Environmental Impact Assessment for

Waste Management Facility

Final Report
June, 2020

Submitted to:
Sindh Environmental Protection Agency, GoS

UNITED WASTE MANAGEMENT

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EXECUTIVE SUMMARY

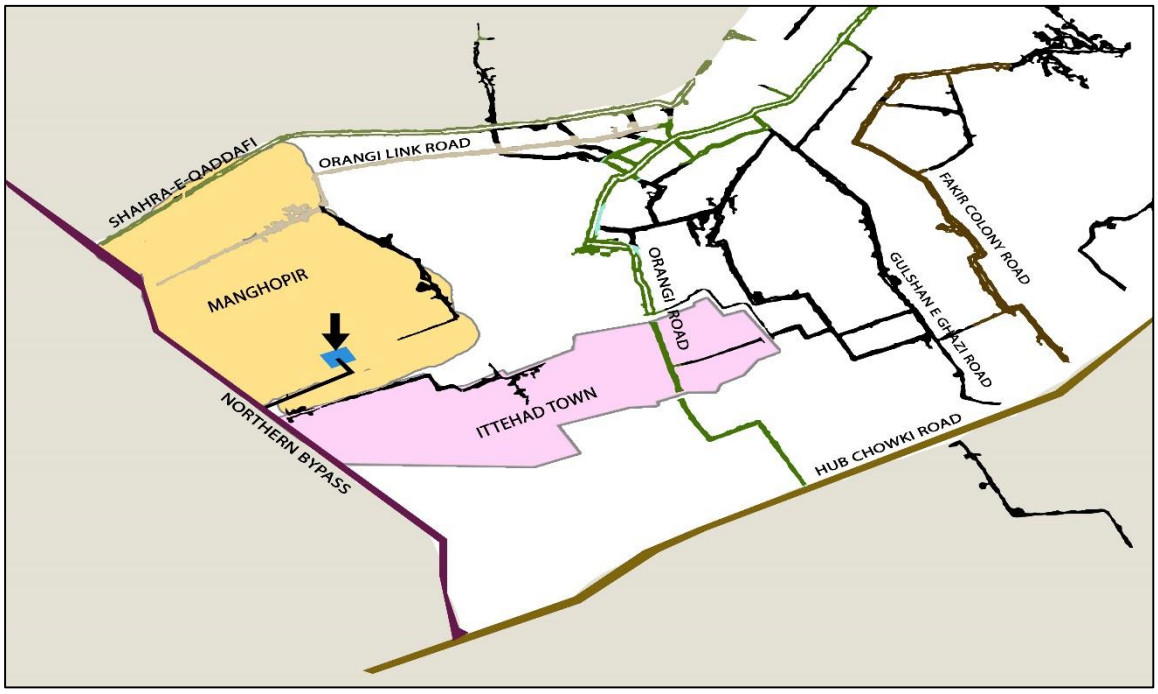
The present Environmental Impact Assessment (EIA) study has been prepared by Environmental Consultancy Services (ECS) in compliance with Sindh Environmental Protection Act, 2014 for the proposed Waste Management Facility (WMF) of M/S United Waste Management (UWM). During preparation of this EIA report comprehensive literature review was done which was supplemented by field visits at project site and its surrounding areas. Literature review for this study revealed that the rapid urbanization in Karachi resulted in a number of environmental issues. One of the important issue which needs proper attention of the authorities is increasing volumes of solid waste. The municipal body of Karachi struggles to manage solid waste in an environmentally sound manner. During the year 2020, the City District Government of Karachi which is now defunct carried out a study which revealed that the continuous city expansion by development of new industrial units, high-rise buildings, housing schemes and institutions have over the years contributed to waste generation.

In recent years the amount of waste generated within the city has substantially increased up to approximately 14,000 to 16,000 tons per day. It is also estimated that by the end of year 2020, solid waste generation may reach up to 18,000 to 20,000 tons per day. The current solid waste management practices of the city are poor and needs adequate attention of the authorities and private sector investors to provide cost effective waste management solution for the city on immediate basis[1]. Further during the visit at existing Incineration facility operated under the management of Karachi Municipal Corporation (KMC) it was observed that the city lacks equipped government owned incineration facilities for effective treatment of hazardous industrial as well as bio medical waste. During the discussion with KMC's representative at Incineration facility, it was highlighted that KMC operates two (02) incineration units having the cumulative waste treatment capacity of around 2000 Kilograms (kg)/hour. Out of (02) installed incinerators one is functional which has also outlived its life as it was installed back in 1997. Furthermore, it has also been observed that in Karachi there are only two (02) commercial incineration facilities owned by private sector investors for treatment of hazardous, industrial and bio medical waste. On the basis of the above stated facts it is easy to understand that there is a dire need to establish more commercial incineration units in Karachi to effectively deal the subject matter in an environmentally sound manner. The leakages in waste management system of the city such as; burning, burial, selling, recycling, reusing and open dumping of hazardous industrial and bio medical waste will continue if such projects are not development to cater city's need of solid

[1] *https://www.c40.org/case_studies/karachi-swm-study*

(hazardous and nonhazardous) waste management. Therefore, in this regard M/S United Waste Management (UWM) aims to establish a robust waste management and treatment facility which will include three (03) incineration plants. The incineration plants will essentially include; air pollution control system, the combustion chamber, control panel, feeding system, auto hydraulic ramp, ash removal system, induced auxiliary fan and temperature control system etc. The cumulative waste treatment capacity of the plants is expected to be around 1500 kilograms per hour (kg/hr). The development will take place within the land area of about one (01) acre which has been acquired by the project owner. Office area, green belt, storage yard, access road (drive way), generator room, firefighting tank, recirculation tank, septic tank and soakage pit will be an integral part of the project within the allocated land for this development.

The proposed project will be located in Manghopir near Northern By-Pass, Karachi. Location of the proposed project is shown below;



Additionally it is important to note that the proposed project is likely to enhance waste management and treatment capacity of the city by treatment of hazardous, nonhazardous industrial and bio medical waste in an environmentally sound manner.

The present EIA includes environmental and social (E&S) baseline of the proposed project area, the anticipated E&S impacts associated with construction and operational phase, the mitigation measures to safeguard against the impacts envisaged and E&S monitoring requirements of the project. The baseline was developed by environmental

and social experts engaged by ECS for the present EIA study comprehensive literature review, field investigations, E&S monitoring and key informant interviews (KIIs) during the baseline investigation revealed that no prominent site of cultural significance is observed in the immediate vicinity of the proposed project area, the educational facilities are also limited in number. The healthcare facilities in the proposed project surrounding area includes few small clinics located near Khyber Chowk and only prominent health care facility accessible to local communities is "Qatar Hospital" about 5 to 6 km away from the proposed project area. In addition to this biodiversity of the project area is insignificant in nature and type as the proposed project area does not fall in any of the protected category (National Park, Game reserve or Wildlife sanctuary etc.), nor the species reported in the project area are not reported as threatened, vulnerable, critically endangered or near to extinction according to IUCN red list or protected under CITES and or SIND WILDLIFE ORDINANCE etc. Detailed Air Dispersion Modeling (ADM) study was also done for analysis of gaseous emissions dispersion route and the concentrations. ADM revealed that the emissions from the proposed project will remain within the prescribed Sindh Environmental Quality Standards (SEQS) limits.

Stakeholder consultation meetings were also done during the scoping exercise with the local communities, relevant government departments, academia and independent engineering and healthcare professionals in order to identify and address most relevant E&S impacts through robust and project specific Environmental Management and Monitoring Plan (EMMP). The EMMP developed for the proposed is project specific and covers both the impacts associated with construction and operations of the proposed project. The mitigation safeguards are integral part of plan to minimize adverse impacts based on the point discussed above it is concluded that the proposed project will not have any significant long term adverse impacts onto the existing environment, if the management of the proposed project ensures strict implementation of the EMMP.

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ACRONYMS	
EA	ENVIRONMENTAL ASSESSMENT
E&S	ENVIRONMENTAL AND SOCIAL
EIA	ENVIRONMENTAL IMPACT ASSESSMENT
ECC&CDD	ENVIRONMENTAL CLIMATE CHANGE & COASTAL DEVELOPMENT DEPARTMENT
GPD	GALLONS PER DAY
IEE	INITIAL ENVIRONMENTAL EXAMINATION
K.E	K-ELECTRIC
KW	KILO WATTS
KWSB	KARACHI WATER AND SEWERAGE BOARD
NCS	NATIONAL CONSERVATION STRATEGY
NEP	NATIONAL ENVIRONMENT POLICY
SEPA	SINDH ENVIRONMENTAL PROTECTION AGENCY
S-EPA	SINDH ENVIRONMENTAL PROTECTION ACT
SEQS	SINDH ENVIRONMENTAL QUALITY STANDARDS
UWM	UNITED WASTE MANAGEMENT
WMF	WASTE MANAGEMENT FACILITY
ECS	ENVIRONMENTAL CONSULTANCY SERVICES
UWM	UNITED WASTE MANAGEMENT
WMF	WASTE MANAGEMENT FACILITY

Chapter 1: Introduction

1.1 Background Information

Project Title:	Environmental Impact Assessment Study of Waste Management Facility (WMF)
Project Location:	Manghopir Near Northern By-Pass, Karachi
Study Type:	Environmental Impact Assessment Study
Proponent:	United Waste Management
Environmental Consultants:	Environmental Consultancy & Services

The present Environmental Impact Assessment (EIA) study has been prepared by Environmental Consultancy Services (ECS) in compliance with Sindh Environmental Protection Act, 2014 for the proposed Waste Management Facility (WMF) of M/S United Waste Management (UWM). During preparation of the subject EIA report comprehensive literature review and field surveys revealed that the rapid urbanization in Karachi resulted in a number of environmental issues in addition to this industrialization within the city have further intensified the environmental health risks associated with environmental pollution. The total amount of waste that is generated by the industries, commercial and health-care facilities is about 80 to 85% general, non-hazardous and the remaining 15% to 20 % is considered as hazardous in its nature and type that may be infectious, toxic or radioactive[2]. One of the most important and prevailing issues in Karachi is increasing volumes of solid waste which is mainly due to lack of financial and technical resources available for the city in general. The municipal body of Karachi struggles to manage solid waste in an environmentally sound manner and the amount of solid wastes is expected to substantially increase with rapid growth of population and economic activities within the city.

In recent years the amount of waste generated within the city has substantially increased up to approximately 14,000 to 16,000 tons per day. It is also estimated that by the end of year 2020, solid waste generation may reach up to 18,000 to 20,000 tons per day. The current solid waste management practices of the city are poor and needs adequate attention of the authorities. The private sector investors can play their role in mitigation the problem by providing cost effective waste management solution for the city which is required on immediate basis[3].

2 https://geistscience.com/papers/view/JESS1604205

3 https://www.c40.org/case_studies/karachi-swm-study

The quality of civic life is closely related and affected by sanitary conditions in the residential neighborhoods and other areas, where efficient collection of garbage is the key to clean and healthy environment[4]. Poor planning, inappropriate technology and poor management are obviously the main areas of concern needing serious efforts on the part of the local government and other agencies towards efficient management and modern technological development of this sector. To cater city's need of industrial hazardous and (hazardous and nonhazardous) waste management M/S United Waste Management (UWM) aims to establish a robust waste management and treatment facility which will include three (03) incineration plants. The development will take place within the land area of about one (01) acre which has been acquired by the project owner. Detailed description of the proposed project has been discussed in Chapter-03 of this report.

1.2 Project Proponent

The management of UWM is among the pioneers of environmental and waste management services in Pakistan, with a vast experience in handling and disposal of hazardous and non-hazardous waste. The objective of UWM is to operate on the principle of 3R i.e. to reduce, reuse and recycle for environmental sustainability. Business integrity, safety their employees and surroundings, legal compliance, customer's satisfaction is prime focus of UWM. UWM have a team of experienced professionals with proven track record of delivering a number of waste management projects across the country for both public and private sector organizations. UWM being responsible custodian of environment, health and safety of their workers and community have also developed a dedicated HSE Policy and an Emergency Preparedness and Response Plan which is implemented and applicable at all tiers of the organization, HSE Policy and Emergency Preparedness/Response Plan has been attached as **Annexure-I.**

1.3 Purpose of Environmental Impact Assessment (EIA)

This Environmental Impact Assessment (EIA) Report has been prepared in compliance with the Sindh Environmental Protection Act (SEPA), 2014 and SEPA Review of EIA/IEE Regulations, 2014 for decision on environmental approval of the proposed project. As per SEPA Review of EIA/IEE Regulations, 2014 the proposed project falls in the **Category H of Schedule-II "Waste Disposal and Treatment"** which means the proposed project requires full-fledged EIA to be conducted at planning stage for complying with SEPA Act, 2014.

4 https://www.thenews.com.pk/print/521379-karachi-where-garbage-is -up

1.4 Specific Objectives of EIA

The specific objectives of this EIA are to:

- Assess the existing environmental and socio-economic conditions at and around the project site, particularly identify any environmental and social sensitivity areas.
- Identify the likely impacts of the proposed project on the natural and socio-economic environment, predict and evaluate these quantitatively wherever possible and determine their significance in the light of technical and regulatory concerns, and as well as those related to public perceptions.
- Propose appropriate mitigation and monitoring measures that can be incorporated into the design of the proposed activities to minimize any damaging effects or lasting negative consequences identified by the assessment.
- Prepare an EIA report for submission to the Sindh Environmental Protection Agency (SEPA).

1.5 EIA Methodology

The environmental assessment has been conducted with the following basic targets:

- Identification of the regulatory requirements that apply to the project activities in the proposed area, in the context of environmental protection, health and safety.
- Assessment of the proposed project activities in terms of their likely impacts on the environment during the construction and operation phases of the project in order to identify issues of environmental concerns.
- Recommendation of appropriate mitigation measures that can be incorporated into the design of the project to minimize the environmental impacts those identified.

For achieving these targets amicably M/S United Waste Management (UWM) commissioned the services of environmental consultants namely; Environmental Consultancy & Services (ECS) for conducting this EIA study of the proposed project.

To further perform the tasks related to the subject EIA study, ECS engaged following experts as shown in the **Table 1:**

Table 1: Detail of EIA Experts/Consultants

Sr. #	Name	Position in EIA Assessment Team
1.	Mr. Shahid Ali Lutfi	Team Leader / Sr. Environment Engineer
2.	Mr. Arshad Hussain	Deputy Team Leader
3.	Mr. Nouman Sheikh	Project Manager
4.	Mr. Jibran Khalid	Sr. Environment Specialist/ EIA Advisor
5.	Mr. Shahzad Rizvi	Sr. Sociologist
6.	Mr. Rafi ul Haque	Ecologist/Horticulture Specialist
7.	Dr. M Mansha	Air Quality and Dispersion Modeling Expert
8.	Mr. Sadam Hussain	Sr. Environment Engineer – Technical Writer
9.	Ms. Rani Habib	Environment Engineer
10.	Ms. Mariam Intesama	Environmentalist
11.	Mr. Shahabuddin Arfi	Civil /Environment Engineer
12.	Mr. Imran Khan	Environment/Water Resource Engineer
13.	Mr. Ahmed Farooq	Environmentalist
14.	Mr. Khurram Ahmed	Civil Engineer

1.6 EIA Study Stages

Stage-I **Project Data Acquisition**	- Initial meeting between environmental consultant and project holder (UWM) for basic project acquisition.
Stage-II **Desk Study/Literature Review**	- Review of regulatory requirements based on preliminary assessment of project activities and the project area. - Review of secondary literature review to collect environmental data about the project area.
Stage-III **Scoping and Stakeholder Consultation Meetings**	- Disclose basic non-technical summary of the proposed project to the primary and secondary stakeholder through formal and informal discussions during scoping and consultation meetings to identify environmental and social parameters those are likely to undergo significant change due to the proposed project and document suggestions, concerns and recommendations of stakeholders consulted.

Stage-IV **Baseline Investigations and Surveys**	- Site visits for the Baseline Investigations including Physical, Ecological and Social Environmental conditions of the project area.
Stage-V **Environmental and Social Impact Analysis and Mitigation**	- Evaluation of the environmental parameters those are likely to undergo significant change due to the proposed project. - Development of Environmental Management and Monitoring Plan to mitigate the adverse impacts of the proposed project.
Stage-VII **Documentation of EIA report**	- Documentation and submission of EIA report to SEPA for preliminary scrutiny

1.7 EIA Report Structure

This EIA report has been organized in following chapters;

Chapter 1: Introduction
Highlights background information, basic overview of the proposed project, introduction of the project proponent, purpose and methodology of the subject EIA.

Chapter 2: Legislative and Policy Framework
Gives an overview of policies, legislations and guidelines relevant to the proposed project.

Chapter 3: Project Description
Highlights detailed description of the proposed project such as; construction, operations and decommissioning process, utility requirements/source and completion timeframe etc.

Chapter 4: Environmental and Social Baseline
Describes the existing environment in the proposed project area. It carries details of area's infrastructures, physical, ecological and socio-economic conditions of the area.

Chapter 5: Stakeholder Consultations
Describes the details about all stakeholders, the overall consultation process and their concerns and recommendations about the project.

Chapter 6: Analysis of Alternatives

This section of the EIA document presents an outline for project alternatives to select the best option among all the possible project options which includes project sitting and technologies.

Chapter 7: Environmental Impacts Analysis and Mitigations
Describes the anticipated environmental and social impacts of the project and their consequent screening in accordance with the general guidelines. The screening further identifies the residual impacts resulting as a consequence of the adoption of mitigation measures.

Chapter 8: **Environmental Management and Monitoring Plan**
Details the environmental management and monitoring plan to be implemented by the proponent for effective mitigation of adverse impacts and improved environmental performance.

Conclusion:
Summarizes the report and presents conclusion.

Chapter 2: Legislative and Policy Framework

2.1 Background Information

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).

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 Agencies was empowered to formulate environmental legislation, rules, regulations and standards and their enforcement/implement in the whole Sindh provinces as a formulating, regulatory and monitoring agencies. 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 Overview of National and Provincial Environmental Policies and Guidelines

A basic policy and legislative framework for the protection of the environment and overall biodiversity in the country is in place. Detailed rules, regulations and guidelines required for the implementation of the policies and enforcement of legislation are still in various stages of formulation and discussion. Environmental Policies and Guidelines relevant to the proposed project were also reviewed for this EIA study brief history of the national policies and guidelines is given below;

2.2.1. National Conservation Strategy (NCS)

The National Conservation Strategy (NCS) is the primary 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 strategy[5]. 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.

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[6]. 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;
- Waste Management;
- Forestry;
- Biodiversity and Protected Areas;
- Climate Change and Ozone Depletion;
- Energy Efficiency and Renewable;
- Agriculture and Livestock;
- Multilateral Environmental Agreements;

[5]*Arthur J. Hanson et al, Pakistan's National Conservation Strategy Renewing Commitment to Action, Report of the Mid-Term Review, 2000*
[6]*National Environmental Policy, GoP, 2005*

2.2.2. National Environmental Policy, 2005

The 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[7];

2.2.3. National Climate Change Policy, 2011

To ensure that climate change is mainstreamed in the economically and socially vulnerable sectors of the economy and to steer Pakistan towards climate resilient development.

The main objectives of Pakistan's Climate Change Policy include

- To pursue sustained economic growth by appropriately addressing the challenges of climate change;
- To integrate climate change policy with other inter-related national policies;
- To focus on pro-poor gender sensitive adaptation while also promoting mitigation to the extent possible in a cost-effective manner;
- To ensure water security, food security and energy security of the country in the face of the challenges posed by climate change;
- To minimize the risks arising from the expected increase in frequency and intensity of extreme weather events such as floods, droughts and tropical storms;
- To strengthen inter-ministerial decision making and coordination mechanisms on climate change;
- To facilitate effective use of the opportunities, particularly financial, available both nationally and internationally;
- To foster the development of appropriate economic incentives to encourage public and private sector investment in adaptation measures;
- To enhance the awareness, skill and institutional capacity of relevant stakeholders;
- To promote conservation of natural resources and long term sustainability[8]

[7]National Environmental Policy, 2005.
[8]*National Climate Change Policy, 2011.*

2.2.4. Sindh Drinking Water Policy, 2017

The Public Health Engineer and Rural Health Development Department, Government of 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 water borne 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 Main Environmental Framework Applicable on Proposed Project

"Institutional Framework" refers to a law or other formal provision that assign primary responsibility as well as the authority to an agency for dealing with regulatory affairs related to the subject. In this case it is important to note that post 18th Amendment to the Constitution of Pakistan, the provincial Environmental Protection Agencies are fully empowered to initiate, modify and enforce environmental legislation in their respective provinces. In the province of Sindh, the Sindh Environmental Protection Agency (SEPA) is the prime regulatory and monitoring agency. SEPA is headed by a Director General (DG) and is responsible for enforcement of environmental legislation within the province of Sindh. DG, SEPA is also responsible for the guidance of other provincial departments/institutes on environmental matters and related issues.

EPA Sindh is attached with Environment, Climate Change & Coastal Development Department (ECC&CDD), Government of Sindh. The ECC&CDD, headed by a Secretary, is the administrative body and responsible for coordination with other line departments and agencies of the province. It also performs coordination and communication with other provinces and federal government agencies. As discussed earlier in this EIA document this EIA has been conducted and prepared in compliance with the Sindh Environmental Protection Act, 2104 details of the Act along with the applicable environmental rules, regulations and standards under Sindh Environmental Protection Act, 2014 are given in the section below;

2.3.1. Sindh Environmental Protection Act, 2014

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 and is to provide for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of

pollution, and promotion of sustainable development. The two primary deliberations of the Act are the conduct of projects only after approval of environmental assessments from the SEPA and adherence with Sindh Environmental Quality Standards (SEQS). The Act, under Section 17, empowers the EPA Sindh to require from the proponent an environmental impact assessment or initial environmental examination document from the proponent of any project prior to commencement of any construction or operations activity. Refer to **Annexure II** to review SEPA Act, 2014.

2.3.2. Rules, Regulation and Standards under SEP-Act, 2014

2.3.2.1. SEPA Review of EIA/IEE Regulations, 2014

This regulation describes the procedure for conducting environmental assessments and their approvals process. Categories for projects requiring IEE, EIA or Environmental Checklists is mentioned in the regulation. The environmental assessment includes preparation of an Environmental Management Plan (EMP).

SEPA Review of IEE/EIA Regulations 2014 is attached as **Annexure III** for ready reference and further guidance.

As per the 2014 Regulations, Proponent will submit an EIA report for their project activities to SEPA and seek approval on the same from the agency. Ten hard copies and 2 soft copies of the EIA report will be submitted to SEPA. It will then grant its decision on the EIA as per the rules and procedures set out in the 2014 Regulations. The following rules will apply:

- A fee is payable to SEPA for review of the EIA;
- The EIA submission is to be accompanied by an application in the format prescribed in Schedule V of the 2014 Regulations;
- SEPA is bound to conduct a preliminary scrutiny and reply within fifteen days of the submission of the report a) confirming completeness, or b) asking for additional information, if needed;
- The SEPA will publish a public notice in any English or Urdu national newspaper and in a local newspaper of general circulation in the area affected by the project. The public notice will mention the following:
  - The type of project;
  - The location of the project;
  - The name and address of the proponent;
  - The places at which the EIA can be accessed;
  - The date, time and place for public hearing of any comments on the project or its EIA;

  - The date set for public hearing will not be earlier than fifteen (15) days from the date of publication of the public notice
  - In the review process SEPA shall consult a Committee of Experts constituted by the DG, and concerned Advisory Committee constituted by the Agency;
  - On completion of the review process, the decision of SEPA will be communicated to the proponent in the form prescribed in Schedule V;
  - Where an EIA is approved, SEPA can impose additional controls as part of the conditions of approval;
- SEPA is required to make every effort to complete the EIA review process within four months;
- The approval will remain valid for the project duration mentioned in the EIA but on the condition that the project commences within a period of three years from the date of approval. If the project is initiated after three years from approval date, the proponent will have to apply for an extension in the validity period. The SEPA on receiving such request grant extension (not exceeding 3 years at a time) or require the proponent to submit a fresh EIA if in the opinion of SEPA changes in baseline conditions or the project so warrant;
- After receiving approval from SEPA the proponent will acknowledge acceptance of the conditions of approval by executing an undertaking in the form prescribed in Schedule VI of the 2014 Regulations;
- The 2014 Regulations also require proponents to obtain from SEPA, after completion of the project, a confirmation that the requirements of the EIA and the conditions of approval have been duly complied with;
- The SEPA in granting the confirmation of compliance may impose any additional control regarding the environmental management of the project or the operation, as it deems necessary;

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

These rules are called the Sindh Environmental Quality Standards (Self-Monitoring and Reporting by Industry) Rules, 2014, which is entirely based on the honor system, emerged from a dialogue between the government and industrial representatives. These reports are submitted by an industrial unit to agency in respect of priority parameters. 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. Industrial unit is responsible for the correct and timely submission report to the agency. On the basis of the pollution level of an industrial unit, the Director General shall classify the unit into category “A”, “B” or “C” for liquid effluents, and category “A” or “B” for gaseous emissions.

Category "A" Industrial unit

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

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

Category "C" Industrial unit

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

All measurements of priority parameters contained in the environmental monitoring report submitted by an industrial unit shall be based on test reports of a certified environmental laboratory, and attested copies of such results shall be attached with the environmental monitoring report. The gaseous emissions report shall cover the priority parameters listed in Schedule-VII, and shall include, every two years, metal analysis of all gaseous emissions from the industrial unit[9].

Note*

The proposed project falls in the **Category A** for gaseous emissions and **Category B** for wastewater.

2.3.2.3. Sindh Environmental Quality Standards

SEQS is an important and prime legislation in Sindh targeted for control of pollution. Government of Sindh 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, 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;

[9]*The Sindh Environmental Quality Standards (Self-Monitoring and Reporting by Industry) Rules, 2014*

During the construction and post development phase of the project SEQS will apply to any effluents and emissions. The complete SEQS 2016 is attached as **Annexure-IV.**

2.3.2.4. Hazardous Substance Rules, 2014

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 the Sindh-EPA[10].The Hazardous Substance Rules, 2014 is attached as **Annexure V.**

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;
- Transporting of hazardous substances;

2.3.2.5. Sindh Hospital Waste Management Rules, 2014

Sindh Hospital Waste Management Rules, 2014 promulgated under SEPA 2014 were enforced on 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.

The section 2 of Sindh Hospital Waste Management Rules, 2014 states that 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".

According to Section 8, "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".

[10] *Hazardous Substances Rules, 2014;*

The Hospital Waste Management Plan shall include:

- Waste management points for every ward and department, indicating each point, location on the basis of risk assessment;
- The categories of waste being generated in accordance with Schedule-I
- Quantity of each waste category;
- Details of the types, numbers of containers, waste bags and trolley required annually;
- Schedule and frequency of waste collection from each ward and department;
- Effective arrangements for onsite and off-site transportation of waste as provided in Schedule-I and II;
- Contingency plans for storage or disposal of risk waste in the event of breakdowns of hospital waste facility, or of maintenance or collection arrangements;
- Training courses and programs on waste management;

The Waste Management Plan shall be regularly monitored, reviewed, revised and updated and submitted to the Agency on annual basis. Sindh Hospital Waste Management Rules, 2014 is attached as **Annexure VI.**

2.3.3. Other Provincial Regulations

2.3.3.1. Wildlife Protection (Amendment) Act 2008

The Sindh Wildlife Ordinance 1972 empowers the government to declare certain areas reserved for the protection of wildlife and to control activities within these areas. It also provides protection to endangered species of wildlife[11].

2.3.3.2. Sindh Forest Act (2012)

The act empowers the provincial forest departments to declare any forest area as reserved or protected. The Act also empowers the provincial forest departments to prohibit the clearing of forest for cultivation, grazing, hunting, removing forest produce; quarrying and felling, lopping and topping of trees, branches in reserved and protected forests[12].

[11]Retrieved from faolex.fao.org, 2009
[12]*Retrieved fromSindhforests.gov.pk*

2.3.3.3. Sindh Local Government Ordinance

Under clause (h) of sub section 54 of chapter V, the law endorses the management, operation, maintenance and improvement of the sanitation disposal and solid waste collection of solid, liquid, industrial and hospital waste.

2.3.3.4. Sindh Healthcare Commission Guidelines

These guidelines enforce the implementation of hospital waste management under the Pakistan Environmental Protection Act 1997.

2.3.3.5. Factories Act 2017

According to this act, "factory" means any premises, including the precincts thereof, whereon ten or more workers are working, or were working on any day of the preceding twelve months, and in any part of which a manufacturing process is being carried on or is ordinarily carried on with or without the aid of power, but does not include a mine, subject to the operation of the Mines Act, 1923 (IV of 1923). The provisions relevant to the project are those that concern to health, safety and welfare of workers, disposal of solid waste and effluent and damage to private and public property. The Factories Act also provides regulation for handling and disposal of toxic and hazardous materials.

2.3.3.6. Sindh Occupational Safety and Health Act 2017

Section 4 of this law requires from employers to ensure all possible practicable measures for safety and health at work for all persons in the workplace. It also requires to provide an effective method for systematically identifying hazards to workers and its significance. This Act is attached with this report as **Annexure – VII**.

2.3.3.7. Sindh Prohibition of Child Employment Act, 2017

Article 11(3) of the Constitution of Pakistan prohibits employment of children below the age of 14 years in any factory, mines or any other hazardous employment. In accordance with this Article, the Prohibition of Child Employment Act (PCEA) 2017 disallows the child labor in Sindh. The PCEA defines a child as a person who has not completed his/her fourteenth years of age, and an adolescent means a person who has completed fourteenth year of age but has not completed eighteenth years of his age. No child shall be employed or permitted to work in any establishment including construction but an adolescent can be employed or permitted to work under strict guidelines provided in the PCEA and rules. An adolescent shall not be employed in any hazardous work included in the schedule to the PCEA.

2.3.3.8. The Sindh Solid Waste Management Board Act, 2014

This act empowers the collection and disposal of solid and other waste in the province of Sindh. It also empowers supporting, promoting, administering, executing and implementing a waste management plan or scheme which may benefit the management of waste.

- Employ third party to take over management of solid waste on behalf of the Board which shall have the authority as vested in the Managing Director, to employ such parties as may expedite the waste management and benefit the people;
- The Board may support, promote, administer, execute and implement schemes for undertaking any commercial or business enterprise which may benefit the management of waste;
- Construct, improve, maintain the buildings, sites and machinery relating to the operation of solid waste management;
- Regulate control or inspect the source points of generation, accumulation, transfer, recycling, trading of the solid waste;

2.4 International Finance Corporation's (IFC) Procedures for Hazardous Waste Management

IFC has issued general and hazardous waste management procedures 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. According to these guidelines hazardous waste must always be handled separately from the non-hazardous. Following are the key points which should be considered while handling the hazardous waste

- Hazardous waste must be stored in a way that its contact with other wastes is minimal to zero, with proper ventilation and cool environment;
- Any leaks or spills to be monitored and inspected;
- Facilities that are to generate hazardous waste must have permit and approvals of applicable government authorities;
- Regular visual inspection and proper labeling and categorization of the waste;
- 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;

Chapter 3: Project Description

3.1 Background Information

This section of the EIA report presents a detailed project description which is mainly related to the construction and operational phases of the proposed project. A detailed insight regarding the proposed project description was established by reconnaissance survey, site visit, and discussions between technical team of project proponent and the consultant. The proposed project will include three (03) incineration plants with; built-in air pollution control system, the combustion chamber, control panel, feeding system, auto hydraulic ramp, ash removal system, induced auxiliary fan and temperature control system etc. The cumulative waste treatment capacity of the plants is expected to be around 1500 kilograms per hour (kg/hr). The development will take place within the land area of about one (01) acre which has been acquired by the project owner. Office area, green belt, storage yard, access road (drive way), generator room, firefighting tank, recirculation tank, septic tank and soakage pit will be an integral part of the project within the allocated land for this development. Layout plan of the proposed project is shown in the **Figure-1** below.

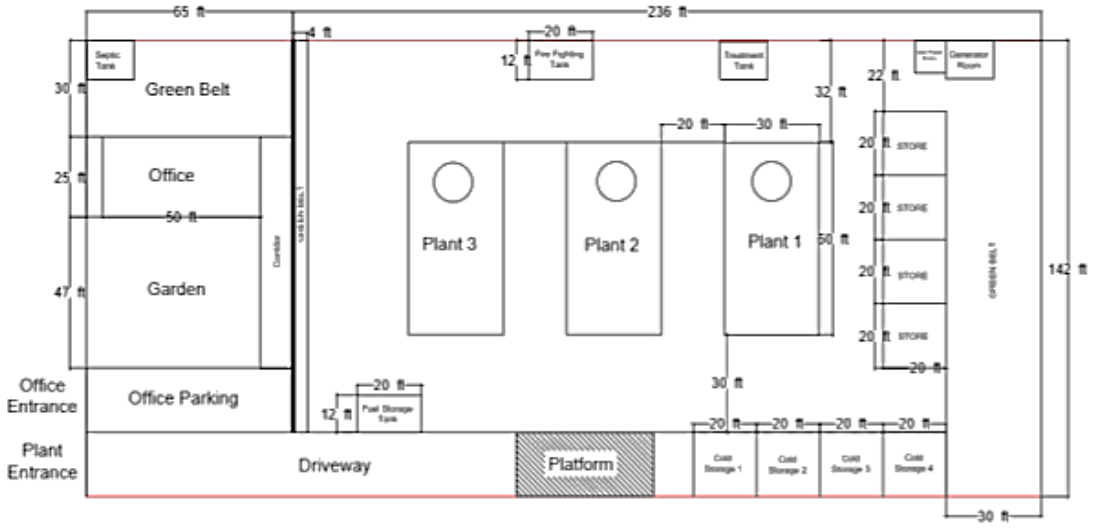


Figure 1: Layout Plan of Proposed Facility

3.2 Project Location

The proposed project will be located at deh Mithiani, Mangopir Deh, District West, off Northern By-Pass, Karachi at 24°59'37.05"N 66°57'7.27"E**.** Location Map of proposed the site is given in the **Figure 2.**

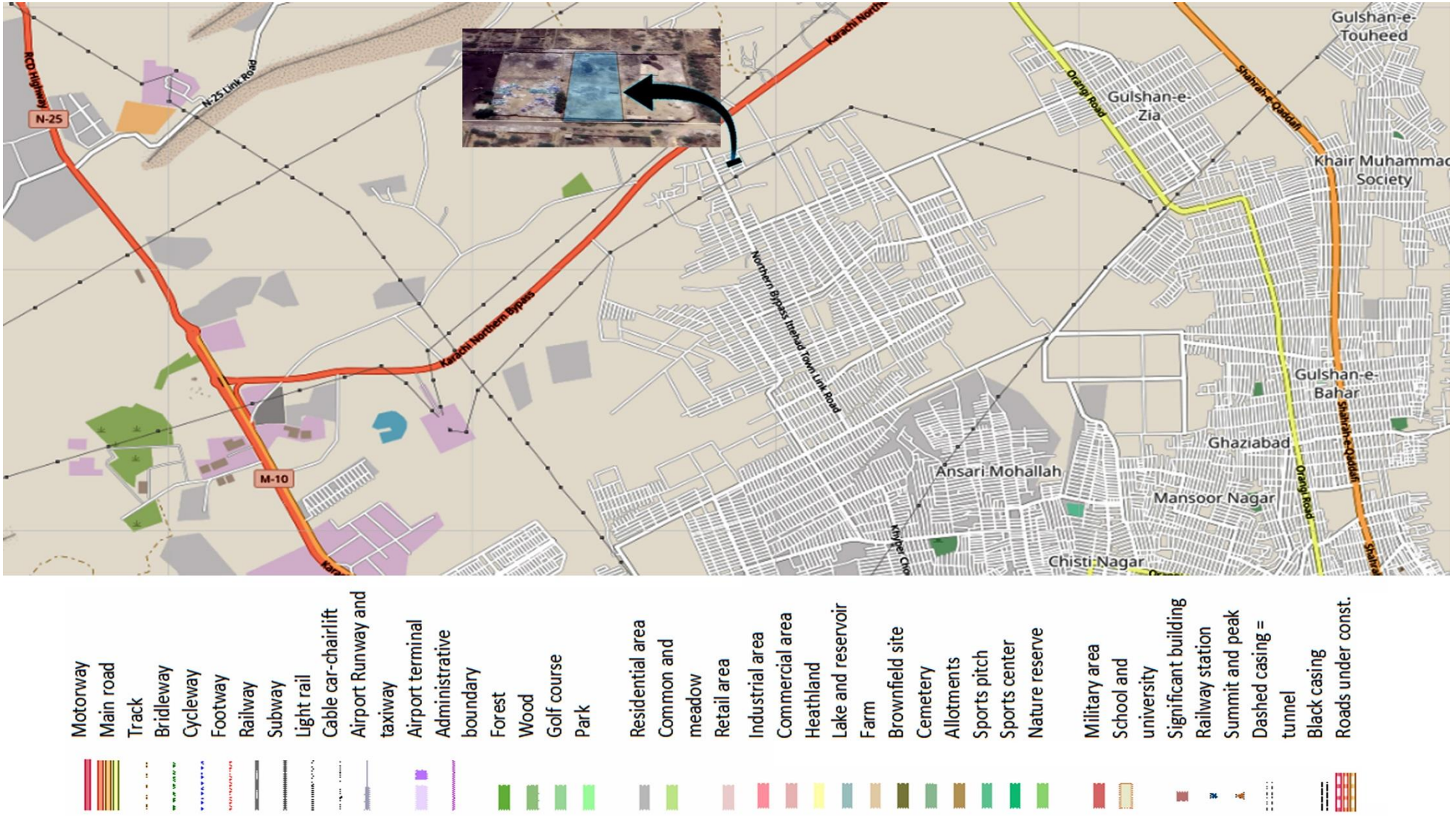


Figure 2: Location Map of Project Area

3.3 Project Significance

During the year 2020, the City District Government of Karachi carried out a study which revealed that the continuous city expansion by development of new industrial units, high-rise buildings, housing schemes and institutions have over the years contributed to waste generation. In recent years the amount of waste generated within the city has substantially increased up to approximately 14,000 to 16,000 tons per day. It is also estimated that by the end of year 2020, solid waste generation may reach up to 18,000 to 20,000 tons per day. The current solid waste management practices of the city are poor and needs adequate attention of the authorities on immediate basis[13]. Additionally the current bio medical waste treatment mechanism adopted by government and few private sector hospitals sustains a weak administrative control over this matter because of financial constraints. Therefore the medical waste is handed over to the third party contractors for further perusal and treatment. It has also 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. **Figure 3** shows hazardous waste management in a typical private sector hospital and **Figure 4** shows hazardous waste management in a typical government sector hospital.

Figure 3: Hazardous/Hospital Waste Management in Typical Private Sector Hospital (Karachi)

[13] *https://www.c40.org/case_studies/karachi-swm-study*

Figure 4: Hazardous/Hospital Waste Management in a Typical Government Sector Hospital (Karachi)

Further during the visit at existing Incineration facility operated under the management of Karachi Municipal Corporation (KMC) it was observed that the city lacks equipped government owned incineration facilities for effective treatment of hazardous industrial as well as bio medical waste. During the discussion with KMC's representative at Incineration facility, it was highlighted that KMC operates two (02) incineration units having the cumulative waste treatment capacity of around 2000 Kilograms (kg)/hour. Out of (02) installed incinerators one is functional which has also outlived its life as it was installed back in 1997. Refer to **Figure 5** to observe present condition of KMC's incinerator under maintenance and **Figure 6** to observe present condition of operational incinerator under the management of KMC.

Figure 5: Present Condition of KMC's Incinerator under Maintenance

Figure 6: Present Condition of Incinerator Operational under Management of KMC

In addition to this it has also been observed that in Karachi there are only two (02) commercial incineration facilities owned by private sector investors for treatment of hazardous, industrial and bio medical waste. The industrial units and medical facilities have very limited options for waste treatment and disposal due to the limited

availability of incineration units within the city. On the basis of the stated facts it is easy to understand that there is a dire need to establish more commercial incineration units in Karachi to effectively deal the subject matter in an environmentally sound manner. The leakages in waste management system of the city such as; burning, burial, selling, recycling, reusing and open dumping of hazardous industrial and bio medical waste will continue if such projects are not development to cater city's need of solid (hazardous and nonhazardous) waste management. Exposure to hazardous waste can result in severe health implications with children being the most susceptible. If in contact with human body in any form, hazardous and biomedical waste can lead to certain infectious diseases and at times may result in serious chronic illnesses as well. Field investigations and surveys during this EIA study also revealed that there were no engineered landfill sites (both hazardous and non-hazardous) in the city; however, the available site referred to as "Landfill Sites" are merely open dumping sites prominently located at; Jam Chakro, Dhabeji, Mehran Town and Govnd Pas. 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 site in Karachi[14]. However, at present due to limited capacity of the management authorities a bulk of residential, industrial and medical waste at times is left unattended contributing to harmful diseases and infections.

The proposed project will provide an effective solution for disposal and treatment of hazardous industrial and bio medical waste of the city. The project developer aims to establish a robust waste management and treatment facility which will include three (03) incineration plants.

3.3.1 Key Benefits of the Proposed Project

- Volume and mass reduction of industrial and bio medical waste.
- Proper disposal of waste with reduced environmental impacts.
- Reduction in air pollution currently caused due to uncontrolled burning of waste
- State-of-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

[14] *https://www.pakistantoday.com.pk/2018/02/06/pc-i-to-redesign-landfills-in-karachi-approved-on-scientific-grounds-report/*

3.4 Technical Description

The proposed project will include installation of three (03) incineration units with; air pollution control system, the combustion chamber, control panel, feeding system, auto hydraulic ramp, ash removal system, induced auxiliary fan and temperature control system etc. The cumulative waste treatment capacity of the plants is expected to be around 1500 kilograms per hour (kg/hr). The development will take place within the land area of about one (01) acre. Office area, green belt, storage yard, access road (drive way), generator room, firefighting tank, recirculation tank, septic tank and soakage pit will be an integral part of the project within the allocated land for this development.

3.4.1 Construction Phase Activities

- Site preparation;
- Base Construction;
- Engineering works;
- Office Construction;
- Development of Green Areas;
- Septic Tanks Construction;
- Utilities/Labor requirement during construction;

3.4.2 Site Clearance

It is important to note that the proposed project site is vacant land and is located in an area mostly having industrial units. During site survey no mature trees were observed at the proposed project location. Installation and commission activities will be executed as per the standards by adopting Good Engineering Practices (GEP) in order to complete the assigned work in specified time schedule. A prefabricated structure of different sections and offices will be assembled for the proposed project.

3.4.3 Project Timelines

The construction of the first incineration unit and associated facilities is expected to be completed in six months after obtaining all necessary permits. The next two units will be constructed after the completion of the first unit within a period of one year.

3.4.4 Engineering and Miscellaneous Works

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

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

3.4.5 Machinery Required

The major machinery that will be used is listed below:

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

3.5 Incinerator Design and Technical Details

Objective of the proposed project is to construct a waste management facility consists three incineration units of industrial and bio medical wastes with a view to solve the waste management issue faced by the city of Karachi. The technical specifications of the incinerator are mentioned in **Table 2**. General schematic of proposed incinerator is given in **Figure 7.**

Table 2: Specification of Each Incineration Unit (Total of 3 units will be installed)

S. No.	Features	Descriptions
1.	Temperature Control	Automatic Temperature Controller
2.	Capacity	500 Kg/hr (Approx 10 tons per day in 24 hours shift)
3.	Waste Container Lifter	Gear Motorized
4.	Combustion Air Motor	3 x 3 HP
5.	Combustion Burner	2 x 500 KWH
6.	Holding Chamber	3 x 12 sq.ft
7.	Wet Scrubber	2 x 15 gph (Re-cyclable)

8.	Recycling Tank	6’ x 12’ x 6’ (2000 liters)
9.	Electrical Pump for Scrubber	2 x 1 HP
10.	Pneumatic Unit for Door Automation	5 doors
11.	Air Dumper	Automatic
12.	Post Combustion Chamber	1 x 350 KWH
13.	Induced Draft Fan	1 x 15 HP
14.	Stack Height	35 ft
15.	Number of Chambers	Two
16.	Primary Chamber Temperature	600˚C— 800˚C
17.	Secondary Chamber Temperature	1200˚C
18.	Combustion Flow Control	Air and Gas Mixture Flow Control
19.	Feeding System	Automatic
20.	Ash Removal Door	2 x Swing open
21.	Control Panel	Pre-wired PLC Controlled
22.	Paint	Heat Resistant
23.	Fuel	Natural Gas, Diesel and Furnace Oil

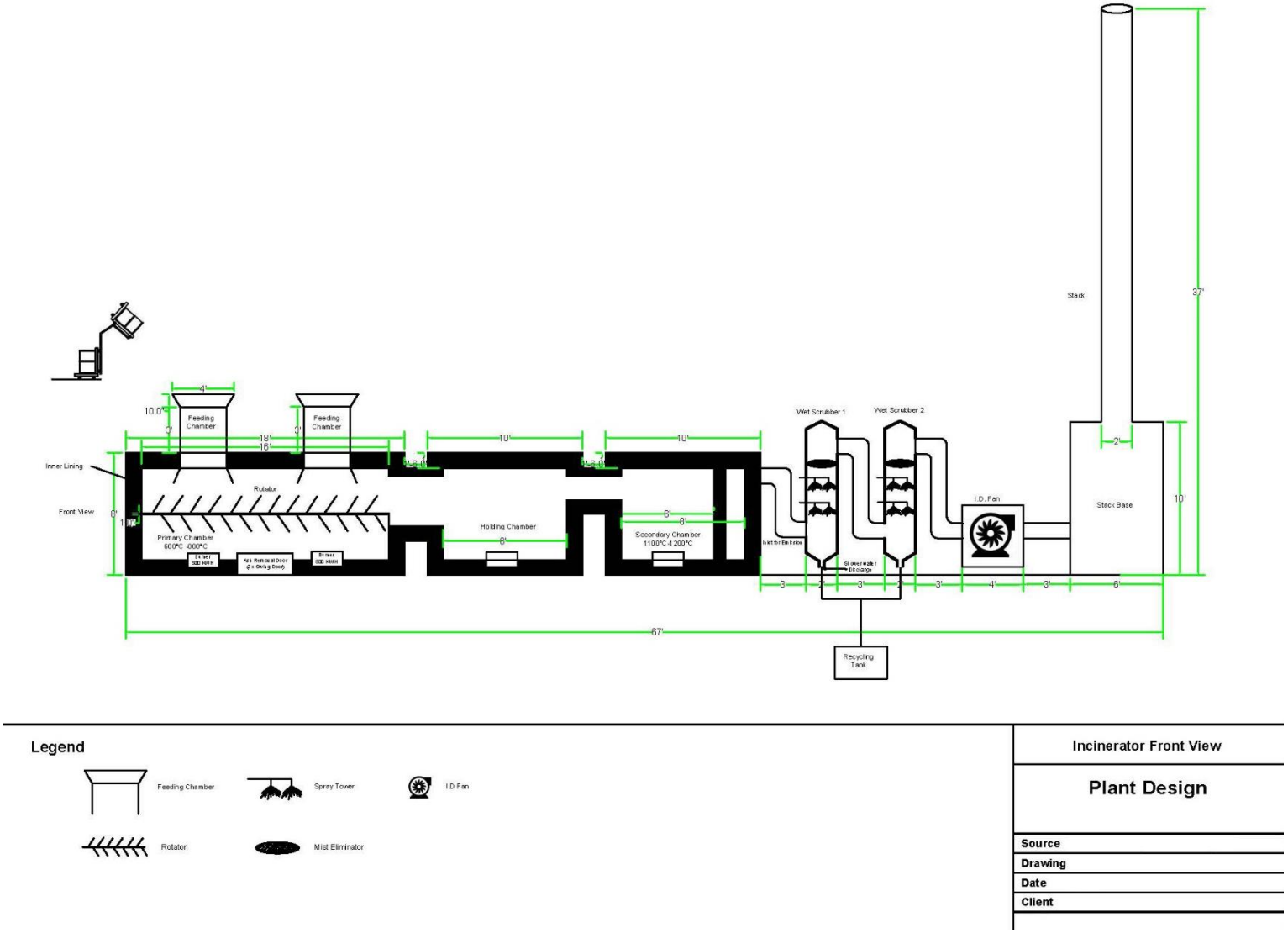


Figure 7: General Schematic of Proposed Incinerators

3.5.1 Waste Feeding System

The waste feeding in the proposed incineration units will be done through hydraulic lifts 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 lock from the top following which it will be transferred to the combustion chamber where it will incinerated. The waste material from industries will be lifted directly by the hydraulic lift in case if it is in safe containers. Alternatively, it will be transferred to the specific containers before lifting it to the hoppers.

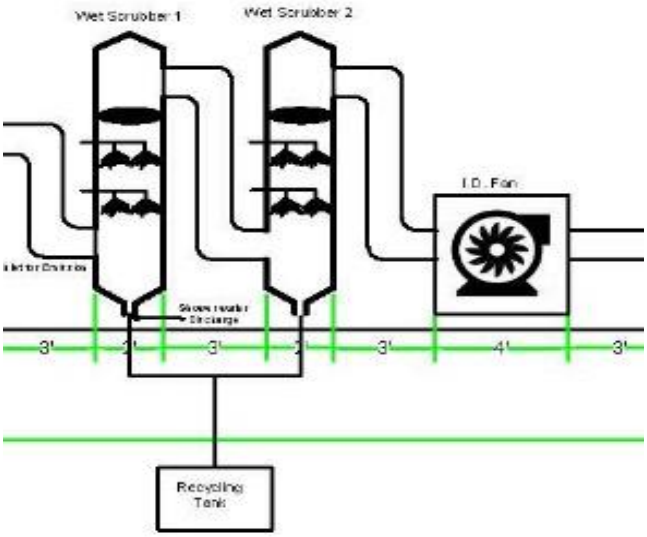
3.5.2 Primary Chamber

The waste is loaded in the incinerator when the primary chamber is first heated to attain a temperature of minimum 600^{o}C. In most of the cases the waste generated heat itself and the temperature rises to almost 800^{o}C. However, in case of waste with low calorific values, external heating is required in order to maintain the temperature between 600^{o}C to 800^{o}C. The primary chamber will be equipped with 2 burners of 500 KWH each. The waste will be rotated inside the primary chamber using a built-in stirrer system. This helps the waste to turn around for ensuring complete burning of waste. Whenever required, excess air is supplied with high pressure to the primary chamber to ensure complete combustion and support the burning process.

3.5.3 Secondary Chamber

The secondary chamber is meant for combustion of gases produced by the incineration of waste in the primary chamber. Secondary chamber of these incineration plants will consist of a burner of 350 KWH. Temperature in the secondary reaches up to 1200^{o}C and the design of the incinerator permits the gases to be exposed to this temperature for 2 seconds. This process in the secondary chamber helps get rid of obnoxious matter and pollutants like Dioxins and Furans.

3.5.4 Wet Scrubber



A wet scrubbing system consisting of two cyclones have 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 liquid containing the pollutant is then collected in recycling tanks and the consumed water will be recycled a number of times in the scrubbers. The scrubbing cyclones will be constructed from stainless steel and will consist of multiple water spraying nozzles. The water consumption in each cyclone will be 15 gallons per hour which will be recycled.

3.6 Utilities Requirement

3.6.1 Gas Supply

The UWM management will apply for new gas connection during construction phase, as presently; the Sui Southern Gas Company Limited Offices are closed in due to pandemic CoviD-19 as precautionary measures. It is estimated that 10MMBTU/day will be required during operation phase of the proposed project.

3.6.2 Electricity Supply

The primary source of electricity for proposed project would be K-Electric. The proposed project will have required 100 KWh electrical power during operational phase for which Power will be acquired from K-Electric. In addition to these, two (02) dedicated diesel based generators will be installed capable of generating around 150 KVA of electricity each as secondary power source at proposed project. Both generators will be places at a designated area with impermeable floor, roofs, and

boundaries to avoid any unforeseen environmental hazard. The project will apply to K-E for electric supply connection during the construction connection as per K-E Policy.

3.6.3 Water Supply

The primary water supply source to the project would be Third Party Tanker. The project's requirement during the construction phase would be around 1500 gallons per day (GPD). During the operation phase, the he estimated requirement will be 500 GPD. This requirement will be mainly for scrubbing system and domestic usage.

3.6.4 Manpower Requirement

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

- Manager Operations - 1
- Site Supervisor - 1 supervisor in each 8 hours shift
- Workers - 24 workers in each 8 hours shift
- Security Staff and 2 company guards - 2 private security guards in each 8 hours shift

3.6.5 Operational Phase

Facilities and equipment's installed and commissioned during the construction phase would be utilized during the operational phase of the proposed project. Utilization purpose and process description of each component of incineration unit is given in the below section;

- **Warehouse**

During the operational phase warehouse located within proposed project, will be utilized as a dedicated storage area for different mechanical and maintenance equipment's, cleaning detergents and any other chemicals (if required) etc.

3.7 Environmental Health and Safety Control and Arrangements

The proposed project will essentially include following environmental, health and safety components as an integral part of the proposed project. Details of each component are given in the below sections;

3.7.1 Air Pollution Control Systems

It is important to note that the proposed incinerators are already installed with air pollution control system (the wet scrubber) details are already elaborated under section 3.5.4

3.7.2 Wastewater Management

During the normal operation, only domestic wastewater will be generated from washrooms, ablution, etc. The wastewater generation will be around 50 GPD which will be diverted into the wastewater treatment system. The wastewater treatment 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 gravels which allow wastewater to gradually soak into the ground, while wastewater from wet scrubbers will be recycled and settled sludge will be incinerated.

3.7.3 Solid Waste Management

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. UWM have a dedicated solid waste management policy which shall be implemented at all project stages.

3.7.4 Safety and Security

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

The security of site will be contracted to private security company in addition to our own guards. CCTV cameras will also be in operation with recording backup.

3.7.5 CSR Activities

As a part of this project the project developer will conduct training for hospitals and industries to guide them on waste handling and storage techniques.

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

UWM will use the services of their own experts as well as experts in the field to create awareness and these training programs will be a regular activity which we plan to carry out when we start our project.

Chapter 4: Environmental & Social Baseline

4.1 Background Information

As discussed earlier in Chapter-3 the proposed project will be located within the District west off Northern Bypass, Karachi. therefore this section of the report mainly focusses onto the Physical, Ecological and Social Baseline of the project area. The study area radius map is shown in **Figure 8.**

Figure 8: Study Area Radius Map

4.2 Methodology of Conducting Baseline Study

To develop an environmental and social baseline of the project area a review of literature was done by team of experts. Furthermore, the literature reviewed for developing a comprehensive environmental and social baseline was validated by frequent site visits and field investigations for ground trothing. For the purpose of the EIA study, the impact zone for the proposed implementation shall confine within a radius of 5 km from the center of the project site.

Following dedicated activities were performed at project site for baseline development:

- Visual observations by experts were carried out within and around the project site.

- Air and noise monitoring was carried out for 24 hours by engaging Global Environmental Laboratory (GEL) Pvt. Ltd.
- Ocular observations by experts were carried out for validating the ecological and social conditions of the project area.

4.3 Physical Environment

The existing physical environmental conditions of the project area are described in this section. Data on topography and land use, geophysical, climate, water resources and drainage, Natural Disaster and Seismology was acquired from published literature and previously conducted studies. Air, noise and water quality was analyzed during extensive field surveys conducted specially for this EIA.

4.3.1 Topography and Land use

The city of Karachi has a land area of 3,640 km² and is located on the Arabian Sea Coast in the extreme south of Pakistan; the city is located at 24° 56' 46'' north and $66^0$37" to 67° 0' 20'' east. It is bounded by Jamshoro District in the northeast, Thatta District in the southeast, the Arabian Sea to the south and the Lasbela District of Balochistan Province to the west. Karachi can be broadly divided into two parts; the hilly areas in the north and west and the coastal area in the southeast. The hilly areas of Karachi are known to be the offshoots of the Kirthar Range. The highest point of these hills in Karachi is about 528 m in the extreme north. These hilly areas have sparse and scattered vegetation and have wide plains, dry river beds and water channels. Karachi has a long coastline in the south. Specifically, the topography of the study area is quite gentle and its elevation is increasing as we move towards the north. It is to be noted that the proposed project lies under the Manghopir Town whereas the project area is barren land, since sparsely situated villages maybe found else wise there is no social aspect present in the project area.

It has been observed that the topography of the project area is plain with no notable changes in elevation, the topographical map of the project site is shown land elevation of proposed project at 120ft in **Figure 9.**

Figure 9: Elevation Map of The Proposed Project Site

4.3.2 Geological Conditions

Geology of the local area is underlain lower Indus basin described as Indus River alluvial of early Eocene. Early deposition of sediments includes silt, sand stone, conglomerate, limestone with low compactness and cementing materials. Surface feature is described as syncline delta, and valley region and anticline ridges are exposed. As stratigraphic description there are two formations Gaj and Manchar formation that dip gently northeast to southeast in offshore. The coastal region is found to be of tertiary and post-tertiary origin. Blatter et.alsize1929 air dates it as recent as Eocene. The region has been formed by the upheaval of land from the Tethys Sea, which once extended up to the northern border of Pakistan but, gradually withdrew with the rising of the Himalayas. The underlying rocks are mostly of marine origin, highly folded, faulted and fissured everywhere.

The exposed geological material in the area is generally silty sand, sandy gravel and silty clay which is either product of in-situ weathering or deposited by the action of gravity and water. Below this over burden of silty sandy gravel soil, alternating layer of sedimentary rock comprising of sandstone, shell mudstone, siltstone and limestone are present. The rock formation of this area is from Nari Formation of Oligocene age and partially from Gaj Formation of Miocene age. The Nari Formation consists mainly of sandstone, siltstone and shale with subordinate limestone while the Gaj Formation consists of shale with subordinate limestone. However, the study area (proposed project site) under focus is Alluvial. Refer to **Figure-10** for Geological map of the project site.

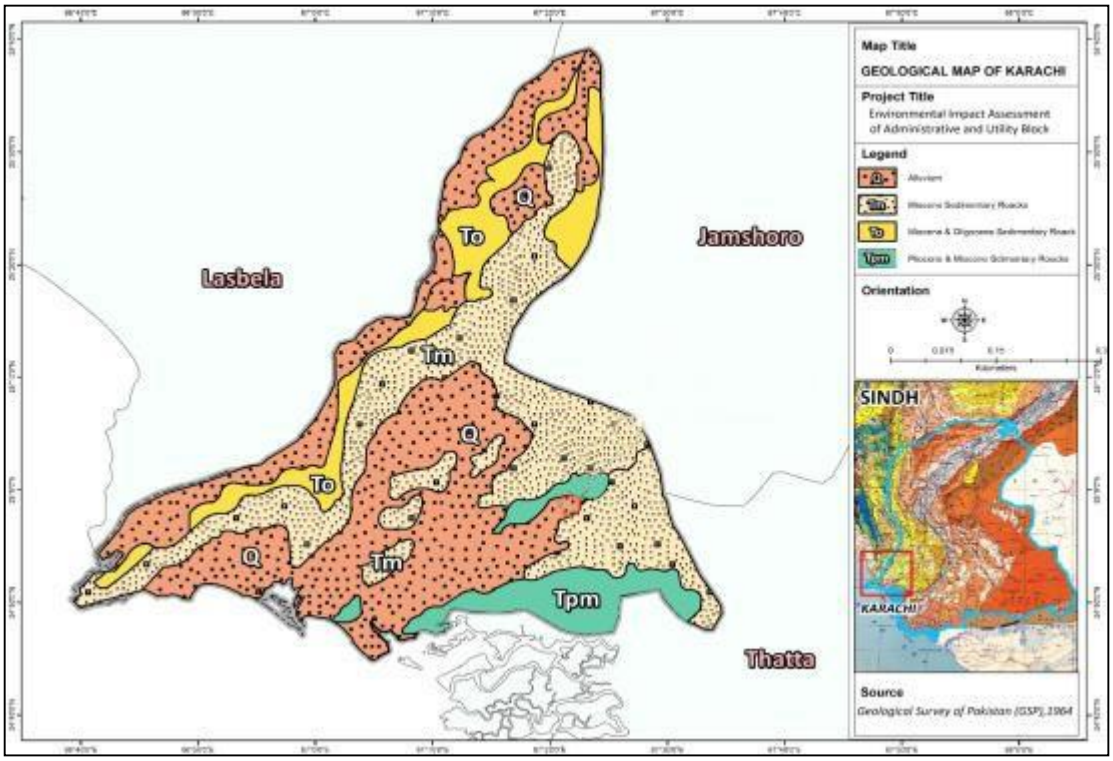


Figure 10: Geological Map of Karachi

4.3.3 Climatic Conditions

According to IPCC 2007 report decrease in rainfall pattern has been observed along the coastal belt and arid plains of Pakistan, in upcoming years most part of Pakistan will experience dry humid conditions especially Sindh, Balochistan, Punjab and the central parts of Northern Areas will receive less than 250 mm of rainfall in a year[15]. The distribution of rainfall in Pakistan varies on wide ranges, the rainfall is associated with the monsoon winds and the western disturbances. The provinces of Khyber Pukhtonkhuwa and Balochistan receive maximum rainfall in the months of December to March while Punjab and Sindh receive 50-75% of rainfall during monsoon season (Khan, 1993 & 2002). The probability of precipitation observed at Port Qasim varies throughout the year. Over the entire year, the most common forms of precipitation are thunderstorms, drizzle, and moderate rain. Thunderstorms are the most severe precipitation observed and it mostly occurs in August. Drizzle is also the most common precipitation which is mostly observed during the month of July. The mean monthly precipitation records for Karachi can be seen in **Figure-11.** Daily High and Low Temperature are given in **Table 3.**

[15] https://www.ipcc.ch/site/assets/uploads/2018/03/ar4_wg2_full_report.pdf

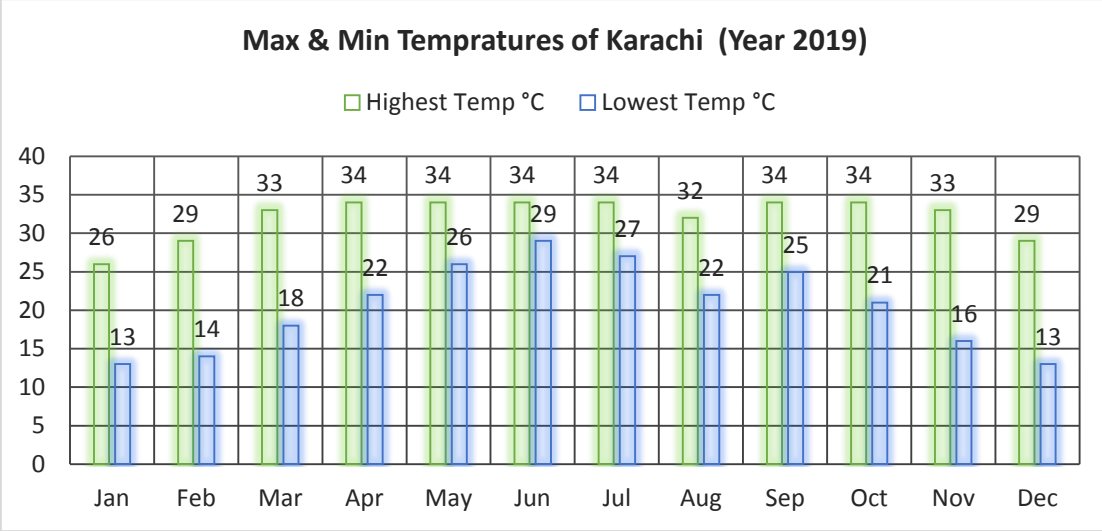


Figure 11: Mean Monthly Min & Max Temp of Karachi City for Year 2019[16]

Table 3: Daily High and Low Temperature[16]

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Highest Temp °C	26	29	33	34	34	34	34	32	34	34	33	29
Lowest Temp °C	13	14	18	22	26	29	27	22	25	21	16	13

4.3.4 Rainfall Conditions

According to IPCC 2007 report decrease in rainfall pattern has been observed along the coastal belt and arid plains of Pakistan, in upcoming years most part of Pakistan will experience dry humid conditions especially Sindh, Balochistan, Punjab and the central parts of Northern Areas will receive less than 250 mm of rainfall in a year (PMD). The distribution of rainfall in Pakistan varies on wide ranges, the rainfall is associated with the monsoon winds and the western disturbances. The provinces of Khyber Pukhtonkhuwa and Balochistan receive maximum rainfall in the months of December to March while Punjab and Sindh receive 50-75% of rainfall during monsoon season (Khan, 1993 & 2002). The probability of precipitation observed at Port Qasim varies throughout the year. Over the entire year, the most common forms of precipitation are thunderstorms, drizzle, and moderate rain. Thunderstorms are the most severe precipitation observed and it mostly occurs in August. Drizzle is also the most common

[16] www.weatherspark.com

[17]precipitation which is mostly observed during the month of July. The mean monthly precipitation records for Karachi can be seen in **Figure-12.**

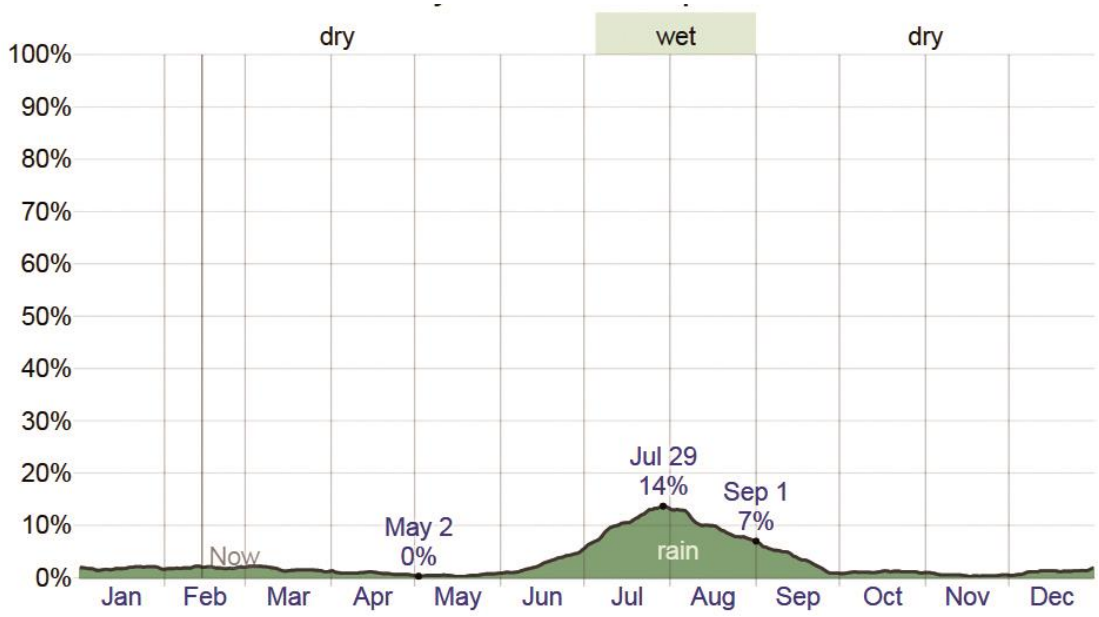


Figure 12: Precipitation Trend in Karachi[16]

4.3.5 Relative Humidity

Karachi experiences extreme seasonal variation in the perceived humidity. The muggier period of the year lasts for 7.8 months, from March 14 to November 8, during which time the comfort level is muggy, oppressive, or miserable at least 27% of the time. The muggiest day of the year is July 25, with muggy conditions 100% of the time. The least muggy day of the year is January 18, with muggy conditions 2% of the time.

The relative humidity typically ranges from 25% (dry) to 91% (very humid) over the course of the year, rarely dropping below 10% (very dry) and reaching as high as 100% (very humid). The air is *driest* around February 9, at which time the relative humidity drops below 33% (comfortable) three days out of four; it is *most humid* around August 2, exceeding 83% (humid) three days out of four. The mean monthly relative humidity for Karachi is shown graphically in **Figure-13.**

[16] www.weatherspark.com

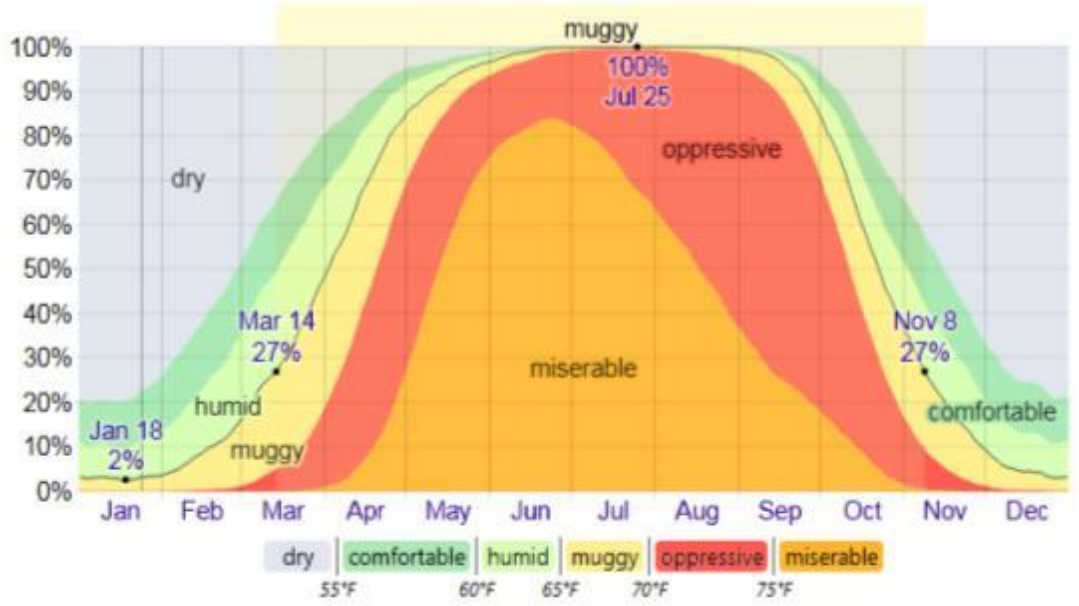


Figure 13: Mean Monthly Relative Humidity for Karachi[16]

4.3.6 Wind Speed and Direction

Wind direction is reported as the direction from which the wind blows and is based on surface observations. Over the course of a year, wind usually blows in all directions with varying frequencies. Certain directions, which occur more frequently than others, are known as the predominant wind directions. Climatological trend of wind direction envisages winds are generally light during the post monsoon and winter months. Karachi's windier part of the year lasts for 5.1 months, from April 13 to September 17, with average wind speeds of more than 10.8 miles per hour. The windiest day of the year is June 29, with an average hourly wind speed of 14.7 miles per hour. The calmer time of year lasts for 6.9 months, from September 17 to April 13. The calmest day of the year is November 26, with an average hourly wind speed of 6.9 miles per hour.

Pollutant concentrations typically decrease with increasing wind speed as a result of dispersion. However, when wind speeds are high, while there is good dispersion of gases and particles, there is more potential for re-suspending surface dusts..The project area lies in a region where wind blows throughout the year with highest velocities during the summer months the direction of the wind is from south-west to west and during winter season the wind blows from north to northeast and it shifts southwest to west in the evening hours. The wind usually carries sand and salt with it

resulting in severe corrosion and erosion. **Figure-14** & **Figure-15** shows the wind speed and direction of the Karachi respectively.[18]

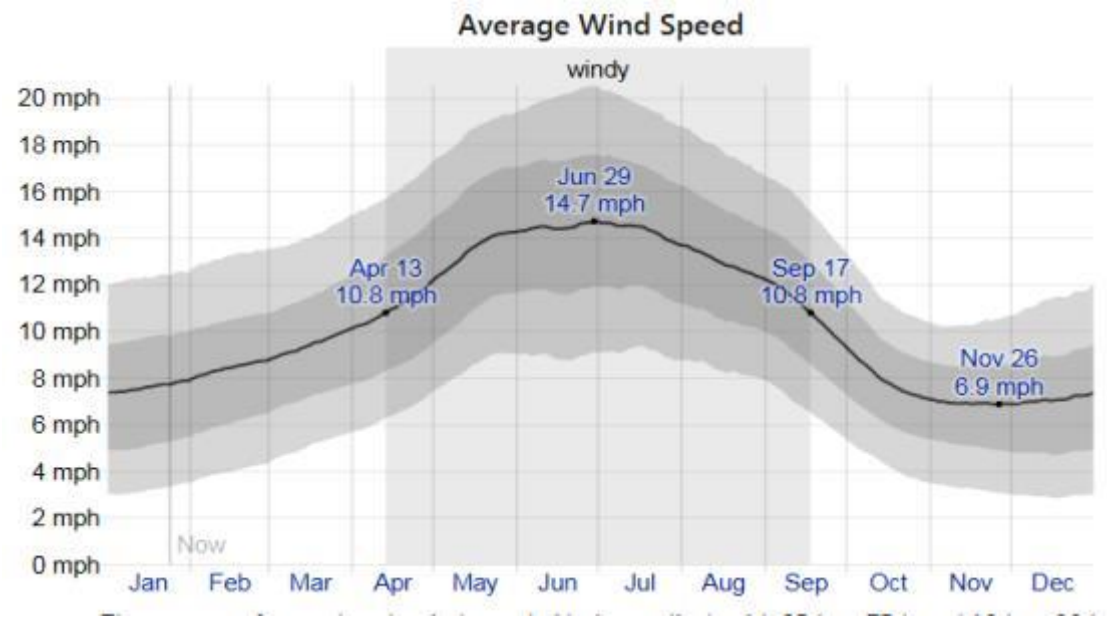


Figure 14: Wind Speed of Karachi[16]

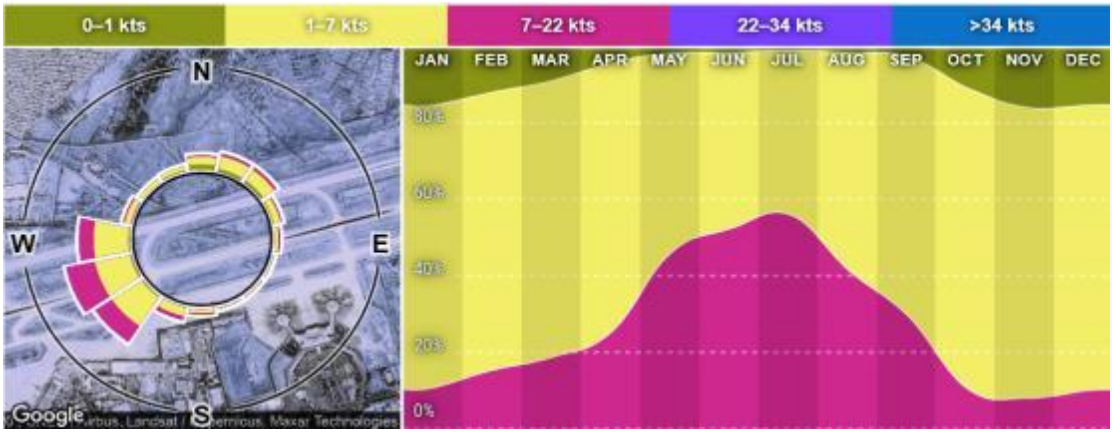


Figure 15: Wind Direction of Karachi[16]

4.3.7 Ambient Air and Noise

To assess the ambient air within the project area monitoring was conducted by GEL Pvt Ltd. Monitoring results are presented in the **Table 4**. In addition to this, ambient noise level the of the project area was monitored by the GEL Pvt Ltd, which shows the project

[16] www.weatherspark.com

area has the ambient noise levels are within range 58 dB. Copy of Ambient Air and Ambient Noise results of project area is also attached as **Annexure-VIII.**

Table 4: Ambient Air Monitoring Results

Parameter	Unit	Concentration	SEQS Limit
Carbon Monoxide (CO)	$mg/m^3/hr$	1.3	10
Sulfur Dioxide (SO_2)	$Ug/m^3/24hrs$	33.2	120
Suspended Particulate Matters (SPM)	$Ug/m^3/24hrs$	182	500
Particulate matter (PM_{10})	$Ug/m^3/24hrs$	70	150
Particulate matter ($PM_{2.5}$)	$Ug/m^3/24hrs$	23	75
Noise	dB	58	75
Oxides Of Nitrogen (NO_2)	$Ug/m^3/24hrs$	19	80

4.3.8 Water Resources

This section details the water resources of the proposed project area. Both, surface and ground water resources have been summarized in this section of the report. Data was obtained through field sampling and review of previously done EIA in the project area. Hydro geologically, Karachi lies in Malir River and Hub River basin. It is surrounded by Hub River in the west and Malir River on east. Malir basin is mainly drained through the Malir River followed by the Liyari channel. Both these channels are transient; therefore, the flowing water is generally sewage and industrial effluent. Hub River follows on the western margin of the city is also transient but it is devoid of any sewage or anthropogenic effects. The coastal aquifers of Karachi are mainly recharged by Malir or Liyari Rivers. Hub River is recharging limited aquifers, Nari and Gaj formations. While Malir and Liyari Rivers are mainly recharging alluvial aquifers in the coastal parts of Karachi city.[19] Figure-16 shows the water supply network of Karachi.

[19]Khan, A., and EghbalBakhtiari, A. (2017). Groundwater Assessment of Coastal Aquifers in Karachi: Impact of Seawater Intrusion. *International Journal of Ground Sediment & Water*, *6*, 247-263.

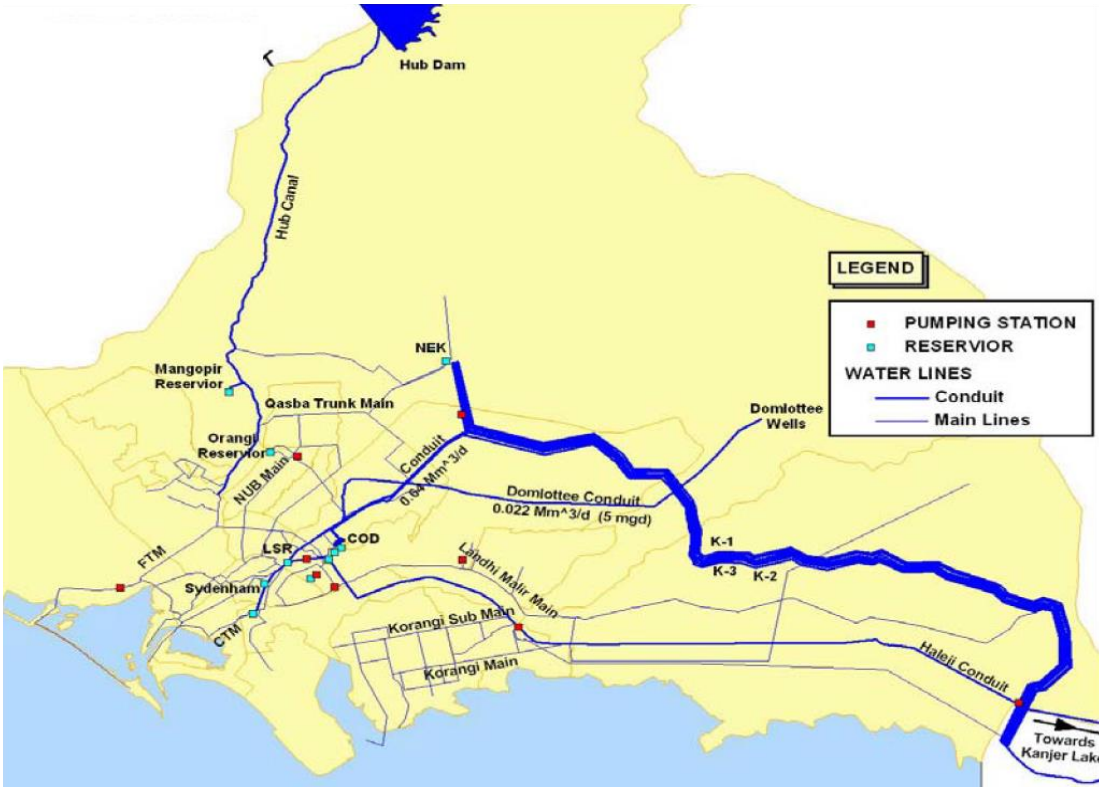


Figure 16: Water Supply Network of Karachi[20]

4.3.9 Sewage Water Drainage

Sewage is gathered through RCC pipes and uncovered channels, and gathered sewerage is arranged to neighboring water bodies through rivers and Nallah's. Karachi's untreated wastewater including domestic sewage and industrial wastewater is discharged into the Lyari and Malir rivers, and finally disposed to the nearest coastal belt. According to KWSB, 417MGD untreated sewage is drained into the sea through the 232KM network of Main Nallah's & 1000Km network of town drains. These Nallah's mainly discharge into the two main rivers namely Malir River & Layari River, refer to **Table 5** to observe the main sewerage containing bodies.[21]

Table 5: Details of Sewerage Lines in Karachi

Major *Nallah's	Major Rivers	Final Drain
Soldier Bazar Nallah	Malir River	Sea
Gujjar Nallah	Layari River	
Orangi Nallah		

[20] http://www.shehri.org/2020.pdf
[21] Hyder, I. (2007, March 16). A presentation on the reforms in Karachi Water & Sewerage Board (KW&SB). Retrieved from http://arifhasan.org/karachi/reforms-in-kwsb-an-overview-for-civil-society

Railway Station Nallah		
Nehr e Khayam		
Ferer Nallah		
Manzoor Colony Nallah		

4.3.10 Storm Water Management

Karachi recorded an annual average monsoon rainfall varying 125-250 mm whereas winter rainfall is about 25mm. there are two main-perennial rivers the Malir and Liyari Rivers, crossing the thickly populated city areas before falling into Arabian sea.The natural drainage system of Karachi consists of Liyari and Malir Rivers and their tributaries of nallahs. **Figure-17** shows the Storm Water Management of Karachi.

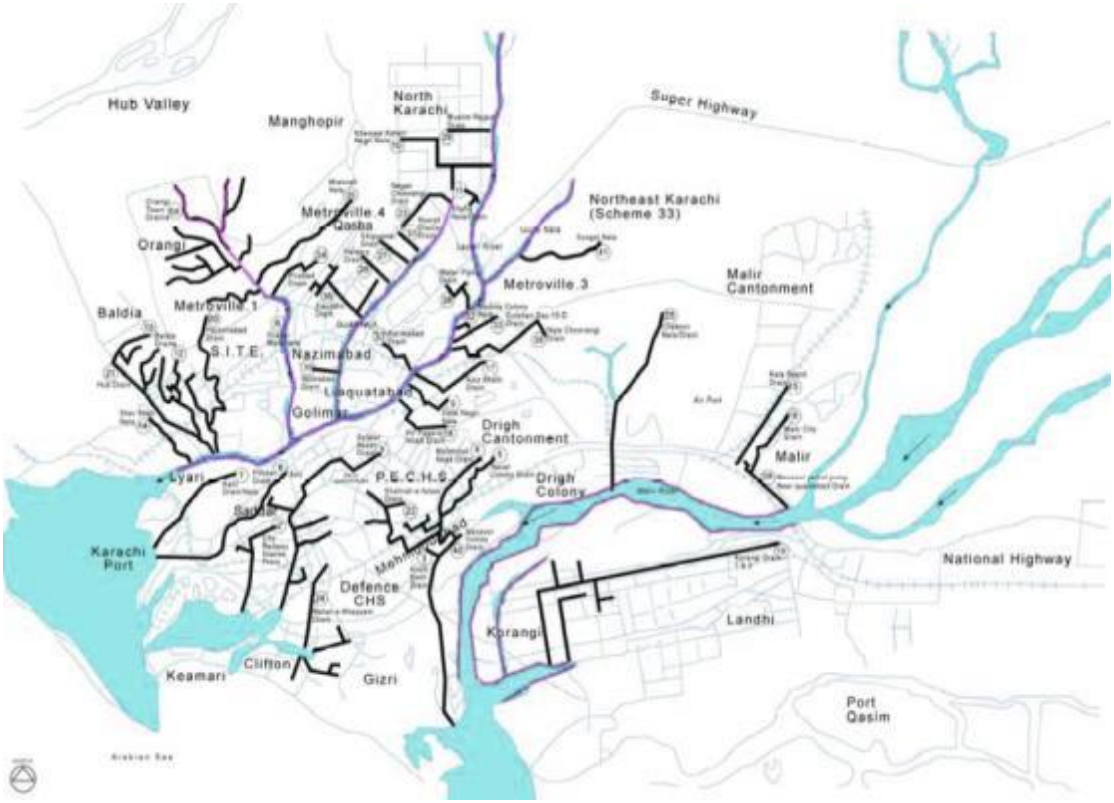


Figure 17: Storm Water Network of Karachi[22]

4.3.11 Solid Waste Management

The amount of solid wastes is expected to substantially increase with rapid growth of population and economic activity. By the year 2020, the solid waste generation may

[22] http://www.shehri.org/2020.pdf

reach up to 18,000 to 20,000 tons per day. The quality of civic life is closely related and affected by sanitary conditions in the residential neighborhoods and other areas, where efficient collection of garbage is the key to clean and healthy environment. Poor planning, inappropriate technology and poor management are obviously the main areas of concern needing serious efforts on the part of the local government and other agencies towards efficient management and modern technological development of this sector. **Figure 18** shows the existing landfill sites.

Figure 18: Land fill sites of Karachi

4.3.12 Disaster Risks

Pakistan straddles the boundaries between the Indo-Pakistan, Arabian and Eurasian plates, and its structure is predominantly affected by their past and present interrelationships. Two composite plates, comprising both continental and oceanic crust (Indo-Pakistan & Arabia) are separated by an intra-oceanic transform boundary, which within the Pakistan offshore area is expressed as the Murray Ridge. The Eurasian Plate is a collage of three microplates which amalgamated in Iran-Afghanistan and western Pakistan area during Cretaceous to Paleogene times (Quad Report, 1994). The most easterly of these microplates, the Afghan Block, forms a considerable part of Pakistan's northwestern edge, and is bounded by the two major transform fault systems of Herat and Chamman. The boundaries between microplates can be traced

by belts of ophiolite assemblages. The Indo-Australian plate upon which Pakistan, India and Nepal lie, is continuously moving northward, colliding with and sub-ducting under the Eurasian plate, thus forming the Himalayan mountains, and triggering earthquakes in the process. **Figure 19** shows Tectonic plates configuration of Pakistan.

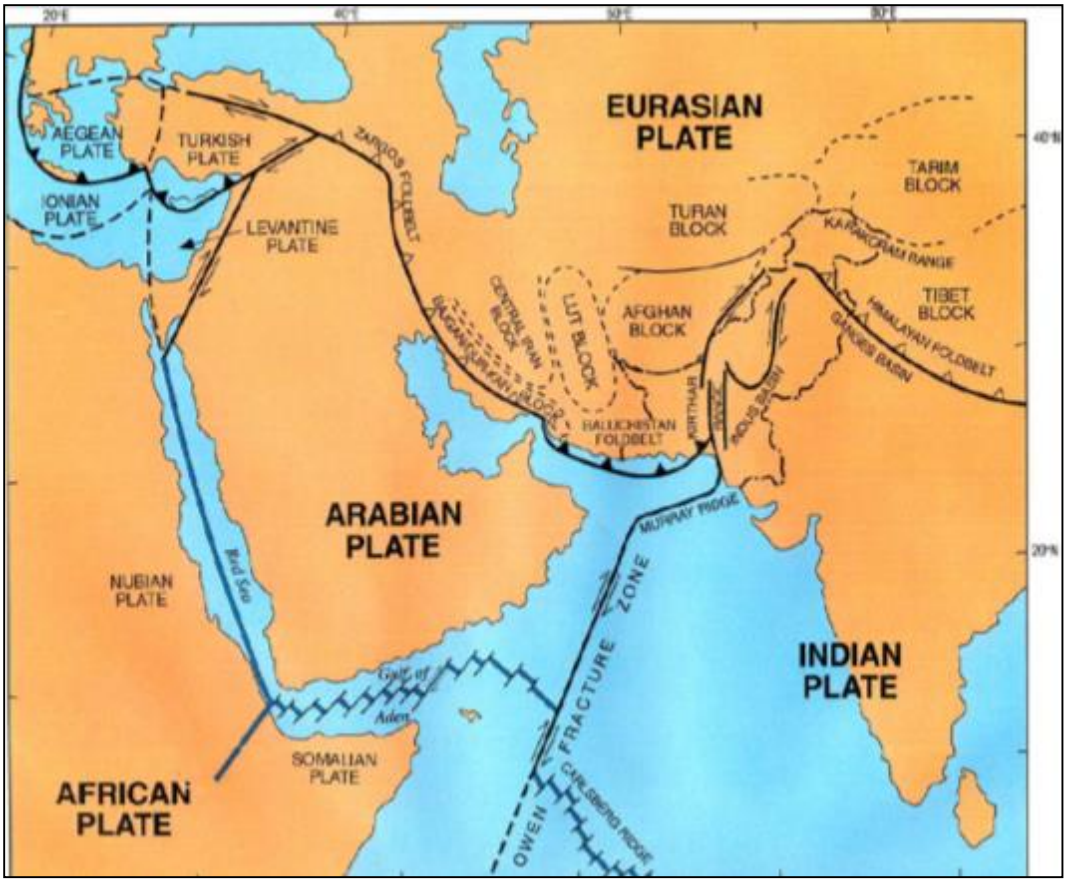


Figure 19: Tectonics Plate Configuration of Pakistan

The history reveals that: The areas comprising Pakistan have suffered four major earthquakes in the 20th century including the great Quetta earthquake of 1935, the 1945 earthquake off the coast of Makran, the 1976 earthquake in the Northern areas, and the October 2005 Kashmir earthquake. In between these major events, the Northern areas and Kashmir have experienced many small quakes with localized impact. No appreciable earthquakes have been recorded in Karachi during the recent past. The proposed project is located in the seism tectonic region of the Kirthar Ranges, where a moderate level of seismic activity is believed to exist, but large magnitude earthquakes are rare. Seismic Zoning Map of the proposed project area is shown in Figure 20. The boundaries of Seismic Zones are defined below in **Table 6**.

Table 6: Details of Boundaries of Seismic Zone

Seismic Zone	Peak Horizontal Ground Acceleration
Zone 1	0.05 to 0.08g
Zone 2A	0.08 to 0.16g
Zone 2B	0.16 to 0.24g
Zone 3	0.24 to 0.32g
Zone 4	> 0.32g

Figure 20: Seismic Zoning Map of The Proposed Project Area

4.4 Ecological Environment

The current project is located in semi sub urban proximity, can also be regarded as peri urban setup, the land use pattern revealed a mix use pattern i.e. domestic agriculture and small industrial boundaries with mix use, this reflected mild anthropogenic environmental stresses on flora and fauna. However the fact is contradicting and during surveys and assessments it was observed that biodiversity of the project area was insignificant due to other innumerable factors including human effect. The area does not fall or in 10 km vicinity of any area falling in the protected category (National Park, Game reserve or Wildlife sanctuary etc.), Neither listed species of flora and fauna were reported threatened, vulnerable, critically endangered or near to extinction according to IUCN red list or protected under CITES and or SIND WILDLIFE ORDINANCE etc.

4.4.1 Habitat

The area is a mix of semi structured building with patches of domestic agriculture, mostly the vegetables were seen growing in the vicinity, few of the representative photographs are shown on the next page.

	
Prosopis on the other side	*Phragmites*
	
Typha along the wall	*Calotropis*

4.4.2. Flora

The proposed project area sustains semiarid environment. The harsh climate, minimum rainfall, and poor soil conditions mainly dominated by calcareous representations, limits the growth of flora. The quality of soil is also poor with little organic matter, sandy loam and poor texture to support large-scale vegetation. In addition to that, it is important to note that the rural population of the area is dependent on livestock and small scale agricultural activities for their livelihood. Therefore, over grazing is another issue limiting the frequency of floral species within the proposed project surrounding area. As mentioned earlier that the poor quality of soil has a limiting role in representing vegetation cover, vegetation in the area represents xeric characteristic with sparse distribution in the low lying areas and clumped in mountainous undulations.

A floristic list was prepared from the surroundings of the project area; the list has been presented in **Table 7**

Table 7: Floristic List

#	Species	Family	Life form	Life Span	Conservation status
1	*Acacia nilotica*	*Mimosaceae*	Tree	Perennial	Domesticated
2	*Aerva javanica*	*Amaranthiaceae*	Shrub	Perennial	Common
3	*Blepheris sindica*	*Acantheaceae*	herb	Perennial	Common
4	*Calotropis procera*	*Ascelpidaceae*	Shrub	Perennial	Occasional
5	*Cynodon dactylon*	*Poaceae*	Grass	Perennial	Common
6	*Euphorbia hirta*	*Euphorbiaceae*	herb	Annual	Common
7	*Phragmites karka*	*Poaceae*	shrub	Perennial	Common
7	*Prosopis juliflora*	*Mimosaceae*	Tree	Perennial	Alien
8	*Suaeda fruiticosa*	*Chenopodiaceae*	Shrub	Perennial	Common
9	*Typha sp*	*Typhaceae*	shrub	Perennial	Common
10	*Zizyphus numularia*	*Rhamanaceae*	Shrub	Perennial	Common

A total of 11 species of plants were observed within the vicinity of the proposed project site. Most of the species were of non-significant importance for conservation and only few of them were maintained their visibility and spread. The plant species dominating the project area include *Prosopis juliflora,Phragmites karka, Typha* and *Calotropis procera.* The plant species within the vicinity of the proposed project location is mainly dominated by *Prosopis juliflora*.

4.4.2 The Dominant Vegetation

The dominant floral species of the project area is *Prosopis juliflora* associated with *Euphorbia caducifolia*. **Figure 21** presents the pictorial profile of the floral vegetation of the area.

Aerva javanica

Acacia nilotica

Blepharis sindica

Capparis decidua

Figure 21: Pictorial Presentation of the Floral Species

4.4.3 Fauna

Proposed project site is located in semi urban and arid environment, however the faunal species observed during the survey were mainly of desert origin. Moreover, it is important to note that the proposed project site sustains few nocturnal species as well. Detailed sampling protocol and method is presented below after brief description of the species and list of identified avifauna, mammals and reptile species of the proposed project area.

4.4.4 Avifauna

In order to study the avifaunal diversity of the project area individual count technique was used during field surveys and the identified species were immediately recorded and reported accordingly. The Limited number of species were recorded during the survey and species identified in the proposed project area are of less ecological importance. Out of recorded birds, none of the species are protected under the Sindh Wildlife Protection Ordinance (SWPO) and IUCN Red List 2006 as Near Threatened (NT). The avian species, which are quite abundant and common in the proposed project area, include Indian Roller, Green Bee Eater and Indian Myna .The list of identified species during the ecological/ baseline survey is presented as **Table 8.** Figure 22 shows the pictorial profile of avifauna of the project area.

Table 8: Avifauna (Birds) of the proposed project area

	English Name	Scientific Name	Occurrence				
			Resident	Migratory	Common	Less Common	Scarce
1	Blue Rock Pigeon	*Columba livia*	X		X		
2	House Crow	*Corvus splendens)*	X		X		
3	House Sparrow	*Passer domesticus*	X		X		
4	Common Myna	*Acridotheres tristis*	X		X		
5	White cheeked Bulbul	*Pycnonotus* leucogenys	X		X		
6	Desert Lark	*Ammomanes deserti*	X		X		
7	Little green bee eater	*Merops orientalis*	X		X		
8	Lapwing	*Hoplopterus indicus*	X		X		
9	Black drongo	*Dicrurus macrocecercus*	X		X		
10	Purple Sunbird	*Nectarinia asiatica*	X		X		

House Crow

Blue rock Pigeon

House Sparrow	*Common Myna*
	
White cheeked Bulbul	*Desert lark*

Figure 22: Pictorial Profile of Avifauna of The Proposed Project Area

4.4.5 Mammals

Direct count method was adopted to identify total number of identified species during the ecological/baseline surveys. The proposed project area sustains few insignificant mammals such as: Five striped palm squirrel, Roof rat and House mouse are the common species of the area while small Indian mongoose is less common. None of the species recorded is protected, threatened or included in the CITES appendices. The list of identified mammals is presented below in **Table 9** and **Figure 23** pictorial profile of mammals of the proposed project area

Table 9: List of Identified Mammals of the Proposed Project Area

S. No	English Name	Scientific Name	Occurrence		
			Common	Less Common	Scarce
1	Roof Rat	*Rattus Rattus*	X		
2	Small Indian Mongoose	*Herpestes javanicus*	X		X
3	Hare	*Leporidae*	X		
4	Five striped palm squirrel	*Funambulus pennantii*	X		

	
Small Indian Mongoose	*Five striped palm squirrel*

Figure 23: Pictorial profile of Mammalian Fauna

4.5 Social Environment

As discussed earlier the proposed project will be located in Manghopir which is about 5 km away from Ittihad town. The main entry and exit points to the proposed project site mainly include Karachi, National Highway (N5), Karachi Northern Bypass, Orangi Town Link Road. Proposed project route Maps road network is shown in Figure 24 below.

Figure 24: Project Route Maps

4.5.1 General Living Conditions

Karachi is among the most populous metropolitan cities of the world. The population of Karachi is increasing exponentially which is coupled by the effect of rural population migration to urban center for more livelihood opportunities. Similarly the proposed project area having a number of industrial units credits its growth to the mixed populations of economic and migrants from different national, provincial, linguistic origins. The community in the project area is a mix of Sindhi, Brahui, Pakhtun (mostly dominant), Hazarewal, Seraiki, Kashmiri, Memon, and some other Gujarati-speaking communities. The local community in the project area utilize groundwater for their domestic and daily usage. During the consultation meeting it was also discussed that women of the project area are mostly housewife and are not working ladies. **Figure 25** shows the consultation with community.

Figure 25: Community Meeting in Project Area

4.5.2 Livelihood and Leadership Dynamics

The livelihood of the people in the project area is mixture of middle and lower class population. The livelihood of middle to lower class communities within the project area mainly depends upon shop keeping, small scale farming, daily wages (laborer) and activities like Farming. Figure 26 shows small scale agriculture activity in project surrounding. There is no strong system of political party leadership observed in the proposed project area. People living in this area are independent and follow solitary lives without any leader. In project area follows a Jirga system, therefore minor conflicts are resolved at village level. However, if the conflict is big complex then the community leader resolves the conflict through listening to both parties' point of view. The locals of the project area have a strong belief in the community head and they believe them as their political leaders and head of the project area.

Figure 26: Small Scale Agriculture Activity in Project Surrounding

4.5.1 Health and Education

The healthcare facilities in the proposed project surrounding area includes few small clinics located near Khyber Chowk and only prominent health care facility accessible to local communities is "Qatar Hospital" about 5 to 6 km away from the proposed project area. Apart from health facilities, adequate educational setup was not identified in the vicinity of the project. However, near Khyber Chowk, there were multiple private and

government schools observed ranging from primary to matric. College level facility was reported by the commuters to be located beyond 4-6 km range.

Chapter 5: Stakeholder Consultation

5.1 Background Information

The main objective of public consultation is to disseminate information about the project and its anticipated impact on the primary and secondary stakeholders. Stakeholder consultation with local community and government departments is a mean of involving all primary and secondary stakeholders in the Project's decision-making process in order to address their concerns, improve project design and give project legitimacy. Stakeholder consultation, if conducted in a participatory and objective manner, is a mean of project sustainability.

The public consultation and participation serve, as an effective tool for social interaction. This tool helps to develop the significant confidence between the stakeholders and the proposed project holder United Waste Management to minimize the anticipated environmental and social impacts of the project.

Primary stakeholders are usually referred to those, who may be directly affected by the proposed project's activities, while on the other hand secondary stakeholders refers to those who are usually affected indirectly or they have power to make decisions at governmental or institutional level. The most important objective of these consultation was to determine the extent of the impact of different proposed project activities and suggest appropriate mitigation measures accordingly. This section of EIA clearly describes the issues raised by the stakeholders during different consultation meetings conducted specifically for this assignment, informal and focused group discussions with the primary and secondary stakeholders were carried out which was primarily focused on determining the perceptions of the stakeholders

The overall objectives of the process were identified as follows:

- To inform and acquire feedback from primary and secondary stakeholders on proposed project activities;
- To identify potential issues and mitigation measures;
- To incorporate stakeholders concerns in the project documents; and
- To identify the negative impacts due to the project execution.

Following stakeholders were approached by ECS team for consultation meetings during this EIA study;

- Local Community;
- Real State Offices;
- Sindh Environmental Protection Agency (SEPA);
- Sindh Healthcare Commission;
- Sindh Solid waste Management Board;
- Karachi Municipal Corporation;
- Engineering Professionals;
- Healthcare Professional;

5.2 Stakeholder Consultation Outcomes/Findings

Consultation outcomes have been discussed in the following sub sections;

5.2.1 Local Community Representatives (Sr. Members & Religious Associates)

- Locals of the project area updated that they are persuaded to use domestic water supplies for small scale agricultural activity in the project area;
- The local community members were positive about the proposed project and informed that the area had no law and order issues, however they suggested that proper security arrangements should be made for the plant operators or workers of the by the project developer;
- Proper security for facility shall be provided so as to keep the hazardous waste inaccessible to outsiders;
- Health of workers and security personnel must be taken care of due to the nature of the project;
- Concern regarding air pollution during the operational phase were highlighted by the community members;
- Proper stacks for the plant were suggested as the vicinity had, once, already faced poor air quality issue during the operational phase of a battery recycling plant;
- A secure and covered transportation system for waste transportation was suggested to keep community safe from any unforeseen hazard and exposure to hazardous waste;
- It was requested to bring in a small-scale medical facility for surrounding residents such as a CSR activity since none is available in the 5KM radius of area. The following photographs show consultation nearby project area.

- Project executers were requested to prefer the local people for labor jobs since farming, alone, is not proving enough to cope up with the inflation situation;

5.2.2 Real Estate Office (Owner)

- A number of industries are already operational in the project area while new industries and plants are being set up as well. Further medical stores, hospitals and clinics are located near Khyber chowk to facilitate the local communities and employees of the industrial units operating in the project area;
- The medical facilities, the clinics and medical stores are also located approximately 3 to 4 km away from the area, it was also discussed that the project executers may also facilitate the waste treatment generated in the project area but the community members should be informed in an transparent manner about the type of waste being treatment at the facility;
- Air pollution control must be taken under consideration since the area has already been a victim of bad air quality during the operation of iron ore and battery recycling plant. However, the issue was resolved with the installation of chimneys;

5.2.3 Sindh Environmental Protection Agency (Deputy Director Technical)

- Consultation with Karachi Municipal Corporation (KMC) should be done to review the current mechanism adopted by KMC for disposing incineration ash, further the project developer should consider acquiring the relevant No Objection Certificates (NOC)s for the proposed development;
- In case the plant is not relying on natural gas from SSGC, the emissions of diesel needs to be assessed thoroughly before project operations;
- Air dispersion modelling for the type of plants involving burning and release of certain emissions is suggested. Proper handling and execution of waste must be ensured through trained staff;
- The responsibility of transportation of waste from different collection points to the incinerator plant and onward to the landfill site, must be clearly taken up by the project developer;
- Each incinerator plant must have a sufficient waste storage capacity in order to continuously run the incinerator plant. For the purpose of security and to maintain check and balance of transparent waste handling and processing, a vigilant surveillance system must be installed at site;

5.2.4 Sindh Health Care Commission (Deputy Director Clinical Governance)

- Healthcare waste is hazardous in nature and should be stored properly in temperature controlled storage area to prevent growth and spread of certain microorganisms;
- Project developed should also consider signing Memorandum of Understanding (MoU) with all the hospitals, industries or medical centers from where the waste will be collected;
- These MOUs should clearly mention every aspect of waste collection and disposal mechanism including transportation of the waste should be given due consideration;
- The transparency and audit of waste material during all the phases must be ensured by the proponent. Especially, between the collection point and the incinerator plant;

5.2.5 Sindh Solid Waste Management Board (Executive Director Karachi)

- The disposal of ash from the proposed incineration units is the only area of concern, the amount quantity and type of ash should be assessed by the developer before its disposal to the landfill sites under the jurisdiction of Sindh Solid Waste Management Board (SSWMB);
- The project developer must visit SSWMB office and submit an application mentioning the aforesaid information to seek approval before disposing of the ash which will be produced as a result of incineration process;

5.2.6 Karachi Municipal Corporation (Deputy Director Incineration Plant)

- Overall the incinerator plants are very useful and rather indispensable for the city of Karachi because of the overgrowing generation of waste from hospitals, clinics, and industries;
- KMC has very limited incineration facility which is already running under load. Therefore, new incinerator plants must be encouraged and supported by all the relevant departments to share the load of KMC and hence may benefit the city;
- Currently KMC dispose of the incineration ash at the available landfill sites which are under the jurisdiction of Sindh Solid Waste and this is the only available option for ash disposal within the city;

5.2.7 Engineering Expert (Former Vice President IEP, Karachi)

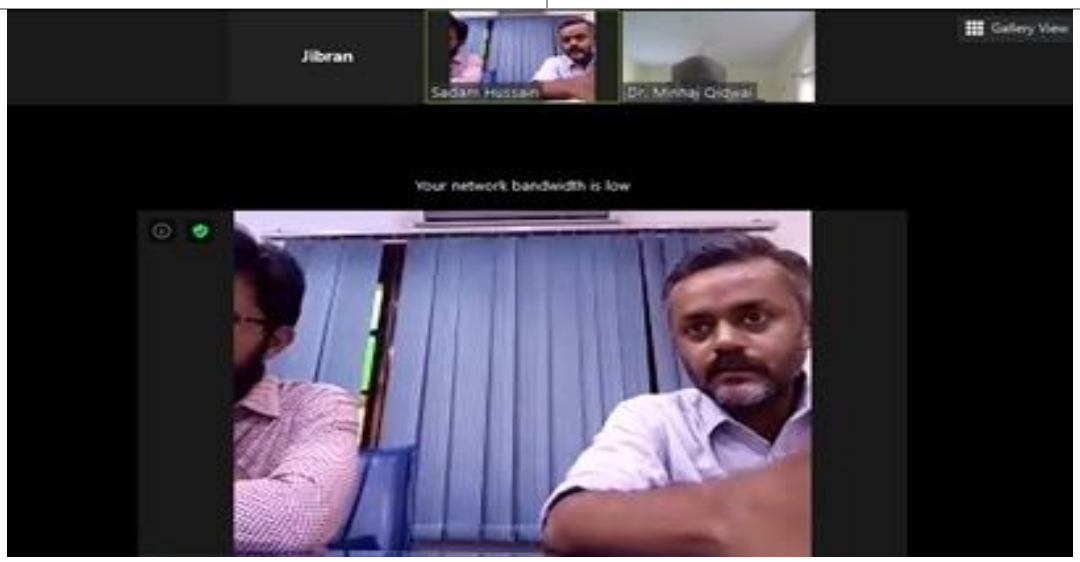
- Medical waste and hazardous industrial waste are very serious and sensitive matter and needs proper attention therefore the proposed facility is highly encouraged;
- The project developer should estimate the ratio of ash to waste and take proper mitigation measures for ash disposal;
- Air quality management and monitoring system (EMS) must be installed and exercised continuously;
- Temperate of each chamber of the incinerator along with the overall temperature must be maintained properly;

5.2.8 Healthcare Professional (Former CEO, Sindh Healthcare Commission)

- Identification and consultation with some private hospitals or clinical as central points for waste collection before finally being dispatched to the incineration plant must be done;
- Project developer should consider a collaborative strategy for establishing a unique model for waste collection, transportation and disposal for incineration;
- Project developer should ensure that there is no leakage in the system while ensuring that all the waste is incinerated and not recycled or reused;

Note* Due to global pandemic situation of COVID-19 a number of departments discouraged physical meeting for consultations, letters were dispatched to all the relevant departments for consultations which were also followed by frequent follow up calls. Further the Government of Sindh (GoS) imposed a lock down to prevent the spread of virus, majority of consultation meetings were undertaken before the prevailing conditions. However few consultation meetings were under taken recently during which proper SOPs were followed by EIA team.

Pictorial presentation of consultation meetings is given on the next page.

Focused Group Discussion with Community	Consultation with Religious Associate (Madrassa)
	
Consultation with Deputy Director Incineration KMC	Consultation with Engineering Expert (Former VP, IEP)
	
Consultation Meeting with Healthcare Professional (Former CEO, SHCC)	

Chapter 6: Project Alternatives

6.1 Background Information

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; site, technology and design. After careful examination and expert's judgment rationale for project site and technology selection was developed and discussed in the below section.

6.1.1 Rationale for Site Selection

The basic purpose of the proposed project is to provide waste management and treatment solutions for Karachi. As discussed previously the proposed project will be located near Northern Bypass which is not so thickly populated area as compared to other parts of the Karachi city. Other areas of the city are heavily swelled by traffic congestion which usually results in air pollution adding more pressure onto the existing air shed of thickly populated areas of the city by installation of 03 incineration plants community health may be affected. The proposed project site also provides access to the two waste disposal sites i.e. Gondpas and Jam Chakro, where incineration ash may be disposed off, thereby having very limited chances of community exposure to incineration ash. The modeling study of emission dispersion also predicted that ambient air levels of the selected criteria pollutants (CO, SO_2, NOx and TSP) would be in compliance with the SEQS limits during the operational phase of the project.

On the basis of aforesaid facts, it is easy to understand that the proposed project site is not much populated hence reducing the chances of community exposure to the emissions. Plus the air shed of the project area is relatively clean and may easily retain the pollution load, however the emissions expected from incinerations will be within the SEQS limits.

6.1.2 Rationale for technology selection

Due to strict environmental regulation for bio medical and industrial waste a number of technologies are adopted globally to treat medical and hazardous industrial waste prior to its final disposal with minimum effects on public health and environment. In this case among all possible options incineration is the best possible option for treatment of industrial and bio medical waste. **Table-10** to observe advantages versus

disadvantages of available hospital and industrial (hazardous & nonhazardous) waste treatment options.

Table 10: Advantages versus Disadvantages of Available Hospital/Hazardous Waste Treatment Options

S No.	Treatment Option	Advantages	Disadvantages
1.	Pyro lytic incineration /three-stage incineration with efficient gas cleaning	Very high disinfection efficiency; Adequate for all infectious waste and most pharmaceutical and chemical waste.	Incineration temperature above 800°C, expected outcomes after and during incineration process; - Air emissions. - Fly ashes. - Bottom ashes.
2.	Single chamber incineration with dust reduction	- Good disinfection efficiency and waste volume reduction - Residues may be disposed of 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 of 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.
7.	Shredding and Disinfect/ Autoclave wet-thermal treatment,	- Environmentally sound; relatively low investment and operation costs. - Good for infectious and microbiological wastes.	- Shredders may be subjected to break-downs and may require qualified technicians; - Inadequate for chemical waste or

		- Immediate treating of hospital waste without any transportation to faraway of hospital site for treating. - Low volume of residues up to 80%	waste which is not easily penetrable by steam (post shredding type)

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

- Volume and mass reduction of industrial and bio medical waste.
- Proper disposal of waste with reduced environmental impacts.
- Reduction in air pollution currently caused due to uncontrolled burning of waste
- Capacity development of hospitals and industries for proper handling of waste
- Adequate for all infectious as well as hazardous waste;
- Conversion of hazardous waste into inert and non-pathogenic waste.

Chapter 7: Potential Environmental Impacts and Mitigation Measures

7.1 Background Information

This section discusses the potential environmental and social impacts of the proposed activities associated with construction and operational phase of the project. Additionally this section of the report predicts the magnitude of the impact, assess its significance, recommends mitigation measures to minimize adverse impacts, and identifies the residual impacts of the proposed project.

The discussion starts with a description of the methodology used for the impact assessment. The impacts on the environment from various activities of the proposed project can be categorized as follows:

Impact on Physical Resources

- Topography and Land use pattern
- Site Aesthetics

Impact on Environmental Resources

- Air Quality
- Noise Levels
- Water Quality
- Soil Quality

Impact on Ecological Resources

- Terrestrial Ecology

Impact on Human Environment

- Health and Safety

Socio-economics

- Road Safety & Traffic
- Livelihood & Economy

Waste Disposal

- Solid waste disposal

Potential impacts from the proposed project activities were identified by thorough review of the project activities, study of surrounding environment, review of literature, review of previous similar studies and expert's judgment.

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, expert's judgment study of surrounding environment, review of literature and review of previous similar studies. The assessment procedure includes following steps:

A. Prediction of the potential environmental and social impacts

This step refers to the description of quantitative and qualitative impacts of the proposed project. This may be achieved through comparison with other similar activities.

a) Definition of the Criteria for Determining Significance

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

b) Identification of the mitigation measures

If it is determined that the predicted impact is 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 impact altogether by not taking certain proposed activity or parts of an activity, for example, using CFC-free equipment to avoid impact on ozone layer
- Minimizing impacts by limiting the degree or magnitude of the activity, for example, minimizing dust emission by reducing vehicle speed

- Compensating for the impact by replacing or providing substitute resources or environments

c) Evaluation of the residual impacts

Incorporation of the suggested mitigation measures reduces the adverse impact of the proposed project and brings it within the acceptable limit. This step refers to the identification of the anticipated remaining impacts after mitigation measures have been applied.

B. Identification of the monitoring requirements

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 impact is within the predicted limits and to provide timely information if unacceptable impact is taking place.

7.2 Impact Assessment (Construction Phase)

7.2.1 Physical Resources

7.2.1.1 Topography and Land use

Potential Impact

The activities associated with construction phase, may result in changes in topography no major impacts onto the existing land use pattern is envisaged at proposed project location. However small scale excavations, leveling and grading may result in micro topographical changes at project site. Further, in case of residual construction material such as cement and or ready mix if not handled properly and left unattended it may result in formation of uneven structures. The impact on the topography is expected to be insignificant.

Criteria for Determining the Significance

An adverse impact will be interpreted if surface topography is modified and an adverse impact onto the surface topography of project site will be interpreted if the fact is

established that the topographic elevation of project site is modified and prominent heaps are observed.

Mitigations

- 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 so as to avoid the probability of formation of heaps

Residual Impacts

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

Monitoring Requirements

Surface topography, to be monitored during construction by an Independent Environmental Monitoring Consultant (IEMC).

7.2.1.2 Site Aesthetics

Potential Impact

If construction residues are not well managed 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.

Criteria for Determining the Significance

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

Mitigations

- A designated area will be allocated for storage of the construction residue 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

Residual Impacts

Implementation of the proposed mitigation measures is not likely to leave any long-term residual impact.

Monitoring Requirements

Periodic visual inspections will be carried out as part of the Environmental Management Plan (EMMP) to ensure good site aesthetics by an Independent Environmental Monitoring Consultants:

- Proper housekeeping
- Visual Assessment
- Waste Storage Practices

7.2.2 Impact on Environmental Resources

7.2.2.1 Ambient Air Quality

Potential Impact

The proposed project will include small scale construction activities which may affect the ambient air quality on temporary basis. Ambient air quality may be altered typically by use of construction machinery, equipment and vehicles if the items discussed are not tuned properly. Also untrained drivers by over speeding of heavy vehicles may contribute in dust dispersion within the project vicinity which may cause impairment of human health which includes chronic respiratory diseases.

Criteria for Determining the Significance

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

Mitigations

- Use of standard construction equipment and vehicles
- Scheduled maintenance of equipment and vehicles including engine tuning, filter cleaning, etc.
- Water spraying will be done to reduce dust emissions
- The vehicle speeds on graded roads will be limited in order to minimize dust emissions

Residual Impacts

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

Monitoring Requirements

Ambient air quality monitoring including critical pollutants such as; SOx, NOx, PM_{10} and CO 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.

7.2.2.2 Noise

Potential Impact

Noise related nuisance is a characteristic feature of construction stage. Heavy vehicles and construction machinery during the construction is likely to generate elevated levels of noise. This may cause negative health effects on the workers and to those who are exposed to it such as stress, hypertension, headaches and even hearing loss. However, it is important to note that the major construction activity is expected to be carried out during the daytime

Criteria for Determining the Significance

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

Mitigation Measures

- All construction vehicles, machineries and equipment to be installed with suitable silencers

- Project construction zone to be barricaded and proper signs boards to 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' (PPE) to reduce their probability of high noise exposure
- Also, 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

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

Monitoring Requirements

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

7.2.2.3 Water and Wastewater Quality

Potential Impact

Use of water during construction phase will be minimal. Wastewater will be generated from domestic usage during the construction activities. This water will be in limited amounts and will be routed into the soakage pit. Supervision of construction site will be done in a way that no stagnant water pools or puddles remain for longer period as they will serve as breeding grounds for mosquitoes.

Criteria for Determining the Significance

A significant impact on the water quality will be interpreted if improper discharge of construction material onsite causes nuisance and may result in stagnant water and ground water quality degrades and deviates from the current condition.

Mitigation measures

- Avoid excessive use of water to ensure conservation of available water resources for the community
- Avoid mixing of water with waste generated during construction
- Avoid dumping of construction waste in any water channel or nallah around proposed facility
- Regular check and maintenance of vehicles and machineries to avoid spills

Residual Impacts

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

Monitoring Requirements

Visual inspection and proper implementation of proposed mitigation measures to be ensured

7.2.2.4 Soil Quality

Potential Impact

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

Criteria for Determining the Significance

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

Mitigation Measures

- 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 response team will be available throughout the construction phase.

Residual Impacts

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

Monitoring Requirement

Visual inspections will be carried out by an Independent Environmental Monitoring Consultant to ensure that the soil within the project surrounding is not being contaminated during the project activities.

7.2.3 Impact on Ecological Resources

7.2.3.1 Terrestrial Ecology

Potential Impact

Since most terrestrial flora and fauna recorded or reported within study area are disturbance tolerant and are dwellers of typical urban setting, hence no significant impact is envisaged.

7.2.4 Impact on Human Environment

7.2.4.1 Health and Safety

Potential Impact

Construction phase activities may result in severe health and safety hazards. It is important to note that the untrained workers may cause harm to themselves as well as others due to lack of awareness and skills.

Criteria for Determining the Significance

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

Mitigation Measures

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 skilled workers will be allowed to work at the construction sites
- Provision of first aid facilities for workers at site for meeting 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 by 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
- Arrangement of proper first aid unit and emergency vehicle 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 drained to avoid stagnant water that could harbor mosquitoes and other disease vectors
- Accidents records will be maintained
- Use of signage must be implemented
- The Management of facility must ensure that the safety policy is implemented at all project stages to reduce the chance of occurrence of frequent hazards

Residual Impacts

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

Monitoring Requirements

Risk assessment to be carried out on weekly basis by engaging Independent Environmental Monitoring Consultants.

7.2.5 Waste Disposal

7.2.5.1 Solid waste

Potential Impact

Main solid waste generation during construction phase is expected to be construction debris like rubble, excess construction materials, steel scrap, wooden scrap, sand, gravel, lubricating oils and chemicals etc. Besides being an eyesore, the waste can also pose a health hazard; pollute soil, surface and ground water if disposed of improperly. Majority of the construction material to be used and waste generated as a result of construction activity will be inherently less reactive and chemically inert under normal conditions however, its handling and storage may pose adverse impacts of minor nature which could easily be controlled by implementing the recommended mitigation measures in this report.

Criteria for Determining the Significance

A significant impact will be interpreted if the construction waste is scattered and dispersed at project sites and its surroundings.

Mitigations Measures

A waste management plan will be developed by the contractor after approval of the management of the proposed facility before the start of the construction activities. Key elements of the waste management system will be the following:

- Separate bins will be placed for different type of wastes - plastic, paper, metal, glass, wood, and cotton
- Recyclable material will be separated at source. The recyclable waste will be sold to waste contractors for recycling
- No waste will be dumped at any location outside the proposed site boundary
- All hazardous waste will be separated from other wastes. Hazardous wastes will be stored in designated areas with restricted access and proper marking. Hazardous wastes will be disposed of through approved waste contractors
- Surplus construction materials including partially filled chemical and paint containers will be returned to suppliers. Inert construction wastes will be sold as scrap to contractors

- Record all waste generated during the construction period will be maintained. Quantities of waste disposed, recycled, or reused will be logged on a Waste Tracking Register
- Training will be provided to personnel for identification, segregation, and management of waste

Residual Impacts

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

Monitoring Requirements

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

7.3 Impact Assessment (Operational Phase)

7.3.1 Impact on Physical Resources

7.3.1.1 Topography and Land use

Potential impact

Since all the activities for development of proposed UWM incineration plant 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.

7.3.1.2 Site Aesthetics

Potential Impact

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 warehouse and the incineration plant, it may create adverse effect onto the existing (internal) site aesthetics.

Criteria for Determining the Impact

Incase if the items to be utilized during operational phase are scattered within and around the proposed UWM incineration facility during the operational phase of the proposed project an adverse impact will be interpreted.

Mitigation Measures

- 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 cold storage area, chemical drums and maintenance material etc shall only be placed in warehouse and so on
- Strong administrative controls and 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 project site

Residual Impact

Strict implementation of the suggested mitigation 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

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

7.3.2 Impact on Environmental Resources

7.3.2.1 Air Quality

Potential impact

During operational phase, following would be the potential ambient air pollution sources; incineration units, backup generators (if used) and waste transportation vehicles, fugitive emissions from diesel storage area and incineration ash if left unattended. Following ambient air pollutant are likely to disperse in ambient environment Oxides of Sulphur (SOx), Nitrogen Oxide (NO), Nitrogen Dioxide (NO_2), Carbon Monoxide (CO), Particulate Matter (PM_{10} and $_{2.5}$) VOCs, Dioxins, Furans, and incineration ashes (if stored at site before final disposal). The aforesaid pollutants may only disperse incase if proper pollution abatement technologies and methods are not adopted. Furthermore, it is important to note the incineration units are installed with air pollution control system which will significantly reduce air emissions levels in the project area. Additionally, the detailed Air Dispersion Modeling was conducted to

identify and predict stack emissions concentration. The model revealed that the 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

An adverse impact will be interpreted if the proposed facility exceeds the maximum permissible SEQS limits for gaseous emissions and ambient air quality. 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

- All the possible ambient air pollution sources shall be installed with appropriate air pollution abatement technologies
- A specially designed wet scrubbing system with fitted in incineration units should be frequently checked to avoid chances of ambient air pollution in the project surrounding
- Air to fuel ratio of generators should be maintained at all times
- Diesel storage facility should be inspected for any leakages and incase if a leakage is identified it should be immediately being repaired to avoid fugitive emissions from the source
- Discourage idling of vehicles i.e. vehicle 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
- Height of stacks will be as per statutory requirement. Stack will have sampling points consisting of sampling port-hole, platform and access ladder, to monitor the emission levels

Residual Impacts

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

Monitoring Requirements

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).

7.3.2.2 Noise

Potential Impact

The proposed project will include a number of noise sources, which will have potential adverse impacts on the workplace and ambient noise levels. The noise normally occurring inside rooms is often referred to as "background noise." The continuous exposure to the elevated levels of noise may result in; headaches, hearing problems and even loss in severe conditions, anxiety, and accumulation of stress hormones and hypertension. All these health conditions may affect the overall health of the exposed workers and laborers associated with the proposed project.

Criteria for Determining the Significance

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

Mitigations Measures

- Proper maintenance of all the equipment to be utilized during operational phase will be maintained 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 sign board indicating noise area shall be installed at all areas within the proposed WMF
- Workers to be provided with ear plugs and ear muffs at high noise area and unauthorized personnel shall not be allowed to enter high noise area at all time
- Authorized personnel should seek and obtain work permit before entering the noisy area

Residual Impacts

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

Monitoring Requirements

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

7.3.2.3 Water and Wastewater Quality

Potential Impact

As discussed earlier in environmental baseline section there are no prominent surface water resources at project site, however the main sources of water supply to the project area includes water tanker. Primarily Domestic wastewater will be generated during operational phase. The wastewater may be a potential source of pollution to groundwater.

Criteria for Determining the Significance

A significant impact will be interpreted if the discharge effluent water does not meet the prescribed SEQS limits or exceeds the limits.

Mitigations Measures

- Ensure that sewage water is properly treated at the site by wastewater treatment system and ensure that there are proper soakage pits with porous walled chamber that allows water to slowly soak after the effluent is pre-settled in septic tanks.
- Effluent sewers to be periodically cleaned and inspected for integrity in order to ensure effective transport of effluents and prevent overflows and leakages and infiltration;
- Utilization of sand and fine gravels to 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 are filtered out by soil matrix allowing organic material to be digested/degraded by microorganisms.

Residual Impacts

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

Monitoring Requirements

- Periodic audits to be conducted by Independent Environmental Monitoring Consultant (IEMC) to assess implementation of the control measures and results of audits to be reviewed and corrective actions to be taken for any deviations.

7.3.3 Impact on Ecological Resources

7.3.3.1 Terrestrial Ecology

Potential Impact

As described in ecological baseline the proposed UWM incineration plant will be located in an area in close proximity of manghopir hence; the concentration of human settlement is quite low within the specific area in comparison with other parts of the city. This factor may reduce anthropogenic environmental stressors therefore floral and faunal species may flourish. However, the fact is contradicting and during surveys and assessments it was observed that biodiversity of the project area was insignificant due to unavailability of fresh water resources. The area does not fall in any of the protected category (National Park, Game reserve or Wildlife sanctuary etc.), Neither listed species of flora and fauna were reported threatened, vulnerable, critically endangered or near to extinction according to IUCN red list or protected under CITES and or SIND WILDLIFE ORDINANCE etc.

Additionally, it is important to note that once the medical and industrial waste is incinerated the process will produce ash as a final product which if stored improperly before disposal in an open environment may disperse in the ambient environment and ultimately ash particles may settle onto the plant's leaf which may affect the process of transpiration ultimately affecting plant life. During the process of ash transportation if the ash is transported in an uncovered vehicle there are significant chances of its dispersion. Accidental spills may also affect this existing plant species in project area.

Criteria for Determining the Significance

An adverse impact will be interpreted if any physical damage is observed to the existing species in 05 km radius of the project area and if the fact is established on scientific ground that the damage has been caused by project operations.

Mitigations Measures

- Incineration ash should be controlled at source and shall be stored till such time its final fate is decided after its composition testing in a designated area provided with impermeable roof, floor and boundaries to avoid its dispersion in ambient environment
- The anticipated impacts on to the existing species nearby the project area are invisible in the short run, while the accumulation of incineration ash particles onto the existing species may exhibit the devastating impacts onto the survival rate in the long run, therefore 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 Impacts

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

Monitoring Requirements

During operational phase periodic ecological monitoring will be carried out as, by an Independent Environmental Monitoring Consultant (IEMC).

7.3.4 Impact on Human Environment

7.3.4.1 Health and safety

Potential Impact

During the operational phase a number of equipment's and systems will be working in parallel to that a number of technical and non-technical personnel will also work at the proposed project site. The working activities 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.

Incase 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

A significant impact 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

- It is strongly recommended that a proper HSE management system and team is available at project site at all times on rotational basis during the entire life cycle of the proposed project
- Ensure that all areas of the proposed WMF are 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 are clearly identified and a proper risk assessment matrix along with its mitigation and controls are in place and communicated to all the workers via tool box talk
- Tool box talk shall be made mandatory on regular basis and all the workers shall be trained for all the possible hazards at project site
- Ensure that adequate firefighting systems are in place and frequent mock drills are carried out to enhance the emergency preparedness and response skill of the workers
- Ensure proper maintenance of firefighting systems during the entire life cycle of the proposed project
- Implement Log out Tag Out (LOTO) while working on live electrical panels during operational phase
- 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
- All compressed gas containers and cylinders stored outdoor 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 project site for any of the activity associated with operational phase. The contractors shall only be allowed to access 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 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

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

Monitoring Requirements;

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

7.3.5 Socio-Economics

7.3.5.1 Road Safety & Traffic

Potential Impact

During the operational phase it is envisaged that a number of administration officials will travel from city to the project site. However, at this stage movement from the city to project site may not be much frequent but in future once the area is fully developed severe traffic issues may develop with the passage of time and increase in population concentration in project area.

At this stage particularly waste carrier (specialized vehicles) may move from different parts of the city to the project site and from project site to the waste dumping/disposal site for disposal of incineration ash. During this routine waste transportation via specialized vehicles in case if the drivers does not obey traffic rules and speed limits 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 project area, the nearest stakeholders may experience nuisances and their daily operations may be delayed due to traffic congestion.

Criteria for determining the significance

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

Mitigation Measures

- Project proponent to develop comprehensive traffic management plan in consultation with local Traffic Police of the project area, and this plane shall be implemented during the entire life cycle of the proposed project.

- Proponent should ensure that the transportation of the waste is done in off peak hours when there is less chance of traffic congestion.

- 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 site via project vehicles should have valid licenses and HSE staff must impart proper training to the drivers and workers regarding road accidents and mitigations.

7.3.5.2 Livelihood and Economy

Potential Impacts

Project operations will require significant number of unskilled and skilled professionals. Therefore a positive impact on the local livelihood during the project operations is expected by creating new job opportunity. In addition, local hotels (Dhabas) in project vicinity will also be benefited in terms of increased routine sales, therefore a positive impact is expected by project operations.

7.3.5.3 Waste Disposal

Potential Impacts

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

Since the proposed facility of UWM will treat both bio medical waste generated from clinics or hospitals and hazardous waste generated from industrial units the principle waste expected during project operations may include; incineration ash, 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 onto human health of the workers and local communities as well as other environmental receptors.

Criteria for Determining the Significance;

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

Mitigation Measures

- Proper inventories of all the waste to be generated at project site during operations shall be maintained and recorded on daily basis.

- Additionally it is important to note that a number of research work is available which shows that hospital as well as industrial waste incineration ash may be stabilized and solidified and the main objective of this treatment is to reduce the leach ability of the heavy metals present in these materials so as to permit their disposal in a sanitary landfill requiring only a lower degree of environmental

protection or to increase the mechanical characteristics of the bottom ash using different amounts of Ordinary Portland Cement (OPC) as a binder. Therefore the solidified matrix is able to immobilize the heavy metals found in fly and bottom ash[23].

- Based on the research discussed in the mitigation above 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.

Residual Impacts

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

Monitoring Requirements

Detailed inspection regarding waste management practices shall be carried out by third party consultant.

[23] *https://www.sciencedirect.com/science/article/pii/S0304389411006650*

Chapter 8: Environmental Management Plan

8.1 Background Information

The potential environmental impacts during the construction and operation phase of the proposed project on various environmental components such as social, biological and physical environment were predicted in the course of the EIA study. This EIA document has also identified mitigation measures to minimize the environmental impacts of the proposed project, keeping these effects within acceptable limits.

The EMMP (Environmental Management and Monitoring Plan) has been designed to address how the proposed measures will be implemented. It defines the responsibilities of the UWM Management and contractor; develops a system of checks and balances; proposes actions that are to be taken by each role player; and lays down the required documentation, communication, and monitoring procedures.

8.1.1 Objectives and Purpose of EMMP

The purpose of this EMMP is not only to address the expected environmental impacts of the proposed project, but also to enhance project benefits and to introduce standards of good practice to be adopted for the proposed project.

The primary objectives of the EMMP are to:

- Facilitate the implementation of the mitigation measures that are identified in the EIA;
- Define the responsibilities of the project proponent and contractor and to provide a means for effective communication of environmental issues between them;
- Identify monitoring parameters in order to ensure the effectiveness of the mitigation measures guidelines

Detailed Environmental Management Plan for construction phase is given in **Table 11** and monitoring plan is given in **Table 12**. Meanwhile on the other hand detailed Environmental Management Plan for operational phase is given in **Table 13** and its monitoring plan is given in **Table 14** accordingly.

The summarized environmental monitoring and sampling plan for construction and operation phase is given in **Table-15.**

Table 11: Environmental Management Plan (EMP) Construction Phase

S.No.	Aspect	Probable Impact	Impact Receptor	Safeguards and Mitigations	Implementation Responsibility
1.	**Physical Resources**				
1.1.	Land Use and Topography;	Since the proposed WMF will be developed within land been allotted to UWM therefore no impact on land use is expected. However Minor topographical changes in case of improper site leveling.	Project site	All construction activities to be properly planned by qualified engineers.	UWM's and Contractor's Administration
1.2.	Site Aesthetics and Solid Waste Management;	Construction material and residue if left unattended may result in unaesthetic visual impact.	Project site	All construction material and debris to place at a designated area, which shall be properly marked and labeled with impermeable flooring.	UWM's and Contractor's Administration
		Construction waste such as; waste oil, drums, chemicals etc. if left unattended may result in adverse environmental health and safety impact.	Project site, project staff and nearby communities.	All construction waste shall be properly segregated and stored at a designated area which should clearly differentiate storage of hazardous and nonhazardous waste material.	UWM's and Contractor's Administration

				All hazardous waste shall be disposed via EPA, Sindh's Certified Contractor.	UWM's and Contractor's Administration
2.	**Environmental Resources**				
2.1.	Ambient and Noise Air	Temporary raise in ambient and noise pollution by un tuned construction machinery, equipment and vehicle.	Project staff, and nearby settlements.	Only certified and inspected construction machineries equipment and vehicles shall be allowed at project to minimize chances of ambient air pollution.	UWM's and Contractor's Administration
				Water sprinkling to reduce chances of dust dispersion.	Contractor's HSE Staff
2.2.	Groundwater	Groundwater contamination in case of chemical, oil and or lubricant spillage and seepage through soil.	Groundwater aquifers and by contaminated groundwater utilization project staff and nearby communities.	Develop a detailed construction specific spillage control plan which shall be implemented during the construction phase.	Contractor's Administration

		Excessive extraction of ground water for construction activities may result in groundwater depletion.	Project staff and local communities.	Utilization of water supplied through KWSB for construction activities.	UWM's and Contractor's Administration
				Grey water generation during construction should be reused.	UWM's and Contractor's Administration
2.3.	Native Soil	Small scale excavation if required may result in soil erosion, additionally chemical, oil or lubricant spillage may contaminate native soil.	Project site, ground water aquifers and through contaminated groundwater project staff and local communities.	Native soil preservation and backfilling in case of excavation.	UWM's and Contractor's Administration
				Malfunctioning or damaged construction equipment, machinery, containers and vehicles should be sent immediately repaired at a designated	UWM's and Contractor's Administration

				area/workshop with impermeable floor to prevent soil contamination.	
2.4.	Human Health and Safety	Un organized construction works in haphazard manner may increase risks and hazards that may lead to severe injuries.	Project staff and contractors.	Implementation of all the relevant health and safety guidelines such as, OSHA and other health and safety standards to be implemented.	UWM's and Contractor's Administration
		Untrained workers and contractors with limited capacity to understand HSE dynamics may result in serious accidents.	Project staff and contractors.	Trained personnel will be appointed for the specific work with proper understanding of HSE dynamics.	UWM's and Contractor's Administration
				Regular tool box talks will be carried out for safety induction of new workers and strengthening HSE culture at site.	UWM's and Contractor's Administration
		Fast moving vehicles within the project site may result in serious accidents as well as dust dispersion.	Project staff and contractors.	All construction vehicles shall not be allowed to operate more than 20 km/hr speed within project site.	UWM's and Contractor's Administration
3.	**Ecological Resources**				

3.	**Social Resources and Interaction**				
4.1	Stakeholder's and Community Interaction	Conflicts between laborers/UWM and nearby stakeholders in case of miscommunication or any asset damage during construction.	Nearby communities, project staff and core stakeholders.	All construction activities shall be planned and a detailed construction activities plan shall be communicated to the core stakeholders to avoid conflicts.	UWM's and Contractor's Administration

Table 12: Environmental Monitoring Plan (Construction Phase)

Aspect	Monitoring Parameters	Monitoring Frequency	Monitoring Responsibility
Land Use and Topography	Visual inspection for site leveling and surface topography	Weekly	UWM's HSE Staff through IEMC
Site Aesthetics and Solid Waste Management	Housekeeping and construction debris management	Weekly	UWM's HSE Staff through IEMC
	Waste Storage Practices.	Weekly	UWM's HSE Staff through IEMC
	Waste Disposal Mechanism	Quarterly basis	UWM's HSE Staff through IEMC
Ambient Air and Noise	Vehicle, equipment and machinery fitness, emissions and noise.	Before and mobilization at site and on monthly basis.	UWM's HSE Staff through IEMC
	Water sprinkling	Daily	UWM's HSE Staff through IEMC
Groundwater	Spillage control and prevention plan.	Weekly basis during construction phase.	UWM's HSE Staff through IEMC

	Water utilization inventories.	Weekly basis during construction phase,	UWM's HSE Staff through IEMC
	Water recycling inventories.	Weekly basis during construction phase,	UWM's HSE Staff through IEMC
Native Soil	Native soil conservation.	Weekly basis during construction phase.	UWM's HSE Staff through IEMC
	Chemicals, lubricants, oil leakages from construction equipment, machinery and vehicles.	Weekly basis during construction phase.	UWM's HSE Staff through IEMC
Human Health and Safety	HSE inspection.	Weekly basis during construction.	UWM's HSE Staff through IEMC
	Staff and contractor' Qualification.	Before procurement.	UWM's HSE Staff through IEMC
	HSE toolbox talk and training records.	Monthly basis.	UWM's HSE Staff through IEMC
	Speed limit.	Daily basis during construction phase.	UWM's HSE Staff through IEMC

Stakeholder's and Community Interaction	Communication mechanism among UWM, core stakeholders local communities.	Before start of construction activities.	UWM's HSE Staff through IEMC

Table 13: Environmental Management Plan (EMP) Operational Phase

S.No.	Aspect	Probable Impact	Impact Receptor	Safeguards and Mitigations	Responsibility
1.	**Physical Resources**				
1.1.	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 project site it may create adverse effect onto the existing site aesthetics.	Project site	It is strongly recommended to keep all the items to be utilized during operational phase at a designated areas and storage rooms.	UWM's Administration and HSE Staff
				Administrative controls and 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 project site.	UWM's Administration and HSE Staff

2.	**Environmental Resources**				
2.1	Ambient Air and Noise	Ambient air and noise pollution is expected in case if appropriate pollution control systems are not in place from following sources; incineration units, backup generators and waste transportation vehicles.	Project staff and nearby settlements;	All the possible ambient air and noise pollution sources shall be having adequate air and noise pollution abatement systems in place; such as appropriate stack heights, and suitable silencers etc.	UWM's Administration and HSE Staff
				Pollution abatement equipment to be utilized for proposed incineration units. Wet scrubber to be used.	UWM's Administration and HSE Staff
				Air to fuel ratio of generators should be maintained at all times.	UWM's Administration and HSE Staff
				Diesel storage facility should be inspected for any leakages and incase if a leakage is identified it should be immediately be repaired to	UWM's Administration and HSE Staff

				avoid fugitive emissions from the source.	
2.2	Groundwater	Primarily domestic wastewater will be generated during operational phase which may be a potential source of pollution to groundwater.	Groundwater aquifers and by contaminated groundwater utilization project staff and nearby communities	Ensure that sewage water is properly treated at the site by sewerage treatment system and ensure that there are proper soakage pits with porous walled chamber that allows water to slowly soak after the effluent is pre-settled in septic tanks.	UWM's Administration and HSE Staff
				Effluent sewers to be periodically cleaned and inspected for integrity in order to ensure effective transport of effluents and prevent. overflows and leakages and infiltration;	UWM's Administration and HSE Staff
				Wastewater from all sections of the facility to be routed to wastewater treatment system also ensure that the project	UWM's Administration and HSE Staff

				site have provision of adequate soakage pits; those shall be designed and engineered properly;	
2.3	Native Soil	Small scale excavation for maintenance works during operational phase if required may result in soil erosion, additionally chemical, oil or lubricant spillage may contaminate native soil.	Project site, ground water aquifers and through contaminated groundwater project staff and local communities.	Native soil preservation and backfilling in case of excavation.	UWM's Administration and HSE Staff
				Malfunctioning or damaged construction equipment, machinery, containers and vehicles should be sent immediately repaired at a designated area/workshop with impermeable floor to prevent soil contamination.	UWM's Administration and HSE Staff
2.4	Human Health and Safety	A number 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	Project staff and nearby settlements.	HSE management system and team should be available at project site at all times on rotational basis during the entire life cycle of the proposed project.	UWM's Administration and HSE Staff

		and storage, protocols for operations monitoring and inspections and adequate health, safety and environmental risk assessment systems, tools and personnel are not in place.		Industrial hazardous and bio medical waste transportation shall be done separately in specialized, covered vehicles to avoid spills in case of elongated transportation time due to heavy traffic or any other emergency situation. For transportation of bio medical waste temperature controlled vehicles are recommended.	UWM's Administration and HSE Staff
				Ensure that all areas of the proposed WMF are 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.	UWM's Administration and HSE Staff

				Tool box talk shall be made mandatory on regular basis and all the workers shall be trained for all the possible hazards at project site.	UWM's Administration and HSE Staff
				Ensure that adequate firefighting systems are in place and frequent mock drills are carried out to enhance the emergency preparedness and response skill of the workers.	UWM's Administration and HSE Staff
				All the workers involved in, operational activities will be provided with proper PPEs according to their job description	UWM's Administration and HSE Staff
2.5	Solid Waste Management	Proposed WMF itself is a mitigation for treatment of medical and industrial waste as the proposed project includes high tech incineration units with built in air pollution control system but the	Project staff and nearby settlements.	Incineration ash to be disposed of in an environmentally sound manner or reused after composition testing by adopting the concept of	UWM's Administration and HSE Staff

		principle waste expected during project operations may include; incineration ash, 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 onto human health of the workers and local communities as well as other environmental receptors.		industrial ecology i.e. waste of one industry becomes raw material of other.	
3.	**Ecological Resources**				
3.1.	Terrestrial ecology	Incineration ash if stored improperly before disposal in an open environment may disperse in the ambient environment and ultimately ash particles may settle onto the plant's leaves which may affect the process of transpiration and which ultimately may affect existing plant's	Floral species and vegetation.	Incineration ash should be controlled at source and shall be stored till such time its final fate is decided after its composition testing in a designated area provided with impermeable roof, floor and boundaries to avoid its	UWM's Administration and HSE Staff

		life. Also during the process of ash transportation if the is transported in an uncovered vehicle there are significant chances of its dispersion.		dispersion in ambient environment.	
				Ash transportation if required shall be done in specialized and covered vehicles to the disposal site.	UWM's Administration and HSE Staff
4.	**Social Resources and Interaction**				
4.1	Stakeholder's and Community Interaction;	Conflicts between laborers/UMW and nearby stakeholders in case of miscommunication or any asset damage during operational phase.	Nearby communities, project staff and core stakeholders.	A proper GRM system should be established by project proponent for conflict resolution.	UWM's Administration and HSE Staff
4.2	Traffic and Road Safety	At this stage particularly waste carrier (specialized vehicles) may move from different parts of the city to the project site and from project site to the waste dumping/disposal sites located within the city. During this routine waste transportation via specialized vehicles in case if the	Communities and nearby stakeholders.	Drivers and employees accessing project site via project vehicles should have valid licenses and HSE staff must impart proper training to the drivers and workers regarding road accidents and mitigations.	UWM's Administration and HSE Staff

		drivers does not obey traffic rules and speed limits 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 their daily operations may be delayed due to traffic congestion.			
				Transportation of the waste not to be done in peak traffic hours.	UWM's Administration and HSE Staff

Table 14: Environmental Monitoring Plan (Operational Phase)

Aspect	Monitoring Parameters	Monitoring Frequency	Responsibility
Site Aesthetics	Housekeeping practices and visual inspection;	Weekly basis	UWM's Administration and HSE Staff through IEMC
	Standard procedures and practices for effective housekeeping	Weekly basis	UWM's Administration and HSE Staff through IEMC
Ambient Air and Noise	Provision of ambient air and noise pollution systems in operational phase equipment, machineries and vehicles	On monthly basis.	UWM's Administration and HSE Staff through IEMC

	Provision of centrifugal ceramic filters in incineration units, ambient air and noise monitoring as prescribed in SEQS.	Before procurement and on monthly basis.	UWM's Administration and HSE Staff through IEMC
	Incinerator maintenance record and gaseous emissions monitoring as per SEQS, 2014.	Monthly basis	UWM's Administration and HSE Staff through IEMC
	Visual inspection for leakages and VOCs testing	Quarterly basis	UWM's Administration and HSE Staff through IEMC
Groundwater	Wastewater monitoring as per prescribed SEQS.	Quarterly basis	UWM's Administration and HSE Staff through IEMC
Native Soil	Native soil conservation.	Weekly basis during operational phase.	UWM's Administration and HSE Staff through IEMC
	Chemicals, lubricants, oil leakages from construction equipment, machinery and vehicles.	Weekly basis during operational phase.	UWM's Administration and HSE Staff through IEMC
Human Health and Safety	Availability of HSE team and systems	Daily basis during operational phase.	UWM's Administration and HSE Staff through IEMC
	Display of HSE signs and symbols	Daily basis during operational phase.	UWM's Administration and HSE Staff through IEMC

	Tool box talk and training records.	Monthly basis.	UWM's Administration and HSE Staff through IEMC
	Firefighting systems, and fire extinguisher maintenance records.	Monthly basis.	UWM's Administration and HSE Staff through IEMC
	Provision of PPEs.	Daily basis.	UWM's Administration and HSE Staff through IEMC
Solid Waste Management	Disposal of incineration Ash at designated disposal sites of SSWB.	Each incineration batch.	UWM's Administration and HSE Staff through IEMC
Terrestrial ecology;	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.	Quarterly basis	UWM's Administration and HSE Staff through IEMC
	Enclosed and specialized ash transportation vehicles.	Regularly during transportation	UWM's Administration and HSE Staff through IEMC

Traffic and Road Safety;	Driving license and road side accident prevention and mitigation training record.	Monthly basis.	UWM's Administration and HSE Staff through IEMC
	Waste transportation schedule and time.	Daily basis.	UWM's Administration and HSE Staff through IEMC

Table 15: Summarized Environmental Monitoring and Sampling Plan

CONSTRUCTION PHASE				
1. Gaseous Air Emission Plan				
Parameters	**Source**	**Frequency**	Standards	
CO, Smoke, Noise	Construction Machinery	Quarterly	SEQS	
CO, NOx, SOx and Particulates	Power Generator	Quarterly	SEQS	
2. Ambient Air Quality Plan				
Parameters	**Locations**	**Frequency**	Duration	
PM $_{2.5,}$ $PM_{10,}$ SPM, NO, NO_2, CO, SO_X,	Project location	Quarterly	8-hours	
3. Drinking Water Quality Sampling Plan				
Parameters	**Locations**	**Frequency**	**Duration**	Standards
E-Coli, fecal coliform, Total Coliform pH, TDS.	Drinking Water Source	Quarterly	-	SEQS/WHO
4. Noise Level Sampling Plan				
Parameters	**Locations**	**Frequency**	**Duration**	Standards
Decibels [dB(A)Scale]	At the interface of project Project location	Quarterly	Continuous for 8 hours in a full working day	SEQS Noise Guidelines
5. Solid Waste Sampling & Characterization Plan				
Parameters	**Locations**	**Frequency**	**Duration**	Standards

• Waste generation rate, • Waste composition; • Recyclables and non-recyclables, • hazardous waste	At main solid waste collection point from where the waste is transported from site	Quarterly	-	SEPA
OPERATION PHASE				
1. Gaseous Air Emission Plan				
Parameters	**Source**	**Frequency**	Standards	
CO, NOx, SOx, Pb, HCl, Cd, Hg, PM, Smoke, HF, Zn, Ar, H_2S	Incinerators	Monthly	SEQS	
CO, SOx, NOx and PM	Power Generator (Stand by)	Quarterly	SEQS	
2. Ambient Air Quality Plan				
Parameters	**Locations**	**Frequency**	Duration	
PM $_{2.5,}$ $PM_{10,}$ SPM, NO, NO_2, CO, SO_X	Project location	Quarterly	24-hours	
3. Wastewater Quality Sampling Plan				
Parameters	**Locations**	**Frequency**	**Duration**	**Standards**
pH, BOD_5, COD, TSS, O&G	Project location	Bi-annually	-	SEQS
4. Drinking Water Quality Sampling Plan				
Parameters	**Locations**	**Frequency**	**Duration**	Standards
E-Coli, fecal coliform, Total Coliform pH, TDS.	Drinking Water Source	Quarterly	-	SEQS/WHO
5. Noise Level Sampling Plan				

Parameters	Locations	Frequency	Duration	Standards
Decibels [dB(A)Scale]	Project location	Quarterly	8 hours	SEQS Noise Guidelines
6. Solid Waste Sampling & Characterization Plan				
Parameters	**Locations**	**Frequency**	**Duration**	Standards
• Waste generation rate, • Waste composition; • Recyclables and non-recyclables, • Hazardous waste	At main solid waste collection point from where the ash and waste (if any) is transported from site	Quarterly	-	SEPA

Conclusion

On the basis of this EIA study it is concluded that there is a dire need to establish more commercial incineration units in Karachi to effectively manage disposal and treatment of hazardous (industrial and bio medical waste). The leakages in waste management system of the city such as; burning, burial, selling, recycling, reusing and open dumping of hazardous industrial and bio medical waste will continue if such projects are not development to cater city's need of solid (hazardous and nonhazardous) waste management.

Additionally it is important to note that the proposed project is likely to enhance waste management and treatment capacity of the city by treatment of hazardous, industrial and bio medical waste in an environmentally sound manner. The incineration units proposed within WMF of UWM will not only provide a cost effective solution for waste management but will also generate employment opportunities. Proposed project operations may not result in elevated emission as predicted in ADM study, if the project owner maintains the air pollution control system throughout the lifecycle of the project. ADM also predicted that the stack emissions of the proposed incineration units will remain under (SEQS). A detailed project specific EMMP is part of this EIA report, to mitigate the possible construction and operational phase E&S impacts of the proposed project. Therefore it is concluded that the proposed project will not have any significant long term adverse impacts onto the existing environment, if the project proponent ensures strict implementation of the EMMP and comply legislative requirements of Sindh Environmental Protection Act, 2014 during the entire lifecycle of the project.

ANNEXURE

United Waste Management

EMERGENCY PREPAREDNESS & RESPONSE PLAN

Prepared by: _____

Reviewed by: _____

Approved by: _____

DOCUMENT CHANGE RECORD

Revision NO.	Date	Initiated By	Page No.	Section	Nature Of Amendment	Done By

1. PURPOSE:

The purpose of this procedure is to define mechanism and responsibilities for the availability of emergency detection and response equipment/ hardware which is appropriate to the potential emergency situations associated with the activities, processes and locations. The procedure also defines requirement for the maintenance of emergency response equipment.

2. SCOPE:

This procedure is applicable to United Waste Management Facility.

3. RESPONSIBILITIES:

3.1. Responsibility to prepare and get implemented this document/procedure through Top management lies with Head EHS.

3.2. Top Management is ultimately responsible and held accountable to comply all the Requirements of the standards.

4. PROCEDURE:

4.1 Emergencies are events, which can:

4.1.1 Lead to major loss in terms of human disabilities and/or fatalities.
4.1.2 Lead to extensive property, plant and material losses.
4.1.3 Extend to prolonged periods of production losses due to internal industrial relations situations or external political influences.
4.1.4 Cause adverse effects on environment as well as severe material losses and endanger human life and health due to major spillage of raw materials/chemicals or accidental emissions.
4.1.5 Lead to public inconvenience / damages and could bring bad name to the company due to offsite emergency situations like major spillage of dangerous materials from road tankers or containers.

4.2 In an emergency situation, the basic principles are to:

4.2.1 Protect People.
4.2.2 Protect the Environment.
4.2.3 Protect Company and Property.

4.2.4 Bring the incident under control.

4.3 Emergency / Crisis Management:

4.3.1 A team comprising of following personnel of the company was assigned the task of selecting possible emergencies, which could happen at the site.

- HEAD Process Operations
- HEAD Electrical
- HEAD Administration & Human Resources
- HEAD Environment, Health and Safety
- HEAD Quality Assurance (Management Representative)

4.3.2 Team went through a long list of possible emergencies, which emerged from:

- A brain storming session
- Off-site emergencies

4.3.3 During the study following types of emergencies were considered:

- Internal emergencies (Man led)
- External emergencies (Natural disasters)

4.3.4 On the basis of this systematic analysis, following possible emergencies have been identified for the site.

INTERNAL EMERGENCIES

1) Environmental Risks
2) Poor Health and Safety Practices
3) Work Related Misconduct
4) Gate Threat
5) Fatality in premises
6) Fire
7) Any other Injury

EXTERNAL EMERGENCIES / NATURAL DISASTERS

1) Earthquake
2) Heavy Rain Flood
3) Cyclone
4) Civil Unrest/ Terrorist act / General Strike

4.4 Procedure for Managing Internal Emergency Situations

4.4.1 Mentioned here in below are crisis situations, which may be develop within the factory due to any reason.

4.4.2 An internal Crisis / Emergency are defined as situations which disrupt the normal pace and flow of work within the premises. At times, it may have consequences even outside the premises.

4.4.3 The focus is on internal crisis situations arising out of concerted action on part of the employees. For each such concerted action which has been identified (the list being representative and not exhaustive), immediate management response has been listed, thereby enabling prompt action.

4.4.4 Injury / Medical Emergency:

4.4.4.1 In the event of an employee face medical emergency or injury, EHS department to be informed, we have first aid box in areas and if required through Ambulance or company car the person would rush to the nearest hospital for detail medical.

4.4.5 Fatality:

4.4.5.1 In the event of an employee dying whilst on duty or otherwise inside the Company premises, the doctor needs to examine to find out the cause of death. **Head EHS** should be informed immediately:

4.4.6 If the cause of death is due to natural reasons then:

4.4.6.1 Need to rush the body to the hospital.
4.4.6.2 File a FIR with local police station immediately.
4.4.6.3 Inform his next of kin / relatives.

4.4.7 If the death is due to accident, then

4.4.7.1 Telephonically and through Telegram / hand delivery of letter inform the government functionaries as required under the law.

4.4.7.2 File a FIR with local police station immediately (if deemed fit).

4.4.7.3 In the event of death due to electric shock, telephonically and through telegram / letter via hand delivery inform the concern government department. Also isolate the location of accident and switch off the supply of electricity to that location.

4.4.7.4 Precautions should be taken not to disturb the location of the accident and the said area should be cordoned off, until the completion of various formalities by the statutory authorities involved in the investigation of the accident.

4.4.7.5 Within twenty-four hours, a full investigation by site management should be carried out.

4.4.8 Procedure for Managing External Crisis/ Natural Disasters:

4.4.8.1 In general terms, the typical effects of a crisis to our site would be:

1) Disruption of operation
2) Loss of life
3) Injury
4) Damage or destruction of structures and property
5) Disruption of organizational infrastructure and systems
6) Economic loss
7) Social and psychological after effects.

4.4.8.2 Below are listed specific types of disasters:

a. Earthquake:

Type of disaster: Natural, External.

(a) Characteristics

1) Usually no prior warning
2) Speed of onset sudden
3) Zones/Areas of seismic activity are generally well known and well defined.
4) Causes damage to structures, system and inflict considerable casualties.

(b) General Counter Measures:

5) Development of possible warning indicators (e.g. Contact with relevant authorities)
6) Employee education and awareness programs (especially departments such as Process Operations and Security).

(c) Role & Responsibility:

1) Role of Administration & HR

To ensure that telephone exchange lines are kept free and inform all concerned, i.e. fire brigade, Deputy Commissioner, Police, etc. as required in liaison with Works Manager.

He will also:

- Arrange vehicles for evacuation of causalities.
- Ensure the security of Company property Goods and Material.
- See that nobody takes advantage of the situation, buildings, and offices and go down etc.
- Ensure security of vacated buildings, offices and mill.
- Control Main gate movements.

2) Telephone Operator

On receiving of a telephone call indicating of FIRE (or any other emergency); the telephone operator should immediately carry out following procedures:

- Inform C.E immediately.
- Inform the Heads of the Departments

- Keep the telephone lines free for any urgent and important telephone calls that you may be required to do on the advice of Emergency committee or senior management.

3) Gate Security In-charge

To hold the post in case of fire and direct the fire Brigade to the affected area. He will inform Fire Brigade about the hazards at site and locations of fire hydrants and other necessary firefighting equipment at site, using factory layout drawings and charts.

In case of major fire, the security staff should keep the factory main and side gates closed, and ensure that nobody should leave the factory or enter the factory, unless directed by Head EHS, Head Admin & H.R or his representatives.

4) EHS Head and Officers

In case of emergency, EHS Officers are responsible to gather employees at designated assembly point/shelter area and call for attendance to make sure that none of the employee is trapped in fire.

EHS Head shall make sure that no unnecessary actions are taken which could produce adverse effect on human health and/or result in casualties..

b. Emergency Procedure in Case of Fire

Emergency due to fire could be minor or major.

(a) Minor

These emergencies can be contained at source by the firefighting team of the organization, which includes the Security Personnel and personnel from operating departments, who are trained in firefighting. The Fire controller would coordinate their function.

(b) Major

A fire, which is likely to require the help of the Fire Brigade, would come under this category. However, in the case of a major fire in the warehouse area, the Fire Brigade should be contacted immediately,

(c) Emergency Plan

This would require help form the Fire Brigade, Police, Ambulance and may require evacuation of people from the neighborhood outside the plant.

- All people not involved in the shutdown procedure and fire-fighting operations should leave the affected building and go to designated assembly points.
- If fire is small use available fire extinguishers to extinguish the fire.

(d) Emergency Procedure during Air Raids

Head Admin & H.R shall have to play a key role for the safety of employees during air raids. It shall have the responsibility to develop and/ or construct designate areas, and also organize drills, where employees and others could take shelter during air raids.

During war times, the city administration blows intermittent siren, which lasts for about five minutes to alert the public of the air raid by the enemy, when the attack is over, continuous siren, is blown.

When the siren for air attack is blown, employees including contractor's employees and other visitors should follow the emergency procedures detailed below, and avoid getting panic.

- All employees and others should stop their work and take shelter at the nearby-designated ware shelter trenches (if constructed) or below the staircases.
- All employees shall stay at the designated shelter area(s) until a clear sign is confirmed by city administration by blowing continuous siren, when the employees shall return to their place of work in a disciplined and orderly manner.
- God forbid, if a bomb is dropped at the organization premises, all employees shall continue to remain at the designated shelter area unless and until that particular shelter area is directly involved and affected. Under such circumstances, everyone is advised to rush in disciplined manner to another nearby shelter area.
- After the air raid is cleared, the employees shall proceed to the Assembly point as given in the emergency procedure for fire. Even when the employees are at the assembly point, and if there is a siren for air raid, the employees shall immediately proceed to designated shelter area without creating any panic.

- After the air raid/war is over, the Head Admin & H.R alongwith Head EHS shall prepare a report of damages and necessary repairs and revamping including cost and time schedules where applicable, and submit it to top management.

c. Emergency Procedure during Heavy Rains / Floods:

It is recommended that before the monsoon season starts, following preventive measures shall be undertaken:

- Inspection and cleaning of storm drains.
- Inspection of solid waste storage area, solid waste disposal area with cradle-to-grave tool.
- Inspection and carrying out necessary repairs and adequate sealing of external electrical system including distribution boards, panels, manhole covers. The electrical system, including conduit system should be worthy enough for rains so that rainwater does not penetrate in the system.
- Inspection, testing and rectification of system and safety earthling
- Inspection of asbestos, tin sheet and RCC roof for leakage and carry out necessary repairs. Those areas, which have been leaking usually, shall be critically inspected.

(a) Departmental Heads shall ensure that the company's property such as company's supplies, equipment and other materials including stores etc. are stored under cover and above ground level on the pallets and are properly protected from damage with heavy rains.

(b) The electrician shall remain alert and keep a close watch on the outdoors-electrical system for any abnormalities. If there are sign for rainwater seeping in the system or electrical motor, immediate corrective measures as necessary shall be taken. If felt necessary, additional help shall be called by calling the additional electrician, seeking assistance from the shift instrument technician,

(c) If the rains continues to pour heavily, and there are indications that it might create havoc or lead to a flood within the organization, under such circumstances, the electrician in consultation with the HEAD Electrical shall disconnect electrical power supply.

(d) Departmental Heads shall ensure that all their employees, excluding Emergency Assistants, remain inside and no one shall be allowed to leave the premises without

the prior permission. In case of rising floods, they shall take shelter within the premises.

(e) The Emergency Assistants and those who volunteer shall, under the direction of the Head EHS shall assist in protecting company's assets and/or fight any emergency that may happen.

(f) The Head Admin & H.R shall ensure that their sensitive and important and sensitive documents and assets including computer systems under their custody are well protected. It shall be regular feature that all such documents and information systems are always kept at least 4 inches above floor level and well-protected in cabinets.

(g) After heavy rains, the Head Admin & H.R shall organize to pump out accumulated water/ flooded areas.

(h) After the floods are over, the Head Admin & H.R, and Head EHS along with Concerned Managers with the help of his team shall survey the organization and submit a detailed report of consequential damage to the plant equipment, and building together with the plan for repairs and replacement, if any including cost estimate and time schedule.

4.4.9 Emergency Drills:

Head EHS plan and conduct quarterly / bi-annually Emergency Drill for the possible scissions as identified and note the time elapsed for the fulfillment of the purpose. After conducting the emergency drill including headcount activity, Emergency Drill Report, Form: will prepared developed and forwarded to head of the departments, the report also includes equipment used, names of personnel who participated in the drill and overall deficiencies observed. Head EHS also prepares the Emergency drill Evaluation and submits to Departmental Heads for his evaluation. In light of the evaluation report Head EHS and Department Manager /In-charge of the area take subsequent action.

4.4.10 Updating and Review of Emergency Response Programs:

Emergency procedures are reviewed and revised as necessary after each occurrence of accident or emergency. Emergency response programs will be audited during Internal Audits and periodically reviewed in Management reviews.

5 RECORDS LIST:

a. List of EHS Team

b. List of Fire Fighting Team
c. List of First Aid Team
d. List of Evacuation Team
e. List of Emergency Equipment
f. List of Emergency Call Number
g. Contacts List of Key Personnel
h. Emergency Drill Report
i. Emergency drill Evaluation
j. Fire Extinguisher Record
k. Computer Workstation Ergonomics

ENVIRONMENT HEALTH AND SAFETY POLICY

- United Waste Management (UWM) recognizes that the environment Health and Safety is the integral part of its business performance, planning, decision making and in future projects.

- UWM is committed to achieving the highest level of Health Safety and Environmental performance with compliance to legal requirement as the minimum.

- Provide and maintain building, equipment, system and working conditions which are safe and without risk to employees, visitors and customers.

- Prevent pollution at workplace and educating, training and motivating employees to perform their activities in a safe and environment friendly manner.

- Setting clear targets for maintaining environment health and safety standards as minimum to be improved upon and ensure the compliance of requirements of Pakistan Environment Protection Act and National Environment Quality Standards (NEQS) as applicable.

- Continuing to identify the potential hazards present in workplace and make effective and sufficient risk assessment and to plan eliminate or control the risk and avoid adverse effect.

- Ensuring the development and implementation of HSE policies and procedures and trainings to staff accordingly.

- Involve the staff in reviewing and improving the HSE performance through feedback after every internal / external training provided to staff and through continual feedback through HSE committee meetings.

- Encouraging employees participation in developing standards and achievement of HSE objectives, targets and monitoring and review of practices.

- All the laboratory generated waste disposed off in an acceptable manner according to written and approved procedure and in compliance to local environmental rules.

- Provide training and information to all concern staff about the use of safety equipment during operation of equipment and performing the work in confined space.

- Generation of accident / incident report, conducting investigation and recovery plan and track all reports of investigation through HSE committee to avoid recurrence of accident.

- To achieve these targets a committee comprising 3 members from different sections is formed.

HSE Committee
HEAD OF DEPARTMENT

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 ;

(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;

(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;

(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;

(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**

(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.

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

Establishment of the Sindh Sustainable Development Fund.

8. (1) There shall be established a 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

(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.

(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

(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.

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. **Regulation of motor vehicles.**

(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.

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

(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.

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.

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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 -

(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).

(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.

(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.

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.

Appeals to the Environmental Protection Tribunal.

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

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.

Appeals from orders of the Environmental Protection Tribunal.

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

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.

Jurisdiction of Judicial Magistrate.

(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.

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.

Appeals from orders of the Judicial Magistrate.

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.

GOVERNMENT OF SINDH
SINDH ENVIRONMENTAL PROTECTION AGENCY

Karachi dated the 16th December,2014.

The Sindh Environmental Protection Agency Review of IEE and EIA Regulations 2014, provide the necessary details in respect of the preparation

NOTIFICATION

NO.EPA/TECH/739/2014:- In exercise of the powers conferred bysection 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 theSindh Environmental Protection Agency (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations,2014.

(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) "Committee" means the Environmental Assessment Advisory Committee constituted under regulation 24;

(d) "DirectorGeneral" means the DirectorGeneral of the Agency;

(e) "EIA" means an environmental impact assessment as defined in section 2(xv);

(f) "IEE" means an initial environmental examination as defined in section 2(xxx);

(g) "section" means a section of the Act.

(h) "Firm" means the Environmental Consulting Firm certified by the Agency;

(i) "Environmental Sensitive areas" means the area which falls under sensitive sites like protected areas, or the sites which may have crucial and growing importance;

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(j) "protected area" means any area which safeguards the earths precious bio-diversity protect outstanding areas of natural beauty and conservation of cultural significance;

(k) "Schedule" means the Schedule to these regulations;

(l) "urban area" meansan areawithin the limits of a town, municipality or city and includes any area declared as such by Government by notification in the official gazette;

(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 an IEE

A proponent of a project falling in any category listed in Schedule-I shall file an IEE with the Agency, and the provisions of section 17 shall apply to such projects.

4. Projects requiring an EIA

A proponent of a project falling in any category listed in Schedule-II shall file an EIA with the Agency, and the provisions of section 17 shall apply to such projects.

5. **Projects requiring checklist**

A proponent of a project falling in any category listed in Schedule-III shall file environmental checklist with theAgency and the provisions of section 17 shall apply to such projects.

6. Projects not requiring an IEE or EIA

(1) A proponent of a project not falling in any category listed in Schedules-I, II and III shall not be required to file an IEE or EIA:

Provided that the proponent shall file -

(a) an EIA, if the project is likely to cause an adverse environmental effects;

(b) an application for projects not listed in Schedules-I,II and IIIin respect of which the Agency has issued guidelines for construction and operation for approval accompanied by an undertaking and an affidavit that the aforesaid guidelines shall be fully complied with.

(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 IEE or EIA or environmental check list, for reasons to be recorded in such direction:

Provided that no such direction shall be issued without the recommendations in writing of theCommittee.

(3) The provisions of section 17 shall apply to a project in respect of which an IEE or EIA or environmental checklist is filed under sub-regulation (1) or (2).

7. Preparation of IEE/EIA and environmental checklist

(1) The Agency may issue guidelines for preparation of an IEE or an EIA or an environmental checklist, including guidelines of general applicability, and sectoral guidelines indicating specific assessment requirements for planning, construction and operation of projects relating to particular sector.

(2) Where guidelines have been issued under sub-regulation (1), an IEE or EIA or environmental checklist shall be prepared, to the extent practicable, in accordance therewith and the proponent shall justify in the IEE or EIA or in environmental checklist any departure therefrom.

8. Review Fees

The proponent shall pay, at the time of submission of an IEE or EIA or environmental checklist, a non-refundable review fee to the Agency as per rates shown in Schedule-IV

9. Filing of IEE, EIA and environmental check list.

(1) Ten hard copies and two electronic copies for an IEE and EIA reports shall be filed with the Agency prepared by Firm.

(2) Every IEE and EIA shall be accompanied by -

(a) an application, in the form prescribed in Schedule-V;

(b) copy of receipt showing payment of the Review Fee.

(c) no objection certificates from the relevant departments in case of EIA shall be the part of reports;

(d) the environmental check list as per its guidelines.

10. Preliminary scrutiny

(1) Within fifteen working days of filing of the IEE or EIA or environmental check list, the Agency shall –

(a) confirm that the IEE or EIA or environmental check list is complete for purposes of initiation of the review process; or

(b) require the proponent to submit such additional information as may be specified; or

(c) return the IEE or EIA or environmental checklist to the proponent for revision, clearly listing the points requiring further study and discussion.

(2) Notwithstanding anything contained in sub-regulation (1), 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 of an EIA, the Agency shall simultaneously with issue of confirmation of

completeness under sub-regulation (2) of regulation 9, cause to be published in any English or Urdu national newspaper and in a local newspaper of general circulation in the area affected by the project, a public notice mentioning the type of project, its exact location, the name and address of the proponent and the places at which the EIA of the project can, subject to the restrictions in sub-section (3) of section 17, be accessed.

(2) The notice issued under sub-regulation (1) shall fix a date, time and place of public hearing for any comments on the project or its EIA.

(3) The date fixed under sub-regulation (2) shall not be earlier than fifteen days from the date of publication of the notice.

(4) The Agency shall also ensure the circulation of the EIA to the concerned Government Agencies and solicit their comments thereon.

(5) All comments received by the Agency from the public or any Government Agency shall be collated, tabulated and duly considered by it before decision on the EIA.

(6) TheAgency 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

(1) The Agency shall make every effort to carry out its review of the environmental checklist within thirty days, IEE withinsixty days, and of the EIA within four months of issue of confirmation of completeness under regulation 9.

(2) In reviewing the EIA, the Agency shall consult such Committee of Experts be constituted for the purpose by the DirectorGeneral, and may also solicit views of concerned Advisory Committee, if any, constituted by the Agency.

(3) The Director-General may, where he 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 Generalmayconstitute 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) In reviewing of the IEE, the Director General may direct the proponent and Firm to present the report before the committee as given under sub-regulation (4) and the Director General may also invite environmental experts from outside the Agency for the purpose of assistance.

(6) 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 10, and views of the committees mentioned in sub-regulations (2) and (3) above.

(7) The environmental check list shall be reviewed as per guidelines issued by the Agency.

13. Decision

(1) Subject to regulation 9 and 11, the documentary evidence in the form of videos (soft copies) of public hearing shall be submitted by the proponent at the time of environmental approval or at any stage of review process, to the Agency.

(2) On completion of the review, the decision of the Agency shall be communicated to the proponent in the form prescribed in Schedule-VIin the case of an IEE and environmental check list, and in the form prescribed in Schedule-VIIin the case of an EIA and for environmental checklist.

14. Conditions of approval

(1) Every approval of an IEE or EIA or check list shall, in addition to such conditions as may be imposed by the Agency, be subject to the condition that the project shall be designed and constructed, and mitigatory and other measures adopted, strictly in accordance with the IEE or EIA or environmental check list, 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 -

(a) before commencing construction of the project, acknowledge acceptance of the stipulated conditions by executing an undertaking in the form prescribed in Schedule-VIII;

(b) before commencing operation of the project, obtain from the Agency written confirmation that the conditions of approval, and the requirements in the IEE or EIA or environmental check list relating to design and construction, adoption of mitigatory and other measures and other relevant matters, have been duly complied with.

15. Confirmation of compliance

(1) The request for confirmation of compliance under clause (b) of sub-regulation (2) of Regulation 13 shall be accompanied by an Environmental Management Plan indicating the measures and procedures proposed to be taken to manage or mitigate the environmental impacts for the life of the project, including provisions for monitoring, reporting and auditing.

(2) Where a request for confirmation of compliance is received from a proponent, the Agency may carry out such inspection of the site and plant and machinery and seek such additional information from the proponent as it may deem fit:

Provided that every effort shall be made by the Agency to provide the

requisite confirmation or otherwise withintwenty days of receipt of the request, with complete information, from the proponent.

(3) TheAgency may, while issuing the requisite confirmation of compliance, impose such other conditions as the Environmental Management Plan, and the operation, maintenance and monitoring of the project as it may deem fit, and such conditions shall be deemed to be included in the conditions to which approval of the project is subject.

16. Deemed approval

The period for communication of decision stipulated in sub-section(4) ofsection 17 shall commence from the date of filing of an IEE or EIA or environmental check list in respect of which confirmation of completeness is issued by the Agency under clause (a) of sub-regulation (1) of regulation 9.

17. Extension in review period

Where the Agency in a particular case extends the period of four months under the provisions of sub-section (4) of section 17, it may extend the further period as it may deem fit, for the reasons to be recorded in writing thereof.

18. Validity period of approval

(1) The approval accorded by the Agency under section 17 read with regulation 12 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 years from the date of issue.

(3) After issue of confirmation of compliance, the approval shall be valid for a period of three years from the date thereof.

(4) The proponent may apply to the Agency for extension in the validity periods mentioned in sub-regulations (1), (2) and (3), which may be granted by theAgency 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.

19. Entry and inspection

(1) For the purpose of verification of any matter relating to the review or to the conditions of approval of an IEE or EIA or environmental check list prior to, beforeor during and after commencement of construction or operation of a project, duly authorized staff of theAgency 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.

20. Monitoring

(1) After issue of approval, the proponent shall submit a report to the Agency on completion of construction of the project.

(2) After issue of confirmation of compliance, the proponent shall submit an annual report summarizing operational performance of the project, with reference to the conditions of approval and maintenance and mitigatory measures adopted by the project.

(3) The proponent shall, in order to enable the Agency to effectively monitor compliance with the conditions of approval, furnish such additional information as the Agency may require.

21. 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 IEE or EIA or environmental check list is incorrect, itshall issue notice to the proponent for show cause within two weeks of receipt thereof as to why the approval should not be cancelled.

(2) Incase 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.

22. Registers of IEE,EIA and Check list projects

Separate Registers to be maintained by the Agency for IEE, EIA and environmental check list projects under sub-section (6) of section 17 shall be in the form prescribed in Schedule-IX.

23. Environmentally sensitive areas

(1) The Agency may, by notification in the official Gazette, designate an area to be an environmentally sensitive area.

(2) Notwithstanding anything contained in regulations 3, 4 and 5, the proponent of

a project situated in an environmentally sensitive area shall be required to file an EIA with the Agency.

(3) The Agency may from time to time issue guidelines to assist proponents and other persons involved in the environmental assessment process to plan and prepare projects located in environmentally sensitive areas.

(4) Where guidelines have been issued under sub-regulation (3), the projects shall be planned and prepared, to the extent practicable, in accordance therewith and any departure therefrom justified in the EIA pertaining to the project.

24. **Environmental Assessment Advisory Committee.**- For the purpose of rendering advice on all aspects of the environmental assessment including guidelines procedure and categorization of projects, the following Advisory Committee shall be constituted:-

(i) Director Technical, Sindh Environmental Protection Agency (EIA/IEE)	**Chairman**
(ii) Chief Environment, Planning and Development Department	**Member**
(iii)Four representative on each of industry, non-Governmental organization, legal and other experts	**Members**

25. Repeal and Savings. (1) The provisions of the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Assessment Impact Regulations 2000, to the extent of the Province of Sindh are hereby 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 Rules.

DIRECTOR GENERAL
SINDH ENVIRONMENTAL PROTECTION AGENCY

SCHEDULE I

(See Regulation 3)

A. Agriculture, Livestock and Fisheries

1. Poultry, livestock, stud and fish farms
2. Projects involvingpackaging,formulation, cold storage and warehouse of agricultural products.

B. Energy

1. Hydroelectric power generation less than 50 MW
2. Thermal power generation less than 100MW
3. Coal fired power plants with capacity less than 50 MW
4. Transmission lines less than 11 KV, and grid station
5. Waste-to-energy generation projects including bio-mass less than 25 MW
6. Solar project
7. Wind project

C. Oil and Gas projects:

1. Oil and gas 2D/3D Seismic survey and drilling activities
2. Oil and gas extraction projects including exploration and production located outside the environmentally sensitive areas
3. Construction of LPG storage facilities
4. Construction of LPG,CNG filling station and petrol pumps

D. Manufacturing and processing

1. Ceramics and glass units less than 500 million
2. Food processing industries with total cost less than Rs. 200 millions
3. Pharmaceutical units.
4. Marble units
5. Carpet manufacturing units
6. Rice mills,ghee/oil mills ,
7. Brick kilns
8. Stone crushing units
9. Man-made fibers and resin projects with total cost less than Rs. 200 millions

10. Manufacturing of apparel, textile garments unit , including dyeing, bleaching and printing, with total cost less thanRs.50 million

11. Wood products with total cost more than Rs.100 million

12. Steel re-rolling mills

13. Recycling plants

E. Mining and mineral processing

Commercial extraction of sand, gravel, limestone, clay, sulphur and other minerals not included in Schedule II with total cost less than Rs.100 million

1. Crushing, grinding and separation processes

2. Smelting plants with total cost less than Rs100 millions

F. Transport

1. Flyovers, underpasses and bridges having total length less than 500 meters

G. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume less than 25million cubic meters of surface area less than 4 square kilometers

2. Small-scale irrigation systems and drainage system with total cost less than Rs. 100million

H. Water supply and filtration

Water supply schemes and **filtration**plants with total cost less than 100 million(Including projects of maintenance, up gradation, reconstruction of existing projects.)

I. Waste disposal and treatment

1. Solid and non-hazardous waste with annual capacity less than 10,000 tons
2. Waste water treatment for sewage treatment facility with total cost less than 200M
3. Industry specific Waste watertreatment facility for Industrial effluent(small scale plant)

J. Urban development

1. Housing schemesless than 10 acres
2. Mutli-story buildings having residential and commercial setup on the total plot size is less than 2000 sq.yards
3. Hospitals with capacity of 50 beds, health care unit/laboratories with 500 OPD/day.
4. Construction of Educational, Academic institutions on land less than 10 acres.

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 II

(See Regulation 4)

List of projects requiring an EIA

A. Energy

1. Hydroelectric power generation over 50 MW
2. Thermal power generation over 100MW
3. Coal power projects above 50 MW
4. Transmission lines (11 KV and above) and distribution projects.
5. Nuclear power plants
6. Wind energy projects if falls under any sensitive, protected area.

B. Oil and Gas projects

1. Petroleum refineries.
2. LPG and LNG Projects(including LNG Terminals,re-gasification units) except LPG filling stations
3. Oil and gas transmission systems
4. Oil and gas gathering system,separation and storage.

C. Manufacturing and processing

1. Cement plants
2. Chemical manufacturing industries
3. Fertilizer plants
4. Steel Mills
5. Sugar Mills and Distilleries
6. Food processing industries including beverages, dairy milk and products, slaughter houses and related activities with total cost more than Rs. 200 Million
7. Industrial estates (including export processing zones)
8. Man-made fibers and resin projects with total cost of Rs 200M and above
9. Pesticides (manufacture or formulation)
10. Petrochemicals complex
11. Synthetic resins, plastics and man-made fibers, paper and paperboard, paper pulping, plastic products, textiles (except apparel),printing and publishing, paints and dyes, oils and fats and vegetable ghee projects, with total cost more than Rs. 10 million
12. Tanning and leather finishing projects
13. Battery manufacturing plant

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. Smelting plants with total cost of Rs. 100 million and above

E. Transport

1. Airports
2. Federal or Provincial highways or major roads (includingrehabilitation or rebuilding or reconstruction of existing roads)
3. Ports and harbor development
4. Railway works
5. Flyovers,underpasses and bridges having total length of more than 500m

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 15,000 hectares and above
3. Flood Protection

G. Water supply and filtration

Large Water supply schemes and **filtration** plants.

H. Waste Disposal and treatment

1. Handling, storageor disposal of hazardous or toxic wastes or radioactive waste (including landfill sites, incineration of hospital toxic waste)
2. Waste disposal facilities for municipal or industrial wastes, with totalannual capacity of 10,000 tons and above.
3. Waste water treatment facility for industrial or municipal effluents.

I. Urban development and tourism

1. Housing schemes above 10 acres
2. Residential/commercial high rise buildings/apartments from15 stories and above.
3. Land use studies and urban plans (large cities)
4. Large scale public facilities.
~~5.~~ Large-scale tourism development projects

J. Environmentally Sensitive Areas

All projects situated in environmentally sensitive areas

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-III

List ofprojects requiring environmental screening(through check list)

a. Construction of, offices and small commercial buildings (1-6 story),home industrial units, ware houses, marriage / banquet facilities, large scale motor vehicles workshops, restaurants / food outlets ,large baking unit subject to the compliance with existing zoning laws.

b. Reconstruction / rehabilitation of roads(small roads in urban area and farm to market roads more than 2 km.

c. On-farm dams and fish farms.

d. Pulses mills.

e. Flour Mills

f. Projects promoting energy efficiency(small scale).

g. Lining of existing minor canals and /or water courses.

h. Canal cleaning

i. Forest harvesting operations

j. Rain harvesting projects

k. Rural schools (Secondary and Higher Secondary) and rural and basic health units having atleast ten beds capacity.

l. BTS Towers

m. Lime Kilns

n. Ice factories and cold storage.

o. Cotton oil mill

p. Warehouses for pesticides and pharmaceuticals

Schedule-IV

(See Regulation 7)

Description	IEE	EIA	Environmental Check list
Projects	Rs.100,000	Rs.200,000	Rs.30,000 except BTS Towers which is Rs.15,000

SCHEDULE V

[See Regulation 8(2)(a)]

Application Form

1.	Name and address of Proponent		Phone: Fax: Telex:	
2.	CNIC No. of proponent			
3.	Description of project			
4.	Location of project			
6.	Objectives of project			
7.	IEE/EIA attached?	IEE/EIA :	Yes/No	
8.	Have alternative sites been considered and reported in IEE/EIA?		Yes/No	
9.	No Objection Certificate of relevant stakeholders		Name(s)	
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
		Ambient water quality	Yes/No	Yes/No
		Ground water quality	Yes/No	Yes/No
12.	Have estimates of the following been reported, especially Quantitative Analysis?		Estimated	Reported
		Water balance	Yes/No	Yes/No
		Solid waste disposal	Yes/No	Yes/No
		Liquid waste treatment	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 IEE/EIA is true and correct to the best of my knowledge and belief.

Date

Signature, name and _____
designation of proponent
(with official stamp/seal)

SCHEDULE VI
[See Regulation 12]

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 –

   _____

   [Delete (a) _____ or (b),

whichever is inapplicable] Dated

Tracking no.___

Director-General
Sindh Environmental Protection Agency
(with official stamp/seal)

SCHEDULE VII

[See Regulation 12]

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:

_____

[Delete _____

(a)/(b)/(c), whichever is inapplicable] Dated

Tracking no.___

Director-General
Sindh Environmental Protection Agency
(with official stamp/seal)

SCHEDULE VIII
[See Regulation 13(2)]

Undertaking

I, (full name and address) as proponent for (name, description and location of project) do hereby solemnly affirm and declare that I fully understand and accept the conditions dated , and undertake to design, construct and operate the project strictly in accordance with the said conditions and the IEE/EIA/Environmental Check List.

Signature, name and
designation of proponent
(with official stamp/seal)

Witnesses
(full names and addresses)

_____

_____

SCHEDULE IX

(See Regulation 21)

Form of Registers for IEE and EIA and Environmental Check List projects

S.No.	Description	Relevant Provisions
1	2	3
1.	Tracking number	
2.	Category type (as per Schedules I, II& III)	
3.	Name of proponent	
4.	Name and designation of contact person	
5.	Name of consultant	
6.	Description of project	
7.	Location of project	
8.	Project capital cost	
9.	Date of receipt of IEE/EIA/Environmental Check List	
10.	Date of confirmation of completeness	
11.	Approval granted (Yes/No)	
12.	Date of approval granted or refused	
13.	Conditions of approval/reasons for refusal	
14.	Date of Undertaking	
15.	Date of extension of approval validity	
16.	Period of extension	
17.	Date of commencement of construction	
18.	Date of issue of confirmation of compliance	
19.	Date of commencement of operations	
20.	Dates of filing of monitoring reports	
21.	Date of cancellation, if applicable	

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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 40^0C or Temperature Increase *	$\leq 3^oC$	$\leq 3^oC$	$\leq 3^oC$
2.	pH value (H^+)	6-9	6-9	6-9
3.	Biochemical Oxygen Demand (BOD)5 at 20^0C [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 ($SO4^{2-}$)	600	1000	SC***
14.	Sulphide ($S^{=}$)	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 [4][1][3]	Sulfuric acid/ Sulphonic acid plants	
		Other Plants except power	1700
		Plants operating on oil and coal	
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 Moderately Polluted*	<50	<200	500	50
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	β -Ray absorption method
	24 hours**	150 µg/m³	
Respirable Particulate Matter PM2.5	Annual Average*	40 µg/m³***	β 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/Acceptable	
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
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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

The Sindh Hospital Waste Management Rules, 2014

CONTENTS

Rules.

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	
	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.	Inc an
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	Lar
	Pharmaceutical				

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

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.

- 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.

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PROVINCIAL ASSEMBLY OF SINDH
NOTIFICATION
KARACHI, THE 02ND JANUARY, 2018

NO.PAS/LEGIS-B-27/2017- The Sindh Occupational Safety and Health Bill, 2017 having been passed by the Provincial Assembly of Sindh on 17th November, 2017 and assented to by the Governor of Sindh on 26th December, 2017 is hereby published as an Act of the Legislature of Sindh.

THE SINDH OCCUPATIONAL SAFETY AND HEALTH ACT, 2017

SINDH ACT NO. I OF 2018

AN
ACT

to make provision for occupational safety and health conditions at all workplaces for the protection of persons at work against risk of injury arising out of the activities at work places and for the promotion of safe, healthy and decent working environment adapted to the physical, physiological and psychological needs of all persons at work;

Preamble.

WHEREAS it is expedient to make provision for occupational safety health conditions at all workplace for the protection of persons at work against risk of injury arising out of the activities at work places and for the promotion of safe, healthy and decent working environment adapted to the physical, physiological and psychological needs of all persons at work and to provide for all matters connected therewith or ancillary thereto.

Chapter-I
Preliminary

It is hereby enacted as follows:-

Short title and commencement.

1. (1) This Act may be called the Sindh Occupational Safety and Health Act, 2017.

(2) It shall come into force at once.

Applicability of the Act.

2. (1) It shall be applicable to whole of the Province of Sindh and at all places of work, but does not include mines:

Provided that Government may, by order, exempt specified workplaces either wholly or partially and for such period as may be specified.

(2) The provisions of this Act shall be in addition to, and not in derogation of, the provisions of any other law relating to occupational safety and health in Sindh.

(3) In the event of any conflict or inconsistency between the provisions of this Act and any other law, for the time being in force, pertaining to occupational safety and health, the provisions of this Act shall prevail and the conflicting or inconsistent provisions of such other law shall, to the extent of the conflict or inconsistency, be construed as superseded.

Definitions.

3. In this Act, unless there is anything repugnant in the subject or context –

(a) "accident" means an event that –
  (i) causes loss of life;
  (ii) causes any person to be harmed; or
  (iii) in different circumstances, might have caused any person to be harmed;

(b) "adolescent " shall have the same meaning as assigned to it under the Sindh Factories Act, 2015 (Act No.XIII of 2016).

(c) "bodily injury" includes physical or mental injury to a person at workplace;

(d) "child" means a person who has not completed the age of fourteenth year.

(e) "code of practice" means a set of rules relating to the methods to be applied or the procedure to be adopted in connection with the construction, installation, testing, operating, or use of any article, apparatus, instrument, device or process at workplace;

(f) "competent person" means a person who by virtue of education, training and experience has the ability and skills to undertake the job;

(g) "contractor" means any person or a body, whether incorporated or not, who contracts to carry out the whole or any part of any work undertaken in the course of or for the purpose of trade or business, and includes sub-contractor;

(h) "duty holder" means a person with duty in relation to health and safety as provided under this Act;

(a) "employer" means the owner of an establishment and includes-

(i) in a factory, the name of the person who shall be the occupier and manager for the purposes of this Act;

(ii) in any industrial establishment under the control of any department of the Federal Government or Government, or District Government, the authority appointed by such Government in this behalf, or where no such authority is so appointed, the head of the department; and

(iii) in any other industrial establishment or commercial establishment, any person responsible to the owner for the supervision and control of such establishment;

(i) "establishment" means any industrial or commercial establishment, business, trade, profession, service, office, firm, factory, society, undertaking, company, educational institution, hospital, shop, premises, enterprise or organization of whatsoever nature through a contractor for the purpose of carrying out any business, industry or excavation and includes all its departments and branches, whether situated at the same place or at different places;

(j) "factory" means a factory as defined in the Sindh Factories Act, 2015 (Act No.XIII of 2016);

(k) "harm" means –

(i) illness, injury, or both; and

(ii) includes physical or mental harm caused by work-related stress;

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

(m) "hazard" means any activity, arrangements, circumstances, events, occurrences, phenomenon, processes, situations, or substances (whether arising or used within or outside a place of work) that is an actual or potential cause or source of harm; and includes –

(i) a situation where a person's behavior may be an actual or potential cause or source of harm to the **another** person or persons; and

(ii) a situation described in sub-paragraph (i) resulting from physical or mental fatigue, drugs, alcohol, traumatic shock, or another temporary condition that affects a person's behavior;

(n) "imminent danger" means any hazard or condition that may reasonably be expected to cause loss of life, injury or illness to a person exposed before the hazard;

(o) "machinery" includes all plants whereby power is generated, transformed, transmitted or applied;

(p) "mine" shall have the same meaning as assigned to it in the Mines Act, 1923 (IV of 1923);

(q) "occupational disease" means occupational diseases as mentioned in the Sindh Workers Compensation Act 2015 (Act No. VII of 2015);

(r) "owner" means a person receiving rent of the premises, tools, machinery, equipment or substance for use at workplace, for the time being, and includes an agent or trustee for the person;

(s) "person in control of a workplace" means the person who has ultimate control over the workplace, it may or may not include the employer, contractor, lessor, tenant, or managing agent;

(t) "premises" means any place, and in particular, includes –

(i) any land, building or part thereof;
(ii) any vehicle or watercraft;
(iii) any installation on land (including the foreshore and other land intermittently covered by water), any offshore installation, and any other installation (whether floating, or resting on the seabed or the subsoil thereof or resting on other land covered with water or the subsoil thereof); and
(iv) any tent or moveable structure;

(u) "prescribed" means prescribed by rules, regulations or bye-laws;

(v) "rules, regulations and bye-laws" means the rules, regulations and bye-laws made under this Act;

(w) "risk" means the probability of occurrence of injury or damage;

(x) "safe and safety" means the environment or conditions of a

workplace free from any hazard;

(y) "Schedule" means Schedule to this Act;

(z) "self-employed person" means an individual who works for gain or reward otherwise than under a contract of employment, whether or not that person employs others;

(aa) "supplier" means a person who manufactures, supplies, sells, leases, distributes, erects or installs any tool, equipment, machine, device or any biological, chemical or physical agent to be used by a worker or at a work place;

(bb) "worker" means any person employed, whether directly or through any other person, for wages, to do any skilled or unskilled, professional, technical, clerical, manual or other work, or in connection with the affairs of an establishment under any contract of service or apprenticeship, whether written or oral, express or implied and includes such a person when laid off or terminated, retrenched, dismissed and or removed from employment, for the purpose of recovery of dues under this Act, and includes any person or class of persons which Government may specify by notification in official gazette, but does not include –

(a) a person employed in the Federal Government or Provincial Government, District Government or Armed forces;
(b) a member of the employer's family; that is to say the husband or wife and dependent children of the employer;

(cc) "workplace" or "place of work" mean any premises where work is carried out, by one or more persons and includes premises used for the storage of tools, machinery, equipment or substance; and

(dd) "volunteer" means a person who does not expect to be rewarded for work to be performed and does not receive reward for work performed but does not include a person who is in a place of work for the purpose of receiving on the job training or gaining work experience;

General duties of Employer.

4. (1) It shall be the duty of an employer to ensure all possible practicable measures in respect of safety and health at work of all persons in the workplace and in addition, the welfare of the workers and volunteers.

(2) Every employer shall inter-alia ensure that there exists effective methods for -

(a) systematically identifying existing hazards to workers at work; and

(b) systematically identifying (if possible before, and otherwise as, they arise) new hazards to workers at workplace; and

(c) regularly assessing each hazard identified, and determining whether or not it is a significant hazard.

(3) Where there occurs any accident or harm in respect of which an

employer is required by section 25 to record particulars, he shall take all practicable steps to ensure that the occurrence is so investigated as to determine whether it was caused by or arose from a significant hazard.

(4) Without prejudice to the generality of the duty of an employer under the preceding sub-sections, the duty of the employer shall -

(a) provide and apply of processes, systems of work and tasks to be safe and without risks of injury to health;

(b) provide and maintain tools, machinery, equipment and appliances which are safe and without risks of injury to worker's health;

(c) make arrangements to ensure the safety and absence of risk of injury to health of workers in connection with the use, handling, storage, disposal and transport of articles, materials and substances;

(d) make arrangements to control and prevent physical, chemical, biological, radiological, ergonomic, psychosocial or any other hazards that affect the safety and health of workers and other persons at workplace;

(e) provide such information, instructions, training and supervision, as is necessary or required by this Act and the regulations, to ensure safety and health at work of all workers;

(f) maintain workplace or place of work in a condition which is safe, clean, orderly and without risks of injury to health and the provisions and maintenance of safe means of access to and egress from it;

(g) inform the workers in an understandable manner before any work commences, the hazards associated with their work, risks involved and the preventative and protective measures that need to be taken;

(h) provide for the workers, where necessary, when hazards cannot be otherwise eliminated or controlled, adequate protective clothing and protective equipment of a type approved by Government, to prevent every risk of injury and of adverse effects on health;

(i) maintain particulars of all accidents occurring at the workplace and produce before the Inspector under this Act;

(j) provide measures, where necessary, including adequate first aid arrangements to deal with emergencies, dangerous occurrences, accidents and industrial disasters.

(k) take all practical measures for the prevention of fires and for the provision of safety measures in the event of fire;

(l) engage in activities simultaneously at one workplace and where two or more undertakings, the employer of each undertaking shall collaborate in applying the provisions of this Act.

General duties of self-employed and employers to persons other than their workers.

5. (1) It shall be duty of every self-employed person and employer to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that he himself and other persons (not being his workers)are not exposed to risks to their safety and health.

(2) Every employer and self-employed person shall, in the prescribed circumstances and in the prescribed manner, give to persons (not being his workers) who may be affected by the way in which he conducts his undertaking the prescribed information about such aspects of the way in which he conducts his undertaking as might affect their health or safety.

General duties of persons concerned with premises to persons other than their workers.

6. It shall be duty of every person who is not worker but uses non-domestic premises made available to him as workplace or place of work where he may use plant or substances provided for their use, to take such measures as is reasonable for a person to ensure, so far as is reasonably practicable, that the premises, by all means of access thereto or egress therefrom available for use by persons using the premises, and any plant or substance in the premises or, as the case may be, provided for use thereof, is or are safe and without risk to health.

General duty of persons in control of certain premises in relation to harmful emissions into atmosphere.

7. (1) It shall be the duty of the person having control of any premises to use the best practicable means for preventing the emission into the atmosphere from the premises of noxious or offensive substances and for rendering harmless and inoffensive such substances as may be so emitted.

(2) A substance of any description prescribed for the purposes of sub-section (1) above as noxious or offensive shall be noxious or, as the case may be, an offensive substance for the purposes whether or not it would be so, apart from this sub-section.

General duties of worker and volunteer.

8. (1) It shall be the duty of every worker and volunteer while at workplace to ensure -

(a) the safety and health of the other persons who may be affected by acts or omissions at workplace of that worker and shall not willfully do anything to endanger himself or others;

(b) that the worker and volunteer cooperates with the employer or any other person on whom a duty or requirement in pursuance of this Act is imposed, in fulfilling such duty or requirement;

(c) that the worker and volunteer shall use any protective clothing and protective equipment provided to that worker in pursuance of this Act; and

(d) that the worker and volunteer does not willfully interfere with or willfully misuse any means, appliance, convenience or equipment or any other thing provided for securing the safety and health of persons at the workplace.

(2) If an issue arises as to unsafe work, which poses an immediate threat to the safety or health of workers and volunteer, the matter shall be resolved through dispute resolution procedures contained in the policy referred to under section 13. Where the threat cannot be controlled, the worker or volunteers affected thereby may cease work:

Provided that where work is ceased for reasons explained above, the employer has the right to direct the concerned workers and volunteers to undertake temporary alternative work.

(3) A worker shall also report any occupational accident, occupational disease, dangerous occurrences or commuting accident in accordance with the Occupational Safety and Health policy applying at that place of work.

General duties of Supplier as regards articles and substances for use at work.

9. (1) It shall be the duty of supplier who designs, manufactures, imports or supplies any article for use at workplace to take specified steps sufficient -

(i) to ensure, so far as is reasonably practicable, that the article is so designed and constructed as to be safe and without risks to health when properly used;

(ii) to carry out or arrange for carrying out of such testing and examination as may be necessary for the performance of the duty imposed on him by the preceding paragraph;

(iii) to take such steps as are necessary to secure that there will be available in connection with the use of the article at work adequate information about the use for which it is designed and has been tested, and about any condition necessary to ensure that, when put to that use, it will be safe and without risk to health;

(iv) to ensure, so far as is reasonably practicable, that the substance is safe and without risk to health when properly used.

(2) It shall be the duty of supplier who designs, manufactures or supplies any tools, machinery, equipment or substance for use at work, to ensure -

(i) that such tools, machinery, equipment or substance is safe and without risk of injury to health when correctly used with regard to safe practices;

(ii) that persons to whom such tools, machinery, equipment or substance are supplied, be proved with all information as regards handling, commissioning, use and maintenance.

Explanation.- In this section supply of tools, machinery and equipment includes handling, assembling, installing, erecting and testing.

Chapter –II
PROVISIONS WITH REGARD TO SAFETY AND HEALTH

Safety and Health.

10. (1) Government may, by notification in the official Gazette, make rules for the health and safety of the worker or volunteer in any establishment or class of establishments.

(2) Without prejudice to the generality of the foregoing provisions, the said rules may include, but not limited to, the following matters, namely:-

(a) cleanliness in the place of work and its freedom from nuisance, and maintenance of buildings;

(b) illumination, ventilation, temperature, noise, dust, fume and artificial humidification;

(c) disposal of wastes and effluents;

(d) floor, stairs, means of access, proper working space,

overcrowding, confined spaces, pits, sumps, opening in floors and allied things;

(e) drinking water and conservancy;

(f) guarding and fencing of the machinery and work at or near machinery in motion;

(g) self-acting machines and device for cutting off power; revolving machinery and pressure plants;

(h) instructions, training and supervision in relation to employment on dangerous machine and fencing or casing of machinery; wet floors, open wiring, safety escapes, emergency exits, safe electric wiring and fitting etc;

(i) explosives or inflammable dust, gas and precaution against dangerous fumes etc;

(j) precaution in case of fire;

(k) personal protective equipment;

(l) excessive weights;

(m) loading and earth moving machinery;

(n) cranes, hoist, lifts and other lifting operations;

(o) scaffolding and work at height, and

(p) safety of building, machinery and manufacturing process.

Written statement of policy.

11. Every employer to whom this Act applies, except in such cases as may be prescribed by Government, shall declare a written statement of a general policy with respect to the safety and health of all persons at the workplace and such statement shall include provisions to resolve disputes on safety at the workplace and the reporting procedure for fatalities, injuries and near misses. The policy shall be reviewed and revised when -

(a) introducing or altering the procedures for managing risk to safety; and

(b) changes that may affect safety, health or welfare are proposed to the premises where persons work, to the systems or methods of work or to the plant or substances used for work, but as a minimum at least every five years and to bring the statement and revisions of it to the notice of all persons in the workplace in languages understood by all.

Consultation.

12. (1) In every workplace or place of work, the employer shall provide for-

(a) the election of occupational safety and health representatives from amongst the workers in such establishments having less than fifty workers, and such representatives shall represent the workers in all matters relating to the safety, health and welfare at work, as prescribed; and may report the impending threats, accidents, injuries, fatal injuries to the Inspector; and

(b) to appoint a competent person to function as Safety and Health Officer at the workplace and set up an Occupational safety and Health Committee in the establishment having more than forty-nine workers.

(2) It shall be the duty of the occupational safety and health representatives or the Occupational safety and Health committee to co-operate and assist the employer to promote and develop measures to ensure the safety, health and welfare of the workers at workplace. The committee shall report the effectiveness of such measures to the employer and the Inspector, if so required.

Training of health and safety representative.

13. The employer shall, atleast once in two years, allow occupational safety and health representative to attend health and safety training as approved by Government and shall bear all expenses thereof including paid leave, course fee, lodging boarding, travelling etc.

Non-interfere or misuse of certain provisions.

14. No person shall intentionally or recklessly interfere with or misuse anything provided in the interests of health, safety or welfare in pursuance of any of the relevant statutory provisions.

Precautions against contagious or infectious disease at workplaces.

15. (1) Each worker and volunteer shall be provided with a "Hygiene Card" in which during the month of January and July every year entries shall be recorded after examination by qualified medical practitioner to the effect that the workers is not suffering from any contagious, infectious and occupational disease. The fee of such an examination shall be fixed by Government and shall be borne by the employer of the workplace.

(2) If the worker is found to be suffering from any contagious, infectious and occupational disease on an examination under sub-section(1), the employer shall provide him appropriate medical treatment with paid leave

Compulsory vaccination and inoculation.

16. Every worker shall be vaccinated and inoculated against such diseases and at such intervals as may be prescribed and expenses of such vaccination and inoculation, if any, shall be borne by the employer of the workplace.

CHAPTER –III
ENFORCEMENT

Registration of workplaces and approval of site, buildings and other constructions to be used as workplaces.

17. (1) An employer or self-employed person shall not build, fit out, alter or use any site or building as a workplace, unless its plans or site are approved by Government or its designated authority.

(2) Government or its designated Authority while approving the Plan or site or building shall ensure that all safety measures have been taken and the process to be conducted in the premises shall not be harmful to other people in the area.

(3) The employer shall, before start of the work, send a written notice to the Inspector of the area as may be prescribed by rules.

Appointment of Inspectors.

18. (1) Government may, by notification in the Official Gazette, appoint such persons possessing such professional degree in the relevant fields, to be Inspectors for the purposes of this Act within local limits as it may assign to them respectively.

(2) The Chief Inspector of Factories Sindh appointed under the Sindh Factories Act 2015 (Act No.XIII of 2016) shall be the Chief Safety and Health Inspector under this Act, who shall exercise the powers of an Inspector throughout the Province of Sindh.

(3) In any area where there are more than one Inspector, Government may by notification declare the powers of such Inspectors respectively in local limits.

(4) The Chief Safety and Health Inspector and Inspectors appointed under this Act shall be deemed to be a public servant within the meaning of the Pakistan Penal Code,1860 (XLV of 1860).

(5) Every inspector appointed under this section shall be furnished with such certificate of appointment as may be prescribed, and when visiting workplace in accordance with this Act shall, if so required, produce the said certificate to the employer or other person holding a responsible position at the workplace.

Powers of Inspector.

19. (1) The Inspector appointed under section 18 shall, for the purpose of the execution of this Act, have the powers described in their certificate of appointment which may include -

(a) to enter, inspect and examine any premises at any reasonable time (or, in a situation which in his opinion is or may be dangerous, at any time) -

(i) to which he has reasonable cause to believe, this Act applies;

(ii) which is adjacent to any premises in which the Inspector has reasonable cause to believe that there are stored explosives or flammable materials or other substances which would expose the persons in the premises to risk injury or to health;

(iii) to which an employer has contracted part of the work to a person or persons outside the principal workplace;

(b) to enter any area of any premises or building which is or forms part of the access to any premises referred to in sub-clause (i) or (iii) of clause (a);

(c) to take one or more police officers if the Inspector has reasonable cause to apprehend any obstruction in the execution of the provision of this Act;

(d) to make any complaint or application to Labour Court and to appear in support of such complaint or application;

(e) to require the production of the registers, certificates, notices and documents kept in pursuance of this Act;

(f) to require the production of plans, drawings, any circuit or wiring diagrams pertaining to the workplace;

(g) to make such examination and inquiry as may be necessary to ascertain whether the provisions of this Act are complied with, so far as respects a workplace and any person in the workplace;

(h) to examine every person he has reasonable to believe to be or have been within the preceding two months employed in a workplace or employed in the business of a workplace wholly or mainly outside the workplace and require such person to sign a declaration of the truth of the matters;

(i) to take for analysis sufficient sample of any material in use or mixed for use in the manufacture of any article or articles produced in any workplace in the presence of the employer or if the employer is not readily available, the person responsible for the workplace;

(j) to take any substance used or intended to be used in any workplace being a substance in respect of which the Inspector is of the opinion that a contravention of this Act, rule, regulation or any order made under this Act, or which in the opinion of that Inspector is likely to cause bodily injury to any person in the workplace:

Provided that the employer or other responsible person, at the time the sample is taken and on providing the necessary application, require the Inspector to divide the sample into three parts to mark and seal or fasten up each part in such manner as its nature permits and -

(a) to deliver one part to the employer or to the other responsible person;
(b) to retain one part for future comparison; and
(c) to submit one part to the analyst authorized by Government for the purpose;

(k) to take for analysis any machinery or article found in any workplace;

(l) to take photograph or video of machinery or any article found in such workplace or make any sketch of any workplace; and

(m) to exercise any power or perform any function which is necessary for the purpose mentioned in this section.

(2) No person shall intentionally delay or obstruct the Inspector in exercise of his powers referred to under sub- section (1), and he shall be liable to comply with the provisions of this Act, rules, regulations or bye-laws and produce any register, certificate, notice or document under his custody and he shall not prevent or attempt to conceal or prevent, any person from appearing before or being examined by such Inspector in execution of his duties under this Act.

Notices.

20. (1) If an Inspector is of the opinion that the employer is contriving one or more of the relevant statutory provisions or has contravened one or more of those provisions in circumstances and shall continue the contravention repeatedly, he may serve on him an improvement notice stating the reasons thereof and require the employer to rectify the contravention as may be specified in the notice.

(2) If an Inspector is of the opinion that any activity is being carried on or about to be carried on by or under the control of employer, which involve or likely to involve a risk of serious personal injury, the Inspector may serve a prohibition notice.

(3) A prohibition notice shall -

(i) specify the matters which in his opinion give or likely to give rise of risk;

(ii) where in his opinion any of those matters involves or likely to involve a contravention of any of the relevant statutory provisions and specify the provision or provisions as to which he is of that opinion, and give particulars of the reasons why he is of that opinion; and

(iii) direct that the activities to which the notice relates shall not be carried on by or under the control of the person on whom the notice is served unless the matter specified in the notice and any associated contraventions of provisions so specified in the notice have been remedied.

(4) A directive given in pursuance of sub-section (3) shall take immediate effect if the Inspector is of the opinion that the risk of serious personal injury is or will be imminent, and shall have effect at the end of a period specified in the notice in any other case.

(5) Where any of the relevant statutory provisions applies to a building or any matter connected with a building and the Inspector proposes to serve an improvement notice relating to a contravention of that provision in connection with that building or matter, the notice shall not direct any measures to be taken to remedy the contravention of that provision which are more onerous than those necessary to secure conformity with the requirement of any building regulations for the time being in force to which that building or matter would be required to conform if the relevant building were being newly erected unless the provision in question imposes specific requirement more onerous than the requirements of any such building regulations to which the building or matter would be required to conform.

Explanation.- In this sub-section "the relevant building" shall include the building and in the case of a matter connected with a building, mean the building with which the matter is connected.

(6) An Inspector may, in connection with any premises used or about to be used as a place of work, serve a notice requiring or likely to lead to take measures affecting the means of escape in case of fire with which the premises may or ought to be provided.

Appeal against improvement or prohibition notice.

21. (1) The employer on whom the improvement or prohibition notice is served may, within such period from the date of its service as may be prescribed, appeal to the Labor Court and on such appeal the Labour Court may either cancel or affirm the notice and, if it affirms it may do so either in its original form or with such modification as the case may be and if it thinks fit pass such orders for appointing one or more Assessors for the purpose of enquiring into the facts of the circumstances under which notices have been issued.

Power to deal with cause of imminent danger.

22. (1) Where, in the case of any article or substance found by an Inspector in any premises which he has power to enter and he has reason to believe that in the circumstances in which he finds it, the article or substance is a cause of imminent danger or serious personal injury, he may seize and render it harmless and take corrective measures which may include destruction, demolition, dismantling, removing and repairing.

(2) Before it is rendered harmless under this section -

(i) any article that forms part of a batch of similar articles; or

(ii) any substance, the inspector shall, if it is practicable for him to do so, take a sample thereof and give to a responsible person at the premises where the article or substance was found by him a portion of the sample marked in a manner sufficient to identify it.

(3) As soon as may be after any article or substance has been seized and rendered harmless under this section, the Inspector shall prepare and sign a written report given particulars of the circumstances in which the article or substance was seized and so dealt with by him, and shall give a signed copy of the report to the employer or responsible person at the premises and unless that person is the owner of the article or substance, also serve a signed copy of the report on the owner; and where the Inspector is unable after reasonable enquiry ascertain the name or address of the owner, he may serve the copy of notice on him by giving it to the employer or responsible person at the premises.

Notification and investigation of accidents, dangerous occurrences and occupational illnesses.

23. (1) Every employer shall maintain a register of accidents in the prescribed form and shall record in the register the prescribed particulars relating to -

(a) every accident that harmed or might have harmed any worker or any person in a place of work controlled by the employer; and

(b) every hazard to which worker was exposed while at workplace in the employment of the employer.

(2) Every self-employed person shall maintain a register of accidents, in the prescribed form, and shall record in the register the prescribed particulars relating to -

(a) every accident that harmed or might have harmed any self-employed person at work or any person in a place of work; and

(b) every hazard to which self-employed person was exposed while at workplace.

(3) Every employer or self-employed person shall maintain a register and record therein any accident occurs in a workplace which -

(a) causes loss of life; or

(b) disables any person from reporting to normal work for more than seven days;

(c) makes any person unconscious as a result of any action or process related to work;

(4) The employer and self-employed person shall report every accident in the prescribed form to the Inspector within twenty four hours of the occurrence of the accident.

(5) Where accident causing disablement or death is notified by the employer or self-employed person, notice in writing of the death shall be sent to the Inspector by the employer or self-employed person in control of the workplace within twenty four hours of the disability or death comes to the knowledge of the employer or self-employed person controlling the workplace.

(6) Where an accident occurs in the workplace causing the death of any person at the workplace, no person shall touch or disturb or cause any other person to touch or disturb, without the permission of an Inspector, any machinery or any article which was involved in such accident, other than for the purpose of extricating or attending on any person involved in such accident.

(7) Where any illness occurs in a workplace which -

(a) is prescribed ; or

(b) leads to a loss of life of a person who was at the workplace ; or

(c) leads to an absence from normal work for more than seven continuous days and, is considered to be related to the workplace; or

(d) causes sudden or simultaneous illness or loss of consciousness at that workplace;

written notice shall forthwith be sent by the employer or the manager to the Inspector of the area where the workplace is located, in the form prescribed for the purpose.

(8) Where at any workplace there is possibility of the workers being subjected to special risk or hazard to safety and health at work, the Chief Inspector of Safety and Health may require such workers to undergo pre-employment and periodic medical examinations suited for the circumstance and at periods so determined which the employer and the workers shall comply.

(9) The medical examination shall be conducted at Hospitals authorized by Government and the cost thereof shall be borne by employer.

No interference at accident scene.

24. Where an accident occurs at workplace, no person shall, unless authorized to do so by an Inspector, remove or in any way interfere with or disturb any wreckage, articles, substance or thing related to the incident except to the extent necessary -

(a) to save the life of, prevent harm to, or relieve the suffering of, any person; or

(b) to maintain the access of the public to an essential service or utility; or

(c) to prevent serious damage to or loss of property.

Power to direct formal investigation of incidents, accidents and cases of disease.

25. (1) Government may direct a formal investigation into any accident occurring or any occupational disease or any other disease contracted or suspected to have been contracted in a workplace and of its causes and circumstances, and with respect to any such investigation the following provisions shall have effect:-

(a) Government may appoint a competent person or persons possessing technical, legal or special knowledge to act as Assessor for holding such investigations;

(b) the person or persons so appointed as Assessor shall hold the investigation in open session in such manner and under such conditions as the Assessor may think most effectual for ascertaining the causes and circumstances of the incident, accident or case of disease, and for enabling the court to make the report;

(c) the person appointed to hold any such inquiry shall have all the power of a Civil Court under the Code of Civil

Procedure, 1908 (V of 1908), for the purpose of enforcing the attendance of witnesses and compelling the production of documents and material objects and every person required by such person as aforesaid to furnish any information shall be deemed to be legally bound to do so within the meaning of section 176 of the Pakistan Penal Code (XLV of 1860);

(d) the Assessor shall make a report to the Government stating the causes and circumstances of the incident, accident or case of disease and adding observations or suggestions which he thinks fit to make;

(e) A person holding inquiry under this section may exercise any or all the powers of an inspector appointed under this Act for the purposes of inquiry.

(2) Government may cause the report of the Assessor to be made public.

CHAPTER – IV
OCCUPATIONAL SAFETY AND HEALTH COUNCIL SINDH

Occupational Safety and Health Council Sindh.

26. (1) Government shall establish a Council for Occupational Safety and Health Sindh, which shall consists of following:-

(a) the Secretary Labour and Human Resources Department, Sindh, shall be the Chairperson;

(b) five Government Representatives from Industries Department, Sindh Building Control Authority, Health Department, Sindh Environment Protection Agency; and Fire Department of Local Governments;

(c) four members to represent employers;

(d) four members to represent workers;

(e) four professionals **nominated by the Chief Minister**, at least one of them shall be a women;

(f) three members from civil society, as Government may consider appropriate and necessary, at least one of them shall be a woman; and

(g) An officer from Directorate of Labour Sindh who shall also act as Secretary to the Council.

(2) Members appointed under clause (c) and (d) shall respectively be chosen from the list of names submitted by the representative bodies of the employers and workers recognized by Government for that purpose;

Provided that unless rules are framed in this behalf, the first members to be so appointed shall be chosen from such persons as Government may deem fit.

(4) The non-official member shall hold office for a period of five years and shall be eligible for re-nomination.

(5) The Council may discharge its functions notwithstanding any vacancy in the constitution of the Council.

Functions of the Council.

27. (1) The Council shall perform the following functions:-

(a) advice Government on all matters relating to the objects of this Act which Government may refer to the Council ; and

(b) review legislation relating to occupational safety and health, and recommend to Government for amendments, expansion, clarification under the said legislation.

(2) Without prejudice to the generality of the preceding provision, the Council may make recommendations with regard to –

(i) the formulation and implementation of provincial policies and strategies relating to occupational safety and health;

(ii) the actions to facilitate cooperation between Government, employers, workers and any other persons or organizations engaged in occupational activities;

(iii) the action, if any, which needs to be taken by Government in order to comply with the provisions of any international instrument relating to safety, health and welfare at work;

(iv) any matter arising in the course of the performance of its functions, either of its own motion, or when requested by Government to do so;

(v) the compilation and publication of annual statistics on occupational accidents, dangerous occurrences and occupational diseases as well as measures taken in pursuance of occupational safety and health policy Sindh;

(vi) training on occupational safety and health;

(vii) studies and research or otherwise keep abreast of the scientific and technical knowledge necessary to fulfill the objects of this Act or any other matters relating to safety, health and welfare of workers at workplace;

(viii) any matter relating to gender issues and adolescent at workplace;

(ix) the development or content of codes of practice, standards and guidelines;

(x) advice on any other matter relevant to the occupational safety and health as may be referred to the Council by Government.

Meetings and quorum of the Council.

28. (1) The Council shall meet at least once in every four months in a calendar year.

(2) Nine members of the Council shall form a quorum for any meeting of the Council of whom at least -

(i) Five official members;
(ii) two representatives of employers;
(iii) two representative of workers; and
(iv) one professional or member of civil society.

(3) Subject to the provisions of this Act, the Council may regulate its

own procedure with regard to its meetings and the transaction of business at the meetings.

(4) The Council may appoint committees or sub-committees as it deems fit, to exercise such powers and perform such duties or discharge such functions as may, subject to such conditions, if any, as the Council may impose.

CHAPTER –V
OFFENCES AND PENALTIES

Penalties for offences.

29. Any person who -

(a) willfully obstructs an Inspector in the exercise of any of his lawful powers, or fails to produce on demand by an Inspector any registers or other documents kept in pursuance of the regulations made under this Act, or conceals or prevents or attempts to prevent any person from appearing before, or being examined by an Inspector, or

(b) unless duly authorized, or in case of necessity, removes any fencing, gangway, ladder, lifesaving means or appliance, light, mark, stage or other things required to be provided by or under the regulations made under this Act, or

(c) having removed any such fencing, gangway, gear, ladder, lifesaving means or appliance, light, mark, stage or other thing, omits to restore it at the end of the period for which its removal was necessary,

shall be and liable to a fine or imprisonment, as described in the Schedule.

Penalties for contravention of Act.

30. (1) The following acts and omissions shall constitute violations under this Act:-

(i) obstruction of an Inspector in the exercise of his powers;

(ii) refusal to a lawful order of an Inspector to produce records under this Act;

(iii) failure to maintain records and falsification of records mandatory under this Act;

(iv) failure to display the abstracts of this Act in workplaces;

(v) failure to give notice of accidents;

(vi) failure to furnish returns under this Act;

(vii) smoking or using naked flame near inflammable material without following the regulations prescribed in this behalf.

(2) Whoever is guilty of a violation provided in sub-section (1) shall be liable to a fine or period of imprisonment, as described in the Schedule.

Forgery of certificate.

31. If any person –

(a) forges or counterfeits any certificate required by, under, or for the purposes of, this Act or any regulation or order;

(b) gives or signs any such certificate knowing it to be false in material particular;

(c) knowingly alters or makes use of any such certificate so forged

counterfeited, or false as aforesaid;

(d) knowingly alters or makes use of as applying to any person such certificate which does not so apply;

(e) personates any person named in any such certificate;

(f) falsely pretends to be a person appointed under any provision this Act or any regulation or order;

(g) willfully connives at any such forging, counterfeiting, giving, signing, altering, making use, impersonating or pretending;

(h) willfully makes a false entry in any register , notice, certificate, or document required by, under for the purposes of, this Act any regulation or order, to be kept or served;

(i) willfully makes or signs a false declaration required for the purpose of this Act or any regulation or order;

(j) knowingly make use of any such false entry or declaration,

shall, without prejudice to any other penalty, be guilty of an offence under this Act, and liable to a fine or imprisonment, as described in the Schedule.

Prosecution of offences and recovery and application of fine.

32. (1) All offences under this Act shall be dealt as specified in the Schedule.

(2) In any proceeding under this Act, it shall be sufficient in the plaint or information to allege that the workplace is a workplace within the meaning of this Act and to state the name of the ostensible employer at the workplace, or, person in control of the workplace, or where the employer or person in control is firm, the designation or title of the firm.

(3) Where, with respect to or in consequence of any accident in a workplace, a report is made by any person or persons appointed to hold a formal investigation under this Act or an investigation is held under the Criminal Procedure Code, and it appears from the report, or from the proceedings at the investigation, that any of the provisions of this Act, rules or any regulations or order made thereunder, were not complied with at or before the time of the accident, summary proceeding against any person liable to be proceeded against in respect of such non-compliance may be commenced at any time within six month after the making of the report or the conclusion of the investigation.

Proceeding against State officers.

33. No suit, prosecution or other proceeding shall lie against any person either employed in the public service authorized under this Act, for anything done or purporting to be done in good faith under this Act.

Burden of proof.

34. (1) Where any entry is required by this Act, rules or regulation or order, to be made in the general register or in any other register or record, the entry made by the employer of a workplace or on behalf of the employer shall, as against the employer, be admissible as evidence of the facts therein, and the fact that any entry so required with respect to the observance of any provision of this Act or of any regulation or order made there under has not been made, shall be admissible as evidence that provision has not been complied with.

(2) The burden of proving that any examination or notification required under this Act, has been carried out in accordance with the

provisions of the relevant section, or regulation or order shall be on the duty holder.

CHAPTER- VI
MISCELLANEOUS

Service and sending of documents etc.

35. (1) Any document including summons or order required or authorized to be served under this Act may be served –

(a) on any person by delivering it to that person, or by leaving it at, or sending it by registered post to, the office or residence of that person;

(b) on any firm by delivering it to any partner of the firm, or by leaving it at, or sending it by post to, the office of the firm;

(c) on the employer or person in control of the workplace including any such employer or person in control being a company to which the companies Act applies, in any such manner as specified in (a) and (b) above, or by delivering it or a true copy, to any person apparently not under the age of sixteen years at workplace.

(2) Any such document may be addressed, for the purpose of the service on the employer or person in control of a workplace, to ''the employer'' or ''person in control of the workplace'' at the proper postal address of the workplace, without further name or description.

(3) The Provisions of this section shall apply with necessary modification to documents required or authorized under this Act to be sent to any person, firm, owner or employer, and sending, addressing, and delivery of such documents.

Display at the establishment.

36. (1) There shall be kept posted at the entrances to the workplace or any other place where workers legitimately gather, notice of the postal addresses and the telephone numbers of the health and safety representative, the occupational safety and health committee (where existing) and the Government.

(2) In addition to the notice required to be displayed under the rules, there shall be displayed in every establishment a notice containing abstracts of this Act and rules made there under.

(3) An updated copy of this Act and any rules made under this Act shall be maintained at the place of work and made available for reference by any worker.

Limitation for records.

37. The general register and every other register or record kept in pursuance of this Act shall be preserved and shall be kept available for inspection by any Inspector for at least two to five years, or such other period as may be prescribed for any class or description of register or record, after the date of the last entry in the register or the record.

Contravention of law with dangerous results.

38. (1) Notwithstanding anything hereinbefore contained, whoever contravenes any provision of this Act or of any regulation, rule or by-law or of any order made there under, shall be punishable, if such contravention results in loss of life, with imprisonment which may extend to two years, or with fine which may extend to one hundred thousand rupees, or with both; or if such contravention results in serious bodily

injury, with imprisonment which may extend to one year, or with fine which may extend to fifty thousand rupees, or with both or if such contravention otherwise causes injury or danger to workers or other persons in or about the workplace with imprisonment which may extend to six month or with fine which may extend to twenty thousand rupees or with both.

(2) Where a person having been convicted under this section is again convicted thereunder, he shall be punishable with double the punishment provided by sub-section (1).

(3) Any forum imposing, confirming in appeal, revision or otherwise, a sentence of fine passed under this section may, when passing judgment, order the whole or any part of the fine recovered to be paid as compensation to the person injured, or in the case of his death, to his legal representative:

Provided that, if the fine is imposed in a case which is subject to appeal, no such payment shall be made before the period allowed for presenting the appeal has elapsed, or, if an appeal has been presented, before the decision of the appeal.

Cognizance of offences.

39. No prosecution shall be instituted for any offence under this Act except at the instance of the Chief Safety and Health or an Inspector authorized in this behalf by general or special order in writing by the Chief Inspector Safety and Health.

Limitation of prosecution.

40. No Court other than the Labour Court established under the Sindh Industrial Relations Act, 2013 (Act XXIX of 2013) shall take cognizance of any offence under this Act unless complaint thereof has been made -

(a) within six month of the date on which the offence is alleged to have been committed; or

(b) within six month of the date on which the alleged commission of the offence came to the knowledge of the Inspector; or

(c) in any case where a person has been appointed by Government under section 25 to hold an investigation, within six months of the date of the making of the report referred to in sub-section (2) of that section.

Reference to formal investigation in lieu of prosecution in certain cases.

41. (1) If the Labour Court trying any case instituted at the instance of the Chief Inspector or of an Inspector under this Act is of opinion that the case is one which should in lieu of a prosecution, be referred to a formal investigation under section 25, it may stay the Criminal proceedings and report the matter to Government with a view to such reference being made.

(2) On receipt of a report under sub-section(1), Government may refer the case for formal investigation under section 25, or may direct the Court to proceed with the trial.

Contract void.

42. Any contract or agreement, whether made before or after the commencement of this Act, whereby an worker relinquishes any right conferred by this Act shall be null and void in so far as it purports to deprive him of such right.

Collection of

43. The authorities and officers entrusted with powers and duties

under this Act for the proper and effective exercise of their powers and discharge of their duties, call for statistics and information and ensure their correctness. The information so collected shall not be disclosed in respect of individual undertaking or establishments. **statistics**.

44. Within six months from the commencement of this Act, all employers and workers shall alter their existing contracts and agreements and shall take such other actions as are necessary to comply with the provisions of this Act and all associations of employers and trade unions shall alter their constitutions, working and procedure to bring them in conformity with the provisions of this Act. **Transitional Provisions**.

45. The provisions of section 5 of the Limitation Act, 1908 (IX of 1908), shall apply in computing the period within which an application is to be made, or any other thing is to be done, under this Act. **Limitation.**

46. Government may, by notification in the official Gazette, amend the Schedules to this Act and thereupon the Schedule shall be deemed to have been amended accordingly after one month from the date of the notification. **Amendment in Schedules.**

47. If any difficulty arises in giving effect to any provisions of this Act, the Government, may be notification in the Official Gazette, make such provisions as may appear to it to be necessary for the purpose of removing the difficulty. **Removal of difficulties.**

48. No suit, prosecution or other legal proceedings shall lie against any person for anything which is in good faith done or intended to be done in pursuance of this Act or any rule made thereunder. **Indemnity.**

BY ORDER OF THE SPEAKER
PROVINCIAL ASSEMBLY OF SINDH

G.M.UMAR FAROOQ
SECRETARY
PROVINCIAL ASSEMBLY OF SINDH

SCHEDULE

Section	Offence	Punishment
4	General duties of Employers	Fine of up to Rs.50,000/-
5	General duties of self-employed and employers to persons other than their workers.-	Fine of up to Rs.50,000/-
6	General duties of persons concerned with premises to persons other than their workers	Fine of up to Rs.50,000/-
7	General duty of persons in control of certain premises in relation to harmful emissions into atmosphere.-	Fine of up to Rs.50,000/-
9	General duties of suppliers as regards articles and substances for use at work.-	Fine of up to Rs.50,000/-
10	Safety and Health	Fine of up to Rs.250,000/-
11	Written statement of policy	Fine of up to Rs.250,000/-
12	Consultation	Fine of up to Rs.250,000/-
13	Training of health and safety representative	Fine of up to Rs.50,000/-
14	Not to interfere with or misuse things provided pursuance to certain provisions.	Fine of up to Rs.50,000/-
15	Precautions against contagious or infectious	Fine of up to Rs.50,000/-

	disease at workplaces	
16	Compulsory vaccination and inoculation.	Fine of up to Rs.10,000/- for each offence
17	Registration of workplaces and approval of site, buildings and other constructions to be used as workplaces	Fine of up to Rs.50,000/-
23	Notification and investigation of accidents, dangerous occurrences and occupational illnesses	Fine of up to Rs.50,000/-
24	No interference at accident scene-	Fine of up to Rs.50,000/-
31	Forgery of certificate, false entries and false declaration	Fine of up to Rs.50,000/-
29	willfully obstructs an Inspector in the exercise of any of his lawful powers	Fine of up to Rs.50,000/-
29	fails to produce on demand by an Inspector any registers or other documents kept in pursuance of the regulations made under this Act.	Fine of up to Rs.50,000/-
29	Conceals or prevents or attempts to prevent any person from appearing before, or being examined by an Inspector.	Fine of up to Rs.50,000/-
29	removes any fencing, gangway, ladder, lifesaving means or appliance, light, mark, stage or other things required to be provided by or under the regulations made under this Act, unless duly authorized, or in case of necessity.	Fine of up to Rs.50,000/-
29	having in case of necessity removed any such fencing, gangway, gear, ladder, lifesaving means or appliance, light, mark, stage or other thing, omits to restore it at the end of the period for which its removal was necessary.	Fine of up to Rs.50,000/-
30	refusal to a lawful order of an inspector to produce records under this Act	Fine of up to Rs.50,000/-
30	failure to maintain records and falsification of records mandatory under this Act	Fine of up to Rs.50,000/-
30	failure to display the abstracts of this Act in workplaces	Fine of up to Rs.50,000/-
30	failure to give notice of accidents	Fine of up to Rs.50,000/-
30	failure to furnish returns under this Act	Fine of up to Rs.50,000/-
30	smoking in the presence of inflammable material or using a naked light in the presence of inflammable material without following the regulations prescribed in this behalf	Fine of up to Rs.50,000/-
30	violation of provisions relating to the employment of children;	Fine of up to Rs.50,000/-

GEL Pvt Ltd

AMBIENT AIR QUALITY	GEL/QMR/FF/708/04A Revision #: 00 ISSUE #: 01 ISSUE DATE:01.04.2019

Report Reference No: GEL/LAB/13137-A/11115/0620 Reporting Date: 29/06/2020
Department : Gaseous Emissions Lab
Name of Customer : United Waste Mangement (UWM-001)
Address : Near Al-Asif Kanta, Northern bypass Karachi
Location : Northern Bypass near Al-asif Kanta
Date of Analysis : 19/06/2020
Date of Completion of Analysis: 29/06/2020

S.No	Parameter	Unit	SEQS Limit	Result	Method
1	Carbon monoxide (CO)	mg/m^3	10	1.3	EVM7 / Haz Scanner
2	Sulphur dioxide (SO2)	$\mu g/m^3$	120	33.2	VRAE-PGM-7840 / Haz Scanner
3	Particulate Matter (SPM)	$\mu g/m^3$	500	182	EVM7 / Haz Scanner
4	Particulate Matter (PM10)	$\mu g/m^3$	150	70	EVM7 / Haz Scanner
5	Particulate Matter (PM2.5)	$\mu g/m^3$	75	23	EVM7 / Haz Scanner
6	Noise	dB	75	58	Noise Level Meter
7	Oxides of Nitrogen (NO2)	$\mu g/m^3$	80	19	VRAE-PGM-7840

SEQS = Sindh Environmental Quality Standards
This report is not valid for any negotiations

Approved By G.M. Field Operations

End of the Report

Global Environmental Lab (Pvt) Ltd
2nd Floor, Alwan-e-Sanat, ST-4/2, Sector-23, Korangi Industrial Area, Karachi.
Ph: (92-21) 35113804-5 Fax: (92-21) 35113806 Email:info@gel.com.pk

Process description:

M/s United Waste Management (UWM) intends to install the incineration units at proposed facility, The proposed project will be located at Etihad Town, Khyber Chowk, Northern By-Pass, Karachi at 24°59'37.05"N 66°57'7.27"E. The emission design standards of these Korean based incineration units will be in compliance with the prevailing environmental legislation of Sindh. During the initial/planning phase, UWM have hired the services of a reputable consultant, Environmental Consultancy Services (ECS), for the preparation of Environmental Impact Assessment (EIA) Study for the proposed project in compliance with the promulgated environmental legislation. The location of the plant is shown in Figure 2.

The incinerator consists of multiple chambers. The waste is loaded in the primary chamber once it reaches the temperature of 600^{o}C. The temperature inside the incinerator varies from 600 ^{o}C to 850 ^{o}C. Once the waste is treated, the gases formed as a result of burning then transfer to the secondary chamber for combustion. This chamber consist of zig zag compartments to ensure a retention time of unto 2 seconds with temperature varying from 800 ^{o}C to 1250 ^{o}C. To reduce the temperature of the gases coming out of combustion chamber, they move to the third chamber. Once cooled down, they transfer to the fourth chamber which acts as a wet scrubber to remove any pollutants in the gas stream through high speed jets. After the purification and treatment, gases are safe to be release through chimney outlets that rise 30ft above the ground level, having a diameter of 0.792 meters. The temperature of emitting gasses depends upon the type of fuel being used. It is estimated to be around 225 ^{o}C if LPG is used and approximately 250 ^{o}C if diesel is used as fuel. The automated burners can operate on LPG and diesel, both, and are controlled through a panel board which automatically turns on/off once the required temperature is reached in either of the two chambers. The whole process is supplemented by blower motors which provide a mix of oxygen to achieve complete combustion. At the end of the process, the

weight of the waste incinerated in reduced by 90-95% whereas the volume of the waste is reduced to 90%.

As mentioned, the burners of the incinerator will be either LPG or diesel operated which involves the combustion of fuel in both cases. Therefore, some major pollutants including the Oxides, Nitrogen (NOx), Carbon monoxide (CO), Sulfur dioxide (SO2) and Particulate matter (PM10) are a potential threat to the environment. The monitoring and control of these emissions to protect the surrounding environment (fauna & flora) and residential communities around the project site as per the regulatory requirement of the Sindh Environmental Act 2014 and Sindh Environmental Quality Standards (SEQS) published in 2014, will be taken care of through the installation of state of art technology selection and control devices.

In order to comply with the Sindh Environmental Protection Act 2014, the quantitative analysis (simulation) of impacts of the expected demission on air quality of the project site surrounding has been carried out using the United States Environmental Protection Agency (USEPA) approved regulatory air quality model; AERMOD. The objectives of the air quality impact assessment (through dispersion modeling) are to (a) predict the impact of the proposed Project on the air quality of the surrounding area and (b) determine whether predicted air quality exceeds applicable SEQS standards and guidelines.

Figure 1: Geological Location of Proposed Incineration Facility Project, Karachi.

Overview; AERMOD:

AERMOD (American Meteorological Society/Environmental Protection Agency Regulatory Model) 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. The data information flow is shown in Figure 2.

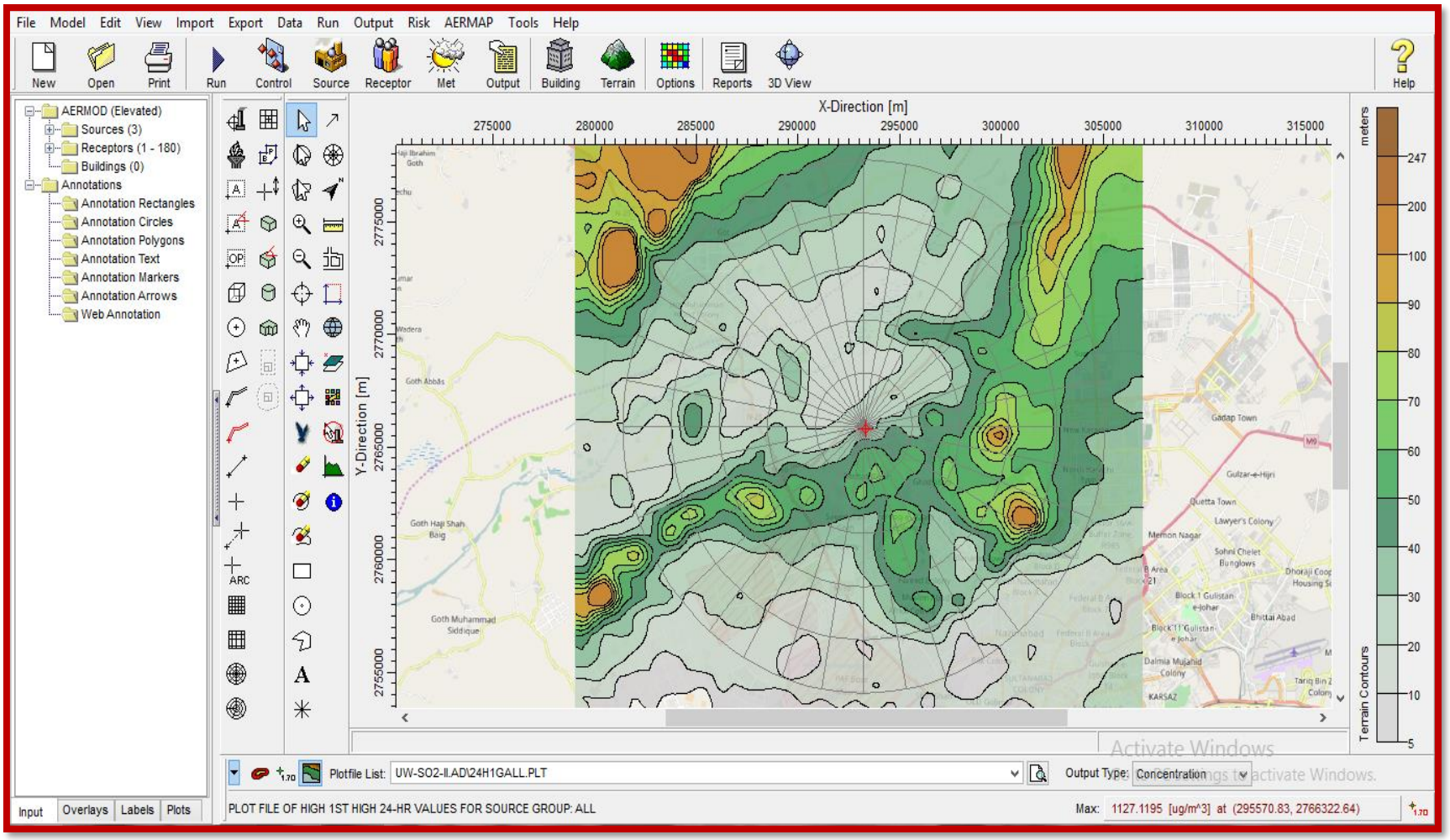


Figure 2: An O Overview of AERMOD Modeling Tool[24]

[24] https://www.weblakes.com/products/aermod/resources/lakes_aermod_view_release_notes.pdf

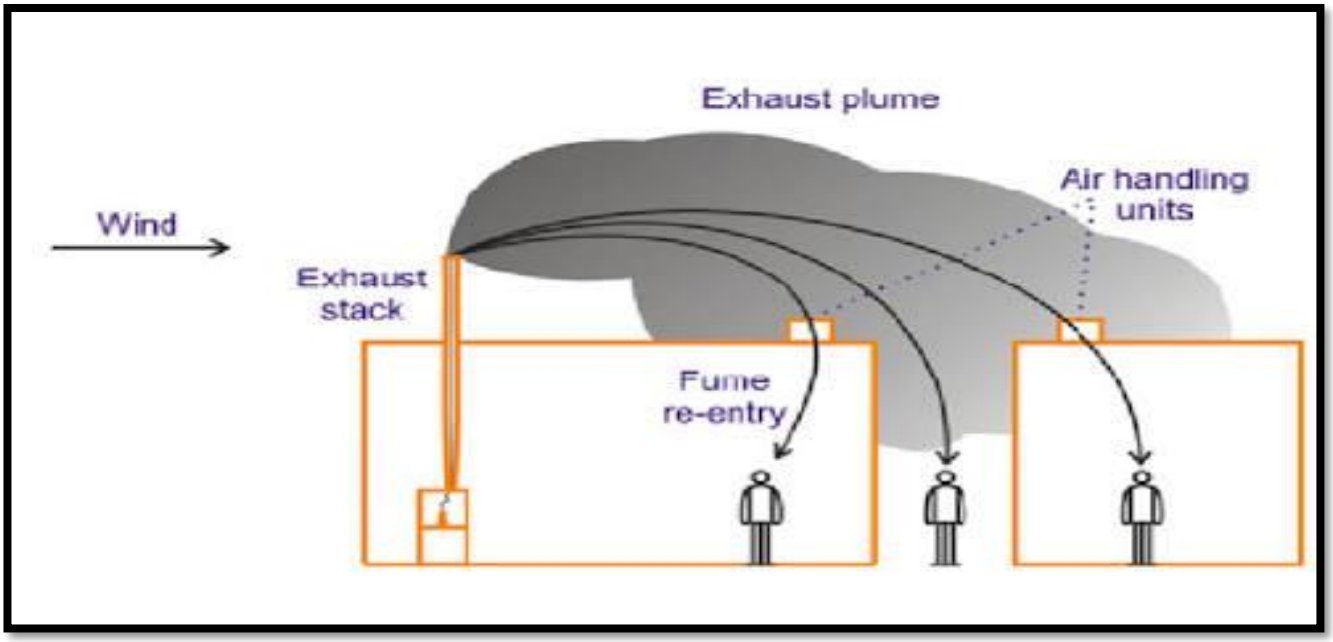
Mathematical expressions; Air Dispersion Modeling

For a better understanding of impact of emissions, it is essential to understand the concept of emission dispersion and the governing mathematical expressions/models. In this section, the theoretical concept of the air dispersion modeling of emissions is described.

The air dispersion models are used to estimate the downwind concentration of pollutants emitted by various pollution sources such as industrial facilities and regional public traffic. Dispersion models play an important role in the industrial and regulatory communities. The concept of dispersion of air emission from a stationary source like stack, in atmosphere with prevailing meteorological condition at the site and how the pollutants deposit in ground in surrounding after their release from the source is shown in Figure 3. The schematic view of this dispersion of emissions from an industrial stack is shown in Figure 4 and for the development of mathematical expression that governs dispersion, known as Gaussian-Plume, is shown in Figure 5. All of the near field dispersion modeling is based upon this equation with some assumptions given in this report. The typical models used to demonstrate compliance with applicable National Ambient Air Quality Standards (as in present case, Punjab Environmental Quality Standards) as part of new source review, prevention of significant deterioration and non-attainment permitting efforts.

To conduct a dispersion modeling analysis, data is entered in the following four major categories:

- Meteorological conditions; such as wind speed, wind direction, stability class, temperature and mixing height;
- Emissions parameters; such as source location, source height, stack diameter, gas exit velocity, gas exit temperature and emission rate;
- Terrain elevations; and
- Building parameters; such as location, height and width.



. **Figure 3. Schematic View of Plume Dispersion Modeling of Emission from a Stack**

(Source. www.eng.utoledo.edu/~akumar/IAP1/Air_Quality_Modeling.ppt)

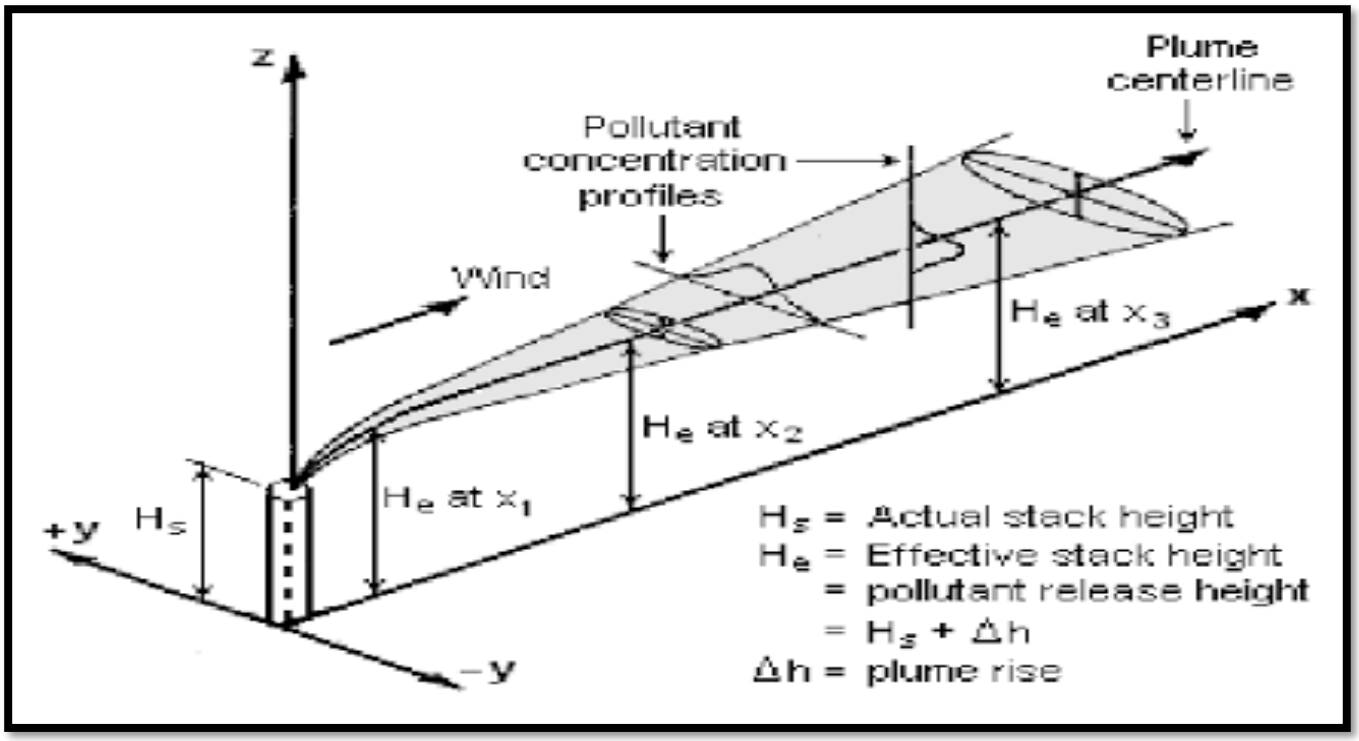


Figure 4. Schematic View of Plume Dispersion Modeling of Emission from a Stack

(Source. www.eng.utoledo.edu/~akumar/IAP1/Air_Quality_Modeling.ppt

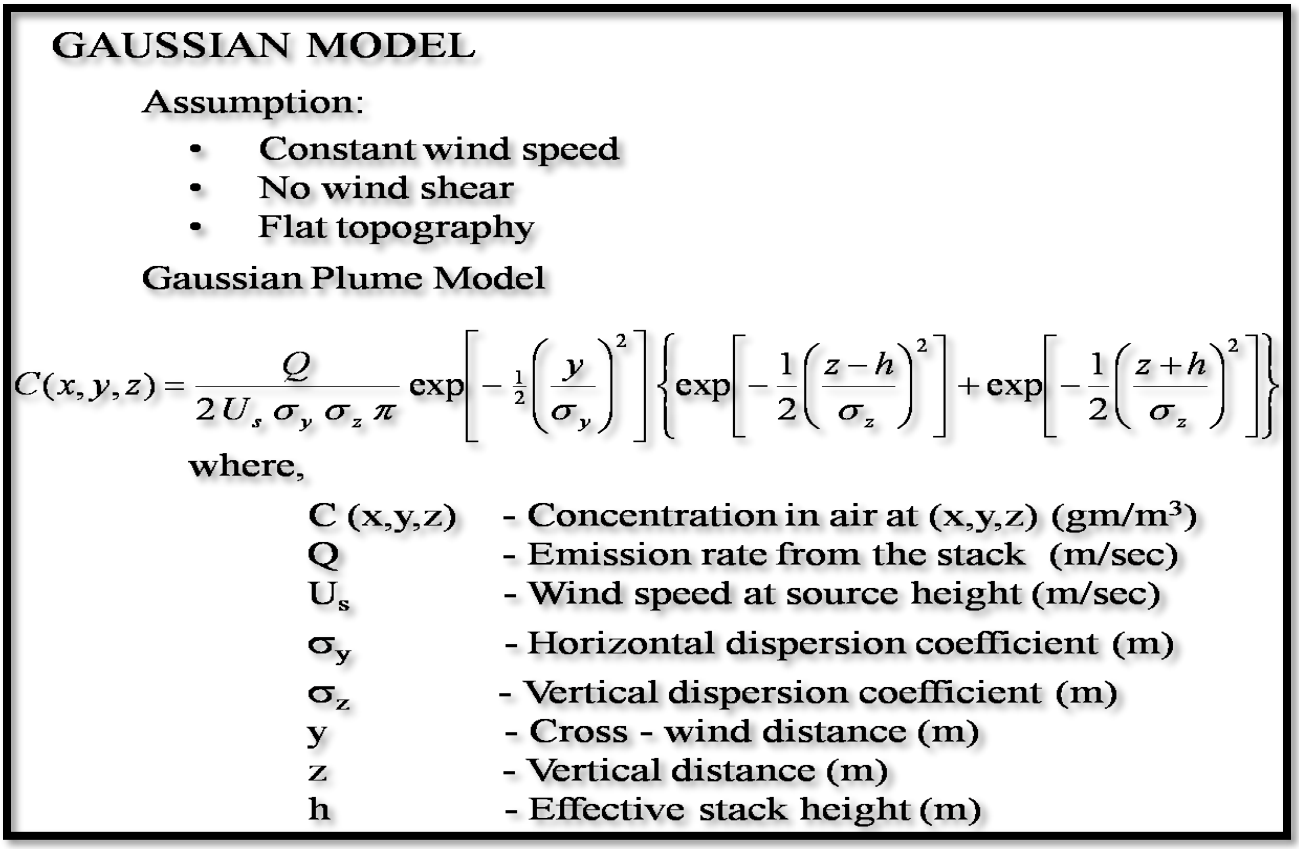


Figure 5. Mathematical Expression of Gaussian-Plume Models

(Source. www.eng.utoledo.edu/~akumar/IAP1/Air_Quality_Modeling.ppt)

Limitations of Gaussian-plume models

Causality effects

Gaussian-plume models assume pollutant material to be transported in a straight line instantly, like a beam of light, to receptors that may be several hours or more in transport time away from the source.

Low wind speeds

Gaussian-plume models 'break down' during low wind speed or calm conditions due to the inverse wind speed dependence of the steady-state plume equation, and this limits their application.

Straight-line trajectories

In moderate terrain areas, these models will typically overestimate terrain impingement effects during stable conditions because they do not account for turning or rising wind caused by the terrain itself. This issue is addressed by AERMOD and SCREEN, which are specifically designed for this purpose.

Spatially uniform meteorological conditions

Gaussian steady-state models have to assume the atmosphere uniformity across the entire modeling domain, and that transport and dispersion conditions exist unchanged long enough for the material to reach the receptor. Convective conditions are one example of a non-uniform meteorological state that Gaussian-plume models cannot emulate.

The Effect of Meteorological Conditions, Surface Roughness and Terrain Data on Dispersion of Emissions

As descried below, wind direction, wind speed and atmospheric stability are the most important meteorological parameters governing atmospheric dispersion of pollutants:

- Wind direction determines the sector of the compass into which the plume is dispersed.
- Wind speed affects the distance which the plume travels over time and can affect plume dispersion by increasing initial dilution of pollutants and inhibiting plume rise.

- Atmospheric stability is a measure of the turbulence of the air, and particularly of its vertical motion. It, therefore, affects the spread of the plume as it travels away from the source. New generation dispersion models use a parameter known as the Monin-Obukhov length that, together with wind speed, describes the stability of the atmosphere.

For meteorological data to be suitable for dispersion modeling purposes, a number of parameters need to be measured on an hourly basis. These parameters include wind speed, wind direction, cloud cover and temperature.

Roughness of the terrain over which a plume passes can have a significant effect on dispersion by altering the velocity profile with height and the degree of atmospheric turbulence. This is accounted for in the meteorological data processing by a parameter called the 'surface roughness length'. The surface roughness length within the study area has been calculated based on the land use (grassland) around the meteorological station within a 1km and a 15km area and calculated within the AERMET meteorological processor. The presence of elevated terrain can significantly affect (usually increase) ground level concentrations of pollutants emitted from elevated sources such as stacks, by reducing the distance between the plume center line and ground level and increasing turbulence and, hence, plume mixing. The effect of complex terrain occurs when gradients exceed 1 in 10m (10%). As the study area consists of relatively flat terrain, its inclusion within the dispersion modeling is not considered necessary.

DISPERSION MODELING METHODOLOGY:

Modeling Input Data

Following three types of necessary input data of emissions modeling have been used in present study;

Stack and Emission Data

The 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

Table-1. Stack and Emission Input Data

Parameter	Unit	Incinerator-I	Incinerator-II	Incinerator-III
Temperature	°C	200	200	200
Diameter	m	0.61	0.61	0.61
Stack height	m	10.668	10.668	10.668
Exit velocity	m/s	25	25	25
PM10 Emission Rate	g/s		52.575	52.575
CO Emission Rate	g/s	26.2875	26.2875	26.2875
SO2 Emission Rate	g/s	157.725	157.725	157.725
Nox Emission Rate	g/s	157.725	157.725	157.725

Meteorological Input Data

The hourly surface meteorological data (in SAMSON format) and Upper Air Met Profiling data (in fsl format) of Karachi acquired during 2016 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

Following baseline ambient air quality data collected by EPA certified lab in the project area is used as input in modeling the study. It is shown in Table 2

Table 2: Baseline Ambient Air Quality Measurement Data in/Around Project Site

S. No.	Parameters	Unit	SEQS *	Measuring Value	Method/Instrument
1.	Nitrogen Dioxide, (NO_2)	µg/m^3	80	19.00	Gas Phase Chemiluminescence
2.	Carbon Monoxide, (CO)	mg/ m^3	5	1.3	GFC Spectroscopy
3.	Sulphur Dioxide, (SO_2)	µg/m^3	120	33.2	Fluorescence
4.	Particulate Matter,(PM_{10})	µg/m^3	150	70.0	β Ray Absorption

Other Modeling Assumption

In order to predict the results of dispersion modeling over the entire modeling area (10 km radius from the project site i.e UWMS), the model study area was divided into a Uniform Polar Grid Network with a total of 180 grids and 36 radial directions. The terrain elevation effect in the dispersion was incorporated using AERMAP tool.

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 Ranke values are plotted in form of counters in selected modeling domain (10 km radius from the project site i.e UWMS)
iii. The plants operate on diesel fuel throughout the year to study the worst case of emissions
iv. Output emissions concentrations are modeled for 24-hrs and annual averaged period for NOx, SO2, And PM10 while 1-hr and 8-hrs averaged for CO. 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

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 Act, 20164

ii. Tabular form showing the source contribution, magnitude of impact and compliance level of SEQS for each pollutant.

Modeling Scenarios;

The impact of emissions from the stacks of proposed waste incineration facilities of one incinerator, with capacity of 500 kg/hr, when it operates and when three incinerators

operate at full cumulative capacity of 1500 kg/hr, collectively, were quantified through dispersion modeling by assuming the following emission scenarios;

Scenario-I: Impact of emissions when only 1 incinerator is in operation at project site (Normal Scenario) for 24 hrs throughout the year

Scenario-II: Impact of emissions when 3 incinerators are in operation at project site (worst case scenario) for 24 hrs throughout the year

Results and Discussion

In present study, the model predicted the ground level concentrations of Oxides of Nitrogen (NOx), Sulphur Dioxide (SO2), Carbon Monoxide (CO) and Total Particulate Matter using designed emission, meteorological and baseline ambient quality datasets. The predicted ambient air quality concentrations of these pollutants in/around the proposed project area was determined by sum of concentrations of emissions of these pollutants predicted by model and baseline ambient quality concentrations collected through field survey at the project site.

In the next sections, the results were discussed on the basis of pollutants showing the compliance status of predicted ambient ground level concentrations of each of pollutants due proposed project with SEQS in/around the project site. This discussion covers the results of emissions projected to be released into atmosphere for each of three assumed scenarios of operation of incinerators with the assumption that emissions are only released from the stacks of each of the incinerator in the project area. Although model predicted the emission with 1-hr, 24-hrs and annual averaged concentrations of the pollutants, however, the concentrations of 24- averaged are compared with SEQS ambient limits as the baseline data is available for 24 hourly averaged basis in/around the proposed project area.

Scenario-1: This scenario discuss the estimation of impact of emissions on ambient air quality from the proposed project with only 1x incinerator in operation for 24 hours

throughout the year. The incremental concentrations of emissions of Carbon monoxide (CO), Oxides of Nitrogen (NO2 as NOx), Sulphur dioxide (SO2) and Particulate Matter (as PM10) are 0.025 m/m3 (8-hr averaged), 48.65 ug/m3 (24-hr averaged), 57.78 ug/m3 (24-hr averaged) and 36.56 ug/m3 (24-hr averaged) respectively. While ambient data of each of the pollutant was collected through field survey by EPA certified lab, the predicted concentrations of the pollutants were determined by summing up the (a) incremental concentrations predicted by model using hourly meteorological data of 2016 and (b) measured ambient air baseline data around the power plant within radius 22.3 km.

For Scenario-I, the predicted ambient concentrations of CO, NOx, SO2 and PM10 are 0.72 mg/m3 (8-Hrs averaged), 67.65 ug/m3 (24-hr averaged), 90.98 ug/m3 (24-hr averaged) and 106.56 ug/m3 (24-hr averaged) respectively. The rest of the details are given in Table 3. The spatial distribution of CO emissions from the project site are shown in figure 5 and figure 6 for 1-hrs and 8-hrs average, respectively. While spatial distribution of NOx, SO2 and PM10 for 24 hourly and annual averaged are shown in Figures 7 to 12 respectively in Annexure-I.

The scenario-1 is considered as normal operational scenario since this modeling simulation depict that the predicted ambient air concentrations would be within the SEQS limits of ambient air.

Scenario-II: With an assumption that all 3x incernators would be operational for 24 hours throughout the year, this is considered an operational and the worst case scenario of emissions impact on the air quality from the proposed project. The incremental emission concentrations of CO, NOx, SO2 and PM10 would be 0.053 mg/m3 (8-hrs averaged), 76.44 ug/m3 (24 hrs averaged), 64.22 ug/m3 (24 hrs averaged) and 57.58 ug/m3 (24 hrs averaged), respectively.

In Scenario-II, the predicted ambient concentrations of CO, NOx, SO2 and PM10 are 1.57 mg/m3 (8-Hrs averaged), 95.44 ug/m3 (24-hr averaged), 97.42 ug/m3 (24-hr averaged) and 128.7 ug/m3 (24-hr averaged) respectively as given in Table 4. The spatial distribution

of CO emissions from the project site are shown in Figure 13 and 14 for 1-hrs and 8-hrs average, respectively. While spatial distribution of NOx, SO2 and PM10 for 24 hourly and annual averaged are shown from Figures 15 to 20 respectively in Annexure-II..

Table 3: Process contribution and Predicted Ambient Air Concentrations Selected Criteria Pollutants for Scenario-I

Pollutants	Averaging Time	Unit	Model Predicted Incremental Concentrations from Process/project (a)	SEQS Limits	Baseline Ambient Air Concentrations (b)	Predicted Ambient Concentrations (c=a+b)
CO	1-hrs	mg/m3	0.19	10	1.3	1.49
	8-hrs		0.025	5	0.7	0.72
NOx	24-hrs	ug/m3	48.65	120	19	67.65
	Annual		19.45	-	-	-
PM10	24-hrs	ug/m3	36.56	150	70	106.56
	Annual		9.62	-	-	-
SO2	24-hrs	ug/m3	57.78	120	33.2	90.98
	Annual		16.44	-	-	-

Table 4: Process contribution and Predicted Ambient Air Concentrations Selected Criteria Pollutants for Scenario-II

Pollutants	Averaging Time	Unit	Model Predicted Incremental Concentrations from Process/project (a)	SEQS Limits	Baseline Ambient Air Concentrations (b)	Predicted Ambient Concentrations (c=a+b)
CO	1-hrs	mg/m3	0.27	10	1.3	1.57
	8-hrs		0.053	-	0.7	0.75
NOx	24-hrs	ug/m3	76.44	120	19	95.44
	Annual		26.34	-	-	
PM10	24-hrs	ug/m3	58.77	150	70	128.77
	Annual		15.55	-	-	
SO2	24-hrs	ug/m3	64.22	120	33.2	97.42
	Annual		29.41	-	-	

Conclusion:

The current dispersion modeling of emission from proposed project with the installation of 3x incinerators by M/s United Waste Management Private Limited (UMPL) have the cumulative capacity of 1500 Kg/hr and 500 kg/hr each. It is located at the Northern Bypass, Manghopir, Karachi.

The modeling results indicate that the concentrations i.e. CO, NOx, SO2 and PM10, are well within SEQS limits of each pollutant and, therefore, the impact of emission from proposed project to ambient air within domain of 10 km radius is predicted as insignificant with the given prevailing meteorological conditions within modeling domain and comply with SEQS limits for ambient air for both emission scenarios.

ANNEXURE-I

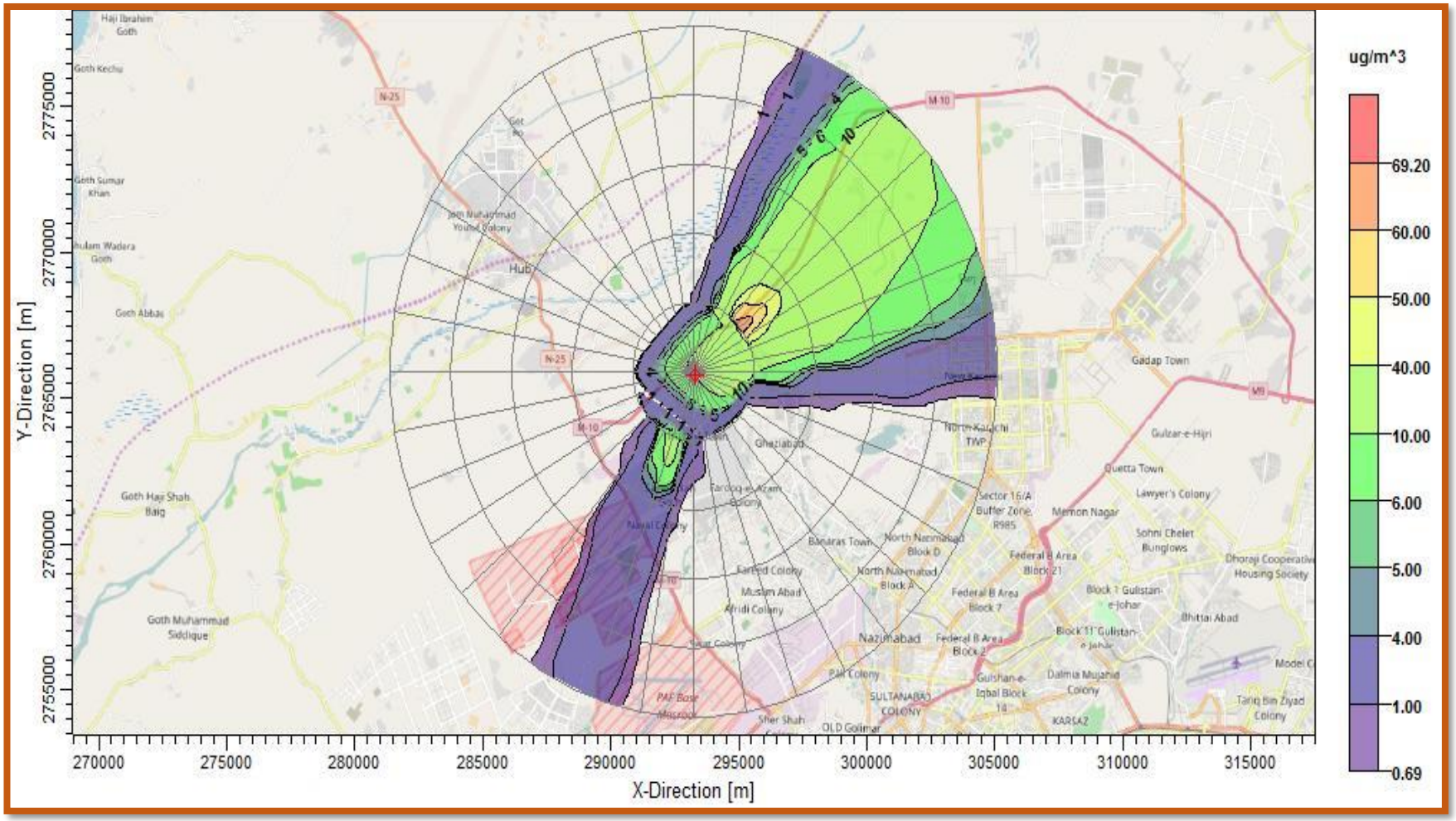


Figure 5: Spatial Dispersion of 1st Highest Concentrations of CO for 1-Hrly Averaged for Scenario-I

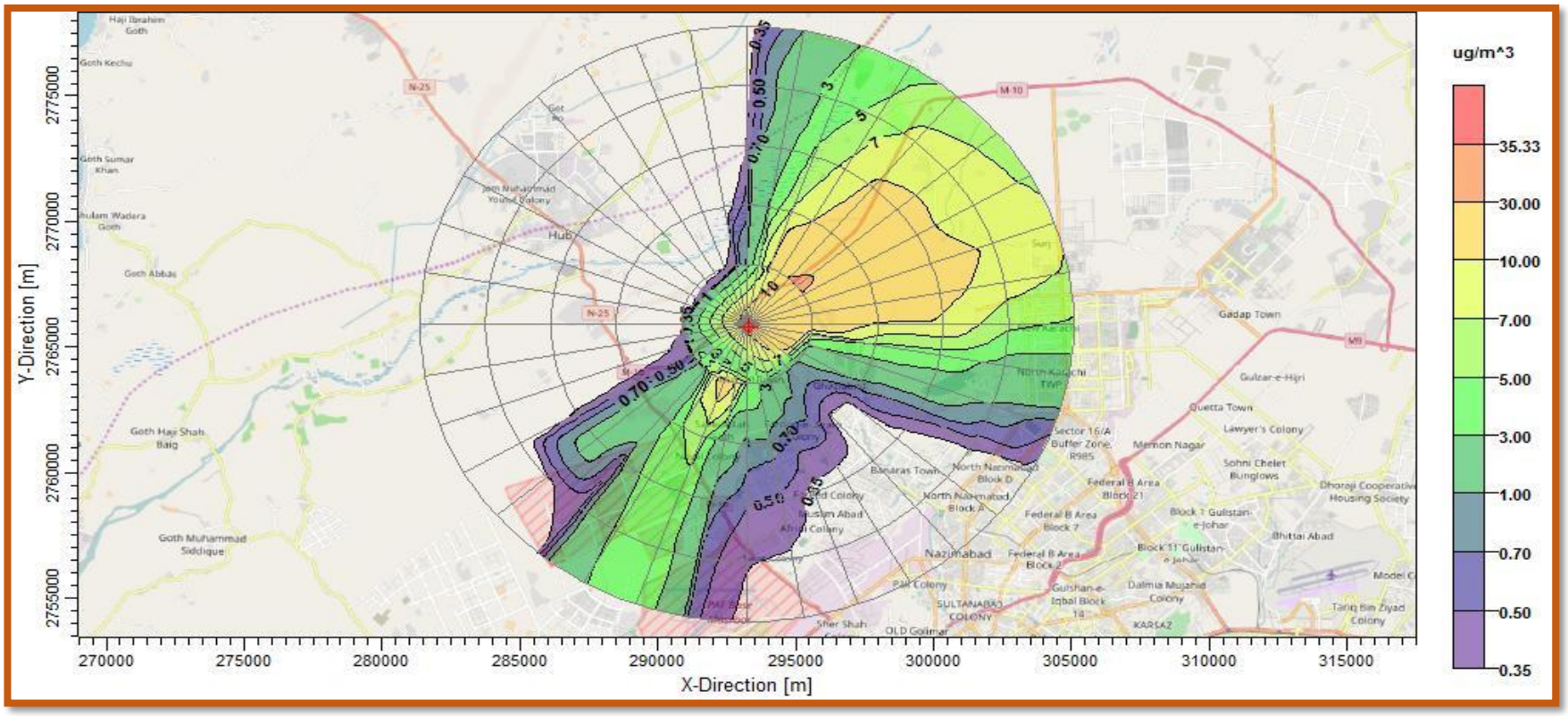


Figure 6: Spatial Dispersion of 1st Highest Concentrations of CO for 8-Hrly Averaged for Scenario-I

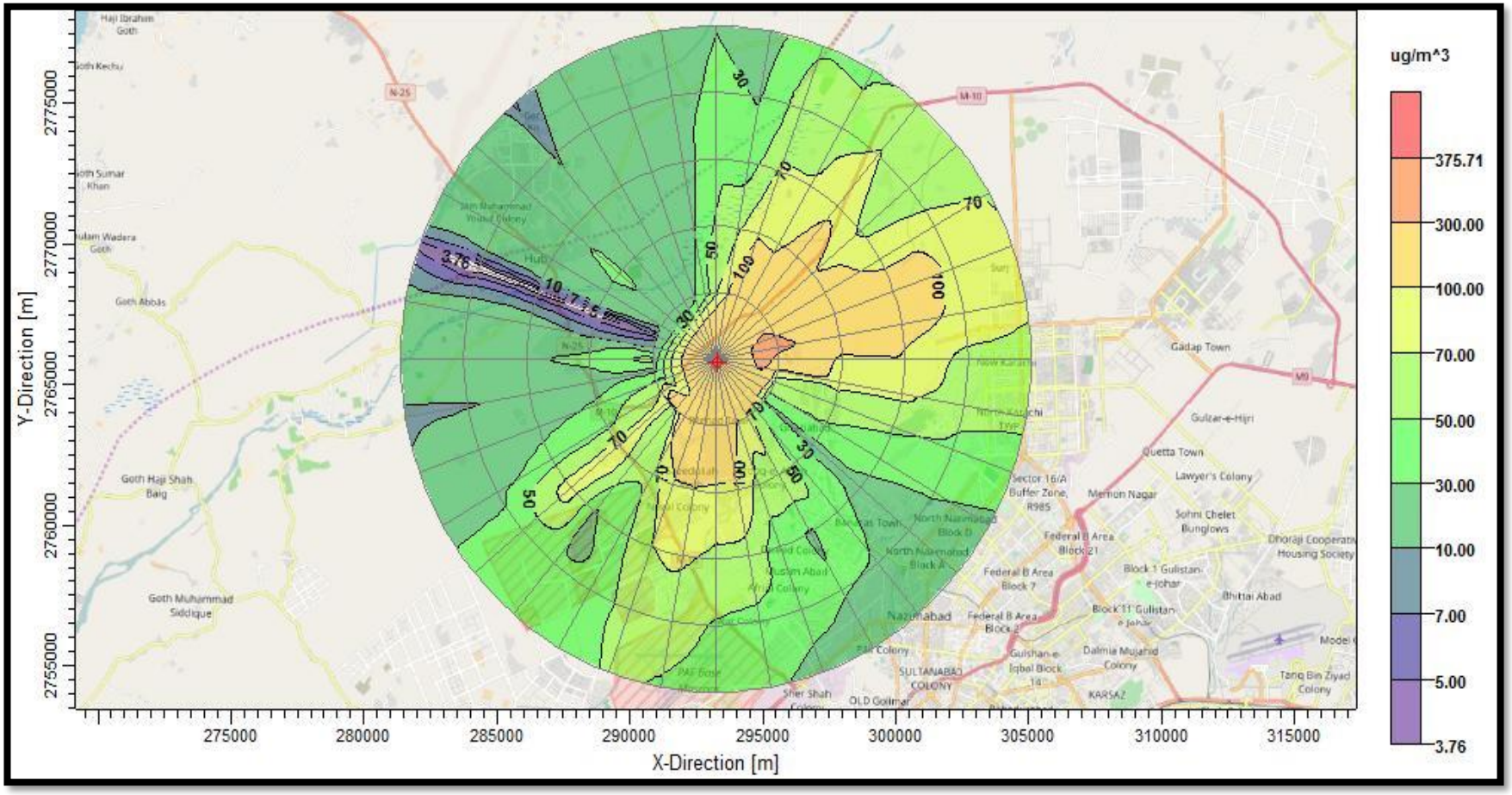


Figure 7: Spatial Dispersion of 1st Highest Concentrations of NOx for 24-Hrly Averaged for Scenario-I

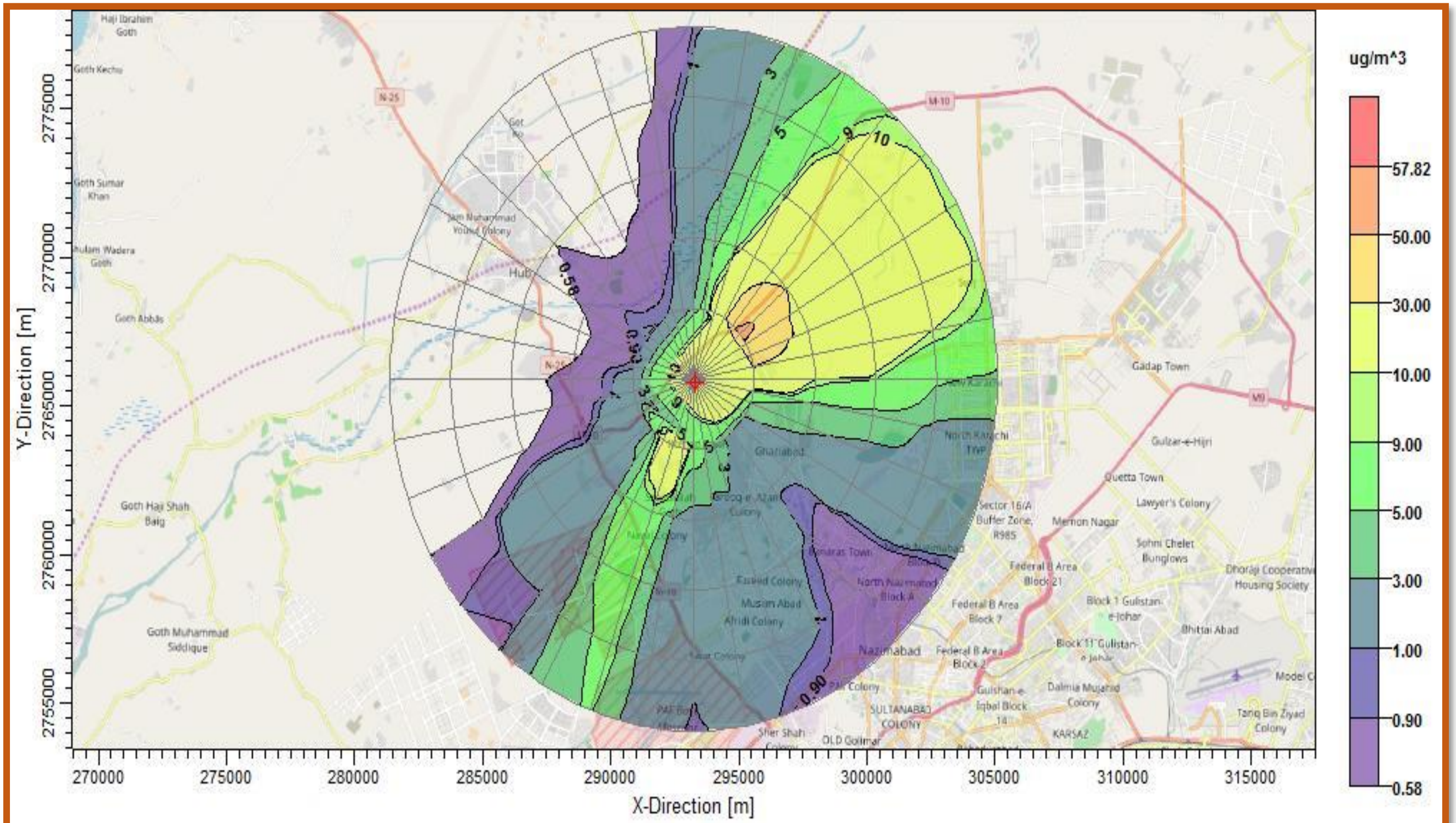

ug/m^3
57.82
50.00
30.00
10.00
9.00
5.00
3.00
1.00
0.90
0.58
Y-Direction [m]
X-Direction [m]

Figure 8: Spatial Dispersion of NOx for Annual Averaged for Scenario-I

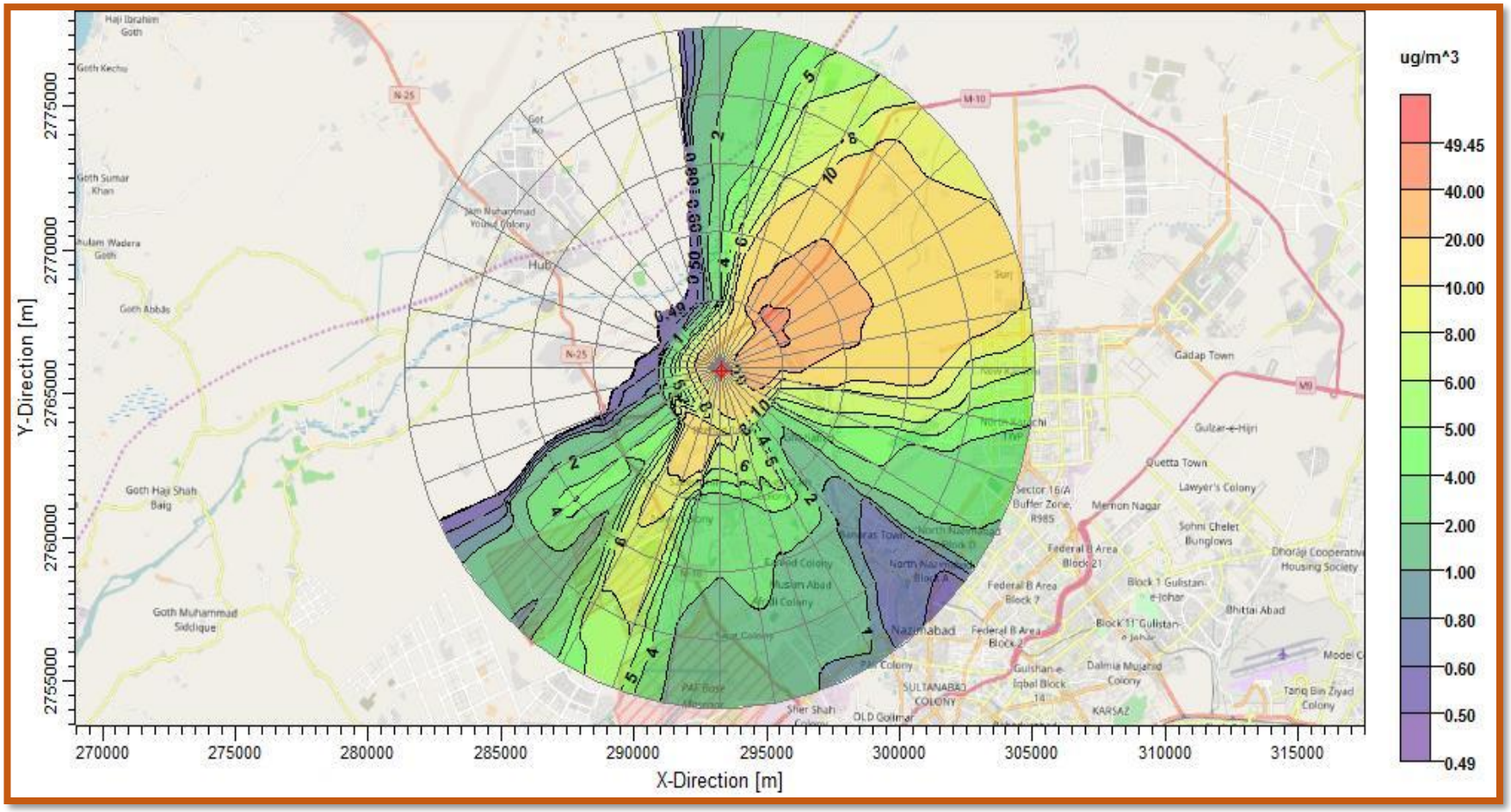


Figure 9: Spatial Dispersion of 1st Highest Concentrations of PM10 for 24-Hrly Averaged for Scenario-I

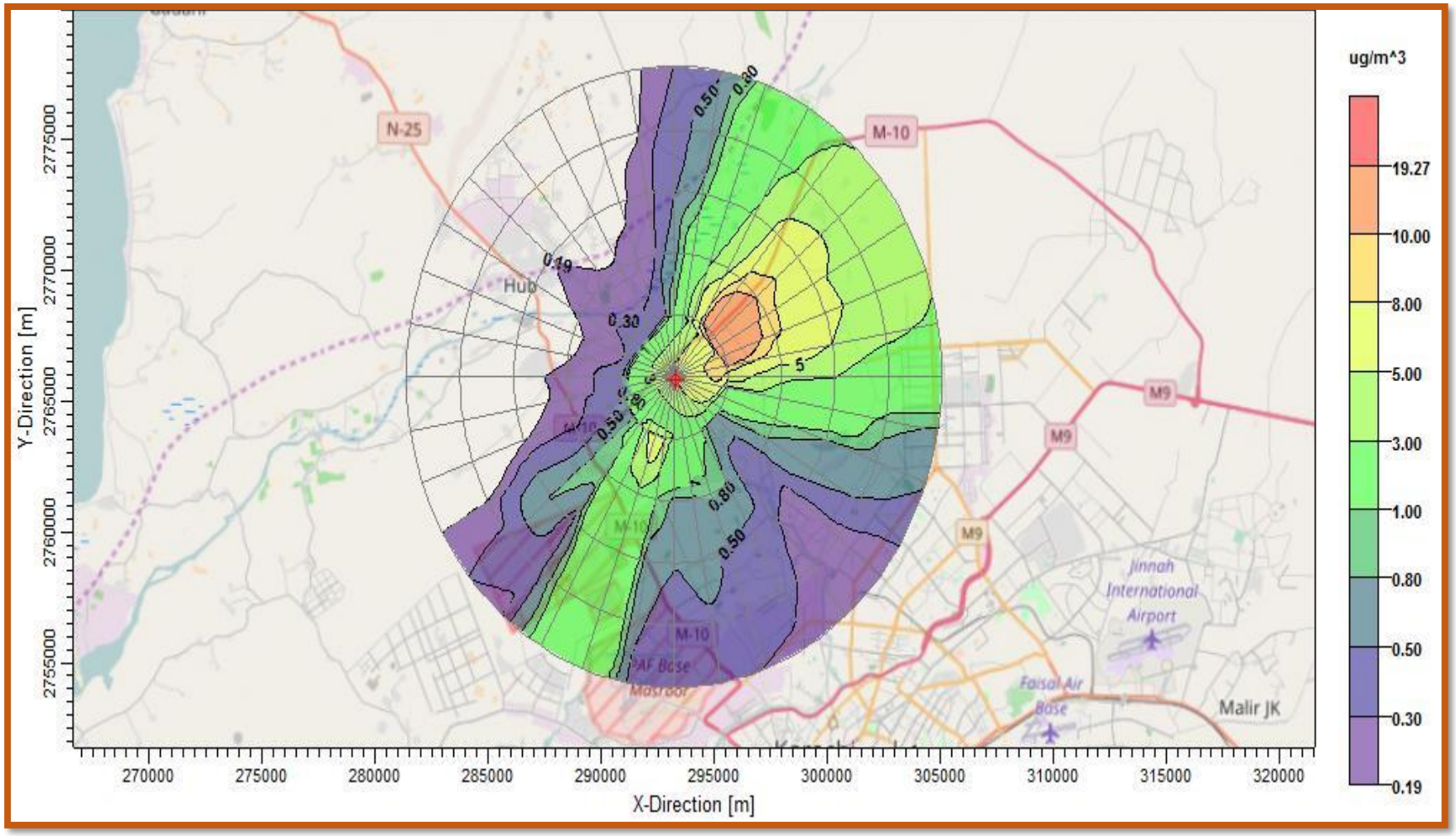


Figure 10: Spatial Dispersion of PM10 for Annual Averaged for Scenario-I

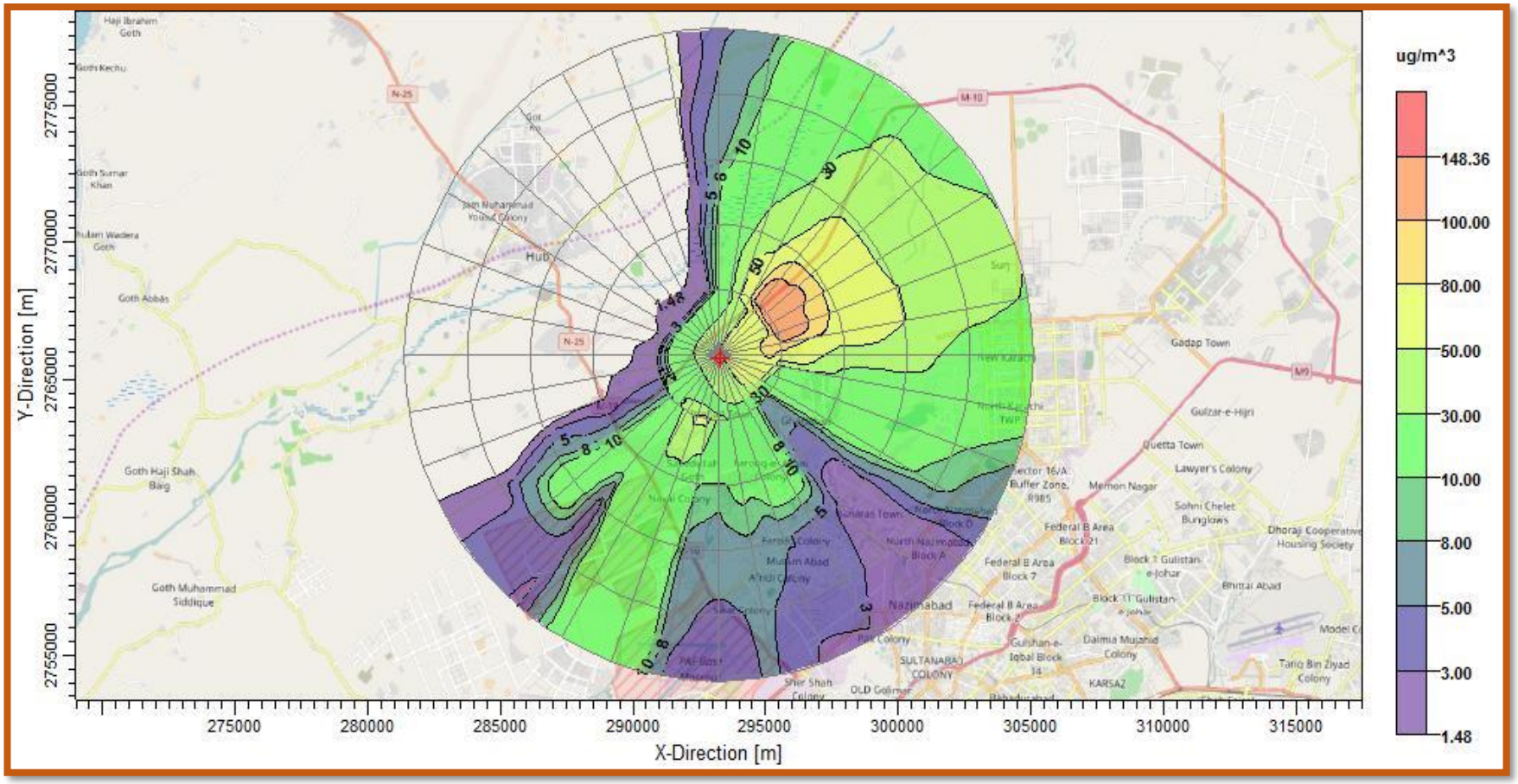


Figure 11: Spatial Dispersion of 1st Highest Concentrations of SO2 for 24-Hrly Averaged for Scenario-I

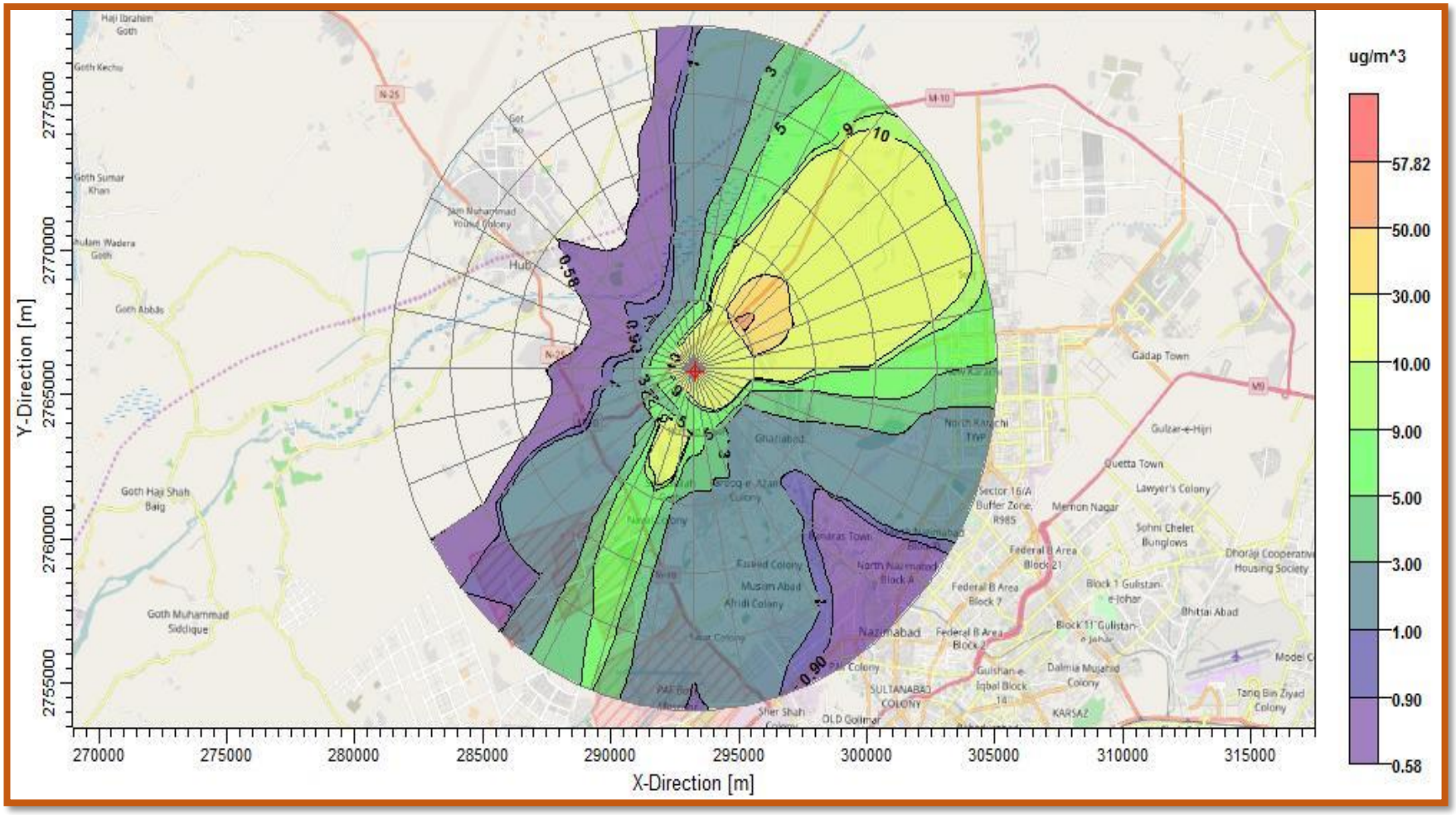


Figure 12: Spatial Dispersion of SO2 for Annual Averaged for Scenario-I

ANNEXURE-II

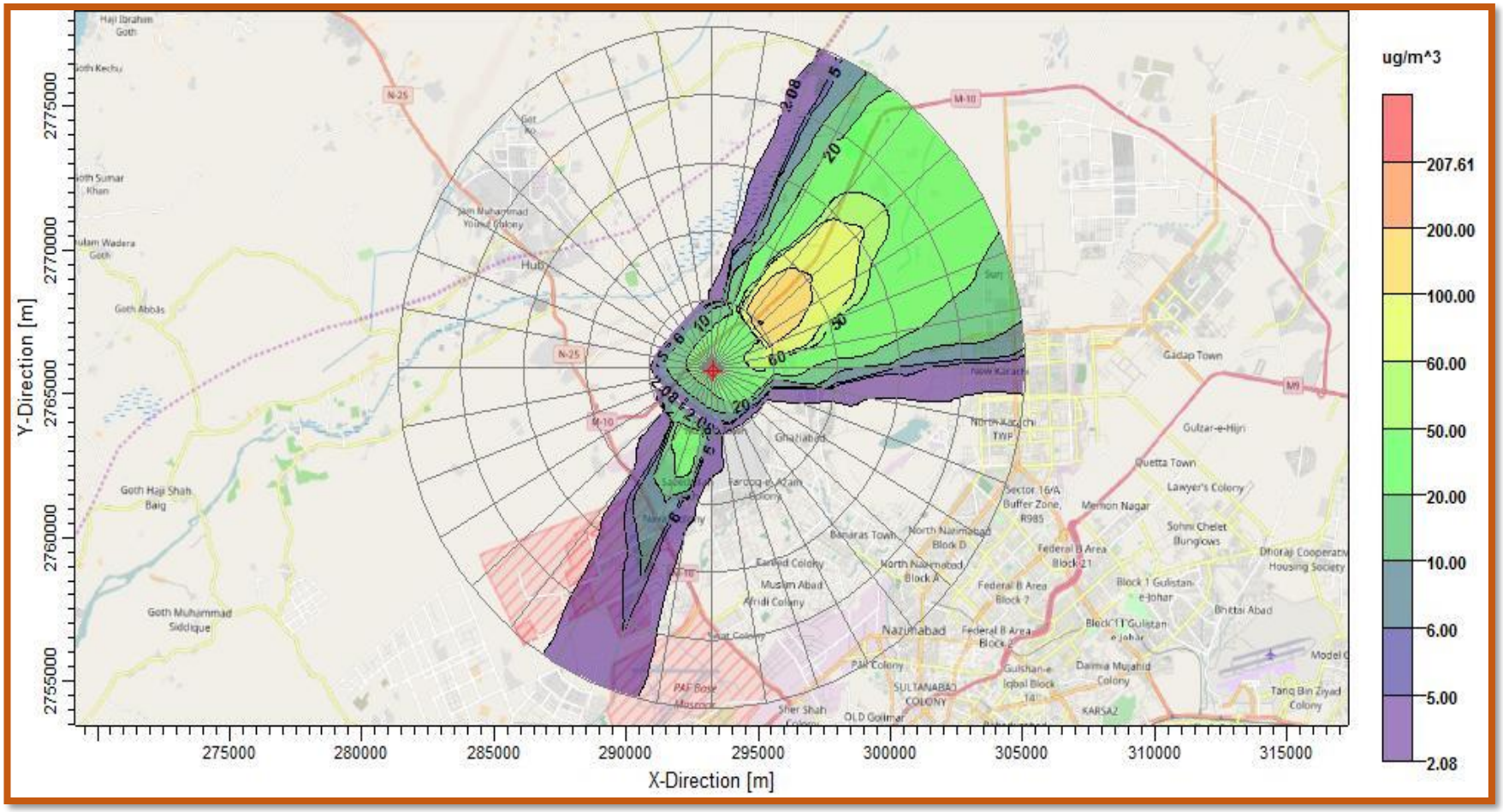


Figure 13: Spatial Dispersion of 1st Highest Concentrations of CO for 1-Hrly Averaged for Scenario-II

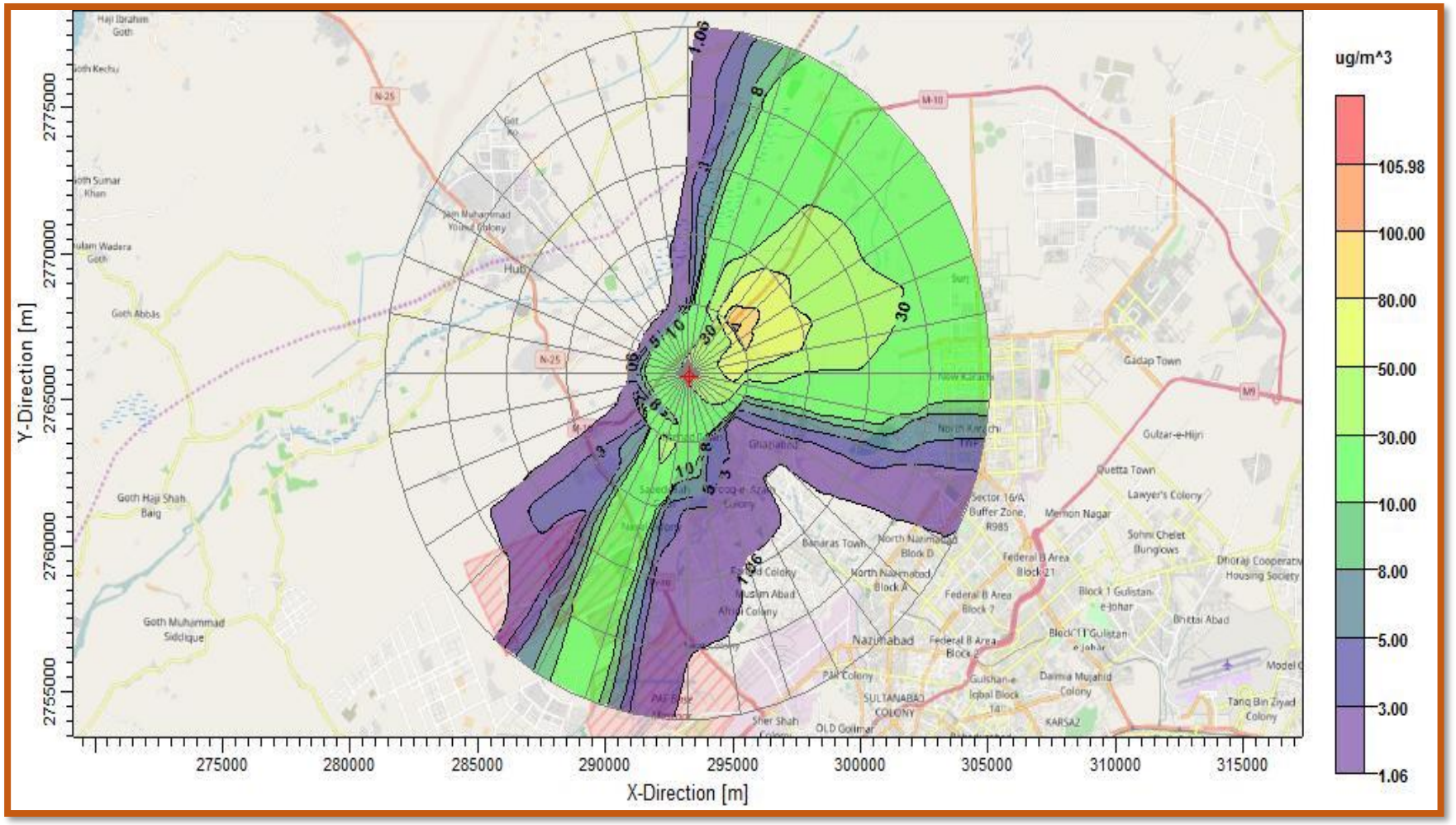


Figure 14: Spatial Dispersion of 1st Highest Concentrations of CO for 8-Hrly Averaged for Scenario-II

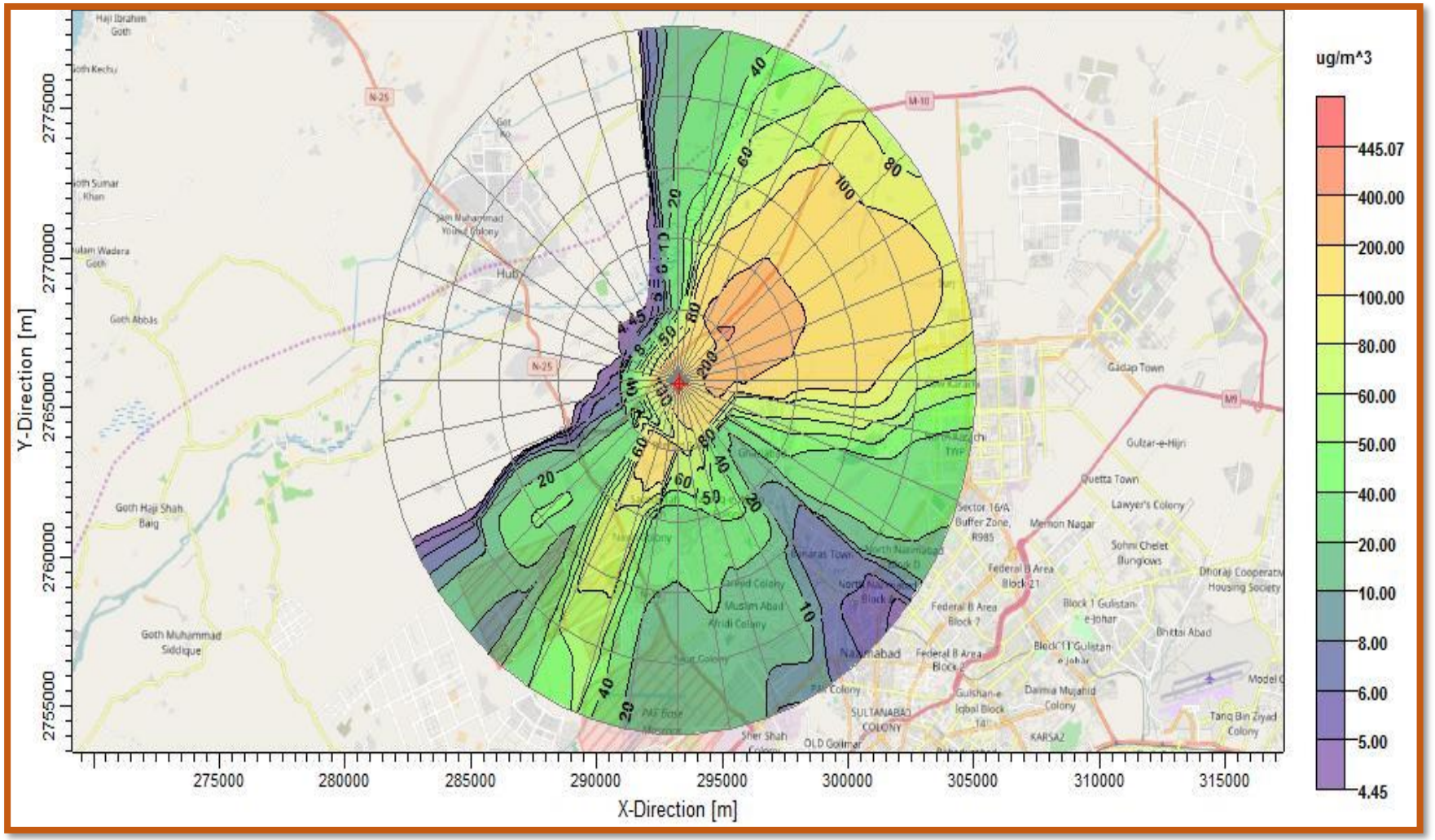


Figure 15: Spatial Dispersion of 1st Highest Concentrations of NOx for 24-Hrly Averaged for Scenario-II

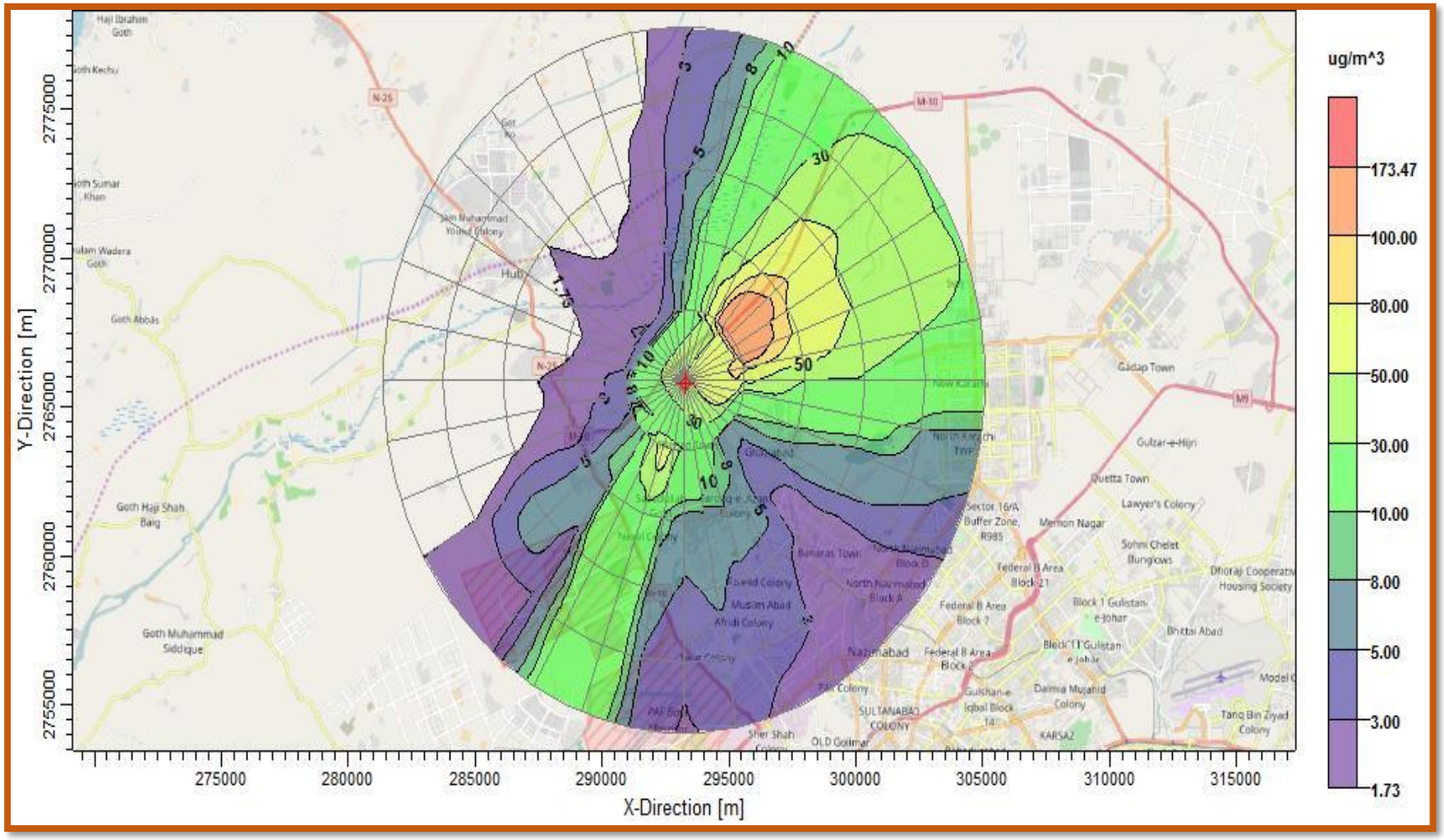


Figure 16: Spatial Dispersion of NOx for Annual Averaged for Scenario-II

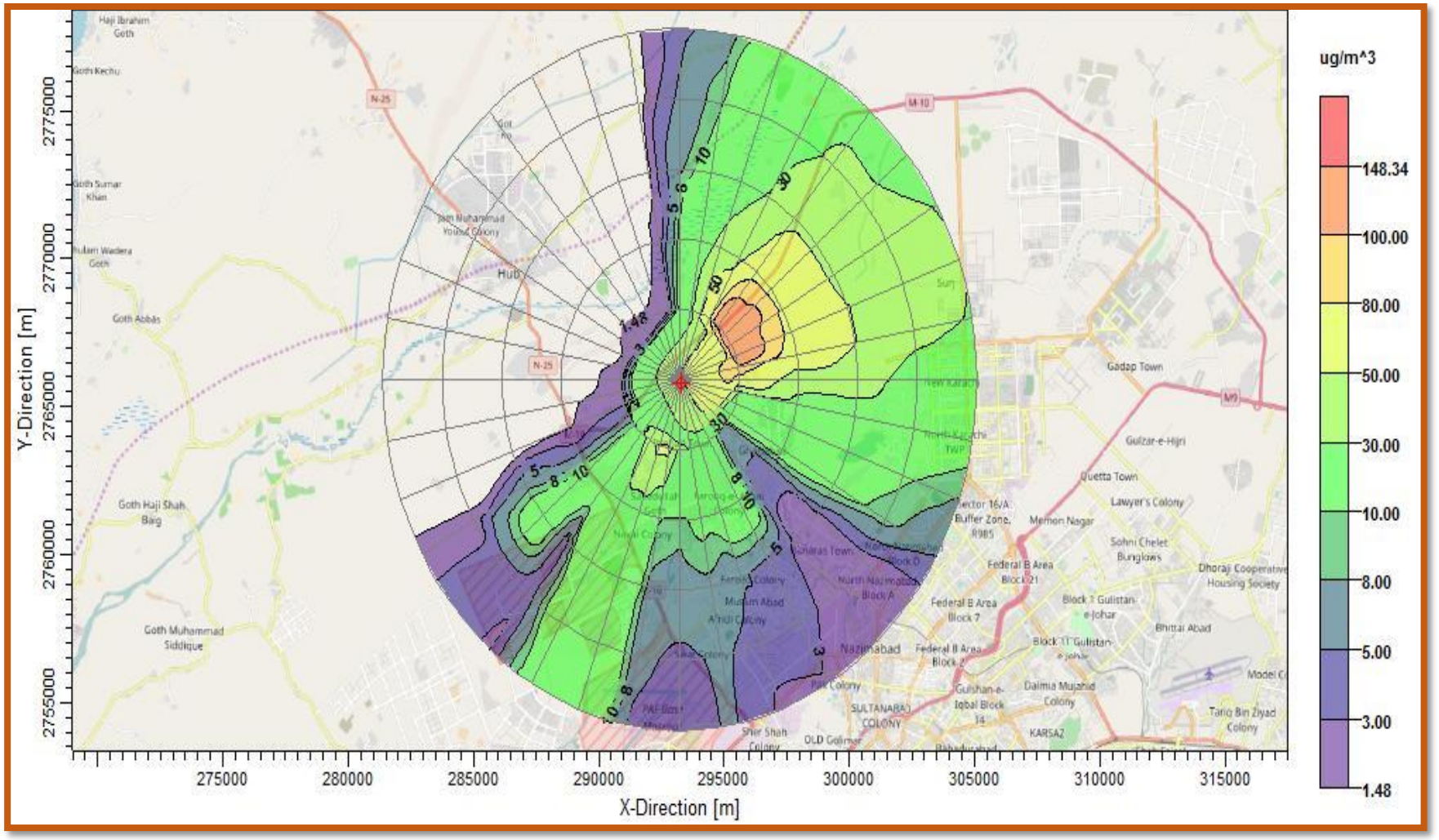


Figure 17: Spatial Dispersion of 1st Highest Concentrations of PM10 for 24-Hrly Averaged for Scenario-II

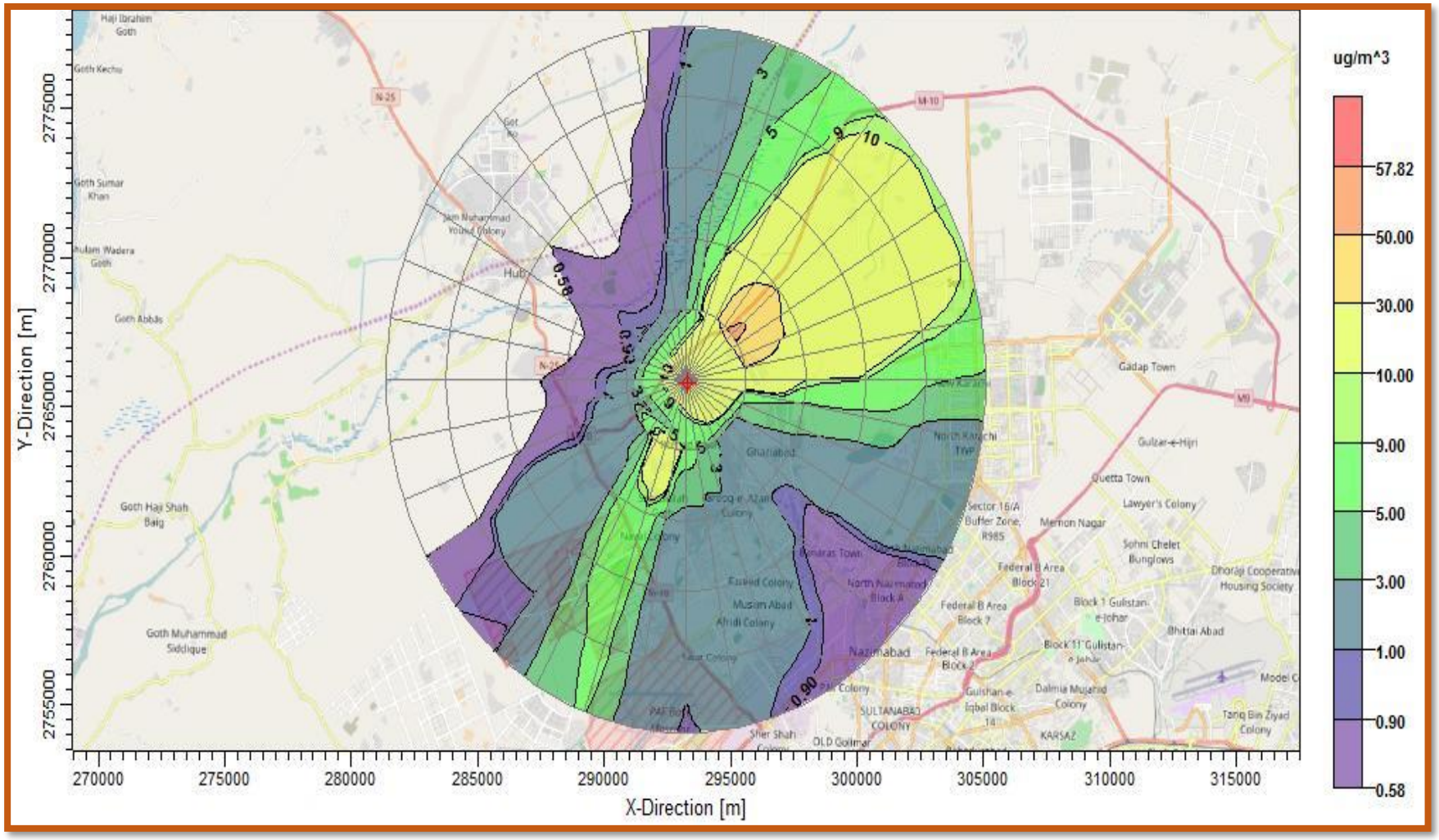


Figure 18: Spatial Dispersion of PM10 for Annual Averaged for Scenario-II

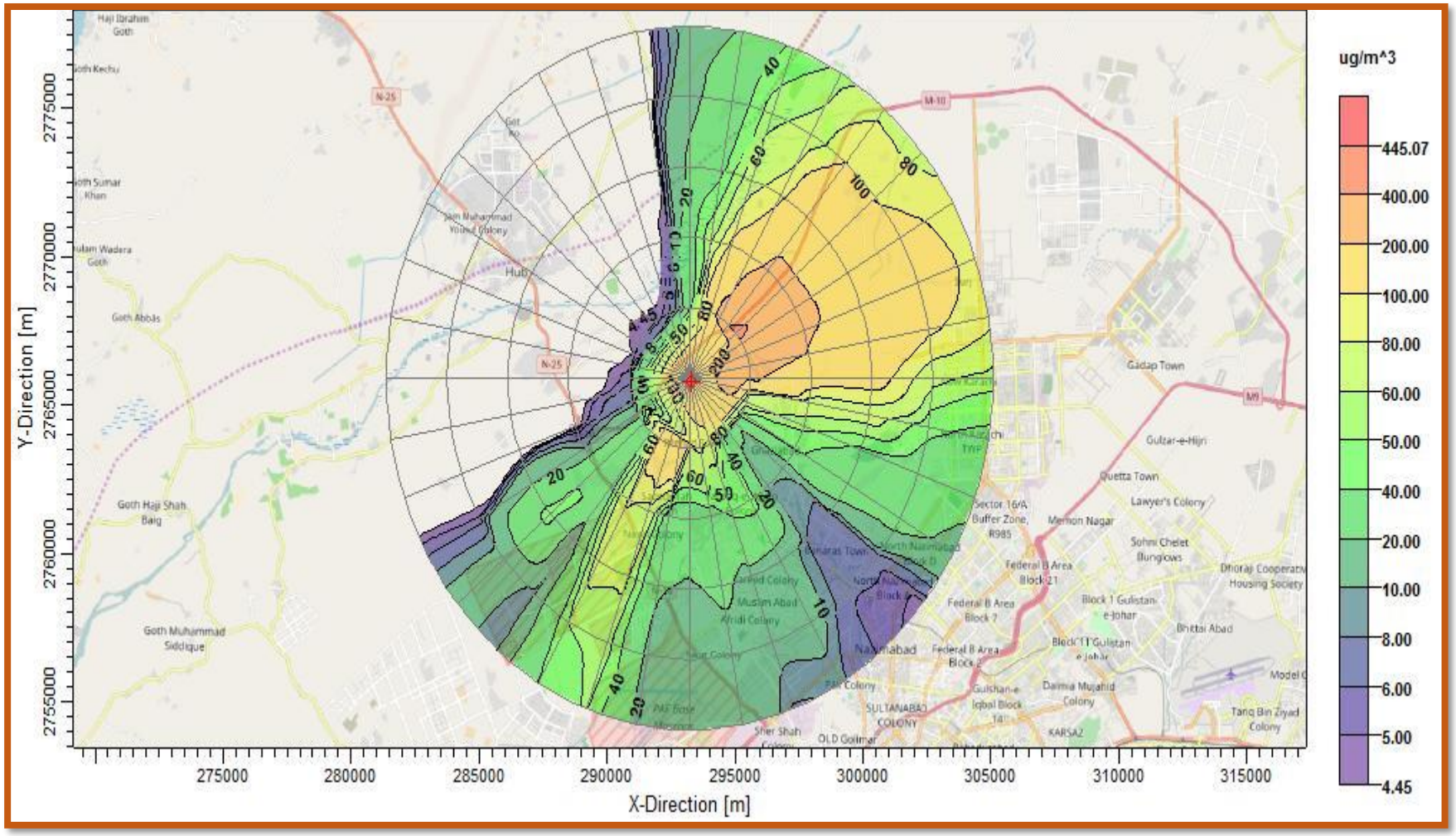


Figure 19: Spatial Dispersion of 1st Highest Concentrations of SO2 for 24-Hrly Averaged for Scenario-I

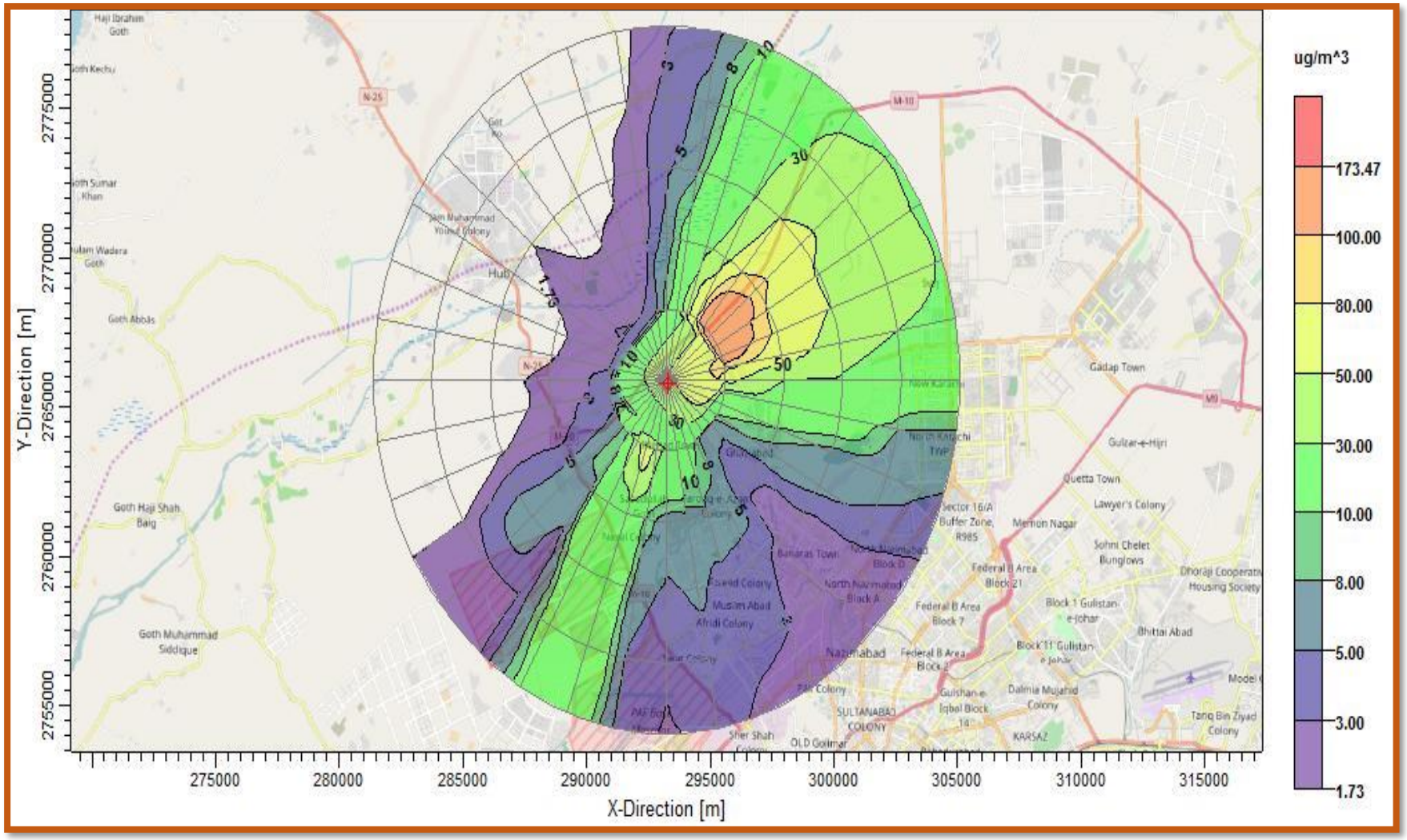


Figure 20: Spatial Dispersion of SO2 for Annual Averaged for Scenario-II