

FINAL REPORT

FEBRUARY 2023

ENVIRONMENTAL IMPACT ASSESSMENT
COMBINED EFFLUENT
TREATMENT PLANT
AT S.I.T.E. SUKKUR



**EMC Pakistan
Private Limited**





ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

COMBINED EFFLUENT TREATMENT PLANT AT SITE SUKKUR

Final Report
February 2023
Ref: EIA/07/02/23



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Executive Summary

This report, prepared as per the guidelines of the Sindh Environmental Protection Agency, will serve to identify the Environmental Impacts associated with the construction and operation of the proposed Combined Effluent Treatment Plant (CETP) at SITE Sukkur, along with a robust description on environmental practices and measures that the Proponent (Sindh Industrial Trading Estates (Guarantee) Limited, Sukkur) will undertake to mitigate the identified environmental impacts.

This Environmental Impact Assessment (EIA) report documents clearly and impartially the environmental impacts of the proposed project and identify and propose mitigation measures to eliminate and/or minimize the identified impacts. The proposed project comprises of construction and operation of CETP at SITE Sukkur to treat effluent being released by industrial units located at SITE Sukkur.

The development is planned with the objective to treat the industrial effluent so they meet Sindh Environmental Quality Standards (SEQS) and then discharge it into River Indus.

The CETP is proposed to be located northwest of SITE Sukkur, at 27°44'20.7N and 68°50'42.39E. Below is an overview of the project:

Table EX-1: Project Overview	
Name of Project	Combined Effluent Treatment Plant at SITE Sukkur
Proponent	Sindh Industrial Trading Estates (Guarantee) Limited, Sukkur
Project area	Sukkur, Sindh
Location	27°44'20.7N and 68°50'42.39E
Treatment capacity	3 million gallons per day (MGD)
EIA Consultant	EMC Pakistan Pvt. Ltd. Mr. Syed Nadeem Arif Managing Director Email: mail@emc.com.pk Address: Office # 503, Anum Estate Building, Main Shahrah-e-Faisal (Opposite Duty-Free Shop), Karachi, Pakistan. Tel: +92-21-34311466, 34321532 Fax: +92-21-34311467

The EIA report has been prepared in compliance with the mandatory requirements of Section 17 of Sindh Environmental Protection Act, 2014, which states that “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 Agency approval in respect thereof”.

Sindh Environmental Protection Agency (SEPA) shall review the IEE & EIA and accord approval subject to such terms and conditions as it may prescribe or require.

In accordance with the Sindh EPA Environmental Assessment Regulations 2021, the project has been categorized as follows;

Schedule – III

H. Waste Disposal and treatment

3. Combine Effluent Treatment Plant

The project will be implemented on 75 acres area of land which is under SITE Limited Sukkur's jurisdiction. The Project includes designing, construction and operation of the CETP. The plant will be designed to treat an aggregate 3 MGD of effluent. The proposed CETP uses Extended Aeration System (EAS) process to treat the effluent.

Salient features of project are as follows;

S#	Aspect	Details
1.1	Cost of the project	2,500,000,000 PKR
1.2	Project objectives	Secondary Treatment of Industrial Effluent before its disposal in the River.
1.3	Design capacity of CETP (in million gallons per day, MGD)	3 MGD
1.4	Exact locations of influent inlet to CETP and CETP discharge	Inlet: 485096.54 E, 3068492.98 N Outlet: 485370.94 E, 3068663.28 N
1.5	Details of CETP Process, screening, settling and sedimentation tanks, aeration units, clarifiers, flow rates, etc.	Screening> Grit Chamber> Aeration Tank> Sedimentation> Chlorination/Disinfection tank
1.6	Details of sludge treatment and disposal	Extraction from Screening, Sedimentation, Aeration
1.7	Water Balance of CETP	2.5 MGD
1.8	Reuse of treated water	None
1.9	List of chemicals and their quantities to be used during construction and operation	Poly Electrolyte and Sodium Hypochlorite
1.10	Project duration/schedule/timeline	6 Months (Design Phase) 18 Months (Construction Phase)

The treated water will be ultimately be discharged into River Indus after it meets SEQS.

This EIA study of proposed Combined Effluent Treatment Plant Project is aimed at developing the environmental profile of the project area and evaluating the existing physical, biological and socioeconomic aspects leading to respective impacts due to construction and operations at the CETP.

The present EIA report has identified the significant environmental aspects and screened the potential aspects to ensure that the likely impacts due to proposed activities during construction, and operation of the proposed project, and the residual impact on adoption of mitigation measures have been critically assessed with respect to compliance with the Sindh Environmental Protection Act 2014. The main purpose of the EIA study is to ensure that:

- Any major adverse impact on the environment (physical, ecological and social) during different phases of projects viz. siting, design, construction and operation are identified.

- Adverse impacts are appropriately addressed and adequate mitigation measures are incorporated in the siting, design, construction and operation phases of project.
- Socioeconomic aspects are identified, and mitigated.
- Consultation is carried out with relevant stakeholders.

Consultation photographs



Discussion with SITE Sukkur



Consultations at government school



Consultation at SESSI hospital, Sukkur

- Alternatives to achieve the objectives are analyzed.
- Environmental Management Plan (EMP) for sustainable development and operation of the project is developed for implementation and monitoring of the project activities.

The study was conducted so as to cover all the aspects of the project (such as project location, construction and operations) and their anticipated impacts. The study was comprehensive and was carried out in accordance with national legislative requirements. The findings of the study in terms of the nature and extent of the project's environmental impacts and their subsequent assessment are highlighted below:

- Temporary disturbance due to construction phase activities such as land clearing, excavation works, movement of construction vehicles, generation of solid waste and sewage generation from construction crew can negatively impact the environment. However, adoption of appropriate mitigation strategies shall ensure that no long-term damage is caused to the environment as a result of these activities. These strategies, include minimizing wastes generation and the area of activities, ensuring proper maintenance of the vehicles, proper handling of the sewage and other waste, stressing use of PPE where required and wetting exposed surface and stockpiles of fine material. Good management practices will also decrease the negative impacts of the project. Provisions of these environmental aspects have been included in the EMP.
- The project is a socially and environmentally beneficial initiative by the proponent to the associated stakeholders.
- During operations, the solid waste generated from screening facility shall be segregated according to the nature of waste and disposed accordingly. The screens will be cleaned on regular basis to maintain their efficiency. Likewise, the sludge will be efficiently handled to avoid site nuisance, contamination and degradation of aesthetic quality of site. Dewatering of sludge will be carried out to reduce the volume of sludge for ultimate disposal.
- Regular monitoring of the treatment facility including sludge monitoring and effluent monitoring will be carried out.
- There will be an overall positive impact from the project development in view of the following observations:
 - Creation of jobs for the locals
 - No resettlement involved
 - No damage to existing infrastructure
 - No damage to property
 - No impact in form of over consumption of utilities due to the project

Therefore, in the light of this study, it can be concluded that the project will not be significant residual environmental impacts. Most of the impacts will either be temporary or can be mitigated with appropriate measures. The proponent is committed to ensuring environmentally friendly operations and as such, the mitigation measures will be adopted in their essence to avoid adverse impacts on climate, hydrology, geology and ecology of the area during construction and operations.

The consultant recommends that the EIA study be approved with the conditions that the recommendation given in this EIA report including EMP will be adopted by the proponent during project phases to ensure sound environmental management.

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Chapter 1 Introduction

1.1. General

This Environmental Impact Assessment, thereafter; EIA report documents clearly and impartially the environmental impacts of the proposed project. The proposed project comprises installation of combined effluent treatment plant (CETP) at SITE Sukkur to treat effluent being released by industrial units located at SITE. The proposed treatment will be constructed on approx. 75 acres area.

The development is planned with the objective to treat the industrial effluent and then discharge it at the allocated location in environmentally friendly manner. The CETP would use Extended Aeration System (EAS) to treat the effluent.

The EIA report has been prepared in compliance with the mandatory requirements of Section 17 of Sindh Environmental Protection Act, 2014, which states that “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 Agency approval in respect thereof”. Sind Environmental Protection Agency, thereafter; SEPA shall review the IEE & EIA and accord approval subject to such terms and conditions as it may prescribe or require.

Since the proposed project shall be located in Sindh Province, hence this EIA Report will be submitted to Sindh Environmental Protection Agency for review and subsequent issuance of “No Objection Certificate (NOC)”. Further coordination for environmental monitoring activities will continue with EPA Sindh which has been duly authorized to follow-up and enforce environmental monitoring compliance of the project.

Table 1.1: Project Overview	
Name of Project	Combined Effluent Treatment Plant at SITE Sukkur
Proponent	Sindh Industrial Trading Estates (SITE) Limited Sukkur
Project area	Sukkur, Sindh
Location	27°44'20.7N and 68°50'42.39E
Treatment capacity	3 million gallon per day (MGD)
EIA Consultant	EMC Pakistan Pvt. Ltd. Mr. Syed Nadeem Arif Managing Director Email: mail@emc.com.pk Address: Office # 503, Anum Estate Building, Main Shahra-e-Faisal (Opposite Duty Free Shop), Karachi, Pakistan. Tel: +92-21-34311466, 34321532 Fax: +92-21-34311467

1.2. Location

The CETP is proposed to be located northwest of SITE Sukkur, near Provincial Disaster Management Authority (PDMA) Warehouse, at coordinates 27°44'20.7N latitude and 68°50'42.39E longitude.

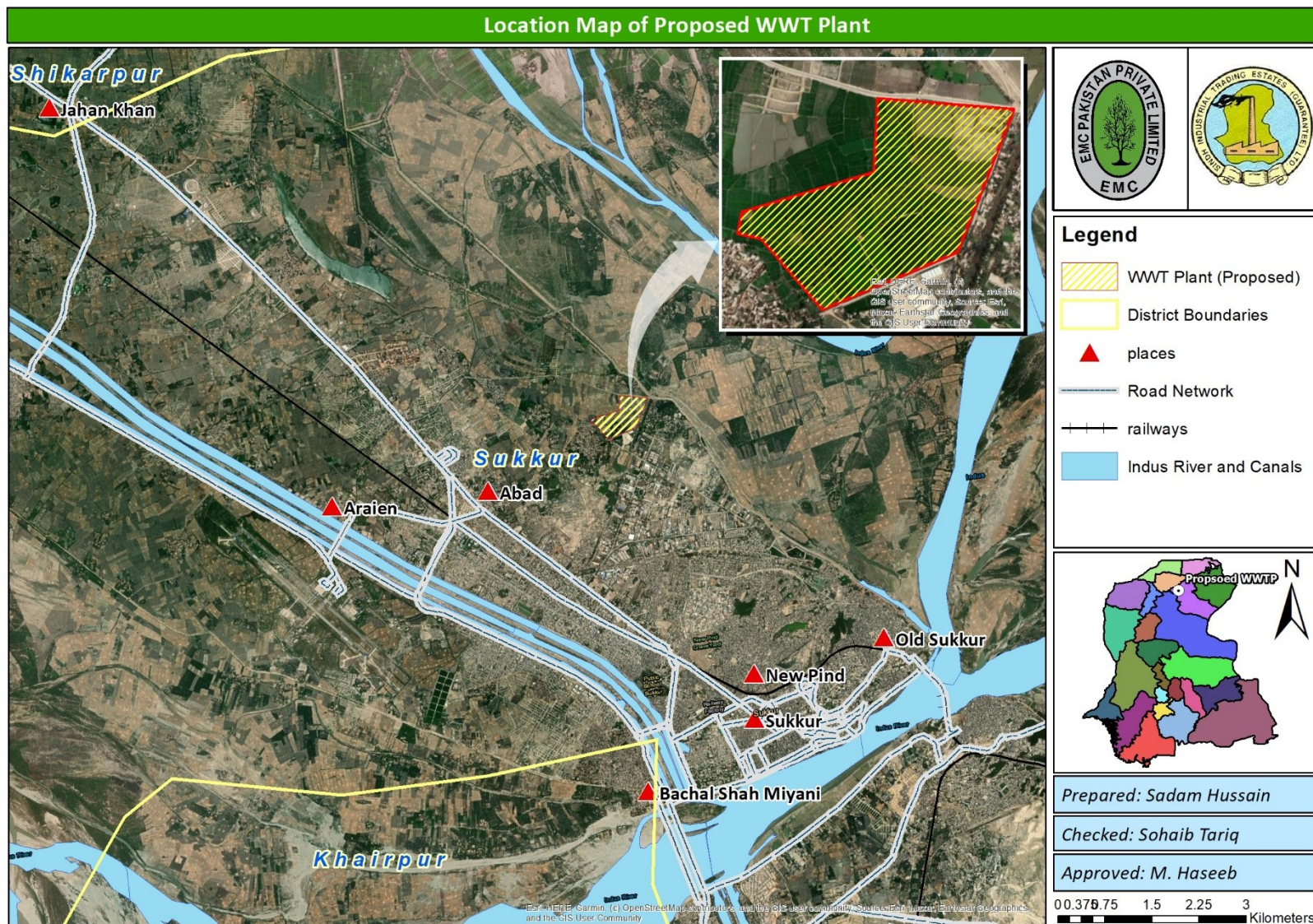


Figure 1.1: Location of Proposed CETP

1.3. Objectives of EIA

The objective of the Environmental Impact Assessment is to fulfil the requirement for obtaining an environmental permit from the Sindh Environmental Protection Agency (SEPA). EIA report will form a part of the documentary evidence in support of a permit application to the EPA.

The main objectives of an EIA are to identify the environmental and socio-economic impacts both positive and negative that may result from a project. The EIA provides recommendations to mitigate negative impacts and maximize benefits on all aspects of the surrounding environment (physical, biological and social). The objectives outlined for this EIA study are given below:

- To identify and describe elements of community and environment likely to be affected by the proposed developments and / or likely to cause adverse impacts to the project, including natural and man – made environment;
- To identify any potential losses or damage to flora, fauna and natural habitats;
- Develop a baseline of its current environmental scenario as well as socioeconomic conditions;
- Identify and evaluate impacts due to construction and operational activities of the project with the relevant environmental regulations of Pakistan
- Determine social aspects and environmental resources which are particularly sensitive to impacts and categorize impacts on the basis of their severity;
- Evaluation of impacts severity/degree and providing necessary mitigation measures;
- Provide recommendations/suggestions for the environmental monitoring and management of social and physical environment in the surroundings of project area; and
- Ensure that all the impacts of the project have been taken care and all the relevant stakeholders are aware of the impacts.

1.4. The Proponent

SITE Sukkur is one of the leading industrial estates in Pakistan. It spreads over an area of approx. 1060 acres on Shikarpur Road, housing more than hundred industrial units, it is a hub of industrial and trading activities in northern Sindh. With the passage of time, the need of industrial development in the district arose, where Sukkur was selected as a venue for industrial estate in 1964. SITE Sukkur is sufficiently supporting district's economy and providing better employment and providing better employment opportunity for the local populace¹.

1.5. Scope of EIA Study

This EIA study of proposed CETP Project is aimed at developing the environmental profile of the project area to evaluate the existing physical, biological and socioeconomic aspects leading to respective impacts due to construction and operations of the project.

¹ <http://heritage.eftsindh.com/pending.php?id=74/sukkur/industrial-area-sukkur>

The main purpose of the EIA study is to ensure that:

- Any major adverse impact on the environment (physical, ecological and social) during different phases of projects viz. siting, design, construction and operation are identified.
- Adverse impacts are appropriately addressed and adequate mitigation measures are incorporated in the siting, design, construction and operation phases of project.
- Socioeconomic aspects are identified, and mitigated.
- Consultation is carried out with relevant stakeholders.
- Alternatives to achieve the objectives are analyzed.
- Environmental Management Plan (EMP) for sustainable development and operation of the project is developed for implementation and monitoring of the project activities.

The EIA report has identified the significant environmental aspects and screened the potential aspects to ensure that the likely impacts due to proposed activities during construction, and operation of the proposed project, and the residual impact on adoption of mitigation measures have been critically assessed with respect to compliance with the Sindh Environmental Protection Act 2014.

1.6. Methodology for Environmental Assessment Study

This environmental assessment (examination and evaluation) is based on comparative evaluation of the environmental quality before and after establishment of the project. For this purpose, the baseline or the profile project area was developed by collecting data, records and information on physical, ecological as well as socioeconomic environment, in particular the surrounding areas in its neighborhood. An assessment of impact of construction activity at the different phases of the project, i.e., pre-construction, construction and operation stages. The changes anticipated in the critical environmental aspects leads to identification of significant impact, for which necessary mitigation measures have been proposed. Figure below shows the step-by-step process for the completion of an EIA.

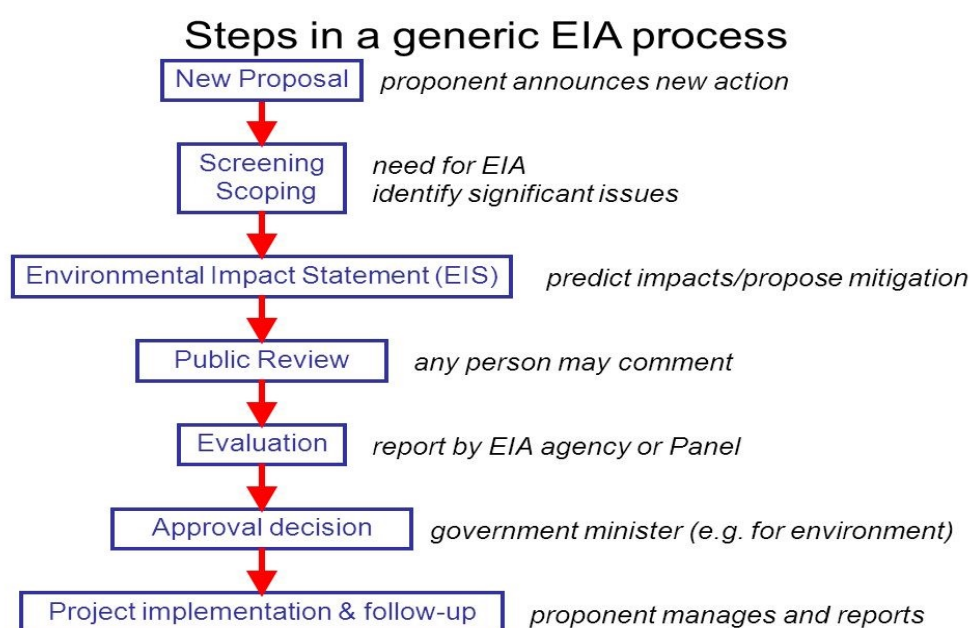


Figure 1.2: Steps of EIA

1.6.1. Acquiring Project Specific Data

This was the very first step to embark on the study initiated through meetings held with the officials of the proponent. In the meetings, discussions were made to clarify the nature and extent of project in environmental perspectives. Basic information in the form of raw input received from the proponent was analyzed by the experts to comprehend the project and to assess its influence on the environment.

1.6.2. Literature Review

While the project details were being acquired, desktop study was also initiated simultaneously to draft environmental baseline information of the project area. The desktop study comprised of literature review, collection of updated authenticated published/printed data on the physical and social environment related to the focused area. The same was also used to delineate the scope of surveys which would then form the basis of environmental assessment.

1.6.3. Stakeholder Consultation

A stakeholder consultation was undertaken to document the concerns of the local community and other stakeholders, and to identify issues that may require additional assessment in order to address these concerns. Stakeholder consultation was conducted during the survey with following objectives:

- To inform the Stakeholders, Communities about the project
- To gather feedback from primary and secondary stakeholders of project
- To identify relevant potential issues, including the socioeconomic impacts of the project, and corresponding mitigation measures.

During the stakeholder consultation process for the project, following key considerations were focused:

- Identification of sensitive receptors in the area
- Concerns of the nearby villages about the project

1.6.4. Reconnaissance and Detailed Surveys

Preliminary surveys of project location were organized by EMC in which experts visited the area and assessed the physical scenario in order to plan various detailed studies. The relevant surveys were carried out under the supervision of environmental experts. Preliminary socio-economic evaluation was also undertaken.

This was followed by detailed and comprehensive surveys which were carried out in order to investigate various domains of environment and socio-economic sector to highlight various issues, and concerns that may lead to the identification of aspects and subsequent assessment of impacts.

For having an overview of the project area and to assess the existing infrastructure and socio-economic activities, a detailed groundwork investigation was carried out around the

microenvironment of project site. Following environmental parameters testing and monitoring was conducted to set an initial baseline condition of the project area.

- Ambient Air Quality
- Ambient Noise Level Measurement
- Surface Water Testing
- Groundwater testing
- Ecological Survey



1.6.5. Environmental/Social Aspects Identification

Aspects are those elements which are the cause of positive or negative environmental impacts. It includes activities performed during construction and operation phases. The EIA process requires development of an inventory of all possible environmental and socio-economic aspects, which provide the basis of categorization and evaluation of impacts and their likelihood to occur due to the materialization of the project.

1.6.6. Environmental Impacts Assessment and Mitigation Measures

Based on the developed aspects inventory, experts analyzed the aspects for their logical outcome as potential impacts on the physical and social environment. These impacts have been identified, assessed and weighed for different activities during construction, commissioning and operational phases of the project. Mitigation and control measures were also proposed for various activities of projects in order to minimize the potential impacts during the life span of the project.

1.6.7. Environmental Management and Monitoring Plan

In the light of impacts identified and mitigations proposed an Environmental Management Plan (EMP) is developed which has a pivotal role in assigning tasks to personnel for the environmental management and implementation of mitigation measures as well as to monitor its effectiveness throughout the life cycle of the project. It also provides monitoring plans/procedures to be followed for checking and compliance maintenance of environmental quality and legal requirements through suggested mitigation measures.

1.6.8. Documentation Review and Conclusion

This is the final step to complete the environmental assessment and compile all the work done in shape of a report. Report writing started just after the initiation of environmental assessment. The report is written by experts of EMC and compiled by the office staff in coordination with the experts. At the end of the study, the entire report is reviewed by the team leader followed by recommendations and conclusion in the light of the assessment

1.7. Preparation of Report

This EIA report has been prepared in accordance with the federal guidelines for preparation of environmental reports. All pre-requisites of report writing in structural format, contents and presentation have been considered and met as per the standard format of the EIA document.

1.7.1. Structure of EIA Report

The EIA report has been structured on the standard format, prescribed by EPA. The report has been presented in the following sections:

- Section 1 - Introduction
- Section 2 - Legal Requirements
- Section 3 - Project Description
- Section 4 - Environmental and Social Baseline
- Section 5 - Stakeholder Consultation
- Section 6 - Screening of Potential Environmental Impacts and Mitigation Measures
- Section 7 - Environmental Management Plan (EMP)
- Section 8 - Findings, Recommendations and Conclusion

1.8. EIA Study Team

Following team of EMC experts has conducted this EIA study.

Table 1.2: EIA Study Team		
S. No.	Name	Position in Project
1.	Mr. Syed Nadeem Arif	Project Manager / Team Leader
2.	Mr. Muhammad Haseeb	Environmental Specialist
3.	Mr. Tanvir Arif	Social Expert
4.	Mr. Sohaib Tariq	Environmental Engineer
5.	Mr. Imran Khan	Environmentalism
6.	Mr. Muddasir	Environmentalism
7.	Mr. Ather Adil	Field Sampling Officer
8.	Mr. Ehtisham	Field Social Officer

Chapter 2 Legislative Framework

This section describes the current legal responsibilities of the Project proponent in the context of the environment and sustainable development, and the institutions that exist in the country that may influence the environmental management of the proposed Project.

Prior to the 18th Amendment to the Constitution of Pakistan in 2010, the legislative powers were distributed between the federal and provincial governments through two 'lists' attached to the Constitution as Schedules. The Federal list covered the subjects over which the federal government had exclusive legislative power, while the 'Concurrent List' contained subjects regarding which both the federal and provincial governments could enact laws. The subject of 'environmental pollution and ecology' was included in the Concurrent List and hence allowed both the national and provincial governments to enact laws on the subject. However, as a result of the 18th Amendment this subject is now in the exclusive domain of the provincial government.

As a result, the Ministry of Environment at the federal level has been abolished. Its functions related to the national environmental management have been transferred to the provinces. The international obligations in the context of environment will be managed by the Ministry of Climate Change.

The assessment has been carried out to comply with local and international guidelines. The main among these are:

- National Environmental Laws & Legislations;
- Provincial Environmental Laws & Legislations;
- Environmental and Social Guidelines;
- International Treaties and Conventions; and
- Institutional Setup for Environmental Management.

Proponent shall guarantee that the operation is conducted to conform to Proponents' commitment to the total integration of health, safety and social responsibility to environmental excellence in all aspects of its operations to:

- Protect the environment, preserve sustainable development;
- Implement all operations for disposal of all materials (hazardous and non-hazardous) safely and without causing any health, environment and safety threat;
- Take up appropriate industry and corporate standards where adequate laws or regulations do not exist;
- Stop any operation if the health, environment or safety is at risk; and
- Attain high level of preparedness to manage emergency situation.

Institutional Setup for Environmental Management

Environmental issues are governed by three levels of the government viz. Federal, Provincial and Local Government. The Ministry of Environment and Local Government is the Ministry at the Federal level, which oversees the affairs of the environment in the country. The Provincial Governments have designated the Ministries of Local Government to administer matters related to the environment at the provincial level.

The highest environmental body in the country is the Pakistan Environmental Protection Council (PEPC), which is presided over by the Chief Executive of the Country. Other bodies include the Pakistan Environmental Protection Agency (Pak-EPA), provincial EPAs (for four provinces, AJK and Northern Areas), and environmental tribunals. The roles, responsibilities and authorities of PEPC and the EPA's are defined in the PEPA 1997.

The PEPC has been formed by the Federal Government. Its members include the President of Pakistan, or someone appointed by the President, as the Chairperson; the Minister of the Ministry of Environment, Local Government and Rural Development as the vice-Chairperson; Governors of the Provinces; Ministers in charge of the subject of environment in the Provinces; Secretary to the Federal Government in charge of the Ministry of Environment, Local Government and Rural Development; Director General Federal EPA; heads of other federal and provincial departments; environmentalists and community representatives including scientists. The functions and powers of the Council include formulation of national environmental policy, enforcement of PEPA 1997, approval of the NEQS, incorporation of environmental considerations into national development plans and policies and provide guidelines for the protection and conservation of biodiversity in general and for the conservation of renewable and nonrenewable resources.

The Federal government has also formed the Federal EPA, which is headed by a Director General and has wide-ranging functions given in PEPA 1997. These include the preparation and coordination of national environmental policy for approval by the PEPC, administering and implementing the PEPA 1997 and preparation, revision or establishment of NEQS.

The Provincial Environmental Protection Agencies are formed by the respective Provincial Governments. A Director General who exercises powers delegated to him by the Provincial Government heads each Provincial EPA. IEEs and EIAs are submitted to provincial EPA's for approval.

2.1. National Laws and Legislation

In Pakistan, the awareness about necessity of having environmental protection laws and regulations developed since late 1970s. First step in this direction was the promulgation of the Pakistan Environmental Protection Ordinance, 1983. The organization entrusted with enforcement of environmental laws was then established viz. Pakistan Environmental Protection Agency in 1984. These efforts were continued and plan for protection of environment was developed called the Pakistan National Conservation Strategy.

Similarly, provincial governments also created Provincial Environmental Protection Agencies to look after the environmental issues in their regions. Then, in 1993, the National Environmental Quality Standards (NEQS) were made.

The powers of Environmental Protection Agencies were considerably enhanced by enacting the Pakistan Environmental Protection Act, 1997. And, the Pakistan Environmental Protection Agency Review of IEE and EIA Regulations (IEE-EIA Regulations), 2000 explained the particulars about the preparation, submission, and review of Initial Environmental Examinations (IEEs) and Environmental Impact Assessments (EIAs). Moreover, there are numerous other national laws that contain the provisions for protection of environment.

Previously, the issue of ‘environmental pollution and ecology’ was placed in Concurrent list in the Constitution which allowed both Federal and Provincial Governments to enact laws on it. But, Eighteenth Amendment to the Constitution of Pakistan, 2010, transferred this issue to the Provincial governments. Due to this, the functions related to the national environmental management were transferred to the provinces. The Federal Government has established two Environmental Tribunals one each in Karachi and Lahore. The Karachi Tribunal has control over the provinces of Sindh and Baluchistan while the Lahore Tribunal covers the provinces of the Punjab and Khyber Pakhtunkhwa. The High Courts have designated senior civil judges as Environmental Magistrates to take all contraventions punishable in respect of handling of hazardous substances and pollution caused by motor vehicles. The international obligations in the context of environment will be management by the Ministry of Climate Change, Government of Pakistan.

2.1.1. National Conservation Strategy

The National Conservation Strategy (NCS) is the primary policy document of the Government of Pakistan (GoP) on national environmental issues. The policy was approved by the Federal Cabinet in March 1992. The Strategy also attained recognition by the 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 mid-term review of the achievement 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 strategy (GoP, November 2000). 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 National Environmental Action Plan was approved by the Pakistan Environmental Protection Council under the chairmanship of the President / Chief Executive of Pakistan in February 2001. NEAP also 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.

The Government of Pakistan and United National Development Program (UNDP) have jointly initiated an umbrella support program called the National Environmental Action Plan-Support Program signed in October 2001 and implemented in 2002. The development objective supported by NEAP-SP is environmental sustainability and poverty reduction in the context of economic growth. The objective of 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 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.

2.1.2. Pakistan Penal Code, 1860

Section XIV of PPC deals with the offences affecting the public health, safety, convenience, decency and morals. Person may be guilty of public nuisance if his act or omission causes common injury, danger or annoyance to the public or results in spread of infection of diseases dangerous to life. The section also deals with environmental pollution.

Provisions under this Act relating to environment are no longer being enforced after promulgation of the Pakistan Environmental Protection Act, 1997. However, pollution offences can still be tried under the Pakistan Penal Code, 1860.

2.1.3. Land Acquisition Act, 1894

This Act provides law for the acquisition of land needed for public purposes and for companies and for determining the amount of compensation to be made on account of such acquisitions. The law provides details of various peculiarities involved in acquisition of land such as preliminary investigation, objection to acquisition, declaration of intended acquisition, enquiry into measurements, value & claims, taking possession, reference to court and procedure thereon, apportionment of compensation, payment, temporary occupation of land, acquisition of land for companies, disputes resolutions, penalties and exemptions etc. This Act has 55 sections addressing different areas. Such as section 4(2) mentions that it shall be lawful for any official authorized by the Collector to enter upon and survey, to dig or to do all other acts necessary to ascertain that whether the land is adapted for such purpose. No land acquisition is involved as the project will be established on land of SITE Limited Sukkur.

2.1.4. The Forest Act, 1927 and Cutting of Trees (prohibition) Act, 1992

The Act contains procedures for constituting and managing various types of forests, such as reserved forests, village forests and protected forests. The Act empowers the provincial forest departments to declare any forest area as reserved or protected. It also defines the duties of forest related public servants, and prescribes penalties for violation of any provision of the Act.

2.1.5. The Canal and Drainage Act, 1873

The Canal and Drainage Act, 1873 prohibits corruption or fouling of water canals (defined to include channels, tube wells, reservoirs and watercourses), or obstruction of drainage. This requires that waste streams generated from project activities do not contaminate the water bodies in the macroenvironment.

2.1.6. The Biodiversity Action Plan, 2000

The Biodiversity Action Plan, 2000 has been the most significant direct step towards addressing the issue of biodiversity loss. It details the current status and trends and direct and indirect causes of biodiversity; its principles, goals and aims; proposals for action plan including planning & policies, legislation, identification and monitoring, in situ & ex situ conservation, sustainable use, research and training, public education and awareness, Environmental Impact Assessment, information extraction and financial resources etc.

2.1.7. The National Environmental Policy, 2005

The National Environmental Policy, 2005 provides an overarching framework for addressing the environmental issues facing Pakistan, particularly pollution of fresh water bodies and coastal waters, air pollution, lack of proper waste management, deforestation, loss of biodiversity, desertification, natural disasters and climate change. It also gives direction for addressing the cross sectoral issues as well as the underlying causes of environmental degradation and meeting international obligations.

The National Environmental Policy, 2005 while recognizing the goals and objectives of the National Conservation Strategy, National Environmental Action Plan and other existing environment related national policies, strategies and action plans, provide broad guidelines to the Federal Government, Provincial Governments, Federally Administrated Territories and Local Governments for addressing environmental concerns and ensuring effective management for their environmental resources.

The National Environmental Policy, 2005 aims to protect, conserve and restore Pakistan's environment in order to improve the quality of life for the citizens through sustainable development and the same is agreed by the proposed project.

This EIA study has been conducted with the objective to provide environmental management strategy in the form of environmental management plan which ensures environmental friendly execution of project while simultaneously addressing the principles of sustainable development and acknowledging the provisions of the environmental policies and acts in effect in the country.

2.2. Provincial and Local Environmental Laws and Legislations

2.2.1. Sindh Environmental Protection Act, 2014

The following articles of the SEPA 2014 have a direct bearing on the proposed Project:

Article 11(1): ‘Subject to the provisions of this Act and the rules and regulations therein, 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 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.

Article 11(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.

Section 11(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. All stipulated tests will be regularly performed from designated laboratories approved by Sindh EPA.

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

Article 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’.

Article 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.

Article 17(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.

Article 17(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’.

Article 17(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’.

Article 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’.

Article 20(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.

Article 20(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’.

Section 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.

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

SEPA Regulations 2021 categorize projects into three separate schedules depending on whether a project requires an Environmental Checklist (Schedule-I) or an IEE (Schedule-II) or EIA (Schedule III). The Regulations also require that all projects located in environmentally sensitive areas need submission of an EIA.

On the basis of the nature and scope of project, it has been accordingly categorized into Schedule-III;

H. Waste Disposal and Treatment

3. Combined Effluent Treatment Plant

2.2.3. Sindh Environmental Quality Standards (SEQS)

The Sindh Environmental Quality Standards (SEQS), 2016, specify the following standards:

- Maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged to inland waters, sewage treatment facilities, and the sea (three separate sets of numbers);
- Maximum allowable concentration of pollutants (16 parameters) in gaseous emissions from industrial sources;
- Maximum allowable concentration of pollutants (two parameters) in gaseous emissions from vehicle exhaust and noise emission from vehicles;
- Maximum allowable noise levels from vehicles;

2.2.4. Other National and Provincial Laws and Regulations

Other national and provincial laws and regulations are listed below;

Table 2.1: National and Provincial laws and regulations	
National and Provincial Legislation	Brief Description
Employment of Child Act 1991	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 Employment of Child Act (ECA) 1991 disallows the child labor in the country. The ECA defines a child to mean a person who has not completed his/her fourteenth year of age. The ECA states that no child shall be employed or permitted to work in any of the occupation set forth in the ECA (such as transport sector, railways, construction, and ports) or in any workshop wherein any of the processes defined in the Act is carried out. The contractor will be bound by this Act to disallow any child labor at the project sites or campsites.
Bonded labor system (Abolition) Act 1992	On the commencement of this act, the bonded labor system shall stand abolished and every bonded laborer shall stand freed and discharged from any obligations to render any bonded labor.
Sindh Cultural Heritage Act, 1994	This provincial Act empowers the Government of Sindh to preserve and protect any premises or objects of archaeological, architectural, historical, cultural, or national interest in Sindh by declaring them protected.
Antiquity act 1975	The Antiquities Act relates to the protection, preservation and conservation of archaeological/historical sites and monuments.
The Sindh Minimum Wages Act, 2015	To provide for the regulation of minimum rates of wages and various allowances for different categories of workers employed in certain industrial and commercial undertakings and

Table 2.1: National and Provincial laws and regulations

National and Provincial Legislation	Brief Description
	establishments.
Workmen's compensation 1923	The liability of an employer is confined to payment of compensation to a "workman" and then only in respect of an injury caused by "accident arising out of and in the course of his employment". The liability of employer is limited by ceiling fixed in Schedule to the Act.
The Sindh Forest Act 2012	The law requires review and revision to meet the challenges of management and empower the forest managers to carryout management interventions with full legal support. The new legal instrument should amply address the provision and requirements of UNFCCC, CBD and Convention on Combating Desertification. Legal aspects of carbon sequestration and carbon credit marketing should also be kept in view.
Sindh Wildlife Protection Ordinance, 1972 (SWPO)	This ordinance provides for the preservation, protection and conservation of wildlife by the formation and management of protected areas and prohibition of hunting of wildlife species declared protected under the ordinance. The ordinance also specifies three broad classifications of the protected areas; national parks, wildlife sanctuaries and game reserves. Activities such as hunting and breaking of land for mining are prohibited in national parks, as are removing vegetation or polluting water flowing through the park. Wildlife sanctuaries are areas that have been set aside as undisturbed breeding grounds and cultivation and grazing is prohibited in the demarked areas. Nobody is allowed to reside in a wildlife sanctuary and entrance for the general public is by special dispensation. However, these restrictions may be relaxed for scientific purpose or betterment of the respective area on the discretion of the governing authority in exceptional circumstances. Game reserves are designated as areas where hunting and shooting is not allowed except under special permits.
Sindh Wildlife Protection, Preservation, Conservation and Management Act, 2020	The Sindh Wildlife Protection, Preservation, Conservation and Management Act, 2020 aims to enhance protection for wildlife. Its passing marked the repealing of a weaker law, hardly providing any protection to wild animals, for the first time since 1972. The new legislation has wider coverage, protecting even those

Table 2.1: National and Provincial laws and regulations

National and Provincial Legislation	Brief Description
	wild animals that enter Sindh via trans-boundary migration or as a result of human activity.
Hazardous Substance Rule, 2014	These Rules were notified to streamline procedures for issuance of licenses to industries / businesses that generate hazardous waste, safety precautions for workers and devices them methods for the removal of hazardous wastes in an environmentally friendly manner. The rules also specify procedures to be adopted for import, transport and disposal of hazardous waste; and identify two hundred and forty-three hazardous substances and synthetic chemicals. The rules also specify the requirement of obtaining license from Sindh EPA for the import, transport, storage and disposal of hazardous substances as specified in the rules.
The Sindh, Occupational Safety and Health Act, 2017	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;
Sindh Municipal Water Act, 2012	Municipal Water: (1) Upon the coming into force of this Act, all water used, or intended to be used for drinking, domestic, recreational, horticultural, industrial or commercial purposes and such other purposes as may be prescribed shall be declared as municipal water. (2) Use of water for drinking purposes shall take precedence over all other water uses. Constitution of Commission: (1) Upon commencement of this Act, but not later than twelve months thereafter, the Government shall establish the Sindh Municipal Water Commission. (2) The Commission shall be a body corporate, having perpetual succession and common seal with power to enter into contract; and it may sue or be sued by the said name.
The Sindh Water Management (Amendment) Act,	The Sindh Water Management Ordinance 2002 was amended in 2005 and called The Sindh Water Management (Amendment) Act, 2005.

Table 2.1: National and Provincial laws and regulations

National and Provincial Legislation	Brief Description
2005	This Ordinance provides for the establishment of public systems for the distribution and delivery of irrigation water, the removal of drainage water and the management of flood waters. The Ordinance provides for the establishment of the Sindh Irrigation and Drainage Authority (SIDA) and defines its composition.

2.3. Environmental and Social Guidelines

The environmental as well as social guidelines related to the proposed project are as discussed under:

2.3.1. World Bank Guidelines on Environmental & Social Aspects

The principal World Bank publications that contain environmental guidelines are listed below:

- Environmental Assessment Operational Policy 4.01. Washington, DC, USA. World Bank 1999,
- Environmental Assessment Sourcebook, Volume I: Policies, Procedures, and Cross Sectoral Issues. World Bank Technical Paper Number 139, Environment Department, the World Bank, 1991,
- Environmental Assessment Sourcebook, Volume III: Guidelines for Environmental Assessment of Energy and Industry Projects. World Bank Technical Paper No. 154, Environment Department, the World Bank, 1991,
- Pollution Prevention and Abatement Handbook: Towards Cleaner Production, Environment Department, the World Bank, United Nations Industrial Development Organization and the United Nations Environment Program, 1998.

The first two publications listed here provide general guidelines for the conduct of an IEE/EIA, and address the IEE/EIA practitioners themselves as well as project designers. While the Sourcebook in particular has been designed for the Bank projects, and is especially relevant for the impact assessment of large-scale infrastructure projects. It contains enormous information which is useful to environmentalists and project proponents. The Sourcebook dealing with the assessment of industry and energy projects is more specific. The Pollution Hand book provides general waste management policies with specific techniques for the prevention of air and water pollution. Project guidelines are presented for major pollutants as well as typical emissions from various industrial sectors.

2.3.2. IFC EHS guidelines for Water and Sanitation

These IFC guidelines provide recommendations for environmental management related to operations of and maintenance of (i) potable water treatment and distribution systems, and (ii)

collection of sewage in centralized systems (such as piped sewer collection networks) or decentralized systems (such as septic tanks subsequently serviced by pump trucks) and treatment of collected sewage at centralized facilities. The current EIA has reviewed the guidelines in context of proposed CETP operations to suggest suitable mitigation strategies for the different CETP project activities. For the proposed CETP setup, guidelines have been reviewed with respect to:

- Solid Waste
- Ecological impacts
- Hazardous chemicals
- General EHS issues during construction and operation

Chapter 3 Description of Project

3.1. Project Overview

The proposed project comprises installation of combined effluent treatment plant (CETP) at SITE Sukkur to treat effluent being released by industrial units located at SITE. The proposed CETP will be constructed on approx. 75 acres area.

The development is planned with the objective to treat the industrial effluent and then discharge it at the allocated location in environmentally friendly manner.

3.2. Location of CETP

The CETP is proposed to be located northwest of SITE Sukkur, near Provincial Disaster Management Authority (PDMA) Warehouse, at 27°44'20.7N and 68°50'42.39E.

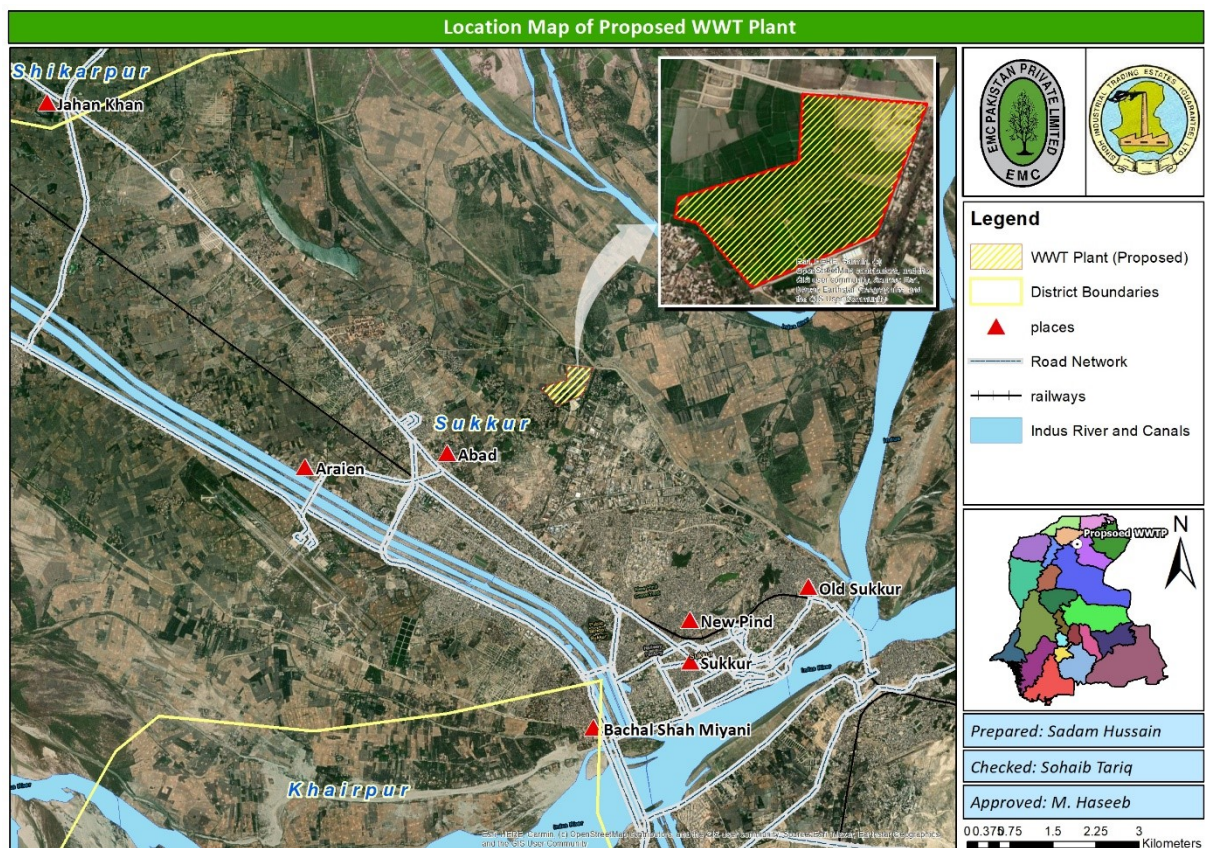


Figure 3.1: Project location

3.3. Treatment Process Scheme

The process flow diagram (PFD) and the mass-balance diagram of the proposed Combined Effluent Treatment Plant (CETP) at SITE Sukkur is depicted in figure 3.2 and figure 3.3;

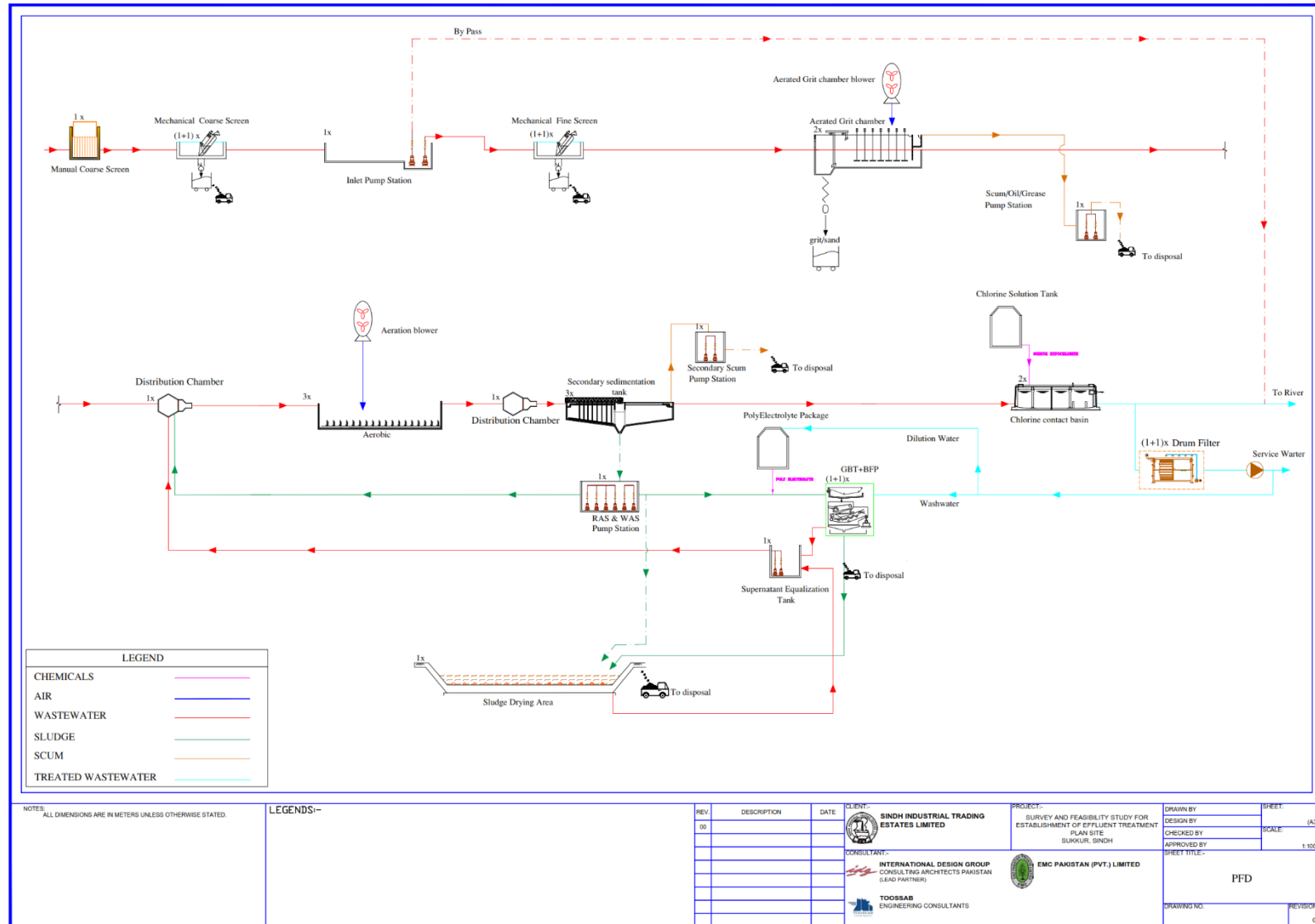


Figure 3.2: Process flow diagram

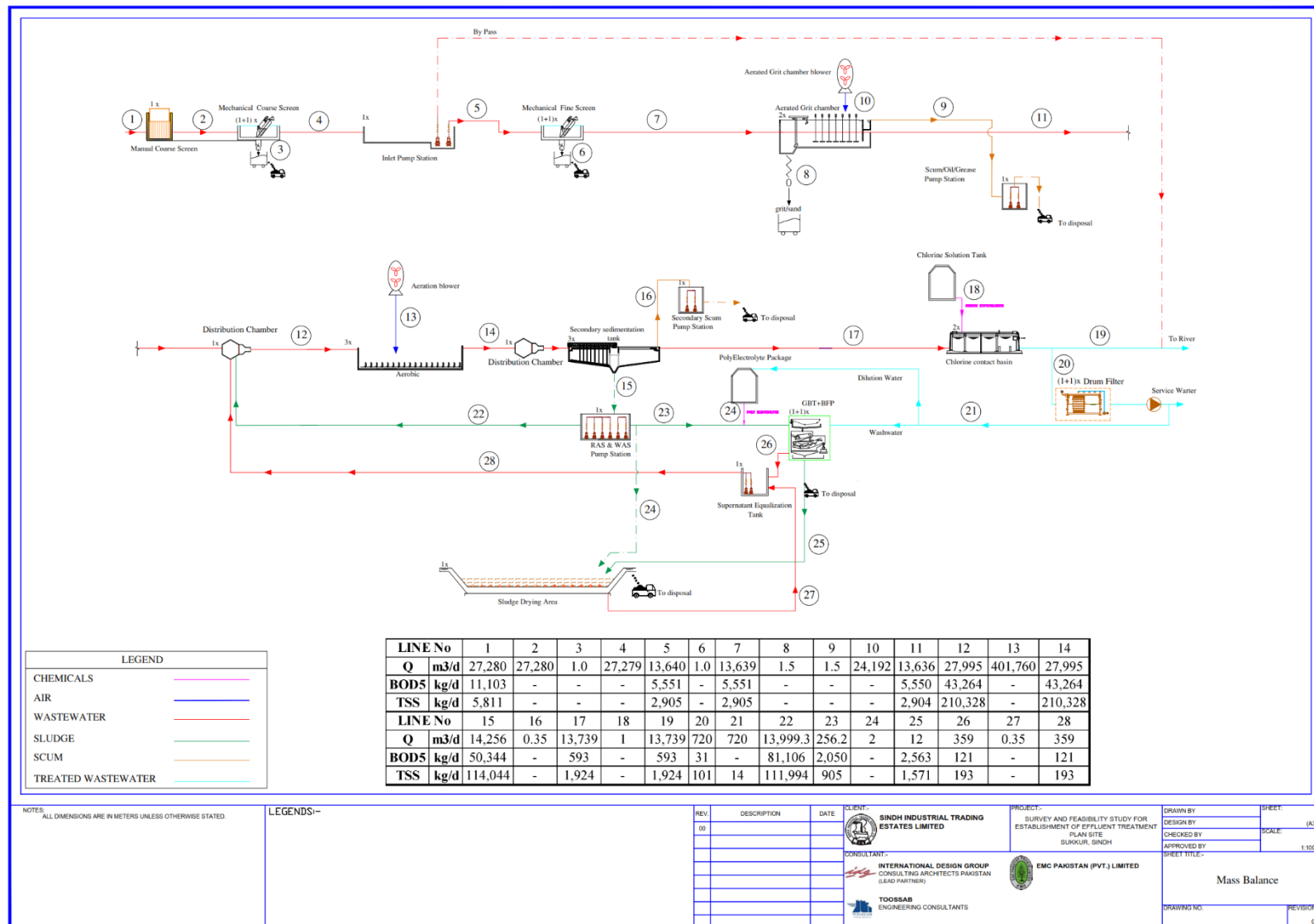


Figure 3.3: Mass Balance of proposed CETP

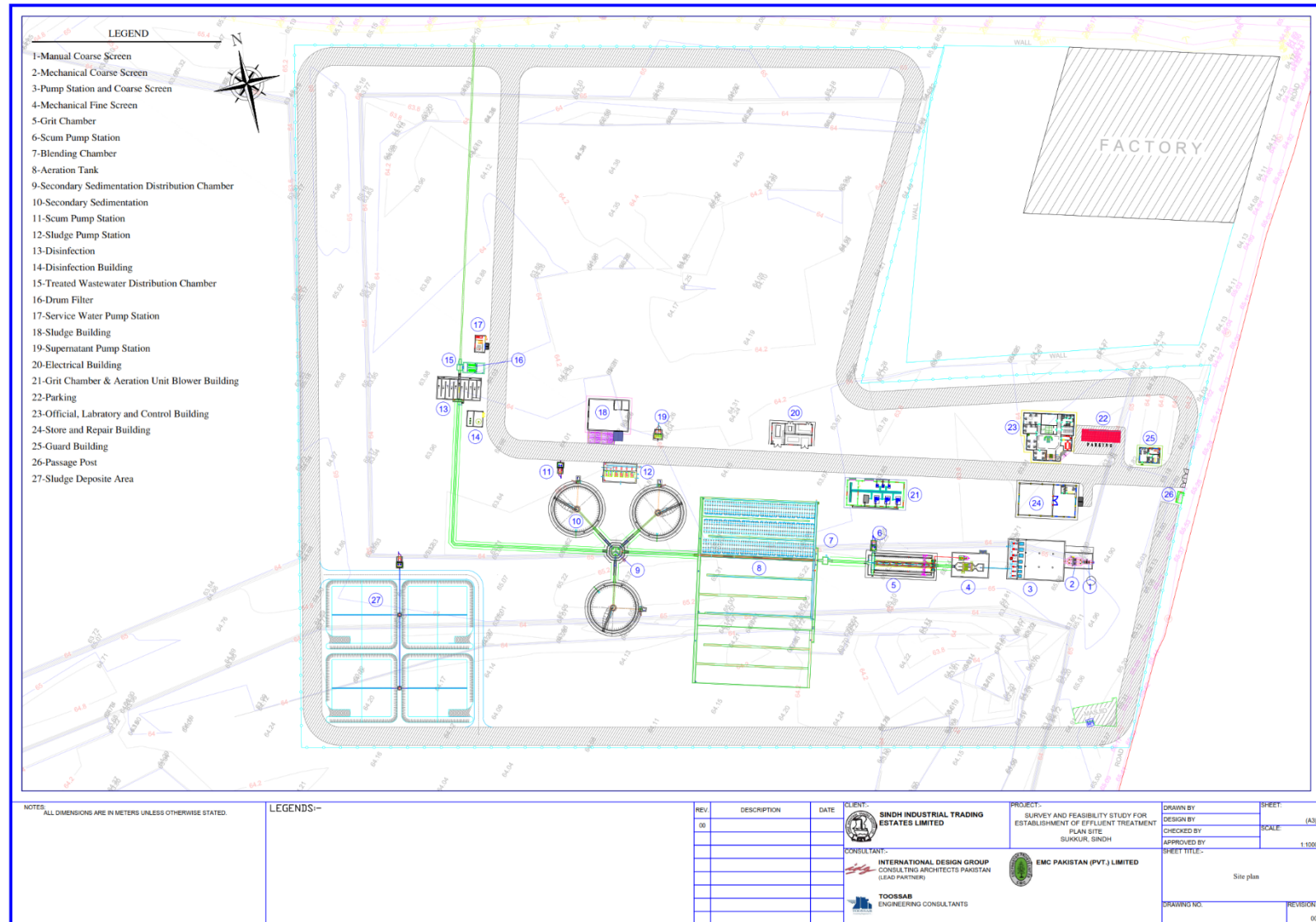


Figure 3.4: Layout of CETP

Salient features of the project are as follows;

S#	Query	Comments
1.1	Cost of the project	2,500,000,000 PKR
1.2	Project objectives	Secondary Treatment of Industrial Effluent before its disposal in the River.
1.3	Design capacity of CETP (in million gallons per day, MGD)	3 MGD
1.4	Exact locations of influent inlet to CETP and CETP discharge	Inlet: 485096.54 E, 3068492.98 N Outlet: 485370.94 E, 3068663.28 N
1.5	Details of CETP Process, screening, settling and sedimentation tanks, aeration units, clarifiers, flow rates, etc.	Screening>Grit Chamber>Aeration Tank> Sedimentation>Chlorination/Disinfection tank
1.6	Details of sludge treatment and disposal	Extraction from Screening, Sedimentation, Aeration
1.7	Water Balance of CETP	2.5 MGD
1.8	Reuse of treated water	None
1.9	List of chemicals and their quantities to be used during construction and operation	Poly Electrolyte and Sodium Hypochlorite
1.10	Project duration/schedule/timeline	6 Months (Design Phase)

3.4. Plant Design

Sukkur Industrial Wastewater Treatment Plant including two separate modules, which three stream. The first module has two streamlines, and the second module (extension module), which will be constructed in the future, has one streamline. Table below shows the capacity of each streamline.

Aspect	Module I		Module II
Module	Streamline I	Streamline II	Streamline III
Q (m ³ /d)	4547	4547	4547

Treatment process of Sukkur industrial WWTP concludes of pretreatment, biological treatment and sludge treatment.

Pretreatment process (physical unit operation) consists of inlet pump station, screening unit and grit and grease removal unit. Selected biological process for plant is Extended Aeration system.

Since in the extended aeration system, the average time that the sludge remains in the system is more than 20 days, the sludge will be stabilized, and there is no need for a digester facility.

Process design criteria & calculation are presented for below consisted units:

- Manual Coarse Screen

- Mechanical Coarse Screen
- Mechanical Fine Screen
- Grit Chamber Unit
- Biological Unit
- Secondary Sedimentation Tank
- Disinfection Unit
- Drum Filtration
- Sludge Treatment Combined Unit (GBT+BFP)
- Supernatant
- Sludge Deposit Area

Sludge treatment process consists of Sludge Treatment Combined Unit. Process design criteria & calculation are presented for below consisted units:

3.4.1. Influent water characteristics

Quantity design basis of Sukkur industrial wastewater treatment plant is presented below.

Quantity design basis of Sukkur wastewater treatment plant		
Parameter	Unit	Value
Average flow rate	m ³ /d	13,640
	MGD	3
Maximum factor (K _{max})	-	2
Maximum flowrate (Full flowrate)	m ³ /hr	1137
	MGD	6
Minimum factor (K _{min})	-	0.5
Minimum flowrate	m ³ /hr	284
	MGD	1.5

Considering that the current wastewater flow rate is equal to 2 MGD and at the end of plan, flow rate is equal to 3 MGD, the concentration of each quality parameter in the whole project is based on the weighted mean between the quality of the current wastewater from the PIT (based on tests), and the average quality parameters of the wastewater from the various Industries (based on tests) are calculated as follows:

$$(2 \text{ MGD} \times \text{PIT Average Quality Wastewater}) + (1 \text{ MGD} \times \text{Industries Average Quality Wastewater}) / 3 \text{ MGD}$$

So raw wastewater characteristics and design basis of wastewater are shown below.

Quality of raw wastewater		
Parameters	Unit	Value
BOD ₅	mg/l	407
COD	mg/l	723
TSS	mg/l	213

TKN	mg/l	16
Sulphide (S ²⁻)	mg/l	8
Min. temperature	°C	15
Max. temperature	°C	35
<i>This is estimated from the composite sampling and testing carried out by EPA certificated QTS Laboratory, detailed results are annexed.</i>		

The characteristics of combined wastewater, which includes raw and supernatant, and is the design basis of the wastewater treatment plant, are presented in Table below.

Quality design basis of Sukkur wastewater treatment plant		
Parameters	Unit	Value
BOD5	mg/l	405
COD	mg/l	715
TSS	mg/l	221
TKN	mg/l	16
Min. temperature	°C	15
Max. temperature	°C	35

3.4.2. Effluent water characteristics

The design of the wastewater treatment plant is based on meeting the given standard of "Sindh Environmental Quality Standard for Municipal & Liquid Industrial Effluents." This standard, determines the quality of the effluent from the treatment plant for discharge into inland water.

Level of Treatment		
Parameters	Unit	Value
BOD5	mg/l	80
COD	mg/l	150
TSS	mg/l	200
TDS	mg/l	3500
Oil and grease	mg/l	10
Sulphide (S ²⁻)	mg/l	1

3.4.3. Pre-Treatment

It should be noted that the maximum flow will be equalized in the pump station; as a result, the pumped flow rate will always be the average flow rate, so all units are designed based on the average flow rate.

Manual Coarse Screen Units 50 mm

The Specifications of manual coarse screen 50 mm is listed in Table below.

Specifications of manual coarse screen 50 mm		
Design parameter	Unit	Value
Design flow	m ³ /d	27,280
Number of equipment(s)	-	1
Upstream depth of wastewater	m	0.4
Bar space	mm	50
Bar width	mm	4
Approach velocity	m/s	0.6
Screenings	m ³ /10 ⁶ m ³	6
Density	kg/m ³	1000
Moisture	%	60
Bar number	-	24
Screen width	m	1.3
Screen Quantity	m ³ /d	0.2
	Kg/d	82

Mechanical Coarse Screen Units 20 mm

The Specifications of mechanical coarse screen 20 mm is listed in Table.

Specifications of manual coarse screen 20 mm		
Design parameter	Unit	Value
Design flow	m ³ /d	27,280
Number of equipment(s)	-	1+1
Upstream depth of wastewater	m	0.4
Bar space	mm	20
Bar width	mm	4
Approach velocity	m/s	0.6
Screenings	m ³ /10 ⁶ m ³	30

Density	kg/m ³	1000
Moisture	%	60
Bar number	-	55
Screen width	m	1.3
Screen Quantity	m ³ /d	1
	Kg/d	410

Mechanical Fine Screen Units

The Specifications of mechanical fine screen 6 mm are listed in Table.

Specifications of mechanical fine screen		
Design parameter	Unit	Value
Design flow	m ³ /d	13,640
Number of equipment(s)	-	1+1
Upstream depth of wastewater	m	0.3
Bar space	mm	6
Bar width	mm	4
Approach velocity	m/s	0.7
Screenings	m ³ /10 ⁶ m ³	70
Density	kg/m ³	1000
Moisture	%	60
Bar number	-	125
Screen width	m	1.3
Screen Quantity	m ³ /d	1
	Kg/d	573

Channel

The Specifications of channel between all units are listed in Table.

Specifications of channel		
Design parameter	Unit	Value
Max design flow	m ³ /d	13,640
Min design flow	m ³ /d	6,820
Water depth	m	0.4
Free board	m	0.3
Total depth	m	0.7
Width	m	0.6

Grit Chamber Units

The Specifications of aerated grit chamber are listed below;

Specifications of Aerated Grit Chamber		
Design parameter	Unit	Value
Design flow	m ³ /d	13,640
Number of grit chamber	-	2
Retention time	min	10
Grit width	m	3
Channel width	m	3.75
Channel length	m	25.5
Free board	m	0.6
Total depth	m	4.4
Total required Air with Safety factor	m ³ /hr	1008
Number of blowers	-	2+1
Total number of diffusers	-	72

3.4.4. Biological treatment

The extended aeration process utilizes a large aeration basin in which high MLSS concentration is maintained. In this process, the wastewater is in contact with air, the produced sludge settles, and part of it is returned to the aeration tank. In the extended aeration, generally, primary clarification is not used. The key parameters that distinguish extensive aeration from other activated sludge processes are the hydraulic retention time of approximately 24 hours and the very high solids retention time (20 to 30 days) in the aeration tank. Due to this high SRT, the sludge is stabilized, and there is no need for sludge digestion facilities.

The Specifications of extended aeration unit are listed in Table.

Specifications of Extended Aeration unit		
Parameter	Unit	value
Number of stream lines	-	3
Number of tanks	-	3
Average design flow of each reactor	m ³ /d	13,999
MLSS	mg/L	4000
Solid retention time	d	20
Effluent S	mg/l	0.3
Useful aeration volume	m ³	20,623

Amount of air required with safety factor	m ³ /h	16,802
Number of blowers	-	3+1
Capacity of each blower	m ³ /h	5,601
Each Diffuser capacity	m ³ /h	10
Total Number of Diffuser	-	1683

3.4.5. Secondary sedimentation

The Specifications of secondary clarifier are listed in Table.

Secondary sedimentation tanks		
Parameter	Unit	value
Number of stream lines	-	3
Number of tanks	-	3
design flow rate	m ³ /d	13,999
Area of each sedimentation tank	m ²	380
Diameter each sedimentation tank	m	22
Retention time	hr	6.8
Secondary sludge concentration	mg/l	8000
Total RAS flowrate	m ³ /d	13,999
TSS Effluent	mg/l	140
BOD Effluent	mg/l	43
COD Effluent	mg/l	87

3.4.6. Disinfection unit

The Specifications of disinfection units are listed in Table.

Specifications of disinfection unit		
Parameter	Unit	value
Design flow rate	m ³ /d	13,999
Number of tanks	-	2
Retention time at average flow rate	min	35
Volume of each tank	m ³	331.5
Total depth	m	2

Injection chlorine dose	mg/l	8
Amount of consumed sodium hypochlorite	l/h	1820

3.4.7. Drum filter

The service water includes the water required for equipment such as screen, screw compactor, and washing water for dewatering equipment in addition to GBT & BFP equipment and chemical preparation. Also, The Specification drum filter are listed in Table.

Specification of Drum filter		
Parameter	Unit	value
Service water flow rate	m ³ /h	30
Number of drum filter	-	1+1
Each Drum Capacity	m ³ /h	30
Maximum Mesh	micron	40

3.4.8. Sludge treatment

Sludge Treatment Combined Unit (GBT+BFP)

Combined units associate the functions of one gravity belt thickener and belt filter press. The Specification of Sludge Treatment Combined Unit are listed in Table.

Specification of Sludge Treatment Combined Unit (GBT & BFP)		
Parameter	Unit	value
Number of equipment		1+1
Max sludge production rate	Kg/d	2,460
	m ³ /h	308
Operating day	d	5
Operating hour	hr	8
Belt width	m	1.2
Solid Loading Rate	kg/m.hr	359
Total required polymer	Kg/hr	2
	GBT	
	Thickened Sludge	
Q	m ³ /d	38
TSS	kg/d	1,947
	mg/L	51,500
BOD	kg/d	1,299
	mg/L	34,354
COD	kg/d	28,303

	mg/L	1,070
	GBT supernatant	
Q	m ³ /d	269
TSS	kg/d	102
	mg/L	381
BOD	kg/d	74
	mg/L	276
COD	kg/d	220
	mg/L	59
	BFP	
	Sludge cake	
Q	m ³ /d	12
TSS	mg/L	214,000
BOD	mg/L	131,208
COD	mg/L	116,036

Supernatant Pump Station

The Specification of supernatant are listed in Table.

Parameter	Unit	Value
Q	m ³ /d	38
TSS	kg/d	1,947
	mg/L	51,500
BOD	kg/d	1,299
	mg/L	34,354
COD	kg/d	28,303
	mg/L	1,070

Deposit Area

The Specification of Deposit Area are listed in Table.

Parameter	Unit	Value
Deposit time	Month	3
Q sludge	m ³ /d	12
deposit time	m ³ /d	38
TSS	kg/d	2,563
	Kg/year	230,632
Area	m ²	2,563
Number of deposits	-	4
Area each deposit	m ²	641

Detailed design report is attached in annexure.

3.5. Electrical Load

Electrical load for proposed CETP is described as follows;

Load	Unit
Electrical installed	1802
Electrical demand	1263

Electricity is to be acquired from SEPCO and standby diesel generators would additionally be provided.

Diesel generator sizing will be as follows;

Total Active Power	kW	840
Total Reactive Power	KVAR	524
Total Apparent Power	KVA	990

The Detailed electrical design report is annexed.



Figure 3.5: Location of inlet of influent and outfall of treated effluent



Figure 3.6: Proximity of Indus River to the proposed CETP and outfall point

Chapter 4 Environmental and Social Baseline

4.1. General

This section describes the existing environmental and social conditions of the project area where the proposed CETP will be installed. The information covered in the section includes:

1. Physical environment e.g., soil, water, air, climate, topography etc.
2. Biological environment including flora, fauna, forest reserves etc.
3. Social environment including demography, availability of public amenities, and other social settings.

Discussion on the natural environment covers the area's physical and biological resources, including geomorphology, water resources, climate and air quality, vegetation, wildlife and wildlife habitat. Description of the socioeconomic environment includes details of the area's population and households, education, health, gender issues, water supply, agriculture, transport and communications, and occupations and income.

4.1.1. Purpose of the Baseline Study

The objective of developing baseline environmental and social profile is to establish the current status of environmental and social settings in project area to identify and assess the potential change likely to arise with the implementation of the project activities. This helps in assessment of the overall level of positive and negative impacts associated with the project.

4.1.2. Methodology

Baseline environmental and social profile of the project area was developed by collecting information through field surveys, literature review of available secondary data including maps prepared by the Geological survey of Pakistan, electronic and print media, published literature, District Census Reports (DCRs), and studies previously conducted in district and archives of the experts.

Field surveys for the project area were carried out in November by EMC team. The surveys were focused on collection of information regarding the project area's physical, ecological and social status with respect to the proposed project.

4.2. Study Area

4.2.1. Microenvironment & Macroenvironment

Microenvironment comprises the approx. 75 acres project site located between longitude 68°50'41.76"E, and latitude 27°44'23.07"N and its immediate vicinity within 500 meters radius. While the macroenvironment of the project area comprises the areas outside the 500m in particular and Sukkur city and district in general.

The current land use at the project site comprises mix of uncultivated and cultivated area. Photographs of project site are shown below;

[1] <http://www.sukkur.gov.pk/>

Project site



4.3. Physical Environment

4.3.1. Geology and Topography

Topographically, the district Sukkur may be divided into two broad parts. Fertile plain in the western half and desert in the eastern half separated by the Rohri Hills. With the exception of the low limestone hills running from the town of Rohri towards the south, and on the west of Nara Canal. The rest of the area of the district in the western half, is flat and level plain. The hills vary in elevation from 100 to 125 meters. There are four prominent hills namely, Adam Shah hills near Sukkur, Kalka hills at Aror, Laheri hills at Rohri and Shadi Shaheed hills at Kandahra. The eastern half of the district is a wasteland. It consists of barren tract of clay and ridges of sand hills covered with caper and thorn jungle.

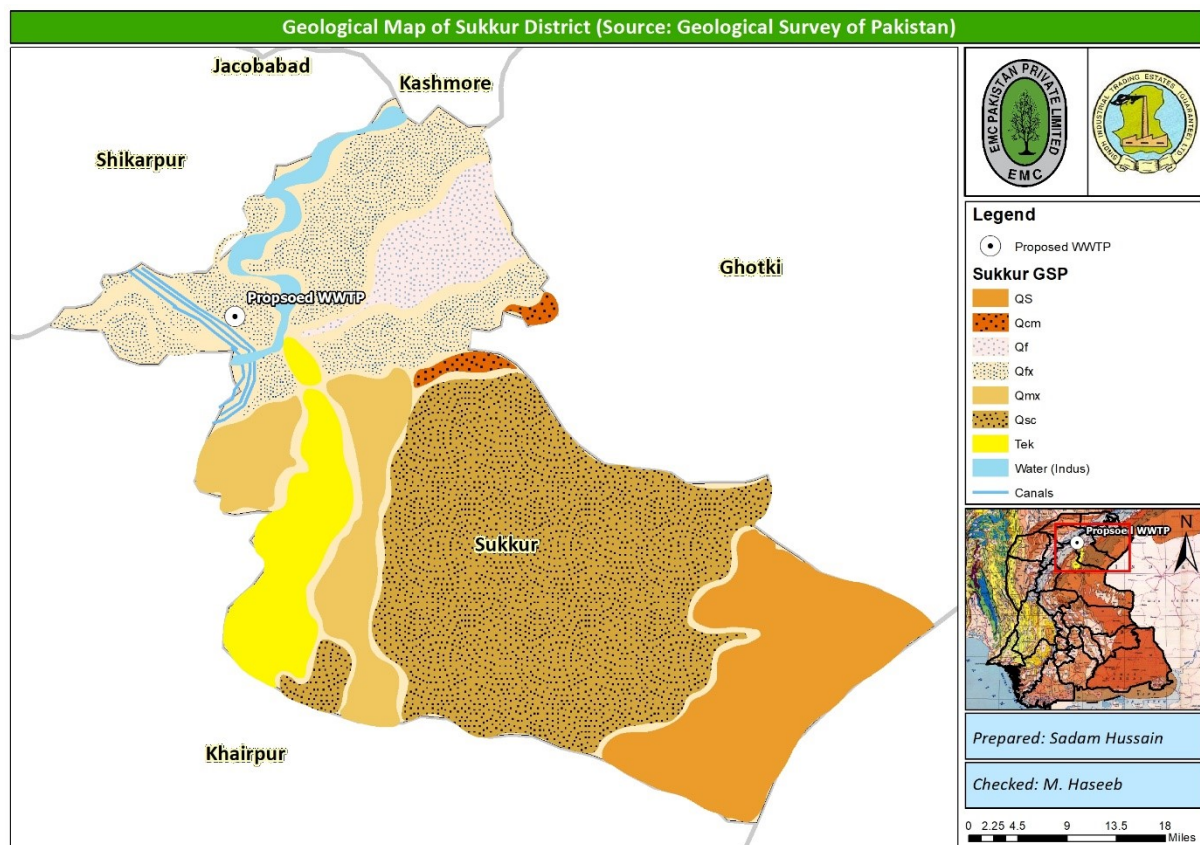


Figure 4.1: Geological Features of Sukkur

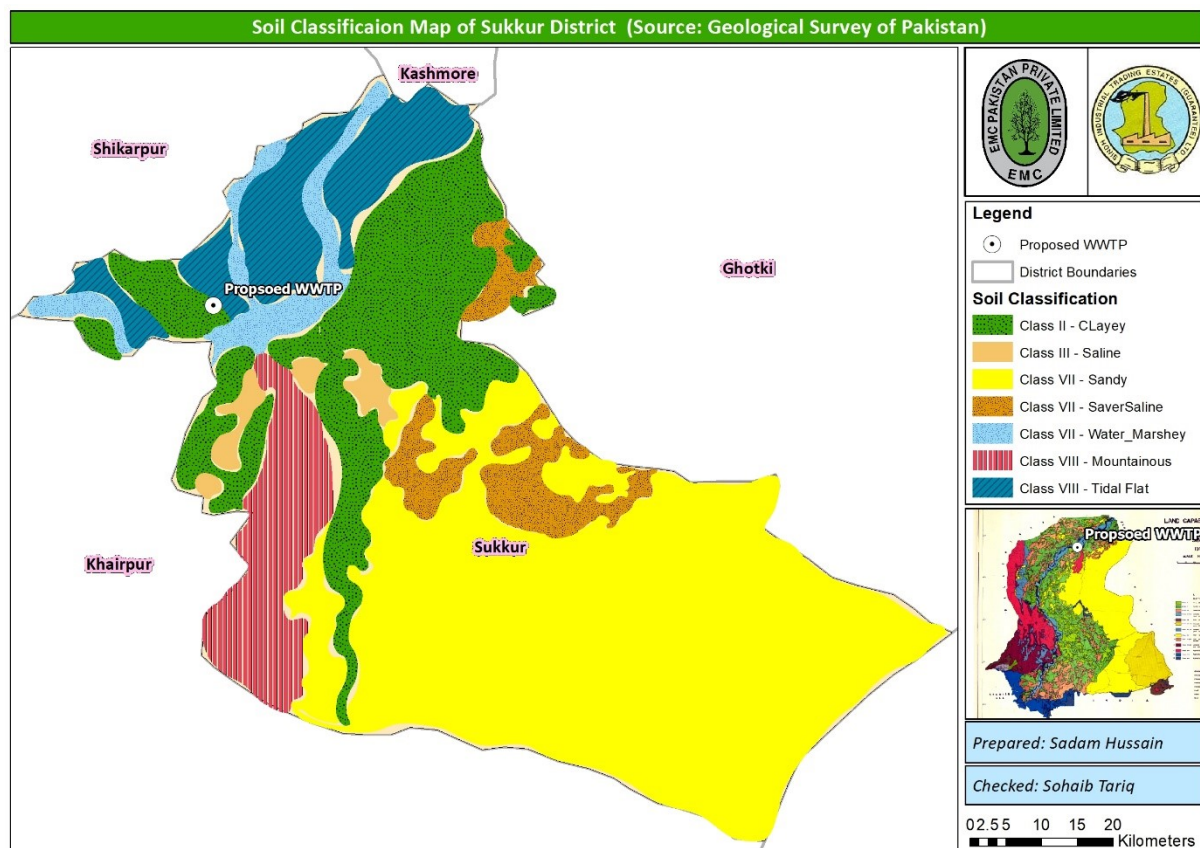


Figure 4.2: Soil map of Sukkur

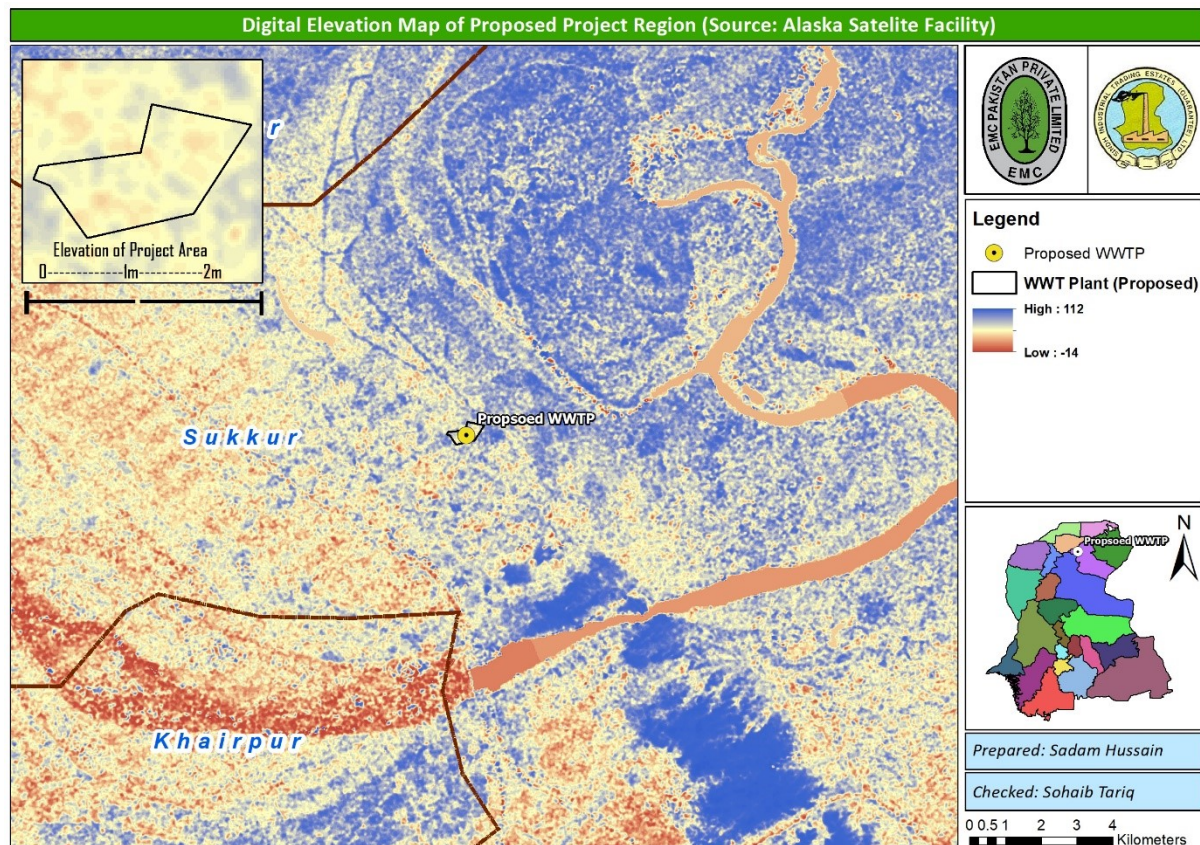


Figure 4.3: Elevation map of Sukkur

4.3.2. Hydrology

4.3.2.1. Surface Water

The irrigation system of Sindh is entirely dependent on the River Indus for supplies of water downstream of the area. Riverine tract of the River Indus occupies a special significance in the ecology of Sindh. The hydrograph of the river is strongly seasonal with a long low water season between October and March and a high-water season between April and September – driven primarily by snowmelt in the upper catchment and monsoon rainfall. The river usually peaks in mid-August or early September. The river carries large sediment loads due to widespread and rapid erosion in its upper catchments. It is estimated that about 1 billion m³ of sediment is deposited in its floodplain each year. Because of this continuing deposition, the river has developed natural levees along its length.

Expansion of agriculture and subsequent industrial development led to the need for conserving water for agriculture purpose and power generation through construction of reservoirs on the River Indus and its tributaries with associated irrigation canal networks. A number of Dams, head works barrages and diversion canals have been constructed on Indus and its tributaries from 1886 to 1993. The first barrage on the Indus was commissioned in 1932 (Sukkur Barrage) followed by Kotri (Ghulam Muhammad barrage) and Guddu in 1955 and 1962 respectively (Osmani, 2003). Indus River and Irrigation canals from Sukkur Barrage are the source of water in the macro environment i.e., district Khairpur and Sukkur. Six canals take off from Sukkur barrage for irrigation purposes. These include Dadu Canal, Nara Canal, Rohri Canal, Rice Canal, N.W Canal and Kirthar Canal.

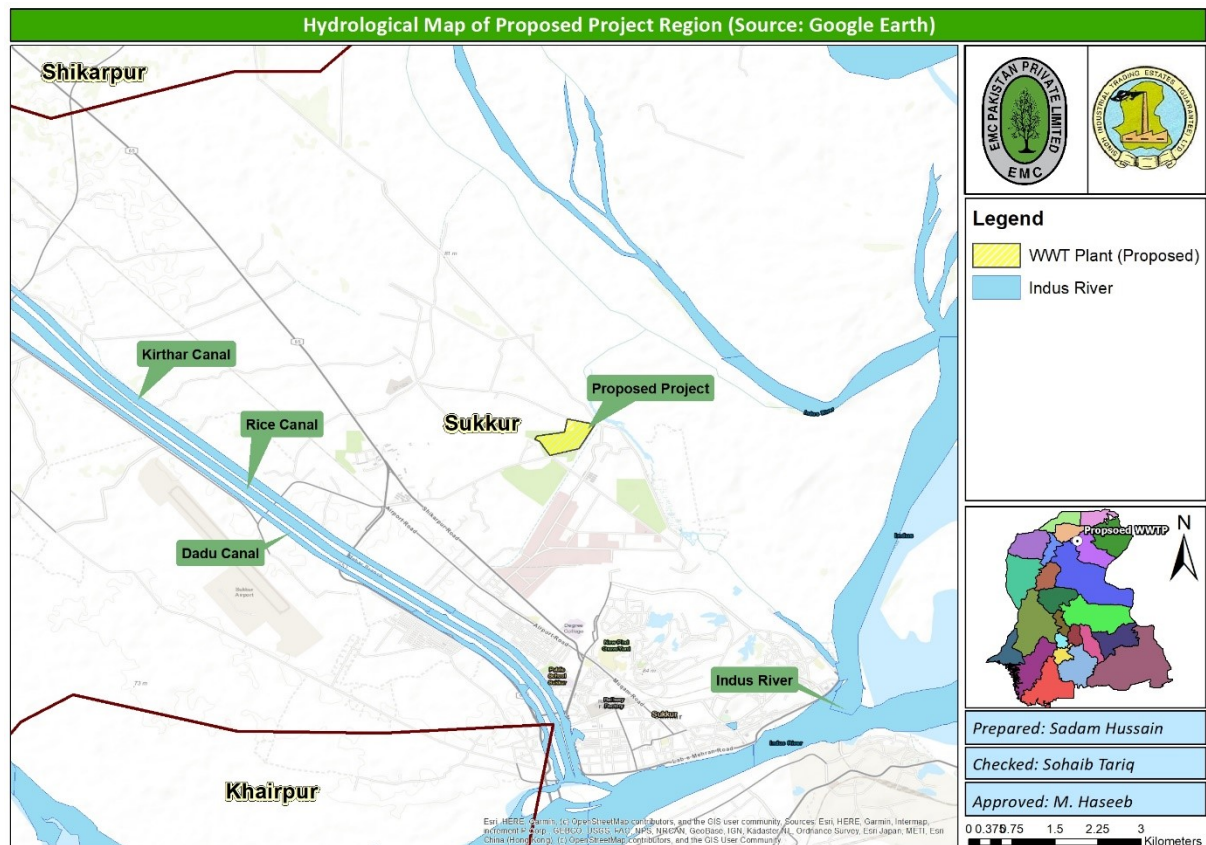


Figure 4.4: Surface hydrology of project area and surroundings in Sukkur

4.3.2.2. Groundwater

Pakistan's groundwater resources comprise a vast aquifer underlying the Indus Basin, recharged by the river flows, irrigation water and precipitation. The distribution of groundwater within the Indus Basin is non-uniform with majority of freshwater concentrated in Punjab. In Punjab, about 79% of the area and in Sindh, about 28% of the area is underlain by fresh groundwater (IUCN 1992). In Sindh, fresh water invariably occurred in areas where river had its courses during the past 800 years. Between Tando Mohammad Khan and Bulri where river was consistently flowing from 13th to 18th centuries, fresh water is present in shallow depth of about 15m to 18m. Generally, ground water becomes saline downstream of Hyderabad. This is thought to be because of the recent shift (in terms of geological times) of the Arabian Sea which used to be further southwards until Hyderabad some 12000 years ago. The areas with saline groundwater show higher concentration of chlorine compared to carbonates and bicarbonates suggesting that some millennia ago the area was submerged into seawater. Though meandering of the river Indus had diluted the brackish water, but 800 years of deserting by the Indus River had allowed saline water down below to displace fresh water of Indus River by various processes including sea water encroachment, surface water evaporation and dilution.

The water table along canals and Indus ranges from 20ft to 25ft with a gradient generally oriented southward. Groundwater for domestic consumption is abstracted through shallow hand pumps.

Water Quality

The Water sampling was conducted during the reconnaissance survey of the project site for CETP. During the survey 02 ground water samples were taken, one from the village and other from PDMA

warehouse, & 03 surface water samples were taken from various locations and analyzed at SEPA approved Laboratory. Water Quality Result and location coordinates are given in table below.

Table 4.1: Coordinates of the Water sampling locations

S No.	Sample ID	Location	Coordinates
1	Ground Water-1	PDMA	27°44'13.0"N 68°50'42.4"E
2	Ground Water-2	Village	27°44'32.6"N 68°50'51.3"E
Surface Water samples			
1	Surface Water-1	Kheer Thar Canal Outfall	27°42'23.6"N 68°50'17.0"E
2	Surface Water-2	River Indus (sample 01)	27°42'13.8"N 68°53'17.6"E
3	Surface Water -3	River Indus (sample 02)	22°44'35.2"N 68°51'01.5"E

Table 4.2: Surface Water Test Report

S. No.	Parameters	Units	27°42'23.6"N 68°50'17.0"E	27°42'13.8"N 68°53'17.6"E	22°44'35.2"N 68°51'01.5"E
			Results	Results	Results
1	pH value	-	7.21	7.26	7.17
2	Chemical Oxygen Demand (COD)	mg/L	26	52	16
3	Biochemical Oxygen Demand (BOD) ₅ at 20C	mg/L	10.4	19.3	7.8
4	Total Suspended Solids (TSS)	mg/L	35	21	21
5	Total Dissolved Solids (TDS)	mg/L	168	155.1	344
6	Oil & Grease	mg/L	0.29	0.20	0.41
7	Fluoride (as F ⁻)	mg/L	0.81	0.34	0.51
8	Chloride (as Cl ⁻)	mg/L	26.6	7.1	53.25
9	Total Hardness (as CaCO ₃)	mg/L	100	101	240
10	Turbidity	NTU	01	0.81	0.9

Because there is no standard defined in SEQS for surface water sample therefore, the analysis results have not been compared with any standard value. All the Parameters are in acceptable limits for all the samples taken from Kirthar Canal Outfall and River Indus.

Table 4.3: Ground Water Test Report

S. No.	Parameters	Standards	LD L	Units	27°44'32.6"N 68°50'51.3"E	27°44'13.0"N 68°50'42.4"E
		SSDWQ - LIMITS			Results	Results
1	pH value	6.5 – 8.5	0.01	-	7.07	7.20
2	Odour	Non-Objectionable / Acceptable	-	Physical	Acceptable	Acceptable
3	Taste	Non-Objectionable / Acceptable	-	Physical	Acceptable	Acceptable
4	Color	≤ 15	1.0	TCU	0.75	0.64
5	Turbidity	< 5	0.01	NTU	0.81	0.44
6	Total Dissolved Solids (TDS)	< 1000	1.0	mg/L	422	366
7	Total Hardness as CaCO ₃	< 500	0.1	mg/L	205	280
8	Fluoride (as F ⁻)	≤ 1.5	0.01	mg/L	0.29	0.34
9	Chloride (as Cl ⁻)	< 250	0.1	mg/L	35.5	34.4
10	Nitrate (NO ₃)	≤ 50	0.01	mg/L	0.34	0.79
11	Nitrite (NO ₂)	≤ 3	0.01	mg/L	0.042	0.038
12	Cyanide (as CN ⁻) total	≤ 0.05	0.01	mg/L	0.001	0.003
13	Phenolic Compound as (Phenols)	-	0.01	mg/L	BDL	BDL
14	Aluminum (Al)	≤ 0.2	0.01	mg/L	BDL	BDL
15	Antimony (Sb)	≤ 0.005	0.01	mg/L	BDL	BDL
16	Arsenic	≤ 0.05	0.01	mg/L	BDL	BDL
17	Cadmium	0.01	0.01	mg/L	BDL	BDL
18	Chromium, Total	≤ 0.05	0.01	mg/L	BDL	BDL
19	Copper	2	0.01	mg/L	0.025	0.04
20	Lead	≤ 0.05	0.01	mg/L	BDL	BDL
21	Mercury	≤ 0.001	0.01	mg/L	BDL	BDL
22	Selenium	0.01	0.01	mg/L	BDL	BDL
23	Nickel	≤ 0.02	0.01	mg/L	BDL	BDL
24	Boron	0.3	0.01	mg/L	BDL	BDL
25	Zinc	5.0	0.0	mg/L	0.40	0.49

			1	L		
26	Manganese	≤ 0.5	0.0 1	mg/ L	0.32	0.21
27	Barium	0.7	0.0 1	mg/ L	0.2	0.20
Mircobiological Analysis Reports						
28	Total Coliform	0cfu/100ml	-	cfu	100>	50>
29	Fecal Coliform	0cfu/100ml	-	cfu	48>	25>
30	Escherichia Coli(E-Coli)	0cfu/100ml	-	cfu	40>	22>

Analysis results of ground water samples from PDMA and village shows that pH, TDS, total hardness and other parameters are within the prescribed SSDWQ limits. However, some coliforms have been detected in groundwater samples. Reported depth of the groundwater from where the samples were collected is approx. 40ft.

Water sampling photographs	
	
	

4.3.3. Geography

Covering a total area of 300 km², Sukkur is located between 27°42'22"N latitude and 68°50'54"E longitudes and its elevation, high above sea level, is 220 ft (67 m). The city is situated in the Sukkur District, along the western bank of the Indus River, directly across from the historic city of Rohri. Indus River flows on the north-western side of the Sukkur district. Sukkur is the narrowest part of the Indus River course.^[1]

4.3.4. Climate

4.3.4.1. Temperature

The Sukkur District experiences extreme temperatures. The hot season lasts for 3 months, from mid of April to start of August, with an average daily high temperature above 40°C. The hottest month of the year at Sukkur Airport is June, with an average high of 44°C and low of 29°C.

The cool season lasts for 2 months, from December to mid of February, with an average daily high temperature below 27°C. The coldest month of the year at Sukkur Airport is January, with an average low of 8°C and high of 23°C.

Interpretation of the available meteorological data shows that the project area experiences extreme hot temperatures where mean daily maximum temperatures can go up to 45°C and even beyond due to the direction of sea breeze. The climate of the area is extreme and is characterized by hot summers and moderately cold winters. According to available meteorological information..

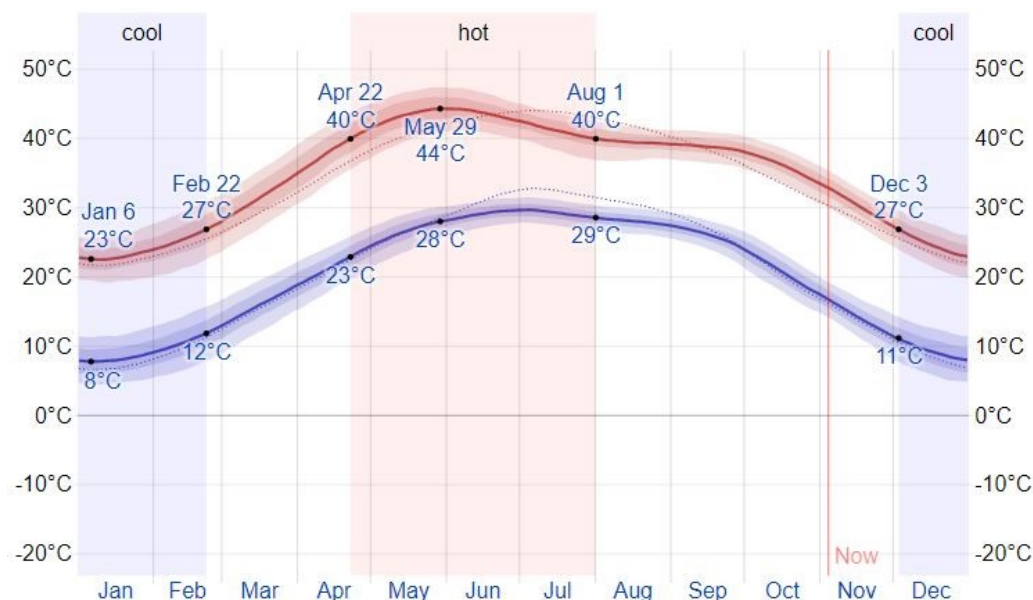


Figure 4.5: The daily average high (red line) and low (blue line) temperature. The thin dotted lines are the corresponding average perceived temperatures. (Source: www.weatherspark.com)

4.3.4.2. Rainfall

The rainy period of the year lasts for 1 months, from start of July to end of August, with a sliding 31-day rainfall of at least 13 millimeters. The month with the most rain at Sukkur Airport is July, with an average rainfall of 16 millimeters.

The rainy period of the year lasts for 1 months, from July to end August, with a sliding 31-day rainfall of at least 13 millimeters. The month with the most rain at Sukkur Airport is July.

end of August to July. The month with the least rain at Sukkur Airport is October, with an average rainfall of 1 millimeter. The rainless period of the year lasts for 10 months, from

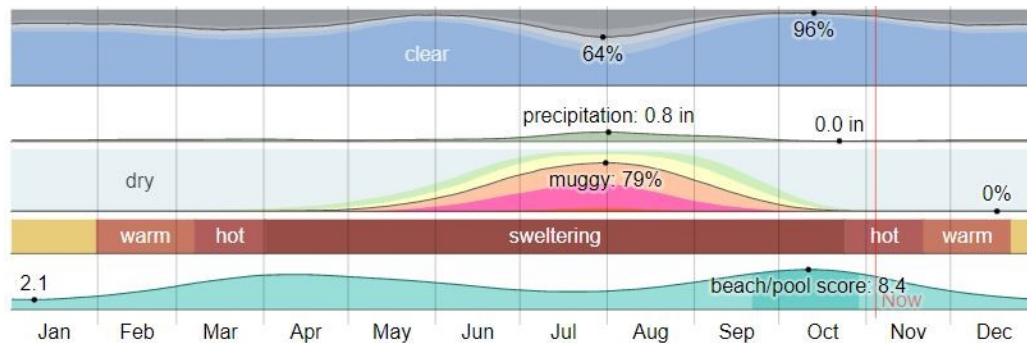


Figure 4.6: The average rainfall (Source: www.weatherspark.com)

4.3.4.3. Humidity

Sukkur experiences extreme seasonal variation in the perceived humidity. The humid period of the year lasts for 3 months, from end of May to mid of September, during which time the comfort level is humidity, oppressive, or miserable at least 20% of the time. The month with the most humidity days at Sukkur Airport is July, with 22 days that are humid or worse.

The least humidity day of the year is 1st February, when humidity conditions are essentially unheard of.

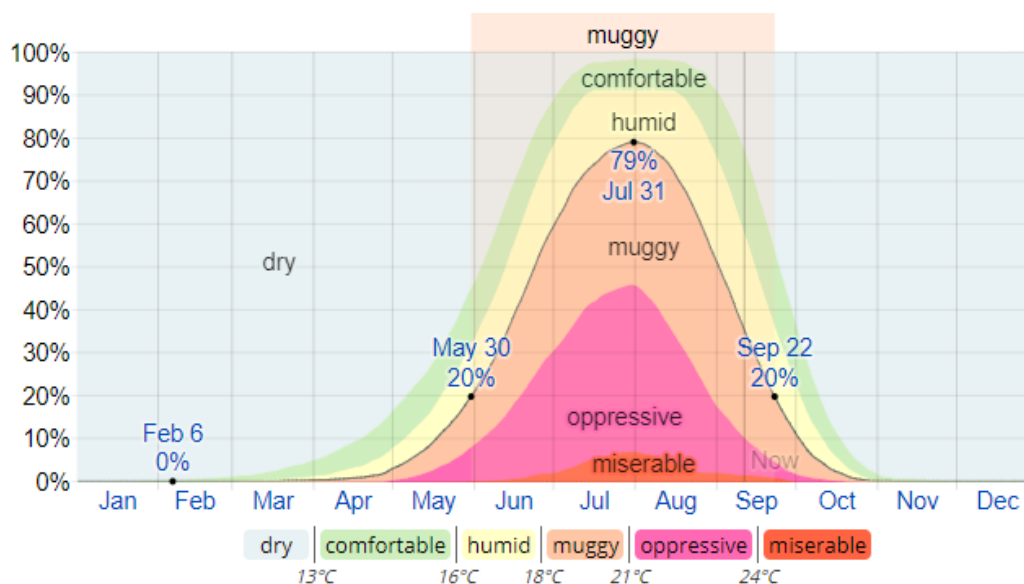


Figure 4.7: Humidity comfort levels, categorized by dew point. (Source: www.weatherspark.com)

4.3.4.4. Wind

The average hourly wind speed in Sukkur experiences significant seasonal variation over the course of the year. The windier part of the year lasts for 3 months, from mid of May to mid of

September, with average wind speeds of more than 3.6 meters per second. The windiest day of the year is end of June, with an average hourly wind speed of 5.1 meters per second.

The calmer time of year lasts for 8 months, from start of September to mid of May. The calmest day of the year is start of November, with an average hourly wind speed of 2.2 meters per second.

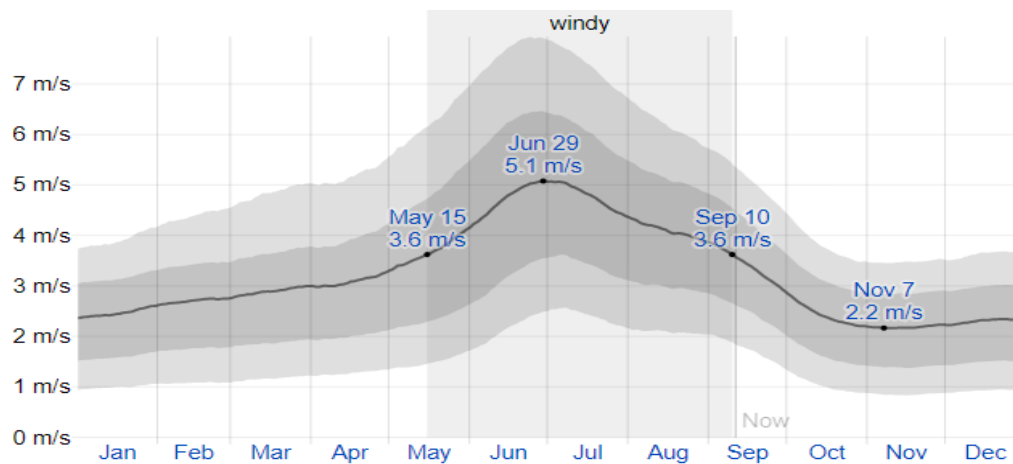


Figure 4.8: The average of mean hourly wind speeds
(dark gray line). (Source: www.weatherspark.com)

The wind is most often from the north for 2 weeks, from start of March to end of March for 2 weeks, from mid of November to start of December, with a peak percentage of 34% to end of November. The wind is most often from the south for 7.4 months, from March 26 to November 7, with a peak percentage of 83% on July 5. The wind is most often from the east for 2.0 weeks, from November 7 to November 21 and for 3.0 months, from December 6 to March 7, with a peak percentage of 31% on November 20.

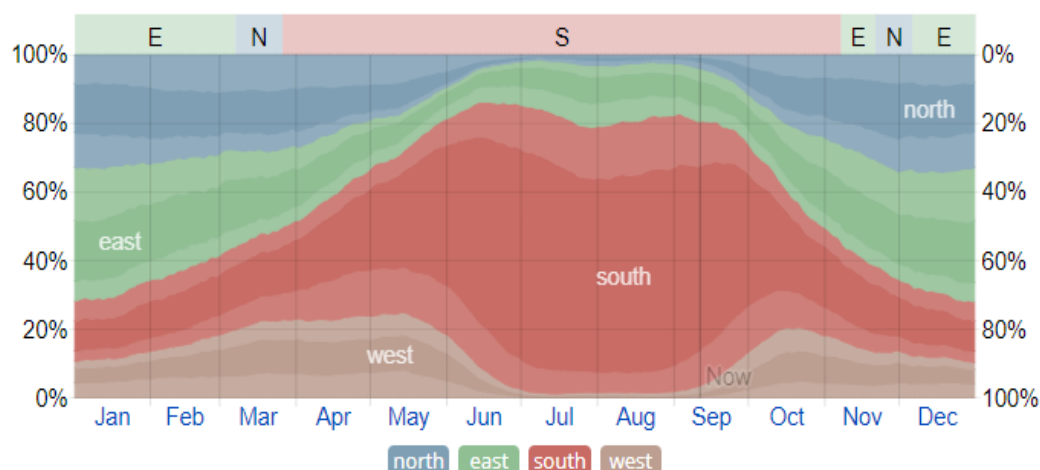
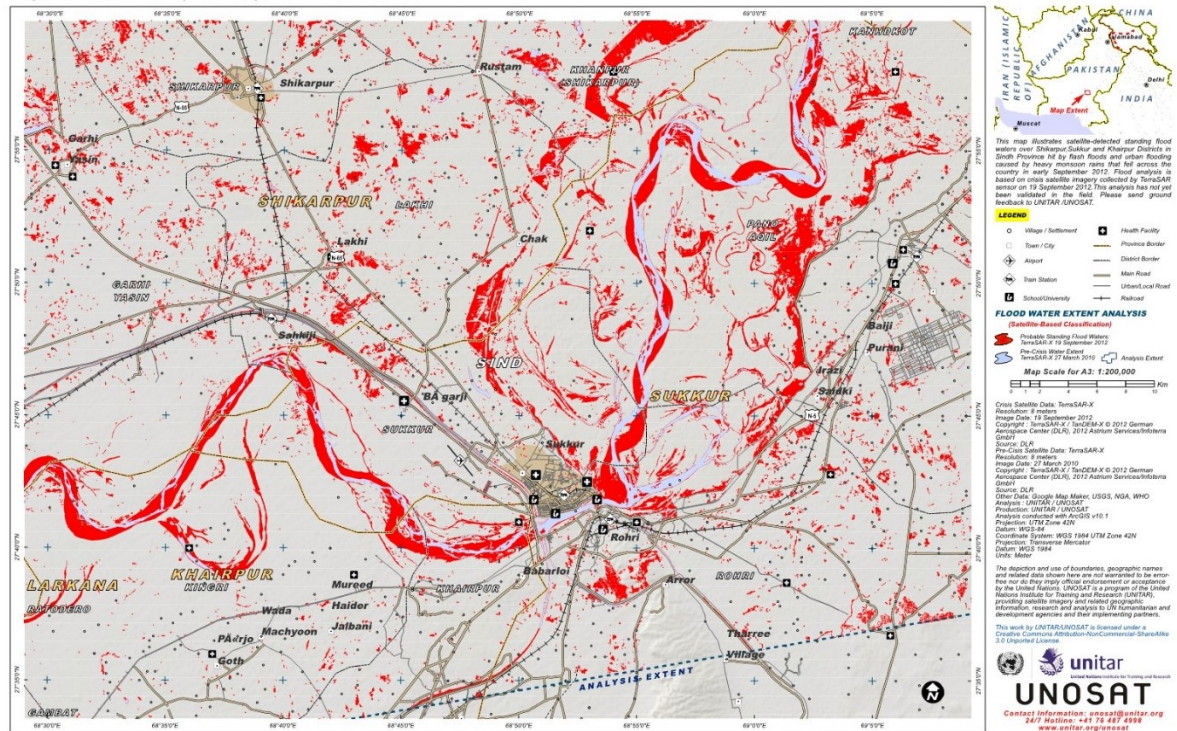


Figure 4.9: Mean Wind direction. (Source: www.weatherspark.com)

4.3.5. Flood Risk

OVERVIEW OF FLOOD WATERS IN SHIKARPUR, SUKKUR AND KHAIRPUR DISTRICTS, SINDH PROVINCE, PAKISTAN

Analysis with TerraSAR-X Data Acquired on 19 September 2012 and 27 March 2010



SUKKUR, SINDH - RISK ANALYSIS MAP

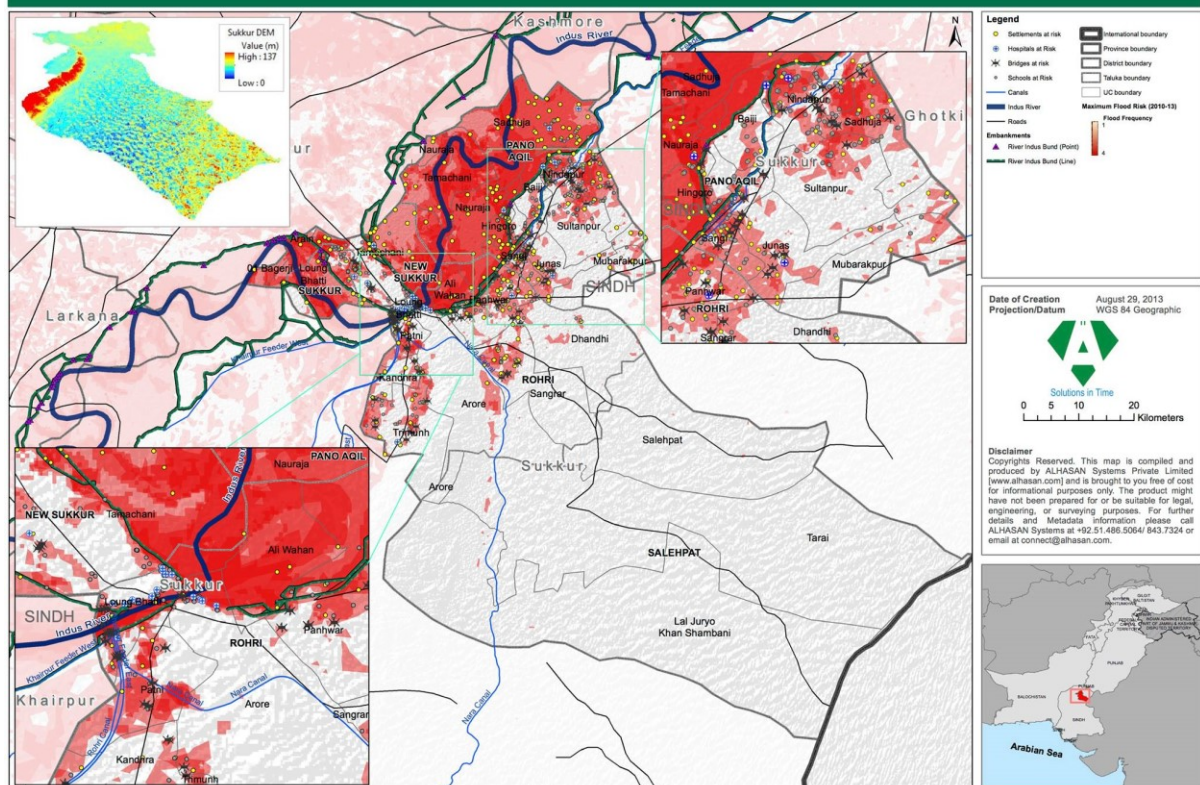


Figure 4.10: Risk Analysis Map

4.3.6. Air and Noise Quality

Rapid urbanization and an exponential increase in the number of all types of vehicles have given rise to the deterioration of air quality in urban centers. Vehicles which are not properly maintained are particularly a problem. Lead emissions from automobile exhausts are reportedly high in some parts of the city during specific traffic peak hours. Indiscriminate burning of municipal solid wastes also contributes to air pollution in some areas. Ambient Air Quality Monitoring was conducted at 2 locations in the project area by EMC. The parameters observed were according to the SEQS for Ambient Air Quality and analysis results meet the SEQS standards. All the parameters of Ambient Air Quality i.e. Sulfur Dioxide, Nitrous Oxides, Carbon Monoxide, Suspended Particulate Matter, Particulate Matter all were observed to be complying the SEQS standards.

Table 4.4: Ambient Air Quality Monitoring Results in macroenvironment

Time / Duration	Testing Parameters	*SEQS Limits	Units	Readings. Avg. / hrs	
				L1	L2
24'hrs.	CO	5.0	mg/m ³	1.78	1.93
	NO	40.0	µg/m ³	32.5	34.2
	NO ₂	80.0	µg/m ³	51.4	54.5
	SO ₂	120.0	µg/m ³	28.5	33.5
	O ₃	130.0	µg/m ³	19.6	22.4
	PM ₁₀	150.0	µg/m ³	138.8	143.6
	PM _{2.5}	75.0	µg/m ³	63.8	71.2
	SPM	500.0	µg/m ³	411.7	437.2
	Lead (pb)	1.5	µg/m ³	ND	ND

Noise in the area mainly be attributed to industrial activity and heavy and light vehicular traffic. Noise levels in the project area are shown below;

Table 4.5: Noise Test Report

#	Location	SEQS Limits: 75 dB(A) *Leq			
		Noise Level Readings			
		Coordinates	Minimum	Maximum	Average
1	Proposed ETP Project Site Area	27°44'15.7"N, 68°50' 35.7"E	61.2	62.4	61.2
2	Near Community Area (Nehal Khan Khoso)	27°44'23.2"N 68°50'54.2"E	63.6	64.8	64.2
3	Near Main Road side Right Corner	27°44'32.1"N 68°50'59.1"E	65.2	65.7	65.4
4	Near Main Road side Left Corner	27°44'35.6"N 68°50'43.0"E	64.1	64.6	64.35
5	SITE Sukkur Industrial Area Near	27°43'21.4"N	62.7	62.9	62.8

	SESSI Hospital	68°50'31.6"E			
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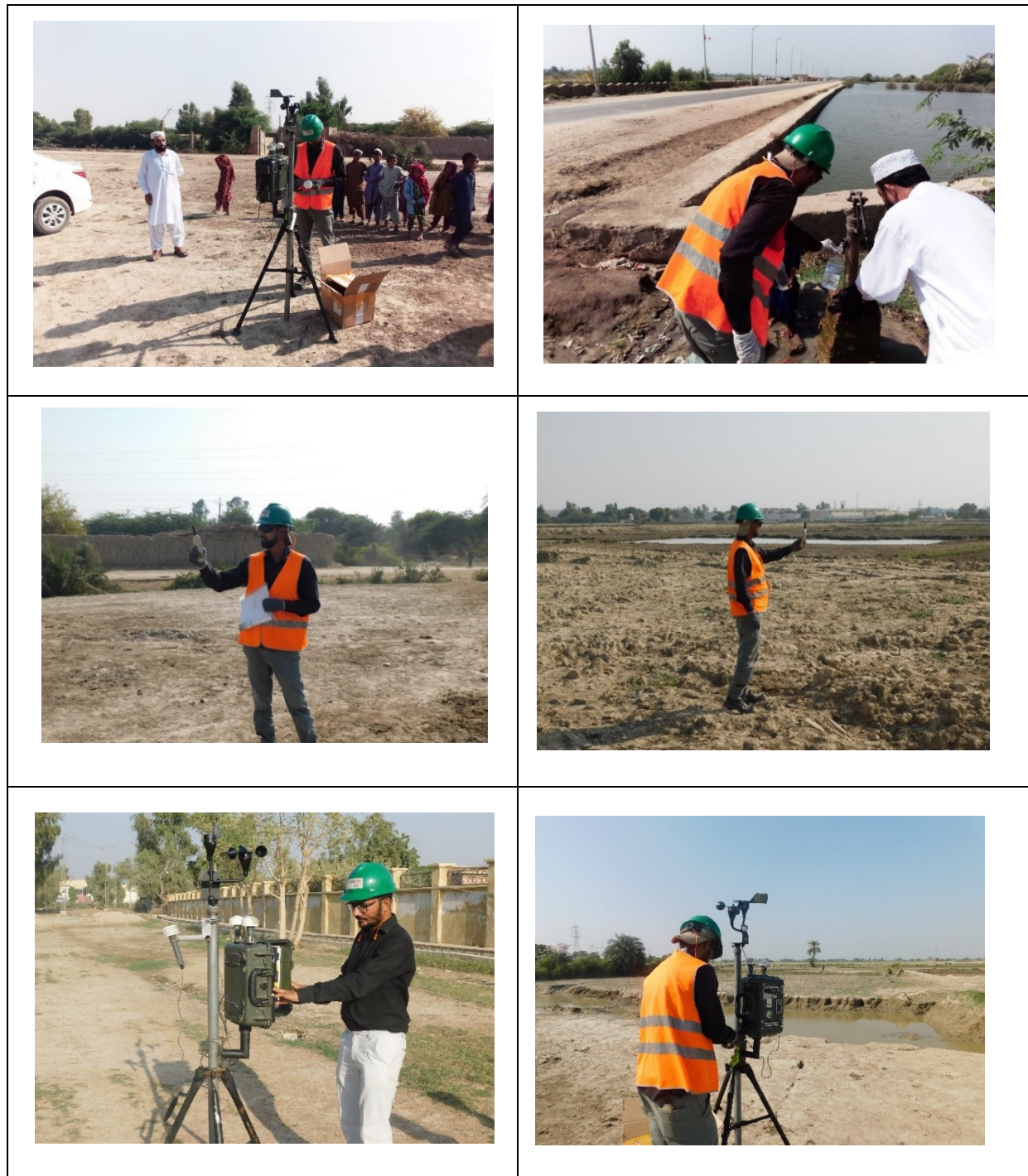


Figure 4.10: Noise and Air quality monitoring at the Project Site

4.3.7. Seismicity and Tectonic setup

The project area falls in Seismic Zone – 2A (Figure 4.11). Zone – 2A is the largest zone with respect to area, but it has the lesser seismic activity. It covers most parts of Punjab and Sindh western part of Balochistan. In the south it covers the coastal areas of Sindh where a few but significant historical earthquakes are found; however, there are generally fewer earthquakes in this zone.

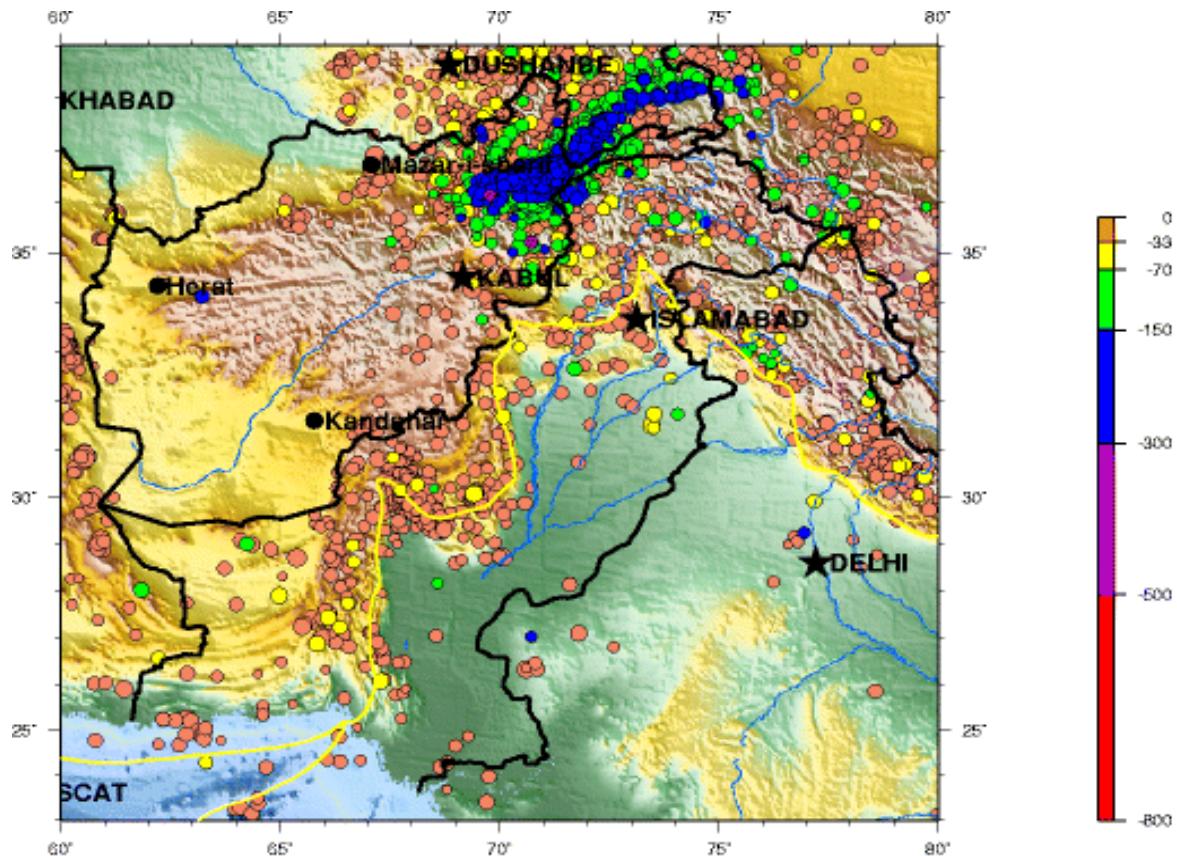


Figure 4.11: Seismicity & Natural Disasters- Pakistan, 1990-2000

4.4. Ecological Baseline

4.4.1. Flora

Flora of the Project Area falls in the scrub Dry Tropical Thorn Forest Zone. This is the natural vegetation of the Indus Basin. It has the capacity to survive and grow in areas with extremely high temperatures and low precipitation.

Main trees in the Project Area and in urban area of District Sukkur are Date palm (*Phoenix dactylifera*), *Acacia nilotica* (Keekar), *Eucalyptus camaldulensis* (Safaida), *Phoenix dactylifera* (Date Palm), *Dalbergia sissoo* (Shisham), *Azadirachta indica* (Neem), *Salvadora oleoides* (Peelu) and *Ficus religiosa* (Peeple).

Among the grasses; *Arislida depressa* (Lumb), *Eleusine compressa* (Chemmer), *lasiurus indicus* (Gorkha) and *Saccharum bengalensis* (Kana) are found in the Project Area .



Figure 4.12: Status of vegetation at the Project Site

4.4.1.1. Reserve Forests / National Parks

The Project area is now highly urbanized and industrialized and as such lacks reserved forests, national parks or game sanctuaries. However, man-created plantations comprising of ornamental and shade species are common in Sukkur city.

4.4.2. Fauna

Changes in land use has significantly altered the status of fauna in the project. Animal life in the project area macroenvironment have been constraint with human habitations within agriculture areas, as well as the urban centers. Scavengers are attracted to the garbage dumps for food. Common Crow and House Sparrows are common in the project area and city. Large populations of Pigeons breed in urban houses. Kites, Crows, Mynas, House Sparrows, and Alexandrine Parakeets breed in the urban areas. Usually, Shisham and Acacia trees are planted alongside the roads and canals. Mostly Doves breed on such trees.

4.4.2.1. Mammals

The only mammals found in the area are domesticated animals, such as buffaloes, cattle, sheep, goats, camels, donkeys, dogs, cats etc.

4.4.2.2. Birds

The bird communities found in the area include a variety of residential birds, such as house crow (*Corvus splendens*), common mynah (*Acridotheres tristis*), red-vented bulbul (*Pycnonotus cafer*), ringdove (*Streptopelia decaocto*) and pigeon (*Columba livia*). The less urbanized areas host less common local or migrant species of Bee-eaters, Woodpeckers, Parakeets, Warblers and Thrushes.

4.5. Socioeconomic Profile of Project Area

4.5.1. Macro Environment

This social baseline chapter provides a detailed review of the socio-economic conditions for the proposed project. The socio-economic profile is based on a literature review and several consultations with primary stakeholders and secondary stakeholders. The purpose of this social baseline is to provide a comprehensive overview of the social and cultural context of the district Sukkur which will help in identification of the positive and negative impacts of

the project on the local community and contribute to providing plausible mitigation measures that can become part of the Social Management Plan. With respect to the secondary sources, latest government publications based on national, provincial and sectoral census surveys and reports from NGOs and development agencies were used to establish the macro-environment of the project area. Both quantitative and qualitative data available at the district level was used to provide a comprehensive overview of the major socio-economic parameters: demography, ethnicity, poverty, economy, education, health, utilities and the like.

The major secondary sources used to develop the baseline include the Population Census-2017, Provincial Development Statistics (Sindh), Pakistan Social and Living Standards Measurements (PSLM) Report, Provincial Agricultural Statistics (Sindh) and the Planning Commission's Multi-Dimensional Poverty Index report.

4.5.1.1. Administrative Context

The project falls in the administrative jurisdiction of upper Sindh, district Sukkur.

Sukkur district comprises of 5 tehsils, 63 union councils and 260 Mauzas. Pano Aqil is the most populated taluka of the district and is known for having one of the largest military cantonments of the country. Shikarpur and Ghotki were previously a part of District Sukkur.

Table 4.6: District with Tehsils & Union Councils

District	Area / Sq. Kms	Tehsils	Union Councils	Number of Mauzas/Deh
Sukkur	5,165	5	63	260

Source: PBS (Govt. of Pakistan – 2017 Census)

4.5.1.2. Demography

Sukkur is a less populated district with a total population of 1,487,903. The average annual growth rate between 1998 and 2017 census has been 2.49%. A total of 263,042 households have been reported in the district in the 2017 census, a majority of which are based in the rural part of the district. The sex ratio of district Sukkur is 109.9 indicating 109 males per 100 females.

Table 4.7: District Population by Gender and Rural/Urban

Administrative Units	House Holds	Population – 2017				Sex Ratio 2017	1998- 2017
		Male	Female	Trans-gender	All Sexes		Average Annual Growth Rate
Sukkur	263,042	776,259	711,587	57	1,487,903	109.09	2.49
Rural	135,906	399,295	368,485	8	767,788	108.36	2.86
Urban	127,136	376,964	343,102	49	720,115	109.87	2.13

Source: PBS (Provisional Results of Census - 2017)

District Sukkur is rural by its characteristics as majority of the population resides in rural areas.

4.5.1.3. Multi-Dimensional Poverty Index

The Multi-Dimensional Poverty Index (MPI) was developed in 2010 as an alternative to the traditional measures of poverty that are based on household income and consumption. Developed through collaboration of UNDP's Human Development Office and the Oxford Poverty and Human Development Initiative (OPHI), the Multi-Dimensional Poverty Index (MPI) incorporates other measures of poverty including education, health and various standards of living. Two main components, the 'Incidence' (H) of poverty and the 'Intensity' (A) of poverty are multiplied to come up with the MPI of a certain geographical area. The incidence of poverty is the percentage of people who are categorized as multi-dimensionally poor or the poverty headcount. The intensity of poverty is the weighted average of all MPI indicators in which people are classified as poor or deprived.

In 2015, with the support of UNDP and OPHI, the Planning Commission estimated national, provincial and district-level MPIs based on Pakistan's Social and Living Standards Measurement Survey Data (2014-15). Based on these datasets, a comparison of the MPI for the entire Sindh Province and the MPI values for project districts in Sindh is presented in Table 4.3. According to these MPI estimations, poverty is higher than the provincial average in other districts except Sukkur. Moreover, except for Sukkur, both the poverty headcount and the intensity of poverty data indicate that more than half of the district populations are categorized as 'poor' and considered 'deprived' in at least 50% of the socio-economic indicators.

Table 4.8: Multidimensional Poverty Index of Project District in Sindh				
S. No	Regions	MPI	Incidence (H)	Intensity (A)
1	Sukkur	0.197	39.5%	50.0%
2	Sindh	0.231	43.1%	53.5%

Source: UNDP Report Multi-Dimensional Poverty in Pakistan 2015

4.5.1.4. Ethnic and Religious Diversity

District Sukkur is composed of pre-dominantly Sindhi speaking people, however Urdu speaking, Punjabi, Pathan and Balochis also inhabit the district. A significant Muhajir (migrants) community is residing in this district, particularly in the city of Sukkur. This community is mainly associated with business and trade in this district. Islam is the major religion of this district as the population is Muslim followed by Hindus and Christians are very few. Major clans of this district are Syed, Arain Mahar, Soomro, Memon, Mughal, Ansari and Phulpoto.

4.5.1.5. Economy & Livelihood

In Sukkur district, the main source of livelihood is agriculture in the rural areas. The sources of livelihood in rural areas are less diversified as compared to urban areas. In urban areas, people are engaged in various other economic activities like trade, services, personal business, and government and private jobs.

According to 2014 PESA report, agriculture is the main source of employment for the rural population of District Sukkur. In the urban areas however, people are engaged in various other economic activities like trade, services, personal business, and government and private jobs. The Agriculture Census 2000 classifies rural households under three broad categories: households that own and cultivate land or tenants; livestock owners; and non-agricultural households. In district Sukkur, the share of non-agricultural households is 47.7%, while agricultural households constitute 25.5% and livestock owners constitute 26.8% of all rural households in the district.

District Sukkur has two industrial estates. Sindh Industrial Trading Estate (SITE) was established in 1963 over an area of about 1060 Acres. The Estate comprises of industrial units which include ghee, oil, biscuits, soap, beverages, flour, straw paper board, poultry farm, dates, Sulphuric acid, ice and cold storage. The Small Industries Estate (SIE) Sukkur was set up over an area of 110 acres. The Estate comprises of industrial units like cotton seed crushing units, RCC pipes, paints and varnishes, biscuits, flour, rice husking, printing press, ceramic wares and light engineering.

4.5.1.6. Education

District Sukkur has the lowest number of government schools compared to the districts. The district also has the lowest total enrolment ratio and the lowest number of teachers. The total enrollment of students in government schools of District Sukkur is 160,693 out of which 97,344 are males and 63,349 are females. Out of a total of 5,504 teachers, 3,969 are male and 1,535 are female teachers. This illustrates that one teacher is teaching an average of 29 students.

Table 4.9: District Summary: Government Schools, Enrolment, Teachers and School Status										
Districts	No. of Schools				Enrolments			Teachers		
	Boys	Girls	Mixed	Total	Boys	Girls	Total	Male	Female	Total
Sukkur	172	199	856	1,227	97,344	63,349	160,693	3,969	1,535	5,504

Source: SEMIS Census 2015- 2016 -Sindh Education Management Information System (SEMIS)

4.5.1.7. Health

District Sukkur has the highest number of hospitals (23) with a total capacity of 1210 beds. Apart from that the district has 77 Dispensaries with a total of 12 beds, 5 Rural Health Centers (RHC) with 54 beds, and 26 Basic Health Units (BHU) with 52 beds, 6 T.B. Clinics and 6 Mother & Child Healthcare Centers with 32 beds.

Table 4.10: Details of Health facilities in District												
Districts	Hospitals		Dispensaries		R.H.Cs.		B.H.Cs.		T.B. Clinics		M.C.H. Centres	
	No.	Beds	No.	Beds	No.	Beds	No.	Beds	No.	Beds	No.	Beds
Sukkur	23	1210	77	12	5	54	26	52	6	0	6	32

Source: Health Profile of Sindh-2016 (Sindh Bureau of Statistics)

Table 4.11: Health Personnel in Project District							
Districts	Sector	Physicians	Gynecologist	Pediatricians	Doctors/ GMO	LHV	Midwives
Sukkur	Govt.	3	5	3`	180	76	92
	Semi Govt.	-	-	-	34	9	6
	L. Bodies	-	1	-	17	-	4
	Private/ Missionary	8	6	7	150	12	41
	Total	11	12	10	381	97	143
<i>Source: Health Profile of Sindh-2016 (Sindh Bureau of Statistics)</i>							

4.5.1.8. Agriculture

Sukkur contributes significantly in agriculture sector of Sindh because its climate is suitable for production of various crops including the kharif crops of cotton, rice, jowar and sugarcane and the Rabi crops of wheat, gram and oil seeds. Date orchards are abundant in this district. Due to its soil and topography, Sukkur is an ideal place for date cultivation. Sukkur has the largest dry dates market of Sindh. Important date varieties include Aseel, Fasli, Bhedir, Karbalian, Kupro and Mithri.

4.5.1.9. Gender Roles

The literacy rate among women in the surveyed villages of district Sukkur is almost non-existent however women from Syed families are educated. Women from poor families are involved in farming alongside men while some women are able to generate income by sewing clothes. There are no separate schools for females in the rural areas. Due to tribal system in Sukkur, the females are not allowed to attend schools. Women are involved in livestock rearing and household chores.

4.5.2. Micro Environment

4.5.2.1. Land Use

The proposed site is located in the main Sukkur City of District Sukkur, Sindh, in the S.I.T.E industrial area (Sukkur) in its immediate neighbourhood Provincial Disaster Management Authority (PDMA) Warehouse is located just opposite to the project's site followed by two villages on either side of its location.

4.5.2.2. Education

There are few educational facilities near the proposed project site as many of the educational institutes are located outside the premises of Sukkur S.I.T.E Industrial Area. The educational facilities include Govt. Boys Primary School (483m), Workers Model School (2km), Meritorious School System (2.29km) and The City School – Nursery Branch (3km). The colleges include Sindh College of Education (2.17km), Blessing College of Nursing (2.52km) and Govt. Degree College & Post Graduate Studies Center (3km). The universities include

IBA Sukkur (2.69km), Virtual University – Sukkur Campus (4.2km) and Ziauddin University Sukkur (6km).

4.5.2.3. *Health*

The people of area don't have access to good health facilities but due to non-availability of trained doctors, lady health doctors and technical facilities, people prefer to go to PPHT Govt. Hospital (2.51km). Other hospital facilities include Sindh Rangers Hospital (2.56km), Mughal Hospital (2.39km) and River City Hospital (3.02km). The health care facility closest to the project location is Sindh Employees' Social Security Institution (SESSI) – OPD Hospital (1.58km)

4.5.2.4. *Utilities*

In S.I.T.E industrial area the basic utilities are available for the industries while the residents of the villages are not able to avail these facilities. They don't have access to basic services such as gas connections and electricity (if available they face long load-shedding of 12 to 15 hours daily). They use solar panels if they can afford. Sukkur Electric Power Company (SEPCO) is the distribution company responsible for supplying electricity to Sukkur district. There are no gas connections in any of the villages. There is no proper sewerage system in the area. Most of the villagers reported open defecation due to unavailability of latrines in their houses. There is no solid waste management system in villages. The majority of people throw their waste in the open area while industries have access to municipal waste collection.

4.5.2.5. *Traffic Condition*

The project is directly facing an internal road that connects with Sukkur – Jacobabad Highway/ Shikarpur Road at the distance of 2.25kms. The traffic condition in the nearby roads is somewhat satisfactory as the project is located inside the S.I.T.E Industrial Area of Sukkur which is surrounded by numerous industries. The industrial traffic includes the flow of trucks containing raw material and finished goods.

Chapter 5 Stakeholder Consultation

5.1. Background and Objectives of Stakeholder Consultation

The participation of project stakeholders in project planning, design and implementation is now universally recognized as an integral part of environmental & social impact assessment. Local communities, their representatives, government departments, national and international NGOs and the civil society at large may all be able to contribute to and benefit from, the dialogue directed at identifying and resolving key project-related issues. Stakeholder consultation has become an important requirement of the EIA study after the enactment of the guidelines for public consultation under the Pakistan Environmental Protection Act (PEPA) 1997. After the 18th Amendment to the Constitution, the Government of Sindh passed the Sindh Environmental Protection Act 2014, which also stresses the importance of engaging with the concerned primary and secondary stakeholders during the EIA study.

The proposed project “Combined Effluent Treatment Plant” will be a modern plant planned to be used for treating waste water of the nearby industries. The project is planned to be constructed on land measuring approx. 75 Acres situated in S.I.T.E industrial area Sukkur which falls under the jurisdiction of District Sukkur, Sub-Division of Sukkur City, Sindh. New developments in the area will change the overall landscape and can create both challenges and opportunities for the existing and new residents and businesses in the area.

While in the short-term, the impacts might be felt only in the microenvironment of the project, in the long-term, the impacts may also spread to other nearby neighborhoods and activities including traffic management, the swift passageway for fire tenders and ambulance and stress on existing utilities. Instead of these perceived impacts, meaningful engagement with the project stakeholders has been carried out to identify the potential positive and negative impacts, assess the magnitude of these impacts from a social perspective and prescribe solutions for the construction and operations phase of the proposed project.

5.1.1. Stakeholder Mapping

To better understand the different stakeholder groups for this project, a stakeholder mapping exercise has been carried out whereby the different stakeholder groups and their interests in the project are discussed in this section:

1. **Local People/Neighborhood:** Individuals or groups in the vicinity of the project site are informed regarding the project background and context. Due to their proximity to the project site, they are often the most vulnerable stakeholders and therefore, consultation with these stakeholders is carried out throughout the project life. The consultation exercise provides an opportunity to appraise the stakeholders regarding the consultation process, identify likely project impacts, and record concerns of local communities. Moreover, intensive stakeholder engagement during the planning stage of the project provides a basis for reducing the trust deficit and encourages confidence-building.
2. **Proponents:** The main aim of the project proponent “S.I.T.E Sukkur - Government of Sindh (GoS)” is to accomplish the objectives of the project through cost-effective and sustainable project activities. To this end, the project proponent has to recognize that strong associations and responsive relations with stakeholders would go a long way to achieve the project

objectives. Therefore, the proponent has to strive to engage stakeholders at all levels from the outset; inform them regarding project goals, design and alternatives. Moreover, they have to keep trying to create public understanding and acceptance of the proposal through a commitment to implement the promised objectives. They have to accomplish the project through general acceptance of the design and keep improving through the use of public inputs on alternatives and mitigation measures.

3. **Government Agencies:** The government agencies involved in the EIA process is mandated to have their policy and regulatory responsibilities addressed in impact analysis and mitigation consideration. For the competent authority, an effective public involvement program will ensure a project proposal that effectively incorporates environmental and social concerns. During the EIA review, the most important concern for SEPA is a transparent public consultation process and a strong stakeholder engagement plan that can address the concerns and suggestions of all stakeholders.
4. **NGOs/Interest groups:** Comments from NGOs and specific interest groups often provide a useful policy perspective on the project's methodology and implementation mechanisms. For example, due to the vast exposure of certain NGOs and interests groups, alternative measures for reaching the project goals may be advised that is more environmentally friendly and socially acceptable.

5.1.2. Primary and Secondary Stakeholders

Primary stakeholders are those who have a direct interest in the project which includes residents, commercial entities and institutions falling in the immediate environs of the project area. Secondary stakeholders include the relevant government agencies and public interest groups which may indirectly influence or be influenced by the project. The concerns and input from both primary and secondary stakeholders are important to identify the issues arising from the construction and/or operation phase of the project and propose mitigation measures that minimize the negative project impacts and enhance the positive ones.

Within the project vicinity, the primary stakeholders are the residential, commercial and institutional entities in the immediate vicinity, that include Bakhsh Lakan Village, S.I.T.E Limited – Sukkur, Pepsi- Sukkur, Govt. Primary School S.I.T.E area Sukkur, Sindh Employees' Social Security Institution (SESSI), Provincial Disaster Management Authority (PDMA) and Reema Cooking Oil & Ghee Factory. The secondary stakeholders for this project include the utility companies that operate in the area including SEPCO, SSGC, as well as the regulatory authorities, mandated to ensure environmental protection in the city, which falls under the remit of SEPA and compliance with building and construction laws which is looked after by SBCA. The primary and secondary stakeholders for the "Combined Effluent Treatment Plant" have been identified in the table below.

Table 5.1: Stakeholders for Combined Effluent Treatment Plant

Neighborhood	<i>Residential Interests</i> • Bakhsh Lakan Village <i>Commercial Interests</i> • Pepsi – Sukkur Beverages • Reema Cooking Oil & Ghee Factory <i>Institutional/Governmental Interests</i> • S.I.T.E Limited Sukkur • Provincial Disaster Management Authority (PDMA) • Govt. Primary School S.I.T.E Area Sukkur • Sindh Employees' Social Security Institution (SESSI)
Government Agencies & Other Service Providers	• Sindh Environmental Protection Agency (SEPA) • District Sukkur • Sukkur Electric Power Construction Cooperation (SEPCO) • Sui Sothern Gas Company (SSGC)
NGOs/Interest groups	• Sujag Shaikh Welfare Association (SSWA) • Sindh Rural Support Organization (SRSO) • Sahil Development Organization • HANDS • NARI Foundation

5.2. Consultation Approach & Methodology

A Neighborhood Survey was conducted to identify the residential and commercial interests in the area that may face direct impacts from the proposed development. The survey was conducted in two stages. In the first stage, several site visits were carried out to identify all stakeholders that either reside or work in the project vicinity and conduct an initial identification of potential positive and negative impacts. Relevant public service institutions directly involved in service provision in the areas were also identified.

During the second stage, a social survey field team used a pre-designed semi-structured template to engage the area residents, commercial interests and public service institutions. Those stakeholders, who were not available at the first attempt, were re-visited on the same day or followed-up for their comments during the next few days. During each meeting, the project team introduced the project to the stakeholders, recorded their concerns, suggestions and provided contact details to enable stakeholders to share further comments over email or in writing. A 'Project Brief' providing the salient features of the project were also handed over to the available stakeholders as part of the information disclosure process.

Moreover, the team inquired about the current situation of the area such as the status of utilities, security and law and order situation in the project area from the residents near the project site. Several open-ended questions were also included in the questionnaire to ensure that the respondents could openly share their opinions and suggestions relevant to the study.

The following table shows the stakeholders that were approached during the Neighborhood Survey.

Table 5.2: Consultation with Primary Stakeholders

S. No	Respondents	Stakeholders	Stakeholder Type	Date
1	Mr. Hafeezullah Lakan (Resident)	Bakhsh Lakan Village	Residential	27-10-2022
2	Mr. Ghulam Mustafa Dharejo (Resident)	Bakhsh Lakan Village	Residential	
3	Mr. Syed Manzoor Hussain (Manager Quality Control)	PEPSI Sukkur Beverages	Commercial	
4	Mr. Hafeezullah Waseer (Production Manager)	Reema Cooking Oil and Ghee Factory	Commercial	
5	Mr. Muhammad Iqbal Channa (Headmaster)	Government Primary School SITE Area Sukkur	Institutional	
6	Mr. Abdul Rehman (Assistant Director)	Provincial Disaster Management Authority (PDMA) Warehouse	Governmental	28-10-2022
7	Mr. Abdul Aziz Bugti (Sub-Engineer WI)	S.I.T.E Limited Sukkur	Governmental	
8	Dr. Nigar Ahmed Shah (Chief Medical Officer)	Sindh Employees' Social Security Institution (SESSI)	Governmental	

5.2.1. Consultation Feedback

The social team from EMC carried out consultations in the project area on 4th week of October, 2022 after an initial site visit. Consultations were conducted with the residential and commercial stakeholders in the vicinity of project site. The following major issues and concerns were raised by the primary stakeholders:

Concern & Suggestions

- The residents of Bakhsh Lakan Village were happy to see new development in the area. They were concerned about their farms and villages should not get affected due to the project activities. They also requested for a school and health care facility in their area.

- The Quality Control Manager of PEPSI Sukkur Beverages mentioned that they have their own effluent treatment plant in their facility. They are totally in acceptance with the combined effluent treatment plant project in the area.
- The Production Manager of Reema Cooking Oil & Ghee Factory showed their support in proposed project by saying that combined ETP is better than individual ETP. It will be more cost effective.
- The Headmaster of Govt. Primary School S.I.T.E area Sukkur raised a concern that treated water should not be used for drinking purpose and should not affect the quality of ground water.
- The Assistant Director of Provincial Disaster Management Authority (PDMA) Warehouse has raised a concern that the project should not contaminate the quality of ground water. In addition, he was concerned about the project activities that could cause general disturbances as well as the safety and security of his workers and material in the warehouse.
- The Chief Medical Officer of Sindh Employees' Social Security Institution (SESSI) has raised a concern regarding the health of workers in S.I.T.E area Sukkur. He mentioned that there is only a single outpatient department without emergency service and hospital admission, govt. should do something regarding the health of the workers. He further mentioned that they use line water for non-drinking purpose because pure drinking water is not easily available through pipeline.

Consultation photographs



Discussion with SITE sukkur



Consultations at government school



Consultation at SESSI hospital, Sukkur



Consultation at PDMA warehouse



Consultation with local villagers



Consultation at Sukkur Beverages PEPSICO

Chapter 6 Potential Environmental & Socioeconomic Impacts and their Mitigation Measures

This section of the report describes the potential impacts imposed upon the physical, biological and socio-economic environment likely to arise from the implementation of proposed project activities. Waste generated during construction and operation activities of the project, is released unchecked into the environment. Hence, it results in the degradation of environment in the form of air, water, soil, noise and social pollution etc.

The sources of pollution are first identified and then their impacts are noticed at each stage of the proposed project i.e., pre-construction, construction, post-construction and operational phase. Impacts of the project can be of short or long-term, temporary or permanent, acute or chronic, positive or negative in nature.

The significant hazards imposed upon due the implementation of the proposed project will prove to be guidance for appropriate mitigation measures. Enforcement of the recommended mitigation measures would minimize and eradicate the negative impacts, while enhancing in the positive outcome i.e., sustainable development.

6.1. Methodology of Impact Assessment

The screening process proceeds by identifying the potential environmental aspects of siting the treatment plant, identifying the potential environmental impacts at preconstruction, construction and operational stages of the project and identifying the residual impacts after adoption of mitigation measures that may be needed at the outset of activities.

The impacts on environmental resources from the proposed project may be short-term and temporary in nature; long-term impacts that may be chronic in nature, while permanent impacts are long lasting and irreversible. Impacts may be positive or negative, and are generally identified as such.

The impact assessment for the proposed project involved combined use of checklist and matrix method along with professional judgment to effectively evaluate the potential impacts during different stages of project. The formula for determining the likelihood, severity and extent of impact is shown below:

Matrix Formula:						
		Likelihood frequency				
		Very High (1)	High (2)	Medium (3)	Low (4)	Very Low (7)
Consequences severity /	Very high (1)	VH X VH (1)	H X VH (2)	L X VH (3)	L X VH (4)	VL X VH (7)
	High (2)	VH X H (2)	H X H (4)	M X H (6)	L X H (8)	VL X H (14)
	Medium (3)	VH X M (3)	H X M (6)	M X M (9)	L X M (12)	VL x M (21)
	Low (4)	VH X L (4)	H X L (8)	M X L (12)	L X L (16)	VL X M (28)
	Very Low (7)	VH X VL ()	HX VL (14)	M X VL (21)	L X VL (28)	VL X VL (49)

	VERY HIGH	HIGH	MEDIUM	LOW	VERY LOW
Likelihood / Probability	• The occurrence during abnormal /unplanned event on monthly basis or • During normal activity, the aspect occurs continuously as a result of normal operating condition	• The occurrence during abnormal /unplanned event is once per quarter or • During normal activity, the aspect occurs twice a month	• The probability of occurrence during abnormal / unplanned events is once every six months or • During normal activity, the aspect occurs once a month	• The occurrence of aspect during abnormal or unplanned event with the probability of occurrence of once per year or • During normal activity, the aspect occurs once in six months	• The occurrence of aspect is only during abnormal or unplanned event with the probability of occurrence less than once per year

6.2. Screening of Potential Environmental Impacts

The environmental, socioeconomic and project information collected during the project was reviewed to assess the potential impacts of the proposed activities. The information thus reviewed, included both primary and secondary data which was used to develop project area baseline. The project site is a calm environment with fair air quality due to limited sources of air emissions and presence of green fields in the area. The only source of air emissions includes the dust due to arid land and high rate of erosion.

Installation and operation of proposed treatment plant will require the following environmental constraints to be addressed:

1. Land Use
2. Flora
3. Fauna
4. Cultural Heritage and Archaeological Issues
5. Wastewater
6. Solid waste particularly sludge handling
7. Air and noise pollution
8. Hazardous material handling
9. Occupational safety hazards
10. Socioeconomic issues

6.3. Siting considerations for the proposed project

1. Location

The CETP is proposed to be located northwest of SITE Sukkur, at 27°44'20.7N and 68°50'42.39E.

2. Land Use

The microenvironment is currently under no residential or commercial use and available for project activities after necessary land preparation and clearance as temporary cultivation activity exists. Scope of pre-construction work would include clearing of vegetation onsite for site levelling.

3. Communities

They are settlements in the proximity of the proposed project site.

4. Land Acquisition

The 75 hectares land area has been selected for the project and no land acquisition or voluntary/involuntary settlement is needed since the project is established on the land of SITE Sukkur.

5. Protected areas and Heritage sites

The project site has no protected areas such as wildlife, game reserves or national park, or any archaeological, historical or cultural heritage in its neighborhood or in immediate vicinity; no impact is therefore envisaged.

6. Erosion and loss of biodiversity

Project site constitutes land with limited vegetation mostly in form of low height plants and crops. Trees are very small in number. Removal of plantation will be addressed by planting trees at suitable sites as part of landscaping and site restoration activity.

7. Environmental protection

Contractors shall be committed to strictly follow the EMP on minimizing the soil erosion and contamination and other related environmental aspects and impacts.

8. Hydrology

The area surrounding the plant site is plain with moderate slight observed in ground elevation. Establishment of the proposed treatment plant in project area can impact the hydrology of the area through land disturbance due to:

- Erosion and
- Changes in runoff patterns

Removal of vegetation and agriculture during site clearance of proposed treatment plant can result in soil erosion during construction. Alterations in land use due to project construction work will also affect the runoff patterns in the project area. It's therefore mandatory that all waste streams resulting from the project area are carefully routed to avoid disturbance and contamination of existing hydrological pattern in project area.

Mitigation Measures

- During construction, all waste streams generated from the project will be routed and managed on-site. Discharge of these streams from the project site will be avoided.

- During operation, waste streams will be routed to nearby sewers. Screening will be ensured to avoid choking of sewers.
- To prevent damage to proposed treatment plant from flood during rainy season, a periphery embankment may be constructed for the protection of proposed treatment plant.
- Sediment traps will be provided during construction.
- Vegetation i.e., tree buffer will be provided along the boundaries of project site to mitigate potential of soil erosion

9. Structure Stability

Water Treatment Plant project area, designated according to Pakistan Building Codes (2007) lies in Zone 2A. It is therefore recommended that, the material used for the construction of the CETP should be used in accordance with the Pakistan Building Codes (2007) Zone 2A and United Building Code (UBC).

6.4. Potential Environmental Impacts at Construction Phase

During construction stage, following environmental issues will require management through implementation of EMP:

- Soil Erosion
- Contaminated Land
- Waste Streams (Wastewater and Solid Waste)
- Impact on Ambient Air Quality
- Noise & Vibration
- Occupational Health and Safety
- Ecological disturbance

6.4.1. Soil Erosion

During the construction work, soil erosion may be caused by the exposure of soil surfaces to rain and wind during site clearing, earth moving and excavation activities. This phenomenon is localized to the project site for a short span of time i.e., during construction phase only. The mobilization and transport of soil particles during the construction activities may in turn result in the sedimentation of surface drainage networks, which may result in impacts to the quality of natural water systems and ultimately the biological systems that use these waters.

Recommended Mitigation Measures

- The project should be scheduled to avoid or minimize work during heavy rainfall periods (i.e., during the dry season) or windy days to the extent practical.
- After construction activities, the site which is cleared temporarily should be re-vegetating promptly.
- Off-site sediment transport should be reduced or prevented by the use of settlement ponds, silt fences, water treatment, as well as modifying or suspending activities during extreme rainfall and high winds to the extent practical.

- The environmental impact of soil erosion can best be mitigated by removing vegetative cover only from the specific site on which construction is to take place and by disturbing the vegetation in adjacent areas as little as possible.

6.4.2. Soil contamination from oil spills

During the construction stage, the contamination of land may occur through leakages from unchecked chemicals or fuel spillage during their improper handling, transportation and storage. Spills may result during maintenance of vehicle and machinery or during an accident.

Mitigation Measures

Actions necessary to manage the risk from soil contamination will depend on factors such as the level and location of contamination, the type and risks of the contaminated media, and the intended land use. However, a basic management strategy shall cover the following and same is provided in the EMP:

- Vehicles and equipment maintenance should be taken place at specified site with provision of containments.
- Washing of vehicles should be carried out in the designated areas.
- Construction vehicles and machinery should be examined on a regular basis for leakage prevention.
- Removal of oil and contaminated soil in the fuel and oil storage areas will be made possible by the availability of appropriate implements i.e., shovels, plastic bags and absorbent materials.
- A daily leak/ spill record will be maintained for each vehicle and repairs shall be done at the earliest opportunity. Leaking vehicles will not be operated unless repaired.
- All operating vehicles will be checked for any fuel, oil, or battery fluid leakage.

6.4.3. Construction Waste

The construction waste which is normally generated is concrete waste, steel, wooden scaffolding, cement bags, excavated soil, wood remains etc. mismanagement of construction waste may result in choking of nearby sewers and degradation of aesthetic quality of project area.

Mitigation Measure

- EMP should be implemented to control the impacts of waste generation.
- The construction waste which will be sent for recycling like damaged pipes left over steel, wooden and plastic pieces.
- The construction material will be kept in a covered place, especially during the precipitation season.
- Various waste containers for different types of waste will be deployed onsite. The waste bins will be properly marked for each type of waste produced during the constructional activities.

- The project area will contain the sewage and litter facility to overcome the problem of unchecked dumping of waste.

6.4.4. Impact on Ambient Air Quality

Construction activities such as preparation of construction material, land clearing, levelling, excavation and installation of building foundations are all potential sources of alterations to air quality of project area primarily the fugitive dust emissions caused by a combination of on-site excavation and movement of earth materials, movement of construction machinery on dust tracks.

Another source of emissions may include exhaust from diesel engines of earth moving equipment, as well as from open burning of solid waste on-site.

Mitigation Measures

For control of air pollution during construction work, following measures are recommended:

- Minimizing dust from open area sources by using control measures such as installing enclosures and covers, and increasing the moisture content.
- Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements.
- PPEs, such as dusk masks, should be used where dust levels are excessive.
- Avoiding open burning of solid.
- Sprinkling of water and fine spray from nozzles to suppress the dust.
- On-Road- Inspection should be done for black smoke generating machinery.
- Use of cleaner fuel should be done.
- Vehicles having pollution under control certificate may be allowed to supply the construction material to the project site.
- Use of covering sheets should be done for trucks to prevent from dust dispersion caused through the trucks.

6.4.5. Wastewater Generation

Wastewater is generated as run off from construction site during construction work including preparation of building materials, washing activities, runoff due to precipitation, etc. Another source of wastewater includes campsites used by workers during construction phase.

Onsite management of wastewater is important to prevent discharge to other sensitive receptors in the area such as canals and agricultural fields as this may deteriorate the water quality of the surface and groundwater resources near the project site.

Mitigation Measures

- Careful management of construction work is necessary to ensure water is not wasted.
- Where possible, the construction wastewater should be reused after initial treatment (if required such as sedimentation).

- Washing of vehicles and construction machinery should be avoided if possible or be done in a designated area.
- Wastewater generation will be minimized by controlling the pollutant at the source.
- Regular monitoring of the wastewater generation will be taken into consideration.
- Adequate Potable or permanent sanitation facilities serving all workers should be provided at all construction sites.

6.4.6. Noise & Vibration

During the construction phase, noise and vibration will result from use of heavy construction machinery such as earth moving and excavation equipment, concrete mixers, movement of equipment and construction machinery, and operation of generators.

Mitigation Measures

The following measures are adopted in order to keep the noise within the limits as prescribed in NEQS:

- The activities associated with greatest potential to generate noise should be planned during the day period that will result in least disturbance to the nearby residents.
- Noise control devices should be used such as temporary noise barriers and deflectors for impact activities.

6.4.7. Occupational Health and Safety Issues of construction work

1. Over-exertion

Over-exertion, and ergonomic injuries and illnesses, such as repetitive motion, over-exertion, and manual handling, are among the most common causes of injuries in construction site.

Mitigation Measures

Recommendations for their prevention and control include:

- Workers should be trained with lifting and materials handling techniques before the construction of the project, including the placement of weight limits above which mechanical assists or two person lifts are necessary.
- Work site layout should be planned to minimize the need for manual transfer of heavy loads.
- Tools should be selected and work stations would be designed to reduce force requirements and holding times, which promote improved postures, including, where applicable, user adjustable work stations.
- Administrative controls, such as job rotations and rest or stretch breaks should be implemented into the work processes.

2. Slips and fall

Slips and falls on the same elevation associated with poor housekeeping, such as excessive waste debris, loose construction materials, liquid spills, and uncontrolled use of electrical

cords and ropes on the ground, are also among the most frequent cause of lost time accidents at construction site.

Mitigation Measures

Recommended methods for the prevention of slips and falls from, or on, the same elevation include:

- Good house-keeping practices, such as the sorting and placing loose construction materials in established areas away from foot paths, should be implemented.
- Excessive waste debris and liquid spills should be cleaned up regularly.
- Electrical cords and ropes should be located in common areas and marked corridors.
- Slip retardant footwear should be used.

3. Struck By Objects

Construction activities of the project may pose significant hazards related to the potential fall of materials or tools, as well as ejection of solid particles from abrasive or other types of power tools which can result in injury to the head, eyes, and extremities.

Mitigation Measures

Techniques for the prevention and control of these hazards include:

- Maintaining clear traffic ways to avoid driving of heavy equipment over loose scrap.
- Temporary fall protection measures in scaffolds and out edges of elevated work surfaces should be used, such as hand rails and toe boards to prevent materials from being dislodged.
- Appropriate PPEs such as safety glasses with side shields, face shields, hard hats, and safety shoes, should be wore.

4. Moving Machinery

Vehicle traffic and use of lifting equipment in the movement of machinery and materials on a construction site may pose hazards such as physical contact, spills, dust, emissions, and noise.

Heavy equipment operators have limited fields of view close to their equipment and may not see pedestrians close to the vehicle.

Mitigation Measures

- The location of vehicle traffic, machine operation, walking areas, and controlling vehicle traffic should be planned and segregated through the use of one-way traffic routes, establishment of speed limits, and on-site trained flag-people wearing high-visibility vests or outer clothing covering to direct traffic.
- The visibility of personnel should be ensured through the use of high visibility vests when working in or walking through heavy equipment operating areas as well as training of workers to verify eye contact with equipment operators before approaching the operating vehicle.

- Inspected and well-maintained lifting devices should be used that are appropriate for the load, such as cranes, and securing loads when lifting them to higher job-site elevations.

5. Other Site Hazards

Construction on site may pose a risk of exposure to dust, chemicals, hazardous or flammable materials, and wastes in a combination of liquid, solid, or gaseous forms.

Mitigation Measures

- Implementation of environmental management plan
- Implementation of project specific plans and other applicable management practices
- Use of waste-specific PPEs based on the results of an occupational health and safety assessment, including respirators, clothing/protective suits, gloves and eye protection.

6.5. Potential Environmental Impacts during Operation

Contrary to construction, operation related impacts would require more stringent techniques to handle the pollution and contamination owing to the nature and duration of activities. Potential pollution sources from the operational activities related to water treatment plant are:

- Sludge as solid waste
- Wastewater
- Hazardous Chemicals
- Air emissions
- Ecological impacts

6.5.1. Solid Waste

Sludge Production

Sludge formation at sedimentation tanks originate from 3 processes including:

- Removing suspended solids from raw water,
- Chemical flocs caused by addition of coagulant,
- Chemical flocs caused by hardness removal (if necessary)

Mitigation measures

Sludge will be managed at the proposed treatment plant by:

1. Reducing the volume of sludge through sludge thickener and sludge dewatering systems which will be designed for sludge treatment system.
2. Storing the dried sludge cake in a separate designated place onsite for end disposal.

This will be ensured by adding sludge dewatering and thickening units to the treatment process:

Sludge Thickening Tanks

The purpose of the sludge thickening tank is to increase the solid concentration in the sludge and thus to decrease the volume rate of the sludge. For that purpose, the sludge which comes

to the thickening tank will be kept for a longtime and in the meantime the amount of solids will be increased via thickening mechanism by draining the water which is squeezed within the sludge flocks.

Sludge Dewatering Building

The belt filter is selected as equipment for the sludge dewatering in the treatment plant. The thickened sludge from bottoms of the sludge thickening tanks via pipes, will be transmitted into the sludge chamber in the sludge dewatering building by gravity. Then it will be lifted to the belt filters by sludge feeding pumps. The solid concentration of the sludge cake will be increased by dosing polyelectrolyte to the sludge. Thus, the sludge cake will be more stable and its volume will be less.

Storage of sludge cake

The sludge cake which is dewatered in the belt filters, will be transmitted by the screw conveyors to the outside of the building and loaded to the containers. The containers which are filled with sludge cake, will be carried to a separate place for storing.

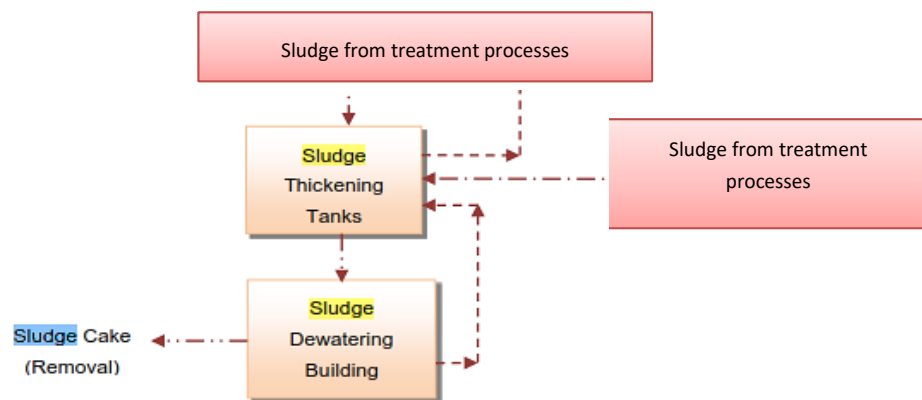


Figure 6.1: Sludge dewatering and thickening process

The sludge resulting from treatment plant after treatment and processing is called biosolid and it can be used or disposed according to certain rules.

The 40 CFR Part 503 rule of the USEPA, defines biosolids as the final solid, semisolid, or liquid residue generated during the treatment of domestic sewage in a municipal wastewater treatment plant. Most of the requirements contained in the 40 CFR Part 503 rule were generated based on results from extensive multimedia risk-assessment studies conducted by the USEPA.

According to this rule, the sludge of the wastewater treatment plant after processing and preparation (biosolid) can be disposed of or used in one of the following ways:

- 1- Land Application:
- 2- Surface Disposal:
- 3- Incineration

Each of these applications is described briefly in the 40 CFR Part 503 rule.

Since the biosolids from wastewater Treatment Plant of Sukkur Pakistan meets the requirements of the class B, in compliance with the items mentioned in the 40 CFR Part 503 rule it can be disposed of or used in one of the mentioned methods.

In addition, it should be noted that the sludge from the wastewater treatment plant is toxic if the influent wastewater contains a high concentration of heavy metals that enter the sludge after removal during the treatment process. But due to the very low concentration of heavy metals in the influent wastewater, the sludge and biosolid produced by this treatment plant is not toxic. Therefore it is recommended that after testing the sludge for selected parameters including heavy metals, it can either be used for land application, disposed at landfill site or disposed through incineration through EPA certified contractor.

Other Solid Wastes

Other operation related waste during the proposed treatment plant includes process residuals, used filtration membranes/ spent media and wastes from office buildings. The process residues will be collected in the sludge. Most of the waste thus generated is non-hazardous in nature.

Mitigation Measures

- Solid waste generation from screening area is generally non-hazardous in nature such as debris, plastic or wood and will be disposed to nearby waste collection unit (waste bins/designated dumping sites).
- If the waste from screening contains appreciable amount of plastic waste, it will be handled by engaging a waste management contractor for its disposal in an environmentally friendly manner.
- Options such as recycling after segregation would be considered depending on the amount of waste generated.
- Regular disposal of screening waste is required to eliminate the risk of accumulation of waste within the treatment facility area.

6.5.2. Wastewater

Following waste streams will be generated during project operation:

1. Wastewater/sewage from office buildings
2. Filter backwash during filter cleaning
3. Supernatant produced from sludge dewatering

1. Wastewater from Office buildings

Sewage from office buildings will be routed to the sewer lines and will not require additional management measures.

2. Filter Backwash

Filter back wash will be stored in filter backwash holding tank, and will be sent back to outlet of the aeration tank and will be treated again.

3. Supernatant from sludge dewatering

The supernatant water produced in the belt filter, will be collected in the return water pumping station near of the sludge dewatering building. Water will be pumped from this unit to the outlet of the aeration tank and will be treated again.

Mitigation Measures

In addition to the mitigation plans describe above, some other recommendations on mitigation measures for sludge are given below:

- Leaching of the sludge into the ground should be controlled through efficient handling.
- In order to overcome the problem of groundwater contamination, sludge should be dried in a leak-proof facility.
- Sludge handling should be monitored along with the effluent monitoring.
- Do not store sludge for prolonged periods.
- Ensure prompt sludge dewatering to avoid nuisance due to odors and flies
- In case the sludge is to be kept for some period; ensure it is properly covered and confined
- Adopt containment procedures to avoid spillage of sludge

6.5.3. Odor

In general, most areas of a wastewater treatment facility contain some level of odor. Processes at ETP can produce various odors, the most common of which found include hydrogen sulfide, ammonia, sulfur dioxide, skatoles, mercaptans, amines and indoles.

Odors can be minimized by ensuring adequate plant operations, prevention of leaks, seepages and leachate, periodic cleaning of pre-treatment chambers and adequate and timely disposal of sludge.

6.5.4. Water Contamination

Groundwater contamination due to leachate will not result from the proposed treatment plant operation since the surface water will be treated which generally lacks potentially harmful contaminants such as heavy metals which are often the constituents of sewage.

Mitigation Measures

- Careful selection of lining material used for interior lining of sedimentation, aeration tanks and other plant equipment and facilities.
- Regular inspection of tanks and basins for structure breakage
- The system for the treatment of the wastewater and effluent production should ensure minimization of leakages of wastewater to groundwater (connections between pipes and tanks should be water-tight)
- Refueling of vehicles and equipment on the site shall be strictly controlled
- Washing of vehicles and equipment on the site shall be restricted

6.5.5. Noise Abatement

Sources of noise during plant operations would include process equipment like pumps, power supply equipment including generators as backup power supply, and gensets, exhaust fans etc. it is anticipated that average noise levels in the plant site shall remain between 70-80dBA

(within SEQS limits). Some area such as generator rooms, pump room etc. will have significant noise levels and will require noise abatement measures to be put in place.

Mitigation Measures

Noise abatement should be accomplished by using:

- source containment (enclosing noisy equipment in rooms),
- isolating noise sources from other treatment units,
- placing signage to communicate noise hazard to workers and intimating requirement for use of PPE

6.5.6. Chemical Hazard

The proposed facility will consume Polyelectrolytes and Sodium hypochlorite in moderate quantities. These chemicals will be stored in a separate designated area.

To prevent potential health hazards during chemical handling, following mitigation measures are recommended:

- Proper signage including Material Safety Data Sheet (MSDS) should be displayed at the storage area to communicate the hazard.
- PPE should be made mandatory for personnel dealing with these chemicals.
- Adequate First Aid should be available onsite to immediately remedy the affected person.
- Trainings should be imparted to the staff on safe use and handling of these chemicals.

6.6. Socio-economic Impacts

- There is an overall positive impact anticipated from project development.
- The toxic industrial effluent which is at present mostly being released untreated, would be treated and then released, which is beneficial for the local populace and the surrounding environment.
- There is also no infrastructure damage anticipated from project establishment.
- Negative impacts in form of resettlement and loss of property will not occur, since the site is currently under no use.
- During construction, jobs will be created for unskilled labor which will be deployed from nearby villages.
- Project benefits will be distributed to the communities in form of jobs and potable water supply.

Table 6.1: Impact Rating of Potential Environment Impacts

<i>Actions Affecting Environment Resources & Values</i>	<i>Description of Impact</i>	<i>Recommended Mitigation Measures</i>	<i>Significance</i>	<i>Probability</i>	<i>Severity</i>	<i>Impact Rating*</i>
A. Environmental Problems due to Siting/ Location of Project						
Changes in land uses	The microenvironment is currently under no residential or	Careful planning & Implementation	Low	Low	Low	16

Table 6.1: Impact Rating of Potential Environment Impacts

<i>Actions Affecting Environment Resources & Values</i>	<i>Description of Impact</i>	<i>Recommended Mitigation Measures</i>	<i>Significance</i>	<i>Probability</i>	<i>Severity</i>	<i>Impact Rating*</i>
	commercial use and available for project activities. The site comprises barren, stoney land with bushes and shrubs covering most of it.	of IFC's EHS Guidelines to prevent erosion during pre-construction and construction activities.				
Resettlement	No resettlement or removal or property is involved.	Implementation of social outreach program to communicate project benefits to the community and acquire local support and confidence.	Nil	Nil	-	-
Changes in hydrology affecting existing land values	- Erosion and - Changes in runoff patterns	Careful design and planning to minimize/offset problem	Low	Low	Low	49
Changes in drainage pattern	Damages due to change in flooding, accretion, erosion hazards	- Careful design to minimize /offset problem - Implementation of EMP	Low	Low	Low	49
Encroachment into precious ecological zones	Loss of precious ecology	- Careful design to minimize /offset problem - Implementation of EMP	Low	Very Low	Very Low	49
Historical / monuments / cultural values	Loss of precious values	Careful planning to minimize /offset problem	Low	Very Low	Very Low	49
Environmental aesthetics	- Loss of environmental aesthetics - Visual impacts	Careful planning of plant layout	Medium	Medium	Medium	9
Surface water pollution	Impairment of downstream beneficial water uses	- Onsite management of waste streams - Careful Management of Resources	Medium	Low	Low	12
Groundwater ^a	Impairment of beneficial water uses	Implementation of EMP Provision of containments and	High	Medium	Medium	6

Table 6.1: Impact Rating of Potential Environment Impacts

<i>Actions Affecting Environment Resources & Values</i>	<i>Description of Impact</i>	<i>Recommended Mitigation Measures</i>	<i>Significance</i>	<i>Probability</i>	<i>Severity</i>	<i>Impact Rating*</i>
		linings for processes with potential of groundwater contamination.				
Air (construction phase)	Impairment of air quality	• Implementation of EMP for control of air emissions sources • Careful Management & monitoring of construction activities	High	High	High	2
Air (operation phase)	Impairment of air quality	• Implementation of EMP for control of air emissions sources • Careful Management & monitoring of operation activities	Low	Low	Low	16
Noise	Health hazard	Careful planning & monitoring of noisy activities during construction and operation	Medium	High	Medium	6
Recreation/ tourism	• Aesthetics • Impairment of land uses	4. Careful planning/O&M	High	Very Low	Low	28
Occupational health & Safety hazards	Hazards to workers health & safety	Effective implementation of EMP & IFC's EHS Guidelines to offset problem	High	High	High	4
Hazards due to Spills/fires/ explosions	• Hazards to workers health & safety • Degradation of environment	Effective implementation of EMP & IFC's EHS Guidelines Implementation of Emergency Response Plan Regular	High	High	High	4

Table 6.1: Impact Rating of Potential Environment Impacts

<i>Actions Affecting Environment Resources & Values</i>	<i>Description of Impact</i>	<i>Recommended Mitigation Measures</i>	<i>Significance</i>	<i>Probability</i>	<i>Severity</i>	<i>Impact Rating*</i>
		monitoring to identify hazards for early control				
Odors	Problems of Environmental Degradation	Careful Planning and Implementation of EMP & IFC's EHS Guidelines	Medium	Low	High	12
Vibration hazards	• Damager to infrastructure in proximity • Occupation hazard for works	Implementation of EMP& IFC's EHS Guidelines	Medium	Low	Medium to High	12
Loss of irreplaceable resources	Long-term national environmental and economic losses	Planning should be consistent with high-level government policies	High	Very Low	High	14
Endangered species	Long-term environmental losses	Planning to be consistent with polices	Nil	Nil	Nil	--

**Impact rating based on Matrix Formula.*

a since the input for the treatment plant will be surface water and not sewage, there is no serious threat of groundwater contamination. Nevertheless, the consultant has recommended to consider incorporation of containments and linings systems into the design where applicable to control this impact.

Chapter 7 Environmental Management Plan (EMP)

7.1. Introduction

The rationale of this EMP is to propose environmental protection measures to protect the areas of environment that may be affected by the development of the project and to assist the regulatory agency (EPA) in deciding the appropriate approval conditions for the project. This EMP is meant to provide an overall approach for managing and monitoring environment-related issues and to describe the institutional framework for implementing the EMP.

The previous section has identified the potential environmental impacts from different activities during the design, construction and operation stages of project and mitigation measures to reduce the severity of the impacts down to an acceptable level. For practical implementation and management of the mitigation measures suggested in earlier section, an Environmental Management Plan (EMP) has been prepared. The EMP satisfies the requirement of the SEP Act 2014 and rules and regulations thereunder.

7.2. Objectives of EMP

High level of environmental protection can only be ensured by implementation of a well-designed EMP that covers all significant anticipated impacts. In this section, a structure of EMP is being given for assisting the proponents with environmental management. It is recommended that the proponents must implement this EMP and where required, changes must be made accordingly. The objectives of EMP are as follows:

- To outline measures to be taken during the implementation and operation of a project to eliminate or offset adverse environmental impacts, or reduce them to acceptable levels;
- To detail the actions needed to implement these measures such as defining roles and responsibilities of the project proponents for the implementation of EMP and identifying areas where these roles and responsibilities can be shared with other stakeholders;
- To define the requirements for communication, documentation, training, management and implementation of the mitigation measures;
- To provide the required assistance to assess the effectiveness of the mitigation measures such as guide through the monitoring mechanism and identifying related parameters that will be required for confirming the effective implementation of the mitigation measures;
- To ensure that the proponents and their Construction Contractor(s) meet all environmental related legal obligations.

7.3. Structure of EMP

The EMP has been structured to cover essentially the following key areas and defines the methods and procedures for its implementation:

- Organizational structure, roles and responsibilities of project personnel;
- Specific requirements for the implementation of the EMP;
- Mitigation or impact management matrix;
- An environmental monitoring system with the emphasis on specific parameters to monitor as well as a self-monitoring and reporting system.

In the preparation of this plan several aspects concerning the siting, designing, construction, and operation of the proposed treatment plant have been taken into consideration. Additionally, management related issues have been provided to guide through the procedures.

The proponent will establish an Environment, Health & Safety (HSE) department which will handle all environment related concerns and issues. The Environmental Management Representative² (EMR) will hold the responsibility to oversee all issues pertaining to the Health, Safety, and Environment. To support HSE management system, an HSE officer will be appointed to coordinate with the contractor during construction process and also monitor the activities during the construction and operations stages of proposed treatment plant.

7.4. Framework for Environmental Management

The approach to be followed for environmental management must include the following:

- Compliance with the relevant legislations and regulations;
- Regular review of the impacts on the environment;
- Development of appropriate indicators in order to monitor core impacts;
- Setting of appropriate annual objectives, targets and publicly reporting on progress;
- Open communication with the stakeholders on project related issues.

The proponent will undertake overall responsibility for compliance with the EMP. It will ensure that all activities it executes with Construction Contractors comply with positive environmental sensitivities as well as cooperate with the concerned regulatory agencies such as the Sindh Environmental Protection Agency.

On the other hand, Construction Contractor will carry out field activities as part of the proposed project that includes relevant and subsidiary construction work. The Construction Contractor will be subjected to certain liabilities under the environmental laws of the country which will be mentioned in the contract with the proponents. The performance of the Construction Contractor will be monitored constantly by the site environmental officer (this responsibility can be assumed by the HSE officer during construction).

7.5. Roles and Responsibilities

Organizational structure for the proposed treatment plant comprises following key players:

SITE Limited Sukkur (herein after referred collectively as the Proponent): The proponent and owner of the EMP during construction and operation

Construction Contractor (CC): Key player for implementation of EMP during construction

Sindh Environmental Protection Agency (SEPA): The regulatory body responsible for environmental management in Sindh province and the key governing body for ensuring proposed treatment plant's compliance with the EIA provision including EMP.

² EMR can be the HSE Manager or HSE officer as deputed by the management.

Environmental management will be the integral part of policy governing the construction and operation of CETP, therefore committing to reduce the environmental impacts will reflect the management's approach and belief that good performance in this area is synonymous with running well-managed and efficient operations.

An important prerequisite to EMP compliance is the identification of responsibilities of various personnel with regard to environmental management. During the construction phase, HSE Officer will be deputed onsite to implement the EMP and ensure all environmental related issues are being management as per the requirements of EMP. During operation phase, the proponents will delegate all specific environment related actions to respective departments who will be fulfilling their responsibilities as per the mitigation and monitoring matrices.

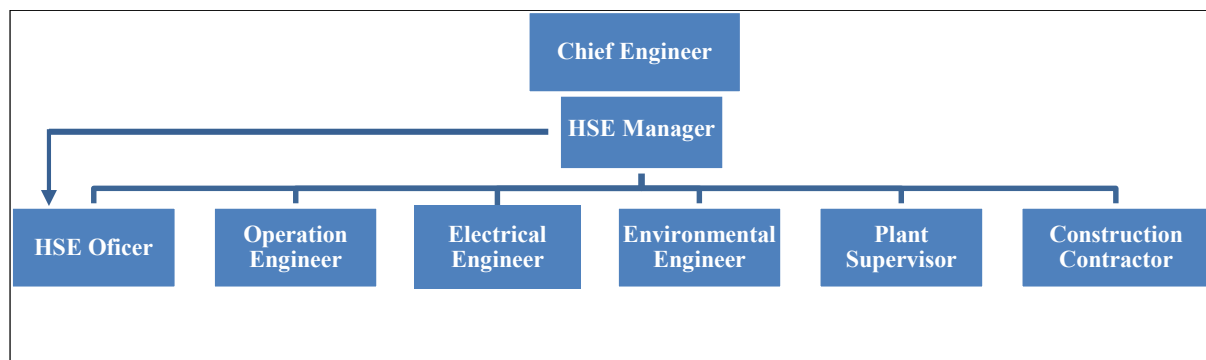


Figure 7.1: Project Management Hierarchy

7.5.1. Chief Engineer

During project operations, main responsibility for environmental performance will rest with Chief Engineer of proponents. Since the Chief Engineer of the proponents will regulate environmental management plan, he/she will have an important role to play. Some of the key role and responsibilities of the Chief Engineer are given below:

- To cooperate and consult with relevant environmental agencies regarding project development;
- To evaluate the progress of development and implementation of the project;
- To review the project performance and make necessary interventions to improve project performance
- In case of disaster, review the incident report and issue necessary directions
- To approve any changes to the project program including change management in consultation with respective managers, if appropriate.

7.5.2. Plant Supervisor

The daily management by Plant Supervisor will be performed in coordination with the HSE Officer, and Environmental Engineer. Under their surveillance, environmental management during operations will be performed as per the mitigation and monitoring plans outlined in this EIA. The Plant Supervisor particularly, shall be a person experienced in the supervision

of water treatment plant operations as it would be his responsibility to schedule and oversee repair/maintenance work and operations of the facility.

Some of the key responsibilities of the Plant supervisor include:

- Supervision and review of proposed treatment plant performance in coordination with Chief Engineer
- Coordination with senior management
- Conducting regular meetings with other staff including HSE department on proposed treatment plant environmental performance
- Issuing approval to environmental programs as suggested by the HSE department
- In case of disaster, review the case and issue directions for control of damage and future prevention of similar disasters.

To ensure that the points of views of staff are considered and accommodated in the EMP accordingly;

- To regularly meet and resolve the upcoming and on-going environmental issues;
- To identify issues and where possible propose solutions for inclusion in the management plan review process;
- To make sure that the staff is adequately trained to carry out their respective duties so as to improve environmental performance of operations;
- To contribute towards the actions to deliver the management plan and ensure its continued development.

7.5.3. HSE Manager

The role of HSE manager is vital. The success of an EMP always depends on the performance of the HSE department/manager. Following are some of the roles and responsibilities that should be designated to the Manager HSE.

- To supervise the HSE performance of the project
- To issue necessary directions regarding project activities in order to enhance environmental performance
- To ensure that the views of staff and HSE Officer are considered and appropriately incorporated in the EMP accordingly.
- To improve coordination and exchange of information between top management, employees, contractors etc.
- To contribute towards the actions to deliver the management plan and ensure its continued development.
- To ensure that project's safety protocols including Emergency Response Plan are in place and being implemented effectively.
- To periodically review the project's HSE setup and update as per the latest safety standards.
- To monitor the progress and development and implementation of the management plan.

7.5.4. HSE Officer

The role of HSE Officer will be vital during the construction phase. He will be the key advisor on environmental issues to the proposed project. He will be responsible for the following:

- To manage and monitor the HSE performance of the project and report to HSE manager
- To monitor the progress and development and implementation of the management plan.
- To ensure that project's safety protocols including Emergency Response Plan are in place and being implemented effectively.
- To supervise the construction activities and performance of construction contractor
- To supervise project operations and implementation of EMP

7.5.5. Construction Contractor

The responsibility to manage and implement environmental management practices as per the impact assessment report as well as HSE policies belongs to both Construction Contractor and the proponent. The role and responsibilities of the Construction Contractor will consist of the following basic points:

- To implement the EMP and carry out construction activities in environmentally sound manner;
- To coordinate with the HSE Officer to resolve issues arising during construction phase;
- To manage construction crew and reduce the environmental impacts;
- To appoint a dedicated environment officer that will understand and tackle environmental issues more easily.

7.6. Legislation and Guidelines

The EIA for the proposed treatment plant Project has discussed in detail the national and international legislation and guidelines that are relevant to the project in Chapter 2 of this report.

The proponent of the project will ensure that the project is conducted in conformance with national legislation and relevant international conventions and that guidance is sought from national and international guidelines. It will also be ensured that key project management of the company and all its assigned contractors are aware of these legislation and guidelines prior to start of the project activities.

7.7. Grievance Redress Mechanism

The Grievance Redress Mechanism (GRM) is proposed to address any complaints or grievances arising during the implementation of the project. Efforts will be made to avoid grievances through strong consultations at grass root level. Nevertheless, it may be expected that some complaints cannot be resolved through consultation and participation, therefore, an accessible and effective GRM is needed. The proposed Project will establish the GRM from the beginning, i.e., as soon as activities for project design starts and will remain functional till its closure. For effective coordination in the field, stakeholders will be involved at each sub-

project level to build/maintain a close rapport with affected persons and local community throughout project implementation. The GRM will remain intact throughout the project implementation to address the community concerns and grievances arising during execution of project works.

The complaints received will be properly recorded and documented by a designated staff in the Complaint Register. The information recorded in the register will include the date of the complaint, particulars of the complainant, description of the grievance, actions/steps taken/to be taken to resolve the complaint, the person responsible to take the action, follow up requirements and the target date for the implementation of the mitigation measure. The register will also record the actual measures taken to mitigate these concerns. The aggrieved stakeholders will be kept informed about the actions on their complaints.

7.8. Implementation of EMP

The success of the management plan will lie with its implementation. Effective EMP implementation necessitates compliance with environmental laws and regulations in addition to the development of a comprehensive and organized methodology that has the capability to meet the implementation criteria during constructions and operations. Factors involved in EMP implementation are detailed as follows:

a. Permits

Obtaining NOC from Sindh Environmental Protection Agency does not relieve the proponent of other obligations and hence proponent and Construction Contractor will obtain all relevant clearances and necessary approvals required by the government prior to commencing the proposed operation. In addition, issuance of NOC will abide-by proponent to carry-on continuous monitoring.

b. Alterations in design of Water Treatment Plant

The design of the proposed project not only deals with the particular facilities and their suggested locations but also with the location of the project as a whole, the mechanics involved and related operations. If any design parameter changes at time of approval, the proponents will assess the environmental impacts that may arise from such changes. If the impacts are found to be different and in excess of those mentioned in the report, proponents will develop further mitigation measures with respect to the changes to minimize these impacts and seek approval for the required change from Sindh Environmental Protection Agency as well as other regulatory authorities it comes under.

c. Terms and Conditions of Contract

It is recommended that the findings of Environmental Impact Assessment (EIA) in terms of environmental mitigation should be incorporated into the operations plans and procedures of the contract. Therefore, signing of contract will strictly bind Construction Contractor to follow those procedures and comply with the environmental regulations.

7.8.1. Training in Standard Safety Procedures

Necessary training on environmental and other safety issues will be provided to the technical and supporting staff before start of activities to ensure that all the staff is well acquainted with the nature of job, inherent risks, hazards, requirements of job safety and EMP. The HSE Manager will determine the training requirements.

During the training, the following areas of knowledge and experience are considered essential:

- Understanding the properties (e.g., flammability, corrosiveness, toxicity, reactivity) of hazardous substances, as well as the levels at which they pose a significant danger requiring protective measures.
- Awareness of early-warning indicators, hazards/risk identification, and ability to recognize potentially hazardous situations.
- Familiarity with engineering controls to avoid occurrence of hazardous situations.
- Familiarity with capabilities and limitations of the facility to respond to hazardous emergencies: ventilation system, plumbing systems, shut-off systems, containment devices, and emergency response procedures.
- Knowledge of the use and maintenance of emergency response equipment, as well as routine equipment for health and safety monitoring and protection.
- Knowledge of methods and procedures for decontaminating equipment, and facility, following potential chemical contamination.

Records of all trainings should be maintained. It is recommended that in case of any undesirable event or emergency situation, a follow-up session should be arranged to review the weaknesses and gaps in the existing system and possible reasons which caused the event. This would enable the management in keeping such events from recurring by placing additional and more efficient controls.

7.8.2. Communications

For effective management and monitoring of the environmental performance during the construction and operation phase, communication will be maintained by the Site Supervisor and HSE Manager who will coordinate with the project management and regulatory agency on necessary matters.

Construction Phase: EMR/Site supervisor will be responsible for coordinating the project progress to the HSE Manager during construction phase. He will supervise the construction work to ensure that provisions of EMP/EIA are not violated at any stage. If any undesirable event such as work-related injury, death, or any other emergency situation arises during construction, the Site Supervisor shall report this to the HSE manager. Any issues that require attention of higher management will be communicated to them for action by the HSE manager. The site supervisor should report to the HSE Manager on weekly basis during the construction phase.

Operation Phase: Following is suggested for an effective communication of project's HSE performance during the operation phase of the project.

- **Kick-off Meeting** to define the environmental responsibilities, awareness of EMP to the managing staff and to streamline the work plan according to the EMP. This meeting is to be arranged prior to commencement of activities.
- **Quarterly Meetings** to review the progress of activities performed and effectiveness of measures in place for pollution control. Deadlines are re-evaluated in it and if necessary, the project program is revised in these meetings. In the end of quarterly meetings, minutes will be issued to include the outcome of the meeting, issues discussed, and decisions. The minutes of meeting will also be provided to the project manager and the contractor for their own record.
- **Peer Review** for professional opinion and evaluation of the project performance, recommendations for innovation such as new available pollution controls, waste minimization strategies etc.

7.8.3. Safe Working Conditions

Water treatment plant operators, in particular, are exposed to a combination of hazards and hazardous working conditions such as:

- Workers may be exposed to chemical fumes in the chemical storage
- They may be required to work outdoors in extreme weather conditions
- May be required to climb ladders and walk on slippery surfaces
- Are exposed to odors, constant noise as well as dust and air contaminants, grease, oil, gases and chemicals (including lubricating and cleaning chemicals) and fumes
- Large tanks of water treatment units pose the hazard of drowning and necessitate provision of fences and barriers
- Are required to work in confined places
- Are prone to injuries including burns, falls and cuts from equipment.

As such it is necessary that in addition to having the skills and knowledge to operate and maintain the equipment, the workers are also familiar with all safety practices. Measures for control of occupational hazards are suggested in the mitigation matrix.

a. Training Plan

A detailed training plan incorporating the international Occupational Health and Safety Guidelines (such as those of OSHA) shall be developed by the HSE department for the operational phase to effectively meet all training requirements of the concerned personnel. As a prerequisite of EMP implementation, all workers (construction workers as well as operators of proposed treatment plant) will receive training in:

- The use of personal protective equipment (including dust masks, face shields, safety shoes, safety glasses, clothing/protective suits, gloves, eye and ear protection, respirators)

to protect them against smoke, odors, dust, fumes, noise, chemicals and oxygen deficiency;

- Reading and understanding of MSDS (that will enable the workers to use and store chemicals in a safe and responsible manner);
- Confined Space Entry procedures, emergency response (to deal with fire, accidental chemical releases, medical emergencies etc.), safety practices and evacuation procedures.

The HSE Officer will determine the training requirements of the staff working in the proposed treatment plant.

7.8.4. Mitigation/Impact Management Matrix

Once the project is underway, EMP implementation can only be ensured by a well-designed mitigation matrix and monitoring system. Mitigation matrix defines all the impacts and their remedial measures highlighting the responsible personnel to work on those mitigations. The mitigation matrix for this proposed treatment plant is given in Table-6.1. Proponents and Construction Contractor will be required to adhere to these mitigation measures throughout the project.

7.8.5. Environmental Monitoring System

Environmental Monitoring is the process of repeated observation and measurement of one or more environmental quality parameters (physical, chemical and biological) that enables changes to be observed over a period. These parameters are of various environmental phases such as soil and water.

The main objective of the environmental monitoring program is the conservation of the quality of various environmental components.

Components of Environmental Monitoring System

Two major components of environmental monitoring system are i) Monitoring Plan and ii) Self-Monitoring and Reporting System. A detail of these components is given as follows:

i. Monitoring Plan

Monitoring of all the activities will be required to analyze the impacts of construction and operation on the environment. It highlights the areas to be monitored and allocates the monitoring responsibility of various parameters to appropriate personnel. In keeping with this plan, HSE Officer will coordinate with Chief Executive Officer (CEO) and Construction Contractor to monitor environmental parameters during the construction phase.

During operations, the managers of the respective areas will follow the monitoring plan as mentioned in the EIA. They will keep record of all environmental non-compliances and report them along with the corrective actions in regular quarterly meetings with the senior management.

ii. Important Monitoring Areas for the Water Treatment Plant

Although there are many parameters to be monitored during the operation of the proposed treatment plant (as listed in the monitoring plan), the most important monitoring area specific to proposed treatment plant is effluent monitoring and monitoring of untreated influent.

Effluent Monitoring: Water samples will be collected, tested and analyzed against regulatory standards by means of an effective monitoring network. The purpose of effluent monitoring is to obtain quantitative information concerning the current levels of effluent quality parameters and it is necessary for analysis of discharges from final point sources. For this CETP, specific effluent quality monitoring requirements include that of microbiological, chemical and physical parameters which needs to be monitored on a regular basis. Accordingly, a monitoring plan given in table 6.2.

The performance of the plant will be evaluated in comparison with local standards. Noncompliance with the local requirements would call for immediate checking of the treatment units to identify the weak process zones/treatment areas.

iii. Self-Monitoring and Reporting System

As per the guidelines specified in Self-Monitoring and Reporting System, the industries are required to monitor their discharges and report them to provincial EPA. The proponent will therefore, carry out the monitoring of treated water to assess the performance of treatment process to ensure the treatment is effective and meeting the end quality criteria for treated effluent.

iv. The Environmental Management and Monitoring Team

Proponent is committed to meeting SEQS and all legal requirements pertaining to safety and environment. Different branches of these organizations work to ensure product safety as well as commendable Health, Safety and Environment practices.

Table 7.1: Mitigation Matrix (Design and Construction Phase)				
S. No.	Affected areas	Possible mitigation measures	Responsibility	Duration (stage)
1.	Structural Stability	The material used for the construction of the proposed treatment plant should be used in accordance with the Uniform Building Code (UBC) Zone 2A.	Proponent and Construction Contractor	Design stage
2.	Hydrology	During construction, all waste streams generated from the project will be routed and managed on-site. Discharge of these streams from the project site will be avoided. During operation, waste streams will be routed to nearby sewers. Screening will be ensured to avoid choking of sewers. To prevent damage to proposed treatment plant from flood during rainy season, a periphery embankment may be constructed for the protection of proposed Southern treatment plant.	Construction Contractor, HSE Officer	Design and construction
3.	Soil Erosion	The project should be scheduled to avoid heavy rainfall periods (i.e. during the dry season) to the extent practical. Paved surface will be preferred for use for movement of construction equipment and machinery. Dust suppression techniques will be used to prevent soil erosion.	Construction Contractor	At the time of construction
4.	Soil Contamination	Construction vehicles and machinery should be examined on a regular basis for leakage prevention.	Construction Contractor	During construction
		Containments will be provided to prevent soil contamination in the fuel and oil storage areas. A daily leak/ spill record will be maintained for each vehicle and repairs shall be done at the earliest opportunity. Leaking vehicles will not be operated unless repaired. All operating vehicles will be checked for any fuel, oil, or battery fluid leakage.	Construction Contractor	As and when required
5.	Construction Waste	The project area will contain the sewage and litter facility to overcome the problem of unchecked dumping of waste.	Construction Contractor & HSE Officer	During construction
		The construction material will be kept in a cover place, especially during the precipitation season.	Construction Contractor & HSE Officer	During construction
6.	Ambient Air Quality	Minimizing dust from open area sources by using control measures such as installing enclosures and covers, and increasing the moisture content.	Construction Contractor	As and when required
			Construction Contractor	During construction

Table 7.1: Mitigation Matrix (Design and Construction Phase)				
S. No.	Affected areas	Possible mitigation measures	Responsibility	Duration (stage)
		Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements.	Construction Contractor	During construction
		Provision of proper protective equipment to the construction workers should be made essential so as to minimize their exposure to fumes;	Construction Contractor & HSE Officer	At time of construction
		Construction machinery and vehicles should be in good working condition in order to avoid the emissions.	HSE Officer	Regular inspection
		Care should be taken to keep all material storages adequately covered and contained so that they are not exposed to situations where winds on site could lead to particulate emissions.	Construction Manager & HSE Officer	At time of construction
		When not in use, generators should be turned off.	Construction Manager & HSE Officer	At time of construction
7.	Noise & Vibration	Noise control devices should be used such as temporary noise barriers and deflectors for impact activities. PPEs should be used when working in high noise areas.	Construction Manager & HSE Officer	At time of construction
8.	Wastewater Generation	Washing of vehicles and construction machinery will be restricted to a designated area.	Construction Manager	At time of construction
		The oily waste will be contained before disposing the wastewater into the sewer.	Construction Manager	At time of construction
		Sanitary wastewater in construction and other sites should be managed.	HSE Officer	At time of construction
		Fine-tuned vehicles and machinery should be used in order to minimize spillage and dripping.	Construction Manager	At time of construction
		Sewage generated from construction crew will be managed properly.	HSE Officer	At time of construction
9.	Occupational Health and Safety	Workers should be trained with lifting and materials handling techniques before the construction of the project, including the placement of weight limits above which mechanical assists or two person lifts are necessary.	Construction Contractor	During construction
		Good house-keeping practices, such as the sorting and placing loose construction materials in established areas away from foot paths, should be implemented.	HSE Officer	During construction

Table 7.1: Mitigation Matrix (Design and Construction Phase)				
S. No.	Affected areas	Possible mitigation measures	Responsibility	Duration (stage)
		Excessive waste debris and liquid spills should be cleaned up regularly.	HSE Officer	During construction
		Electrical cords and ropes should be located in common areas and marked corridors.	Construction Manager	At time of planning and design
		Temporary fall protection measures in scaffolds and out edges of elevated work surfaces should be used, such as hand rails and toe boards to prevent materials from being dislodged.	HSE Officer	At time of construction
		Appropriate PPE such as safety glasses with side shields, face shields, hard hats, and safety shoes, should be wore.	Construction Contractor & HSE Officer	At time of construction
		The location of vehicle traffic, machine operation, walking areas, and controlling vehicle traffic should be planned and segregated through the use of one-way traffic routes, establishment of speed limits, and on-site trained flag-people wearing high-visibility vests or outer clothing covering to direct traffic.	HSE Officer	At time of construction
		Use of waste-specific PPE based on the results of an occupational health and safety assessment, including respirators, clothing/protective suits, gloves and eye protection.	HSE Officer	At time of construction

Table 7.2: Mitigation Matrix (Operational Phase)				
S. No.	Affected areas	Possible mitigation measures	Responsibility	Frequency
1	Solid Waste Generation	Solid waste generation from screening area will be handled properly. Removal can be done through hauling to disposal area i.e. landfill.	HSE Department/HSE Officer	During operation
		Regular disposal of screening is required to eliminate the risk of accumulation of waste within the treatment facility area.	HSE Department/HSE Officer	During operation
2	Sludge Control	Sludge will be reduced in volume using dewatering and thickening techniques.	HSE Department/HSE	During operation

Table 7.2: Mitigation Matrix (Operational Phase)				
S. No.	Affected areas	Possible mitigation measures	Responsibility	Frequency
			Officer	
		Sludge cake will be stored in a separate building before end disposal.	HSE Department/HSE Officer	During operation
3	Odour	All chemical buildings designs and indoor treatment units will have provisions for required level of ventilation.	HSE Department/HSE Officer	Regular
		Good housekeeping practices will be helpful in reducing odour emissions.	HSE Department/HSE Officer	During operation
4	Hazardous materials	- Proper signage including Material Safety Data Sheet (MSDS) should be displayed at the storage area to communicate the hazard. - PPEs should be made mandatory for personnel dealing with these chemicals. - Adequate First Aid should be available onsite to immediate remedy the affected person. - Trainings should be imparted to the staff on safe use and handling of these chemicals.	HSE Department/HSE Officer	During operation
5	Noise Abatement	Noise abatement should be accomplished by using double wall barriers, acoustical block, acoustical louvers, sound traps, wall treatments, noise enclosures, orientation / location of equipment and vegetative buffers.	HSE Department/HSE Officer	During operation
	Water contamination	- Careful selection of lining material used for interior lining of sedimentation and equalization basins tanks. - Regular inspection of tanks and basins for structure breakage - The system for the treatment of the wastewater and effluent production should ensure minimization of leakages of wastewater to groundwater (connections between pipes and tanks should be water-tight)	HSE Department/HSE Officer	During operation

Table 7.2: Mitigation Matrix (Operational Phase)				
S. No.	Affected areas	Possible mitigation measures	Responsibility	Frequency
		- Refueling of vehicles and equipment on the site shall be strictly controlled - Washing of vehicles and equipment on the site shall be restricted		
	Wastewater	- Sewage from office buildings will be routed to the sewer lines and will not require additional management measures. - Filter back wash will be stored in filter backwash holding tank, and will be sent back to outlet of the aeration tank and will be treated again. - The supernatant water produced in the belt filter, will be collected in the return water pumping station near of the sludge dewatering building. Water will be pumped from this unit to the outlet of the aeration tank and will be treated again.		
	Occupational hazard (chemical handling, slips, falls, burns etc.)	- Good house-keeping practices, such as the sorting and placing loose construction materials in established areas away from foot paths, should be implemented. - Electrical cords and ropes should be located in common areas and marked corridors. - Slip retardant footwear should be used. - Work site layout should be planned to minimize the need for manual transfer of heavy loads. - Administrative controls, such as job rotations and rest or stretch breaks should be implemented into the work processes. - Trainings on safe working practices - Availability of PPE and trainings on their use (wherever required) - Trainings on MSDS, fire safety, first aid and other necessary subjects		

Table 7.2: Mitigation Matrix (Operational Phase)

S. No.	Affected areas	Possible mitigation measures	Responsibility	Frequency
		should be imparted.		

Table 7.3: Monitoring Plan (During Construction)

Monitoring Areas	Location of monitoring	Parameters and techniques to monitor	Monitoring Frequency	Reason to monitor parameter	Responsibility
Noise	Generators	Noise levels in dBA Vibration meter (mils/sec)	Quarterly	Legal compliance Ensure structural safety	HSE Officer
Air Emissions	Exhausts of generators and vehicles	Composition of exhaust flue gases - CO, NO _x , SO _x , Particulate matter (mg/Nm ³) - noise, smoke and CO for vehicles	Quarterly	Legal compliance	HSE Officer
Wastewater disposal	Discharge pump	As per SEQS effluent standards	Quarterly	Legal compliance	Plant Supervisor HSE Officer
Ambient Air quality	CETP premises	9 parameters as per SEQS	Quarterly	Legal Compliance	HSE Officer
Occupation Hazard	CETP premises	Working practices Use of PPE Safety of work place Identification of hazard and hazard control measures	Daily during operations	HSE safety Legal compliance	HSE Department

Table 7.4: Monitoring Plan (During Operation)					
Monitoring Areas	Location of monitoring	Parameters and techniques to monitor	Monitoring Frequency	Reason to monitor parameter	Responsibility
Noise	Standby Generators (when operational)	Noise levels in dBA Vibration meter (mils/sec)	Quarterly	Legal compliance Ensure structural safety	HSE Officer
Ambient Air quality	CETP premises	9 parameters as per SEQS	Quarterly	Legal Compliance	HSE Officer
Treated effluent	Final outfall of plant	All 32 parameters as per SEQS	Monthly	To optimize and conserve water use Legal compliance	Plant Supervisor HSE Officer
Untreated influent	Inlet of CETP	All 32 parameters as per SEQS	As required	Legal Compliance	HSE Officer
Occupation Hazard	CETP premises	Working practices Use of PPE Safety of work place Identification of hazard and hazard control measures	Periodically during operations	HSE safety Legal compliance	HSE Department
Sludge storage and disposal	CETP premises	Visual inspection, maintenance of disposal records	Periodically during operations	Environmental aspect	HSE Department

Chapter 8 Conclusion

The establishment of the proposed CETP is intended to resolve the Industrial Effluent Treatment issues in Sukkur. In this connection, the proposed treatment plant has been designed to treat around 3 MGD of water.

In view of the current environmental legal framework, the proposed development needs to be evaluated for its potential environmental impacts on the ambient environment. For this purpose, a detailed Environmental Impact Assessment Study was conducted. During the EIA study, potential environmental impacts of the project were investigated during the EIA and appropriate mitigation measures were also suggested, the implementation of which shall effectively minimize the environmental concerns related to the project.

The study was conducted so as to cover all the aspects of the project (such as project location, construction and operations) and their anticipated impacts. The study was comprehensive and was carried out in accordance with national legislative requirements.

The environmental, socioeconomic data collected through secondary and primary sources was reviewed to assess the potential impacts of the proposed activities. The project site is a calm environment with fair air quality due to limited sources of air emissions and presence of agriculture activity in the area. The major current sources of air emissions are vehicular traffic and dust emissions from unpaved roads.

Based on the detailed impact assessment carried for the CETP, the consultant recommends that:

- The structures and materials for the proposed treatment plant should conform to recommended standards and follow standard practice of civil works.
- Environmentally sound materials and goods are selected, with priority being accorded to products meeting national and international standards.
- Temporary inconveniences due to construction works are minimized through planning and coordination with local population and organizations in the neighborhood.
- For control of potential environmental impacts, the EMP provided in the report should be implemented in its essence to ensure sound environmental management during the project.

This EIA Study finds that the value-addition characteristics of proposed treatment plant would respond to the principles of sustainable development that aim at “socially equitable and economically viable development to improve the quality of life for all citizens of the Earth, without altering the balance in the ecosystem”.

The Study therefore recommends that the EIA Report should be approved with the provision that the suggested mitigation measures will be adopted and the Environmental Management.

ANNEXURES

Annex – I - Design Report

Consultant:			Project:	Client:
TOOSSAB ENGINEERING CONSULTANTS 	EMC PAKISTAN (PVT.) LIMITED 	INTERNATIONAL DESIGN GROUP CONSULTING ARCHITECTS PAKISTAN (LEAD PARTNER) 	SURVEY AND FEASIBILITY STUDY FOR ESTABLISHMEN T OF EFFLUENT TREATMENT PLAN SITE SUKKUR, SINDH	 SINDH INDUSTRIAL TRADING ESTATES LIMITED
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Abbreviations:

BOD ₅	Total 5-day Biochemical oxygen demand
sBOD	Soluble 5-day Biochemical Oxygen Demand
COD	Chemical oxygen demand
bCOD	Biodegradable Chemical Oxygen Demand
nbCOD	Non-Biodegradable Chemical Oxygen Demand
sCOD	Soluble Chemical Oxygen Demand
nbsCOD	Effluent Soluble Chemical Oxygen Demand (Non-Biodegradable Soluble COD)
bpCOD	Biodegradable Particulate Chemical Oxygen Demand
pCOD	Particulate Chemical Oxygen Demand
TKN	Total Kjeldahl Nitrogen
TSS	Total Suspended Solids
iTSS	Inert Total Suspended Solid
VSS	Volatile Suspended Solid
nbVSS	Non-Biodegradable Volatile Suspended Solid
rbCOD	Readily Biodegradable Chemical Oxygen Demand

1) Introduction:

Sukkur Industrial Wastewater Treatment Plant including two separate modules, which three stream. The first module has two streamlines, and the second module (extension module), which

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will be constructed in the future, has one streamline. Table 1 shows the capacity of each streamline.

Table 1- Modulation of Sukkur industrial wastewater treatment plant

Module	Module I		Module II
	Stream line I	Streamline II	Streamline III
Q (m ³ /d)	4547	4547	4547

In this document the design criteria and process calculation is described.

Treatment process of Sukkur industrial WWTP concludes of pretreatment, biological treatment and sludge treatment.

Pretreatment process (physical unit operation) consists of inlet pump station, screening unit and grit and grease removal unit. Selected biological process for plant is Extended Aeration system. Since in the extended aeration system, the average time that the sludge remains in the system is more than 20 days, the sludge will be stabilized, and there is no need for a digester facility.

Process design criteria & calculation are presented for below consisted units:

- ❖ Manual Coarse Screen
- ❖ Mechanical Coarse Screen
- ❖ Mechanical Fine Screen
- ❖ Grit Chamber Unit
- ❖ Biological Unit
- ❖ Secondary Sedimentation Tank
- ❖ Disinfection Unit
- ❖ Drum Filtration

Sludge treatment process consists of Sludge Treatment Combined Unit. Process design criteria & calculation are presented for below consisted units:

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- ❖ Sludge Treatment Combined Unit (GBT+BFP)
- ❖ Supernatant
- ❖ Sludge Deposit Area

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2) Influent Wastewater Characteristics:

Quantity design basis of Sukkur industrial wastewater treatment plant is presented in Table 2.

Table 2- Quantity design basis of Sukkur wastewater treatment plant

Parameter	Unit	Value
Average flowrate	m ³ /d	13640
	MGD	3
Maximum factor (K _{max})	-	2
Maximum flowrate (Full flowrate)	m ³ /hr	1137
	MGD	6
Minimum factor (K _{min})	-	0.5
Minimum flowrate	m ³ /hr	284
	MGD	1.5

Considering that the current wastewater flow rate is equal to 2 MGD and at the end of plan, flow rate is equal to 3 MGD, the concentration of each quality parameter in the whole project is based on the weighted mean between the quality of the current wastewater from the PIT (based on tests), and the average quality parameters of the wastewater from the various Industries (based on tests) are calculated as follows:

$$\frac{(2 \text{ MGD} \times \text{PIT Average Quality Wastewater}) + (1 \text{ MGD} \times \text{Industries Average Quality Wastewater})}{3 \text{ MGD}}$$

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So raw wastewater characteristics and design basis of wastewater are shown in Table 3.

Table 3- Quality of raw wastewater

Parameters	Unit	Value
BOD ₅	mg/l	407
COD	mg/l	723
TSS	mg/l	213
TKN	mg/l	16
Sulphide (S ²⁻)	mg/l	8
Min. Temperature	°C	15
Max. Temperature	°C	35

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COD and BOD₅ fractionation of raw wastewater and design basis are shown in Table 4.

Table 4- COD and BOD fractionation of Combined wastewater and design basis

Parameter	Unit	Value
COD	mg/L	723
bCOD	mg/L	651.2
nbCOD	mg/L	71.8
sCOD	mg/L	600.1
bsCOD	mg/L	586.1
bpCOD	mg/L	65.1
nbpCOD	mg/L	57.8
nbsCOD	mg/L	14.01
rbCOD	mg/L	162.8
sbCOD	mg/L	488.4
BOD ₅	mg/L	407
sBOD	mg/L	366.3
TSS	mg/L	213
VSS	mg/L	154.9
nbVSS	mg/L	72.3
iTSS	mg/L	63.9
TKN	mg/L	16

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The characteristics of combined wastewater, which includes raw and supernatant, and is the design basis of the wastewater treatment plant, are presented in Table 5.

Table 5- Quality design basis of Sukkur wastewater treatment plant

Parameters	Value	Unit
BOD ₅ Concentration	405	mg/l
COD Concentration	715	mg/l
TSS Concentration	221	mg/l
TKN Concentration	16	mg/l
Min. Temperature	15	°C
Max. Temperature	35	°C

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COD and BOD₅ fractionation of combined wastewater with supernatant are shown in Table 6. Fig 1 shows the COD characteristics in raw wastewater.

Table 6- COD and BOD fractionation of Combined wastewater and design basis

Parameter	Unit	Value
COD	mg/L	723
bCOD	mg/L	648.3
nbCOD	mg/L	66.8
sCOD	mg/L	593.6
bsCOD	mg/L	583.5
bpCOD	mg/L	64.8
nbpCOD	mg/L	56.7
nbsCOD	mg/L	10.1
rbCOD	mg/L	162.1
sbCOD	mg/L	486.3
BOD ₅	mg/L	407
sBOD	mg/L	364.7
TSS	mg/L	213
VSS	mg/L	154.9
nbVSS	mg/L	72.3
iTSS	mg/L	66.4
TKN	mg/L	16

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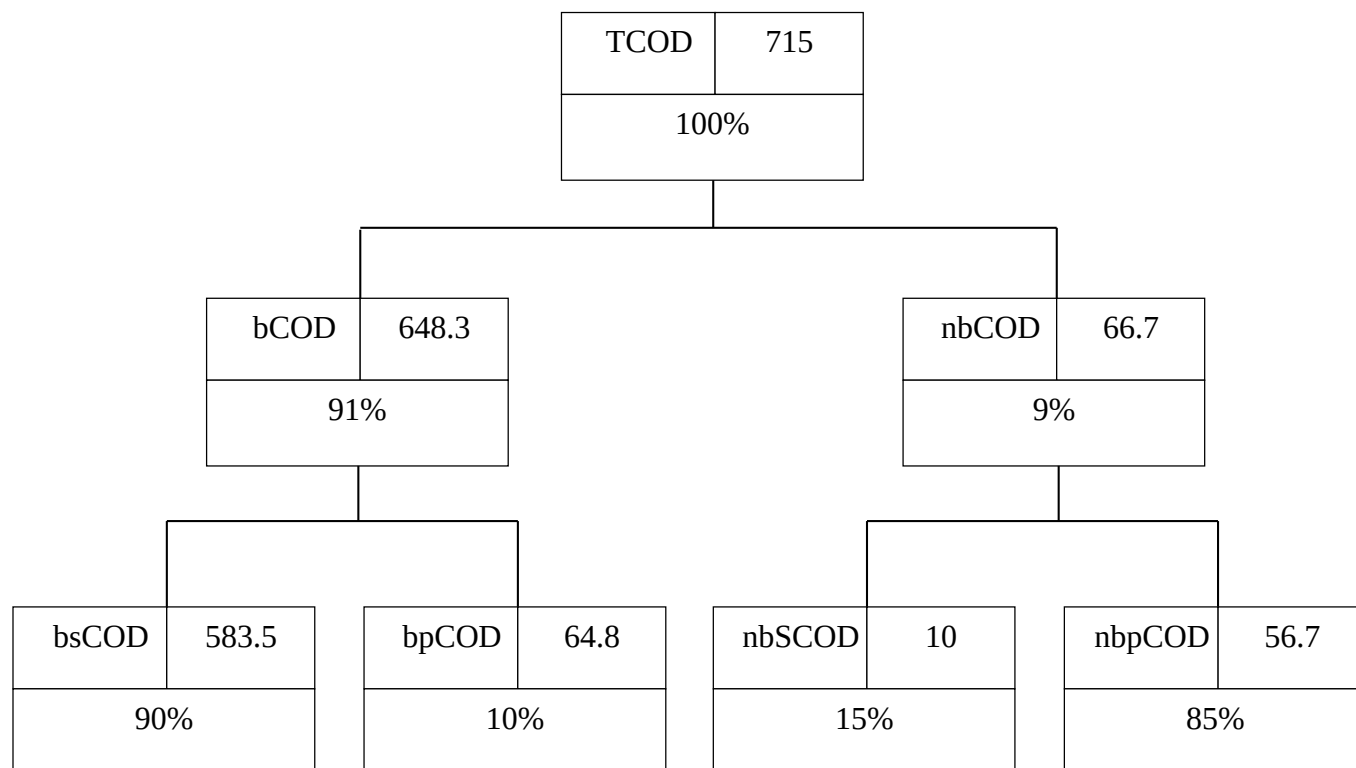


Fig 1. COD fractions of combined wastewater in Sukkur wastewater treatment plant

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3) Effluent Wastewater Characteristics

The design of the wastewater treatment plant is based on meeting the given standard of "Sindh Environmental Quality Standard for Municipal & Liquid Industrial Effluents."

This standard, presented in Table 7, determines the quality of the effluent from the treatment plant for discharge into inland water.

Table 7- Level of treatment

Parameters	Value	Unit
BOD ₅	80	mg/l
COD	150	mg/l
TSS	200	mg/l
TDS	3500	mg/l
Oil and Grease	10	mg/l
Sulphide (S ²⁻)	1	mg/l

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4) Pretreatment

It should be noted that the maximum flow will be equalized in the pump station; as a result, the pumped flow rate will always be the average flow rate, so all units are designed based on the average flow rate.

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4.1) Manual Coarse Screen Units 50 mm

The Specifications of manual coarse screen 50 mm is listed in Table 8.

Table 8- Specifications of manual coarse screen 50 mm

Design parameter	Unit	Value
Design flow	m ³ /d	27,280
Number of equipment(s)	-	1
Upstream depth of wastewater	m	0.4
Bar space	mm.	50
Bar width	mm.	4
Approach velocity	m/s	0.6
Screenings	m ³ /10 ⁶ m ³	6
Density	kg/m ³	1000
Moisture	%	60
Bar number	-	24
Screen width	m	1.3
Screen Quantity	m ³ /d	0.2
	Kg/d	82

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4.2) Mechanical Coarse Screen Units 20 mm

The Specifications of manual coarse screen 20 mm is listed in Table 9.

Table 9- Specifications of manual coarse screen 20 mm

Design parameter	Unit	Value
Design flow	m ³ /d	27,280
Number of equipment(s)	-	1+1
Upstream depth of wastewater	m	0.4
Bar space	mm.	20
Bar width	mm.	4
Approach velocity	m/s	0.6
Screenings	m ³ /10 ⁶ m ³	30
Density	kg/m ³	1000
Moisture	%	60
Bar number	-	55
Screen width	m	1.3
Screen Quantity	m ³ /d	1
	Kg/d	410

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4.3) Mechanical Fine Screen Units

The Specifications of mechanical fine screen 6 mm are listed in Table 11.

Table 11- Specifications of mechanical fine screen

Design parameter	Unit	Value
Design flow	m ³ /d	13,640
Number of equipment(s)	-	1+1
Upstream depth of wastewater	m	0.3
Bar space	mm.	6
Bar width	mm.	4
Approach velocity	m/s	0.7
Screenings	m ³ /10 ⁶ m ³	70
Density	kg/m ³	1000
Moisture	%	60
Bar number	-	125
Screen width	m	1.3
Screen Quantity	m ³ /d	1
	Kg/d	573

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4.4) Channel

The Specifications of channel between all units are listed in Table 12.

Table 12- Specifications of channel

Design parameter	Unit	Value
Max design flow	m ³ /d	13,640
Min design flow	m ³ /d	6,820
Water depth	m	0.4
Free board	m	0.3
Total depth	m	0.7
Width	m	0.6

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4.5) Grit Chamber Units

The Specifications of aerated grit chamber are listed in Table 13.

Table 13- Specifications of Aerated Grit Chamber

Design parameter	Unit	Value
Design flow	m ³ /h	13,640
Number of Grit Chamber	-	2
Retention time	min	10
Grit width	m	3
Grease width to Grit width	-	0.25
Grease width	m	0.75
Channel width	m	3.75
Grit chamber length to Grit width ratio	-	8.5
Channel length	m	25.5
Grit width to depth ratio	-	0.8
Water depth (useful depth)	m	3.8
Free board	m	0.6
Total depth	m	4.4
Horizontal velocity of sewage	m/s	0.007
Total required Air with Safety factor	m ³ /hr	1008
Number of Blower	-	2+1
Each Blower Capacity	m ³ /hr	504
Each Diffuser capacity	m ³ /hr	14
Total Number of Diffuser	-	72

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5) Biological Treatment

The extended aeration process utilizes a large aeration basin in which high MLSS concentration is maintained. In this process, the wastewater is in contact with air, the produced sludge settles, and part of it is returned to the aeration tank. In the extended aeration, generally, primary clarification is not used. The key parameters that distinguish extensive aeration from other activated sludge processes are the hydraulic retention time of approximately 24 hours and the very high solids retention time (20 to 30 days) in the aeration tank. Due to this high SRT, the sludge is stabilized, and there is no need for sludge digestion facilities.

The Specifications of extended aeration unit are listed in Table 14.

Table 14- Specifications of Extended Aeration unit

Parameter	Unit	Value
Number of stream-lines	–	3
Number of tanks per stream-lines	–	1
Total number of tanks	–	3
Average design flow of each reactor	m ³ /day	13,999
MLSS concentration	mg/L	4000
Solid retention time (SRT)	d	20
Effluent S	mg/lit	0.3
P _{x,bio,vss}	kg/d	1,758
P _{x,vss}	kg/d	2,770
P _{x,TSS}	kg/d	4,010
Useful aeration volume	m ³	20,623

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Parameter	Unit	Value
Useful volume of each reactor	m ³	6,874
Length of each reactor	m	50
Width of each reactor	m	25
Useful depth of each reactor	m	5.5
Free board of each reactor	m	0.5
Total depth per reactor	m	6
NO _x	mg/L	0.02
volumetric load rate (Design)	kgBOD ₅ /m ³ .day	0.28
F/M ratio	kgBOD ₅ /KgVSS.day	0.1
MLVSS concentration	mg/L	2,763
OTR	kg/hr	274
SOTR in T max	kg/hr	987
Efficiency of diffusers	%	25
Amount of air required with safety factor	m ³ /h	16,802
Number of blowers	-	3+1
Capacity of each blower	m ³ /h	5,601
	m ³ /min	93
Each Diffuser capacity	m ³ /hr	10
Total Number of Diffuser	-	1683

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6) Secondary Sedimentation Tank

The Specifications of secondary clarifier are listed in Table 15.

Table 15- Specifications of secondary sedimentation tanks

Parameter	Unit	Value
Number of stream-lines	-	3
Number of tanks per stream-lines	-	1
Total number of tanks	-	3
Design flow rate	m ³ /day	13,999
HLR	m ³ /m ² .d	12.3
Side water depth	m	3.5
Area of each sedimentation tank	m ²	380
Diameter each sedimentation tank	m	22
Retention time	hr	6.8
Secondary sludge concentration	mg/L	8000
Solids loading	kg/ m ² .day	4.1
Recycle fraction	-	1
Total RAS flowrate	m ³ /day	13,999
TSS loading RAS	kg/d	111,994
TSS loading WAS	kg/d	2050
Q WAS	m ³ /day	256.2
BOD WAS	kg/d	905
	mg/L	3,532
TSS Effluent	mg/L	140
VSS Effluent	mg/L	97
BOD Effluent	mg/L	43
COD Effluent	mg/L	87

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7) Disinfection Unit

The Specifications of disinfection units are listed in Table 16.

Table 16- Specifications of Disinfection Units

Parameter	Unit	Value
Design flow rate	m ³ /day	13,999
Number of tanks	No.	2
Retention time at the average flow rate	min	35
Volume of each tank	m ³	331.5
Useful depth	m	1.5
Free board	m	0.5
Total depth		2
Length of each tank	m	8.6
Width of each tank	m	7.5
Number of channels in each tank	No.	5
Width of each channel	m	1.5
L/W ratio	-	29
H/W ratio	-	1
Dispersion number	-	0.0125
Injection chlorine dose	mg/L	8
Amount of consumed sodium hypochlorite	L/hr	1820

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8) Drum Filter

The service water includes the water required for equipment such as screen, screw compactor, and washing water for dewatering equipment in addition to GBT & BFP equipment and chemical preparation. Also, The Specification drum filter are listed in Table 17.

Table 17- Specification of Drum filter

Parameter	Unit	Value
Service water flow rate	m ³ /hr	30
Number of drum filter	-	1+1
Each Drum Capacity	m ³ /hr	30
Maximum Mesh	micron	40

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9) Sludge Treatment

8.1) Sludge Treatment Combined Unit (GBT+BFP)

Combined units associate the functions of one gravity belt thickener and belt filter press. The Specification of Sludge Treatment Combined Unit are listed in Table 18.

Table 18- Specification of Sludge Treatment Combined Unit (GBT & BFP)

Parameter	Unit	Value
Number of equipment		1+1
Max sludge production rate	kg/d	2,460
	m3/d	308
Operating day	d	5
Operating hour	hr	8
Belt width	m	1.2
Hydraulic Loading Rate	L/m.min	747
Solid Loading Rate	kg/m.hr	359
Total wash water flowrate	mg/L	15
Total required polymer	kg/hr	2
GBT		
Thickened Sludge		
Q	m3/d	38
TSS	kg/d	1,947
	mg/L	51,500
BOD	kg/d	1,299
	mg/L	34,354
COD	kg/d	28,303
	mg/L	1,070

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Parameter	Unit	Value
GBT Supernatant		
Q	m ³ /d	269
TSS	kg/d	102
	mg/L	381
BOD	kg/d	74
	mg/L	276
COD	kg/d	220
	mg/L	59
BFP		
Sludge Cake		
Q	m ³ /d	12
TSS	mg/L	214,000
BOD	mg/L	131,208
COD	mg/L	116,036
BFP Supernatant		
Q	m ³ /d	91
TSS	kg/d	1823
	mg/L	165
BOD	kg/d	1118
	mg/L	101
COD	kg/d	998
	mg/L	90

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8.2) Supernatant Pump Station

The Specification of supernatant are listed in Table 19.

Table 19- Specification of Supernatant

Parameter	Unit	Value
Q	m ³ /d	359
TSS	kg/d	536
	mg/L	193
BOD	kg/d	337
	mg/L	121
COD	kg/d	416
	mg/L	150

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8.3) Deposit Area

The Specification of Deposit Area are listed in Table 20.

Table 20- Specification of Deposit Area

Parameter	Unit	Value
Deposit Time	month	3
Q sludge	m ³ /d	12
TSS sludge	kg/d	2,563
	kg/year	230,632
Loading rate	kg/year/m ²	90
Area	m ²	2,563
Number of deposit	-	4
Area each deposit	m ²	641
Length	m	26
Width	m	25
Depth	m	0.7

Annex – II - Electrical Report

Electrical Load List

0	1/15/2023	For Review	A.Vaseghi	S.Rajae	M.Alavi
Rev.	Date	Purpose of Isuue	Prepared By	Checked By	Approved By

Tabulation of Revised Page

Sheet						Remark
	00	01	02	03	04	
1	x					
2	x					
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0	1/15/2023	For Review	A.Vaseghi	S.Rajae
Rev.	Date	Purpose of Isuue	Prepared By	Checked By
				M.Alavi
				Approved By

CONSULTANT:  			SURVEY AND FEASIBILITY STUDY FOR ESTABLISHMENT OF EFFLUENT TREATMENT PLAN SITE SUKKUR, SINDH														CLIENT:						
			Document Title:														Rev 0	Date 1/15/2023		Page 3 of 8			
			Electrical Load List																				
Item No.	Unit	Description	Nameplate			Operation Duty				Starter type	Shaft Power	Efficiency (%)	Duty Factor	Rated Power Factor	Electrical Installed			Electrical Demand			Rev.		
			Rated Voltage (kV)	Phase	Rated Power (kW)	Continuous	Intermittent	Emergency	Standby						(kW)	(kVAr)	(kVA)	(kW)	(kVAr)	(kVA)			
1	Coarse Screen #1	manual coarse screen belt conveyor	0.4	3	1.50		*	*		DOL	1.5	77.0	1.0	0.8	1.5	1.2	1.9	1.5	1.2	1.9			
2	Coarse Screen #2	Electrical Gate	0.4	3	1.50		*	*		DOL	1.5	77.0	0.5	0.8	1.5	1.2	1.9	0.8	0.6	0.9			
3	Coarse Screen #2	Electrical Gate	0.4	3	1.50				*	DOL	1.5	77.0	0.0	0.8	1.5	1.2	1.9	0.0	0.0	0.0			
4	Coarse Screen #2	mechanical coarse screen #1	0.4	3	2.50	*		*		DOL	1.5	78.0	1.0	0.8	2.5	1.8	3.1	2.5	1.8	3.1			
5	Coarse Screen #2	mechanical coarse screen #2	0.4	3	2.50				*	DOL	1.5	78.0	0.0	0.8	2.5	1.8	3.1	0.0	0.0	0.0			
6	Coarse Screen #2	mechanical coarse screen belt conveyor	0.4	3	1.50		*	*		DOL	1.5	77.0	1.0	0.8	1.5	1.2	1.9	1.5	1.2	1.9			
7	Coarse Screen #2	Screw washing press	0.4	3	2.50		*	*		DOL	2.5	78.0	0.7	0.8	2.5	1.8	3.1	1.8	1.3	2.2			
8	Coarse Screen #2	electrical crane	0.4	3	10.00		*	*		DOL	10.0	88.0	0.1	0.8	10.0	6.7	12.0	1.0	0.7	1.2			
9	Pump Station	inlet pump #1	0.4	3	15.00	*		*		SSD	12.0	88.0	1.0	0.8	15.0	10.1	18.1	15.0	10.1	18.1			
10	Pump Station	inlet pump #2	0.4	3	15.00	*		*		SSD	12.0	88.0	1.0	0.8	15.0	10.1	18.1	15.0	10.1	18.1			
11	Pump Station	inlet pump #3	0.4	3	15.00	*		*		SSD	12.0	88.0	1.0	0.8	15.0	10.1	18.1	15.0	10.1	18.1			
12	Pump Station	inlet pump #4	0.4	3	15.00				*	SSD	12.0	88.0	0.0	0.8	15.0	10.1	18.1	0.0	0.0	0.0			
13	Pump Station	by-pass pump #1	0.4	3	30.00	*		*		SSD	25.0	91.0	1.0	0.9	30.0	18.6	35.3	30.0	18.6	35.3			
14	Pump Station	by-pass pump #2	0.4	3	30.00	*		*		SSD	25.0	91.0	1.0	0.9	30.0	18.6	35.3	30.0	18.6	35.3			
15	Pump Station	by-pass pump #3	0.4	3	30.00				*	SSD	25.0	91.0	0.0	0.9	30.0	18.6	35.3	0.0	0.0	0.0			
16	Pump Station	electrical crane	0.4	3	5.00		*	*		DOL	5.0	83.0	0.1	0.8	5.0	3.5	6.1	0.5	0.3	0.6			
17	Fine Screening	Electrical Gate	0.4	3	1.50		*	*		DOL	1.5	77.0	0.5	0.8	1.5	1.2	1.9	0.8	0.6	0.9			
18	Fine Screening	Electrical Gate	0.4	3	1.50				*	DOL	1.5	77.0	0.0	0.8	1.5	1.2	1.9	0.0	0.0	0.0			
19	Fine Screening	mechanical fine screen #1	0.4	3	2.50	*		*		DOL	1.5	78.0	1.0	0.8	2.5	1.8	3.1	2.5	1.8	3.1			
20	Fine Screening	mechanical fine screen #2	0.4	3	2.50				*	DOL	1.5	78.0	0.0	0.8	2.5	1.8	3.1	0.0	0.0	0.0			
21	Fine Screening	mechanical fine screen belt conveyor	0.4	3	1.50		*	*		DOL	1.5	77.0	1.0	0.8	1.5	1.2	1.9	1.5	1.2	1.9			
22	Fine Screening	Screw washing press	0.4	3	2.50		*	*		DOL	2.5	78.0	0.7	0.8	2.5	1.8	3.1	1.8	1.3	2.2			
23	Fine Screening	electrical crane	0.4	3	10.00		*	*		DOL	10.0	88.0	0.1	0.8	10.0	6.7	12.0	1.0	0.7	1.2			
24	Grit Chamber	bridge- grit chamber #1	0.4	3	2.50	*		*		DOL	2.5	78.0	1.0	0.8	2.5	1.8	3.1	2.5	1.8	3.1			
25	Grit Chamber	bridge- grit chamber #1	0.4	3	2.50	*		*		DOL	2.5	78.0	1.0	0.8	2.5	1.8	3.1	2.5	1.8	3.1			
26	Grit Chamber	scum transfer pump #1	0.4	3	3.00		*	*		DOL	2.5	80.0	0.2	0.8	3.0	2.1	3.7	0.6	0.4	0.7			
27	Grit Chamber	scum transfer pump #2	0.4	3	3.00				*	DOL	2.5	80.0	0.0	0.8	3.0	2.1	3.7	0.0	0.0	0.0			
28	Grit Chamber	classifier	0.4	3	1.50		*	*		DOL	1.5	77.0	1.0	0.8	1.5	1.2	1.9	1.5	1.2	1.9			
29	Grit Chamber	Air Blower #1	0.4	3	15.00	*		*		SSD	12.0	88.0	1.0	0.8	15.0	10.1	18.1	15.0	10.1	18.1			
30	Grit Chamber	Air Blower #2	0.4	3	15.00	*		*		SSD	12.0	88.0	1.0	0.8	15.0	10.1	18.1	15.0	10.1	18.1			
31	Grit Chamber	Air Blower #3	0.4	3	15.00				*	SSD	12.0	88.0	0.0	0.8	15.0	10.1	18.1	0.0	0.0	0.0			
32	Odor removal	Pretreatment odor removal	0.4	3	30.00		*	*		DOL	15.0	91.0	1.0	0.9	30.0	18.6	35.3	30.0	18.6	35.3			
33	Aeration Tank	Electrical Gate	0.4	3	0.75		*	*		DOL	0.8	70.0	0.5	0.8	0.8	0.5	0.9	0.4	0.2	0.4			
34	Aeration Tank	Electrical Gate	0.4	3	0.75		*	*		DOL	0.8	70.0	0.5	0.8	0.8	0.5	0.9	0.4	0.2	0.4			
35	Aeration Tank	Electrical Gate	0.4	3	0.75		*	*		DOL	0.8	70.0	0.5	0.8	0.8	0.5	0.9	0.4	0.2	0.4			
36	Aeration Tank	Electrical Wier	0.4	3	0.75		*	*		DOL	0.8	70.0	0.5	0.8	0.8	0.5	0.9	0.4	0.2	0.4			
37	Aeration Building	Air Blower- Aeration tank #1	0.4	3	160.00	*		*			140.0	94.0	1.0	0.9	160.0	90.7	183.9	160.0	90.7	183.9			

CONSULTANT:			SURVEY AND FEASIBILITY STUDY FOR ESTABLISHMENT OF EFFLUENT TREATMENT PLAN SITE SUKKUR, SINDH													CLIENT:					
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			Document Title:													Electrical Load List					
Item No.	Unit	Description	Nameplate			Operation Duty				Starter type	Shaft Power	Efficiency (%)	Duty Factor	Rated Power Factor	Electrical Installed			Electrical Demand			Rev.
			Rated Voltage (kV)	Phase	Rated Power (kW)	Continuous	Intermittent	Emergency	Standby						(kW)	(kVAr)	(kVA)	(kW)	(kVAr)	(kVA)	
38	Aeration Building	Air Blower- Aeration tank #2	0.4	3	160.00	*		*		VFD	140.0	94.0	1.0	0.9	160.0	90.7	183.9	160.0	90.7	183.9	
39	Aeration Building	Air Blower- Aeration tank #3	0.4	3	160.00	*				VFD	140.0	94.0	1.0	0.9	160.0	90.7	183.9	160.0	90.7	183.9	
40	Aeration Building	Air Blower- Aeration tank #4	0.4	3	160.00				*	VFD	140.0	94.0	0.0	0.9	160.0	90.7	183.9	0.0	0.0	0.0	
41	Aeration Building	electrical crane	0.4	3	10.00		*	*		DOL	10.0	88.0	0.1	0.8	10.0	6.7	12.0	1.0	0.7	1.2	
42	sludge pump station	WAS pump #1	0.4	3	18.50		*	*		SSD	15.0	90.0	0.5	0.8	18.5	12.4	22.3	9.3	6.2	11.1	
43	sludge pump station	WAS pump #2	0.4	3	18.50				*	SSD	15.0	90.0	0.0	0.8	18.5	12.4	22.3	0.0	0.0	0.0	
44	sludge pump station	RAS pump #1	0.4	3	75.00	*		*		SSD	62.0	93.5	1.0	0.9	75.0	44.5	87.2	75.0	44.5	87.2	
45	sludge pump station	RAS pump #2	0.4	3	75.00	*		*		SSD	62.0	93.5	1.0	0.9	75.0	44.5	87.2	75.0	44.5	87.2	
46	sludge pump station	RAS pump #3	0.4	3	75.00	*				SSD	62.0	93.5	1.0	0.9	75.0	44.5	87.2	75.0	44.5	87.2	
47	sludge pump station	RAS pump #4	0.4	3	75.00				*	SSD	62.0	93.5	0.0	0.9	75.0	44.5	87.2	0.0	0.0	0.0	
48	sludge pump station	electrical crane	0.4	3	5.00		*	*		DOL	5.0	83.0	0.1	0.8	5.0	3.5	6.1	0.5	0.3	0.6	
49	Secondary clarifier	Scraper- secondary clarifier #1	0.4	3	2.50	*		*		DOL	2.5	78.0	1.0	0.8	2.5	1.8	3.1	2.5	1.8	3.1	
50	Secondary clarifier	Scraper- secondary clarifier #2	0.4	3	2.50	*		*		DOL	2.5	78.0	1.0	0.8	2.5	1.8	3.1	2.5	1.8	3.1	
51	Secondary clarifier	Scraper- secondary clarifier #3	0.4	3	2.50	*		*		DOL	2.5	78.0	1.0	0.8	2.5	1.8	3.1	2.5	1.8	3.1	
52	Secondary scum pump station	scum transfer pump #1	0.4	3	3.00		*	*		DOL	2.5	80.0	0.2	0.8	3.0	2.1	3.7	0.6	0.4	0.7	
53	Secondary scum pump station	scum transfer pump #2	0.4	3	3.00				*	DOL	2.5	80.0	0.0	0.8	3.0	2.1	3.7	0.0	0.0	0.0	
54	sludge Building	GBT and BFP device #1	0.4	3	30.00		*	*		DOL	24.0	91.0	0.5	0.9	30.0	18.6	35.3	15.0	9.3	17.6	
55	sludge Building	GBT and BFP device #1	0.4	3	30.00				*	DOL	24.0	91.0	0.0	0.9	30.0	18.6	35.3	0.0	0.0	0.0	
56	sludge Building	PE Dosing pump #1	0.4	3	1.50		*	*		VFD	1.5	77.0	0.5	0.8	1.5	1.2	1.9	0.8	0.6	0.9	
57	sludge Building	PE Dosing pump #2	0.4	3	1.50				*	VFD	1.5	77.0	0.0	0.8	1.5	1.2	1.9	0.0	0.0	0.0	
58	sludge Building	Crane- Sludge building #1	0.4	3	10.00		*	*		DOL	10.0	88.0	0.1	0.8	10.0	6.7	12.0	1.0	0.7	1.2	
59	sludge Building	Compressor #1	0.4	3	3.00		*	*		DOL	2.2	80.0	0.5	0.8	3.0	2.1	3.7	1.5	1.0	1.8	
60	sludge Building	Compressor #2	0.4	3	3.00				*	DOL	2.2	80.0	0.0	0.8	3.0	2.1	3.7	0.0	0.0	0.0	
61	sludge Building	Poly Electrolyte Package #1	0.4	3	1.50		*	*		DOL	1.5	77.0	0.5	0.8	1.5	1.2	1.9	0.8	0.6	0.9	
62	sludge Building	Poly Electrolyte Package #2	0.4	3	1.50				*	DOL	1.5	77.0	0.0	0.8	1.5	1.2	1.9	0.0	0.0	0.0	
63	sludge Building	Conveyor	0.4	3	1.50		*	*		DOL	1.5	77.0	0.5	0.8	1.5	1.2	1.9	0.8	0.6	0.9	
64	Odor removal	Sludge odor removal	0.4	3	18.50		*	*		DOL	62.0	90.0	1.0	0.8	18.5	12.4	22.3	18.5	12.4	22.3	
65	Supernatant pump station	Supernatant transfer pump #1	0.4	3	3.00		*	*		DOL	2.5	80.0	0.5	0.8	3.0	2.1	3.7	1.5	1.0	1.8	
66	Supernatant pump station	Supernatant transfer pump #2	0.4	3	3.00		*	*		DOL	2.5	80.0	0.5	0.8	3.0	2.1	3.7	1.5	1.0	1.8	
67	Supernatant pump station	Supernatant transfer pump #3	0.4	3	3.00				*	DOL	2.5	80.0	0.0	0.8	3.0	2.1	3.7	0.0	0.0	0.0	
68	Supernatant pump station	Supernatant Mixer	0.4	3	1.10	*		*		DOL	1.1	73.0	1.0	0.8	1.1	0.8	1.4	1.1	0.8	1.4	
69	Supernatant pump station	electrical crane	0.4	3	1.50		*	*		DOL	1.5	77.0	0.1	0.8	1.5	1.2	1.9	0.2	0.1	0.2	
70	Disinfection Unit	dosing pump #1	0.4	3	1.50	*		*		DOL	1.0	77.0	1.0	0.8	1.5	1.2	1.9	1.5	1.2	1.9	
71	Disinfection Unit	dosing pump #2	0.4	3	1.50	*		*		DOL	1.0	77.0	1.0	0.8	1.5	1.2	1.9	1.5	1.2	1.9	
72	Disinfection Unit	dosing pump #3	0.4	3	1.50				*	DOL	1.0	77.0	0.0	0.8	1.5	1.2	1.9	0.0	0.0	0.0	
73	Drum Filter	Electrical Gate	0.4	3	1.50		*	*		DOL	1.5	77.0	0.5	0.8	1.5	1.2	1.9	0.8	0.6	0.9	
74	Drum Filter	Electrical Gate	0.4	3	1.50		*	*		DOL	1.5	77.0	0.5	0.8	1.5	1.2	1.9	0.8	0.6	0.9	
75	Drum Filter	Drum Filter #1	0.4	3	5.50		*	*		DOL	4.0	84.0	0.5	0.8	5.5	3.7	6.6	2.8	1.8	3.3	

CONSULTANT:



**SURVEY AND FEASIBILITY STUDY FOR ESTABLISHMENT OF EFFLUENT
TREATMENT PLANT SITE
SUKKUR, SINDH**

CLIENT:



Document Title:

Electrical Load List

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Item No.	Unit	Description	Nameplate		Operation Duty				Starter type	Shaft Power	Efficiency (%)	Duty Factor	Rated Power Factor	Electrical Installed			Electrical Demand			Rev.
			Rated Voltage (kV)	Phase	Rated Power (kW)	Continuous	Intermittent	Emergency						Standby	(kW)	(kVAr)	(kVA)	(kW)	(kVAr)	
76	Drum Filter	Drum Filter #2	0.4	3	5.50			*	DOL	4.0	84.0	0.0	0.8	5.5	3.7	6.6	0.0	0.0	0.0	
77	Drum Filter	service water pump #1	0.4	3	15.00		*	*	VFD	12.0	88.0	0.5	0.8	15.0	10.1	18.1	7.5	5.0	9.0	
78	Drum Filter	service water pump #2	0.4	3	15.00			*	VFD	12.0	88.0	0.0	0.8	15.0	10.1	18.1	0.0	0.0	0.0	
79	Drum Filter	electrical crane	0.4	3	1.50		*	*	DOL	1.5	77.0	0.1	0.8	1.5	1.2	1.9	0.2	0.1	0.2	
80		Sensors	0.4	3	1.00		*	*	FDR	1.0	100.0	0.5	0.8	1.0	0.8	1.3	0.5	0.4	0.6	
81		Actuator	0.4	3	10.00		*	*	DOL	10.0	100.0	0.5	0.8	10.0	7.5	12.5	5.0	3.8	6.3	
82		uninterruptible power supply	0.4	3	10.00	*		*	FDR	10.0	100.0	1.0	0.8	10.0	7.5	12.5	10.0	7.5	12.5	
83		area lighting	0.4	3	50.00		*	*	FDR	50.0	100.0	0.6	0.8	50.0	37.5	62.5	30.0	22.5	37.5	
84	Guard house	guard house lighting & HVAC panel	0.4	3	8.00		*	*	FDR	8.0	100.0	0.6	0.8	8.0	6.0	10.0	4.8	3.6	6.0	
83	Garage building	garage building lighting & HVAC panel	0.4	3	15.00		*	*	FDR	15.0	100.0	0.6	0.8	15.0	11.3	18.8	9.0	6.8	11.3	
84	Disinfection building	disinfection building lighting & HVAC panel	0.4	3	4.00		*	*	FDR	4.0	100.0	0.6	0.8	4.0	3.0	5.0	2.4	1.8	3.0	
85	Sludge building	Sludge building lighting & HVAC panel	0.4	3	5.00		*	*	FDR	5.0	100.0	0.6	0.8	5.0	3.8	6.3	3.0	2.3	3.8	
86	Screening building	Screening building lighting	0.4	3	5.00		*	*	FDR	5.0	100.0	0.6	0.8	5.0	3.8	6.3	3.0	2.3	3.8	
87	Aeration Building	Blower room lighting	0.4	3	5.00		*	*	FDR	5.0	100.0	0.6	0.8	5.0	3.8	6.3	3.0	2.3	3.8	
88	Service Water Building	Service water room lighting	0.4	3	5.00		*	*	FDR	5.0	100.0	0.6	0.8	5.0	3.8	6.3	3.0	2.3	3.8	
89	Admin building	admin building lighting & HVAC panel	0.4	3	45.00		*	*	FDR	45.0	100.0	0.6	0.8	45.0	33.8	56.3	27.0	20.3	33.8	
90	Electrical building	electrical building lighting & HVAC panel	0.4	3	4.00		*	*	FDR	4.0	100.0	0.6	0.8	4.0	3.0	5.0	2.4	1.8	3.0	
91	Passage Post	passage post lighting	0.4	3	2.00		*	*	FDR	2.0	100.0	0.6	0.8	2.0	1.5	2.5	1.2	0.9	1.5	
Total power for plant														1629	1013	91802	1076	660	1263	

Power Transformer Sizing		
Total Active Power	KW	1076
Total Reactive Power	KVAR	660
Total Apparent Power	KVA	1263
Average Power Factor	%	0.85
Total Apparent Power With Considering 20% As Spare	KVA	1515
Power Transformer Rated Capacity At Site Condition	KVA	1600

Diesel Generator Sizing		
Total Active Power	KW	840
Total Reactive Power	KVAR	524
Total Apparent Power	KVA	990
Total Apparent Power With Considering 20% As Spare	KVA	1188
Power Transformer Rated Capacity At Site Condition	KVA	1300

Capacitor Bank Sizing		
Total Active Power	KW	1076
Total Reactive Power	KVAR	660
Total Apparent Power	KVA	1263
Average Power Factor	%	0.85
Desired Power Factor	%	0.96
Total Needed Reactive Power	KVAR	347
Capacitor Bank Rated Power	KVAR	350

Annex – III - Environmental Monitoring Reports

Lab Report Ref. No.: QTS/CETP/22/5303-A

Reporting Date: 17/11/2022

Report to: Combined Effluent Treatment Plant (ETP), Sindh Industrial & Trading State (SITE) Sukkur

SAMPLE DESCRIPTION
Sample ID: <u>Kheer Thar Canal Outfall</u> Sample Type: <u>Grab Sample</u> Sampling Coordinates: <u>27°42'23.6"N 68°50'17.0"E</u> Sample Collected/Submitted by: <u>QTS representative</u> Sampling Date: <u>28/10/2022</u>

ANALYTICAL TEST REPORT				
S.NO.	PARAMETERS TO BE ANALYZED	UNITS	RESULTS	TEST METHOD
1	pH value	-	7.21	USEPA 150.1
2	Chemical Oxygen Demand(COD)	mg/L	26	Hach 8000
3	Biochemical Oxygen Demand(BOD)5 at 20C	mg/L	10.4	Hach method
4	Total Suspended Solids(TSS)	mg/L	35	Hach 8006
5	Total Dissolved Solids(TDS)	mg/L	168	Hach 8160
6	Oil & Grease	mg/L	0.29	APHA 5520-D
7	Fluoride(as F ⁻)	mg/L	0.81	USEPA 340.1
8	Chloride(as Cl ⁻)	mg/L	26.6	Hach 8206
9	Total Hardness(as CaCO ₃)	mg/L	100	Hach 8213
10	Turbidity	NTU	01	Turbidity meter

USEPA=United State Environmental Protection Agency method

Hach USA, method

BDL=Below Detection Limit

APHA-SM = American Public Health Association- Standard Methods for Water & Waste water Examination

- This report is not valid for any negotiations
- Report is valid for current batch(sample)
- The remaining portion of the sample will be discarded after 07 days unless otherwise instructed

Sample Analyzed by: Hareem Zehra	Signature of Laboratory In charge:  Name : Ali Raza
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Lab Report Ref. No.: QTS/CETP/22/5303-B

Reporting Date: 17/11/2022

Report to: Combined Effluent Treatment Plant (ETP), Sindh Industrial & Trading State (SITE) Sukkur

SAMPLE DESCRIPTION
Sample ID: <u>River Indus (sample 01)</u> Sample Type: <u>Grab Sample</u> Sampling Coordinates: <u>27°42'13.8"N 68°53'17.6"E</u> Sample Collected/Submitted by: <u>QTS representative</u> Sampling Date: <u>28/10/2022</u>

ANALYTICAL TEST REPORT				
S.NO.	PARAMETERS TO BE ANALYZED	UNITS	RESULTS	TEST METHOD
1	pH value	-	7.26	USEPA 150.1
2	Chemical Oxygen Demand(COD)	mg/L	52	Hach 8000
3	Biochemical Oxygen Demand(BOD)5 at 20C	mg/L	19.3	Hach method
4	Total Suspended Solids(TSS)	mg/L	21	Hach 8006
5	Total Dissolved Solids(TDS)	mg/L	155.1	Hach 8160
6	Oil & Grease	mg/L	0.20	APHA 5520-D
7	Fluoride(as F ⁻)	mg/L	0.34	USEPA 340.1
8	Chloride(as Cl ⁻)	mg/L	7.1	Hach 8206
9	Total Hardness(as CaCO ₃)	mg/L	101	Hach 8213
10	Turbidity	NTU	0.81	Turbidity meter

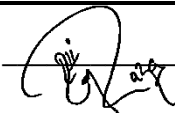
USEPA=United State Environmental Protection Agency method

Hach USA, method

BDL=Below Detection Limit

APHA-SM = American Public Health Association- Standard Methods for Water & Waste water Examination

- This report is not valid for any negotiations
- Report is valid for current batch(sample)
- The remaining portion of the sample will be discarded after 07 days unless otherwise instructed

Sample Analyzed by: Hareem Zehra	Signature of Laboratory In charge:  Name : Ali Raza 
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Lab Report Ref. No.: QTS/ CETP/22/5304-C

Reporting Date: 17/11/2022

Report to: Combined Effluent Treatment Plant (ETP), Sindh Industrial & Trading State (SITE) Sukkur

SAMPLE DESCRIPTION

Sample ID: River Indus (sample 02)
Sample Type: Grab Sample
Sampling Coordinates: 22°44'35.2"N 68°51'01.5"E
Sample Collected/Submitted by: QTS representative
Sampling Date: 28/10/2022

ANALYTICAL TEST REPORT

S.NO.	PARAMETERS TO BE ANALYZED	UNITS	RESULTS	TEST METHOD
1	pH value	-	7.17	USEPA 150.1
2	Chemical Oxygen Demand(COD)	mg/L	16	Hach 8000
3	Biochemical Oxygen Demand(BOD)5 at 20C	mg/L	7.8	Hach method
4	Total Suspended Solids(TSS)	mg/L	21	Hach 8006
5	Total Dissolved Solids(TDS)	mg/L	344	Hach 8160
6	Oil & Grease	mg/L	0.41	APHA 5520-D
7	Fluoride(as F-)	mg/L	0.51	USEPA 340.1
8	Chloride(as Cl-)	mg/L	53.25	Hach 8206
9	Total Hardness(as CaCO3)	mg/L	240	Hach 8213
10	Turbidity	NTU	0.9	Turbidity meter

USEPA=United State Environmental Protection Agency method

Hach USA, method

BDL=Below Detection Limit

APHA-SM = American Public Health Association- Standard Methods for Water & Waste water Examination

- This report is not valid for any negotiations
- Report is valid for current batch(sample)
- The remaining portion of the sample will be discarded after 07 days unless otherwise instructed

Sample Analyzed by: Hareem Zehra	Signature of Laboratory In charge:  Name : Ali Raza
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Lab Report Ref. No. : QTS/ CETP/2022/5304-A

Reporting Date: 17/11/2022

Report to: Combined Effluent Treatment Plant (ETP), Sindh Industrial & Trading State (SITE) Sukkur

SAMPLE DESCRIPTION

Sample ID: Ground Water (PDMA)

Sampling Method: APHA 1060-A & B

Coordinates: 27°44'13.0"N 68°50'42.4"E

Sample Type: Grab Sample

Sample Collected/Submitted by: EMC Representative

Sampling Date: 28/10/2022

ANALYTICAL TEST REPORT

S. NO.	PARAMETERS TO BE ANALYZED	STANDARDS	LDL	UNITS	RESULTS	TEST METHOD
		SSDWQ - LIMITS				
1	pH value	6.5 – 8.5	0.01	-	7.07	USEPA 150.1
2	Odour	Non Objectionable / Acceptable	-	Physical	Acceptable	Physical
3	Taste	Non Objectionable / Acceptable	-	Physical	Acceptable	Physical
4	Color	≤ 15	1.0	TCU	0.75	APHA-2020 B/C
5	Turbidity	< 5	0.01	NTU	0.81	APHA-2130 B
6	Total Dissolved Solids(TDS)	< 1000	1.0	mg/L	422	Hach 8160
7	Total Hardness as CaCO ₃	< 500	0.1	mg/L	205	EDTA Titration.Hach-8213
8	Fluoride(as F ⁻)	≤ 1.5	0.01	mg/L	0.29	USEPA 340.1
9	Chloride(as Cl ⁻)	< 250	0.1	mg/L	35.5	Hach 8206
10	Nitrate (NO ₃)	≤ 50	0.01	mg/L	0.34	Hach -8039
11	Nitrite (NO ₂)	≤ 3	0.001	mg/L	0.042	Hach - 8153
12	Cyanide(as CN ⁻)total	≤ 0.05	0.001	mg/L	0.001	Hach 8027
13	Phenolic Compound as (Phenols)	-	0.001	mg/L	BDL	USEPA-420.1
14	Aluminum (Al)	≤ 0.2	0.001	mg/L	BDL	APHA-3111 D
15	Antimony (Sb)	≤ 0.005	0.001	mg/L	BDL	APHA-3111 B
16	Arsenic	≤ 0.05	0.01	mg/L	BDL	APHA-3120 B
17	Cadmium	0.01	0.001	mg/L	BDL	ASTM D-3557
18	Chromium , Total	≤ 0.05	0.01	mg/L	BDL	ASTM D-1687
19	Copper	2	0.01	mg/L	0.025	Hach 8506
20	Lead	≤ 0.05	0.001	mg/L	BDL	ASTM D-3559
21	Mercury	≤ 0.001	0.001	mg/L	BDL	ASTM D-3223
22	Selenium	0.01	0.001	mg/L	BDL	ASTM D-3859
23	Nickel	≤ 0.02	0.01	mg/L	BDL	ASTM D-1886
24	Boron	0.3	0.01	mg/L	BDL	ASTM D-3082
25	Zinc	5.0	0.01	mg/L	0.40	USEPA 3500 Zn B
26	Manganese	≤ 0.5	0.01	mg/L	0.32	Hach 8034
27	Barium	0.7	0.01	mg/L	0.2	Hach 8014
MIRCROBIOLOGICAL ANALYSIS REPORTS						
28	Total Coliform	0cfu/100ml	-	cfu	100>	APHA-SM9221B
29	Fecal Coliform	0cfu/100ml	-	cfu	48>	APHA-SM9221F
30	Escherichia Coli(E-Coli)	0cfu/100ml	-	cfu	40>	APHA-SM9221F

SSDWQ = Sindh Standard for Drinking Water Quality

USEPA = United State Environmental Protection Agency method

Hach USA, method

BDL= Below Detection Limit

ND= Not Detected

LDL=Least Detectable Value

- This report is not valid for any negotiations
- Report is valid for current batch(sample)
- The remaining portion of the sample will be discarded after 07 days unless otherwise instructed

Sample Analyzed by: Hareem Zehra

Signature of Laboratory In charge:
Name : Ali Raza




Lab Report Ref. No. : QTS/ CETP/2022/5304-B
Report to: Combined Effluent Treatment Plant (ETP), Sindh Industrial & Trading State (SITE) Sukkur

Reporting Date: 17/11/2022

SAMPLE DESCRIPTION

Sample ID: Ground Water (Village)

Sampling Method: APHA 1060-A & B

Coordinates: 27°44'32.6"N 68°50'51.3"E

Sample Type: Grab Sample

Sample Collected/Submitted by: EMC Representative

Sampling Date: 28/10/2022

ANALYTICAL TEST REPORT

S. NO.	PARAMETERS TO BE ANALYZED	STANDARDS	LDL	UNITS	RESULTS	TEST METHOD
		SSDWQ - LIMITS				
1	pH value	6.5 – 8.5	0.01	-	7.20	USEPA 150.1
2	Odour	Non Objectionable / Acceptable	-	Physical	Acceptable	Physical
3	Taste	Non Objectionable / Acceptable	-	Physical	Acceptable	Physical
4	Color	≤ 15	1.0	TCU	0.64	APHA-2020 B/C
5	Turbidity	< 5	0.01	NTU	0.44	APHA-2130 B
6	Total Dissolved Solids(TDS)	< 1000	1.0	mg/L	366	Hach 8160
7	Total Hardness as CaCO ₃	< 500	0.1	mg/L	280	EDTA Titration.Hach-8213
8	Fluoride(as F)	≤ 1.5	0.01	mg/L	0.34	USEPA 340.1
9	Chloride(as Cl)	< 250	0.1	mg/L	34.4	Hach 8206
10	Nitrate (NO ₃)	≤ 50	0.01	mg/L	0.79	Hach -8039
11	Nitrite (NO ₂)	≤ 3	0.001	mg/L	0.038	Hach - 8153
12	Cyanide(as CN)-total	≤ 0.05	0.001	mg/L	0.003	Hach 8027
13	Phenolic Compound as (Phenols)	-	0.001	mg/L	BDL	USEPA-420.1
14	Aluminum (Al)	≤ 0.2	0.001	mg/L	BDL	APHA-3111 D
15	Antimony (Sb)	≤ 0.005	0.001	mg/L	BDL	APHA-3111 B
16	Arsenic	≤ 0.05	0.01	mg/L	BDL	APHA-3120 B
17	Cadmium	0.01	0.001	mg/L	BDL	ASTM D-3557
18	Chromium , Total	≤ 0.05	0.01	mg/L	BDL	ASTM D-1687
19	Copper	2	0.01	mg/L	0.04	Hach 8506
20	Lead	≤ 0.05	0.001	mg/L	BDL	ASTM D-3559
21	Mercury	≤ 0.001	0.001	mg/L	BDL	ASTM D-3223
22	Selenium	0.01	0.001	mg/L	BDL	ASTM D-3859
23	Nickel	≤ 0.02	0.01	mg/L	BDL	ASTM D-1886
24	Boron	0.3	0.01	mg/L	BDL	ASTM D-3082
25	Zinc	5.0	0.01	mg/L	0.49	USEPA 3500 Zn B
26	Manganese	≤ 0.5	0.01	mg/L	0.21	Hach 8034
27	Barium	0.7	0.01	mg/L	0.20	Hach 8014
MIRCROBIOLOGICAL ANALYSIS REPORTS						
28	Total Coliform	0cfu/100ml	-	cfu	50>	APHA-SM9221B
29	Fecal Coliform	0cfu/100ml	-	cfu	25>	APHA-SM9221F
30	Escherichia Coli(E-Coli)	0cfu/100ml	-	cfu	22>	APHA-SM9221F

SSDWQ = Sindh Standard for Drinking Water Quality

USEPA = United State Environmental Protection Agency method

Hach USA, method

BDL= Below Detection Limit

ND= Not Detected

LDL=Least Detectable Value

- This report is not valid for any negotiations
- Report is valid for current batch(sample)
- The remaining portion of the sample will be discarded after 07 days unless otherwise instructed

Sample Analyzed by: Hareem Zehra

Signature of Laboratory In charge:
Name : Ali Raza




Project Name:	Combined Effluent Treatment Plant (ETP) Sindh Industrial & Trading State (SITE) Sukkur	Test Report No	QTS/CETP/22/5305-A
		Sampling Duration	24'hrs.
		Sampling Date:	28/10/2022
Sampling Description	Ambient Air, Sampling	Site ID : 01	27°44'15.7"N,
		Project Area	68° 50' 35.7"E

Ambient Air Quality Test Report

S. No	Time	SO ₂ (µg/m ³)	NO (µg/m ³)	NO ₂ (µg/m ³)	*PM _{2.5} (µg/m ³)	*PM ₁₀ (µg/m ³)	*SPM (µg/m ³)	Lead (µg/m ³)	Wind Speed (m/s)	Wind Direction (Deg)	Air Temperature (°C)	Humidity (%)
1	10:00	24.5	28.8	41.1	63.8	138.8	411.7	ND	0.1	36	29	65
2	11:00	24.7	28.9	41.9					0.2	35	30	62
3	12:00	24.9	30.0	42.6					0.0	38	31	60
4	01:00	25.5	30.3	43.0					0.3	39	32	57
5	02:00	26.0	30.6	44.6					0.4	40	33	55
6	03:00	26.6	31.1	45.5					0.2	37	34	50
7	04:00	26.8	31.6	46.7					0.0	0.0	33	49
8	05:00	27.4	32.7	48.0					0.1	33	33	48
9	06:00	28.9	32.9	49.2					0.2	36	32	46
10	07:00	29.0	33.0	51.1					0.3	38	31	44
11	08:00	30.1	33.6	53.3					0.5	39	30	46
12	09:00	30.3	33.8	54.0					0.4	40	30	47
13	10:00	30.7	33.9	55.6					0.3	38	29	49
14	11:00	31.2	34.4	56.6					0.5	36	28	50
15	00:00	31.8	35.5	57.0					0.6	34	27	51
16	01:00	32.6	36.0	57.3					0.8	35	26	53
17	02:00	33.0	36.3	57.8					0.7	33	25	54
18	03:00	32.9	35.2	58.0					0.6	32	24	56
19	04:00	30.1	34.8	58.4					0.7	30	25	58
20	05:00	29.9	33.7	59.0					0.9	34	26	60
21	06:00	28.6	32.9	56.8					0.8	36	27	59
22	07:00	27.4	31.1	55.2					0.7	37	28	58
23	08:00	26.2	30.0	53.3					0.6	38	29	56
24	09:00	25.1	29.9	52.7					0.5	39	30	54
Minimum		24.5	28.8	41.1	63.8	138.8	411.7	ND	0.0	0.0	24	44
Maximum		33.0	36.3	59.0	63.8	138.8	411.7	ND	0.9	40	34	65
Average		28.5	32.5	51.4	63.8	138.8	411.7	ND	0.4	33.5	29.2	53.6
SEQS*		120	40	80	75	150	500	1.5	-	-	-	-

SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/739/2014

*= The Average Calculation of 24'hr. , ND = Not Detected

Term & Condition:

- This report is not valid for any negotiations
- Report is valid for current batch(sample)
- This report is intended only for your guidance & not for legal purpose or for advertisement.

Remarks: The average concentration calculated for the 24 hours are well within guideline values set by SEQs.

Sample Analyzed By: <u>Ather Adil</u>	Signature of Laboratory Incharge:  Name : <u>Ali Raza</u>
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Ambient Air Quality Test Report

Project Name:	Combined Effluent Treatment Plant (ETP) Sindh Industrial & Trading State (SITE) Sukkur	Test Report No	QTS/CETP/22/5305-A
		Sampling Duration	24'hrs.
		Sampling Date:	28/10/2022
Sampling Description	Ambient Air, Sampling	Site ID : 01 Project Area	27°44'15.7"N, 68° 50' 35.7"E

Parameter	Unit	Monitoring Duration	Average Obtained Concentration	SEQS	LDL-Limits	Methodology/Instrument
Carbon Monoxide (CO)	mg/m ³	08 Hours	1.78	5.0	0.0	Non-Dispersive Intra Red (NDIR)
Nitrogen oxide (NO)	µg/m ³	24 Hours	32.5	40.0	0.0	Chemiluminescence
Nitrogen Dioxide (NO ₂)	µg/m ³	24 Hours	51.4	80.0	0.0	
Sulphur Dioxide (SO ₂)	µg/m ³	24 Hours	28.5	120.0	0.0	Ultraviolet Fluorescence Method
Ozone (O ₃)	µg/m ³	01 Hour	19.6	130.0	0.0	Non-Dispersive UV Absorption Method
Particulate Matter (PM ₁₀)	µg/m ³	24 Hours	138.8	150.0	10.0	β Ray Absorption Method
Particulate Matter (PM _{2.5})	µg/m ³	24 Hours	63.8	75.0	2.5	
Suspended Particulate Matter (SPM)	µg/m ³	24 Hours	411.7	500.0	1.0	
Lead (Pb)	µg/m ³	24 Hours	ND	1.5	-	ASS Method
Wind Speed (m/s)	(m/s)	24 Hours	0.4	-	1.0	(Haz-Scanner) EPAS
Wind Direction (Deg)	Degree	24 Hours	33.5	-	1.0	(Haz-Scanner) EPAS
Air Temperature (°C)	(°C)	24 Hours	29.2	-	-	Thermometer
Humidity (%)	(%)	24 Hours	53.6	-	1.0	(Haz-Scanner) EPAS

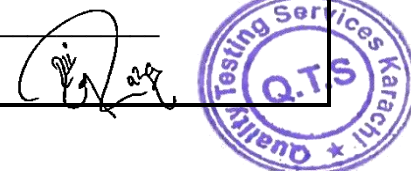
*SEQS= Sindh Environmental Quality Standards.
(24 Hours Standard for all the parameters Except O₃ and CO),
µg/m³= Micrograms per Cubic Meter
mg/m³= Milligrams per Cubic Meter
ND= Not Detected
LDL=Least Detection Limit

Remarks:

The average concentration calculated for the 24 hours are well within guideline values set by SEQs.

Sample Analyzed By: Ather Adil

Signature of Laboratory Incharge: _____
Name : Ali Raza



Project Name:	Combined Effluent Treatment Plant (ETP) Sindh Industrial & Trading State (SITE) Sukkur	Test Report No	QTS/CETP/22/5305-B
		Sampling Duration	24'hrs.
		Sampling Date:	29/10/2022
Sampling Description	Ambient Air, Sampling	Site ID: 02 SITE Industrial Area	27°43'18.0"N, 68° 50' 25.9"E

Ambient Air Quality Test Report

S. No	Time	SO ₂ (µg/m ³)	NO (µg/m ³)	NO ₂ (µg/m ³)	*PM _{2.5} (µg/m ³)	*PM ₁₀ (µg/m ³)	*SPM (µg/m ³)	Lead (µg/m ³)	Wind Speed (m/s)	Wind Direction (Deg)	Air Temperature (°C)	Humidity (%)
1	10:00	29.3	31.2	49.3	71.2	143.6	437.2	ND	0.8	45	29	68
2	11:00	29.9	31.4	50.8					0.9	47	30	67
3	12:00	30.8	32.7	51.9					1.0	49	31	66
4	01:00	30.9	32.9	52.0					1.1	52	32	65
5	02:00	31.4	33.3	53.4					1.3	55	33	67
6	03:00	31.7	33.8	53.9					1.2	57	34	66
7	04:00	32.3	34.0	54.0					1.4	58	35	64
8	05:00	31.2	34.6	54.2					1.2	56	36	63
9	06:00	31.8	34.8	54.5					1.0	53	37	62
10	07:00	32.0	35.0	54.7					0.7	51	36	60
11	08:00	32.6	35.8	54.9					0.9	49	35	61
12	09:00	33.0	36.5	55.0					0.6	48	34	63
13	10:00	33.5	36.6	55.3					0.8	46	33	65
14	11:00	36.0	35.8	55.6					0.9	44	32	66
15	00:00	36.6	35.9	55.8					1.1	40	31	67
16	01:00	37.2	34.7	56.1					1.3	38	29	68
17	02:00	37.0	34.6	56.4					1.4	36	27	69
18	03:00	36.6	34.7	56.7					1.7	33	26	70
19	04:00	35.2	34.8	56.8					1.8	29	24	71
20	05:00	34.4	35.0	57.0					1.6	26	23	68
21	06:00	33.3	34.4	55.6					1.4	25	25	67
22	07:00	32.8	33.8	56.0					1.2	20	26	66
23	08:00	31.9	33.2	55.6					1.0	28	27	65
24	09:00	31.3	33.0	56.8					0.6	27	28	64
Minimum		29.3	31.2	49.3	71.2	143.6	437.2	ND	0.6	20	23	60
Maximum		37.2	36.6	57					1.8	58	37	71
Average		33.0	34.2	54.5					1.1	41.9	30.5	65.7
SEQS*		120	40	80	75	150	500	1.5	-	-	-	-

SEQS= Sindh Environmental Quality Standards (The Gazette of Pakistan) Registered No. EPA/TECH/739/2014

*= The Average Calculation of 24'hr. , ND = Not Detected

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- Report is valid for current batch(sample)
- This report is intended only for your guidance & not for legal purpose or for advertisement.

Remarks: The average concentration calculated for the 24 hours are well within guideline values set by SEQs.

Sample Analyzed By: <u>Ather Adil</u>	Signature of Laboratory Incharge: _____ Name : <u>Ali Raza</u>
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Ambient Air Quality Test Report

Project Name:	Combined Effluent Treatment Plant (ETP) Sindh Industrial & Trading State (SITE) Sukkur	Test Report No	QTS/CETP/22/5305-B
		Sampling Duration	24'hrs.
		Sampling Date:	29/10/2022
Sampling Description	Ambient Air, Sampling	Site ID: 02 SITE Industrial Area	27°43'18.0"N, 68° 50' 25.9"E

Parameter	Unit	Monitoring Duration	Average Obtained Concentration	SEQS	LDL-Limits	Methodology/Instrument
Carbon Monoxide (CO)	mg/m ³	08 Hours	1.93	5.0	0.0	Non-Dispersive Intra Red (NDIR)
Nitrogen oxide (NO)	µg/m ³	24 Hours	34.2	40.0	0.0	Chemiluminescence
Nitrogen Dioxide (NO ₂)	µg/m ³	24 Hours	54.5	80.0	0.0	
Sulphur Dioxide (SO ₂)	µg/m ³	24 Hours	33.5	120.0	0.0	Ultraviolet Fluorescence Method
Ozone (O ₃)	µg/m ³	01 Hour	22.4	130.0	0.0	Non-Dispersive UV Absorption Method
Particulate Matter (PM ₁₀)	µg/m ³	24 Hours	143.6	150.0	10.0	β Ray Absorption Method
Particulate Matter (PM _{2.5})	µg/m ³	24 Hours	71.2	75.0	2.5	
Suspended Particulate Matter (SPM)	µg/m ³	24 Hours	437.2	500.0	1.0	
Lead (Pb)	µg/m ³	24 Hours	ND	1.5	-	ASS Method
Wind Speed (m/s)	(m/s)	24 Hours	1.1	-	1.0	(Haz-Scanner) EPAS
Wind Direction (Deg)	Degree	24 Hours	41.9	-	1.0	(Haz-Scanner) EPAS
Air Temperature (°C)	(°C)	24 Hours	30.5	-	-	Thermometer
Humidity (%)	(%)	24 Hours	65.7	-	1.0	(Haz-Scanner) EPAS

*SEQS= Sindh Environmental Quality Standards.
(24 Hours Standard for all the parameters Except O₃ and CO),
µg/m³= Micrograms per Cubic Meter
mg/m³= Milligrams per Cubic Meter
ND= Not Detected
LDL=Least Detection Limit

Remarks:

The average concentration calculated for the 24 hours are well within guideline values set by SEQs.

Sample Analyzed By: <u>Ather Adil</u>	Signature of Laboratory Incharge: _____ Name : <u>Ali Raza</u>
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Report Ref. No. : QTS/ CETP/22/5306

Reporting Date: 17/11/2022

Project: **Combined Effluent Treatment Plant (ETP), Sindh Industrial & Trading State (SITE) Sukkur**

SAMPLE DESCRIPTION

Sample ID: Noise Level Test
Sample Description: Ambient Noise
No. of samples: 05
Sample Collected/Submitted by: QTS representative
Sampling Date 28/10/2022

NOISE TEST REPORT

S.NO.	LOCATION/SOURCE	SEQS Limits : 75 dB(A) *Leq			
		Noise Level Readings			
		Coordinates	Minimum	Maximum	Average
1	Proposed ETP Project Site Area	27°44'15.7"N, 68°50' 35.7"E	61.2	62.4	61.2
2	Near Community Area (Nehal Khan Khoso)	27°44'23.2"N 68°50'54.2"E	63.6	64.8	64.2
3	Near Main Road side Right Corner	27°44'32.1"N 68°50'59.1"E	65.2	65.7	65.4
4	Near Main Road side Left Corner	27°44'35.6"N 68°50'43.0"E	64.1	64.6	64.35
5	SITE Sukkur Industrial Area Near SiESSI Hospital	27°43'21.4"N 68°50'31.6"E	62.7	62.9	62.8

SEQS= Sindh Environmental Quality Standard

*dB (A) Leq:= Time weighted average of the level of sound in decibel on scale which is relatable to human hearing.

Terms & Conditions:

- This report is not valid for any negotiations
- Report is valid for current batch(sample)
- This report is intended only for your guidance & not for legal purpose or for advertisement.

Comments:

The Noise level from the source is within acceptable level as describe in SEQs.

Sample Analyzed by: Ather Adil

Signature of Laboratory In charge:
Name : Ali Raza




**Annex – IV- Composite testing results of Industrial
Effluent (Design Basis)**

Lab Report Ref. No. : QTS/CEPT/22/5153-A

Reporting Date: 07/11/2022

Report to: PROJECT COMBINED EFFLUENT TREATMENT PLANT S.I.T.E LTD SUKKUR.

SAMPLE DESCRIPTION

Sample ID: Waste water Main Sewerage Pit (Composite Sample A)
Sampling Method: APHA-1060 B & C
Sample Type: Composite Sample 24Hrs
Sample Collected/Submitted by: QTS Representative
Sampling Date : 18/10/2022
Sample Receipt at QTS - Date : 20/10/2022

ANALYTICAL TEST REPORT

S.NO.	PARAMETERS TO BE ANALYZED	STANDARD SEQS	LDL	UNITS	RESULTS	TEST METHOD
1	pH value	6-9	0.01	-	7.80	USEPA 150.1
2	Temperature	40°C	01	°C	32.5	Thermometer
3	Biochemical Oxygen Demand(BOD) ₅ at 20°C	80	0.1	mg/L	264*	Hach 8043
4	Chemical Oxygen Demand(COD)	150	1.0	mg/L	436*	Hach 8000
5	Total Suspended Solids(TSS)	200	1.0	mg/L	19	Hach 8006
6	Total Dissolved Solids(TDS)	3500	1.0	mg/L	1727	Hach 8160
7	Cyanide(as CN ⁻)total	1	0.001	mg/L	0.022	Hach 8027
8	Ammonia(NH ₃)	40	0.1	mg/L	1.3	Hach 10031
9	Cadmium	0.1	0.001	mg/L	BDL	ASTM D-3557
10	Chromium(trivalent & hexavalent)	1	0.01	mg/L	1.04*	ASTM D-1687
11	Copper	1	0.01	mg/L	0.86	Hach 8506
12	Lead	0.5	0.001	mg/L	0.186	ASTM D-3559
13	Nickel	1	0.001	mg/L	0.071	ASTM D-1886
14	Zinc	5	0.01	mg/L	1	USEPA 3500 Zn B
15	Oil & Grease	10	0.001	mg/L	1.31	APHA 5520-D
16	Fluoride(as F ⁻)	10	0.01	mg/L	BDL	USEPA 340.1
17	Phenolic compounds(as phenol)	0.1	0.001	mg/L	0.006	USEPA 420.1
18	Chloride(as Cl ⁻)	1000	0.01	mg/L	621	Hach 8206
19	Mercury	0.01	0.001	mg/L	BDL	ASTM D-3223
20	Iron	8	0.01	mg/L	1.05	Hach 8008
21	An-ionic detergents(as MBAS)	20	0.001	mg/L	0.17	Method 5540 C
22	Manganese	1.5	0.1	mg/L	BDL	Hach 8034
23	Boron	6	0.01	mg/L	0.455	ASTM D-3082
24	Barium	1.5	0.1	mg/L	BDL	Hach 8014
25	Sulphate(SO ₄ ⁻²)	600	1.0	mg/L	101	USEPA 375.4
26	Selenium	0.5	0.01	mg/L	BDL	ASTM D-3859
27	Total toxic metals (Cd,Cr,Cu,As,Ba)	2	-	mg/L	0.38	-
28	Pesticide	0.15	0.01	mg/L	0.0019	EPA-8080
29	Sulphide(S ²⁻)	1	0.001	mg/L	2	Hach 8131
30	Silver	1	0.001	mg/L	0.029	ASTM D-3866
31	Arsenic	1	0.01	mg/L	BDL	Hach method
32	Chlorine	1	0.1	mg/L	BDL	Hach 80021
33	Soluble Biochemical Oxygen Demand (sBOD ₅)	N/A	1.0	mg/L	223	APHA 5210D
34	Soluble Chemical Oxygen Demand (sCOD ₅)	N/A	0.1	mg/L	395.0	ASTM D1252
35	Total Organic Carbon (TOC)	N/A	1.0	mg/L	312.8	ASTM D5902
36	Total Solids (TS)	N/A	1.0	mg/L	1746	By Method of Calculation
37	Volatile Suspended Solid (VSS)	N/A	1.0	mg/L	2428	APHA2540E
38	Tin (Sn)	N/A	0.001	mg/L	0.001	APHA 3111A
39	Sodium (Na)	N/A	0.1	mg/L	381.6	APHA 3111
40	Silicates (Silica Dioxide (SiO ₂))	N/A	0.01	mg/L	20.3	ASTM D859
41	Sulfite (SO ₃ ⁻²)	N/A	0.001	mg/L	0.051	APHA 4500SO3
42	Phosphorus (PO ₄)	N/A	0.01	mg/L	31.13	APHA 4500P
43	Nitrogen Organic (Norg)	N/A	0.01	mg/L	16.08	APHA 4500Norg
44	Colour	N/A	0.1	TCU	178	APHA 2120E
45	Total Coliform (MPN)	N/A	-	CFU	54x 10 ³	APHA 9221E
46	Faecal Coliform (MPN)	N/A	-	CFU	54x 10 ³	APHA 9221E
47	Foam	N/A	0.1	ml	2.0	IP562
48	Threshold Odor Number (TON)	N/A	1	TON	12	APHA 2150B
49	Chlorinated benzenoids (CB)	N/A	0.0001	mg/L	0.0062	EPA 612
50	Polynuclear aromatics (PAHs)	N/A	0.001	mg/L	0.019	EPA 610
51	Heavy metals (Pb,Hg,Se,Ni,Ag,As)	N/A	0.01	mg/L	0.048	-
52	Calcium Ca	N/A	0.01	mg/L	307.5	Complexometric EDTA
53	Nitrate	N/A	0.01	mg/L	7.6	Hach 8039

SEQS=Sindh Environmental Quality Standards

USEPA=United State Environmental Protection Agency method

Hach USA, method

BDL=Below Detection Limit

N/A = Not Available

APHA-SM = American Public Health Association- Standard Methods for Water & Waste water Examination

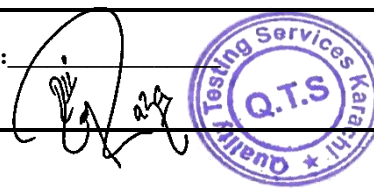
Term and Condition:

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- This report is intended only for your guidance & not for legal purpose or for advertisement.

Comments:

**Tested parameters are not within the permissible limits SEQS established for Industrial Effluent Water.*

Sample Analyzed by: Hareem Zehra	Signature of Laboratory In charge: Name : Ali Raza
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Lab Report Ref. No. : QTS/CEPT/22/5153-B

Reporting Date: 07/11/2022

Report to: PROJECT COMBINED EFFLUENT TREATMENT PLANT S.I.T.E LTD SUKKUR.

SAMPLE DESCRIPTION

Sample ID: Waste water Main Sewerage Pit (Composite Sample B)
Sampling Method: APHA-1060 B & C
Sample Type: Composite Sample 24Hrs
Sample Collected/Submitted by: QTS Representative
Sampling Date : 20/10/2022
Sample Receipt at QTS - Date : 23/10/2022

ANALYTICAL TEST REPORT

S.NO.	PARAMETERS TO BE ANALYZED	STANDARD SEQS	LDL	UNITS	RESULTS	TEST METHOD
1	pH value	6-9	0.01	-	7.92	USEPA 150.1
2	Temperature	40°C	01	°C	32.4	Thermometer
3	Biochemical Oxygen Demand(BOD) ₅ at 20°C	80	0.1	mg/L	197*	Hach 8043
4	Chemical Oxygen Demand(COD)	150	1.0	mg/L	350*	Hach 8000
5	Total Suspended Solids(TSS)	200	1.0	mg/L	12	Hach 8006
6	Total Dissolved Solids(TDS)	3500	1.0	mg/L	2026	Hach 8160
7	Cyanide(as CN ⁻)total	1	0.001	mg/L	0.024	Hach 8027
8	Ammonia(NH ₃)	40	0.1	mg/L	1.38	Hach 10031
9	Cadmium	0.1	0.001	mg/L	BDL	ASTM D-3557
10	Chromium(trivalent & hexavalent)	1	0.01	mg/L	0.89	ASTM D-1687
11	Copper	1	0.01	mg/L	1.91*	Hach 8506
12	Lead	0.5	0.001	mg/L	0.291	ASTM D-3559
13	Nickel	1	0.001	mg/L	0.052	ASTM D-1886
14	Zinc	5	0.01	mg/L	2.3	USEPA 3500 Zn B
15	Oil & Grease	10	0.001	mg/L	1.16	APHA 5520-D
16	Fluoride(as F ⁻)	10	0.01	mg/L	BDL	USEPA 340.1
17	Phenolic compounds(as phenol)	0.1	0.001	mg/L	0.0029	USEPA 420.1
18	Chloride(as Cl ⁻)	1000	0.01	mg/L	834	Hach 8206
19	Mercury	0.01	0.001	mg/L	BDL	ASTM D-3223
20	Iron	8	0.01	mg/L	0.11	Hach 8008
21	An-ionic detergents(as MBAS)	20	0.001	mg/L	0.157	Method 5540 C
22	Manganese	1.5	0.1	mg/L	BDL	Hach 8034
23	Boron	6	0.01	mg/L	0.258	ASTM D-3082
24	Barium	1.5	0.1	mg/L	2.0*	Hach 8014
25	Sulphate(SO ₄ ⁻²)	600	1.0	mg/L	100	USEPA 375.4
26	Selenium	0.5	0.01	mg/L	BDL	ASTM D-3859
27	Total toxic metals (Cd,Cr,Cu,As,Ba)	2	-	mg/L	0.96	-
28	Pesticide	0.15	0.01	mg/L	BDL	EPA-8080
29	Sulphide(S ²⁻)	1	0.001	mg/L	1.9	Hach 8131
30	Silver	1	0.001	mg/L	0.018	ASTM D-3866
31	Arsenic	1	0.01	mg/L	BDL	Hach method
32	Chlorine	1	0.1	mg/L	BDL	Hach 80021
33	Soluble Biochemical Oxygen Demand (sBOD ₅)	N/A	1.0	mg/L	169	APHA 5210D
34	Soluble Chemical Oxygen Demand (sCOD ₅)	N/A	0.1	mg/L	291	ASTM D1252
35	Total Organic Carbon (TOC)	N/A	1.0	mg/L	237.5	ASTM D5902
36	Total Solids (TS)	N/A	1.0	mg/L	2038	By Method of Calculation
37	Volatile Suspended Solid (VSS)	N/A	1.0	mg/L	2872	APHA2540E
38	Tin (Sn)	N/A	0.001	mg/L	0.001	APHA 3111A
39	Sodium (Na)	N/A	0.1	mg/L	439.2	APHA 3111
40	Silicates (Silica Dioxide (SiO ₂))	N/A	0.01	mg/L	35.19	ASTM D859
41	Sulfite (SO ₃ ⁻²)	N/A	0.001	mg/L	0.019	APHA 4500SO3
42	Phosphorus (PO ₄)	N/A	0.01	mg/L	43.53	APHA 4500P
43	Nitrogen Organic (Norg)	N/A	0.01	mg/L	11.24	APHA 4500Norg
44	Colour	N/A	0.1	TCU	113.5	APHA 2120E
45	Total Coliform (MPN)	N/A	-	CFU	54x 10 ³	APHA 9221E
46	Faecal Coliform (MPN)	N/A	-	CFU	54x 10 ³	APHA 9221E
47	Foam	N/A	0.1	ml	2	IP562
48	Threshold Odor Number (TON)	N/A	1	TON	8	APHA 2150B
49	Chlorinated benzenoids (CB)	N/A	0.0001	mg/L	BDL	EPA 612
50	Polynuclear aromatics (PAHs)	N/A	0.001	mg/L	0.0082	EPA 610
51	Heavy metals (Pb,Hg,Se,Ni,Ag,As)	N/A	0.01	mg/L	0.056	-
52	Calcium Ca	N/A	0.01	mg/L	489.4	Complexometric EDTA
53	Nitrate	N/A	0.01	mg/L	1.01	Hach 8039

SEQS=Sindh Environmental Quality Standards

USEPA=United State Environmental Protection Agency method

Hach USA, method

BDL=Below Detection Limit

N/A = Not Available

APHA-SM = American Public Health Association- Standard Methods for Water & Waste water Examination

Term and Condition:

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Comments:

**Tested parameters are not within the permissible limits SEQS established for Industrial Effluent Water.*

Sample Analyzed by: Hareem Zehra	Signature of Laboratory In charge: Name : Ali Raza
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Lab Report Ref. No. : QTS/CEPT/22/5153-C

Reporting Date: 07/11/2022

Report to: PROJECT COMBINED EFFLUENT TREATMENT PLANT S.I.T.E LTD SUKKUR.

SAMPLE DESCRIPTION

Sample ID: Waste water Main Sewerage Pit (Composite Sample C)
Sampling Method: APHA-1060 B & C
Sample Type: Composite Sample 24 Hrs
Sample Collected/Submitted by: QTS Representative
Sampling Date : 22/10/2022
Sample Receipt at QTS - Date : 23/10/2022

ANALYTICAL TEST REPORT

S.NO.	PARAMETERS TO BE ANALYZED	STANDARD SEQS	LDL	UNITS	RESULTS	TEST METHOD
1	pH value	6-9	0.01	-	7.91	USEPA 150.1
2	Temperature	40°C	01	°C	32.8	Thermometer
3	Biochemical Oxygen Demand(BOD) ₅ at 20°C	80	0.1	mg/L	178*	Hach 8043
4	Chemical Oxygen Demand(COD)	150	1.0	mg/L	353*	Hach 8000
5	Total Suspended Solids(TSS)	200	1.0	mg/L	11	Hach 8006
6	Total Dissolved Solids(TDS)	3500	1.0	mg/L	1791	Hach 8160
7	Cyanide(as CN ⁻)-total	1	0.001	mg/L	0.010	Hach 8027
8	Ammonia(NH ₃)	40	0.1	mg/L	1.4	Hach 10031
9	Cadmium	0.1	0.001	mg/L	BDL	ASTM D-3557
10	Chromium(trivalent & hexavalent)	1	0.01	mg/L	1.2*	ASTM D-1687
11	Copper	1	0.01	mg/L	0.22	Hach 8506
12	Lead	0.5	0.001	mg/L	0.089	ASTM D-3559
13	Nickel	1	0.001	mg/L	0.075	ASTM D-1886
14	Zinc	5	0.01	mg/L	1.81	USEPA 3500 Zn B
15	Oil & Grease	10	0.001	mg/L	1.07	APHA 5520-D
16	Fluoride(as F ⁻)	10	0.01	mg/L	BDL	USEPA 340.1
17	Phenolic compounds(as phenol)	0.1	0.001	mg/L	0.0016	USEPA 420.1
18	Chloride(as Cl ⁻)	1000	0.01	mg/L	479.2	Hach 8206
19	Mercury	0.01	0.001	mg/L	BDL	ASTM D-3223
20	Iron	8	0.01	mg/L	0.10	Hach 8008
21	An-ionic detergents(as MBAS)	20	0.001	mg/L	0.048	Method 5540 C
22	Manganese	1.5	0.1	mg/L	0.3	Hach 8034
23	Boron	6	0.01	mg/L	0.183	ASTM D-3082
24	Barium	1.5	0.1	mg/L	4.0*	Hach 8014
25	Sulphate(SO ₄ ⁻²)	600	1.0	mg/L	86	USEPA 375.4
26	Selenium	0.5	0.01	mg/L	BDL	ASTM D-3859
27	Total toxic metals (Cd,Cr,Cu,As,Ba)	2	-	mg/L	1.084	-
28	Pesticide	0.15	0.01	mg/L	BDL	EPA-8080
29	Sulphide(S ²⁻)	1	0.001	mg/L	9	Hach 8131
30	Silver	1	0.001	mg/L	0.096	ASTM D-3866
31	Arsenic	1	0.01	mg/L	BDL	Hach method
32	Chlorine	1	0.1	mg/L	BDL	Hach 80021
33	Soluble Biochemical Oxygen Demand (sBOD ₅)	N/A	1.0	mg/L	177	APHA 5210D
34	Soluble Chemical Oxygen Demand (sCOD ₅)	N/A	0.1	mg/L	261	ASTM D1252
35	Total Organic Carbon (TOC)	N/A	1.0	mg/L	211.3	ASTM D5902
36	Total Solids (TS)	N/A	1.0	mg/L	1802	By Method of Calculation
37	Volatile Suspended Solid (VSS)	N/A	1.0	mg/L	2291	APHA2540E
38	Tin (Sn)	N/A	0.001	mg/L	0.001	APHA 3111A
39	Sodium (Na)	N/A	0.1	mg/L	401.7	APHA 3111
40	Silicates (Silica Dioxide (SiO ₂))	N/A	0.01	mg/L	31.24	ASTM D859
41	Sulfite (SO ₃ ⁻²)	N/A	0.001	mg/L	0.017	APHA 4500SO3
42	Phosphorus (PO ₄)	N/A	0.01	mg/L	25.01	APHA 4500P
43	Nitrogen Organic (Norg)	N/A	0.01	mg/L	9.97	APHA 4500Norg
44	Colour	N/A	0.1	TCU	159.8	APHA 2120E
45	Total Coliform (MPN)	N/A	-	CFU	54x 10 ³	APHA 9221E
46	Faecal Coliform (MPN)	N/A	-	CFU	54x 10 ³	APHA 9221E
47	Foam	N/A	0.1	ml	2.0	IP562
48	Threshold Odor Number (TON)	N/A	1	TON	6	APHA 2150B
49	Chlorinated benzenoids (CB)	N/A	0.0001	mg/L	BDL	EPA 612
50	Polynuclear aromatics (PAHs)	N/A	0.001	mg/L	0.0031	EPA 610
51	Heavy metals (Pb,Hg,Se,Ni,Ag,As)	N/A	0.01	mg/L	0.043	-
52	Calcium Ca	N/A	0.01	mg/L	311	Complexometric EDTA
53	Nitrate	N/A	0.01	mg/L	1.2	Hach 8039

SEQS=Sindh Environmental Quality Standards
USEPA=United State Environmental Protection Agency method
Hach USA, method
BDL=Below Detection Limit
N/A = Not Available
APHA-SM = American Public Health Association- Standard Methods for Water & Waste water Examination

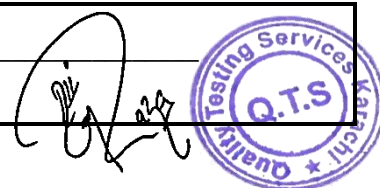
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Comments:

**Tested parameters are not within the permissible limits SEQS established for Industrial Effluent Water.*

Sample Analyzed by: Hareem Zehra	Signature of Laboratory In charge: Name : Ali Raza
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**Annex – V -Sindh Environmental Protection Act
2014**



The Sindh Government Gazette

Published by Authority

KARACHI THURSDAY MARCH 20, 2014

PART-IV

**PROVINCIAL 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 February, 2014 and assented to by the Governor 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.

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;

Preamble.

PART-I

It is hereby enacted as follows:-

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

**Short title and
commencement.**

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

Definitions.

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

- (i) "adverse environmental effect" means impairment of, or damage to, the environment and includes—
 - (a) impairment of, or damage to, human health and safety or 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 causes pollution 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, animal and 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;

- (xxix) "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;

(xl) "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;

- (xlili) "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;
- (xlii) "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;
- (i) "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;
- (ii) "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 **Chairperson** person as the Chief Minister may nominate in this behalf.
- (ii) Minister-in-charge of the **Vice Chairperson** Environment Protection Department.
- (iii) Additional Chief Secretary, **Ex-officio Member** Planning and Development Department, Government of Sindh.
- (iv) Secretaries of the **Ex-officio Members** 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.

- (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**

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.

**Functions and
Powers of the
Council.**

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

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.

**Establishment
of the Sindh
Environmental
Protection
Agency.**

(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.

6. (1) The Agency shall –

**Functions of the
Agency.**

- (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.

Powers 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.

**Management of
the Sindh
Sustainable
Development
Fund.**

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

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

(2) The members of the Board, other than ex-officio members, 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.

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. **Accounts.**

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

PART-V PROHIBITIONS AND ENFORCEMENT

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. **Prohibition of certain discharges or emissions and compliance with standards.**

(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.

**Prohibition of
import of
hazardous
waste.**

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.

**Handling of
hazardous
substances.**

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-

(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.

**Prohibition of
action adversely
affecting
Environment.**

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-

(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.

**Initial
environmental
examination and
environmental
impact
assessment.**

**PART-VI
ENVIRONMENTAL EXAMINATIONS AND ASSESSMENTS**

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.

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 —

Strategic
environmental
assessment.

- (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 alongwith 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.

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.

Environmental
monitoring.

(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 -

**Environmental
Audit and
Review.**

- (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.

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

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:

Penalties.

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.

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:

**Offences by
body corporate.**

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).

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.

**Offences by
Government
Agencies, local
authorities or
local councils.**

PART-IX

ENVIRONMENTAL PROTECTION TRIBUNALS AND COURTS

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.

**Environmental
Protection
Tribunals.**

(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 Environmental Protection Tribunal.

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

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

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

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

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

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

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

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

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

**Appeals to the
Environmental
Protection
Tribunal.**

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

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

**Appeals from
orders of the
Environmental
Protection
Tribunal.**

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

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

**Jurisdiction of
Judicial
Magistrate.**

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

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

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

(a) the Agency; and

(b) any aggrieved person.

**Appeals from
orders of the
Judicial
Magistrate.**

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

**PART-X
PUBLIC PARTICIPATION**

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

(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**

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

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. **Indemnity**

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

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

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 rules.**

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. **Power to make regulations.**

(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 **as per prescribed rules**;
- (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.

**BY ORDER OF THE SPEAKER
PROVINCIAL ASSEMBLY OF SINDH**

**G.M.UMAR FAROOQ
SECRETARY
PROVINCIAL ASSEMBLY OF SINDH**

**Karachi: Printed at the Sindh Government Press
20-3-2014**

Annex – VI - Sindh EPA Regulations 2021



**GOVERNMENT OF SINDH
SINDH ENVIRONMENTAL PROTECTION AGENCY**

Karachi dated the 03rd September, 2021

NOTIFICATION

NO.EPA/TECH/739/2021:- In exercise of the powers conferred by section 37 of the Sindh Environmental Protection Act, 2014, the Sindh Environmental Protection Agency, with the approval of Government, is pleased to make the following regulations, namely:-

1. Short title and commencement

- (1) These regulations may be called the Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021.
- (2) They shall come into force at once.

2. Definitions. -

- (1) In these regulations, unless there is anything repugnant in the subject or context
 - (a) “Act” means the Sindh Environmental Protection Act, 2014 (VIII of 2014);
 - (b) “Agency” means the Sindh Environmental Protection Agency as defined under section 2(ii);
 - (c) “Director General” means the Director General of the Agency;
 - (d) Environmental Checklist means rapid environmental assessment or environmental screening through a prescribed checklist in respect of projects having least/minimal impacts on the environment.
 - (e) “Firm” means the Environmental Consulting Firm registered by the Agency.
 - (f) “Environmentally sensitive area” means a location, large or small, that has significant environmental values that contribute to maintaining biological diversity and integrity, have intrinsic or attributed scientific, historical or cultural heritage value, or are important in providing amenity, harmony or sense of community, ecosystem as declared by Agency.
 - (g) “Protected area” means any area which safeguards the earths precious bio-diversity, protected areas of natural beauty and conservation of cultural significance as declared by relevant authority;
 - (h) “Schedule” means the Schedules provided in these regulations;

- (i) “Urban area” means an area within the limits of a town, municipality or city as determined by the Agency on the basis of population and environmental issues
 - (2) All other words and expressions used but not defined in these regulations shall have the same meaning as are assigned to them in the Act.
- 3. Projects requiring Environmental Checklist (EC)**

A proponent of a project falling in any category listed in Schedule-I shall file environmental checklist with the Agency and the provisions of section 17 shall apply to such projects.
- 4. Projects requiring an Initial Environmental Examination (IEE)**

A proponent of a project falling in any category listed in Schedule-II shall file an IEE with the Agency, and the provisions of section 17 shall apply to such projects.
- 5. Projects requiring an Environmental Impact Assessment (EIA)**

A proponent of a project falling in any category listed in Schedule-III shall file an EIA with the Agency, and the provisions of section 17 shall apply to such projects.
- 6. Projects not requiring an Environmental Assessment**
 - (1) A project not falling in any category listed in Schedules-I, II and III shall not be required to file an EC, IEE or EIA
 - (2) Notwithstanding anything contained in sub-regulation (1), the Agency may direct the proponent of a project, whether or not listed in Schedule I or II or III, to file an EC or IEE or EIA, for reasons to be recorded in such direction:

Provided that no such direction shall be issued without the recommendations in writing of the Advisory Committee constituted under regulations 21.
- 7. Preparation of environmental assessment report**
 - (1) The Agency may issue guidelines for preparation of an EC or IEE or EIA reports including guidelines of general applicability, and sectoral guidelines indicating specific assessment requirements for planning, construction and operation of projects relating to particular sector.
 - (2) The Agency may issue guidelines for preparation scope of an Environmental Management Plan(EMP) or Environmental Audit(EA).
 - (3) Where guidelines have been issued under sub-regulation (1) & (2), an EC, IEE or EIA or EMP or EA shall be prepared, to the extent practicable, in accordance therewith and the proponent shall justify any departure therefrom.
- 8. Review Fees**

The proponent shall pay, at the time of submission of an EC, IEE or EIA or EMP or BTS tower a non-refundable review fee to the Agency as prescribe in Schedule-IV.

9. Filing of report

- (1) Two hard copies and two electronic copies for an EC or IEE or EIA report shall be filed with the Agency by the proponent. The Agency may require the proponent to submit additional copies, as and when required during the review process.
- (2) Every EC, IEE and EIA shall be accompanied by -
 - (a) an application, in the form prescribed in Schedule-V;
 - (b) Copy of receipt showing payment of review fee as prescribed in Schedule-IV

10. Preliminary Scrutiny

- (1) Any report filed by the proponent or applicant shall be returned, if found incomplete in terms of Regulation 9.
- (2) Notwithstanding anything contained in sub-regulation (1) of regulation 12, the Agency may require the proponent to submit an additional information at any stage during the review process.

11. Public participation

- (1) In the case in an EIA, the Agency shall issue a public notice to be published in widely circulated English or Urdu or Sindhi national newspaper and in a local newspaper of general circulation in the area affected by the project, mentioning the type of project, its exact location, the name and address of the proponent and the date, time and place of public hearing for inviting comments from primary stakeholders.
- (2) The date fixed under sub-regulation (1) shall not be earlier than ten days from the date of publication of the notice.
- (3) The Agency shall also ensure the circulation of the EIA, where necessary, to the concerned Government Agencies and solicit their comments thereon.
- (4) All comments received by the Agency from the public or any Government Agency shall be duly considered before issuance of decision.
- (5) The Agency may issue guidelines indicating the basic techniques and measures to be adopted to ensure effective public consultation, involvement and participation in EIA assessment.

12. Review process

- (1) Notwithstanding anything contained in sub section (4) of Section 17, the Agency shall make every effort to conclude its review process of the EA, EMP or environmental checklist within fifteen days, of the IEE within thirty days, and of the EIA within sixty days after receiving of complete case.
- (2) In reviewing an EIA, the Agency shall consult such Committee of Experts be constituted for the purpose by the Director General, and may also solicit views of concerned Advisory Committee, if any, constituted by the Agency.

- (3) The Director General may, where considers it necessary, constitute a committee to inspect the site of the project and submit its report on such matters as may be specified.
- (4) In reviewing the IEE, the Director General may constitute a committee of the officers from within the Agency, on case to case basis, in view of the jurisdiction and location of the project for the purpose to extend final recommendation about the approval or rejection of the IEE.
- (5) The review of the IEE or EIA by the Agency shall be based on quantitative and qualitative assessment of the documents and data furnished by the proponent, comments from the public and Government Agencies received under regulation 12, and views of the committees mentioned in sub-regulations (2) and (3) above.
- (6) EMP, EA, EC shall be reviewed as per guidelines issued by SEPA

13. Decision

- (1) The documentary evidence in the form of videos (soft copies) of public hearing shall be submitted by the proponent within three days after conclusion of public hearing to the Agency.
- (2) On completion of the review process, the decision of the Agency shall be communicated to the proponent in the form prescribed in Schedule-VI or in case of an IEE or EMP or environmental checklist or environmental audit in the form prescribed in Schedule-VII in case of an EIA.

14. Conditions of approval

- (1) Every approval of an EC or IEE or EIA or EMP or EA shall, in addition to such conditions as may be imposed by the Agency, be subject to the condition that the project shall be designed, constructed or operated and mitigatory and other measures adopted, strictly in accordance with the EC or IEE or EIA or EMP or EA, unless any variations thereto have been specified in the approval by the Agency.
- (2) Where the Agency accords its approval subject to certain conditions, the proponent shall submit an undertaking to the Agency, before commencing operation of the project, in the form prescribed in Schedule-VIII that the conditions of approval, and the requirements in the IEE or EIA relating to design and construction, adoption of mitigation and other measures have been duly complied with.

15. Validity period of Approval

- (1) The approval accorded by the Agency under section 17 read with sub-regulation (2) of regulation 15 shall be valid, for commencement of construction, for a period of three years from the date of issue.
- (2) If construction is commenced during the initial three years validity period, the

validity of the approval shall stand extended for a further period of three year.

- (3) The proponent may apply to the Agency for extension in the validity periods mentioned in sub-regulations (1), (2), which may be granted by the Agency in its discretion for such period not exceeding three years at a time, if the conditions of the approval do not require significant change:

Provided that the Agency may require the proponent to submit a fresh IEE or EIA, if in its opinion changes in location, design, construction and operation of the project so warrant.

16. Entry and inspection

- (1) For the purpose of verification of any matter relating to the review or to the conditions of approval of an EC or IEE or EIA or EMP or EA list prior to, before or during and after commencement of construction or operation of a project, duly authorized staff of the Agency shall be entitled to enter and inspect the project site, factory building and plant and equipment installed therein.
- (2) The proponent shall ensure full cooperation of the project staff at site to facilitate the inspection, and shall provide such information as may be required by the Agency for this purpose and pursuant thereto.

17. Cancellation of approval

- (1) Notwithstanding anything contained in these regulations, if, at any time, on the basis of information or report received or inspection carried out, the Agency is of the opinion that the conditions of an approval have not been complied with, or that the information supplied by a proponent in the approved EC or IEE or EIA or EMP or EA list is incorrect, it shall issue notice to the proponent for show cause within two weeks of receipt thereof as to why the approval should not be cancelled.
- (2) In case no reply is received or if the reply is considered unsatisfactory, the Agency may, after giving the proponent an opportunity of being heard -
 - (i) require the proponent to take such measures and to comply with such conditions within such period as it may specify, failing which the approval shall stand cancelled; or
 - (ii) cancel the approval.
- (3) On cancellation of the approval, the proponent shall cease construction or operation of the project forthwith.
- (4) Any action taken under this regulation shall be without prejudice to any other action that may be taken against the proponent under the Act or rules or regulations or any other law for the time being in force.

18. Registers of EC or IEE and EIA projects

Separate Registers to be maintained by the Agency for EC or IEE and EIA projects shall be in the form prescribed in Schedule-IX.

19. Environmentally sensitive areas

- (1) The Agency may designate an area to be an environmentally sensitive area,
- (2) Notwithstanding anything contained in regulations 3 and 5, the proponent of a project situated in an environmentally sensitive area shall be required to file an EIA with the Agency.

20. Environmental assessment guidelines

- (1) The Agency may from time to time issue guidelines to assist proponents and other persons involved in the preparation of environmental assessment.
- (2) Where guidelines have been issued under sub-regulation (1), the projects shall be planned and prepared, to the extent practicable, in accordance therewith and any departure therefrom justified in the IEE/EIA pertaining to the project.

21. Environmental Assessment Advisory Committee. -

The agency may constitute one or more Committees for the purpose of rendering advice on implementation and enforcement of Section 17, which may include experts of relevant field, civil society, academia, environmental experts, representative of Administrative Department, legal expert and experts from natural resources.

22. Repeal and Savings.

- (1) The Sindh Environmental Protection Agency (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations 2014, shall, on commencement of these regulations, stand repealed.
- (2) All orders made, notification issued, actions taken under the repealed Regulations shall remain in force until amended, altered or repealed by the provisions of these regulations.

**DIRECTOR GENERAL
SINDH ENVIRONMENTAL PROTECTION
AGENCY**

SCHEDULE-I

(See Regulation 3)

List of projects requiring Environmental Screening (through check list)

- a. Subject to the compliance with concerned zoning laws:
 - i. Construction of residential and commercial buildings having total covered area from 60,000 sq.feet to 100,000 sq.feet
 - ii. Housing Schemes covering an area from 05 acres to 15 acres.
 - iii. Ware Houses for Non-Hazardous substances having total area from 1000 sq.yards to 5,000 sq.yards
 - iv. Warehouse for Fertilizers
 - v. Marriage Halls/Banquet/Restaurants/Baking facilities having total area more than 500 sq.yards
 - vi. Motor vehicle workshops/Service Stations having total area of more than 500 sq.yards.
- b. Construction/Reconstruction/Rehabilitation of roads in urban area from 500 meters to 01 kilometres and in rural area from 500 meters to 05 kilometres.
- c. Construction of Flyover, underpasses and bridges of length from 100 meters to 500 meters
- d. On-farm dams and fish farms
- e. Pulses mills
- f. Flour Mills
- g. Lining of existing minor canals and /or water courses.
- h. Canal cleaning
- i. Forest harvesting operations
- j. Rain harvesting projects
- k. Health care units of less than 50 beds
- l. BTS Tower
- m. Lime Kilns
- n. Ice factories and cold storage.
- o. Cotton oil mill
- p. Construction of LPG, CNG, LNG filling station and petrol pumps
- q. Carpet manufacturing units
- r. Rain harvesting projects
- s. Industrial Effluent Treatment Plant
- t. Sanitary Landfill site up to 500 tons/day

Schedule-II
(See Regulation 4)

List of projects requiring an Initial Environmental Examination

A. Agriculture, Livestock and Fisheries

1. Poultry, livestock and fish farms
2. Warehousing for pesticides and pharmaceuticals
3. Projects involving packaging, formulation, cold storage and warehouse of agricultural, livestock and fish products.
4. Construction & Operation of Slaughter houses

B. Energy

1. Hydroelectric power generation up to 25 MW
2. Thermal power generation up to 100 MW
3. Coal fired power plants with capacity up to 50 MW
4. Transmission lines up to 132 KV, and grid stations
5. Waste-to-energy generation projects including bio-mass up to 25 MW
6. Construction of Coal Handling and storage facilities
7. Handling, Transportation & Storage of Biofuel Facility
8. Handling and storage of edible grains and seeds
9. All Renewable energy Projects (excluding Protected/Sensitive area under any law)

C. Oil and Gas projects:

1. Oil and gas 2D/3D Seismic survey and drilling activities (on and off shore)
2. Oil and gas extraction projects including exploration and production located outside the environmentally sensitive/protected areas
3. Oil & Gas transmission gathering, storage, separation & transportation system
4. Construction of CNG, LPG Petroleum and LNG bulk storage facility
5. Oil blending and recycling units

D. Manufacturing and processing

1. Ceramics and glass units
2. Food processing units
3. Pharmaceutical units.
4. Rice mills, ghee/oil mills, Cotton ginning
5. Man-made fibers and resin projects

6. Tanning and leather finishing projects
7. Manufacturing of apparel, textile garments units, including weaving, spinning, dyeing, bleaching and printing
8. Woodwork units manufacturing products
9. Steel re-rolling mills
10. Waste recycling plants
11. Battery manufacturing plant
12. Brick Kilns
13. Marble processing units
14. Stone Crushing units

E. Mining and mineral processing

1. Commercial extraction of sand, gravel, limestone, clay, Sulphur and other minerals not included in Schedule I.
2. Crushing, grinding and separation processes
3. Metal Smelting plant production capacity up to 20 tons/day

F. Transport

1. Construction of flyovers, underpasses and bridges having length more than 500 meters to 1000 meters in urban areas and more than 5km in rural areas
2. Bus terminals/ railway station/ metro stops and construction & operation of transport related terminals
3. Rehabilitation or rebuilding or reconstruction of existing roads more than one kilometers in urban areas and more than 5 km from rural areas

G. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume of less than 25 million cubic meters of surface area less than 4 square kilometers
2. Irrigation systems and drainage system with the area of less than 15,000 hactars
3. Flood protection bunds

H. Water supply and filtration

Water supply schemes and filtration plants

I. Waste disposal and wastewater treatment

1. Solid and Non-hazardous waste with annual capacity up to 10,000 tonnes (excluding municipal landfill sites and commercial facilities) including Garbage Transfer station/composting plant

2. Wastewater treatment for sewerage treatment facility less than 100 mgd
3. Hospital waste disposal facilities including incineration units owned by Hospitals for own use excluding commercial facility.

J. Urban development

1. Housing schemes more than 15 acres to 50 acres
2. Residential, Commercial multistory High rise construction projects having covered area more than 100,000 sq.feet to 500,000 sq.feet.
3. Laboratories
4. Hospitals, health care unit of more than 50 beds
5. Construction of Educational and Academic institutions.

K. Other projects

Any other project for which filing of an IEE is required by the Agency under sub-regulation (2) of Regulation 6.

SCHEDULE III

(See Regulation 5)

List of projects requiring an EIA

A. Energy

1. Hydroelectric power generation more than 50 MW
2. Thermal power generation more than 100 MW
3. Coal power projects more than 50 MW
4. Transmission lines above 132 KVA and distribution projects.
5. Nuclear power plants
6. Wind, Solar or renewable energy projects if falls under any environmental sensitive and protected area.

B. Oil and Gas projects

1. Oil Petroleum refineries.
2. LPG and LNG Terminals Projects
3. Coal Handling Terminals Projects

C. Manufacturing and processing

1. Cement plants
2. Chemical manufacturing industries
3. Fertilizer plants
4. Steel Mills
5. Sugar Mills and Distilleries
6. Establishment of Industrial estates & Export processing zones
7. Petrochemicals complex
8. Synthetic resins, plastics and man-made fibers, paper and paperboard, paper pulping, plastic products, printing and publishing, paints and dyes.

D. Mining and mineral processing

1. Mining and processing of coal, gold, copper, sulphur and precious stones
2. Mining and processing of major non-ferrous metals, iron and steel rolling
3. Metal Smelting plant production capacity more than 20 tons/day

E. Transport

1. Airports
2. Construction of highway, motor ways, major roads (Intercity roads) more than one km and above

3. Ports and harbor development
4. Mass transit projects
5. Railway works
6. Construction of Flyover, underpass and bridges having total length more than one km.

F. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume of 25 million cubic meters and above having surface area of 4 square kilometers and above
2. Irrigation and drainage projects serving more than 15,000 hectares and above

G. Water supply and filtration

Public water supply schemes and **filtration** plants.

H. Waste Disposal and treatment

1. Facilities for handling, storage or disposal of hazardous or toxic wastes or radioactive waste (including landfill sites, incineration units, etc.)
2. Solid waste municipal landfill sites.
3. Combine Effluent Treatment Plant
4. Domestic wastewater treatment plant more than 100mgd

I. Urban development and tourism

1. Housing schemes above 50 acres
2. Residential, Commercial High rise buildings subject to compliance of building bylaws of relevant organizations more than 500,000 sq.feet
3. All Projects located in High Density Zones notified by Government and relevant land controlling organization, irrespective of their size.
4. Commercialization of major corridors/roads in urban centers
5. Large Scale public facilities
6. Large-scale tourism development projects

J. Environmentally Sensitive Areas

All projects situated in environmentally sensitive areas being identified by the Agency.

K. Other projects

1. Any other project for which filing of an EIA is required by the Agency under sub-regulation (2) of Regulation 5.
2. Any other project likely to cause an adverse environmental effect.

Schedule-IV
(See Regulation 8)

Project Cost (in million)	Review Fee
Up to 20	Rs.50,000
Above 20 up to 100	Rs. 100,000
Above 100 up to 200	Rs. 200,000
Above 200 up to 500	Rs. 400,000
Above 500	Rs. 600,000
Review fee for Environmental Checklist or EMP shall be Rs. 40,000/=	
Review fee for BTS Tower shall be 20,000/=	

*

Note:

The fee shall be payable into the “Sindh Sustainable Development Fund” account
Details are as under:

A/C Title: Sindh Sustainable Development Fund

Account Number: 03084572626100

Bank: Sindh Bank

Branch Code: 0308-Korangi Industrial Area

SCHEDULE V
[See Regulation 9(2)(a)]
Application Form

1.	Name and address of Proponent		Phone: Email:	
2.	CNIC No. of proponent			
3.	Brief description of project			
4.	Location of project			
5.	Cost of the Project			
6.	Objectives of project			
7.	IEE/EIA attached?	IEE/EIA: Yes/No		
8.	Have alternative sites/options been considered/ reported in IEE/EIA?	Yes/No		
9.	Title document of the project			
10.	Existing land use		Land requirement	
11.	Is basic site data available, or has it been measured?	(only tick yes if the data is reported in the IEE/EIA)	Available	Measured
			Yes/No	Yes/No
		Meterology (including rainfall)	Yes/No	Yes/No
		Ambient air quality	Yes/No	Yes/No
12.	Have estimates of the following been reported, especially Quantitative Analysis?	Water balance	Estimated	Reported
		Solid waste disposal	Yes/No	Yes/No
		Liquid waste	Yes/No	Yes/No
13.	Source of power		Power requirement	
14.	Labour force (number)	Construction: Operation:		
15.	Environmental Consulting Firm			

Verification. I do solemnly affirm and declare that the information given above and contained in the attached EC/IEE/EIA is true and correct to the best of my knowledge and belief.

Date

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

SCHEDULE VI
[See Regulation 13(2)]

Decision on IEE/Environmental Check List

1. Name and address of proponent _____
 2. Description of project _____
 3. Location of project _____
 4. Date of filing of IEE _____
 5. After careful review of the IEE, the Agency has decided –
 - (a) to accord its approval, subject to the following conditions:

 - or (b) that the proponent should submit an EIA of the project, for the following reasons –

- Dated _____

Tracking no. ____

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

SCHEDULE VII

[See Regulation 13(2)]

Decision on EIA

1. Name and address of proponent _____
 2. Description of project _____

 3. Location of project _____
 4. Date of filing of EIA _____
 5. After careful review of the EIA, and all comments thereon, the Federation Agency has decided –
 - (a) to accord its approval, subject to the following conditions:

 - or (b) that the proponent should submit an EIA with the following modifications-

 - or (c) to reject the project, being contrary to environmental objectives, for the following reasons:

- Dated _____

- Tracking no.____

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

SCHEDULE VIII
[See Regulation 14(2)]

Undertaking

I, (full name and address) as proponent for (name, description and location of project) do hereby solemnly affirm and declare that the conditions of approval and the requirements in the IEE or EIA relating to design and construction, adoption of mitigation and other measures and other relevant matters have been duly complied with in the design and construction of the project.

Signature, name and

designation of proponent
(with official stamp/seal)

Witnesses(full names and addresses)

SCHEDULE IX
(See Regulation 18)
Form of Registers for EC, IEE and EIA projects

<u>S. No.</u>	<u>Description</u>	<u>Relevant Provisions</u>
1	2	3
1.	Tracking number	
2.	Category type (as per Schedules I or II)	
3.	Name of proponent	
4.	Name and designation of contact person	
5.	Name of consultant	
6.	Description of project	
7.	Location of project	
8.	Date of submission of IEE/EIA	
9.	Date of public hearing / technical presentation	
10.	Date of committee of experts for schedule-II projects	
11.	Approval granted (Yes/No)	
12.	Date of approval granted or refused	

**Annex – VII- Sindh Environmental Quality
Standards**



The Sindh Government Gazette

Published by Authority

KARACHI THURSDAY JANUARY 28, 2016

PART-I

GOVERNMENT OF SINDH
SINDH ENVIRONMENT PROTECTION
AGENCY

NOTIFICATION

NO.EPA/TECH/739/2014:- In exercise of the powers conferred under clause (g) of sub-section (1) of section of 6 of the Sindh Environmental Protection Act, 2014, the Sindh Environmental Protection Agency, with the approval of the Sindh Environmental Protection Council, is pleased to establish the following standards:-

1. (1) These Standards may be called the Sindh Environmental Industrial Waste Water, Effluent, Domestic, Sewerage, Industrial Air Emission and Ambient Airs, Noise for Vehicles, Air Emissions for Vehicles and Drinking Water Quality Standards, 2015.

(2) These Standards shall come into force at once.

2. In these Standards, unless there is anything repugnant in the subject or context --

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

(b) "Standards" means the Sindh Environmental Quality Standards.

**SINDH ENVIRONMENTAL QUALITY STANDARDS FOR MUNICIPAL AND
LIQUID INDUSTRIAL EFFLUENTS (mg/l, UNLESS OTHERWISE DEFINED)**

S. No.	Parameter	Standards		
		Into Inland Waters 3	Into Sewage Treatment ⁽⁵⁾ 4	Into Sea ⁽¹⁾ 5
1.	Temperature 40 ⁰ C or Temperature Increase *	≤3 ⁰ C	≤3 ⁰ C	≤3 ⁰ C
2.	pH value (H ⁺)	6-9	6-9	6-9
3.	Biochemical Oxygen Demand (BOD) ₅ at 20 ⁰ C ⁽¹⁾	80	250	80**
4.	Chemical Oxygen Demand(COD) ⁽¹⁾ ..	150	400	400
5.	Total Suspended Solids (TSS)	200	400	200
6.	Total Dissolved Solids (TDS)	3500	3500	3500
7.	Oil and Grease	10	10	10
8.	Phenolic compounds (as phenol)	0.1	0.3	0.3
9.	Chloride (as Cl ⁻)	1000	1000	SC***
10.	Fluoride (as F ⁻)	10	10	10
11.	Cyanide (as CN ⁻) total	1.0	1.0	1.0
12.	An-ionic detergents (as MBAS) ⁽²⁾	20	20	20
13.	Sulphate (SO ₄ ²⁻)	600	1000	SC***
14.	Sulphide (S ²⁻)	1.0	1.0	1.0
15.	Ammonia (NH ₃)	40	40	40
16.	Pesticides ⁽³⁾	0.15	0.15	0.15
17.	Cadmium ⁽⁴⁾ ..	0.1	0.1	0.1
18.	Chromium (trivalent and hexavalent) ⁽⁴⁾ ..	1.0	1.0	1.0
19.	Copper ⁽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 3⁰C 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/Nm³, UNLESS
OTHERWISE DEFINED)."**

S. No.	Parameter	Source of Emission	Standards
1	2	3	4
1.	Smoke	Smoke opacity not to exceed	40% or 2 Ringleman Scale or equivalent smoke number
2.	Particulate matter	(a) Boilers and Furnaces	
	(1)	(i) Oil fired	300
		(ii) Coal fired	500
		(iii) Cement Kilns	300

		(b) Grinding, crushing, Clinker coolers and Related processes, Metallurgical Processes, converter, blast furnaces and cupolas.	500
3.	Hydrogen Chloride	Any	400
4.	Chlorine	Any	150
5.	Hydrogen Fluoride	Any	150
6.	Hydrogen Sulphide	Any	10
7.	Sulphur Oxides ^{(2) (3)}	Sulfuric acid/ Sulphonic acid plants	
		Other Plants except power Plants operating on oil and coal	1700
8.	Carbon Monoxide	Any	800
9.	Lead	Any	50
10.	Mercury	Any	10
11.	Cadmium	Any	20
12.	Arsenic	Any	20
13.	Copper	Any	50
14.	Antimony	Any	20
15.	Zinc	Any	200
16.	Oxides of Nitrogen	Nitric acid Manufacturing unit.	3000
	(3)	Other plants except power plants operating on oil or coal:	
		Gas fired	400
		Oil fired	600
		Coal fired	1200

Explanations:-

1. Based on the assumption that the size of the particulate is 10 micron or more.
2. Based on 1 percent Sulphur content in fuel oil. Higher content of Sulphur will ease 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 ($\mu\text{g}/\text{m}^3$) Standards.

Background Air Quality (SO ₂ Basis)	Annual Average	Max. 24-hours Interval	Criterion I Max. SO ₂ Emission (Tons per Day Per Plant)	Criterion II Max. ground level increment to ambient (One year Average)
Unpolluted	<50	<200	500	50
Moderately Polluted*				
Low	50	200	500	50
High	100	400	100	10
Very Polluted**	>100	>400	100	10

* For intermediate values between 50 and 100 $\mu\text{g}/\text{m}^3$ 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 $100\mu\text{g}/\text{m}^3$
(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 I: 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
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(b) For Heavy Duty Diesel Engines and Large Goods Vehicles (g/Kwh)

Type of Vehicle	Category/ 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
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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 1 st 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(SO ₂)	Annual Average*	80 µg/m ³	Ultraviolet Fluorescence method
Oxides of Nitrogen as (NO)	24 hours**	120 µg/m ³	Gas Phase Chemiluminescence
Oxides of Nitrogen as (NO ₂)	Annual Average*	40 µg/m ³	Gas Phase Chemiluminescence
O ₃	24 hours**	40 µg/m ³	Gas Phase Chemiluminescence
	Annual Average*	80 µg/m ³	Gas Phase Chemiluminescence
Suspended Particulate Matters(SPM)	1 hour	130 µg/m ³	Non dispersive UV absorption method
Respirable	Annual Average*	360 µg/m ³	High Volume
Particulate Matter PM10	24 hours**	500 µg/m ³	Sampling (Average flow rate not less than 1 l in 3/minutes)
Respirable	Annual Average*	120 µg/m ³	B Ray absorption method
Particulate Matter PM10	24 hours**	150 µg/m ³	B Ray absorption method
Respirable	Annual Average*	40 µg/m ³ ***	B Ray absorption method
Particulate Matter PM2.5	24 hours**	75 µg/m ³	B Ray absorption method
Lead Pb	Annual Average*	1 µg/m ³	ASS Method after sampling using EPM 2000 or equivalent filter paper
	24 hours**	1.5 µg/m ³	ASS Method after sampling using EPM 2000 or equivalent filter paper
Carbon Monoxide(CO)	8 hours**	5 mg/m ³	Non Dispersive Infra Red(NDIR) method
	1 hours**	10 mg/m ³	Non Dispersive Infra Red(NDIR) method

*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 $40\mu/m^3$ or background annual average concentration plus allowable allowance of $9\mu/m^3$, 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/Acceptable
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		
<i>Essential Inorganic</i>	<i>mg/Litre</i>	<i>mg/Litre</i>
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	
<i>Toxic Inorganic</i>	<i>mg/Liter</i>	<i>mg/Litre</i>	
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 1 st Jan, 2015		Effective from 1 st 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