throughout the construction phase.

Residual Impacts

207. Residual impacts will be negligible/low if adhered to recommended mitigation measures.

Monitoring Requirement

208. Visual inspections will be carried out by site supervisor to ensure that the soil within the project surrounding is not being contaminated during the project activities.

VII. Ecological Environment

I. Flora

Potential Impact

209. The construction activities will be confined to the proposed project site. However, exhaust of noxious gases from movement of construction machinery, transportation vehicles and dust will pollute air which may adversely affect health and vigor of plants in the proposed project area.

Criteria for Determining the Significance

210. A significant impact will be interpreted if construction activities result in substantial damage to, or loss of, existing vegetation, including shrubs and other plants, in the proposed project area.

Mitigation Measures

i. Open fires should be banned in the area to avoid hazards of fire in the area;

ii. Construction vehicles, machinery and equipment will remain confined within their

designated areas of movement; and

iii. The project developer's staff and labor shall be strictly directed use the paths and roads for movement and shall not be allowed to trespass through farmlands or forested areas.

Residual Impact

211. Residual impacts are seen to be negligible/low in this case if recommended mitigation measures are implemented.

Monitoring Requirement

212. The site supervisor will conduct regular visual inspections to check that construction activities do not damage existing vegetation, including trees, shrubs, and other plants in the proposed project area.

II. Fauna

Potential Impact

213. Since the construction activities will be limited to the proposed site, which is a vacant land and most fauna recorded or reported within the study area are disturbance tolerant, hence no significant impact is envisaged.

Mitigation Measures

i. No mitigation measure is required.

VIII. Occupational Health and Safety

Potential Impact

214. Slips and falls at the same altitude connected with poor housekeeping in construction are among the most frequent cause of lost time accidents at construction places. Confined spaces that may exist at the construction sites may include sewers, pipes, utility vaults, tanks, and access shafts.

215. Falls from height linked with working with scaffolding, ladders and partially built are among the most common cause of fatal or permanent disabling injury.

216. Over-exertion injuries and illnesses, such as over-exertion, and manual handling, are among the most common causes of injuries. As usual, vehicle traffic and use of lifting apparatus in the travel of machinery and materials on a construction site may pose temporary hazards, such as physical contact, emissions, spills, dust, and noise. Heavy equipment operators have partial fields of view near to their equipment and may not see foot- travelers close to the vehicle. Center-articulated vehicles make a major impact or crush hazard zone on the exterior side of a turn.

217. Construction schedule will affect the workers efficiency. As discussed in Baseline Study

(Chapter 5) summer is long and temperatures are high during May and June. High temperatures can lead to heat-related illnesses such as heat exhaustion, heatstroke, dehydration, and heat cramps. These are particularly dangerous for workers who are engaged in physically demanding tasks under direct sunlight. Similarly, rainfall and wind speed can affect the workers and efficiency. In high heat, fatigue sets in more quickly, and workers may become less alert, which increases the chances of workplace accidents.

Criteria for Determining the Significance

218. A significant impact will be interpreted if a large number of frequent accidents, incidents, injuries and hazards occur at proposed project site.

Mitigation Measures

i. The contractor will ensure that activities at the site will not cause damage to lives and properties by implementing the following measures to ensure the health and safety of workers and the public.

ii. Only trained workers will be allowed to work at the construction sites.

iii. Provision of first aid facilities for workers at site to meet the emergency needs of workers.

iv. Emergency response training should be given to employees and evacuation drills should be scheduled and conducted.

v. Ensure that hazards associated with manual lifting are controlled with proper lifting techniques, work rotation system will reduce the chances of being exposed to work related stress associated with construction activities.

vi. Unauthorized personnel will not be allowed to access the proposed project site without permission and safety permits.

vii. Arrangement of proper first aid unit and emergency vehicle will be made to take affected personnel to the nearest medical facility.

viii. Workers should be facilitated by providing appropriate work specific PPE's.

ix. Construction area will be fenced to avoid accidents and will be properly collected to avoid stagnant water that could harbor mosquitoes and other disease vectors.

x. Accidents record will be maintained.

xi. Use of signage must be implemented.

xii. The AKC management must ensure implementation of proper Safety policy at project location so as to reduce the chances of occurrence of frequent hazards.

Residual Impacts

219. Residual impacts are seen to be negligible/low in this case if recommended mitigation

measures are implemented.

Monitoring Requirements

220. Risk assessment to be carried out on regular basis by engaging Independent Environmental Monitoring Consultant.

IX. Solid Waste

Potential Impact

221. Different types of waste is likely to be generated during the construction phase of the project. The municipal waste will be in the form of food, cans, paper. Construction waste will include excavated soil, sand, gravel, pieces of concrete, bricks, wood, metal pieces and electrical wires whereas hazardous waste can be comprised of paints and construction chemicals. All these, if left unattended, can become a source of nuisance and environmental pollution in the project area. Insecure and unhygienic disposal of solid wastes particularly garbage and trash may cause degradation of soil and land. Insecurely disposed of heaps of wastes containing kitchen garbage and food waste can serve as breeding grounds for the disease spreading vectors and rodents.

Criteria for Determining the Significance

222. A significant impact will be interpreted if the above mentioned wastes are scattered and dispersed at the project site and its surroundings.

Mitigations Measures

i. Solid waste generated during construction sites should be safely disposed of at designated waste disposal sites;

ii. Proper labeling of waste containers, including the identification and quantity of the contents, hazard contact information should be carried out;

iii. Training of employees for identification, segregation, and management of waste should be ensured;

iv. Construction workers and supervisory staff should be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste.

Residual Impacts

223. Proper implementation of the mitigation measures will ensure that the residual impact from waste is minimal.

Monitoring Requirements

224. An IEMC will carry out monthly visual inspections to ensure good solid waste management practices at the proposed project site.

7.2. Operational Phase Impacts

I. Topography and Land Use

Potential Impact

225. Since all the activities for development of proposed WMF are limited to construction phase only, hence no impact on to the topography and land use pattern is envisaged during the operational phase of the proposed project.

II. Site Aesthetics

Potential Impact

226. If proper housekeeping practices are not adopted during the operational phase and the items to be utilized are scattered at all places within and around the proposed WMF, it may create adverse effects onto the existing site aesthetics.

Criteria for Determining the Impacts

227. Incase if the items to be utilized during operational phase are scattered within and around the proposed WMF, may pose adverse impacts.

Mitigation Measures

i. It is strongly recommended to keep all the items to be utilized during operational phase at a designated area, those areas should be properly marked and for its effective utilization and purpose for example, hazardous/medical and industrial waste shall only be stored in controlled temperature, chemical drums and maintenance material etc. shall only be placed in warehouse and so on.

ii. Strong administrative controls and a management system should be in place and implemented during the entire life cycle of the proposed project to avoid the chances of adverse aesthetic impact at the project site.

Residual Impact

228. Strict implementation of the suggested mitigation measures will significantly reduce the chances of any residual impact; however, weak administrative control may exhibit and enhance the quantum of the impact discussed above.

Monitoring Requirements

229. Periodic visual inspections and housekeeping audit should be carried out by engaging a third party Independent Environmental Monitoring Consultant (IEMC) to monitor housekeeping practices at the proposed project site.

III. Ambient Air Quality

Potential impacts

230. During operational phase, following would be the potential air pollution sources; incineration units, backup generator, waste transportation vehicles, fugitive emissions from diesel storage area and incineration ash, following ambient air pollutants are likely to disperse in ambient environment; Oxides of Nitrogen (NOx), Oxides of Sulphur (SOx), Carbon Monoxide (CO), Particulate Matter PM10 incase if proper pollution abatement technologies and methods are not adopted. Furthermore, it is important to note that incineration units will be installed with an air pollution control system which will significantly reduce air emissions levels in the project area. Additionally, the detailed Air Dispersion Modeling (ADM) is conducted to identify and predict stack emissions concentration within the project surrounding areas. The model revealed that the stack emissions during project operations will remain within the permissible limits as defined in SEQS. The ADM findings are attached as ANNEXURE IX.

Criteria for Determining the Significance

231. Adverse impacts will be interpreted if the proposed facility exceeds the maximum permissible SEQS limits for gaseous emissions and air emissions. Also, if the fact is established on scientific grounds that the ambient air quality is degraded or affected by proposed project operations then the significant impact on ambient air quality will be interpreted.

Mitigation Measures

i. All the possible ambient air pollution sources shall be installed with appropriate air pollution abatement technologies.

ii. Pollution abatement equipment to be utilized for proposed incineration units. A combination of APC devices (with capacity to remove 95% to 99% pollutants) would be utilized as part of the mitigation measures to safeguard against non-compliant chlorinated dioxin concentrations. This combination would be a specially designed wet scrubbing system.

iii. A specially designed wet scrubbing system in incineration units should be frequently checked and replaced once it expires and completes the life span to avoid chances of ambient air pollution in the project surrounding.

iv. The air to fuel ratio of incinerators and generators should be maintained at all times.

v. Diesel storage facility should be inspected for any leakages and if a leakage is identified it should be immediately repaired to avoid fugitive emissions from the source.

vi. Discourage the idling of vehicles i.e., vehicles and equipment will be turned off when not in direct use to reduce exhaust emissions.

vii. Discarded or broken medical equipment such as mercury thermometers, sphygmomanometers, blood pressure devices, dilation and feeding tubes will not be

incinerated at any time to avoid chances of dioxins and furans emissions.

viii. Stack will have sampling points consisting of sampling port-hole, platform and access ladder, to monitor the emission levels.

Residual Impacts

232. Strict implementation of the mitigation measures is unlikely to leave any long-term residual impact.

Monitoring Requirements

233. Periodic ambient air quality monitoring as prescribed in SEQS shall be carried out during the entire life cycle of the proposed project by engaging Independent Environmental Monitoring Consultant (IEMC).

IV. Noise & Vibration

Potential Impacts

234. During the operational phase, a number of noise sources, including incineration plant operations, waste transportation vehicles, waste unloading activities, and the emergency generator, etc., will contribute to ambient noise and localized vibration. These impacts require careful management to prevent nuisance and potential discomfort, particularly near the site boundaries. Anticipated noise sources include:

Criteria for Determining the Significance

235. An adverse impact will be interpreted if the noise level exceeds the prescribed SEQS limits.

Mitigations Measures

i. Ensure proper maintenance of all the equipment throughout the entire life cycle of the proposed project to reduce the chances of elevated noise levels.

ii. Provide barriers by using appropriate noise reduction material such as; UPVC walls around site boundaries to provide some buffer against noise propagation.

iii. Proper signboards indicating noise area shall be installed at all areas within the proposed WMF.

iv. Workers to be provided with ear plugs and earmuffs at high noise areas and unauthorized personnel shall not be allowed to enter high noise area at all times.

v. Authorized personnel should seek and obtain work permits before entering the noisy area.

Residual Impacts

236. Strict implementation of mitigation measures is unlikely to leave any long-term residual

impact.

Monitoring Requirements

237. During the operational phase of WMF, periodic noise level monitoring will be carried out as prescribed in SEQS, through SEPA approved laboratory. The ambient noise levels and emissions from equipment and machinery will also be monitored.

V. Wastewater Discharges

Potential Impact

238. During the operation phase, both process and domestic wastewater will be generated. The process wastewater will be generated approximately 5,000 – 5,500 GPD and the domestic wastewater will be generated approximately 400-500 GPD from washrooms, kitchen, ablution, etc. The process wastewater will be routed to a recirculation tank, filtered, and reused in the wet scrubbing system and domestic wastewater will be treated into the wastewater treatment system. The system will be based on dual staged mechanism. The initial stage will have a septic tank. The wastewater from the proposed project will be routed to the septic tank from where it will flow from the top portion of the septic tank into the second stage. The second stage will contain a soak pit. The soak pit will contain loose gravel which allows wastewater to gradually soak into the ground, while wastewater from wet scrubbers will be recycled.

Criteria for Determining the Significance

239. A significant impact will be interpreted if the discharge effluent is not appropriately managed or meet the prescribed SEQS limits or exceeds the limits.

Mitigations Measures

i. Ensure that sewage water shall be treated properly at the site by wastewater treatment system and ensure that there will be proper soakage pits with porous walled chamber that allow water to slowly soak after the effluent is pre-settled in septic tanks.

ii. Effluent sewers shall be periodically cleaned and inspected for integrity in order to ensure effective transport of effluents and prevent overflows and leakages and infiltration.

iii. Wastewater from all sections of the facility shall be routed to a wastewater treatment system.

iv. Utilization of sand and fine gravel shall be made mandatory in pits which should be spread across the bottom of pit to help disperse the flow. Depth should not be less than 1.5 meters above the ground water table, the pits shall be designed in a way which allows percolation through soil from the soak pits, and small particles shall be filtered out by soil matrix allow organic material to be digested/degraded by microorganisms.

Residual Impacts

240. Strict implementation of the mitigation measures is unlikely to leave any long-term residual impact.

Monitoring Requirements

241. Treated water shall be periodically monitored for relevant parameters to assess compliance with SEQS, if it is discharged into main drain line (once installed). Periodic monitoring shall be conducted through a third-party SEPA certified laboratory, monitoring reports will be submitted to SEPA as required and to assess implementation of the control measures and results of monitoring to be reviewed and corrective actions to be taken for any deviations.

VI. Soil Quality

Potential Impact

242. Hazardous waste storage, transfer, and handling activities may result in spills of chemicals, contaminated liquids, oils, or infectious waste, causing soil contamination.

Criteria for Determining the Significance

243. The adverse impact onto the site soil will be interpreted in case if it is contaminated by spillage or leakage of hazardous substances.

Mitigation Measures

i. Waste storage areas will be provided with impermeable concrete flooring and appropriate secondary containment systems to prevent the infiltration of hazardous substances into the soil in the event of accidental spills or leaks.

ii. Spill prevention and emergency response procedures will be implemented.

iii. Spill response kits will be maintained at designated locations within the facility, and workers will be provided with appropriate training on spill prevention, emergency response, and spill management procedures.

Residual Impacts

244. Residual impacts will be negligible/low if adhered to recommended mitigation measures.

Monitoring Requirement

245. Visual inspections will be carried out by HSE supervisor to identify any signs of soil contamination and periodic soil quality monitoring will also be carried out to verify whether operational activities are affecting soil quality.

VII. Ecological Environment

I. Flora

Potential Impact

246. The operation of transportation vehicles, incineration plants and other equipment generate noise. While plants are not directly affected by noise, the disturbances can impact animals that pollinate or disperse plant seeds, which can indirectly affect plant reproduction and growth. Dust generated by movement of vehicles, handling and storage of waste and ash, can negatively impact the surrounding environment. Particulate matter can settle on the leaves of plants or the soil, leading to contamination. Airborne dust and pollutants can damage plant leaves, reduce photosynthesis, and stunt plant growth. Dust accumulation on plants can block sunlight and make it difficult for plants to absorb the necessary nutrients for healthy growth. Additionally, particles may alter the pH of the soil, making it less conducive for plant growth.

Criteria for Determining the Significance

247. A significant impact will be interpreted if operation activities result in substantial damage to, or loss of, existing vegetation, including shrubs and other plants, in the proposed project area.

Mitigations Measures

i. Incineration ash will be controlled at source and stored in bags for a short time in covered area to avoid its dispersion in ambient environment;

ii. Dust control measures such as using water sprays and dust suppression systems during the operation phase;

iii. Noise reduction technologies such as sound barriers or quieter machinery.

iv. It is strongly recommended to observe the survival rate of the existing species on quarterly basis and in case if it is declining the species should be replanted by ratio of 1:5 by the help of local communities.

Residual Impact

248. Strict implementation of mitigation measures is unlikely to leave any long-term residual impact

Monitoring Requirement

249. During operational phase periodic monitoring of flora in the project area will be carried out.

II. Fauna

Potential Impact

250. The proposed WMF will be located in the vicinity of the Bhave Jo Tar, Islamkot, Sindh, which does not shelter any significant or endangered fauna species within a 2 km radius of the project area. Hence, no significant impact is envisaged.

Mitigations Measures

i. No mitigation measure is required.

VIII. Health and Safety

Potential Impact

251. During the operational phase a number of equipment and systems would be working which include incineration units, generators, transportation vehicles, etc. in parallel to that a number of technical and non-technical personnel would also work at the proposed WMF which may include routine office working, repairs and maintenance and incinerator operations, safety and security provision, loading and unloading of medical and industrial waste and incineration ash etc. Therefore, a number of health and safety hazards are envisaged incase if proper Standard Operating Procedures (SOPs) for machinery and equipment operations, Material Safety Data Sheets (MSDS) for chemical handling and storage, protocols for operations monitoring and inspections and adequate health, safety and environmental risk assessment systems, tools and personnel are not in place. In case if the HSE systems are not in place project operations may not only harm the workers but the local communities may also be affected by project operations.

Criteria for Determining the Significance

252. Significant impacts will be interpreted if a large number of fires, explosions, frequent accidents, incidents, injuries and hazards are reported at proposed project site and if the fact is established on scientific grounds that the nearby settlements are affected by project operations in terms of health and safety.

Mitigation Measures

i. It is strongly recommended that a proper HSE management system and team should be available at project site at all times on rotational basis during the entire life cycle at the proposed WMF.

ii. Ensure that all areas of the proposed WMF shall be properly marked and labeled by adequate safety sign boards; these boards shall display hazard type, nature and quick remediation in case of its occurrence. All the sign boards shall be displayed in English, Urdu, and Sindhi language.

iii. HSE staff shall make sure that all the hazards that are likely to occur at project site should be clearly identified and a proper risk assessment matrix along with its mitigation and controls are in place and communicated to all the workers via toolbox talk.

iv. Toolbox talk shall be made mandatory on a regular basis and all the workers should be trained for all the possible hazards at project site.

v. Ensure that adequate firefighting systems are in place and frequent mock drills shall

be carried out to enhance the emergency preparedness and response skill of the workers.

vi. Ensure proper maintenance of firefighting system during the entire life cycle at the proposed WMF.

vii. All the workers involved in, operational activities will be provided with proper PPEs according to their job description including, Masks, aprons, head covering, and shoe covers, gloves, eye-shields and coverall etc.

viii. Ensure all compressed gas containers and cylinders are stored outdoors in a designated cage and must be appropriately label and shielded from exposure to extreme temperatures and away from any combustible materials.

ix. Eye-wash stations or emergency showers should be provided close to all workstations where immediate flushing with water is the recommended first-aid response.

x. Material Safety Data Sheet (MSDS) for chemicals, if any, will accompany the consignment.

xi. The facility must ensure implementation of proper Safety policy at all project locations so as to reduce the chances of occurrence of frequent hazards.

xii. Proper systems for contractor's safety shall be in place which shall be implemented when the contractor's access at project site for any of the activity associated with operational phase. The contractor shall only be allowed to access at the project site if they qualify HSE criteria and policies after getting a proper work permit and the permit shall clearly identify nature, type, quantum and time of work which shall remain valid for a specific period of time till such time the contractor completes their job at site.

xiii. All the vehicles accessing the project area shall also be inspected for fitness especially gas cylinders shall be inspected thoroughly to avoid any leakages or unforeseen hazard associated with damaged gas cylinders.

Residual Impacts

253. Strict implementation of mitigation measures is unlikely to leave any long-term residual impact.

Monitoring Requirements

254. Detailed Health and Safety Inspections shall be carried out by engaging a third-party consultant on a monthly basis.

IX. Road Safety & Traffic

Potential Impact

255. During the operational phase it is envisaged that a number of administration officials will travel to the project site. Although, the access to the proposed project site is easy, and all the stakeholders are fully active and operational, severe traffic issues may develop with the passage of time and population concentration in project area. At this stage particularly waste carrier (specialized vehicles) may move from different routes to the project site and from project site to the waste dumping/disposal site. During this routine waste transportation via specialized vehicles in case if the drivers do not obey traffic rules and speed limit a number of serious accidents may occur at different road networks also if the vehicles are not parked within the existing boundaries of the proposed WMF, the nearest stakeholders may experience nuisances.

Criteria for Determining the Significance

256. A significant impact will be interpreted if any driver or employee associated with the proposed WMF have a severe accident at nearby road networks, if any employee associated with AKC does not have driving license and drives the vehicle to and from project site on regular basis and if a fine is imposed by traffic police on any of the driver and or worker associated with the proposed WMF.

Mitigation Measures

i. The project proponent will develop a comprehensive traffic management plan and this plan shall be implemented during the entire life cycle of the proposed project.

ii. All project vehicles shall be fitted with internal and external cameras which shall be strictly monitored by administration unit for vehicular speed maintenance at all times.

iii. Drivers and employees accessing project sites via project vehicles should have valid licenses and HSE staff must impart proper training to the drivers and workers regarding road accidents and mitigations.

X. Employment and Labor Issues

Potential Impact

257. The project will generate significant employment opportunities. However, issues related to worker safety, labor exploitation, and inadequate wages may arise if proper labor standards are not implemented.

Criteria for Determining the Significance

258. A significant impact will be considered if workers are exposed to unsafe working conditions, lack adequate training, or are at increased risk of occupational injuries or health hazards.

Mitigation Measures

i. Ensure compliance with national labor laws and international standards for worker rights and safety;

ii. Provide training programs for workers on safety practices and technical skills; and

iii. Set up a worker grievance mechanism to address concerns and disputes.

Residual Impacts

259. Strict implementation of the proposed mitigation measures will leave no significant long-term residual impacts on employment and labor conditions.

Monitoring Requirements

260. A detailed monitoring of working conditions, worker training records, and the effectiveness of the grievance redress mechanism shall be carried out.

XI. Solid Waste

Potential Impacts

261. Biomedical waste is any waste which is generated during the diagnosis, and treatment of human beings or in research activities pertaining to the production or testing of biological material or substance. The World Health Organization (WHO) and SEPA concur that the following wastes should be classified as infectious waste:

- Sharps (needles, scalpels, etc.)
- laboratory cultures and stocks
- blood and blood products
- Pathological wastes: including tissues, organs and other body parts and fluids that are removed during surgery or autopsy, or their medical procedures, and specimens of body fluids and their containers.
- Waste is generated from patients in isolation because they are known to have an infectious disease.
- Chemicals and other hazardous materials are used in patient diagnosis and treatment.

262. However, the proposed WMF will include 02 high tech incineration units with built in air pollution control system "Wet Scrubbers", but during the operation phase, the principal waste generated will include incineration ash approximately (5-7%) of total waste, waste oil and chemical drums and domestic office waste such as papers and tube lights etc. Even small quantities of incineration ash or other domestic/routine office waste may result in adverse impact on human health of the workers and local communities as well as other environmental receptors.

Criteria for Determining the Significance

263. A significant impact will be interpreted if the incineration ash is not handled properly and in accordance with globally best practices.

Mitigation Measures

i. Proper inventories of all waste generated at project site during operations shall be maintained and recorded daily.

ii. The 3R principles (Reduce, Reuse, and Recycle) will be implemented.

iii. Waste transportation shall be carried out using covered vehicles to prevent littering and odor emissions.

iv. Ash shall be stored in a dedicated storage yard in covered bags and disposed of on a batch basis.

v. Open burning of waste shall be strictly prohibited at the project site.

vi. Personal protective equipment (PPE) shall be provided to all workers involved in waste handling activities.

vii. Hospital waste incineration ash may be stabilized and solidified, and the main objective of this treatment is to reduce the leachability or to increase the mechanical characteristics of the bottom ash. Therefore, the solidified matrix can immobilize the heavy metals found in fly and bottom ash.

viii. Final fate of incineration ash to be decided after its composition testing; if ash composition is suitable enough to be reused then the process of industrial ecology shall be adopted which means; waste of one industry/sector becomes raw material for other industry.

ix. However, if the composition is not suitable for reuse then ash shall be stored separately and disposed of in accordance with SEPA requirement.

Residual Impacts

264. Strict implementation of the proposed mitigation measures is unlikely to leave any long-term residual impact.

Monitoring Requirements

265. A detailed inspection into waste management practices shall be carried out.

8. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

266. This chapter provides the Environmental Management and Monitoring Plan (EMMP) for the proposed Waste Management Facility (WMF) project. The EMMP provided in this Chapter has been prepared for the construction and operation phases of the WMF.

8.1. Purpose and Objective of EMMP

267. The purpose of the EMMP is to provide a framework for the implementation of the mitigation and monitoring measures which were identified in Chapter 7. Based on this purpose, the key objectives of the EMMP are to:

a. Facilitate the implementation of the identified mitigation and monitoring measures from the assessment;

b. Define the responsibilities of the project proponent and contractor and to provide a means of effective communication of environmental issues between them;

c. Identify parameters in order to ensure the effectiveness of the mitigation and monitoring measures.

268. Detailed Environmental Management Plan for construction and operation phases are provided in Table 8-1 and Table 8-2, respectively. Meanwhile on the other hand a detailed Environmental Monitoring Plan for construction and operational phases are provided in Table 8-3 and Table 8-4, respectively.

Table 8-1: Environmental Management Plan during Construction Phase of Waste Management Facility

Sr. No.	Aspect	Impact	Mitigation	Implementation Responsibility
1	Topography and Land Use	Site preparation activities will involve small-scale excavations, leveling and grading, which may result in micro topographical changes of the project site. Further, in the case of residual construction material such as cement and or ready mix if not handled properly and left unattended it may result information of uneven structures referred to as heaps. The impact on the topography is expected to be insignificant.	• Proper site leveling should be ensured, in order to minimize the probability of topographic changes at and project site. • The cutting and leveling activities within the site will be controlled as required for the proposed project. • Ensure that construction material such as cement and or ready mix is handled properly, and no residual material is left unattended to avoid the probability of formation of heaps and uneven structures.	AKC's and Contractor's Administration

2	Site Aesthetics	If construction residuals are not well managed and or shifted and not disposed off at a designated area, it may affect the site aesthetics. Furthermore, the construction activities will generate solid waste, if the waste is scattered and not handled properly and left unattended it will result in adverse visual aesthetics at the proposed project site.	• A designated area will be allocated for storage of the construction residual and associated waste material, prior to its final disposal. • Ensure that construction material such as cement and or ready mix is handled properly, and no residual material is left unattended so as to avoid the probability of formation of heaps and uneven structures. • It is recommended that green belts will be developed in and around the proposed project site, while considering plantation of native species. • Proper site-specific housekeeping is to be ensured during construction activities	AKC's and Contractor's Administration

3	Ambient Air Quality	The air quality of the project area will be affected by the exhaust emissions (NO2, SO2, CO and particulate matter) produced from the construction machinery and equipment. All these are considered as pollution indicators. Fossil fuels combustion in construction and transport vehicles will emit greenhouse gases (CO2, CH4, and N2O). These greenhouse gases trap the heat and results in warming. Monitoring results of ambient air quality shows that air in project area is in limits of SEQS. These emissions may also affect the air quality by further polluting the air. As discussed, earlier temperature is usually high throughout the year and the wind speeds also remain high and emissions may be carried over longer distances.	• All vehicles, machinery, equipment and generators to be used during construction activities should be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions; • SEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery should be enforced during construction works; • During periods of high temperature and humidity, less frequent but larger applications of water or dust suppressants can be effective at keeping dust levels low; and • The vehicles speed on graded roads will be limited in order to minimize dust emissions.	AKC's and Contractor's Administration

4	Noise and Vibration	The noise monitoring results suggest that the average noise level ranging between 51.2 dB(A) to 58.5 dB(A). However, construction activities can contribute to noise pollution and vibration in several ways. The noise and vibration will be produced due to the operation of construction machinery and equipment. The construction machinery is expected to generate noise levels that would be severe in the project area. Erosion and dust emissions during construction will further enhance the noise levels. Dust accumulates on the moving parts of machines, increasing friction and mechanical wear. This forces machines to work harder, leading to higher noise levels. The dust can settle on nearby infrastructure, including vehicles and machinery. When workers or other equipment interact with these surfaces, it can lead to additional noise as debris is moved or cleaned.	• All construction vehicles, machineries and equipment to be installed with suitable silencers; • Regular maintenance of machinery ensures it operates efficiently and produces less noise; • Project construction zone will be barricaded, and proper sign boards will be displayed. • Unauthorized personnel will not be allowed to access construction zone. • Onsite workers associated with construction activities will be provided with adequate 'personal protective equipment' (PPEs) to reduce their probability of high noise exposure. • The construction activities will be scheduled / planned in such a way as to prevent high noise activities during night times and simultaneous operation of multiple high noise equipment will be avoided to the extent feasible.	AKC's and Contractor's Administration

5	Wastewater Discharges	Generation of wastewater from the construction site may contaminate the soil if not properly managed. This may not only cause harm to soil, but also provide breeding place for mosquitoes and other insects, which is dangerous for the environment.	• No direct discharge will be allowed. • Wastewater will be drained after passing through settling pit.	AKC's and Contractor's Administration
6	Soil Quality	Since the proposed project will be developed on a vacant land, hence very minimum excavation will be required, which may result in soil erosion, not only this but leakage and spillage of construction material and or leakages from construction machineries may also result in soil contamination.	• Careful use of heavy machineries and equipment should be ensured in order to prevent leakages which may result in release of contaminants directly onto the soil. • Ensure that malfunctioning machineries should be kept away from exposed soil area and should be repaired on immediate basis at designated workshops having impermeable floors. • A spill prevention procedure will be implemented throughout the construction phase.	AKC's and Contractor's Administration

7	Ecological Environment	**i. Flora** The construction activities will be confined to the proposed project site. However, exhaust of noxious gases from movement of construction machinery, transportation vehicles and dust will pollute air which may adversely affect health and vigor of plants in the proposed project area. **ii. Fauna** Since the construction activities will be limited to the proposed site, which is a vacant land and most fauna recorded or reported within the study area are disturbance tolerant, hence no significant impact is envisaged.	• Open fires should be banned in the area to avoid hazards of fire in the area; • Construction vehicles, machinery and equipment will remain confined within their designated areas of movement; and • The project developer's staff and labor shall be strictly directed use the paths and roads for movement and shall not be allowed to trespass through farmlands or forested areas. • No mitigation measure is required.	AKC's and Contractor's Administration

8	Occupational Health & Safety	Slips and falls at the same altitude connected with poor housekeeping in construction are among the most frequent cause of lost time accidents at construction places. Confined spaces that may exist at the construction sites may include sewers, pipes, utility vaults, tanks, and access shafts. Falls from height linked with working with scaffolding, ladders and partially built are among the most common cause of fatal or permanent disabling injury. Over-exertion injuries and illnesses, such as over-exertion, and manual handling, are among the most common causes of injuries. As usual, vehicle traffic and use of lifting apparatus in the travel of machinery and materials on a construction site may pose temporary hazards, such as physical contact, emissions, spills, dust, and noise. Heavy equipment operators have partial fields of view near to their equipment and may not see foot- travelers close to the vehicle. Center- articulated vehicles make a major impact or crush hazard zone on the exterior side of a turn.	• The contractor will ensure that activities at the site will not cause damage to lives and properties by implementing the following measures to ensure the health and safety of workers and the public. • Only trained workers will be allowed to work at the construction sites. • Provision of first aid facilities for workers at site to meet the emergency needs of workers. • Emergency response training should be given to employees and evacuation drills should be scheduled and conducted. • Ensure that hazards associated with manual lifting are controlled with proper lifting techniques, work rotation system will reduce the chances of being exposed to work related stress associated with construction activities. • Unauthorized personnel will not be allowed to access the proposed project site without permission and safety permits.	AKC's and Contractor's Administration

			• Arrangement of proper first aid unit and emergency vehicle will be made to take affected personnel to the nearest medical facility. • Workers should be facilitated by providing appropriate work specific PPE's. • Construction area will be fenced to avoid accidents and will be properly collected to avoid stagnant water that could harbor mosquitoes and other disease vectors. • Accidents record will be maintained. • Use of signage must be implemented. • The AKC management must ensure implementation of proper Safety policy at project location so as to reduce the chances of occurrence of frequent hazards.	
9	Solid Waste	Different types of waste is likely to be generated during the construction phase of the project. The municipal waste will be in the form of food, cans, paper. Construction waste will include excavated soil, sand, gravel, pieces of concrete, bricks, wood, metal	• Solid waste generated during construction sites should be safely disposed of at designated waste disposal sites; • Proper labeling of waste containers, including the identification and quantity of the contents, hazard	AKC's and Contractor's Administration

		pieces and electrical wires whereas hazardous waste can be comprised of paints and construction chemicals. All these, if left unattended, can become a source of nuisance and environmental pollution in the project area. Insecure and unhygienic disposal of solid wastes particularly garbage and trash may cause degradation of soil and land. Insecurely disposed of heaps of wastes containing kitchen garbage and food waste can serve as breeding grounds for the disease spreading vectors and rodents.	contact information should be carried out; • Training of employees for identification, segregation, and management of waste should be ensured; • Construction workers and supervisory staff should be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste.	

Table 8-2: Environmental Management Plan during Operational Phase of Waste Management Facility

Sr. No.	Aspect	Impact	Mitigation	Responsibility
1	Topography and Land Use	Since all the activities for development of proposed WMF are limited to construction phase only, hence no impact on to the topography and land use pattern is envisaged during the operational phase of the proposed project.	• No mitigation measure is required.	-
2	Site Aesthetics	If proper housekeeping practices are not adopted during the operational phase and the items to be utilized are scattered at all places within and around the proposed WMF, it may create adverse effects onto the existing site aesthetics.	• It is strongly recommended to keep all the items to be utilized during operational phase at a designated area, those areas should be properly marked and for its effective utilization and purpose for example, hazardous/medical and industrial waste shall only be stored in controlled temperature, chemical	AKC's Administration and HSE Staff

			drums and maintenance material etc. shall only be placed in warehouse and so on. • Strong administrative controls and a management system should be in place and implemented during the entire life cycle of the proposed project to avoid the chances of adverse aesthetic impact at the project site.	
3	Ambient Air Quality	During operational phase, following would be the potential air pollution sources; incineration units, backup generators, waste transportation vehicles, fugitive emissions from diesel storage area and incineration ash, following ambient air pollutants are likely to disperse in ambient environment; Oxides of Nitrogen (NOx), Oxides of Sulphur (SOx), Carbon Monoxide (CO), Particulate Matter PM10 incase if proper pollution abatement technologies and methods are not adopted. Furthermore, it is important to note that incineration units will be installed with an air pollution	• All the possible ambient air pollution sources shall be installed with appropriate air pollution abatement technologies. • Pollution abatement equipment to be utilized for proposed incineration units. A combination of APC devices (with capacity to remove 95% to 99% pollutants) would be utilized as part of the mitigation measures to safeguard against non-compliant chlorinated dioxin concentrations. This combination would be a specially designed wet scrubbing system.	AKC's Administration and HSE Staff

		control system which will significantly reduce air emissions levels in the project area. Additionally, the detailed Air Dispersion Modeling (ADM) is conducted to identify and predict stack emissions concentration within the project surrounding areas. The model revealed that the stack emissions during project operations will remain within the permissible limits as defined in SEQS.	• A specially designed wet scrubbing system in incineration units should be frequently checked and replaced once it expires and completes the life span to avoid chances of ambient air pollution in the project surrounding. • The air to fuel ratio of incinerators and generators should be maintained at all times. • Diesel storage facility should be inspected for any leakages and if a leakage is identified it should be immediately repaired to avoid fugitive emissions from the source. • Discourage the idling of vehicles i.e., vehicles and equipment will be turned off when not in direct use to reduce exhaust emissions. • Discarded or broken medical equipment such as mercury thermometers, sphygmomanometers, blood pressure devices, dilation and feeding tubes will not be incinerated at any time to avoid	

			chances of dioxins and furans emissions. • Stack will have sampling points consisting of sampling port-hole, platform and access ladder, to monitor the emission levels.	
4	Noise & Vibration	During the operational phase, a number of noise sources, including incineration plant operations, waste transportation vehicles, waste unloading activities, and the emergency generator, etc., will contribute to ambient noise and localized vibration. These impacts require careful management to prevent nuisance and potential discomfort, particularly near the site boundaries. Anticipated noise sources include.	• Ensure proper maintenance of all the equipment throughout the entire life cycle of the proposed project to reduce the chances of elevated noise levels. • Provide barriers by using appropriate noise reduction material such as; UPVC walls around site boundaries to provide some buffer against noise propagation. • Proper signboards indicating noise area shall be installed at all areas within the proposed WMF. • Workers to be provided with ear plugs and earmuffs at high noise areas and unauthorized personnel shall not be allowed to enter high noise area at all times. • Authorized personnel should seek and obtain work permits before entering the noisy area.	AKC's Administration and HSE Staff

5	Wastewater Discharges	During the operation phase, both process and domestic wastewater will be generated. The process wastewater will be generated approximately 5,000 – 5,500 GPD and the domestic wastewater will be generated approximately 400-500 GPD from washrooms, kitchen, ablution, etc. The process wastewater will be routed to a recirculation tank, filtered, and reused in the wet scrubbing system and domestic wastewater will be treated into the wastewater treatment system. The system will be based on dual staged mechanism. The initial stage will have a septic tank. The wastewater from the proposed project will be routed to the septic tank from where it will flow from the top portion of the septic tank into the second stage. The second stage will contain a soak pit. The soak pit will contain loose gravel which allows wastewater to gradually soak into the ground, while wastewater from wet scrubbers will be recycled.	• Ensure that sewage water shall be treated properly at the site by wastewater treatment system and ensure that there will be proper soakage pits with porous walled chamber that allow water to slowly soak after the effluent is pre-settled in septic tanks. • Effluent sewers shall be periodically cleaned and inspected for integrity in order to ensure effective transport of effluents and prevent overflows and leakages and infiltration. • Wastewater from all sections of the facility shall be routed to a wastewater treatment system. • Utilization of sand and fine gravel shall be made mandatory in pits which should be spread across the bottom of pit to help disperse the flow. Depth should not be less than 1.5 meters above the ground water table, the pits shall be designed in a way which allows percolation through soil from the soak pits, and small particles shall be filtered out by	AKC's Administration and HSE Staff

			soil matrix allow organic material to be digested/degraded by microorganisms.	
6	Soil Quality	Hazardous waste storage, transfer, and handling activities may result in spills of chemicals, contaminated liquids, oils, or infectious waste, causing soil contamination	• Waste storage areas will be provided with impermeable concrete flooring and appropriate secondary containment systems to prevent the infiltration of hazardous substances into the soil in the event of accidental spills or leaks. • Spill prevention and emergency response procedures will be implemented. • Spill response kits will be maintained at designated locations within the facility, and workers will be provided with appropriate training on spill prevention, emergency response, and spill management procedures.	AKC's Administration and HSE Staff
7	Ecological Environment	**i. Flora** The operation of transportation vehicles, incineration plants and other equipment generate noise. While plants are not directly affected by noise, the disturbances	• Incineration ash will be controlled at source and stored in bags for a short time in covered area to avoid its dispersion in ambient environment; • Dust control measures such as	AKC's Administration and HSE Staff

		can impact animals that pollinate or disperse plant seeds, which can indirectly affect plant reproduction and growth. Dust generated by movement of vehicles, handling and storage of waste and ash, can negatively impact the surrounding environment. Particulate matter can settle on the leaves of plants or the soil, leading to contamination. Airborne dust and pollutants can damage plant leaves, reduce photosynthesis, and stunt plant growth. Dust accumulation on plants can block sunlight and make it difficult for plants to absorb the necessary nutrients for healthy growth. Additionally, particles may alter the pH of the soil, making it less conducive for plant growth. **ii. Fauna** The proposed WMF will be located in the vicinity of the Bhave Jo Tar, Islamkot, Sindh, which does not shelter any significant or endangered fauna species within a 2 km radius of the project area. Hence, no significant impact is envisaged.	using water sprays and dust suppression systems during the operation phase; • Noise reduction technologies such as sound barriers or quieter machinery. • It is strongly recommended to observe the survival rate of the existing species on quarterly basis and in case if it is declining the species should be replanted by ratio of 1:5 by the help of local communities. • No mitigation measure is required.	

8	Health and Safety	During the operational phase a number of equipment and systems would be working which include incineration units, generators, transportation vehicles, etc. in parallel to that a number of technical and non-technical personnel would also work at the proposed WMF which may include routine office working, repairs and maintenance and incinerator operations, safety and security provision, loading and unloading of medical and industrial waste and incineration ash etc. Therefore, a number of health and safety hazards are envisaged incase if proper Standard Operating Procedures (SOPs) for machinery and equipment operations, Material Safety Data Sheets (MSDS) for chemical handling and storage, protocols for operations monitoring and inspections and adequate health, safety and environmental risk assessment systems, tools and personnel are not in place. In case if the HSE systems are not in place project operations may not only	• It is strongly recommended that a proper HSE management system and team should be available at project site at all times on rotational basis during the entire life cycle at the proposed WMF. • Ensure that all areas of the proposed WMF shall be properly marked and labeled by adequate safety sign boards; these boards shall display hazard type, nature and quick remediation in case of its occurrence. All the sign boards shall be displayed in English, Urdu, and Sindhi language. • HSE staff shall make sure that all the hazards that are likely to occur at project site should be clearly identified and a proper risk assessment matrix along with its mitigation and controls are in place and communicated to all the workers via toolbox talk. • Toolbox talk shall be made mandatory on a regular basis and all the workers should be trained for all the possible hazards at	AKC's Administration and HSE Staff

		harm the workers but the local communities may also be affected by project operations.	project site. • Ensure that adequate firefighting systems are in place and frequent mock drills shall be carried out to enhance the emergency preparedness and response skill of the workers. • Ensure proper maintenance of firefighting system during the entire life cycle at the proposed WMF. • All the workers involved in, operational activities will be provided with proper PPEs according to their job description including, Masks, aprons, head covering, and shoe covers, gloves, eye-shields and coverall etc. • Ensure all compressed gas containers and cylinders are stored outdoors in a designated cage and must be appropriately label and shielded from exposure to extreme temperatures and away from any combustible materials. • Eye-wash stations or emergency	

			showers should be provided close to all workstations where immediate flushing with water is the recommended first-aid response. • Material Safety Data Sheet (MSDS) for chemicals, if any, will accompany the consignment. • The facility must ensure implementation of proper Safety policy at all project locations so as to reduce the chances of occurrence of frequent hazards. • Proper systems for contractor's safety shall be in place which shall be implemented when the contractor's access at project site for any of the activity associated with operational phase. The contractor shall only be allowed to access at the project site if they qualify HSE criteria and policies after getting a proper work permit and the permit shall clearly identify nature, type, quantum and time of work which shall remain valid for a specific	

			period of time till such time the contractor completes their job at site. • All the vehicles accessing the project area shall also be inspected for fitness especially gas cylinders shall be inspected thoroughly to avoid any leakages or unforeseen hazard associated with damaged gas cylinders.	
9	Road Safety & Traffic	During the operational phase it is envisaged that a number of administration officials will travel to the project site. Although, the access to the proposed project site is easy, and all the stakeholders are fully active and operational, severe traffic issues may develop with the passage of time and population concentration in project area. At this stage particularly waste carrier (specialized vehicles) may move from different routes to the project site and from project site to the waste dumping/disposal site. During this routine waste transportation via specialized vehicles in case if the drivers do not	• The project proponent will develop a comprehensive traffic management plan and this plan shall be implemented during the entire life cycle of the proposed project. • All project vehicles shall be fitted with internal and external cameras which shall be strictly monitored by administration unit for vehicular speed maintenance at all times. • Drivers and employees accessing project sites via project vehicles should have valid licenses and HSE staff must impart proper training to the drivers and workers regarding road accidents	AKC's Administration and HSE Staff

		obey traffic rules and speed limit a number of serious accidents may occur at different road networks also if the vehicles are not parked within the existing boundaries of the proposed WMF, the nearest stakeholders may experience nuisances.	and mitigations.	
10	Employment and Labor Issues	The project will generate significant employment opportunities. However, issues related to worker safety, labor exploitation, and inadequate wages may arise if proper labor standards are not implemented.	• Ensure compliance with national labor laws and international standards for worker rights and safety; • Provide training programs for workers on safety practices and technical skills; and • Set up a worker grievance mechanism to address concerns and disputes.	AKC's Administration and HSE Staff
11	Solid Waste	Biomedical waste is any waste which is generated during the diagnosis, and treatment of human beings or in research activities pertaining to the production or testing of biological material or substance. The World Health Organization (WHO) and SEPA concur that the following wastes should be classified as infectious	• Proper inventories of all waste generated at project site during operations shall be maintained and recorded daily. • The 3R principles (Reduce, Reuse, and Recycle) will be implemented. • Waste transportation shall be carried out using covered vehicles to prevent littering and	AKC's Administration and HSE Staff

		waste: • Sharps (needles, scalpels, etc.) • laboratory cultures and stocks • blood and blood products • Pathological wastes: including tissues, organs and other body parts and fluids that are removed during surgery or autopsy, or their medical procedures, and specimens of body fluids and their containers. • Waste is generated from patients in isolation because they are known to have an infectious disease. • Chemicals and other hazardous materials are used in patient diagnosis and treatment. However, the proposed WMF will include 02 high tech incineration units with built in air pollution control system "Wet Scrubbers", but during the operation phase, the principal waste generated will include incineration ash approximately (5-7%) of total waste, waste oil and chemical drums and domestic office waste	odor emissions. • Ash shall be stored in a dedicated storage yard in covered bags and disposed of on a batch basis. • Open burning of waste shall be strictly prohibited at the project site. • Personal protective equipment (PPE) shall be provided to all workers involved in waste handling activities. • Hospital waste incineration ash may be stabilized and solidified, and the main objective of this treatment is to reduce the leachability or to increase the mechanical characteristics of the bottom ash. Therefore, the solidified matrix can immobilize the heavy metals found in fly and bottom ash. • Final fate of incineration ash to be decided after its composition testing; if ash composition is suitable enough to be reused then the process of industrial ecology shall be adopted which means; waste of one industry/sector	

		such as papers and tube lights etc. Even small quantities of incineration ash or other domestic/routine office waste may result in adverse impact on human health of the workers and local communities as well as other environmental receptors.	becomes raw material for other industry. • However, if the composition is not suitable for reuse then ash shall be stored separately and disposed of in accordance with SEPA requirement.	

8.2. Environmental Monitoring Plan

269. Environmental monitoring is a vital component of an EMMP. It is the mechanism through which the effectiveness of the EMMP is gauged. Furthermore, the feedback provided by environmental monitoring is instrumental in identifying any problems and planning corrective actions.

8.2.1. Objective of Monitoring

270. The main objectives of environmental monitoring during the construction phase of the proposed project are to:

a. To provide a mechanism to determine whether the project developer is carrying out the project in conformity with the EIA and EMMP;

b. To identify areas where the impacts of the proposed project exceed the criteria of significance and, therefore, require corrective actions;

c. To document the actual impacts of the proposed project on physical, biological, and socio- economic/cultural receptors, quantitatively where possible, in order to design better and more effective mitigation measures; and

d. To provide data for preparing the monitoring report to be submitted to the Sindh EPA in accordance with the legal requirement.

8.2.2. Performance Indicators

271. Environmental parameters that may be qualitatively and quantitatively measured and compared are selected as 'performance indicators' and recommended for monitoring. These performance indicators will be monitored to ensure compliance with the SEQs and comparison with the baseline conditions established. A summary of performance indicators, and their applicable standards to ensure compliance during construction and operational phases, include:

a. Ambient air quality: SEQS

b. Noise levels: SEQS

c. Wastewater quality: SEQS

Table 8-3: Environmental Monitoring during Construction Phase of Waste Management Facility

Environmental Monitoring				
Component	**Monitoring Parameters**	**Source**	**Frequency**	**Standard**
Ambient Air Monitoring (8 hrs.)	CO, O_3, NOx, SO_2, PM_{10}, $PM_{2.5}$, SPM	Project Site	Quarterly	SEQS
Drinking Water Quality	E-Coli, fecal coliform, Total Coliform, pH, TDS	Allocated Potable Water Point	Quarterly	SSDWQ/WHO
Gaseous Emissions	CO, Smoke, Noise	Construction Machinery	Quarterly	SEQS
	CO, NOx, SOx and Particulates	Power Generators	Quarterly	SEQS
Noise Monitoring	Decibels	7 meters from the equipment at construction site	Quarterly	SEQS
Physical Monitoring				
Component	**Monitoring Parameters**		**Frequency**	**Responsibility**
Implementation of HSE Management	Visual Appearance		Daily	AKC's and Contractor's Administration
Solid Waste Management	Visual Appearance which includes collection, segregation, transportation, disposal and management of domestic, commercial, construction wastes (solid and liquid)		Daily	AKC's and Contractor's Administration

Environmental Monitoring				
Component	**Monitoring Parameters**	**Source**	**Frequency**	**Standard**
Ecological and Biodiversity Monitoring and Management	Visual Appearance		Daily	AKC's and Contractor's Administration
Site House keeping	Visual Appearance		Daily	AKC's and Contractor's Administration
Conduct Trainings	Record Keeping		Weekly	AKC's and Contractor's Administration
Water Sprinkling	Dust Emission		Daily	AKC's and Contractor's Administration
Site Barricading	Visual Appearance		Daily	AKC's and Contractor's Administration

Table 8-4: Environmental monitoring during Operational Phase of Waste Management Facility

Environmental Monitoring				
Component	**Monitoring Parameters**	**Source**	**Frequency**	**Standard**
Ambient Air Monitoring (24 hrs.)	CO, O_3, NOx, SO_2, PM_{10}, $PM_{2.5}$, SPM	Project Site	Quarterly	SEQS
Drinking Water Quality	E-Coli, fecal coliform, Total Coliform, pH, TDS	Allocated Potable Water Point	Quarterly	SSDWQ/WHO
Gaseous Emissions	CO, NOx, SOx, Pb, HCI, Cd, Hg, PM, Smoke, HF, Zn, Ar, H2S	Incinerators	Monthly	SEQS
	CO, NOx, SOx and Particulates	Power Generators (Stand by)	Quarterly	SEQS
Wastewater	pH, BOD5, COD, TSS, O&G	Project Site	Bi-annually	SEQS
Noise Monitoring	Decibels	Project Site Boundaries	Quarterly	SEQS
Physical Monitoring				
Component	**Monitoring Parameters**		**Frequency**	**Responsibility**
Implementation of HSE Management	Visual Appearance		Daily	AKC's Administration and HSE Staff

Environmental Monitoring				
Component	**Monitoring Parameters**	**Source**	**Frequency**	**Standard**
Solid Waste Management	Visual Appearance which includes collection, segregation, transportation, disposal and management of domestic, industrial and hospital wastes (solid and liquid)		Daily	AKC's Administration and HSE Staff
Ecological and Biodiversity Monitoring and Management	Visual Appearance		Daily	AKC's Administration and HSE Staff
Site House keeping	Visual Appearance		Daily	AKC's Administration and HSE Staff
Health and Safety	i. Availability of HSE team ii. Display of HSE signs and symbols iii. Provision of PPE's		Daily	AKC's Administration and HSE Staff
	i. Training records ii. Firefighting systems, and fire extinguisher maintenance records		Monthly	
	Toolbox Talk		Daily	
Road Safety & Training	Driving license and roadside accident and mitigation training record		Monthly	AKC's Administration and HSE Staff
	Waste transportation schedule and time		Daily	AKC's Administration

Environmental Monitoring				
Component	**Monitoring Parameters**	**Source**	**Frequency**	**Standard**
				and HSE Staff
Site Barricading	Visual Appearance		Daily	AKC's Administration and HSE Staff

9. CONCLUSION

272. Under this EIA study the following aspects have been covered:

- Review of relevant legislative requirements applicable on the proposed project.
- Review, documentation and analysis of the existing baseline conditions in project surrounding areas.
- Identification, documentation, and analysis of environmental and social impacts associated with the proposed project construction and operations.
- Identification and documentation of mitigation safeguards to minimize the adverse environmental impacts of the proposed project construction and operations.

273. The proposed project would include two (02) incinerators, guard room, labor rooms, office room, stores, fuel tank, scrubber water tank, wastewater tank and green belt. The incineration units will be with built in air pollution control systems. Furthermore, the concentration of stack emissions expected from proposed project's operations at the receptors and nearby settlement in close proximity of the proposed project site, as revealed through Air Dispersion Modeling, will not exceed the limits specified under Sindh Environmental Quality Standard (SEQS).

274. The EIA has documented all major environmental concerns associated with the project on physical, ecological and socio-economic environments. A series of mitigation and monitoring measures have been included to address these concerns. Assuming effective implementation of the mitigation measures and monitoring requirements as outlined in the Environmental Management and Monitoring Plan (EMMP) the adverse environmental and social impacts of the proposed project are likely to be within the acceptable limits. In addition, EMMP will be a part of contract document for project developer. All personnel staff, employees and project developer should undertake appropriate training prior to construction to ensure they are aware of the on-site responsibilities in respect of all environmental and social issues.

275. Project is socio-economically viable and environment friendly if EMMP is implemented in true letter and spirit. Results of the EIA study have shown that the impacts of project activity on the physical and biological environment will have minor significance.

ANNEXURES

Annexure I: Sindh Environmental Protection Act, 2014

The Sindh Government Gazette

Published by Authority

KARACHI THURSDAY MARCH 20, 2014

PART-IV

PROVICIAL ASSEMBLY OF SINDH
NOTIFICATION
KARACHI, THE 20th MARCH, 2014.

NO.PAS/Legis-B-06/2014-The Sindh Environmental Protection Bill, 2014 having been passed by the provincial Assembly of Sindh on 24th Feburary, 2014 and assested by the Governer of Sindh on 19th March, 2014 is hereby published as an Act of the legislature of Sindh

THE SINDH ENVIRONMENTAL PROTECTION ACT, 2014

SINDH ACT NO.VIII OF 2014

AN
ACT

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

Preamble

WHEREAS it is expedient to provide for the protection, conservation, rehabilitation and improvement of the, environment, prevention and control of pollution, promotion of sustainable development, and for matters connected therewith and incidental thereto;

PART-I

It is hereby enacted as follows:-

Short title and commencement

1. (1) This Act may be called the Sindh Environmental Protection Act, 2014.

(2) It extends to the whole of the Province of Sindh.
(3) It shall come into force at once

2. In this Act, unless there is anything repugnant in the subject or context- **Definitions**

(i) "adverse environmental effect" means impairment of, or damage to, the environment and includes—

(a) impairment of, or damage to, human health and safety to biodiversity or property;
(b) pollution; and

(c) any adverse environmental effect as may be specified in the rules or regulations made under this Act;

(ii)"Agency" means the Sindh Environmental Protection Agency established under section 5 of this Act;

(iii) "agricultural waste" means waste from farm and agricultural activities including poultry, cattle farming, animal husbandry residues from the use of fertilizers, pesticides and other farm chemicals and agricultural runoff;

(iv) " "air pollutant" means any substance that causespollution of air and includes soot, smoke, dust particles, odor, light, electro-magnetic, radiation, heat, fumes, combustion exhaust, exhaust gases, noxious gases, hazardous substances and radioactive substances;

(v) "biodiversity" or "biological diversity" means the variability among living organisms from all sources, including inter-alia terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems;

(vi) "biosafety" means the mechanism developing through policy and procedure to ensure human health and the environmentally safe application of biotechnology;

(vii) "Council" means the Sindh Environmental Protection Council established under section 3 of this Act;

(viii) "discharge" means spilling, leaking, pumping, depositing, seeping, releasing, flowing-out, pouring, emitting, emptying or dumping into the land, water or atmosphere;

(ix) "ecosystem" means a dynamic complex of plant, animalnd micro-organism communities and their non-living environment interacting as a functional unit;

(x) "effluent" means any material in solid, liquid or gaseous form or combination thereof being discharged from industrial activity or any other source and includes a slurry, suspension or vapour;

(xi) "emission standards" means the permissible standards established by the Agency for emission of air pollutants and noise and for discharge of effluent and waste;

(xii) "environment" means-
(a) air, water, land and natural resources;
(b) all layers of the atmosphere;
(c) all organic and inorganic matters and living organisms;
(d) ecosystems and ecological relationships;
(e) buildings, structures, roads, facilities and works;
(f) all social and economic conditions affecting community life; and

(g) the inter-relationship between any of the factors in sub-clause (a) to (f) made under this Act;

(xiii) "environmental aspect" means an organization's activities or services that can interact with the environment;

(xiv) "environment audit" means a systemic scrutiny of environmental performance of an organization, factory, company or manufacturing and production unit regarding to its operations;

(xv) "environmental impact assessment" means an environmental study comprising collection of data, prediction of qualitative and quantitative impacts, comparison of alternatives, evaluation of preventive, mitigation and compensatory measures, formulation of environmental management and training plans and monitoring arrangements, and framing of recommendations and such other components as may be prescribed;

(xvi) "Environmental Management Plan" means a site specific plan developed to ensure that all necessary measures are identified and implemented in order to protect the environment and comply with the environmental legislation;

(xvii) "Environmental Protection Order" means an order passed under Section 21 made under this Act.

(xviii) "Environmental Protection Tribunal" means the Environmental Protection Tribunal constituted under section 25 of this Act ;

3

(xvix) "Environmental Review" means a quantitative and qualitative assessment of documents submitted by proponent, comments from public and Government agencies or organizations;

(xx) "factory" means any premises in which industrial activity is being undertaken;

(xxi) "genetically modified organism" means any organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology and which does not occur naturally through mating and or recombination and includes both living and non-living modified organisms;

(xxii) "Government" means the Government of Sindh;

(xxiii) "Government Agency" includes:-

(a) A department, attached department or any other office of Government; and

(b) A development authority, local authority, company body corporate established or control by Government;

(xxiv) "Court" means the Court of the Judicial Magistrate First Class;

(xxv) "hazardous substance" means-

(a) a substance or mixture of substances, other than a pesticide as defined in the Agricultural Pesticides Ordinance, 1971 (II of 1971), which, by reason of its chemical activity or toxic, explosive, flammable, corrosive, radioactive or other characteristics, causes, or is likely to cause, directly or in combination with other matters an adverse environmental effect; and

(b) any substance which may be prescribed as a hazardous substance;

(xxvi) "hazardous waste" means waste which is or which contains a hazardous substance or which may be prescribed as hazardous waste, hospital waste, nuclear waste, obsolete pesticides and persistent organic pollutants;

(xxvii)"hospital waste" means waste medical supplies and materials of all kinds, and waste blood, tissue, organs and other parts of the human and animal bodies, from hospitals, clinics, laboratories and veterinary facilities;

(xxviii) "industrial activity" means any operation or process for manufacturing, making, formulating, synthesising, altering, repairing, ornamenting, finishing, packing or otherwise treating any article or substance with a view to its use, sale, transport, delivery or disposal, or for mining, for oil and gas exploration and development, or for pumping water or sewage, or for generating, transforming or transmitting power or for any other industrial or commercial purposes;

(xxix) "industrial waste" means waste resulting from an industrial activity;

(xxx) "initial environmental examination" means a preliminary environmental review of the reasonably foreseeable qualitative and quantitative impacts on the environment of a proposed project to determine whether it is likely to cause an adverse environmental effect for requiring preparation of an environmental impact assessment;

(xxxi) "local authority" means any agency set up or designated by Government, by notification in the official Gazette, to be a local authority for the purposes of this Act;

(xxxii) "local council" means a local council constituted or established under a law relating to local government;

(xxxiii) "motor vehicle" means any mechanically propelled vehicle adapted for use upon land whether its power of propulsion is transmitted thereto from an external or internal source, and includes a chassis to which a body has not been attached, and a trailer, but does not include a vehicle running upon fixed rails;

(xxxiv) "municipal waste" includes sewage, refuse, garbage, waste from abattoirs, sludge and human excreta and the like;

(xxxv) "noise" means the intensity, duration and character of sounds from all sources, and includes vibration;

(xxvi) "non degradable plastic products" means a plastic product which are made from the non-biodegradable substances;

(xxxvii) "nuclear waste" means waste from any nuclear reactor or nuclear plant or other nuclear energy system, whether or not such waste is radioactive;

5

(xxxviii) "Oxo-biodegradable Plastic Products" means a plastic product made of a polymer by adding a pro-degrading additive containing a transition metal salt, except cobalt, which cause the plastic to degrade and bio-grade from oxidative and cell mediated phenomena either simultaneously or successfully;

(xxxix) "person" means any natural person or legal entity and includes an individual, firm, association, partnership, society, group, company, corporation, co-operative society, Government Agency, non-governmental organization, community-based organization, village organization, local council or local authority and, in the case of a vessel, the master or other person having for the time being the charge or control of the vessel;

(xxxl) "pollution" means the contamination of air, land or water by the discharge or emission of effluent or wastes or air pollutants or noise or other matter which either directly or indirectly or in combination with other discharges or substances alters unfavorably the chemical, physical, biological, radiational, thermal or radiological or aesthetic properties of the air, land or water or which may, or is likely to make the air, land or water unclean, noxious or impure or injurious, disagreeable or detrimental to the health, safety, welfare or property of persons or harmful to biodiversity;

(xli) "prescribed" means prescribed by rules made under this Act;

(xlii) "project" means any activity, plan, scheme, proposal or undertaking involving any change in the environment and includes-

(a) construction or use of buildings or other works;

(b) construction or use of roads or other transport systems;

(c) construction or operation of factories or other installations;

(d) mineral prospecting, mining, quarrying, stone-crushing, drilling and the like;

(e) any change of land use or water use; and

(f) alteration, expansion, repair, decommissioning or abandonment of existing buildings or other works, roads or other transport systems, factories or other installations;

6

(xliii) " proponent" means the person who proposes or intends to undertake a project;

(xliv) "regulations" means regulations made under this Act;

(xlv) "rules" means rules made under this Act;

(xlvi) "sewage" means liquid or semi-solid wastes and sludge from sanitary conveniences, kitchens, laundries, washing and similar activities and from any sewerage system or sewage disposal works;

(xlvii) "Schedule Plastic Products" means all types of flexible plastic packaging and disposable plastic products made of Polythene, Polypropylene, Polystyrene and Poly-ethylene Terephthalate (PET), used for food and non-food items, like shopping bags, garbage bags, snacks packs, water and milk packaging, shrink wraps, bubble pellet wraps, films, liners, woven or non-woven bags, mulch films;

(xlviii) "Sindh Environmental Quality Standards" means standards established by the Agency under clause (e) of sub-section(1) of section 6 and approved by the Council under clause (c) of sub-section(1) of section 4 made under this Act;

(xlix) "standards" means qualitative and quantitative standards for discharge of effluent and wastes and for emission of air pollutants and noise either for general applicability or for a particular area, or from a particular production process, or for a particular product, and includes the Sindh Environmental Quality Standards, emission standards and other standards established under this Act and the rules and regulations;

(l) "strategic environmental assessment" mean an analysis of a proposed policy, legislation, plan or programme to determine whether the principles of sustainable development have been integrated therein and to identify its likely environmental effects and such components as require an initial environmental examination or environmental impact assessment;

(li) "sustainable development" means development that meets the needs of the present generation without compromising the ability of future generations to meet their needs;

7

(lii) "trans-boundary environmental impacts" means environmental impact arising from beyond the boundaries or limits of Sindh province and causing any adverse environmental impact or pollution in the air, land, water and coaster water of Sindh province;

(liii) "waste" means any substance or object which has been, is being or is intended to be, discarded or disposed-of, and includes liquid waste, solid waste, waste gases, suspended waste, industrial waste, agricultural waste, nuclear waste, municipal waste, hospital waste, used polyethylene bags and residues from the incineration of all types of waste.

(liv) "waters (coastal waters, internal waters, territorial waters and historical waters)" means such limits of the waters adjacent to the land territory as may be specified in the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976).

PART-II
THE SINDH ENVIRONMENTAL PROTECTION COUNCIL.

Establishment of the Sindh Environmental Protection Council.

3. (1) The Government of Sindh shall, by notification in the official Gazette, establish a Council to be known as the Sindh Environmental Protection Council consisting of-

(i)	Chief Minister or such other person as the Chief Minister may nominate in this behalf.	**Chairperson**
(ii)	Minister-in-charge of the Environment Protection Department.	**Vice Chairperson**
(iii)	Additional Chief Secretary, Planning and Development Department, Government of Sindh.	**Ex-officio member**
(iv)	Secretaries of the Environment, Finance, Public Health Engineering, Irrigation, Health, Agriculture, Local Government, Industries, Live Stock and Fisheries, Forest and Wildlife, Energy, Education, Departments of Government of Sindh and the divisional commissioners of Sindh.	**Ex-officio members**

8

(v)	Such other persons not exceeding twenty- five as Government may appoint from representatives of the Chambers of Commerce and Industry and industrial associations, representatives of the Chambers of Agriculture, the medical and legal professions, trade unions, non-governmental organizations concerned with the environment and sustainable development, and scientists, technical experts and educationists.	**Non-official members**
vi)	Director General, Sindh Environment Protection Agency	**Member / Secretary**
vii)	Two Members of the Provincial Assembly of Sindh amongst the eleven Members of the Standing Committee on Environment nominated by the Speaker	**Mambers**

2) The Members of the Council, other than ex-officio members, shall be appointed in accordance with the prescribed procedure.

(3) A non-official member, unless he sooner resigns or is removed, shall hold office for a term of three years and shall be eligible for re-appointment but shall not hold office for more than two terms.

(4)The Council shall frame its own rules of procedure.

(5) The Council shall hold meetings, as and when necessary, but not less than two meetings, shall be held in a year.

(6) The Council may constitute committees of its members and entrust them with such functions as it may deem fit, and the recommendations of the committees shall be submitted to the Council for approval.

(7) The Council, or any of its committees, may invite any technical expert or representative of any Government Agency or non-governmental organization or other person possessing specialized knowledge of any subject for assistance in performance of its functions.

9

4. (1) The Council shall-

(a) co-ordinate and supervise the enforcement of the provisions of this Act and other laws relating to the environment in the province;

(b) approve comprehensive provincial environmental and sustainable development policies and ensure their implementation within the framework of a conservation strategy and sustainable development plan as may be approved by Government from time to time;

(c) approve the Sindh Environmental Quality Standards;

(d) provide guidelines for the protection and conservation of species, habitats, and biodiversity in general, and for the conservation of renewable and non-renewable resources.

(e) coordinate integration of the principles and concerns of sustainable development into socio-economic and development policies, plans and programmes at the provincial, district and local levels;

(f) consider the annual Sindh Environment report and give appropriate directions thereon and cause it to be laid before the Provincial Assembly;

(g) deal with inter-provincial and federal-provincial issues, and liaise and coordinate with other Provinces through appropriate inter-provincial forums regarding formulation and implementation of standards and policies relating to environmental matters with an inter-provincial impact;

(h) provide guidelines for biosafety and for the use of genetically modified organisms; and

(i) assist the Federal Government or Federal Agency in implementation and or administration of various provision of United Nation Convention on Laws on Seas, 1980 (UNCLOS) in coastal waters of the province;

(2) The Council may, either itself or on the request of any person or organization, direct the Agency or any Government Agency to prepare, submit, promote or implement projects for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, and the sustainable development of resources or to undertake research in any specified aspect of environment.

PART III
THE SINDH ENVIRONMENTAL PROTECTION AGENCY

Establishment of the Sindh Environmental Protection Agency.

5. (1) Government shall, by notification in the Official Gazette, establish the Sindh Environmental Protection Agency, to exercise the powers and perform the functions assigned to it under the provisions of this Act and the rules and regulations made thereunder.

(2) The Agency shall be headed by a Director General who shall be appointed by Government on such terms and conditions as it may determine.

(3) The Agency shall have such administrative, technical and legal staff as Government may specify, to be appointed in accordance with such procedure as may be prescribed.

(4) The powers and functions of the Agency shall be exercised and performed by the Director General.

(5) The Director General may, by general or special order, delegate any of these powers and functions to staff appointed under sub-section (3).

(6) For assisting the Agency in the discharge of its functions Government shall establish Advisory Committees for various sectors and appoint as members thereof eminent representatives of the relevant sector, educational institutions, research institutes and non-governmental organizations.

Functions of the Agency.

6. (1) The Agency shall –

(a) administer and implement the provisions of this Act and the rules and regulations;

(b) prepare, in co-ordination with the appropriate Government Agency or local council and, in consultation with the concerned Advisory Committees where established, environmental policies for the approval of the Council;

(c) take all necessary measures for the implementation of the environmental policies approved by the Council;

(d) prepare and publish an annual Sindh Environment Report on the state of the environment in the province;

(e) prepare or revise and establish the Sindh Environmental Quality Standards with approval of the Council:

Provided that before seeking approval of the Council, the Agency shall publish the proposed Sindh Environmental Quality Standards for public opinion in accordance with the prescribed procedure;

(f) ensure enforcement of the Sindh Environmental Quality Standards;

(g)where the quality of ambient air, water, land or noise so requires, the Agency may, by notification in the Official Gazette establish different standards for discharge or emission from different sources and for different areas and conditions as may be necessary:

Provided that where these standards are less stringent than the Sindh Environmental Quality Standards; prior approval of the Council shall be obtained;

(h) establish systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation, research, inspection and audit to prevent and control pollution, and to estimate the costs of cleaning up pollution and rehabilitating the environment in various sectors;

(i) take measures to promote research and the development of science and technology which may contribute to the prevention of pollution, protection of the environment, and sustainable development;

(j) issue licences, approval for the consignment, handling, transport, treatment, disposal of, storage, handling or otherwise dealing with hazardous substances;

(k) certify laboratories as approved laboratories for conducting tests and analysis and one or more research institutes as environmental research institutes for conducting research and investigation for the purposes of this Act;

(l) identify the needs for and initiate legislation in various sectors of the environment;

(m) provide assistance to relevant Federal and Provincial Government Agencies in the management of environment accidents and natural and environmental disasters, including conduct of inquiry thereto;

(n) render advice and assistance in environmental matters including such information and data available with it as may be required for carrying out the purposes of this Act:

Provided that the disclosure of such information shall be subject to the restrictions specified in Part XI (Access to Information);

(o) assist Government Agencies, local councils, local authorities and other persons to implement schemes for the proper disposal of wastes so as to ensure compliance with the Sindh Environmental Quality Standards;

(p) provide information and guidance to the public on environmental matters;

(q) recommend environmental courses, topics, literature and books for incorporation in the curricula and syllabi of educational institutions;

(r) promote public education and awareness of environmental issues through mass media and other means including seminars and workshops;

(s) establish and maintain mechanisms, including its own website, to disseminate information, subject to the provisions of this Act, regarding policies, plans and decisions of the Government, the Council and the Agency, relating to the environment;

(t) specify safeguards for the prevention of accidents and disasters which may cause pollution, collaborate with the concerned persons in the preparation of contingency plans for control of such accidents and disasters, and co-ordinate implementation of such plans;

(u) review and approve mitigation plans and give guidance and directions, where necessary, relating to clean up operations ordered under this Act;

(v) encourage the formation and working of non-governmental organizations, community organizations and village organizations to prevent and control pollution and promote sustainable development;

(w) take or cause to be taken all necessary measures for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution and promotion of sustainable development; and

(x) perform any function that the Council may assign to it.

(2) The Agency may -

(a) undertake inquiries or investigation into environmental issues, either of its own accord or upon complaint from any person or organization;

(b) request any person to furnish any information or data relevant to its functions;

(c) initiate, with the approval of Government, requests for foreign assistance in support of the purposes of this Act and enter into arrangements with foreign agencies or organizations for the exchange of material or information and participate in international seminars or meetings;

(d) recommend to Government and the Council the adoption of financial and fiscal programmes, schemes or measures for achieving environmental objectives and goals and the purposes of this Act, including -

(i) taxes, duties, cesses and other levies; and

(ii) incentives, prizes, awards, rewards, subsidies, tax exemptions, rebates and depreciation allowances;

(e) establish and maintain laboratories to help in the performance of its functions under this Act and to conduct research in various aspects of the environment and provide or arrange necessary assistance for the establishment of similar laboratories in the private sector;

(f) arrange, in accordance with such procedure as may be prescribed, financial assistance for projects designed to facilitate in discharge of its functions; and

(g) acquire assistance of concerned authorities of district administration and other relevant agencies, departments and police assistance for enforcement of this Act.

Power of the Agency

7. Subject to the provisions of this Act, the Agency may-

(a) lease, purchase, acquire, own, hold, improve, use or otherwise deal in and with any property both moveable and immovable;

(b) sell, convey, mortgage, pledge, exchange or otherwise dispose of its property and assets;

(c) fix and realize fees, rates and charges for rendering any service or providing any facility, information or data under this Act or its rules and regulations;

(d) enter into contracts, execute instruments, incur liabilities and do all acts or things necessary for proper management and conduct of its business;

(e) appoint, with the approval of Government and in accordance with such procedures as may be prescribed, such advisers, experts and consultants as it considers necessary for the efficient performance of its functions on such terms and conditions as it may deem fit;

(f) summon and enforce the attendance of any person and require him to supply any information or document needed for the conduct of any enquiry or investigation into any environmental issue;

(g) Director General may authorize any officer or official to enter and inspect or under a search warrant issued by Environmental Protection Tribunal or a Court, search at any time, any land, building, premises, vehicle or vessel or other place where or in which there are reasonable grounds to believe that an offence under this Act has been, or is being, or likely to be committed;

(h) take samples of any materials, products, articles or substances or of the effluent, wastes or air pollutants being discharged or emitted or of air, water or land in the vicinity of the discharge or emission;

(i) arrange for the testing and analysis of samples at a certified laboratory;

(j) confiscate any article used in the commission of the offence where the offender is not known or cannot be found within a reasonable time:

Provided that the powers under clauses (f), (g), (h) (i), and (j) shall be exercised in accordance with the provisions of the Code of Criminal Procedure, 1898 (Act V of 1898) or the rules and regulations and under the direction of the Environmental Protection Tribunal or a Court; and

(k) establish the Sindh Environmental Co-ordination Committee comprising the Director-General as its Chairman and such other persons as Government shall appoint as its members to exercise such powers and perform such functions as shall be delegated or assigned to it by Government for carrying out the purposes of this Act and for ensuring coordination among Government Agencies in implementation of environmental policies.

PART IV
SINDH SUSTAINABLE DEVELOPMENT FUND

8. (1) There shall be established a Sindh Sustainable Development Fund. **Establishment o the Sindh Sustainable Development Fund.**

(2) The Sindh Sustainable Development Fund shall be derived from the following sources, namely—

(a) allocations and grants made or loans advanced by the Government of Sindh or by the Federal Government;

(b) aid and assistance, grants, advances, donations and other non-obligatory funds received from foreign governments, national or international agencies, and
non-governmental organizations; and

15

(c) voluntary contributions from private, corporate, multinational organizations and other persons.

(d) Any fees generated under the provision of this act including the fines imposed against contraventions including penalties.

(3)The Sindh Sustainable Development Fund shall be utilized, in accordance with such procedures as may be prescribed for -

(a) providing financial assistance to projects designed for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, the sustainable development of resources and for research in any specified aspect of the environment; and

(b) any other purposes which, in the opinion of the Board, will help achieve environment objectives and the purposes of this Act.

9. (1)The Sindh Sustainable Development Fund shall be managed by a Board known as the Provincial Sustainable Development Fund Board consisting of— **Management of the Sindh Sustainable Development Fund.**

(i)	Additional Chief Secretary, Planning and Development Department, Government of Sindh,	**Chairperson**
(ii)	Such officers of Government, not exceeding five (05), as Government may appoint including Secretaries of the Environment, Finance, Industries and Local Government Departments, Government of Sindh.	**Ex-officio Members**
(iii)	Such non-official persons, not exceeding five(05), as Government may appoint, including representatives of the Chambers of Commerce and Industry, non-governmental organizations and major donors.	**Non-official Members**
(iv)	Director General, Sindh Environmental Protection Agency.	**Secretary/ Member**

(2) The members of the Board, other than ex-officio member shall be appointed in accordance with the prescribed procedure.

(3) A non-official member of the Board, unless he sooner resigns or is removed, shall hold office for a term of three years and shall be eligible for re-nomination, but shall not hold office for more than two terms.

(4) The Board shall frame its own rules of procedure with the approval of Government.

(5) In accordance with such procedures and such criteria as may be prescribed, the Board shall have the power to —

(a) sanction financial assistance for eligible projects;

(b) invest moneys held in the Sindh Sustainable Development Fund in such profit-bearing Government bonds, saving schemes and securities as it may deem suitable; and

(c) take such measures and exercise such powers as may be necessary for utilization of the Sindh Sustainable Development Fund for the purposes specified in sub-section (3) of section 8.

(6) The Board shall constitute committees of its members to undertake regular monitoring of projects financed from the Sindh Sustainable Development Fund and to submit progress reports to the Board which shall publish an Annual Report incorporating its annual audited accounts and performance evaluation based on the progress reports.

Accounts

10.(1) The Agency shall maintain proper accounts of the Sindh Sustainable Development Fund and other relevant records and prepare annual statement of accounts in such form as may be prescribed.

(2) The accounts of the Sindh Sustainable Development Fund shall be audited annually by the Auditor General of Pakistan.

PART V
PROHIBITIONS AND ENFORCEMENT

Prohibition of certain discharges or emissions and compliance with standards.

11. (1) Subject to the provisions of this Act and the rules and regulations, no person shall discharge or emit or allow the discharge or emission of any effluent, waste, pollutant, noise or any other matter that may cause or likely to cause pollution or adverse environmental effects, as defined in section 2 of this Act, in an amount, concentration or level which is in excess to that specified in Sindh Environmental Quality Standards; or, where applicable, the standards established under Section 6(1)(g)(i); or direction issued under Section 17, 19, 20 and 21 of this Act; or any other direction issued, in general or particular, by the Agency.

17

(2) All persons, in industrial or commercial or other operations, shall ensure compliance with the Environmental Quality Standards for ambient air, drinking water, noise or any other Standards established under section 6(1)(g)(i); shall maintain monitoring records for such compliances; shall make available these records to the authorized person for inspection; and shall report or communicate the record to the Agency as required under any directions issued, notified or required under any rules and regulations.

(3) Monitoring and analysis under sub-section (1) and (2), shall be acceptable only when carried out by the Environmental Laboratory certified by the Agency as prescribed in the rules.

12. No person shall import hazardous waste into Sindh province or its coastal, internal, territorial or historical waters, except acquiring prior approval of the Agency. **Prohibition of import of hazardous waste.**

13. Subject to the provisions of this Act, no person shall import, generate, collect, consign, transport, treat, dispose of, store, handle or otherwise use or deal with any hazardous substance except- **Handling of hazardous substances.**

(a) under a licence issued by the Agency; or

(b) in accordance with the provisions of any other law, rule, regulation or notification for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement or other instrument to which Government is a party.

14. (1) Subject to the provisions of this Act and the rules and regulations, no person shall cause any act, deed or any activity, including- **Prohibition of action adversely affecting Environment.**

(a) recycling or reuse of hospital waste and infectious waste;

(b) disposal of solid and hazardous wastes at unauthorized places as prescribed;

(c) dumping of wastes or hazardous substances into coastal waters and inland water bodies;

(d) release of emissions or discharges from industrial or commercial operations as prescribed;

(e) recycling or reuse or recovery of hazardous wastes or industrial by-products in an unauthorized or non-prescribed manner or procedure; and

18

(f) any activity which may cause adverse environmental affect due to trans boundary projects of Province of Sindh.

which lead to pollution or impairment of or damage to biodiversity, ecosystem, aesthetics or any damage to environment and natural resources as defined in section 2 (xxxvi) of this Act.

(2) No person shall generate, handle, transport, dispose of or handle the hospital waste and infections waste except in accordance with the Hospital Waste Management Rules and in such manner as may be prescribed.

(3) No person shall import, manufacture, stockpile, trade, supply, distribute or sell any scheduled plastic product which is non-degradable. The scheduled plastic products must be oxo-biodegradable and the pro-degradant used must be approved by the Agency or any other department or agency and in such manner as prescribed.

Regulation of motor vehicles.

15. (1) Subject to the provisions of this Act, no person shall operate or manufacture a motor vehicle or class of vehicles from which air pollutants or noise are being emitted in an amount, concentration or level which is in excess of the Sindh Environmental Quality Standards or, where applicable, the standards established under sub-clause (i) of clause (g) of sub-section (1) of section 6.

(2) For ensuring compliance with the standards mentioned in sub-section (1), the Agency may direct that any motor vehicle or class of vehicles shall install such pollution control devices or other equipment or use such fuels or undergo such maintenance or testing as prescribed.

(3) For ensuring compliance with the standards mentioned in sub-section (1), the Agency may direct that any manufacturer of motor vehicle or class of vehicles shall use such manufacturing standard or design or pollution control devices or other equipment or undergo such testing as may be prescribed.

(4) Where a direction has been issued by the Agency under sub-section (2) and (3) in respect of any motor vehicles or class of motor vehicles, no person shall operate or manufacture any such vehicle till such direction has been complied with.

Certified Environmental Laboratory

16. (1) The monitoring, testing and analysis carried out in compliance or for the enforcement of any provisions of this Act.

(2) The laboratory or organization having any facility for environmental monitoring, testing and analysis and intend to perform under sub-section (1) shall register with the Agency in accordance with the Environmental Laboratory Certification Rules as prescribed.

19

PART VI
ENVIRONMENTAL EXAMINATIONS AND ASSESSMENTS

Initial environmental examination and environmental impact assessment.

17. (1) No proponent of a project shall commence construction or operation unless he has filed with the Agency an initial environmental examination or environmental impact assessment, and has obtained from the Agency approval in respect thereof.

(2) The Agency shall –

(a) review the initial environmental examination and accord its approval, subject to such terms and conditions as it may prescribe, or require submission of an environmental impact assessment by the proponent; or

(b) review the environmental impact assessment and accord its approval subject to such terms and conditions as it may deem fit to impose or require that the environmental impact assessment be re-submitted after such modifications as may be stipulated or decline approval of the environmental impact assessment as being contrary to environmental objectives.

(3) Every review of an environment impact assessment shall be carried out with public participation and, subject to the provisions of this Act, after full disclosure of the particulars of the project.

(4) The Agency shall communicate its approval or otherwise within a period of two months from the date that the initial environmental examination is filed, and within a period of four months from the date that the environmental impact assessment is filed complete in all respects in accordance with the regulations, failing which the initial environmental examination or, as the case may be, the environmental impact assessment shall be deemed to have been approved, to the extent to which it does not contravene the provisions of this Act and the rules and regulations:

(5) The provisions of sub-sections (1), (2), (3) and (4) shall apply to such categories of projects and in such manner as prescribed:

(6) The Agency shall maintain separate registers for initial environmental examination and environmental impact assessment projects, which shall contain brief particulars of each project and a summary of decisions taken thereon, and which shall be open for inspection to the public during office hours.

20

Strategic environmental assessment.

18. (1) All provincial government agencies, departments, authorities, local councils and local authorities responsible for formulating policies, legislation, plans and programmes to be implemented in Sindh province which may cause any environmental impact in the jurisdiction of the province shall, before submitting the same to the competent authority for approval, forward to the Sindh Environmental Protection Agency a strategic environment assessment containing —

(a) description of the objectives and features of the proposed policy, legislation, plan or programme that are in consonance with the principles of sustainable development;

(b) assessment of the adverse environmental effects, if any, likely to be caused during implementation of the policy, legislation, plan or programme along with proposed preventive, mitigation and compensatory measures;

(c) analysis of possible alternatives; and

(d) identification of those components of the policy, legislation, plan or programme, if any, in respect of which specific environmental impact assessment need to be carried out in due course.

(2) The Agency shall, in consultation with the concerned Government Agencies and Advisory Committees where established, review the strategic environment assessment, within sixty (60) days of its filing, and prepare a report containing its comments and recommendations in respect thereof which shall be forwarded to the initiating Government Agency, authority, local council or local authority and duly considered by it and the competent authority before approval or otherwise of the proposed policy, legislation, plan or programme.

(3) The provisions of sub-sections (1), and (2) shall apply to such categories of policies, plans and programmes and in such manner as may be prescribed.

Environmental monitoring.

19. (1) The Agency shall carry out or arrange environmental monitoring of all projects in respect of which it has approved an initial environmental examination or environmental impact assessment to determine whether the actual environmental impact exceeds the level predicted in the assessment and whether the conditions of the approval are being complied with.

(2) For purposes of sub-section (1), the Agency may require the person in charge of a project to furnish such information as it may specify pertaining to the environmental impact of the project, including quantitative and qualitative analysis of -

21

(a) discharge of effluents, wastes, emissions of air pollutants, noise and any other matter or action that may be found offensive under section 14 from the project on daily, weekly, monthly or annual basis;

(b) ambient quality of the air, water, noise and soil before, during and after construction and during operation of the project.

(3) On review of the data collected by it and information provided, the Agency may issue such directions to the person in charge as it may consider necessary to ensure compliance with the conditions of the approval.

Environmental Audit and Review

20. (1) The Agency shall from time to time require the person in charge of a project to furnish, within such period as may be specified, an environmental audit or environmental review report or environmental management plan containing a comprehensive appraisal of the environmental aspects of the project.

(2) The report of a project prepared under sub-section (1) shall include -

(a) analysis of the predicted qualitative and quantitative impact of the project as compared to the actual impact;

(b) evaluation of the efficacy of the preventive, mitigation and compensatory measures taken with respect to the project; and

(c) recommendations for further minimizing or mitigating the adverse environmental impact of the project.

(3) Based on its review of the environmental audit report, the Agency may, after giving the person in charge of the project an opportunity of being heard, direct that specified mitigation and compensatory measures be adopted within a specified time period and may also, where necessary, modify the approval granted by it under section 17.

PART VII
ENVIRONMENTAL PROTECTION ORDER

Environmental Protection Order.

21. (1) Where the Agency is satisfied that the discharge or emission of any effluent, waste, air pollutant or noise, or the disposal of waste, or the handling of hazardous substances, or any other act or omission is likely to occur, or is occurring, or has occurred, in violation of any provision of this Act, the rules or regulations or of the conditions of a licence, or is likely to cause, or is causing or has caused an adverse environmental effect, the Agency may, after giving the person responsible for such

discharge, emission, disposal, handling, act or omission an opportunity of being heard, by order direct such person to take such measures as the Agency may consider necessary within such period as may be specified in the order.

(2) In particular and without prejudice to the generality of the foregoing power, such measures may include —

(a) immediate stoppage, preventing, lessening or controlling the discharge, emission, disposal, handling, act or omission, or to minimize or remedy the adverse environmental effect;

(b) installation, replacement or alteration of any equipment or thing to eliminate, control or abate on a permanent or temporary basis, such discharge, emission, disposal, handling, act or omission;

(c) action to remove or otherwise dispose of the effluent, waste, air pollutant, noise, or hazardous substances;

(d) action to restore the environment to the condition existing prior to such discharge, disposal, handling, act or omission, or as close to such condition as may be reasonable in the circumstances, to the satisfaction of the Agency; and

(e) impose a penalty as prescribed.

(3) Notwithstanding the provisions of sub-section (1), in an emergency situation where, for reasons to be recorded, the Agency is satisfied that the discharge or emission of any effluent, waste, air pollutant or noise, or the disposal of waste, or the handling of hazardous substances, or any other act or omission is likely to occur, or is occurring, or has occurred, in violation of the provisions of this Act and that circumstances of the case warrant immediate action in the public interest, it may pass an ad-interim order of the nature described in sub-sections (1) and (2) by providing reasonable opportunity of hearing.

PART VIII
OFFENCES AND PENALTIES

Penalties.

22. (1) Whoever contravenes or fails to comply with the provisions of sections 11, 17, 18 and 21 or any order issued there under shall be punishable with a fine which may extend to five million rupees, to the damage caused to environment and in the case of a continuing contravention or failure, with an additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues:

Provided that if the contravention of the provisions of section 11 also constitutes a contravention of the provisions of section 15, such contravention shall be punishable under sub-section (2).

23

(2) Whoever contravenes or fails to comply with the provisions of sections 13, 14, 15 and 16 or any rule or regulation or conditions of any license, any order or direction, issued by the Agency, shall be punished with a fine, and in case of continuing contravention or failure with an additional fine which may extend to ten thousand rupees for every day during which such contravention continues.

(3) Where an accused has been convicted of an offence under sub-sections (1) and (2), the Environmental Protection Tribunal and Court shall, as the case may be, in passing sentence, take into account the extent and duration of the contravention or failure constituting the offence and the attendant circumstances.

(4) Where an accused has been convicted of an offence under sub-sections (1) or (2), the Environmental Protection Tribunal or Court, as the case may be, shall endorse a copy of the order of conviction to the concerned trade or industrial association, if any, or the concerned Provincial Chamber of Commerce and Industry or the Federation of Pakistan Chambers of Commerce and Industry.

(5) Where a person convicted under sub-sections (1) and (2) had been previously convicted for any contravention of this Act and its rules or regulations, the Environmental Protection Tribunal, as the case may be, may, in addition to the punishment awarded thereunder-

(a) sentence him to imprisonment for a term that may extend up to three years;

(b) order the closure of the factory;

(c) order confiscation of the facility, machinery and equipment, vehicle or substance, record, document or other object used or involved in contravention of the provisions of this Act;

(d) order such person to restore the environment at his own cost, to conditions existing prior to the contravention or as close to such conditions as may be reasonable in the circumstances to the satisfaction of the Agency; and

(e)order that compensation be paid to any person or persons for any loss, or damage to their health or property suffered by such contravention.

(6) The Director General or an officer generally or specially authorised by him in this behalf may, on the application of the accused, compound an offence under this Act with the permission of the Environmental Protection Tribunal or Court in accordance with such procedure as prescribed.

24

(7) Where the Director General is of the opinion that a person had contravened any provision of this Act, he may, subject to the rules, by notice in writing to that person require him to pay to the Agency a penalty in the amount set out in the notice for each day the contravention continues.

Offences by body corporate.

23. Where any contravention of this Act has been committed by a body corporate, and it is proved that such offence has been committed with the consent or connivance of, or is attributed to any negligence on the part of, any director, partner, manager, secretary or other officer of the body corporate, such director, partner, manager, secretary or other officer of the body corporate, shall be deemed guilty of such contravention along with the body corporate and shall be punished accordingly:

Provided that in the case of a company as defined under the Companies Ordinance, 1984 (XLVII of 1984), only the Chief Executive as defined in the said Ordinance shall be liable under this section.

Explanation.— For the purposes of this Section, "body corporate" includes a firm, association of persons and a society registered under the Societies Registration Act, 1860 (XXI of 1860), or under the Co-operative Societies Act, 1925 (VII of 1925).

Offences by Government Agencies, local authorities or local councils.

24. Where any contravention of this Act has been committed by any Government Agency, local authority or local council, and it is proved that such contravention has been committed with the consent or connivance of, or is attributable to any negligence on the part of, the Head or any other officer of Government Agency, local authority or local council, such Head or other officer shall also be deemed guilty of such contravention along with the Government Agency, local authority or local council and shall be liable to be proceeded against and punished accordingly.

PART IX
ENVIRONMENTAL PROTECTION TRIBUNALS AND COURTS

Environmental Protection Tribunals.

25. (1) Government may, by Notification in the Official Gazette, establish as many Environmental Protection Tribunals as it considers necessary and, where it establishes more than one Environmental Protection Tribunal, it shall specify territorial limits within which, or the class of cases in respect of which, each one of them shall exercise jurisdiction under this Act.

(2) An Environmental Protection Tribunal shall consist of a Chairperson who is, or has been, or is qualified for appointment as a Judge of the High Court to be appointed after consultation with the Chief Justice of the High Court and two members to be appointed by Government, of which at least one shall be a technical member nominated from amongst the officers of the Agency with suitable professional qualifications and experience in the environmental field.

(3) For every sitting of the Environmental Protection Tribunal, the presence of the Chairperson and not less than one Member shall be necessary.

(4) A decision of an Environmental Protection Tribunal shall be expressed in terms of the opinion of the majority of its members, including the Chairperson, or if the case has been decided by the Chairperson and only one of the members and there is a difference of opinion between them, the decision of the Environmental Protection Tribunal shall be expressed in terms of the opinion of the Chairperson.

(5) An Environmental Protection Tribunal shall not, merely by reason of a change in its composition, or the absence of any member from any sitting, be bound to recall and rehear any witness who has given evidence, and may act on the evidence already recorded by, or produced, before it.

(6) An Environmental Protection Tribunal may hold its sittings at such places within its territorial jurisdiction as the Chairperson may decide.

(7) No act or proceeding of an Environmental Protection Tribunal shall be invalid by reason only of the existence of a vacancy in, or defect in the constitution, of, the Environmental Protection Tribunal.

(8) The terms and conditions of service of the Chairperson and members of the Environmental Protection Tribunal shall be such as may be prescribed.

Jurisdiction and powers of Environmental Protection Tribunals.

26. (1) An Environmental Protection Tribunal shall exercise such powers and perform such functions as are, or may be, conferred upon or assigned to it by or under this Act or the rules and regulations.

(2) All contraventions punishable under sub-section (1) of section 22 shall exclusively be triable by an Environmental Protection Tribunal.

(3) An Environmental Protection Tribunal shall not take cognizance of any offence triable under sub-section (2) except on a complaint in writing by—

(a) the Agency or any Government Agency or local council; and

(b) any aggrieved person, who has given notice of not less than thirty days to the Agency, of the alleged contravention and of his intention to make a complaint to the Environment Protection Tribunal.

(4) In exercise of its criminal jurisdiction, the Environmental Protection Tribunal shall have the same powers as are vested under the Code of Criminal Procedure, 1898 (Act V of 1898).

(5) In exercise of the appellate jurisdiction under section 27 the Environmental Protection Tribunal shall have the same powers and shall follow the same procedure as an appellate court in the Code of Civil Procedure, 1908 (Act V of 1908).

(6) In all matters with respect to which no procedure has been provided for in this Act, the Environmental Protection Tribunal shall follow the procedure laid down in the Code of Civil Procedure, 1908 (Act V of 1908).

(7) An Environmental Protection Tribunal may, on application filed by any officer duly authorised in this behalf by the Director General, issue bailable warrant for the arrest of any person against whom reasonable suspicion exists, of his having been involved in contravention punishable under sub-section (1) of section 22:

Provided that such warrant shall be applied for, issued and executed in accordance with the provisions of the Code of Criminal Procedure, 1898 (Act V of 1898):

Provided further that if the person arrested executes a bond with sufficient sureties in accordance with the endorsement on the warrant he shall be released from custody, failing which he shall be taken or sent without delay to the officer in-charge of the nearest jurisdiction police station.

(8) All proceedings before the Environmental Protection Tribunal shall be deemed to be judicial proceedings within the meaning of sections 193 and 228 of the Pakistan Penal Code (Act XLV of 1860), and the Environmental Protection Tribunal shall be deemed to be a court for the purpose of sections 480 and 482 of the Code of Criminal Procedure, 1898 (Act V of 1898).

(9) No court other than an Environmental Protection Tribunal shall have or exercise any jurisdiction with respect to any matter to which the jurisdiction of an Environmental Protection Tribunal extends under this Act and the rules and regulations.

(10) Where the Environmental Protection Tribunal is satisfied that a complaint made to it under sub-section (3) is false and vexatious to the knowledge of the complainant, it may, by an order, direct the complainant to pay to the person complained against such compensatory costs which may extend to one hundred thousand rupees.

Appeals to the Environmental Protection Tribunal.

27. (1) Any person aggrieved by any order or direction of the Agency under any provision of this Act or the rules or regulations may prefer an appeal with the Environmental Protection Tribunal within thirty days of the date of communication of the impugned order or direction to such person.

(2) An appeal to the Environmental Protection Tribunal shall be in such form, contain such particulars and be accompanied by such fees as prescribed.

Appeals from orders of the Environmental Protection Tribunal.

28. (1) Any person aggrieved by any final order or by any sentence of the Environmental Protection Tribunal passed under this Act may, within thirty days of communication of such order or sentence, prefer an appeal to the High Court.

(2) An appeal under sub-section (1) shall lie before the High Court of Sindh.

Jurisdiction of Judicial Magistrate.

29. (1) Notwithstanding anything contained in the Code of Criminal Procedure, 1898 (Act V of 1898), or any other law for the time being in force, but subject to the provisions of this Act, all contraventions punishable under sub-section (2) of section 22 shall exclusively be triable by the Court of Judicial Magistrate of First Class having of First Class having jurisdiction.

(2) A Judicial Magistrate shall be competent to impose any punishment specified in sub-sections (2) and (4) of section 22.

(3) A Judicial Magistrate shall not take cognizance of an offence triable under sub-section (1) except on a complaint in writing by—

(a) the Agency; and

(b) any aggrieved person.

Appeals from orders of the Judicial Magistrate.

30. Any person aggrieved by any final order or sentence passed by a Judicial Magistrate under section 28 may, within thirty days from the date of the communication of such order or sentence, appeal to the Court of the District and Sessions Judge defined as Green Court under this Act, whose decision thereon shall be final.

PART X
PUBLIC PARTICIPATION

Public participation.

31.(1)The Agency shall cause relevant details of any proposed project regarding which an Environmental Impact Assessment has been received to be published, along with an invitation to the public to furnish their comments thereon within a specified period.

(2) In accordance with such procedure as may be prescribed, the Agency shall hold public hearings to receive additional comments and hear oral submissions.

(3) All comments received under sub-sections (1) and (2) shall be duly considered by the Agency while reviewing the environmental impact assessment or strategic impact assessment, and decision or action taken thereon shall be communicated to the persons who have furnished the said comments.

PART XI
GENERAL

Power to make and amend schedule.

32. The Agency may, by notification in the official Gazette, make and amend the schedule.

Indemnity

33. No suit, prosecution or other legal proceedings shall lie against Government, the Council, the Agency, the Director General of the Agency, members, officers, employees, experts, advisors, committees or consultants of the Agency or Environmental Protection Tribunal or Court or any other person for anything which is done or intended to be done in good faith under this Act or rules or regulations.

Dues recoverable as arrears of land revenue.

34. Any dues recoverable by the Agency under this Act and rules or regulations shall be recoverable as arrears of land revenue.

Act to override other laws.

35. The provisions of this Act shall have effect notwithstanding anything inconsistent therewith contained in any other law for the time being in force.

Power to make rules.

36. The Sindh Environment Protection Agency may, by notification in the Official Gazette, make rules for carrying out the purposes not in consistence of this Act with the approval of Government.

Power to make regulations.

37. (1) For carrying out the purposes of this Act, the Agency may, by Notification in the Official Gazette and with the approval of Government, make regulations not inconsistent with the provisions of this Act or the rules.

(2) In particular and without prejudice to the generality of the foregoing power, such regulations may provide for —

(a) submission of periodical reports, data or information by any Government Agency, local authority or local council in respect of environmental matters;

(b) preparation of emergency contingency plans for coping with environmental hazards and pollution caused by accidents, natural disasters and calamities;

(c) appointment of officers, advisors, experts, consultants and employees;

(d) levy of fees, rates and charges in respect of services rendered, actions taken and schemes implemented;

(e) monitoring and measurement of discharges and emissions;

(f) categorization of projects to which, and the manner in which sections 17, 18 and 20 applies;

(g) laying down of guidelines for preparation of initial environmental examination, environmental impact assessment and strategic environmental assessment, and development of procedures of their filing, reviews and approval.

(h) laying down standard operating procedures for environmental sampling, examination of water, waste water, gaseous emissions, solid waste and noise;

(i) providing procedures for handling hazardous substances; and

(j) installation of devices in, use of fuels by, and maintenance and testing of motor vehicles for control of air and noise pollution.

30

Annexure II: SEPA (Environmental Assessment) Regulations, 2021

GOVERNMENT OF SINDH
SINDH ENVIRONMENTAL PROTECTION AGENCY

Karachi dated the 03rd September, 2021

NOTIFICATION

NO.EPA/TECH/739/2021:- In exercise of the powers conferred by section 37 of the Sindh Environmental Protection Act, 2014, the Sindh Environmental Protection Agency, with the approval of Government, is pleased to make the following regulations, namely:-

1. Short title and commencement

(1) These regulations may be called the Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021.

(2) They shall come into force at once.

2. Definitions. -

(1) In these regulations, unless there is anything repugnant in the subject or context

(a) "Act" means the Sindh Environmental Protection Act, 2014 (VIII of 2014);

(b) "Agency" means the Sindh Environmental Protection Agency as defined under section 2(ii);

(c) "Director General" means the Director General of the Agency;

(d) Environmental Checklist means rapid environmental assessment or environmental screening through a prescribed checklist in respect of projects having least/minimal impacts on the environment.

(e) "Firm" means the Environmental Consulting Firm registered by the Agency.

(f) "Environmentally sensitive area" means a location, large or small, that has significant environmental values that contribute to maintaining biological diversity and integrity, have intrinsic or attributed scientific, historical or cultural heritage value, or are important in providing amenity, harmony or sense of community, ecosystem as declared by Agency.

(g) "Protected area" means any area which safeguards the earths precious bio-diversity, protected areas of natural beauty and conservation of cultural significance as declared by relevant authority;

(h) "Schedule" means the Schedules provided in these regulations;

(i) "Urban area" means an area within the limits of a town, municipality or city as determined by the Agency on the basis of population and environmental issues

(2) All other words and expressions used but not defined in these regulations shall have the same meaning as are assigned to them in the Act.

3. Projects requiring Environmental Checklist (EC)

A proponent of a project falling in any category listed in Schedule-I shall file environmental checklist with the Agency and the provisions of section 17 shall apply to such projects.

4. Projects requiring an Initial Environmental Examination (IEE)

A proponent of a project falling in any category listed in Schedule-II shall file an IEE with the Agency, and the provisions of section 17 shall apply to such projects.

5. Projects requiring an Environmental Impact Assessment (EIA)

A proponent of a project falling in any category listed in Schedule-III shall file an EIA with the Agency, and the provisions of section 17 shall apply to such projects.

6. Projects not requiring an Environmental Assessment

(1) A project not falling in any category listed in Schedules-I, II and III shall not be required to file an EC, IEE or EIA

(2) Notwithstanding anything contained in sub-regulation (1), the Agency may direct the proponent of a project, whether or not listed in Schedule I or II or III, to file an EC or IEE or EIA, for reasons to be recorded in such direction:

Provided that no such direction shall be issued without the recommendations in writing of the Advisory Committee constituted under regulations 21.

7. Preparation of environmental assessment report

(1) The Agency may issue guidelines for preparation of an EC or IEE or EIA reports including guidelines of general applicability, and sectoral guidelines indicating specific assessment requirements for planning, construction and operation of projects relating to particular sector.

(2) The Agency may issue guidelines for preparation scope of an Environmental Management Plan(EMP) or Environmental Audit(EA).

(3) Where guidelines have been issued under sub-regulation (1) & (2), an EC, IEE or EIA or EMP or EA shall be prepared, to the extent practicable, in accordance therewith and the proponent shall justify any departure therefrom.

8. Review Fees

The proponent shall pay, at the time of submission of an EC, IEE or EIA or EMP or BTS tower a non-refundable review fee to the Agency as prescribe in Schedule-IV.

9. Filing of report

(1) Two hard copies and two electronic copies for an EC or IEE or EIA report shall be filed with the Agency by the proponent. The Agency may require the proponent to submit additional copies, as and when required during the review process.

(2) Every EC, IEE and EIA shall be accompanied by -

(a) an application, in the form prescribed in Schedule-V;

(b) Copy of receipt showing payment of review fee as prescribed in Schedule-IV

10. Preliminary Scrutiny

(1) Any report filed by the proponent or applicant shall be returned, if found incomplete in terms of Regulation 9.

(2) Notwithstanding anything contained in sub-regulation (1) of regulation 12, the Agency may require the proponent to submit an additional information at any stage during the review process.

11. Public participation

(1) In the case in an EIA, the Agency shall issue a public notice to be published in widely circulated English or Urdu or Sindhi national newspaper and in a local newspaper of general circulation in the area affected by the project, mentioning the type of project, its exact location, the name and address of the proponent and the date, time and place of public hearing for inviting comments from primary stakeholders.

(2) The date fixed under sub-regulation (1) shall not be earlier than ten days from the date of publication of the notice.

(3) The Agency shall also ensure the circulation of the EIA, where necessary, to the concerned Government Agencies and solicit their comments thereon.

(4) All comments received by the Agency from the public or any Government Agency shall be duly considered before issuance of decision.

(5) The Agency may issue guidelines indicating the basic techniques and measures to be adopted to ensure effective public consultation, involvement and participation in EIA assessment.

12. Review process

(1) Notwithstanding anything contained in sub section (4) of Section 17, the Agency shall make every effort to conclude its review process of the EA, EMP or environmental checklist within fifteen days, of the IEE within thirty days, and of the EIA within sixty days after receiving of complete case.

(2) In reviewing an EIA, the Agency shall consult such Committee of Experts be constituted for the purpose by the Director General, and may also solicit views of concerned Advisory Committee, if any, constituted by the Agency.

(3) The Director General may, where considers it necessary, constitute a committee to inspect the site of the project and submit its report on such matters as may be specified.

(4) In reviewing the IEE, the Director General may constitute a committee of the officers from within the Agency, on case to case basis, in view of the jurisdiction and location of the project for the purpose to extend final recommendation about the approval or rejection of the IEE.

(5) The review of the IEE or EIA by the Agency shall be based on quantitative and qualitative assessment of the documents and data furnished by the proponent, comments from the public and Government Agencies received under regulation 12, and views of the committees mentioned in sub-regulations (2) and (3) above.

(6) EMP, EA, EC shall be reviewed as per guidelines issued by SEPA

13. Decision

(1) The documentary evidence in the form of videos (soft copies) of public hearing shall be submitted by the proponent within three days after conclusion of public hearing to the Agency.

(2) On completion of the review process, the decision of the Agency shall be communicated to the proponent in the form prescribed in Schedule-VI or in case of an IEE or EMP or environmental checklist or environmental audit in the form prescribed in Schedule-VII in case of an EIA.

14. Conditions of approval

(1) Every approval of an EC or IEE or EIA or EMP or EA shall, in addition to such conditions as may be imposed by the Agency, be subject to the condition that the project shall be designed, constructed or operated and mitigatory and other measures adopted, strictly in accordance with the EC or IEE or EIA or EMP or EA, unless any variations thereto have been specified in the approval by the Agency.

(2) Where the Agency accords its approval subject to certain conditions, the proponent shall submit an undertaking to the Agency, before commencing operation of the project, in the form prescribed in Schedule-VIII that the conditions of approval, and the requirements in the IEE or EIA relating to design and construction, adoption of mitigation and other measures have been duly complied with.

15. Validity period of Approval

(1) The approval accorded by the Agency under section 17 read with sub-regulation (2) of regulation 15 shall be valid, for commencement of construction, for a period of three years from the date of issue.

(2) If construction is commenced during the initial three years validity period, the

validity of the approval shall stand extended for a further period of three year.

(3) The proponent may apply to the Agency for extension in the validity periods mentioned in sub-regulations (1), (2), which may be granted by the Agency in its discretion for such period not exceeding three years at a time, if the conditions of the approval do not require significant change:

Provided that the Agency may require the proponent to submit a fresh IEE or EIA, if in its opinion changes in location, design, construction and operation of the project so warrant.

16. Entry and inspection

(1) For the purpose of verification of any matter relating to the review or to the conditions of approval of an EC or IEE or EIA or EMP or EA list prior to, before or during and after commencement of construction or operation of a project, duly authorized staff of the Agency shall be entitled to enter and inspect the project site, factory building and plant and equipment installed therein.

(2) The proponent shall ensure full cooperation of the project staff at site to facilitate the inspection, and shall provide such information as may be required by the Agency for this purpose and pursuant thereto.

17. Cancellation of approval

(1) Notwithstanding anything contained in these regulations, if, at any time, on the basis of information or report received or inspection carried out, the Agency is of the opinion that the conditions of an approval have not been complied with, or that the information supplied by a proponent in the approved EC or IEE or EIA or EMP or EA list is incorrect, it shall issue notice to the proponent for show cause within two weeks of receipt thereof as to why the approval should not be cancelled.

(2) In case no reply is received or if the reply is considered unsatisfactory, the Agency may, after giving the proponent an opportunity of being heard -

(i) require the proponent to take such measures and to comply with such conditions within such period as it may specify, failing which the approval shall stand cancelled; or

(ii) cancel the approval.

(3) On cancellation of the approval, the proponent shall cease construction or operation of the project forthwith.

(4) Any action taken under this regulation shall be without prejudice to any other action that may be taken against the proponent under the Act or rules or regulations or any other law for the time being in force.

18. Registers of EC or IEE and EIA projects

Separate Registers to be maintained by the Agency for EC or IEE and EIA projects shall be in the form prescribed in Schedule-IX.

19. Environmentally sensitive areas

(1) The Agency may designate an area to be an environmentally sensitive area,

(2) Notwithstanding anything contained in regulations 3 and 5, the proponent of a project situated in an environmentally sensitive area shall be required to file an EIA with the Agency.

20. Environmental assessment guidelines

(1) The Agency may from time to time issue guidelines to assist proponents and other persons involved in the preparation of environmental assessment.

(2) Where guidelines have been issued under sub-regulation (1), the projects shall be planned and prepared, to the extent practicable, in accordance therewith and any departure therefrom justified in the IEE/EIA pertaining to the project.

21. Environmental Assessment Advisory Committee. -

The agency may constitute one or more Committees for the purpose of rendering advice on implementation and enforcement of Section 17, which may include experts of relevant field, civil society, academia, environmental experts, representative of Administrative Department, legal expert and experts from natural resources.

22. Repeal and Savings.

(1) The Sindh Environmental Protection Agency (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations 2014, shall, on commencement of these regulations, stand repealed.

(2) All orders made, notification issued, actions taken under the repealed Regulations shall remain in force until amended, altered or repealed by the provisions of these regulations.

DIRECTOR GENERAL
SINDH ENVIRONMENTAL PROTECTION AGENCY

SCHEDULE-I

(See Regulation 3)

List of projects requiring Environmental Screening (through check list)

a. Subject to the compliance with concerned zoning laws:
   i. Construction of residential and commercial buildings having total covered area from 60,000 sq.feet to 100,000 sq.feet
   ii. Housing Schemes covering an area from 05 acres to 15 acres.
   iii. Ware Houses for Non-Hazardous substances having total area from 1000 sq.yards to 5,000 sq.yards
   iv. Warehouse for Fertilizers
   v. Marriage Halls/Banquet/Restaurants/Baking facilities having total area more than 500 sq.yards
   vi. Motor vehicle workshops/Service Stations having total area of more than 500 sq.yards.

b. Construction/Reconstruction/Rehabilitation of roads in urban area from 500 meters to 01 kilometres and in rural area from 500 meters to 05 kilometres.

c. Construction of Flyover, underpasses and bridges of length from 100 meters to 500 meters

d. On-farm dams and fish farms

e. Pulses mills

f. Flour Mills

g. Lining of existing minor canals and /or water courses.

h. Canal cleaning

i. Forest harvesting operations

j. Rain harvesting projects

k. Health care units of less than 50 beds

l. BTS Tower

m. Lime Kilns

n. Ice factories and cold storage.

o. Cotton oil mill

p. Construction of LPG, CNG, LNG filling station and petrol pumps

q. Carpet manufacturing units

r. Rain harvesting projects

s. Industrial Effluent Treatment Plant

t. Sanitary Landfill site up to 500 tons/day

Schedule-II

(See Regulation 4)

List of projects requiring an Initial Environmental Examination

A. Agriculture, Livestock and Fisheries

1. Poultry, livestock and fish farms
2. Warehousing for pesticides and pharmaceuticals
3. Projects involving packaging, formulation, cold storage and warehouse of agricultural, livestock and fish products.
4. Construction & Operation of Slaughter houses

B. Energy

1. Hydroelectric power generation up to 25 MW
2. Thermal power generation up to 100 MW
3. Coal fired power plants with capacity up to 50 MW
4. Transmission lines up to 132 KV, and grid stations
5. Waste-to-energy generation projects including bio-mass up to 25 MW
6. Construction of Coal Handling and storage facilities
7. Handling, Transportation & Storage of Biofuel Facility
8. Handling and storage of edible grains and seeds
9. All Renewable energy Projects (excluding Protected/Sensitive area under any law)

C. Oil and Gas projects:

1. Oil and gas 2D/3D Seismic survey and drilling activities (on and off shore)
2. Oil and gas extraction projects including exploration and production located outside the environmentally sensitive/protected areas
3. Oil & Gas transmission gathering, storage, separation & transportation system
4. Construction of CNG, LPG Petroleum and LNG bulk storage facility
5. Oil blending and recycling units

D. Manufacturing and processing

1. Ceramics and glass units
2. Food processing units
3. Pharmaceutical units.
4. Rice mills, ghee/oil mills, Cotton ginning
5. Man-made fibers and resin projects

6. Tanning and leather finishing projects
7. Manufacturing of apparel, textile garments units, including weaving, spinning, dyeing, bleaching and printing
8. Woodwork units manufacturing products
9. Steel re-rolling mills
10. Waste recycling plants
11. Battery manufacturing plant
12. Brick Kilns
13. Marble processing units
14. Stone Crushing units

E. Mining and mineral processing

1. Commercial extraction of sand, gravel, limestone, clay, Sulphur and other minerals not included in Schedule I.
2. Crushing, grinding and separation processes
3. Metal Smelting plant production capacity up to 20 tons/day

F. Transport

1. Construction of flyovers, underpasses and bridges having length more than 500 meters to 1000 meters in urban areas and more than 5km in rural areas
2. Bus terminals/ railway station/ metro stops and construction & operation of transport related terminals
3. Rehabilitation or rebuilding or reconstruction of existing roads more than one kilometers in urban areas and more than 5 km from rural areas

G. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume of less than 25 million cubic meters of surface area less than 4 square kilometers
2. Irrigation systems and drainage system with the area of less than 15,000 hactors
3. Flood protection bunds

H. Water supply and filtration

Water supply schemes and filtration plants

I. Waste disposal and wastewater treatment

1. Solid and Non-hazardous waste with annual capacity up to 10,000 tonnes (excluding municipal landfill sites and commercial facilities) including Garbage Transfer station/composting plant

2. Wastewater treatment for sewerage treatment facility less than 100 mgd
3. Hospital waste disposal facilities including incineration units owned by Hospitals for own use excluding commercial facility.

J. Urban development

1. Housing schemes more than 15 acres to 50 acres
2. Residential, Commercial multistory High rise construction projects having covered area more than 100,000 sq.feet to 500,000 sq.feet.
3. Laboratories
4. Hospitals, health care unit of more than 50 beds
5. Construction of Educational and Academic institutions.

K. Other projects

Any other project for which filing of an IEE is required by the Agency under sub-regulation (2) of Regulation 6.

SCHEDULE III

(See Regulation 5)

List of projects requiring an EIA

A. Energy

1. Hydroelectric power generation more than 50 MW
2. Thermal power generation more than 100 MW
3. Coal power projects more than 50 MW
4. Transmission lines above 132 KVA and distribution projects.
5. Nuclear power plants
6. Wind, Solar or renewable energy projects if falls under any environmental sensitive and protected area.

B. Oil and Gas projects

1. Oil Petroleum refineries.
2. LPG and LNG Terminals Projects
3. Coal Handling Terminals Projects

C. Manufacturing and processing

1. Cement plants
2. Chemical manufacturing industries
3. Fertilizer plants
4. Steel Mills
5. Sugar Mills and Distilleries
6. Establishment of Industrial estates & Export processing zones
7. Petrochemicals complex
8. Synthetic resins, plastics and man-made fibers, paper and paperboard, paper pulping, plastic products, printing and publishing, paints and dyes.

D. Mining and mineral processing

1. Mining and processing of coal, gold, copper, sulphur and precious stones
2. Mining and processing of major non-ferrous metals, iron and steel rolling
3. Metal Smelting plant production capacity more than 20 tons/day

E. Transport

1. Airports
2. Construction of highway, motor ways, major roads (Intercity roads) more than one km and above

3. Ports and harbor development
4. Mass transit projects
5. Railway works
6. Construction of Flyover, underpass and bridges having total length more than one km.

F. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume of 25 million cubic meters and above having surface area of 4 square kilometers and above
2. Irrigation and drainage projects serving more than 15,000 hectares and above

G. Water supply and filtration

Public water supply schemes and **filtration** plants.

H. Waste Disposal and treatment

1. Facilities for handling, storage or disposal of hazardous or toxic wastes or radioactive waste (including landfill sites, incineration units, etc.)
2. Solid waste municipal landfill sites.
3. Combine Effluent Treatment Plant
4. Domestic wastewater treatment plant more than 100mgd

I. Urban development and tourism

1. Housing schemes above 50 acres
2. Residential, Commercial High rise buildings subject to compliance of building bylaws of relevant organizations more than 500,000 sq.feet
3. All Projects located in High Density Zones notified by Government and relevant land controlling organization, irrespective of their size.
4. Commercialization of major corridors/roads in urban centers
5. Large Scale public facilities
6. Large-scale tourism development projects

J. Environmentally Sensitive Areas

All projects situated in environmentally sensitive areas being identified by the Agency.

K. Other projects

1. Any other project for which filing of an EIA is required by the Agency under sub-regulation (2) of Regulation 5.
2. Any other project likely to cause an adverse environmental effect.

Schedule-IV

(See Regulation 8)

Project Cost (in million)	Review Fee
Up to 20	Rs.50,000
Above 20 up to 100	Rs. 100,000
Above 100 up to 200	Rs. 200,000
Above 200 up to 500	Rs. 400,000
Above 500	Rs. 600,000
Review fee for Environmental Checklist or EMP shall be Rs. 40,000/=	
Review fee for BTS Tower shall be 20,000/=	

*

Note:

The fee shall be payable into the "Sindh Sustainable Development Fund" account Details are as under:

A/C Title: Sindh Sustainable Development Fund

Account Number: 03084572626100

Bank: Sindh Bank

Branch Code: 0308-Korangi Industrial Area

13

SCHEDULE V

[See Regulation 9(2)(a)]

Application Form

1.	Name and address of Proponent		Phone: Email:	
2.	CNIC No. of proponent			
3.	Brief description of project			
4.	Location of project			
5.	Cost of the Project			
6.	Objectives of project			
7.	IEE/EIA attached?	IEE/EIA:	Yes/No	
8.	Have alternative sites/options been considered/ reported in IEE/EIA?		Yes/No	
9.	Title document of the project			
10.	Existing land use		Land requirement	
11.	Is basic site data available, or has it been measured?	(only tick yes if the data is reported in the IEE/EIA)	Available	Measured
		Meterology (including rainfall)	Yes/No	Yes/No
		Ambient air quality	Yes/No	Yes/No
			Yes/No	Yes/No
			Yes/No	Yes/No
12.	Have estimates of the following been reported, especially Quantitative Analysis?	Water balance	Estimated	Reported
		Solid waste disposal	Yes/No	Yes/No
		Liquid waste	Yes/No	Yes/No
			Yes/No	Yes/No
13.	Source of power		Power requirement	
14.	Labour force (number)	Construction: Operation:		
15.	Environmental Consulting Firm			

Verification. I do solemnly affirm and declare that the information given above and contained in the attached EC/IEE/EIA is true and correct to the best of my knowledge and belief.

Date

Signature, name _____
of proponent (with official stamp/seal)

14

SCHEDULE VI

[See Regulation 13(2)]

Decision on IEE/Environmental Check List

1. Name and address of proponent _____

   _____

2. Description of project

3. Location of project

4. Date of filing of IEE

5. After careful review of the IEE, the Agency has decided –

   (a) to accord its approval, subject to the following conditions:

   _____

   _____

   or (b) that the proponent should submit an EIA of the project, for the following reasons –

   _____

   Dated _____

Tracking no.___

Director-General
Sindh Environmental Protection Agency
(with official stamp/seal)

SCHEDULE VII

[See Regulation 13(2)]

Decision on EIA

1. Name and address of proponent _____

2. Description of project _____

3. Location of project _____

4. Date of filing of EIA _____

5. After careful review of the EIA, and all comments thereon, the Federation Agency has decided –

   (a) to accord its approval, subject to the following conditions:

   _____

   _____

or (b) that the proponent should submit an EIA with the following modifications-

   _____

   _____

or (c) to reject the project, being contrary to environmental objectives, for the following reasons:

   _____

   Dated _____

Tracking no.___

Director-General
Sindh Environmental Protection Agency
(with official stamp/seal)

SCHEDULE VIII

[See Regulation 14(2)]

Undertaking

I, (full name and address) as proponent for (name, description and location of project) do hereby solemnly affirm and declare that the conditions of approval and the requirements in the IEE or EIA relating to design and construction, adoption of mitigation and other measures and other relevant matters have been duly complied with in the design and construction of the project.

Signature, name and designation of proponent
(with official stamp/seal)

Witnesses(full names and addresses)

_____

_____

SCHEDULE IX

(See Regulation 18)

Form of Registers for EC, IEE and EIA projects

S. No.	Description	Relevant Provisions
1	2	3
1.	Tracking number	
2.	Category type (as per Schedules I or II)	
3.	Name of proponent	
4.	Name and designation of contact person	
5.	Name of consultant	
6.	Description of project	
7.	Location of project	
8.	Date of submission of IEE/EIA	
9.	Date of public hearing / technical presentation	
10.	Date of committee of experts for schedule-II projects	
11.	Approval granted (Yes/No)	
12.	Date of approval granted or refused	

Annexure IIII: Sindh Environmental Quality Standards, 2016

EXTRAORDINARY Registered No. M324

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KARACHI THURSDAY JANUARY 28, 2016

PART-I

GOVERNMENT OF SINDH
SINDH ENVIRONMENT PROTECTION
AGENCY

NOTIFICATION

NO.EPA/TECH/739/2014:- In exercise of the powers conferred under clause (g) of sub-section (1) of section of 6 of the Sindh Environmental Protection Act, 2014, the Sindh Environmental Protection Agency, with the approval of the Sindh Environmental Protection Council, is pleased to establish the following standards:-

1. (1) These Standards may be called the Sindh Environmental Industrial Waste Water, Effluent, Domestic, Sewerage, Industrial Air Emission and Ambient Airs, Noise for Vehicles, Air Emissions for Vehicles and Drinking Water Quality Standards, 2015.

(2) These Standards shall come into force at once.

2. In these Standards, unless there is anything repugnant in the subject or context –

(a) "Government" means the Government of Sindh;

(b) "Standards" means the Sindh Environmental Quality Standards.

L iv-158 Ext -I-8 (23) Price Rs. 70.00

SINDH ENVIRONMENTAL QUALITY STANDARDS FOR MUNICIPAL AND LIQUID INDUSTRIAL EFFLUENTS (mg/l, UNLESS OTHERWISE DEFINED)

S. No.	Parameter	Standards		
		Into Inland Waters	Into Sewage Treatment [5]	Into Sea [ ]
1	2	3	4	5
1.	Temperature 40 ^{0}C or Temperature Increase *	≤3^{o}C	≤3^{o}C	≤3^{o}C
2.	pH value (H^+)	6-9	6-9	6-9
3.	Biochemical Oxygen Demand (BOD)5 at 20^{0}C [1]	80	250	80**
4.	Chemical Oxygen Demand(COD) [1]	150	400	400
5.	Total Suspended Solids (TSS)	200	400	200
6.	Total Dissolved Solids (TDS)	3500	3500	3500
7.	Oil and Grease	10	10	10
8.	Phenolic compounds (as phenol)	0.1	0.3	0.3
9.	Chloride (as Cl^-)	1000	1000	SC***
10.	Fluoride (as F^-)	10	10	10
11.	Cyanide (as CN^-) total	1.0	1.0	1.0
12.	An-ionic detergents (as MBAS)[2]	20	20	20
13.	Sulphate (SO_4^{2-})	600	1000	SC***
14.	Sulphide (S^{2-})	1.0	1.0	1.0
15.	Ammonia (NH_3)	40	40	40
16.	Pesticides [3]	0.15	0.15	0.15
17.	Cadmium [4]	0.1	0.1	0.1
18.	Chromium (trivalent and hexavalent [4]	1.0	1.0	1.0
19.	Cooper [4]	1.0	1.0	1.0
20.	Lead [4]	0.5	0.5	0.5
21.	Mercury [4]	0.01	0.01	0.01
22.	Selenium [4]	0.5	0.5	0.5
23.	Nickel [4]	1.0	1.0	1.0
24.	Silver [4]	1.0	1.0	1.0
25.	Total toxic metals	2.0	2.0	2.0
26.	Zinc	5.0	5.0	5.0
27.	Arsenic [4]	1.0	1.0	1.0
28.	Barium [4]	1.5	1.5	1.5
29.	Iron	8.0	8.0	8.0
30.	Manganese	1.5	1.5	1.5
31.	Boron [4]	6.0	6.0	6.0
32.	Chlorine	1.0	1.0	1.0

Explanations:

1. Assuming minimum dilution 1:10 on discharge, lower ratio would attract progressively stringent standards to be determined by the Sindh Environmental Protection Agency. By 1:10 dilution means, for example that for each one cubic meter of treated effluent, the recipient water body should have 10 cubic meter of water for dilution of this effluent.
2. Methylene Blue Active Substances; assuming surfactant as biodegradable.
3. Pesticides include herbicides, fungicides, and insecticides.
4. Subject to total toxic metals discharge should not exceed level given at S. N. 25.
5. Applicable only when and where sewage treatment is operational and BOD5=80mg/l is achieved by the sewage treatment system.
6. Provided discharge is not at shore and not within 10 miles of mangrove or other important estuaries.

* The effluent should not result in temperature increase of more than 3^0C at the edge of the zone where initial mixing and dilution take place in the receiving body. In case zone is not defined, use 100 meters from the point of discharge.

** The value for industry is 200 mg/l

*** Discharge concentration at or below sea concentration (SC).

Note: 1. Dilution of liquid effluents to bring them to the STANDARDS limiting values is not permissible through fresh water mixing with the effluent before discharging into the environment.

2. The concentration of pollutants in water being used will be subtracted from the effluent for calculating the STANDARDS limits".

"SINDH ENVIRONMENTAL QUALITY STANDARDS FOR INDUSTRIAL GASEOUS EMISSION (mg/Nm^3, UNLESS OTHERWISE DEFINED)."

S. No.	Parameter	Source of Emission	Standards
1	2	3	4
1.	Smoke	Smoke opacity not to exceed	40% or 2 Ringleman Scale or equivalent smoke number
2.	Particulate matter	(a) Boilers and Furnaces	
(1)		(i) Oil fired	300
		(ii) Coal fired	500
		(iii) Cement Kilns	300

		(b) Grinding, crushing, Clinker coolers and Related processes, Metallurgical Processes, converter, blast furnaces and cupolas.	500
3.	Hydrogen Chloride	Any	400
4.	Chlorine	Any	150
5.	Hydrogen Fluoride	Any	150
6.	Hydrogen Sulphide	Any	10
7.	Sulphur Oxides [2][3]	Sulfuric acid/ Sulphonic acid plants	
		Other Plants except power Plants operating on oil and coal	1700
8.	Carbon Monoxide	Any	800
9.	Lead	Any	50
10.	Mercury	Any	10
11.	Cadmium	Any	20
12.	Arsenic	Any	20
13.	Copper	Any	50
14.	Antimony	Any	20
15.	Zinc	Any	200
16.	Oxides of Nitrogen	Nitric acid Manufacturing unit.	3000
	(3)	Other plants except power plants operating on oil or coal:	
		Gas fired	400
		Oil fired	600
		Coal fired	1200

Explanations:-

1. Based on the assumption that the size of the particulate is 10 micron or more.
2. Based on 1 percent Sulphur content in fuel oil. Higher content of Sulphur will case standards to be pro-rated.
3. In respect of emissions of Sulphur dioxide and Nitrogen oxides, the power plants operating on oil and coal as fuel shall in addition to Standards specified above, comply with the following standards:-

A. **Sulphur Dioxide**

Sulphur Dioxide Background levels Micro-gram per cubic meter (ug/m^3) Standards.

Background Air Quality (SO_2 Basis)	Annual Average	Max. 24-hours Interval	Criterion I Max. SO_2 Emission (Tons per Day Per Plant)	Criterion II Max. ground level increment to ambient (One year Average)
Unpolluted	<50	<200	500	50
Moderately Polluted*				
Low	50	200	500	50
High	100	400	100	10
Very Polluted**	>100	>400	100	10

* For intermediate values between 50 and 100 ug/m^3 linear interpolations should be used.
** No projects with Sulphur dioxide emissions will be recommended.

B. Nitrogen Oxide

Ambient air concentrations of Nitrogen oxides, expressed as NO_X should not be exceed the following:-

Annual Arithmetic Mean $100ug/m^3$ (0.05 ppm)

Emission level for stationary source discharge before missing with the atmosphere should be maintained as follows:-

For fuel fired steam generators as Nanogram (10^0-gram) per joule of heat input:

Liquid fossil fuel	130
Solid fossil fuel..	300
Lignite fossil fuel	260

Note:- Dilution of gaseous emissions to bring them to the STANDARDS limiting value is not permissible through excess air mixing blowing before emitting into the environment.

Sindh Environmental Quality Standards for Motor Vehicle Exhaust and Noise

(i) **For in-use Vehicles**

S. No.	Parameter	Standards (maximum permissible limit)	Measuring Method	Applicability
1	2	3	4	5
1.	Smoke	40% or on the Ringleman Scale during engine acceleration mode	To be compared with Ringleman Chart at a distance of 6 meters or more.	Immediate effect
2	Carbon Monoxide	6 %	Under idling conditions; Non-dispersive infrared detection through gas analyzer.	
3.	Noise	85 db (A)	Sound-meter at 7.5 meter from the source.	

For new Vehicles

EMISSION STANDARDS FOR DIESEL VEHICLES

(a) For passenger Cars and Light Commercial Vehicles (g/Km)

Type of Vehicle	Category/Class	Tiers	CO	HC+ NOx	PM	Measuring Method	Applicability
1	2	3	4	5	6	7	8
Passenger Cars.	M 1: with reference mass (RW).	Pak-II, IDI	1.0	0.7	0.08		All imported and local manufactured
	up to 2500 kg. Cars with RW over 2500 kg. to meet NI Category standards	Pak-II DI	1.0	0.9	0.10	NEDC (ECE 15+ EUDCL)	Diesel vehicles with effect from 01-07-2012
Light Commercial Vehicles	NI-I (RW<1250 Kg)	Pak-II IDI	1.0	0.70	0.08		
		Pak-II DI	1.0	0.90	0.10		
	NI-II(1250kg< RW < 1700 Kg)	Pak-II IDI	1.25	1.0	0.12		
		Pak-II DI	1.25	1.3	0.14		
	NI-III(RW< 1700 Kg)	Pak-II IDI	1.50	1.2	0.17		
		Pak-II DI	1.50	1.6	0.20		

Parameter Standards (maximum permissible limit) Measuring method

Noise	85 db (A)	Sound-meter at 7.5 meters from the source

(b) For Heavy Duty Diesel Engines and Large Goods Vehicles (g/Kwh)

Type of Vehicle	Catogry/ Class	Tiers	CO	HC	NOx	PM	Measuring Method	Applicability
1	2	3	4	5	6	7	8	9
Heavy Duty Diesel Engines	Turks and Buses	Pak-II	4.0	1.1	7.0	0.15	ECE-R-49	All Imported and local manufactured diesel vehicles with the effect 1-7-2012
Large goods Vehicles	N2(2000 and up	Pak-II	4.0	7.0	1.10	0.15	EDC	

Parameter Standards (maximum permissible limit) Measuring method

Noise	**85 db (A)**	**Sound-meter at 7.5 meters from the Source**

Emission Standards for Petrol Vehicles (g/km)

Type of Vehicle	Category/ Class	Tier	Co	HC+ NOx	Measuring Method	Applicability
1	2	3	4	5	6	7
Passenger Cars.	M 1: with reference mass (RW). upto 2500 kg. Cars with RW over 2500 kg. to meet N1 Category standards	Pak-II	2.20	0.5	NEDC (ECE 15+ EUDCL)	All imported and new models* locally manufactured petrol vehicles with effect from 1st July, 2009**

Light Commercial Vehicles	NI-I (RW<1250 kg) NI-II (1250kg> kg RW < 1700 Kg)	Pak-II	2.20	0.5	
		Pak-II	4.0	0.65	
		Pak-II	5.0	0.08	
	NI-III(RW> 1700 kg)				
Motor Rickshaws & Motor Cycles	2,4 strokes < 150 cc	Pak-II	5.5	1.5	ECER 40
	2,4 strokes > 150cc	Pak-II	5.5	1.3	

Parameter	Standards (maximum permissible limit)	Measuring method
Noise source	85 db (A)	Sound-meter at 7.5 meters from the

Explanations:

DI:	Direct Injection.
IDI:	Indirect Injection.
EUDCL:	Extra Urban Driving Cycle.
NEDC:	New European Driving Cycle.
ECE:	Urban Driving Cycle.
M:	Vehicles designed and constructed for the carriage of passenger and Comprising no more than eight seats in addition to the driver's seat.
N:	Motor vehicles with at least four wheels designed and constructed for the carriage of goods.
*	New model means both model and engine type change.
**	The existing models of petrol driven vehicles locally manufactured will immediately switch over to Pak-II emission standards but no late than 30th June, 2012.

SINDH ENVIRONMENTAL QUALITY STANDARDS FOR AMBIENT AIR

Pollutants	Time-weight average	Concentration in Ambient Air	Method of measurement
Sulphur Dioxide(SO2)	Annual Average*	80 µg/m³	Ultraviolet Fluorescence method
	24 hours**	120 µg/m³	
Oxides of Nitrogen as (NO)	Annual Average*	40 µg/m³	Gas Phase Chemiluminescence
	24 hours**	40 µg/m³	
Oxides of Nitrogen as (NO2)	Annual Average*	40 µg/m³	Gas Phase Chemiluminescence
	24 hours**	80 µg/m³	
O³	1 hour	130 µg/m³	Non dispersive UV absorption method
Suspended Particulate Matters(SPM)	Annual Average*	360 µg/m³	High Volume Sampling (Average flow rate not less than 1.1 in 3/minutes)
	24 hours**	500 µg/m³	
Respirable Particulate Matter PM10	Annual Average*	120 µg/m³	ß -Ray absorption method
	24 hours**	150 µg/m³	
Respirable Particulate Matter PM2.5	Annual Average*	40 µg/m³***	ß Ray absorption method
	24 hours**	75 µg/m³	
Lead Pb	Annual Average*	1 µg/m³	ASS Method after sampling using EPM 2000 or equivalent filter paper
	24 hours**	1.5 µg/m³	
Carbon Monoxide(CO)	8 hours**	5 mg/m³	Non Dispersive Infra Red(NDIR) method
	1 hours**	10 mg/m³	

*Annual arithmetic mean of minimum 104 measurements in a year taken twice a week, 24 hourly and at uniform interval.

** 24 hourly/8 hourly values should be met 98% in a year, 2% of the time. It may exceed but not on two consecutive days.

***Annual Average limit of 40µ/m³ or background annual average concentration plus allowable allowance of 9µg/m³, whichever is lower.

Sindh Standards for Drinking Water Quality

Properties / Parameters	Standard Values for Sindh	WHO Standards	Remarks
Bacterial			
All water intended for drinking (e.Coli or Thermo tolerant Coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water entering the distribution system (E.Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water in the distribution system (E.coli or thermo tolerant coliform and total coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period	Most Asian countries also follow WHO standards
Physical			
Colour	≤ 15 TCU	≤ 15 TCU	
Taste	Non objectionable/Acceptable	Non objectionable/Accep table	
Odour	Non	Non	

	objectionable/Acceptable	objectionable/Accep table
Turbidity	⟨ 5 NTU	⟨ 5 NTU
Total hardness as $CaCO_3$	< 500 mg/l	---
TDS	⟨ 1000	⟨ 1000
pH	6.5 - 8.5	6.5 - 8.5
Chemical		
Essential Inorganic	***mg/Litre***	***mg/Litre***
Aluminium (Al) mg/l	≤ 0.2	0.2

Properties / Performance	Standard Values for Pakistan	Who Standards	Remarks
Antimony (Sb)	≤ 0.005 (P)	0.02	
Arsenic (As)	≤ 0.05 (P)	0.01	Standard for Pakistan similar to most Asian developing countries
Barium(Ba)	0.7	0.7	
Boron (B)	0.3	0.3	
Cadmium (Cd)	0.01	0.003	Standard for Pakistan similar to most Asian developing countries
Chloride (Cl)	< 250	250	
Chromium (Cr)	≤ 0.05	0.05	
Copper (Cu)	2	2	
Toxic Inorganic	*mg/Liter*	*mg/Litre*	
Cyanide (CN)	≤ 0.05	0.07	Standard for Pakistan similar to Asian developing countries
Fluoride (F)*	≤ 1.5	1.5	
Lead (Pb)	≤ 0.05	0.01	Standard for Pakistan similar to most Asian developing countries
Manganese (Mn)	≤ 0.5	0.5	
Mercury (Hg)	≤ 0.001	0.001	
Nickel (Ni)	≤ 0.02	0.02	

Properties / Performance	Standard Values for Pakistan	Who Standards	Remarks
Nitrate (NO_3)	< 0.50	50	
Nitrite (NO_2)	≤ 3 (P)	3	
Selenium (SE)	0.01 (P)	0.01	
Residual chlorine	0.2-0.5 at consumer end 0.5-1.5 at source	---	
Zinc (Zn)	5.0	3	Standard for Pakistan similar to most Asian developing countries

Properties / Performance	Standard Values for Pakistan	Who Standards	Remarks
Organic			
Pesticides mg/L		PSQCA No. 4639-2004 Page No. 4 Table-No. 3 Serial No. 20-58 may be consulted.***	Annex II
Phenolic compounds (as Phenols) mg/L		< 0.002	
Polynuclear aromatic hydrocarbons (as PAH g/L)		0.01 (By GC/MS method)	
Radioactive			
Alpha Emitters bq/L or pCi	0.1	0.1	
Beta emitters	1	1	

*** PSQCA: Pakistan Standards Quality Control Authority

Proviso:

The existing drinking water treatment infrastructure is not adequate to comply with WHO guidelines. The Arsenic concentrations in some parts of Sindh have been found high then Revised WHO guidelines. It will take some time to control arsenic through treatment process. Lead concentration in the proposed standards is higher than WHO Guidelines. As the piping system for supply of drinking water in urban centers are generally old and will take significant resources and time to get them replaced. In the recent past, Lead was completely phased out from petroleum

products to cut down Lead entering into environment. These steps will enable to achieve WHO guidelines for Arsenic, Lead, Cadmium and Zinc. However, for bottled water, WHO limits for Arsenic, Lead, Cadmium and Zinc will be applicable and PSQCA Standards for all the remaining parameters.

Sindh Environmental Quality Standards for Noise

S. No.	Category of Area / Zone	Effective from 1st Jan, 2015		Effective from 1st January, 2015	
		Limit in dB(A) Leq *			
		Day Time	Night Time	Day Time	Night Time
1.	Residential Area (A)	65	50	55	45
2.	Commercial Area (B)	70	60	65	55
3.	Industrial Area (C)	80	75	75	65
4.	Silence Zone (D)	55	45	50	45

Note: 1. Day time hours: 6:00 a.m to 10:00 p.m

2. Night time hours: 10:00 p.m to 6:00 a.m

3. Silence zone: Zones which are declared as such by the competent authority. An area comprising not less than 100 meters around hospitals, educational institutions and courts

4. Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.

* dB(A) Leq: Time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

3. **Repeal and Savings.**

(1) The provisions of the Statutory Notification dated 10th August, 2000 and 18th October, 2010, issued by the Ministry of Environment, Government of Pakistan, to the extent of the Province of Sindh are hereby repealed.

(2) All actions taken, proceedings initiated shall be deemed to have been taken and initiated validly under the the provisions of these Rules.

DIRECTOR GENERAL
SINDH ENVIRONMENTAL PROTECTION AGENCY

Karachi: Printed at the Sindh Government Press
28-1-2016

Annexure III: Hazardous Substance Rules, 2014

GOVERNMENT OF SINDH
SINDH ENVIRONMENT PROTECTION AGENCY

Karachi dated the 16th, December, 2014.

NOTIFICATION

NO.EPA/TECH/739/2014:- In exercise of the powers conferred by section 36 of the Sindh Environmental Protection Act, 2014, the Sindh Environmental Protection Agency, with the approval of the Government is pleased to make the following rules, namely:-

1. **Short title and commencement.** (1) These rules may be called the Hazardous Substances Rules, 2014.

(2) They shall come into force at once.

2. **Definition.** (1) In these rules, unless there is anything repugnant in the subject or context -

(i) "Act" means the Sindh Environmental Protection Act, 2014;

(ii) "Director-General" means the Director-General of the Agency;

(iii) "environmental impact assessment" means an environmental impact assessment as defined in clause (xv) of section 2;

(iv) "major accident" means an occurrence resulting from uncontrolled developments during industrial activity or from natural events which is likely to cause an adverse environmental effect, involving substantial loss of life and property;

(v) "section" means a section of the Act;

(vi) "Schedule" means Schedule to these rules; and

(vii) "worker" shall have the same meaning as defined in clause (h) of section 2 of the Factories Act, 1934 (XXV of 1934).

(2) All other words and expressions used in these rules but not defined shall have the same meanings as are assigned to them in the Act.

3. **Substances prescribed as hazardous substances.** As provided in sub-clause (b) of clause (xxv) of section 2, substances listed in Schedule-I are hereby prescribed as hazardous substances.

4. **Application for licence.** An application for grant of licence under section 13 shall be filed with the Agency in Form-A of Schedule-II:

Provided that an applicant for grant of licence to import or transport a hazardous substance shall, in addition to information in Form-A, also provide details mentioned in sub-rule (1) of rules 20 and 21 respectively.

5. **EIA of project or industrial activity.** (1) An application for grant of licence filed under rule 4 shall be accompanied by an environmental impact assessment of the project or industrial activity involving generation, collection, consignment, transport, treatment, disposal, storage, handling or import of a hazardous substance in respect of which the licence is sought.

(2) The environmental impact assessment submitted by the applicant shall include –

(a) a safety plan, containing information specified in sub-rule (1) of rule 17;

(b) a waste management plan, if hazardous waste shall be generated by the project or industrial activity, containing information specified in sub-rule (1) of rule 19.

6. **Applicability of Sindh Environmental Protection Agency (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations 2014.** The environmental impact assessment accompanying an application for grant of licence shall be prepared, scrutinized, reviewed and decided in accordance with the provisions of the Sindh Environmental Protection Agency (Review Initial Environmental Examination and Environmental Impact Assessment) Regulations 2014.

7. **Issue of Licence.** (1) Where the Director General approves an application for grant of licence, the applicant shall be informed accordingly and directed to deposit with the Agency, a licence fee at the rate specified in Schedule-III.

(2) On receipt of the licence fee, the Agency shall issue a licence in Form-B of Schedule-II.

(3) If a licence is defaced, damaged or lost, duplicate thereof shall be issued on payment of such fee as specified in Schedule-III.

8. **Conditions of licence.** (1) A licence granted under section 13 shall be subject to the conditions of approval of the environmental impact assessment accompanying the application for licence.

(2) Without prejudice to the provisions of sub-rule(1), a licence granted under section 13 shall also be subject to the following conditions:-

(a) the licensee shall employ qualified technical personnel having necessary knowledge and experience regarding the use, storage and handling of the hazardous substance, and safety precautions relating thereto;

(b) the hazardous substance shall be packed and labeled in

accordance with rule 9;

(c) the premises of the licensee shall comply with the conditions laid down in rule 10;

(d) the licensee shall ensure compliance with the provisions of rules 11 and 12 regarding safety precautions;

(e) the licensee shall provide necessary information, and where required training, to the persons to whom the hazardous substances are sold or delivered, regarding the use, storage and handling of the hazardous substances, and safety precautions relating thereto;

(f) the licensee shall maintain a detailed record of the quantity, type, quality and origin of the hazardous substance and the names and addresses of the persons to whom the hazardous substances are sold or delivered; and

(g) the licensee shall not extend his operation beyond the scope of the project or industrial activity in respect of which the environmental impact assessment has been submitted and approval granted.

(2) The Agency may, in the light of its review of the environmental impact assessment, require that the licensee maintain adequate insurance cover for any aspect of his operation.

(3) The licensee shall provide copy of approval from importing country under the international convention and protocol.

9. **Packing and labeling.-** (1) A container of a hazardous substance shall be of such size, material and design as to ensure that –

(a) it can be stored, transported and used without leakage and safely;

(b) the hazardous substance therein does not deteriorate in a manner as to render it more likely to cause, directly or in combination with other substances, an adverse environmental effect.

(2) The following information shall be printed conspicuously, legibly and indelibly on every container of a hazardous substance:-

(a) name of the hazardous substance;
(b) name, address and licence number of the licensee;
(c) net contents (volume or weight);
(d) date of manufacture and date of expiry, if any;
(e) a warning statement comprising –

(i) the word "DANGER!" in red on a contrasting background;
(ii) a picture of a skull and cross-bones;
(iii) pertinent instructions for use, storage and handling and safety precautions relating thereto.

(f) instructions regarding return or disposal of the empty container:

Provided that if the hazardous substance has an inner container as well as an outer container, the information shall be printed on both containers:

Provided further that if it is impracticable to print the aforesaid information on the container itself due to its size, material or design, the same shall be printed on a label or tag which shall be conspicuously affixed or attached to the container in such manner as to render it difficult to remove. The empty chemical containers or drums may not be used for other purposes:

(g) basic instructions mentioning immediate steps to be taken in case of any accident or emergency, preferably in local language.

10. Conditions for premises. (1) The premises in which a hazardous substance is generated, collected, consigned, treated, disposed of, stored or handled shall -

(a) comply with the conditions specified in Schedule-IV;

(b) be fitted with a notice on the outer door or gate bearing the following information:-

(i) the words "DANGER ! HAZARDOUS SUBSTANCE!" in red, on a contrasting background; and

(ii) a prominent picture of a skull and cross-bones.

(2) In case of import of hazardous substances, proponent shall provide approval from Climate Change Division (International Convention Wing) Government of Pakistan.

11. General safety precautions. (1) A licensee shall ensure that the following safety precautions are conveyed to persons to whom the hazardous substances are sold or delivered:-

(a) carefully read and follow the instructions and safety precautions printed on the container; (Urdu or local language translation of the same may be preferably given to the local buyers);
(b) when opening the container, wear protective clothing and equipment including helmet or cloth cap, safety spectacles or goggles, respirator or mask, rubber or plastic gloves, and work boots, as may be required;
(c) avoid contact of the hazardous substance with exposed skin or eyes, and if such contact occurs, wash the exposed area immediately and consult a doctor;
(d) avoid contaminating clothing, gloves and footwear with the hazardous substance, and if such contamination occurs, remove the

clothing, gloves and footwear immediately and wash the same thoroughly before reuse;

(e) do not eat, drink or smoke in the vicinity of hazardous substances.

(2) The general safety precautions mentioned in sub-rule (1) shall be in addition to such other specific precautions or measures that may be required to be conveyed by the licensee for a particular hazardous substance. The licensee will be bound to inform the Agency, the details of his subsequent consignments as the licence will be issued for a period of one year under section 13.

12. **Safety precautions for workers.** A licensee shall ensure that the following safety precautions are taken in respect of workers employed by him for handling hazardous substances:-

(a) No worker aged below eighteen years or over sixty years shall be employed for any job involving physical handling of hazardous substances.

(b) All workers shall be thoroughly trained in safety precautions for handling hazardous substances and shall be supervised by qualified supervisors.

(c) Protective clothing and equipment comprising helmet or cloth cap, safety spectacles or goggles, respirators or masks, rubber or plastic gloves and work-boots shall be available for all workers who may be exposed to any hazardous substance, and no worker shall be permitted on job unless and until he is wearing such protective clothing and equipment.

(d) Adequate supply of water shall be made available to the workers for personal washing as well as for washing their protective clothing and equipment.

(e) Protective clothing and equipment of the workers shall be washed and cleaned as often as may be required to ensure their efficacy.

(f) No worker shall be permitted to eat, drink or smoke till he has removed his protective clothing and equipment, washed his hands and face, and left the place of work.

(g) All fire-fighting, emergency and safety equipment shall be frequently checked and properly maintained.

(h) First-aid medical facility equipped with required antidotes shall be available in the premises, supervised by trained staff.

(i) Medical check-up of all workers shall be carried out at the time of employment and at least once a year thereafter.

(j) A record of every worker shall be maintained containing, amongst other details, his name and address, his medical check-up history, and the hazardous substances handled by him.

13. **Validity of licence.** A licence issued under rule 7 shall be valid for a period of one year from the date of issue:

Provided that if an application for renewal is made under rule 14, the licence shall continue to remain valid till the application for renewal is decided.

14. **Renewal of licence.** An application for renewal of licence shall also be made to the Federal Agency in Form-A of Schedule II, at least 30 days before the date of its expiry.

(i) An application for renewal shall be accompanied by a brief update of the original environmental impact assessment, unless changes in circumstances require submission of a fresh environmental impact assessment.

(ii) the fee for renewal of licence shall be as provided in Schedule-III, and the licence issued on receipt thereof shall also be in Form-B of Schedule II.

(iii) the fee for duplicate copy of licence shall be as provided in Schedule-III and the licence issue on the receipt thereof shall also be in Form-B of Schedule-II.

15. Cancellation of the licence. (1) Notwithstanding anything contained in these rules, if at any time on the basis of information or report received or inspection carried out, the Agency is of the opinion that the conditions of the licence have not been complied with, or that the information supplied by the licensee in his application or approved environmental impact assessment is incorrect, it shall issue notice to the licensee to show cause, within two weeks of receipt thereof, why the licence should not be cancelled.

(2) If no reply is received or if the reply is considered unsatisfactory, the Agency may, after giving the licensee an opportunity of being heard -

(i) require the licensee to take such measures and to comply with such conditions within such period as it may specify, failing which the licence shall stand cancelled; or

(ii) cancel the licence.

(3) On cancellation of the licence under sub-rule (2), the licensee shall cease his operations forthwith.

(4) The action taken under this rule shall be without prejudice to any other action that may be taken against the licensee under the Act or rules or regulations or any other law for the time being in force.

16. **Entry, inspection and monitoring.** (1) For the purposes of verification of any matter relating to the conditions of the licence, duly authorized staff of the Agency shall be entitled to enter and inspect the premises in which the hazardous

substance is being generated, collected, consigned, treated, disposed of, stored or handled:

Provided that the Agency shall inspect the premises at least once a year.

(2) The licensee shall ensure cooperation of his staff at the premises to facilitate the inspection mentioned in sub-rule (1).

(3) The licensee shall provide such information as may be required by the Agency for effective monitoring of compliance by the licensee with the conditions of the licence.

17. **Safety plan.** (1) The safety plan to be submitted by an applicant under clause (a) of sub-rule (2) of Rule 5 shall include –

(a) an analysis of major accident hazards relating to the hazardous substance involved;

(b) an assessment of the nature and scope of the adverse environmental effects likely to be caused by major accidents;

(c) a description of the safety equipment and systems installed and safety precautions taken; and

(d) a description of the emergency measures proposed to be taken on and off the premises of the applicant to control a major accident, and to mitigate its adverse environmental effect.

(2) Before issue of the licence, the Agency shall, in consultation with other relevant Government Agencies and Departments including the licensee, review the safety plan to ensure that it covers all anticipated contingencies and all emergencies likely to result from a major accident involving the hazardous substance involved, and that the concerned Government Agencies, Departments and the licensee are aware of their specific responsibilities thereunder.

(3) After issue of the licence, the licensee shall ensure that all persons liable to be affected by the approved safety plan are informed of the relevant provisions thereof.

18. **Notification of major accident.** (1) Where a major accident occurs on the premises of a licensee, the licensee shall immediately notify the Agency concerned and shall submit within twenty four hours and weekly thereafter, a report in Schedule-V.

(2) On receipt of the report under sub-rule (1), the Agency shall require the licensee to carry out a detailed environmental audit of the major accident and initiate necessary action, in accordance with the approved safety plan or otherwise, to control the major accident, mitigate its adverse environmental effect and prevent it from recurring.

19. **Waste management plan.** (1) The waste management plan, if required to be submitted by an applicant under clause (b) of sub-rule (2) of rule 5, shall -

(a) provide for the generation, collection, transport and disposal of the hazardous waste in a manner which shall protect against an adverse environmental effect;

(b) ensure that the hazardous waste is not mixed with non-hazardous waste, unless the applicant can prove that such mixing will better protect against an adverse environmental effect.

(2) The waste management plan shall be reviewed every year by the licensee to take into consideration the development of new technologies and management practices which can better protect against an adverse environmental effect, and if required revised waste management plan and fresh environmental impact assessment shall be submitted with the application for renewal of licence.

(3) If the waste management plan provides for export of the hazardous waste, such export shall only be allowed if it is in accordance with a bilateral, multilateral or regional agreement or arrangement that conforms to the requirements of Article 11 of the Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal, Basel, 1989.

(4) The licensee shall inform the Agency on a yearly basis about -

(a) the quantity and characteristics of hazardous waste generated in the previous year; and

(b) progress regarding implementation of the waste management plan.

20. **Import of hazardous substances.** (1) The applicant shall, for grant of licence to import a hazardous substance in addition to the information contained in Form-A of Schedule II, also provide the following details:-

(i) port of entry into Province of Sindh;

(ii) particulars of transport from exporting country to Pakistan;

(iii) quantity of hazardous substance being imported;

(iv) complete information pertaining to safety precautions to be adopted; and

(v) the purpose for which the hazardous substance is to be utilized, alongwith environmental impact assessment in respect thereof, if required under rule 5.

(vi) Licensee shall provide copy of approval from Climate Change Division (International Convention Wing) Government of Pakistan under the provisions of International Convention and Protocol.

(2) If the licence applied for is granted, the concerned Federal Agency or Ministry and the Agency and port authority concerned, shall ensure that proper steps are taken for safe off-loading, handling and storage of the hazardous substance on arrival at the port.

21. **Transport of hazardous substances.** (1) The applicant shall, for grant of licence for transport of a hazardous substance in addition to the information contained in Form-A of Schedule II, also provide the following details :-

(i) name and address of the person from whom the hazardous substance is to be collected;

(ii) name and address of the person to whom the hazardous substance is to be delivered;

(iii) quantity of hazardous substance to be transported;

(iv) mode of transport, including full particulars and specifications of the motor vehicles or other conveyance;

(v) route to be adopted between the origin and destination;

(vi) date and time of proposed transportation;

(vii) nature of waste which may be liquid or solid and its toxicity along with Material and Safety Data Sheet (MSDS); and

(viii) contingency or emergency response plan.

(2) If the licence applied for is granted, the Agency shall ensure that the Government Departments or Agencies concerned are informed of the relevant particulars of the transportation, for taking necessary safety precautions and other measures.

22. **Other approvals.** The issuance of a licence under section 13 read with rule 7 shall not absolve the licensee to obtain any other approval or consent that may be required under any law for the time being in force.

DIRECTOR GENERAL
SINDH ENVIRONMENTAL PROTECTION AGENCY

SCHEDULE-I
(see Rule 3)

List of Prescribed Hazardous Substances or Any Other Synthetically Chemical

S. NO.	NAME OF CHEMICALS	CAS. NO
1.	Acetaldehyde	75-07-0
2.	Acetic acid	64-19-7
3.	Acetic anhydride	108-24-7
4.	Acetone	67-64-1
5.	Acetone cyanohydrins	75-86-5

S. NO.	NAME OF CHEMICALS	CAS. NO
6.	Acetone Thiosemicarbazide	
7.	Acetylene	74-86-2
8.	Acetyl chloride	75-36-5
9.	Acrolein	107-02-8
10.	Acrylamide	79-06-1
11.	Acrylonitrile	107-13-1
12.	Adiponitrile	111-69-3
13.	Aldicarb	116-06-3
14.	Aldrin	309-00-2
15.	Allyl alcohol	107-18-6
16.	Allyl amine	107-11-9
17.	Allyl chloride	107-05-1
18.	Amino biphenyl	92-67-1
19.	3-Amino-1, 2,4 triazole	61-82-5
20.	Aminopterin	
21.	Amiton	78-83-5
22.	Amiton dialate	
23.	Ammonia	7664-41-7
24.	Ammonium chloride	12125-02-9
25.	Ammonium sulphamate	7773-06-0
26.	Aniline	62-53-3
27.	Aniline 2,4,6-Trimethyl	
28.	Anthraquinone	84-65-1
29.	Antimony & Compounds	7440-36-0
30.	Arsenic & Compounds	7440-38-2
31.	Arsine	7784-42-1
32.	Asbestos	1332-21-4
33.	Azinpho-ethyl	
34.	Azinphos methyl	86-50-0
35.	Bacitracin	
36.	Barium and Compounds	513-77-9
37.	Benzal chloride	98-87-3
38.	Benzenamine 3-Trifluoromethyl	
39.	Benzene	71-43-2
40.	Benzene sulfonyl chloride	98-09-9
41.	Benzene 1- (chloromethyl) –4 Nitro	
42.	Benzene arsenic acid	
43.	Benzidine and Salt	92-87-5
44.	Benzimidazole, 4,5-dichloro-2 (Trifluoromethyl)	
45.	Benzyl chloride	100-44-7
46.	Beryllium and Compounds	7440-41-7
47.	Bis (2-chloroehyl) Sulphide	?

S. NO.	NAME OF CHEMICALS	CAS. NO
48.	Bis (chloroethyl) ketone	?
49.	Bis (Tert-butyl peroxy) cyclohexane	?
50.	Bis (Tert-butyl peroxy) butane	?
51.	Bis (2,4,6-Trinitrophenylamine)	?
52.	Bromo chloro methane	74-97-5
53.	Bromoform	75-25-2
54.	Butyl amine tert	75-64-9
55.	Butvl-n-mercaptan	109-79-5
56.	Cadmium and Compounds	7440-43-9
57.	Calcium arsenate	7778-44-1
58.	Calcium Cyanamide	156-62-7
59.	Camphechlor Toxaphene)	8001-35-2
60.	Cantharidin	?
61.	Captan	133-06-2
62.	Carbachol chloride	?
63.	Carbaryl	63-25-2
64.	Carbofuran	1563-66-2
65.	Carbon tetrachloride	56-23-5
66.	Carbon disulphide	75-15-0
67.	Carbon monoxide	630-08-0
68.	Cellulose nitrate	9004-70-0 ?
69.	Chlordane	12789-03-6
70.	Chlorinated benzene	108-90-7
71.	Chlorine	7782-50-5
72.	Chlorine oxide	10049-04-4
73.	Chlorine trifluoride	7790-9102
74.	Chloroacetaldehyde	107-20-0
75.	Chlorobenzene	108-90-7
76.	Chloroform	67-66-3
77.	Chloromethyl methylether	107-30-2
78.	Chloronitrobenzene	88-73-3
79.	Chloroethyle Vinyl ether	110-75-8
80.	Chromium and Compounds	7440-47-3
81.	Cobalt and Compounds	7440-48-4
82.	Copper and compounds	7440-50-8
83.	Crotonaldehyde	123-73-9
84.	Cumene	98-82-8
85.	Cyanides and Compounds	151-50-8
86.	Cyclohexane	110-82-7
87.	DDT	50-29-3
88.	Demeton	298-03-3
89.	Dichlorobenzene	95-50-1

S. NO.	NAME OF CHEMICALS	CAS. NO
90.	Dichloroethyl ether	111-44-4
91.	Dichlorophenol-2.6	87-65-0
92.	Dichlorophenol-2.4	120-83-2
93.	Dichloropropene-1,3	142-28-9
94.	Dichloroproponic acid	127-20-8
95.	Dichlorvos	62-73-7
96.	Dieldrin	60-57-1
97.	Dimethyl hydrazine	57-14-7
98.	Dimethyl phenol 2,4	105-67-9
99.	Dimethylamine	109-89-7
100.	Dimethylaniline	121-69-7
101.	Dinitrophenol 2-4	51-28-5
102.	Dinitrotoluenes	121-14-2
103.	Dinoseb	88-85-7
104.	Dinitrobenzene	528-29-0
105.	Dioxane-p	123-91-1
106.	Dioxathion	78-34-2
107.	Diquat	85-00-7
108.	Endosulfan	115-29-7
109.	Endrin	72-20-8
110.	Epichlorohydrine	106-89-8
111.	Ethion	563-12-2
112.	Ethyl acetate	141-78-6
113.	Ethyl benzene	100-41-4
114.	Ethyl amine	75-04-7
115.	Ethyl ether	60-29-7
116.	Ethyl methacrylate	97-63-2
117.	Ethylene dichloride	107-06-2
118.	Ethylene dibromide	106-93-4
119.	Ethylene diamine	107-15-3
120.	Ethylene oxide	75-21-8
121.	Ethylenimine	151-56-4
122.	Fluorine	7782-41-4
123.	Formaldehyde	50-00-0
124.	Formic acid	64-18-6
125.	Furfural	98-01-1
126.	Heptachlor	76-44-8
127.	Hexachlorobenzene	118-74-1
128.	Hexachlorocyclohexan (Lindane)	608-73-1
129.	Hexachlorocyclopentadiene	77-47-4
130.	Hydrochloric acid	7647-01-0
131.	Hydrogen sulphide	7783-06-4

S. NO.	NAME OF CHEMICALS	CAS. NO
132.	Hydrogen cyanide	74-90-8
133.	Hydrogen fluoride	7664-39-3
134.	Iridium tetrachloride	?
135.	Isobutyl alcohol	?
136.	Lead (Inorganic)	7439-92-1
137.	Lead arsenate	7784-40-9
138.	Lindane	58-89-9
139.	Magnesium powder or ribbon	7439-95-4 ?
140.	Malathion	121-75-5
141.	Maleic anhydride	108-31-6
142.	Malononitrile	109-77-3
143.	Mercury and Compounds	502-39-6
144.	Methoxy chloride	
145.	Methyl alcohol	67-56-1
146.	Methyl amine	74-89-5
147.	Methyl bromide (Bromomethane)	74-83-9
148.	Methyl chloride	74-87-3
149.	M ethyl chloroform (1,1,1-Trichloroethane)	137-5-3
150.	Methyl ethyl ketone peroxide	1338-23-4
151.	Methyl isocyanate	624-83-9
152.	Methyl methacrylate monomer	80-62-6
153.	Methyl Parathion	298-00-0
154.	Mevinphos	7786-34-7
155.	Molybdenum and Compounds	7439-98-7
156.	Monocrotophos	6973-22-4
157.	Butyl acetate	123-86-4
158.	Butyl alcohol	71-36-3
159.	Naled	300-76-5
160.	Naphthalene	91-20-3
161.	Naphthyl amine	91-51-8
162.	Nickel salts	7440-02-0
163.	Nicotine	54-11-5
164.	Nitric acid	7697-37-2
165.	Nitric oxide	10102-43-9
166.	Nitro benzene	98-95-3
167.	Nitrocholorobenzene	100-00-5
168.	Nitrocyclohexane	
169.	Nitrogen dioxide	10102-44-0
170.	Nitrogen trifluride	7783-54-2
171.	Nitrophenols	88-75-5
172.	Nitropropane-2	79-46-9
173.	Nitroso dimethyl amine	62-75-9

S. NO.	NAME OF CHEMICALS	CAS. NO
174.	Cresol	1319-77-3
175.	Nitroaniline	100-01-6
176.	Osmium tetroxide	20816-12-0
177.	Oxygen (Liquid)	7727-37-9
178.	Oxygen difluoride	7783-41-7
179.	Ozone	10028-15-6
180.	Paraoxon (diethyl-4 nitrophenyphosphate)	
181.	Parathion	56-38-2
182.	Pentaborane	19624-22-7
183.	Pentachlorobenzene	608-93-5
184.	Pentachlorophenol	87-86-5
185.	Pentabromophenol	
186.	Phenol	108-95-2
187.	Phenol,2,2-thiobis (4,6-dichloro)	
188.	Phenol,2,2-thiobis (4 chioro 6 methyl phenol)	
189.	Phenol, 3- (1- methyl-ethyl)- methylcarbamate	
190.	Phorate	298-02-2
191.	Phosgene	75-44-5
192.	Phosphoric acid	7664-38-2
193.	Phosphorus	7723-14-0
194.	Phosphorus oxychloride	10025-87-3
195.	Phosphorus pentasulphide	1314-80-3
196.	Phosphorus trichloride	7719-12-2
197.	Phthalic anhydride	85-44-9
198.	Picric acid (2,4,6-trnitrophenol)	88-89-1
199.	Polychlorinated biphenyls (PCBs)	1336-36-3
200.	Propionic acid	79-09-4
201.	Propargyl alcohol	107-19-7
202.	Propylene oxide	75-56-9
203.	Pyrethrins	8003-34-71
204.	Pyridine	110-86-1
205.	Quinone	106-51-4
206.	Sodium azide	26628-22-8
207.	Sodium fluoro-acetate	62-74-8
208.	Sodium hydroxide	1310-73-2
209.	Strychnine	57-24-9
210.	Styrene	100-42-5
211.	Sulfuric acid	7664-93-9
212.	Tert- Butyl peroxyacetate	
213.	Tetra ethyl pyrophosphate	107-49-3
214.	Tetra nitromethane (Rocket Industry)	509-14-8
215.	Tetra-chlorodibenzo-p-dioxin, 1,2,3,7,8 (TCDD)	1746-01-6

S. NO.	NAME OF CHEMICALS	CAS. NO
216.	Tetraethyl lead	78-00-2
217.	Thallic oxide	
218.	Titanium powder	7440-32-6
219.	Toluene	108-88-3
220.	Toluene 2,4-diisocyanate	584-84-9
221.	Toxaphene	8001-35-2
222.	Trans-1,4-dichloro-butene	
223.	Trichloroethylene	79-01-6
224.	Trichlorophenols	95-95-4
225.	Trichlorophenoxy acetic acid 2,4,5 triethylamine	93-76-5
226.	Trichlorophenol 2,3,6	933-75-5
227.	Trichlorophenol 2,4,5	95-95-4
228.	Triethylamine	121-44-8
229.	Triethylene melamine	
230.	Trinitrobenzene	99-35-4
231.	Trinitrotoluene (TNT)	118-96-7
232.	Turpentine	8006-64-2
233.	Uranium and compounds	7440-61-1
234.	Vanadium and compounds	7440-62-2
235.	Vinyl acetate	108-05-4
236.	Vinyl chloride	75-01-4
237.	Vinyledene chloride	75-35-4
238.	Warfarin	81-81-2
239.	Xylene	1330-20-7
240.	Xylidine	1300-73-8
241.	Zinc chloride	7646-85-7
242.	Zirconium and compounds	7440-67-7
243.	Any other substance declared hazardous by Sindh EPA	

SCHEDULE-II
FORM A
(see Rule 4)

Application for grant/renewal of licence for hazardous substance

I/we [*name(s)* _____] of [*address* _____] hereby apply for grant/ renewal of licence to generate/collect/consign/transport/treat/dispose of/ store/ handle/ import (delete words inapplicable) the following hazardous substance

at my/our premises situated at [*address* _____].

I/we have read, and hereby undertake to comply with, all applicable provisions of the Sindh Environmental Protection Act, 2014 and rules and regulations made thereunder, including and in particular the Hazardous Substances Rules, 2014.

I/we submit herewith the following documents:-

(i) Environmental Impact Assessment (EIA) of the project/industrial activity involving the above-mentioned hazardous substance, including safety plan. Waste management plan is/is not included. [*delete word(s) inapplicable*].

(ii) Approved building plan of the premises mentioned above.

(iii) List of machinery and equipment installed/proposed to be installed.

(iv) List of qualified personnel and number of workers employed/proposed to be employed.

Date: _____ _____
Applicant

SCHEDULE-II
FORM B
(See Rule 7)

Licence for hazardous substance

M/s [*name* _____] of [*address* _____] is hereby granted licence to generate / collect / consign / transport / treat / dispose of/ store /handle /import (*delete words inapplicable*) the following hazardous substance –

_____

at its premises situated at [*address* _____] subject to the conditions specified below –

1) the following conditions of approval of the EIA accompanying the application for licence –

2) the conditions specified in Rule 8 of the Hazardous Substances Rules, 2014.

3) The following additional conditions –

This licence shall be valid for a period of one year from the date given below.

Date: _____

Director-General
Sindh Environmental
Protection Agency

SCHEDULE III
(see Rule 7)
Licence fees

Description	Fee
Licence Fee	Rs.50,000
Renewal Fee	Rs.25,000
Duplicate Fee	Rs. 10,000

SCHEDULE IV
(see rule 10)

Conditions for premises

1. **Location**

The premises shall not be located -

(a) in a congested, residential, commercial or office area;

(b) in small lanes or bye-lanes;

(c) close to drinking water sources; or

(d) in an area liable to flooding.

2. **Building**

The building shall -

(a) be soundly constructed with good ventilation and protection against direct sunlight;

(b) have well-maintained electrical installations;

(c) have walls protected by non-flammable or slow-burning material;

(d) have fire-resistant doors fitted with self-closing system;

(e) have smooth, crack-fee floors impermeable to liquids;

(f) have drains, if absolutely necessary, which do not connect directly with the sewerage system;

(g) have signs indicating location of emergency exits, escape routes, and fire-fighting equipment, prohibition of smoking, and safety precautions; and

(h) have proper washing facilities with adequate supply of water.

SCHEDULE V

(see rule 18)

Notification of major accident

Report no._____

1. Name and address of licensee _____
2. Licence no. and date _____
   Nature of industrial activity mentioning Hazardous substance involved.
   _____
3. Description of major accident -
   (a) Date and time
   _____

(b) Exact location

_____

(c) Process/operation during which accident took place

_____

(d) Type and circumstances of accident and estimated quantity of hazardous substance involved.

_____

4. Known causes of the major accident.

_____

5. Nature and extent of damage –

(a) In the premises; _____

(b) Outside the premises. _____

6. Description of emergency measures already taken.

_____

7. Description of further measures proposed to be taken to –

(a) mitigate adverse effects _____

(b) prevent recurrence _____

8. Any other relevant information. _____

_____

Date: _____

Time: _____

Licensee

Annexure V: Hospital Waste Management Rules, 2014

The Sindh Hospital Waste Management Rules, 2014

CONTENTS

Rules.

1. Short title and Commencement.
2. Definitions.
3. Responsibility for waste management.
4. Hospital Waste Management Plan.
5. Waste Segregation.
6. Waste collection.
7. Waste Storage.
8. Waste treatment.
9. Waste Disposal.
10. Accidents and spillages.
11. Maintenance of Record.
12. Immunizations.
13. Inspection.
14. Applicability of section13 and 14.
15. Schedule-I (Categories of hospital Waste)
16. Schedule-II [Label for Bi-Medical waste containers/Bags).

GOVERNMENT OF SINDH
SINDH ENVIRONMENT PROTECTION AGENCY

Karachi dated the 16th December,2014.

NOTIFICATION

NO.EPA/TECH/739/2014:- In exercise of the powers conferred by section 36 of the Sindh Environmental Protection Act, 2014 (VIII of 2014), the Environmental Protection Agency with the approval of the Government of Sindh, is pleased to make the following rules, namely: -

Short title and commencement.- (1) These rules may be called the Sindh Hospital Waste Management Rules, 2014.

(2) They shall come into force at once.

2. **Definitions.-** (1) In these rules, unless there is anything repugnant in the subject or context,-

(a) "Act" means the Sindh Environmental Protection Act, 2014 (VIII of 2014);

(b) "Authorised Officer" means any Officer designated by the Director General of the Agency for the purpose of these rules;

(c) "chemical waste" includes chemicals from diagnostic and experimental work, cleaning processes, housekeeping and disinfecting procedures, mercury waste such as from broken clinical equipment and spillage, and cadmium waste such as from discarded batteries;

(d) "genotoxic waste" includes cytotoxic drugs and outdated materials, vomitus, faeces or urine from patients treated with cytotoxic drugs or chemicals, and materials such as syringes and vials contaminated from the preparation and administration of such drugs;

(e) "Hospital" includes a clinic, laboratory, dispensary, pharmacy, nursing home, health unit, maternity center, blood bank, autopsy centre, mortuary, research institute and veterinary institutions, hospital waste facility, including any other facility involved in health care and biomedical activities;

(f) "Hospital waste" includes any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities or in the cleaning of medical equipments, supplies and accessories pertaining thereto or in the production or testing of biological, and including categories mentioned in Schedule I;

(g) "Hospital Waste Facility" means a suitable thermal, chemical, irradiation, incineration, filtration, autoclaving, destruction, shredding, microwaving, encapsulation or other treatment method, or by a combination of such methods involving proper validation and monitoring procedures;

(h) "Infectious waste" means waste contaminated by any type of pathogens such as bacteria, viruses, parasite or fungi and includes cultures from laboratory work, waste from surgeries and autopsies, waste from infected patients, discarded or disposable materials and equipment which have been in contact with such patients and infected animals from laboratories;

(i) "Liquid waste" means liquid chemical waste, liquid infectious waste, liquid radioactive waste generated from laboratory, which is likely to cause adverse impact on human health and natural resources;

(j) "Non-risk waste" includes paper and cardboard, packaging, food waste and the like;

(k) "Occupier" means a person who controls and administers the Hospital and its premises;

(l) "Operator" means a person who owns or controls or operates a facility for the collection, transportation, treatment, disposal or any other form of handling of hospital waste;

(m) "Pathological waste" includes tissues, organs, body parts, fetuses, blood and body fluids;

(n) "Pharmaceutical waste" includes expired or unused pharmaceutical products, spilled contaminated pharmaceutical products, surplus drugs, vaccines or sera, and discarded items used in handling pharmaceutical such as bottles, boxes, gloves, masks, tubes, or vails;

(o) "Radioactive waste" means wastes that contain radioactive material;

(p) "Risk waste" means infectious waste, pathological waste, sharps, pharmaceutical waste, genotoxic waste, chemical waste, and radioactive waste and liquid waste;

(q) "Schedule" means schedule appended to these rules.

(r) "section" means a section of the Act.

(s) "sharp" includes whether infected or not, needles, syringes, scalpels, infusion sets, saws and knives, blades, broken glass and any other item that could cut or puncture; and

(t) "waste management" includes waste segregation, waste collection, waste transportation, waste storage, waste treatment, waste disposal and waste minimization.

(2) The words and expressions used but not defined in these rules shall have the same meaning as are assigned to them in the Act.

3. **Responsibility for waste management.**- Every hospital owner, occupier, operator shall be responsible for the management of the hospital waste generated by it till its final disposal in accordance with the provision of the Act and these rules.

4. **Hospital Waste Management Plan.**- (1). A Hospital Waste Management Plan shall be based on internationally or nationally recognized environmental management practices, standards, which shall efficiently and effectively address the hospital waste.

(2) The **Hospital** Waste Management Plan shall include -

(a) waste management points for every ward and department, indicating each point, location on the basis of risk assessment;
(b) the categories of waste being generated in accordance with Schedule-I

(c) quantity of each waste category;
(d) details of the types, numbers of containers, waste bags and trolley required annually;
(e) schedule and frequency of waste collection from each ward and department;
(f) effective arrangements for onsite and off-site transportation of waste as provided in Schedule-I and II;
(g) contingency plans for storage or disposal of risk waste in the event of breakdowns of hospital waste facility, or of maintenance or collection arrangements;
(h) training courses and programmes on waste management;

(3) The Waste Management Plan shall be regularly monitored, reviewed, revised and updated and submitted to the Agency on annual basis.

5. **Waste segregation.-** Risk waste shall be separated from non-risk waste at the point where the waste is generated by a doctor, nurse, or other person as per Hospital Waste Management Plan and Schedule-I.

6. **Waste collection.-** Waste shall be collected in accordance with the Schedule-I and II.

7. **Waste storage.-** (1) A separate central storage facility shall be established within the Hospital with the details provided in Hospital Waste Management Plan

8. **Waste Treatment; (1)** On recognition of the type and nature of the waste material and the organisms in the waste, risk waste shall be inactivated or rendered safe before final disposal by a suitable thermal, chemical, irradiation incineration, filtration or other treatment method, or by a combination of such prescribed and effective methods guided by validated and monitoring procedures.

9. **Waste disposal.-**(1) Risk waste shall be disposed of in accordance to the procedure provided in Schedule-I.

(2) The operator, occupier, owner of the Hospital waste disposal and treatment facility shall obtain approval from the Agency under the section 17.

10. **Accidents and spillages.-** (1) In case of accidents or spillages the emergency procedures mentioned in the Hospital Waste Management Plan shall be implemented immediately and same shall be reported to the Agency.

11. **Maintenance of Record:- (1)** Every Hospital shall maintain records related to the management of hospital waste in accordance with these rules.

(2) All records shall be subject to inspection and verification by the Agency at any time.

12. **Immunization.** A course of Hepatitis B vaccine should be offered to all employees responsible for managing of hospital waste who are at risk of exposure to human blood, blood products, or body secretions and the

employees may also be intimated from time to time for tetanus, diphtheria, and polio. In facilities where employees are in contact with animals and their wastes, employees shall be offered rabies vaccine.

13. **Inspection**.-(1) An Authorized Officer may inspect any Hospital, located within the area of his jurisdiction to check that the provisions of these rules are complied with by the Hospital.

(2) If an Authorized Officer found any contravention of any provision of these rules, he shall take legal action as per the sub-section (2) of section 22.

14. **Applicability of section 13 and 14.**- Each Hospital generating risk waste shall apply to the Agency for issuance of license for handling hazardous substances and the provision of section 13 and 14 shall apply for the purpose of granting such license.

DIRECTOR GENERAL
SINDH ENVIRONMENTAL PROTECTION AGENCY

SCHEDULE I
(see rule 2(f))
CATEGORIES OF Hospital WASTE

Category Number	Type of Waste Category	Color Coding	Container Type	Treatment	Disposal
1.	pathological waste (tissues, organs, body parts, fetuses, blood and	Yellow	Metal or tough Plastic bag	-	Cremation/ Incineration/d eep burial

Category Number	Type of Waste Category	Color Coding	Container Type	Treatment	Disposal
	body fluids)				
2.	infectious waste (waste contaminated by any type of pathogens such as bacteria, viruses, parasite or fungi and includes cultures from laboratory work, waste from surgeries and autopsies, waste from infected patients, discarded or disposable materials and equipment which have been in contact with such patients and infected animals from laboratories)	Red	Disinfected container High density plastic container resistant to penetration and leakage	Autoclaving / micro-waving.	Incineration/Landfill
3.	Sharp (whether infected or not, needles, syringes, scalpels, infusion sets, saws and knives, blades, broken glass and any other item that could cut or puncture)	Red	Disinfected container High density plastic container resistant to penetration and leakage	All shall be cut or broken and rendered non-reusable at the point of use; disinfection by chemical treatment autoclaving/ microwaving and mutilation/ shredding	Landfill
4.	Pharmaceutical waste (expired or unused pharmaceutical products, spilled	Yellow	Metal or tough Plastic bag	destruction	incineration/landfill

Category Number	Type of Waste Category	Color Coding	Container Type	Treatment	Disposal
	contaminated pharmaceutical products, surplus drugs, vaccines or sera, and discarded items used in handling pharmaceutical such as bottles, boxes, gloves, masks, tubes, or vails)				
5.	genotoxic waste (cytotoxic drugs and outdated materials, vomitus, faeces or urine from patients treated with cytotoxic drugs or chemicals, and materials such as syringes and vails contaminated from the preparation and administration of such drugs)	Yellow		Return to supplier for treatment	Incineration (>1300°C) Landfill
6.	chemical waste (Chemicals from diagnostic and experimental work, cleaning processes, housekeeping and disinfecting procedures, mercury waste such as from broken clinical equipment and spillage, and cadmium waste such as from discarded	Yellow	Metal or tough Plastic bag	Photo-chemicals should be de-silvered and vaporized.	Landfill

7

Category Number	Type of Waste Category	Color Coding	Container Type	Treatment	Disposal
	batteries)				
7.	radioactive waste (liquid, solid and gaseous waste contaminated with radio nuclides generated from in-vitro analysis of body tissue and fluid, in-vivo body organ imaging and tumour localization, and investigation and therapeutic procedures.	Yellow	Metal or tough Plastic bag	Treated in facility with lead walls	
8.	non-risk waste (paper and cardboard, packaging, food waste and the like)	Black / White	Any Suitable	Recycling plant	Landfill
9.	Incineration Ash (ash from incineration of any bio-medical waste)	Yellow	Metal or tough Plastic bag	-	Landfill
10.	Liquid Waste (waste generated from laboratory and washing, cleaning, house-keeping and disinfecting activities)	-	-	disinfection by chemical treatment	Discharge into drains/ sewage system.

Explanation:

- Chemicals treatment using at least 1% hypochlorite solution or any other equivalent chemical reagent. It must be ensured that chemical treatment ensures disinfection.
- Multilation/shredding must be such so as to prevent unauthorised reuse.
- There will be no chemical pretreatment before incineration. Chlorinated plastics shall not be incinerated.

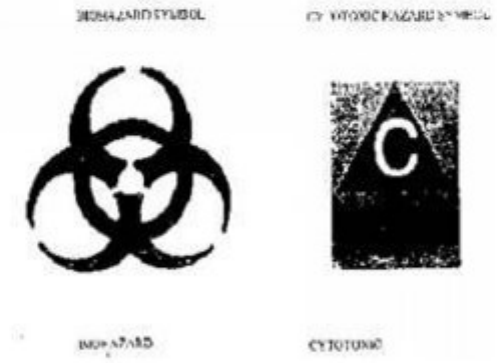
8

- Colour coding of waste categories with multiple treatment options as defined in Schedule I, shall be selected depending on treatment option chosen, which shall be as specified in Schedule I.
- Waste collection bags for waste types needing incineration shall not be made of chlorinated plastics.
- Category 9 (liquid) do not require containers/bags.
- **Labelling** : date, point of production, ward and hospital, quantity and description of waste and prominently displaying the biohazard symbol

SCHEDULE II

(see rule 4(2)(f)

LABEL FOR BIO-MEDICAL WASTE CONTAINERS/BAGS

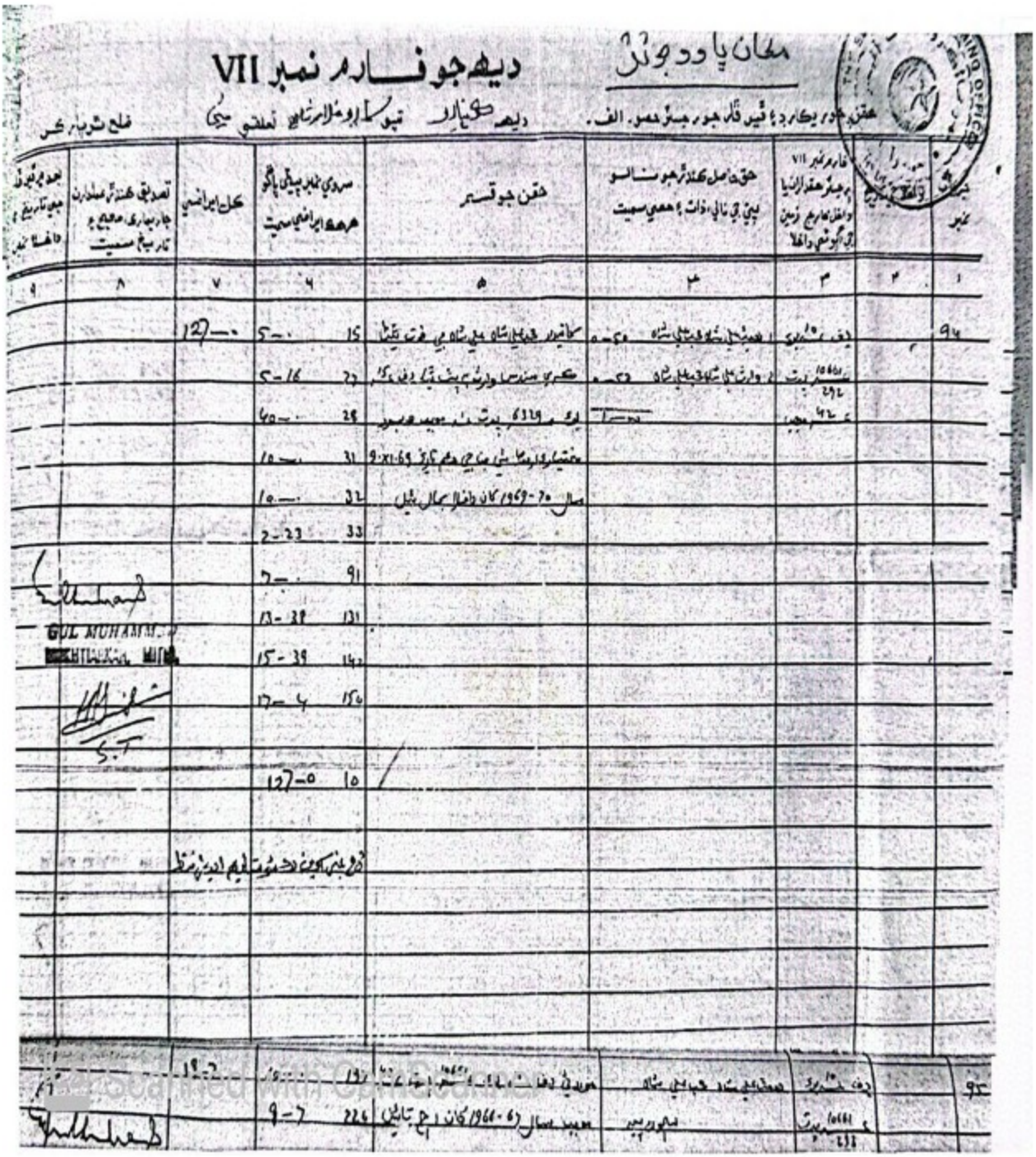


HANDLE WITH CARE

Note :Lable shall be non-washable and prominently visible.

9

Annexure IVI: Copy of Ownership Document



Annexure VII: Ambient Air Quality Monitoring Report

CERL
Climate & Environmental Research Laboratory

EPA Certified
No.
EPA/Lab/CR-01/34/2025

Job Ref No: CERL/AKC/July-26/106
Lab Ref No: CERL/AKC/July-26/AA/2701

Dated: 20-07-2026

Report to:
M/s Al Khyber Construction.
Address: Survey No. 28, Bhave Jo Tar, PO Islamkot, Tharparkar.

Sample ID: Air Quality
Sampling Date: 13-Jul-26
Sample Type: Air/Random Sample Analyzed By: CERL
Analysis Description: Quality Parameters from SEQs for Ambient Air Monitoring.
Sampling Coordinates: 24.735709, 70.319213

ANALYTICAL TEST REPORT

Sr. #	Parameter(s)	Method(s)	Unit	Result			SEQ(s) Limit
				Min	Max	Avg	
1	Carbon monoxide (CO)	EPA RFCA 098-054	mg/m3	2.8	4.4	3.6	10
2	Ozone (O3)	EPA50270 1999	µg/m3	15.3	23.7	19.5	130
3	Nitrogen Oxide (NO)	EPA RFNA 1829-074	µg/m3	19.4	30.2	24.80	40
4	Nitrogen dioxide (NO2)	EPA RFNA 1829-074	µg/m3	36.4	58.1	47.25	80
5	Sulfurdioxide (SO2)	EPA EQSA0486-060	µg/m3	3.5	8.1	5.8	120
6	Suspended Particulate Matter (SPM)	EPA 40CFR50 App B	µg/m3	204.0			500
7	Particulate Matter PM10	EPA 40CFR50	µg/m3	117.0	128.4	122.7	150
8	Particulate Matter PM2.5	EPA 40CFR50	µg/m3	36.4	44.8	40.6	75
9	Lead (Pb)	EPA 40CFR50	µg/m3	<0.1	<0.1	<0.1	1.5

Method: ASTM=American Standard Testing Method, **EPA**=United State Environmental Protection Agency Methods, **SEQs**=Sindh Environmental Quality Standard for Ambient Air Quality, SEP Act Regulation 2014 No. EPA/TECH/739/2014.

Reading Measured by: _____
Chemist - CERL

Verified by: _____
Manager Lab - CERL

Note:
1 Report is valid for current batch (Sample)
2 This Report is not valid for any other certification / Publication or Judicial Purposes.

101, First Floor, Plot No. H-3/B, Sector-5, EBM Causeway, Korangi Industrial Area, Karachi.
Tel : 021-35071077, Cell : 0305-2529997, Email: cerl.envlab@gmail.com

Annexure VIII: Ambient Noise Levels Monitoring Report

CERL
Climate & Environmental Research Laboratory

EPA Certified
No.
EPA/Lab/CR-01/34/2025

Job Ref No: CERL/AKC/July-26/106
Lab Ref No: CERL/AKC/July-26/NM/2702

Dated: 20-07-2026

Report to:
M/s Al Khyber Construction.
Address: Survey No. 28, Bhave Jo Tar, PO Islamkot, Tharparkar.

Sample ID:	Noise Level	Sampling Date:	13-Jul-26
Category of Area/Zone:	Industrial Area	Reporting Date:	13-Jul-26
Analyzed By:	CERL	SEQs Limit:	75 dBA
Method:	ASTM E-1124		
Analysis Description:	Quality Parameters from SEQs for Ambient Noise.		

ANALYTICAL TEST REPORT

Sr. #	Sample Description	Unit	Noise Value		
			Min	Max	Avg
1	Location-1 24.735880, 70.318493	dBA	56.2	58.5	57.35
2	Location-2 24.736009, 70.319029		52.3	54.3	53.3
3	Location-3 24.735726, 70.319198		55.2	56.4	55.8
4	Location-4 24.735582, 70.318731		51.2	53.4	52.3

Method: ASTM=American Standard Testing Method.
SEQS=Sindh Environmental Quality Standard for Noise, SEP Act Regulation 2014 No. EPA/TECH/739/2014.

Reading Measured by: _____
Chemist - CERL

Verified by: _____
Manager Lab - CERL

Note:
1 Report is valid for current batch (Sample)
2 This Report is not valid for any other certification / Publication or Judicial Purposes.

101, First Floor, Plot No. H-3/B, Sector-5, EBM Causeway, Korangi Industrial Area, Karachi.
Tel : 021-35071077, Cell : 0305-2529997, Email: cerl.envlab@gmail.com

Annexure VIIX: Air Dispersion Modelling

PROCESS DESCRIPTION:

1. M/s Al-Khyber Construction intends to install a Waste Management Facility (WMF) at Survey No. 28, Bhave Jo Tar, PO Islamkot, Tharparkar (with geological coordinate as 24°44'08.0"N 70°19'05.2"E. The proposed project location is shown in the map below in Figure 1.
2. Waste Management Facility will have 02x waste incineration units of 100 kg/hr. and 500 kg/hr., respectively. Each unit will be fired with dual (gas/oil) fuel. In the plant, the waste is burned in the primary chamber at temperature of approximately 700-900 degrees C, the gases produced are then burned in the secondary chamber at temperature of up to 1250-degree C, which finally pass on to another chamber where the gases are showered with water through high speed jets for cleaning of the gases and this part acts as a wet scrubber. The gases then finally are emitted through a chimney which have outlets at height of 10 & 15 m for each incineration unit, respectively.
3. As the incinerators at the project will be operated on fossil fuel which involve the combustion of these fuels, therefore, the potentially major pollutants generated from the proposed project. These criteria pollutants include the Nitrogen Oxides (NOx), Carbon monoxide (CO), Sulfur dioxide (SO2) and Total Suspended Particulate (TSP).
4. The monitoring and control of these emissions are necessary to protect the surrounding environment around the project site and also it is the regulatory requirement of the Sindh Environmental Protection Act 2014 and Sindh Environmental Quality Standards (SEQS).

5. The proponent is committed to protect and conserve the environmental resources through effective controls of the emissions by state of the art technology selection and control device installations for incineration of the hazardous waste and to comply the environmental emission regulations of Sindh EPA.

6. In order to comply, the Sindh Environmental Protection Act 2014, the quantitative analysis (simulation) of impact of the expected demission on air quality of the surrounding of the project site has been carried out using the United States Environmental Protection Agency (USEPA) approved regulatory air quality model i. e. AERMOD.

7. The objective of the current air dispersion modeling study of emissions from the proposed Waste Management Facility is to;

   (a) Predict the impact (quantitatively) of the proposed Project on the air quality of the surrounding area.

   (b) Determine the compliance status to SEQS guidelines for ambient air when proposed waste incineration units would be operational.

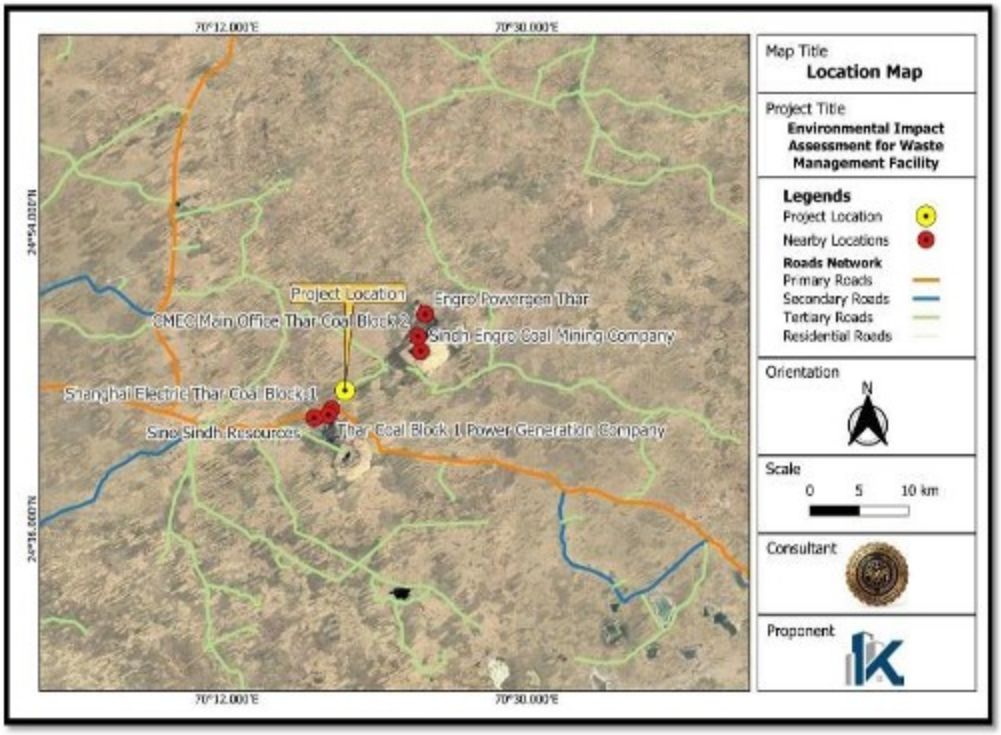


Figure 1: Location of Proposed Waste Management Facility by M/s Al Khyber Construction, Tharparkar

AN OVERVIEW OF AERMOD:

8. "AERMOD" (**A**merican Meteorological Society/**E**nvironmental Protection Agency **R**egulatory **MOD**el) is a steady state regulatory air dispersion plume model developed by USEPA. It assumes the concentrations at all distances during a modeled hour which are governed by the temporally averaged meteorology of the hour. The AERMOD modeling system consists of two pre-processors and the dispersion model (i) AERMET-meteorological preprocessor and (ii) AERMAP for characterizing the terrain and generates receptor grids for the dispersion model. Figure 2 shows the GUI of Web Lakes Environment's AERMOD, USA.

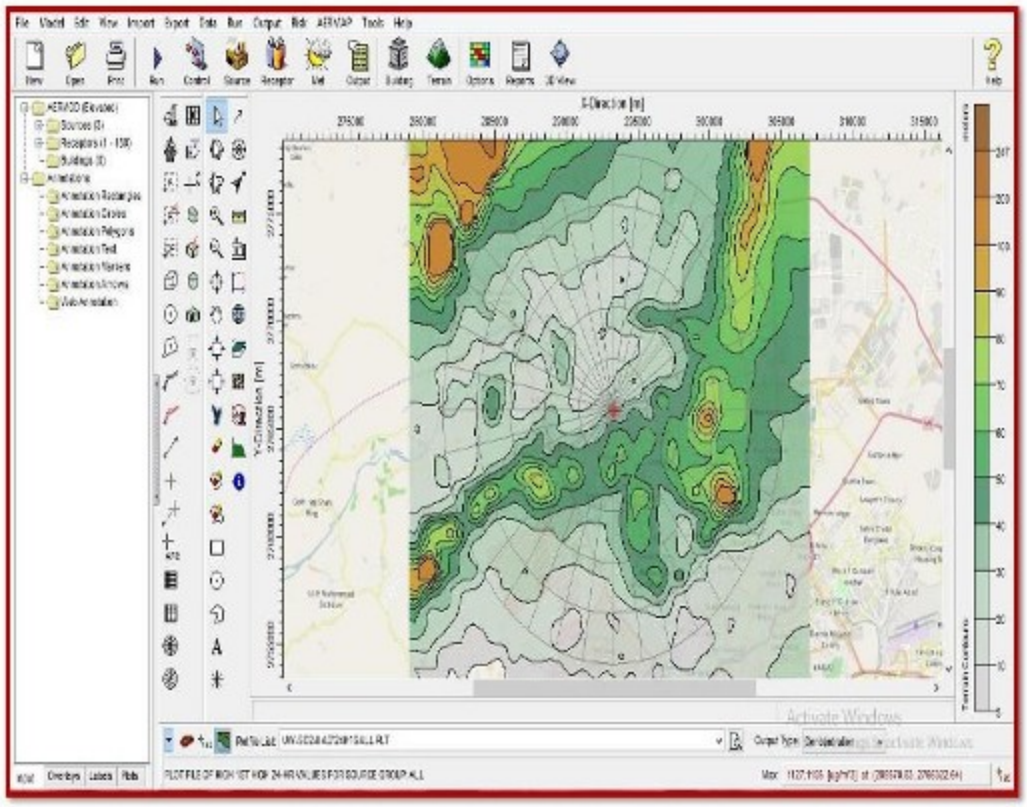


Figure 2: An Overview of AERMOD Modeling Tool[1]

[1] https://www.weblakes.com/products/aermod/resources/lakes_aermod_view_release_notes.pdf

DISPERSION MODELING METHODOLOGY:

Modeling Input Data

9. Following three types of necessary input data of emissions modeling has been used in present study;

Stack and Emission Data

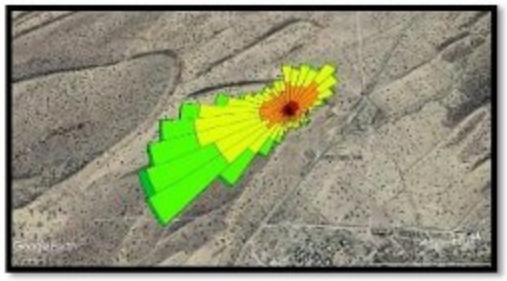
10. Following incinerator's stack design (stack dia, exit temperature, exit volumetric flow rate, stack height) and emission data (for CO, NOx, SO2 and TSP) used is given in Table-1 as provided by client.

Table-1. Stack and Emission Input Data

Parameter	Unit	Incinerator-I 100 kg/hr.	Incinerator-II 500 kg/hr.
Temperature	°C	1250	1250
Diameter	m	0.35	0.60
Stack height	m	10.00	15.00
Exit Velocity	m/s	12.00	15.00
Emission Rates			
CO	g/s	0.04	0.09
NO_x		0.12	0.20
SO_2		0.04	0.15
TSP		0.18	0.54

Meteorological Input Data

11. The hourly surface meteorological data (in SAMSON format) and Upper Air Met Profiling data (in fsl format) of Mithi/Islamkot was used in the present study. The met analysis indicate that the prevailing dominant wind is blowing from W-SW direction on annual basis.



Baseline Air Quality Data

12. Following baseline ambient air quality data was conducted by EPA certified lab in the project area is used as input in modeling the study (Table 2)

Table 2: Baseline Ambient Air Quality Measurement Data (Proposed Project Location)

S. No.	Parameters	Unit	Avg Time (hrs.)	SEQS*	Measuring Value	Method/Instrument
1.	Carbon Monoxide, (CO)	mg/m^3	1	10	3.6	GFC Spectroscopy
2.	Sulphur Dioxide, (SO_2)	$\mu g/m^3$	24	120	5.8	Fluorescence
3	Oxides of Nitrogen (NOx)	$\mu g/m^3$	24	120	72.05	Chemilluminsecence
4.	Particulate Matter, TSP	$\mu g/m^3$	24	500	204.00	β Ray Absorption

Terrain Data

13. In order to predict dispersion modeling results over the entire modeling area (5.0 km radius from the project site, the model study area was divided into a Uniform Polar Grid Network with total 180 grids and 36 radial directions. The terrain elevation effect in the dispersion was incorporated using AERMAP tool.

Other Modeling Assumption

14. Following are model inputs in each of the assumed scenario;

i. Universal Transverse Mercator (UTM) as projection for zone class of 42 in datum of World Geodetic System 1984 (WGS 84) was used to define the modeling domain
ii. The model output was selected as 1st Highest Rank values are plotted in form of counters in selected modeling domain (5 km radius from the proposed project site.
iii. Output emissions concentrations are modeled for 1-hrs, 24-hrs and annual averaged period for NOx, SO2, and TSP while 1-hr and 8-hrs averaged for CO.

iv. The Ground Level Concentrations (GLCs) of each pollutant was compared with SEQS for compliance status of the projected emissions in project surroundings localities.

Modeling Output Data

15. The output data of model is present in two forms;

i. In Contour plots of each pollutants showing the Ground Level Concentrations (GLCs) determining the impact area of emissions for 1-hr average, 8-hrs, 24 hrs. and annual average whichever is applicable in compliance with Sindh Environmental Protection Act, 2014.

ii. Tabular form showing the source contribution, magnitude of impact and compliance level of SEQS for each pollutant.

Modeling Scenarios;

16. The impact of emissions from the stacks of the proposed Waste Management Facility (WMF), comprising two incineration units with treatment capacities of 100 kg/hr. and 500 kg/hr. was assessed, operate independently were quantified through dispersion modeling by assuming the following emission scenarios.

Scenario-I: Impact of Emissions when **incinerator of capacity of 100 kg/hr.** is operational at project site (Normal Scenario) for 24 hrs. throughout the year.

Scenario-II: Impact of Emissions when **incinerators of capacity of 500 kg/hr.** are operational at project site (peak operation scenario) for 24 hrs. throughout the year.

Scenario-III: Impact of Emissions when both **incinerators of capacity of 100 kg/hr. & 500 kg/hr.** are operational at project site (peak operation scenario) for 24 hrs. throughout the year.

RESULTS AND DISCUSSION

17. The air dispersion modeling study was undertaken using the USEPA regulatory model AERMOD to evaluate the impact of emissions from the proposed Waste Management Facility comprising two waste incinerators of capacities 100 kg/hr. and 500 kg/hr. The assessment was carried out to quantify the contribution of Carbon Monoxide (CO), Nitrogen Oxides (NO_x), Sulphur Dioxide (SO_2) and Total Suspended Particulates (TSP) to the surrounding ambient air under three operational scenarios and to determine compliance with the Sindh Environmental Quality Standards (SEQS).
18. The model simulations incorporated stack characteristics, pollutant emission rates, site-specific meteorological data, terrain information and baseline ambient air quality measurements. Three operating scenarios were evaluated, namely operation of the 100 kg/hr. incinerator alone (Scenario-I), operation of the 500 kg/hr. incinerator alone (Scenario-II), and simultaneous operation of both incinerators (Scenario-III).
19. The contour plots presented in **Annexure-I, Annexure-II and Annexure-III** illustrate the spatial distribution of incremental ground level concentrations (GLCs) for CO, NO_x, SO_2 and TSP over the 5-km modeling domain. The predicted concentration contours indicate that the highest ground level concentrations occur close to the emission sources and gradually decrease with increasing distance from the stacks because of atmospheric dilution and dispersion.
20. The contour patterns are generally elongated towards the east and north-east of the project site, which is consistent with the prevailing annual wind direction from the west-southwest observed in the meteorological data. The concentration gradients are smooth without formation of localized hotspots

beyond the immediate vicinity of the facility, demonstrating efficient atmospheric dispersion under the prevailing meteorological conditions.

21. The predicted impact area remains confined within the modeling domain, while pollutant concentrations decrease rapidly away from the source due to the combined effects of stack momentum, elevated release heights and atmospheric mixing.

Scenario-I: Operation of 100 kg/hr. Incinerator

22. Scenario-I represents normal operation of the 100 kg/hr. waste incinerator. The emission rates used in the model were comparatively low, resulting in very small incremental ground level concentrations for all pollutants.
23. The highest predicted 24-hour incremental concentration of SO_2 was only 0.075 µg/m³. When added to the measured background concentration of 5.8 µg/m³, the resulting ambient concentration remained substantially below the SEQS limit of 120 µg/m³.
24. Similarly, the maximum one-hour contribution of CO was only 0.00054 mg/m³. After inclusion of the baseline concentration, the total predicted ambient concentration remained well below the applicable ambient standard of 10 mg/m³.
25. The predicted incremental NO_x concentration for the 24-hour averaging period was only 0.0163 µg/m³, which is insignificant compared with both the measured background concentration and the applicable SEQS limit. Likewise, the incremental TSP concentration of 0.226 µg/m³ represents a negligible increase over the measured baseline concentration of 204 µg/m³ and remains well within the allowable limit of 500 µg/m³.
26. The contour plots in **Annexure-I (Figures 3–14)** further confirm that pollutant plumes remain localized around the project site and exhibit rapid dilution with increasing distance. The contours are widely spaced, indicating efficient atmospheric dispersion and negligible off-site impacts.

Scenario-II: Operation of 500 kg/hr. Incinerator

27. Scenario-II represents operation of the larger 500 kg/hr. incinerator under continuous operating conditions. As expected from the higher emission rates, the predicted incremental concentrations are greater than those of Scenario-I; however, they remain extremely small relative to the applicable ambient air quality standards.
28. The highest predicted 24-hour SO_2 concentration was 0.1465 µg/m³. When added to the measured background level, the resulting ambient concentration remained far below the SEQS limit.
29. The predicted one-hour CO contribution was only 0.00035 mg/m³, indicating negligible impact on ambient air quality. Similarly, the maximum predicted NO_x contribution increased to 0.1953 µg/m³ for the 24-hour averaging period but remained insignificant compared with the measured background concentration and regulatory limit.
30. The highest predicted 24-hour TSP contribution was 0.5271 µg/m³, resulting in only a marginal increase over the existing ambient concentration. Even under this higher-capacity operating condition, the predicted ambient TSP concentration remained substantially below the SEQS limit.
31. The contour plots presented in **Annexure-II (Figures 15–26)** indicate slightly larger plume dimensions compared with Scenario-I due to the increased emission rates. Nevertheless, the pollutant plumes remain concentrated near the facility, with concentrations decreasing rapidly away from the emission source. No sensitive receptors within the modeled area are predicted to experience concentrations approaching regulatory thresholds.

Scenario-III: Simultaneous Operation of Both Incinerators

32. Scenario-III represents the maximum operating condition in which both incinerators operate simultaneously throughout the year. This scenario produces the highest combined emissions and therefore represents the peak operation assessment. Under this condition, the maximum predicted incremental concentrations were:

- SO_2 (24-hour): 0.207 µg/m³
- NO_x (24-hour): 0.3874 µg/m³
- CO (1-hour): 0.0007 mg/m³
- TSP (24-hour): 0.708 µg/m³

33. These values remain extremely small in comparison with their respective SEQS limits. After addition of the measured background concentrations, the predicted ambient concentrations remain well within regulatory standards for all pollutants.
34. Although Scenario-III generates the largest impact among the three modeled cases, the increase in ambient concentrations is negligible and does not significantly alter the existing air quality of the surrounding area.
35. The contour plots presented in **Annexure-III (Figures 27–38)** demonstrate similar dispersion behavior observed in the previous scenarios. The maximum concentrations occur near the facility and gradually decrease in the downwind direction. The contour maps do not indicate development of any significant pollution hotspot or adverse accumulation within the 5-km study area.

Comparison of the Three Modeling Scenarios

36. Comparison of the three operational scenarios clearly demonstrate that pollutant concentrations increase with increasing emission rates. Scenario-I produces the smallest impacts, Scenario-II produces moderately higher concentrations owing to the larger incinerator capacity, while Scenario-III represents the highest predicted impacts because both units operate simultaneously.
37. Despite this progressive increase, the predicted incremental concentrations remain extremely small compared with the existing background air quality and applicable SEQS limits. Even under the peak operating condition, the contribution of the proposed facility to ambient air quality is negligible.
38. The results indicate that background concentrations are the dominant component of the predicted ambient air quality, whereas emissions from the proposed waste management facility contribute only a very small fraction of the total concentrations.

Compliance with Ambient Air Quality Standards

39. The modeling results demonstrate that all predicted concentrations of CO, NO_x, SO_2 and TSP remain well within the Sindh Environmental Quality Standards for ambient air under all operating scenarios.

40. The highest predicted ground level concentrations occur during Scenario-III; however, the total ambient concentrations, including background levels, remain substantially below the applicable regulatory limits. The contour plots also confirm that pollutant dispersion is effective and that emissions are confined to a limited area around the facility without producing significant off-site impacts.

41. Overall, the modeling results indicate that operation of the proposed Waste Management Facility will have an insignificant impact on ambient air quality within the 5-km modeling domain. The study therefore satisfies the objectives of predicting air quality impacts and demonstrating compliance with the Sindh Environmental Quality Standards under normal and maximum operating conditions.

Table 3: Process contribution and Predicted Ambient Air Concentrations Selected Criteria Pollutants for Scenario-I, Scenario-II and Scenario-III

Pollutant	Avg. Time	Unit	Conc. (a)	SEQS	Baseline Conc. (b)	Predicted Ambient Conc. (a+b)
Scenario-I						
SO2	24-Hrs	µg/m³	0.075	120	5.8	5.875
CO	1-Hr	mg/m3	0.00054	10	3.6	3.6054
NOx	24-Hrs	µg/m³	0.0163	120	72.05	72.0663
TSP	24-Hrs		0.226	500	204	204.226
Scenario-II						
SO2	24-Hrs	µg/m³	0.1465	120	5.8	5.9465
CO	1-Hr	mg/m3	0.00035	10	3.6	3.60035
NOx	24-Hrs	µg/m³	0.1953	120	72.05	72.2453
TSP	24-Hrs		0.5271	500	204	204.5271
Scenario-III						
SO2	24-Hrs	µg/m³	0.207	120	5.8	6.007
CO	1-Hr	mg/m3	0.0007	10	3.6	3.6007
NOx	24-Hrs	µg/m³	0.3874	120	72.05	72.4374
TSP	24-Hrs		0.708	500	204	204.708

CONCLUSION:

32. The current dispersion modeling of emissions from proposed project of installation of 2x Incinerators with capacity of 500 kg/hr. and 100 kg/hr. by M/s Al-Khyber Construction planned at Islamkot, Tharparkar.

33. The model output results (with designed emission, meteorological and terrain datasets) indicate that proposed Waste Management Facility would contribute very slightly into air shed in/around the plant. The modeling results indicate that the concentrations NOx, SO2, CO and TSP are within SEQS limits for ambient air.

34. It is concluded that the impact of emission from proposed project to ambient air within domain of 5 km radius is predicted as insignificant with the given prevailing meteorological conditions within modeling domain and comply with SEQS limits for ambient air for all three operational emission scenarios.

ANNEXURE-I

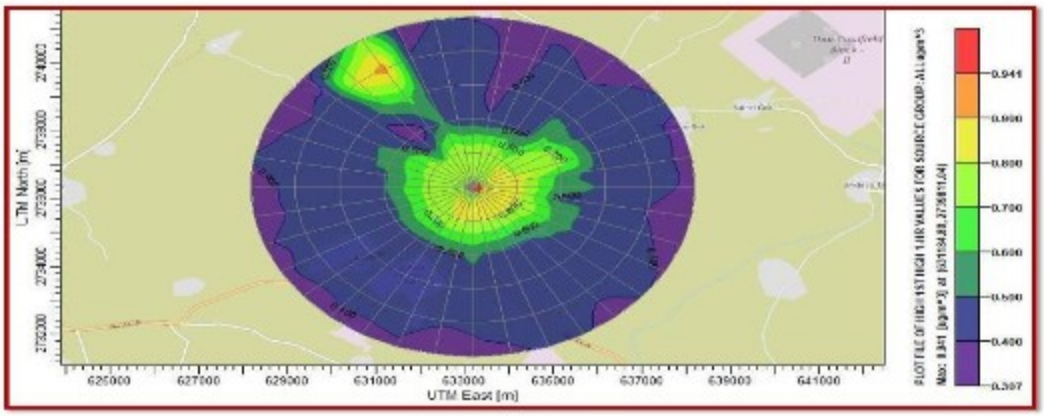


Figure 3: Spatial Dispersion of 1st Highest Concentrations (incremental) of CO for 1-Hrly Averaged for Scenario-I

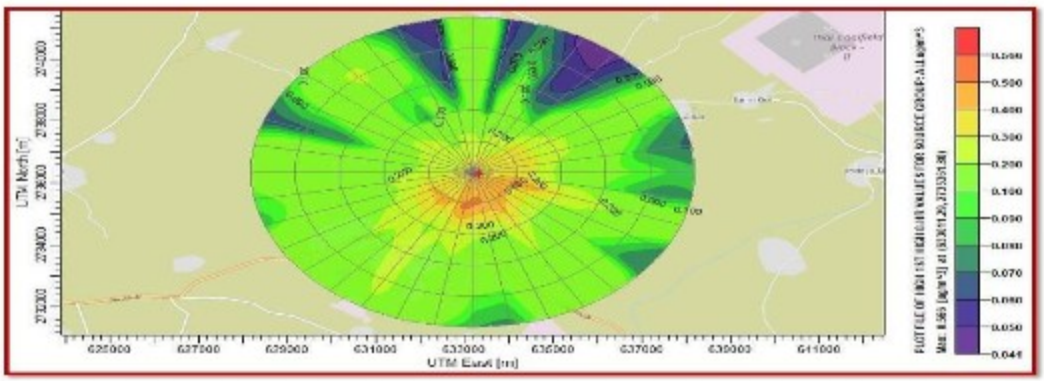


Figure 4: Spatial Dispersion of 1st Highest Concentrations of CO for 8-Hrly Averaged for Scenario-I

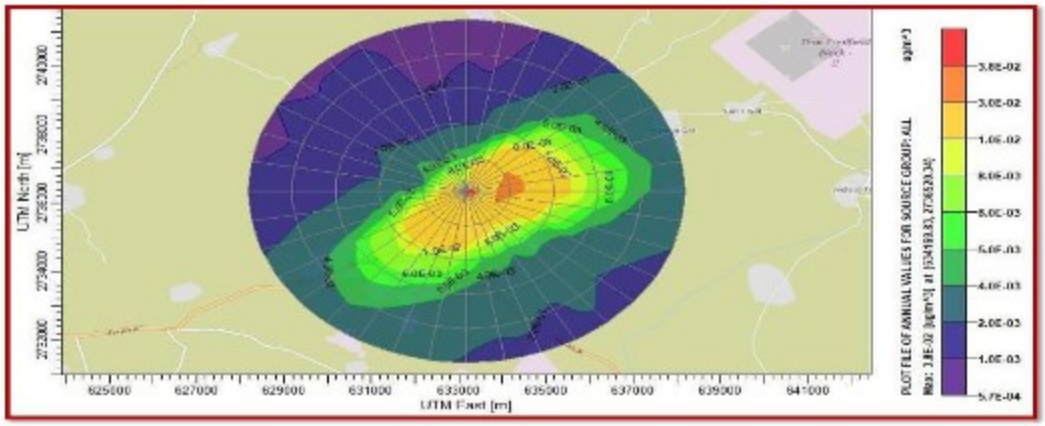


Figure 5: Spatial Dispersion of Incremental Concentrations of CO for Annually Averaged for Scenario-I

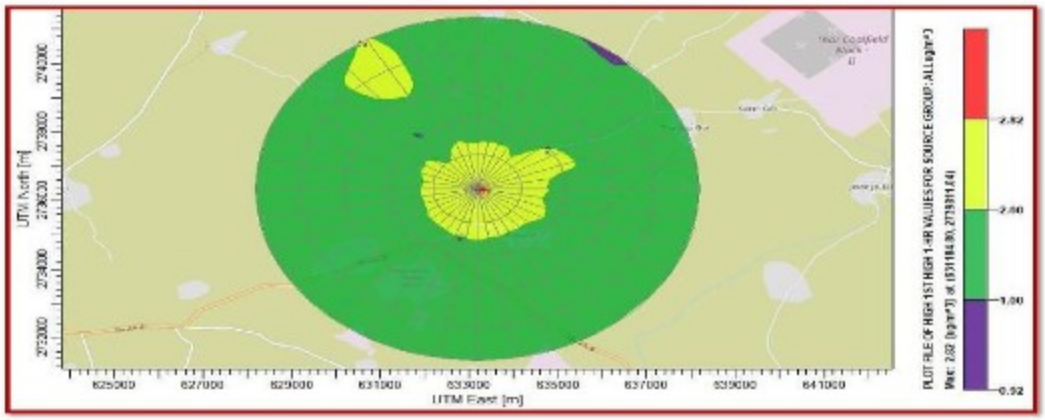


Figure 6: Spatial Dispersion of 1st Highest Concentrations of NOx for 1-Hrly Averaged for Scenario-I

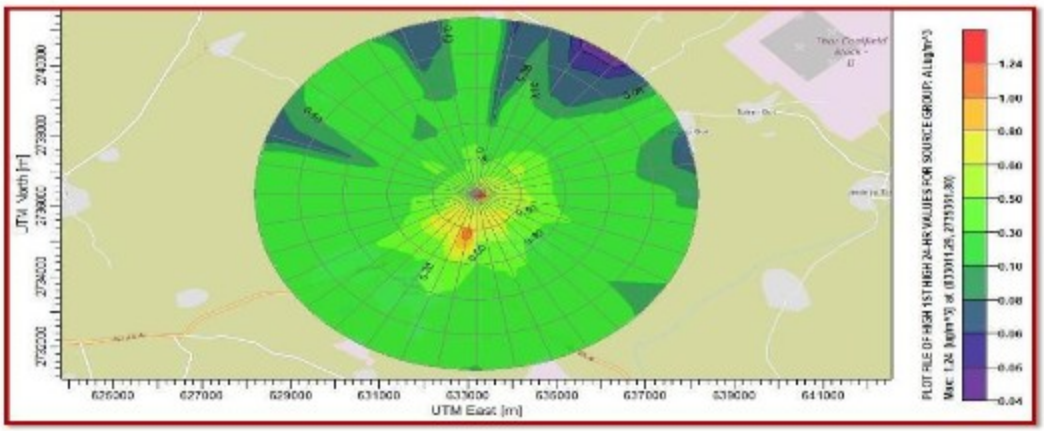


Figure 7: Spatial Dispersion of 1st Highest Concentrations of NOx for 24-Hrly Averaged for Scenario-I

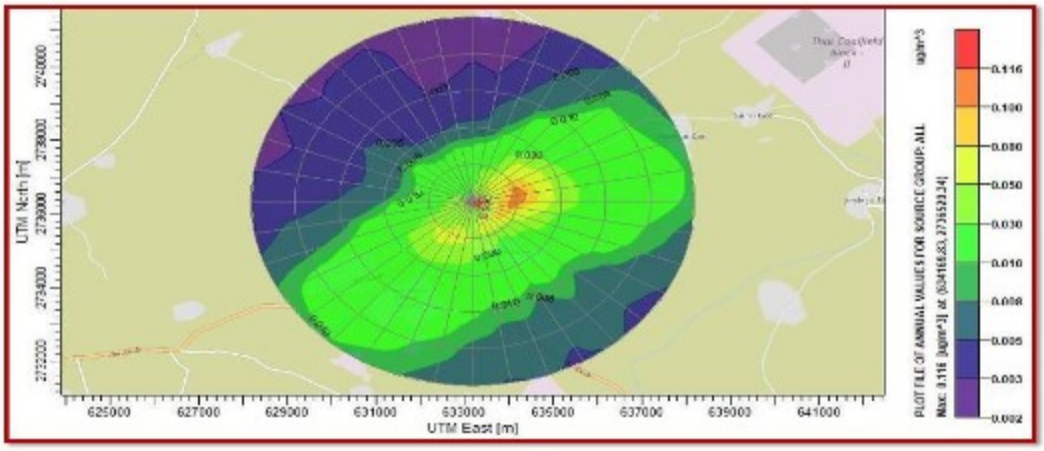


Figure 8: Spatial Dispersion of Incremental Concentrations NOx for Annual Averaged for Scenario-I

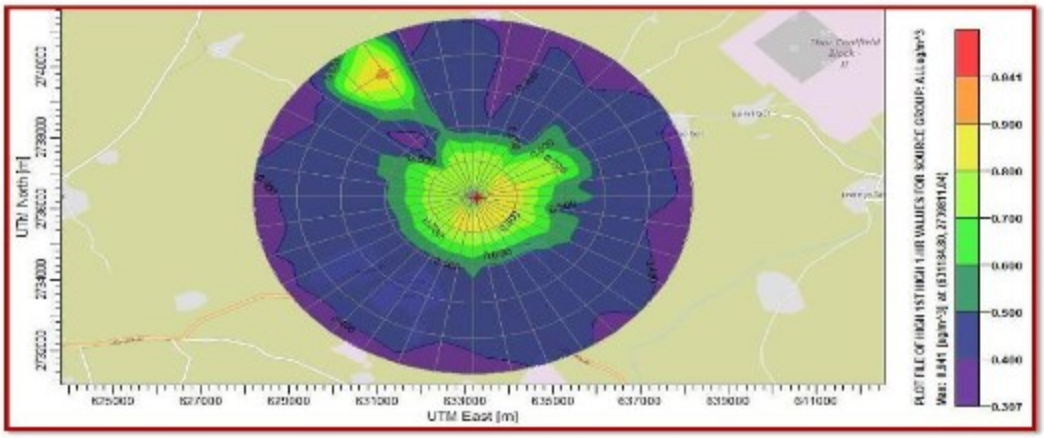


Figure 9: Spatial Dispersion of 1st Highest Concentrations of SO2 for 1-Hrly Averaged for Scenario-I

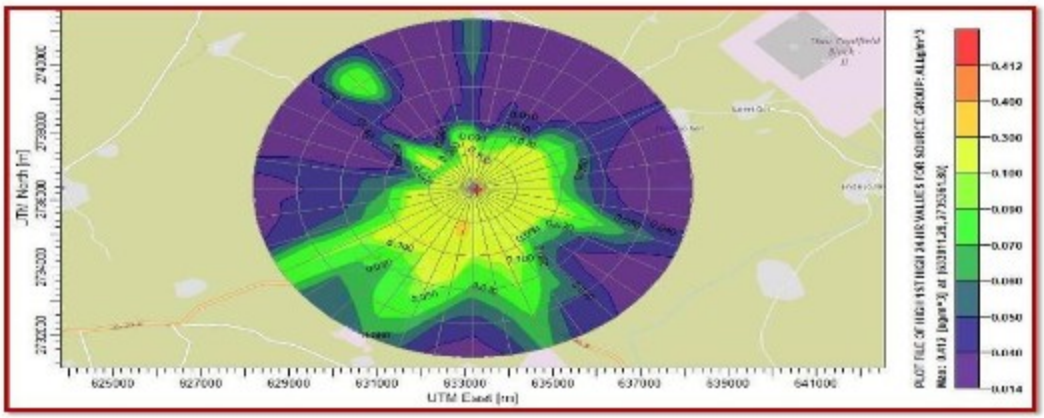


Figure 10: Spatial Dispersion of 1st Highest Concentrations of SO2 for 24-Hrly Averaged for Scenario-I

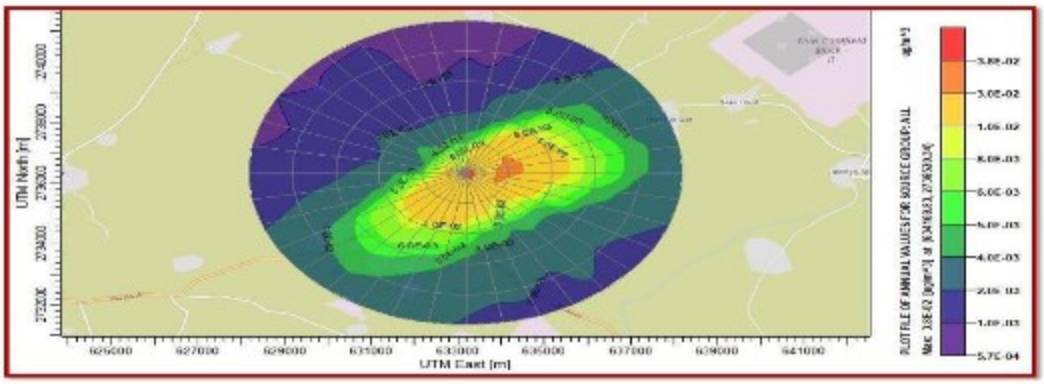


Figure 11: Spatial Dispersion of Incremental Concentrations SO2 for Annual Averaged for Scenario-I

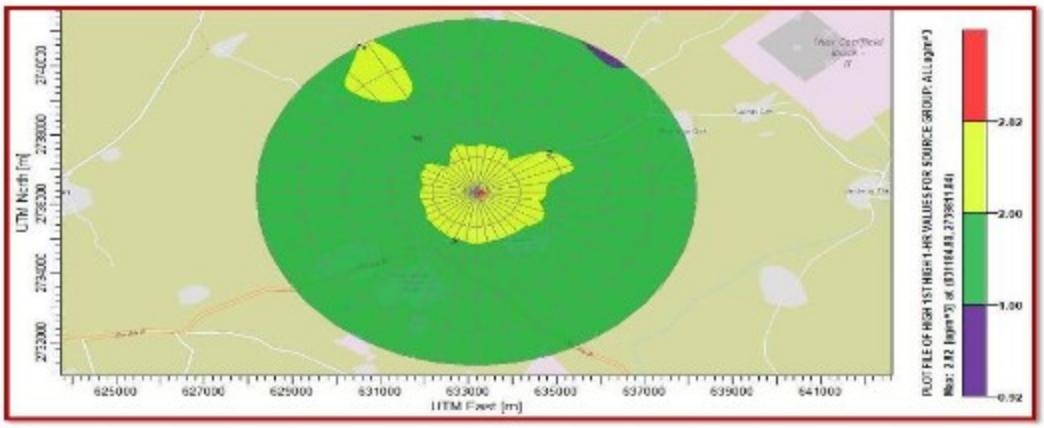


Figure 12: Spatial Dispersion of 1st Highest Concentrations of TSP for 1-Hrly Averaged for Scenario-I

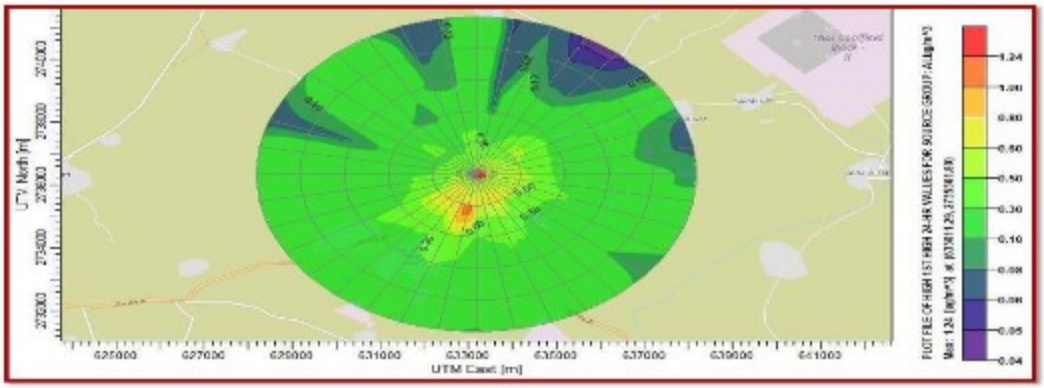


Figure 13: Spatial Dispersion of 1st Highest Concentrations of TSP for 24-Hrly Averaged for Scenario-I

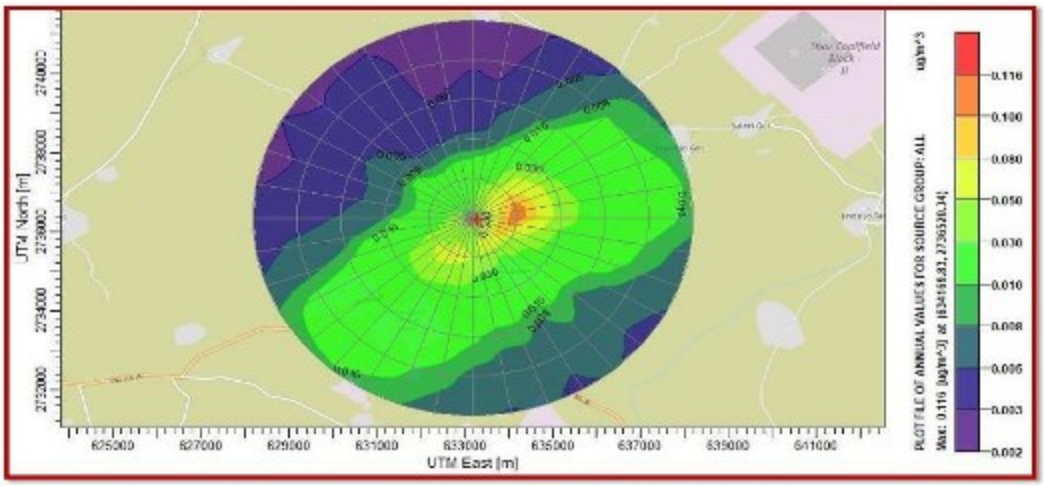


Figure 14: Spatial Dispersion of Incremental Concentrations of TSP for Annual Averaged for Scenario-I

ANNEXURE-II

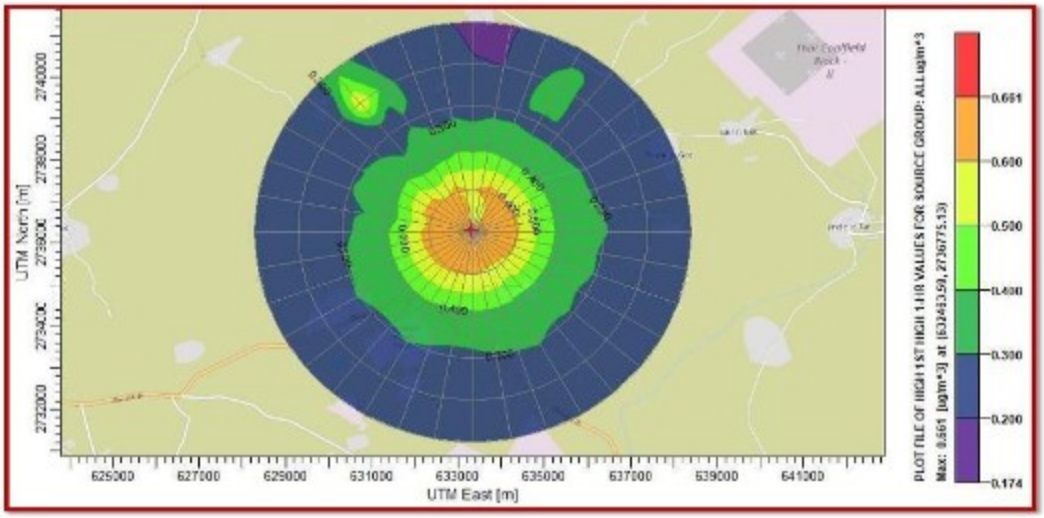


Figure 15: Spatial Dispersion of Incremental 1st Highest Concentrations of CO for 1-Hrly Averaged for Scenario-II

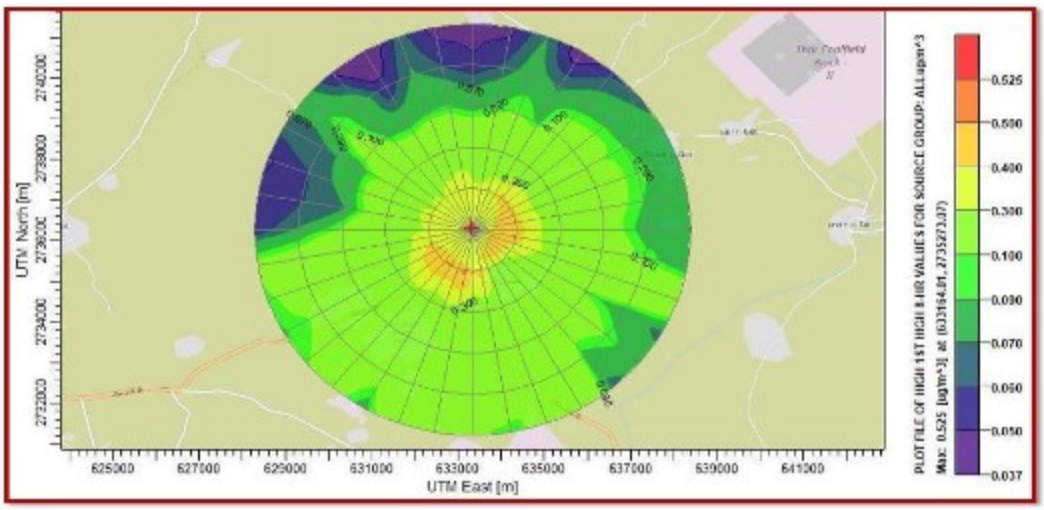


Figure 16: Spatial Dispersion of 1st Highest Concentrations of CO for 8-Hrly Averaged for Scenario-II

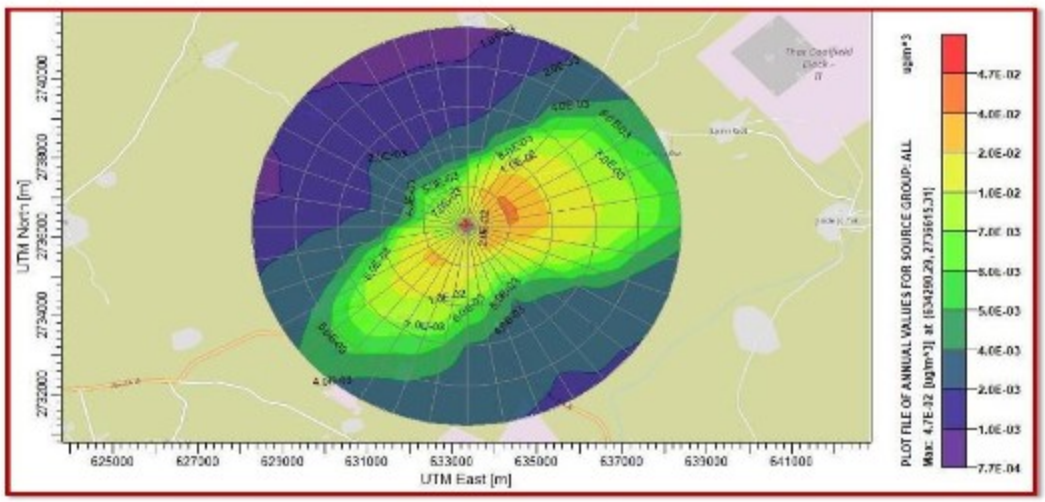


Figure 17: Spatial Dispersion Incremental Concentration of CO for Annual Averaged for Scenario-II

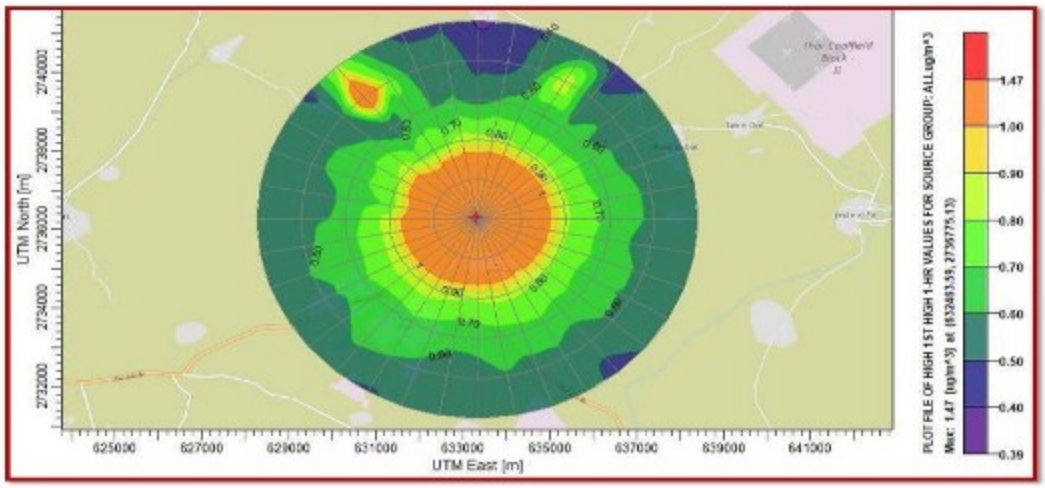


Figure 18: Spatial Dispersion of 1st Highest Concentrations of NOx for 1-Hrly Averaged for Scenario-II

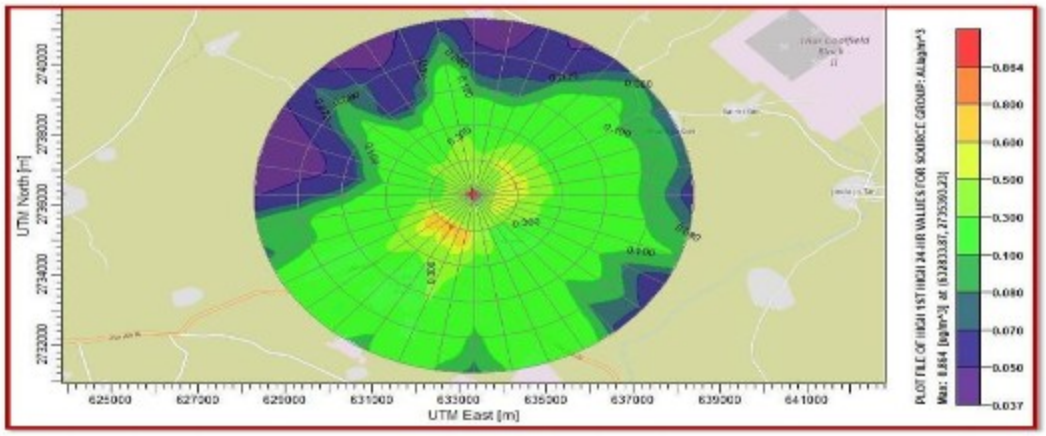


Figure 19: Spatial Dispersion of 1st Highest Concentrations of NOx for 24-Hrly Averaged for Scenario-II

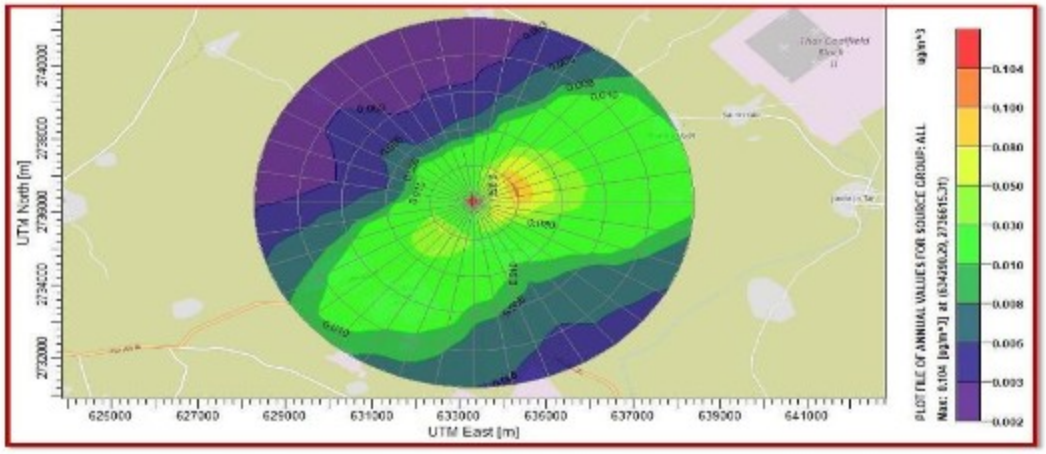


Figure 20: Spatial Dispersion of Incremental Concentration NOx for Annual Averaged for Scenario-II

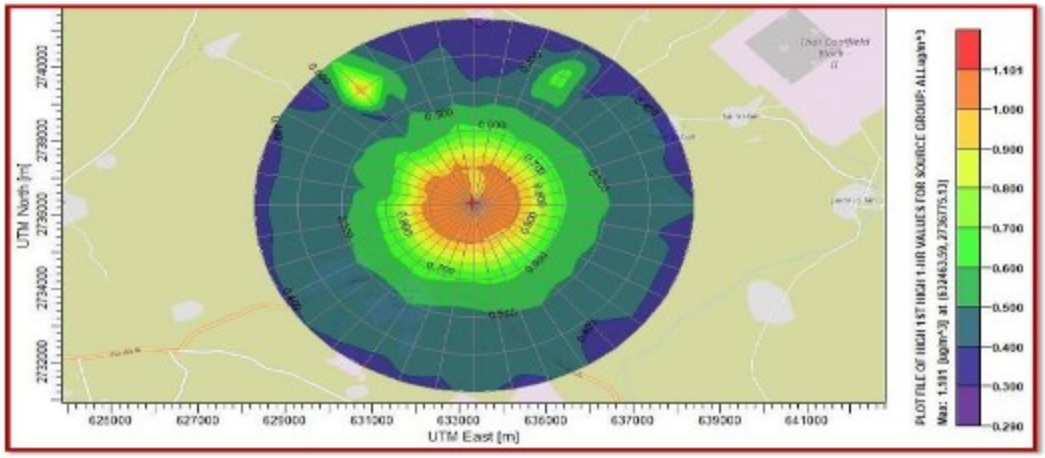


Figure 21: Spatial Dispersion of 1st Highest Concentrations of SO2 for 1-Hrly Averaged for Scenario-II

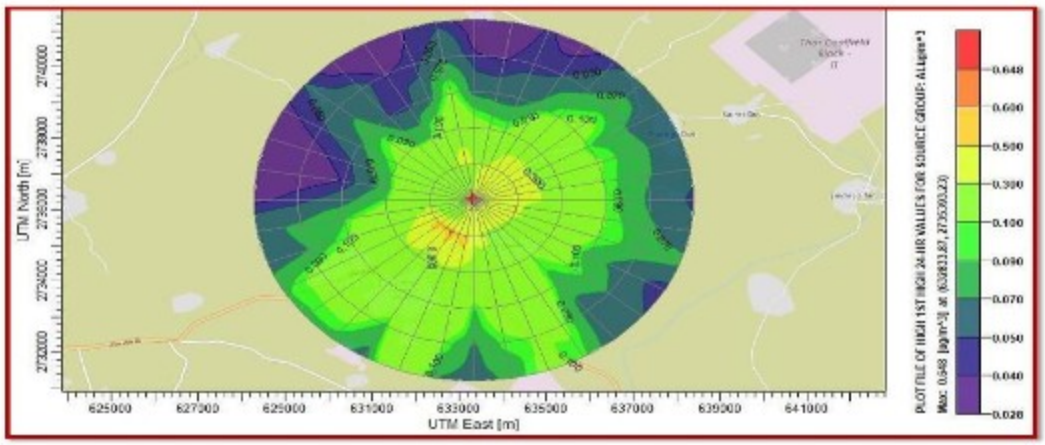


Figure 22: Spatial Dispersion of 1st Highest Concentrations of SO2 for 24-Hrly Averaged for Scenario-II

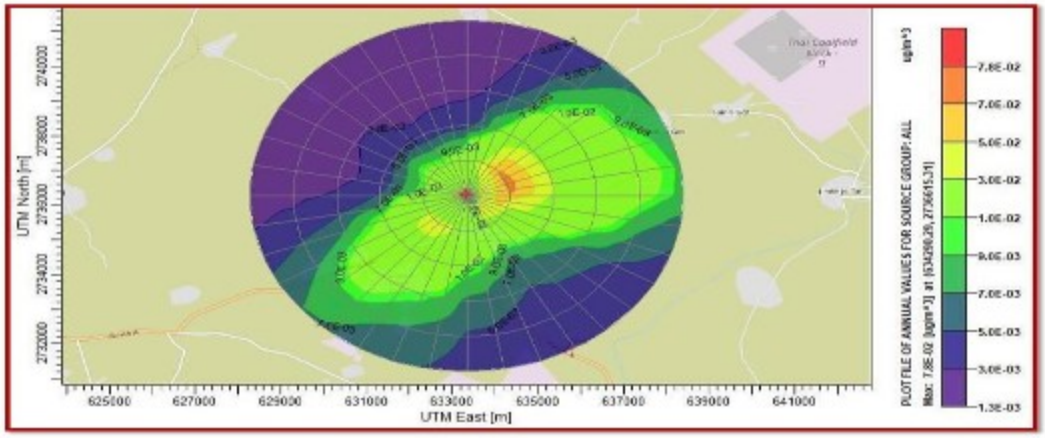


Figure 23: Spatial Dispersion of Incremental Concentration SO2 for Annual Averaged for Scenario-II

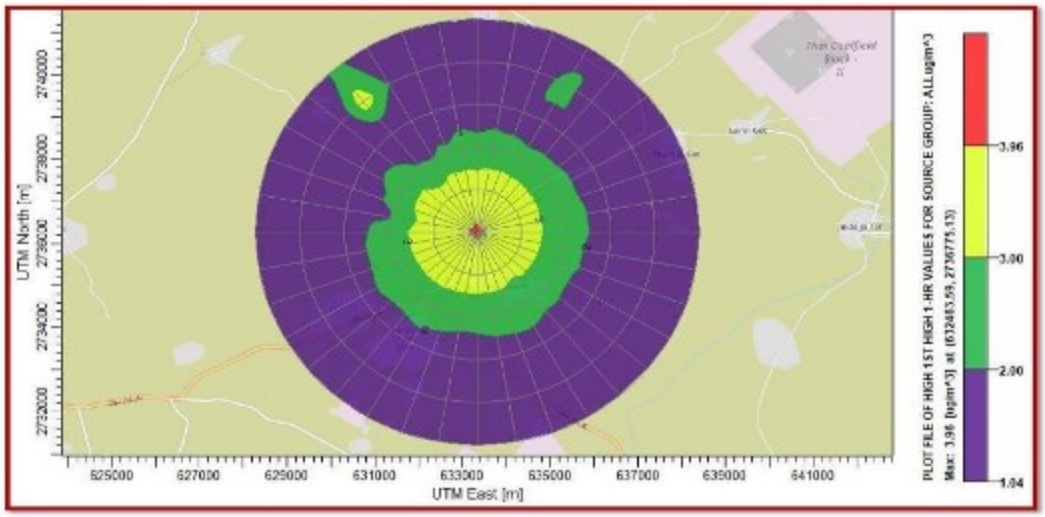


Figure 24: Spatial Dispersion of 1st Highest Concentrations of TSP for 1-Hrly Averaged for Scenario-II

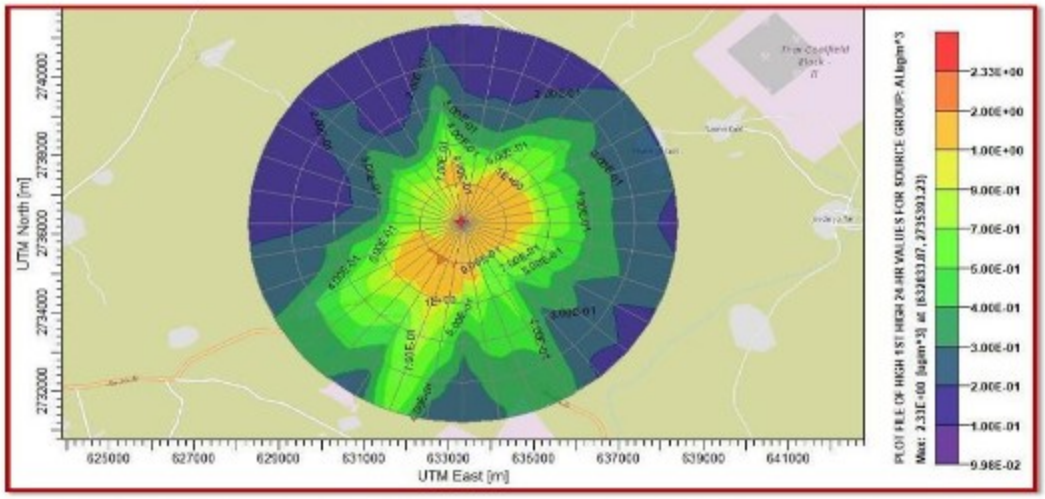


Figure 25: Spatial Dispersion of 1st Highest Concentrations of TSP for 24-Hrly Averaged for Scenario-II

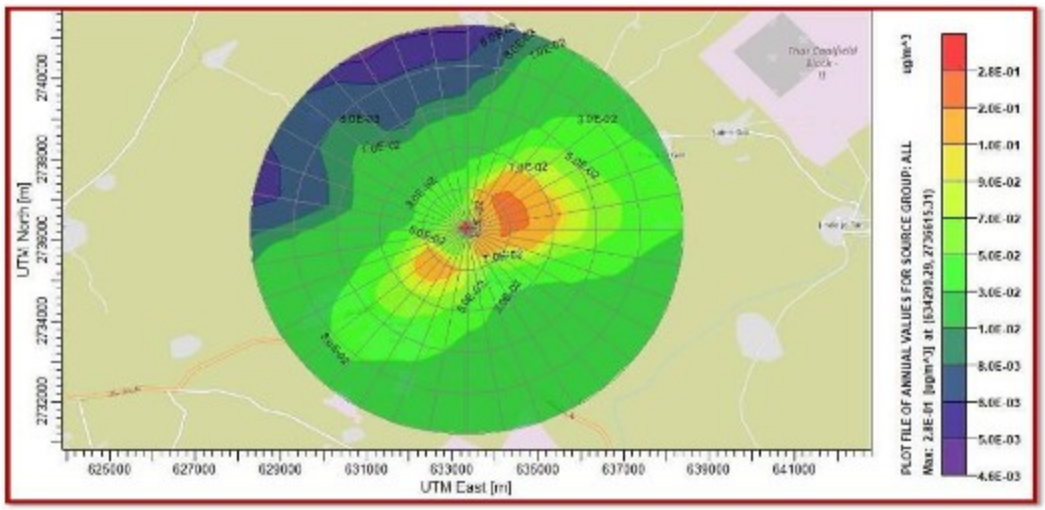


Figure 26: Spatial Dispersion of Incremental Concentration of TSP for Annual Averaged for Scenario-II

ANNEXURE-III

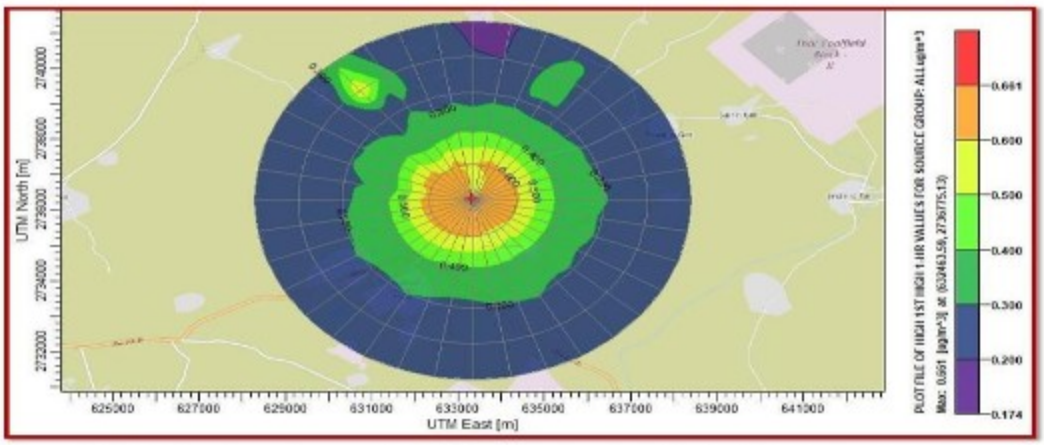


Figure 27: Spatial Dispersion of Incremental 1st Highest Concentrations of CO for 1-Hrly Averaged for Scenario-III

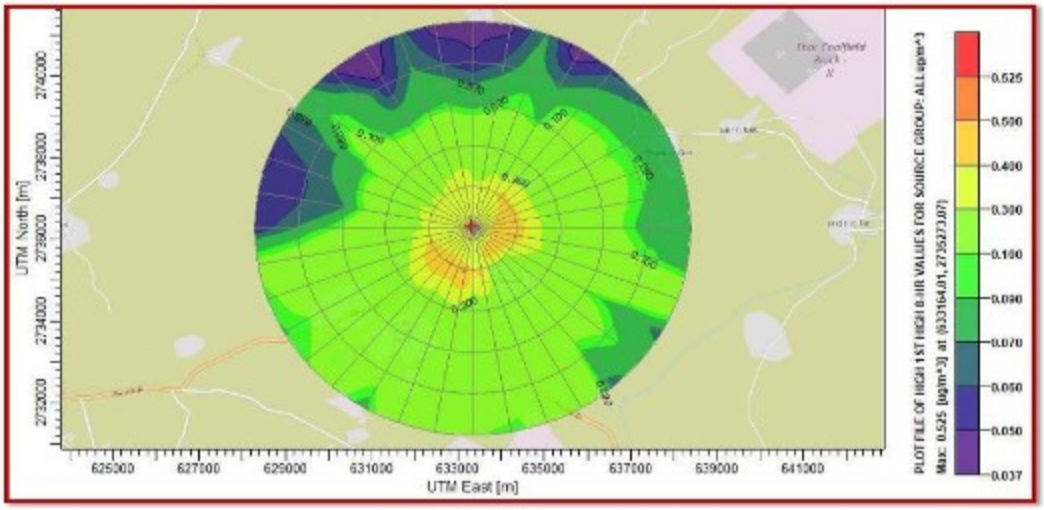


Figure 28: Spatial Dispersion of 1st Highest Concentrations of CO for 8-Hrly Averaged for Scenario-III

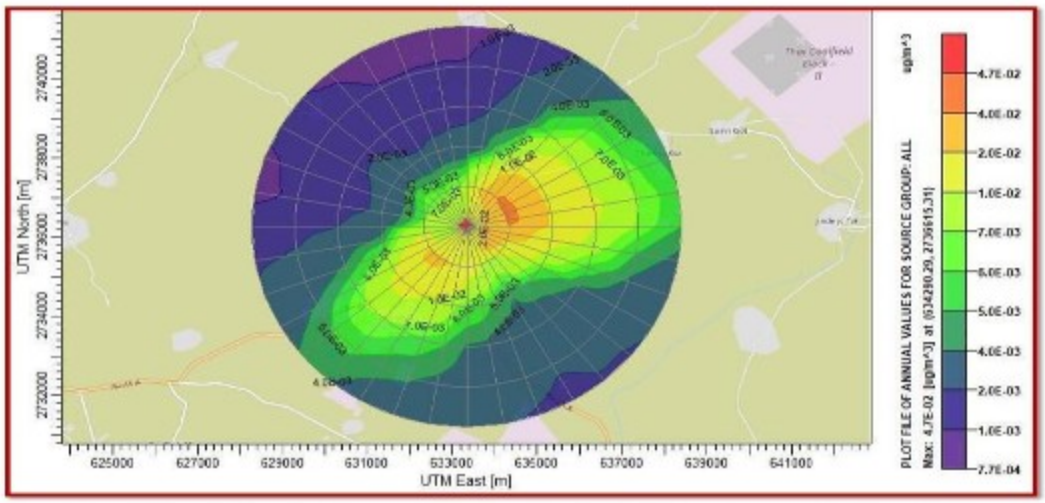


Figure 29: Spatial Dispersion Incremental Concentration of CO for Annual Averaged for Scenario-III

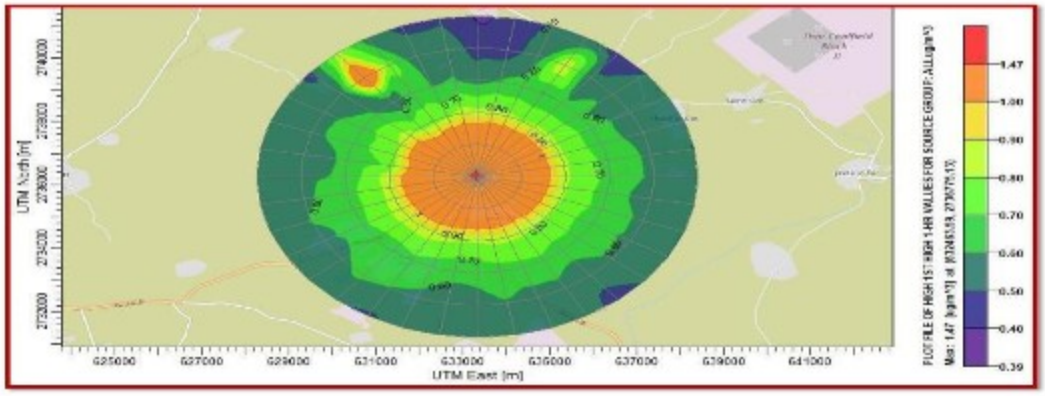


Figure 30: Spatial Dispersion of 1st Highest Concentrations of NOx for 1-Hrly Averaged for Scenario-III

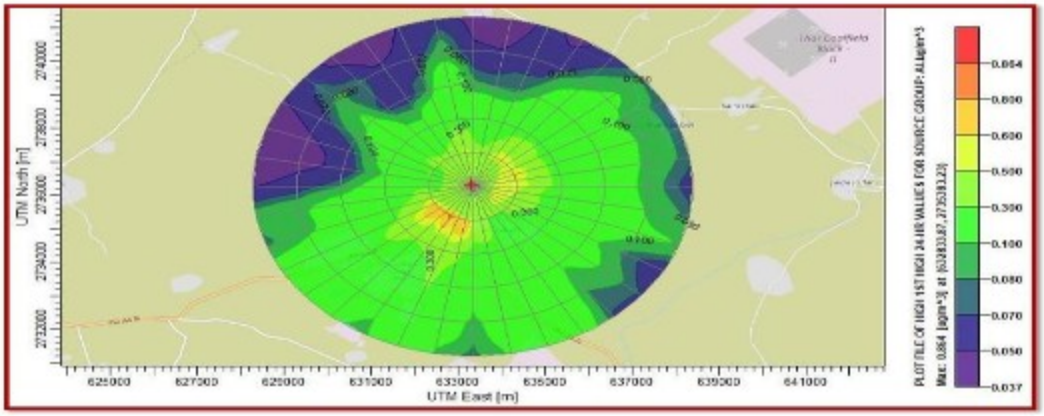


Figure 31: Spatial Dispersion of 1st Highest Concentrations of NOx for 24-Hrly Averaged for Scenario-III

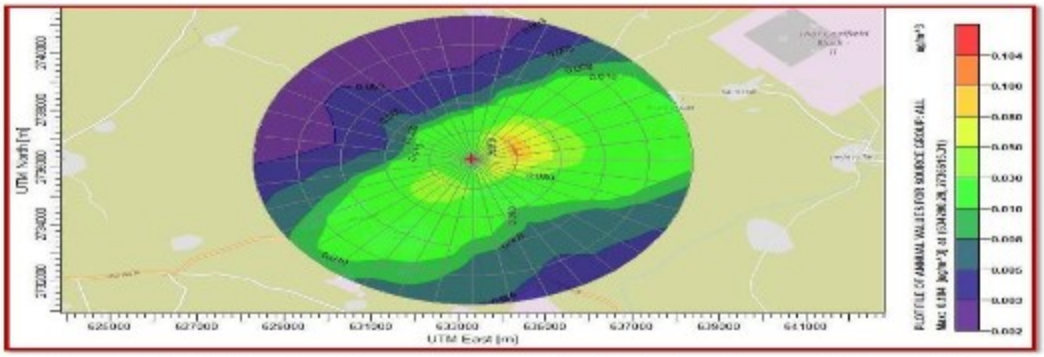


Figure 32: Spatial Dispersion of Incremental Concentration NOx for Annual Averaged for Scenario-III

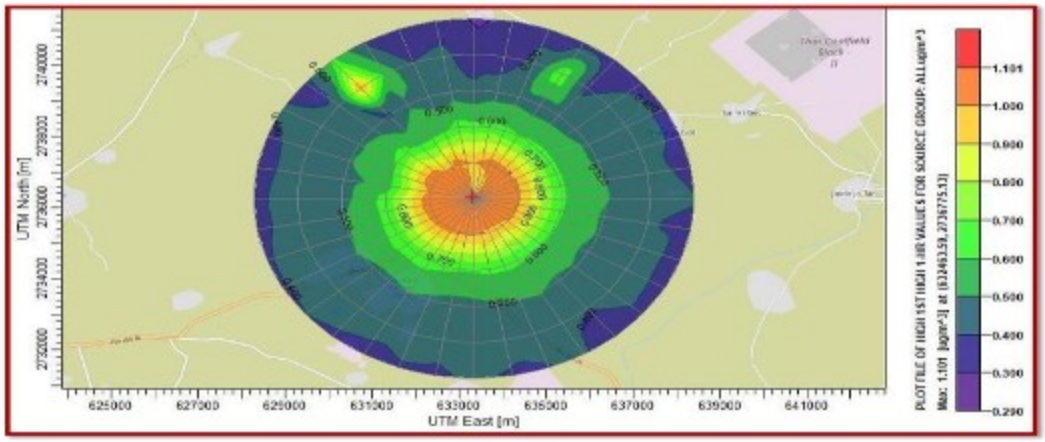


Figure 33: Spatial Dispersion of 1st Highest Concentrations of SO2 for 1-Hrly Averaged for Scenario-III

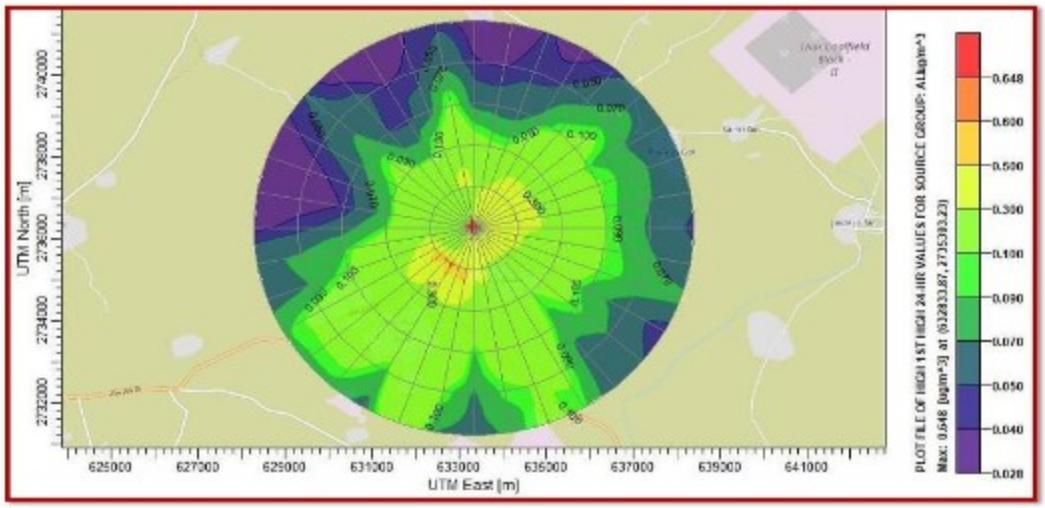


Figure 34: Spatial Dispersion of 1st Highest Concentrations of SO2 for 24-Hrly Averaged for Scenario-III

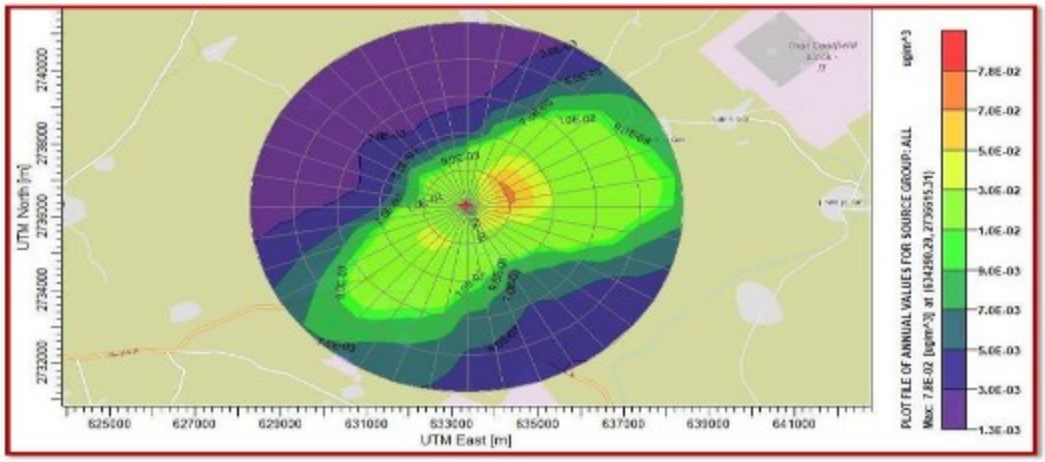


Figure 35: Spatial Dispersion of Incremental Concentration SO2 for Annual Averaged for Scenario-III

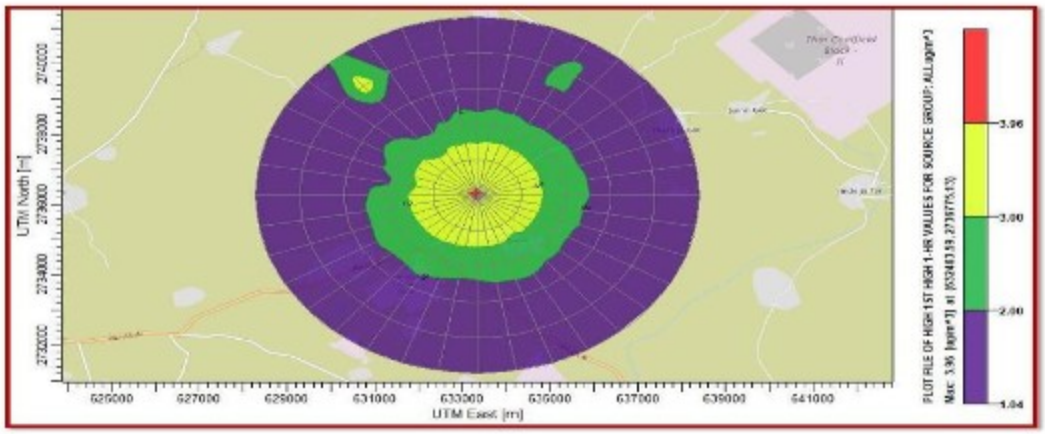


Figure 36: Spatial Dispersion of 1st Highest Concentrations of TSP for 1-Hrly Averaged for Scenario-III

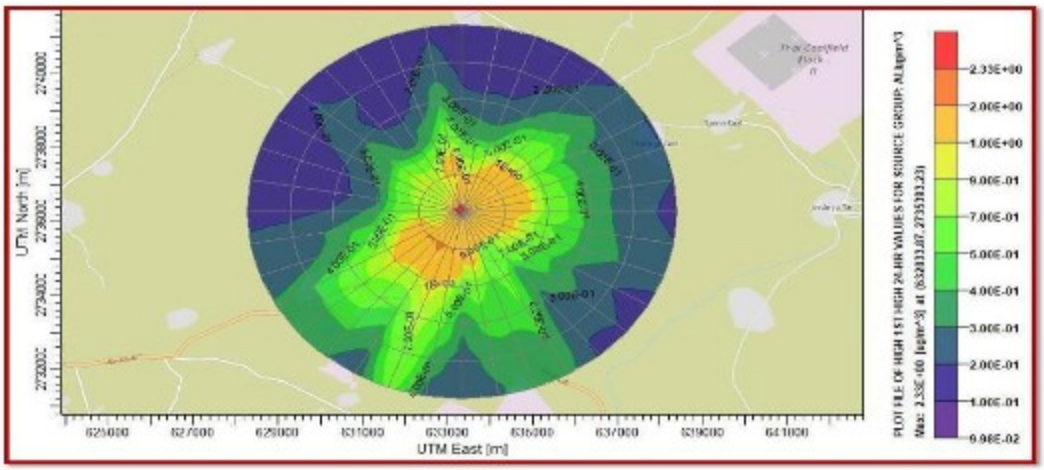


Figure 37: Spatial Dispersion of 1st Highest Concentrations of TSP for 24-Hrly Averaged for Scenario-III

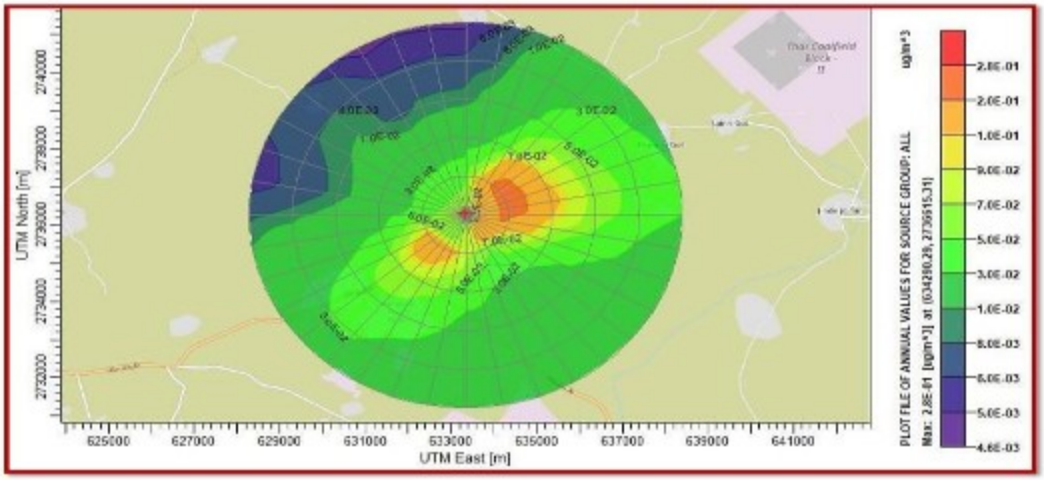


Figure 38: Spatial Dispersion of Incremental Concentration of TSP for Annual Averaged for Scenario-III